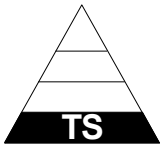

NOT MEASUREMENT SENSITIVE

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DOE HANDBOOK

CHEMICAL MANAGEMENT
(Volume 3 of 3)
Consolidated Chemical User Safety and Health Requirements

U.S. Department of Energy
Washington, D.C. 20585

AREA SAFT

Foreword

Numerous requirements have been promulgated to protect workers, equipment, facilities and the environment. When work is performed, the specific requirements affecting the work must first be identified and incorporated into the work-plan. Because such requirements can number in the thousands, simply identifying all of the applicable chemical safety-related safety and health requirements that govern any work activity can be a monumental task. Concern over this was addressed in the 1994 DOE Chemical Vulnerability Study Management Response Plan, which identified the need for a complex-wide "Roadmap for Requirements". Similarly, discussions within the Energy Facility Contractors Group (EFCOG)/DOE chemical safety community have indicated that one of the main causes of continuing chemical safety deficiencies at DOE is the large number of requirements that govern chemical-related work at the Complex. Many of these requirements approach chemical safety from different perspectives and contain provisions that overlap and are sometimes contradictory and confusing. An EFCOG/DOE Chemical Safety Topical Committee (CSTC) Team, the Chemical User Safety and Health Requirements Roadmap (CUSHR) Team, undertook the task of looking into this issue.

Background

The EFCOG/DOE CSTC CUSHR Team conducted a limited review of how DOE sites address compressed gases. Results showed that at these sites, only 50-70% of requirements were addressed in site documentation of chemical-related safety and health requirements. These results confirmed the view that while all DOE contractors who engage in the same work activities must follow the same requirements, many either do not know which requirements apply to their work or are confused by them. The Team concluded that this was likely due to the fact that multiple requirements from many varied sources frequently overlap, covering the same points in slightly different and sometimes conflicting ways. To assist the sites in understanding and addressing the myriad requirements with which they must comply, the CUSHR Team committed to developing a series of activity-based chapters that consolidate the safety and health requirements that govern DOE chemical-related work activities, removing overlaps and duplications, where found.

Before beginning its work, the Team conducted a Chemical Storage Requirements Pilot in the summer of 2000 to see if this planned effort would be perceived as "value-added" for the DOE community. The pilot document provided consolidated chemical-related safety and health requirements for chemical storage, a universal activity conducted by all that use chemicals throughout the Complex. A listing of consolidated requirements for safe chemical storage, along with a survey was distributed to chemical users across the Complex. The survey results demonstrated that the effort to consolidate requirements will be useful to chemical users throughout the Complex and should continue.

In support of this mandate to assist the sites with a requirements roadmap, the CSTC CUSHR Team developed a series of activity-based chapters which consolidate the safety and health requirements that govern DOE chemical-related work activities. The ten chapters of this document, Volume 3 of the DOE Chemical Management Handbook, coordinate with the subjects covered in that Handbook.

Instructions for Use

This volume consolidates existing core safety and health requirements that all sites engaged in chemical-related activities must follow when applicable and when no exemptions have been granted. It is intended to consolidate overlapping and/or duplicative chemical-related safety and health requirements. It serves

only to **consolidate existing DOE and Federal chemical-related safety and health requirements. It does NOT create any new or additional requirements.**

The listing of consolidated requirements contained here includes "pointers" to the sources of those requirements, showing the user what the requirements are and where each comes from.
In addition to DOE Orders, it includes Occupational Safety and Health Administration (OSHA), National Fire Protection Association (NFPA), American National Standards Institute (ANSI), and Compressed Gas Association (CGA) requirements that are cited in either DOE O 440.1A or in OSHA standard 29CFR1910.6 ("Incorporation by Reference"). It also includes technical standards that are made mandatory by their specific reference within a regulation, rule or DOE Order.

State and local codes including locally adopted building and fire codes are NOT addressed in this document. U.S. Department of Agriculture (USDA) regulations are NOT addressed since the impact from these is considered to be negligible at DOE facilities. Similarly, U.S. Environmental Protection Agency (EPA) pesticide regulations are NOT addressed in this document.

In the web-based version of this document, wherever possible, the referenced requirements are hyperlinked directly to their source documents. For each consolidation, a source document that is repeated is hyperlinked only once. Since ANSI, CGA, and NFPA documents are available only to subscribers to those organizations, the hyperlinks for those referenced requirements will take the reader only to the web pages of those organizations. Subscribers can then access the specific requirements of interest. Non-subscribers may be able to find these documents in their site libraries or can purchase them through the organizations' web pages.

This Requirements Roadmap contains a Glossary of terms and explanatory notes of the various consolidated chemical-related safety and health requirements.

The numerous requirements included in this document come from a large number of sources that have different safety purposes. As a result, some of these requirements may not always be applicable to the work being performed at an individual site or facility. It is the responsibility of each user to determine the applicability of these requirements to their work and how they are implemented. The reference sources for the requirements included in this document can be used to determine the applicability of those requirements to the work being performed. The source requirements are listed to the left of the corresponding section of the document that consolidates the referenced requirements. If there is any question as to the applicability of a requirement or if it is thought that any requirement is taken out of context, then the reader can use the reference sources to research the original requirement.

Due to changing regulatory requirements and revisions to consensus standards the user should contact the subject matter expert (e.g., Fire Protection Engineer, Industrial Safety Engineer, Industrial Hygienist, Environmental Engineer, etc.) to ensure that the most current document is used, as applicable, depending on site contractual requirements.

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ACKNOWLEDGEMENTS

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Glossary

Abandon: leave in place.

Approval: authorization from subject matter experts or the appropriate level of management as defined in local site or facility procedures; or

Approved: acceptable to the authorities having jurisdiction.

CERCLA Hazardous Substance: a substance on the list defined in section 101(14) of CERCLA.

Certain Categories of Property (that Require Special Handling)*:* specific types of hazardous property, the disposition of which is described in 41CFR109-42.11 and 41CFR101-42.1102, such as Radioactively or chemically contaminated property, Asbestos, Polychlorinated biphenyls (PCBs), Controlled substances, Nuclear Regulatory Commission (NRC)-controlled materials, Drugs and reagents other than controlled substances, Lead-containing paint, U.S. ***Munitions List*** (see definition) that require ***demilitarization*** (see definition), etc..

Chemical: any element, compound or mixture of elements and/or compounds. A substance that a) possesses potentially hazardous properties (including, but not limited to flammability, toxicity, corrosivity, reactivity); or b) is included on any federal, state, or local agency regulatory list; or c) is associated with an MSDS and is not an "Article" as defined in 29CFR1910.1200. For the purposes of this document this definition also applies to ***chemical product*** (see definition).

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 will have Material Safety Data Sheets (MSDS) associated with them and include materials such as paints, lubricants, cleaning agents, fuels, etc..

Chemical Storage Area: a location that is segregated by either physical barriers or a distance approved by a Fire Protection Engineer and is used to store any chemical except those that are classified as being ***low hazard*** (see definition). Example 1: If a flammable liquid storage cabinet is in a work area, then the inside of the cabinet is the storage area, not the entire work area. Example 2: Areas used to store chemicals that are of a low hazard are not considered to be chemical storage areas. Types of chemical storage areas include flammable liquid storage areas, oxidizer storage areas, and organic peroxide storage areas.

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

Class I Flammable Liquids: Class 1A, Class 1B, and Class 1C flammable liquids.

Class IA Flammable Liquids: liquids having a flash point less than 73°F and boiling points below 100°F.

Class IB Flammable Liquids: liquids having a flash point less than 73°F and boiling points at or above 100°F.

Class IC Flammable Liquids: liquids having a flash point at or above 73°F and below 100°F.

Class II Combustible Liquids: liquids having a flash point greater than 100°F but less than or equal to 140°F.

Class IIIA Combustible Liquids: liquids having a flash point greater than 140°F but less than or equal to 200°F.

Class 1 Oxidizer: an oxidizer that will not result in spontaneous combustion when it comes into contact with combustible materials, but will slightly increase the burning rate of combustibles that have already been ignited.

Class 2 Oxidizer: an oxidizer that may cause spontaneous ignition when it comes into contact with combustible materials or that will cause a moderate increase in the rate at which a combustible will burn.

Class 3 Oxidizer: an oxidizer that will undergo a vigorous self-sustained decomposition when exposed to contamination or heat or that will cause a severe increase in the rate at which combustibles will burn.

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

Clean-Up Operations: an operation where hazardous substances are removed, contained, incinerated, neutralized, stabilized, cleared-up, or in any other manner processed or handled with the ultimate goal of making the site safer for people and the environment.

Commerce Control List Items[1]: dual use (i.e., commercial/military) items that are subject to export control by the Bureau of Export Administration, Department of Commerce. These items have been identified in the U.S. Export Administration Regulations (15CFR774) as export controlled for reasons of national security, crime control, technology transfer and scarcity of materials.

Commission: the emergency response commission for the State in which the facility is located or the Indian Tribe under whose jurisdiction the facility is located. In the absence of an Emergency Response Commission, the Governor and the chief executive officer, respectively, shall be the commission. Where there is a cooperative agreement between a State and a Tribe, the commission shall be the entity identified in the agreement.

Committee or Local Emergency Planning Committee (LEPC): the local emergency planning committee appointed by the emergency response commission.

[1] The Commerce Control List includes deuterium, heavy water, other compounds of deuterium; nuclear-grade graphite; chemical agents (e.g., tear gas formulation, smoke bombs, and other pyrotechnic articles) having dual military and commercial use; propellants and constituent chemicals (e.g., fine powders of high-purity aluminum, beryllium, iron, magnesium, zirconium, boron or boron carbide); guanidine nitrate; liquid oxidizers (e.g., dinitrogen trioxide, nitrogen dioxide/ dinitrogen tetroxide, dinitrogen pentoxide); certain alloys and polymer composites; high purity (99.99% or greater) bismuth; hafnium metal and alloys (>60%Hf); helium-3; chlorine trifluoride; precursors for toxic chemical agents, etc..

Confined Space: any space not intended for continuous human occupancy and having a limited means of egress. A permit-required confined space contains or has the potential for a hazardous atmosphere (toxic, flammable, or oxygen deficient) and/or engulfment or entrapment hazards. Confined or enclosed spaces include, but are not limited to, storage tanks, process vessels, bins, boilers, ventilation or exhaust ducts, sewers, underground utility vaults, tunnels, pipelines, and open top spaces more than 4 feet in depth such as pits, tubs, vaults, and vessels.

Controlled Substances: a drug or other substance, or immediate precursor, included in Schedule I, II, III, IV or V of Part B of Title 21USCS Section 812. The term does not include spirits, wine, malt beverages or tobacco, as those terms are defined ot used in subtitle E of the Internal Revenue Code of 1954 [26 USCS Sections 5001, et seq.]

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

Dangerous Property: material that exists in a condition that poses a hazard to public health or safety and thus, requires special care and handling.

Decontamination: the removal of hazardous substances from employees and their equipment to the extent necessary to preclude the occurrence of foreseeable adverse health effects.

Demilitarization: as defined by the Department of Defense, the act of destroying the military capabilities inherent in certain types of equipment or material. Such destruction may include deep sea dumping, mutilation, cutting, crushing, scrapping, melting, burning, or alteration so as to prevent the further use of the item for its originally intended purpose.

Disposal: the discharge, deposit, injection, dumping, spilling, leaking, or placing of any solid waste or hazardous waste into or on any land or water so that such solid waste or hazardous waste or any constituent thereof may enter the environment or be emitted into the air or discharged into any waters, including ground waters.

Disposition: the process of reutilizing, transferring, donating, selling, abandoning, destroying, or other disposition of Federal government-owned personal property (i.e., chemicals and chemical products).

DOE Screening Period: the period of time that reportable ***excess chemicals*** (see definition) are screened throughout the DOE complex for reutilization purposes.

Donee: any of the eligible entities that receive Federal surplus personal property (i.e., chemicals) through a ***State Agency for Surplus Property*** (see definition), for example, a ***public agency*** (see definition), a nonprofit tax-exempt educational or public health institution, or a State or local government agency.

Departmental Property Management Officer*:* also designated as the DOE National Utilization Officer who provides approval for user access to the ***Federal Disposal System (FEDS)*** (see definition).

Dual-use List*[2]*: a list of nuclear-related material, equipment, software, and related technology, that can have valid uses in both commercial and military applications, developed by the ***Nuclear Suppliers Group*** (see definition) and described in the International Atomic Energy Agency (IAEA) Information Circular (INFCIRC) 254 Part 2.

Energy Asset Disposal System: a module within the ***Federal Disposal System (FEDS)*** (see definition) database, available to DOE and DOE contractor personnel to conduct internal screening of excess chemicals for use within the agency; it became effective Sept. 1, 1998. *[NOTE: EADS has replaced the Reportable Excess Automated Property System (REAPS) mentioned in 41CFR109-43.304-1.50]*.

Environmental Management System: The environmental policy, environmental performance, objectives and targets, implementing program to achieve those objectives, monitoring and measuring of program effectiveness, environmental problem correction, and continuous improvement process that helps a company manage, measure, and improve the environmental aspects of its operations.

Environment: includes water, air, and land and the interrelationship that exists among and between water, air, and land and all living things.

Especially Designed or Prepared Property: equipment and material designed or prepared especially for use in the nuclear fuel cycle and described in the ***Nuclear Suppliers Group*** (see definition) ***Trigger List*** (see definition) (INFCIRC 254 Part 1). ***Especially Designed or Prepared Property*** is a category under ***High Risk (Personal) Property*** (see definition).

Excess Chemicals: Chemicals (see definition) or ***Chemical Products*** (see definition) that are still in good condition and for which the current owner has no further use. This does not include spent/used material. *[NOTE: This term is used in DOE-PMR and FPMR to mean chemicals that are excess to a* ***holding agency*** *(see definition), such as DOE, that can only be reutilized within the same agency or by another federal agency]*. It includes chemicals identified as ***high risk personal property***, ***hazardous property***, ***hazardous materials***, ***extremely hazardous materials***, hazardous items, and ***certain categories of property that require special handling*** (see definitions).

Excess (Personal) Property: any personal property under the control of any Federal agency (the DOE, for purposes of this document) that is no longer required for that agency's needs, as determined by the agency head or designee.

Excluded PCB products: materials containing 0 through 49 ***ppm*** (see definition) ***PCB*** (see definition).

Export Controlled Property: property, the export of which, is subject to licensing by the U.S. Department of Commerce, the U.S. Department of State, the U.S. Nuclear Regulatory Commission, or is authorized by the U.S. Department of Energy. ***Export Controlled Property*** is

[2] The Dual-use List includes several metals (e.g., beryllium, and zirconium) and their alloys, and certain high explosives.

a category under ***High Risk (Personal) Property*** (see definition). Refer to the ***Commerce Control List*** (see definition) for items that are export controlled.

Extremely Hazardous Materials: (a) those materials that are hazardous to the extent that they generally require special handling such as licensing and training of handlers, protective clothing, and special containers and storage; (b) those materials that, because of their extreme flammability, toxicity, corrosivity or other perilous qualities, could constitute an immediate danger or threat to life and property and that usually have specialized uses under controlled conditions; and (c) those materials that have been determined by the ***holding agency*** (see definition) to endanger public health or safety or the environment, if not rendered innocuous before release to other agencies or to the general public.

Extremely Hazardous Substance: a substance listed in appendices A and B of 40CFR355.

Federal Disposal System: a real-time, online computer database managed by the GSA (since 1992) for recording, tracking and controlling the nationwide inventory of excess and surplus personal property inventory (e.g., equipment, commodities, including chemicals) of the Federal government. For additional information on using FEDS, access http://pub.fss.gsa.gov/property/.

Fire Area: an area in a building that is separated from the rest of the building by a one- hour fire barrier. All penetrations through this fire barrier must be constructed to maintain the one-hour fire resistance.

First Responder - Awareness Level: individuals who are likely to witness or discover a hazardous substance release and who have been trained to initiate an emergency response sequence by notifying the proper authorities of the release. They are temporarily in command of the incident until the Incident Commander (IC) arrives. They would take no further action beyond notifying the authorities of the release.

First Responder - Operations Level : individuals who respond to releases or potential releases of hazardous substances as part of the initial response to the site for the purpose of protecting nearby persons, property, or the environment from the effects of the release. They are trained to respond in a defensive fashion without actually trying to stop the release. Their function is to contain the release from a safe distance, keep it from spreading, and prevent exposures.

Flammable Liquids Storage Rooms: rooms that are designed according to 29CFR1910.106 (d)(4) for the storage of flammable and combustible liquids.

Flammability Rating of "0" or "1": liquids, solids or semi-solids that have a flash point above 200°F or those materials which will not burn when exposed to a temperature of 1500°F for 5 minutes.

Friable Asbestos Materials: materials that contain more than one percent asbestos by weight and that can, by hand pressure, be crumbled, pulverized, or reduced to powder, thus allowing for potential release of asbestos fibers into the air.

Foreseeable Emergency: any potential occurrence such as, but not limited to, equipment failure, rupture of containers, or failure of control equipment which could result in an uncontrolled release of a hazardous chemical into the workplace.

Hazard: potential for radiation, a chemical, biological agent or other pollutant that causes human illness or injury.

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 weaknesses in design or operation of the facility that could lead to accidents.

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

Hazard Control: the management actions or physical measures 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 (5) administrative limits or operational restrictions.

Hazardous Material: property that is deemed a hazardous material, chemical substance or mixture, or hazardous waste under the Hazardous Materials Transportation Act (HMTA), the Resource Conservation and Recovery Act (RCRA), or the Toxic Substances Control Act (TSCA).[3] Generally, a hazardous material has one or more of the following characteristics:

(a) has a flash point below 200°F (93.3°C), closed cup, or is subject to spontaneous heating;
(b) is subject to polymerization with the release of large amounts of energy when handled, stored, or shipped without adequate controls;
(c) in the course of normal operations, may produce fibers, dusts, gases, fumes, vapors, mists, or smokes which have one or more of the following characteristics:
    (1) causes 50 percent fatalities to test animals below 500 mg/kg of test animal weight when a single oral dose is used (LD50);
    (2) is a flammable solid or a strong oxidizing or reducing agent;
    (3) causes first degree burns to skin in a short time exposure, or is systemically toxic by skin contact;
    (4) has a permissible exposure limit (PEL) below 1000 ppm for gases and vapors, below 500 mg/mm^3 for fumes, below 10 mg/m^3 or 2 $fibers/cm^3$ for dust;
    (5) causes occupational chemical dermatitis, which is any abnormality of the skin induced or aggravated by the work environment that includes, but is not limited to, primary irritant categories, allergic sensitizers, and photo sensitizers;
(d) is radioactive to the extent that it requires special handling;
(e) is a recognized carcinogen according to Occupational Safety and Health Administration (OSHA) regulations at 29CFR1910; or
(f) possesses special characteristics, which in the opinion of the ***holding agency*** (see definition), could be hazardous to health, safety, or the environment if improperly handled, stored, transported, disposed of, or otherwise improperly used.

Hazardous Materials Branch Officer: responsible for directing and coordinating all hazardous materials operations assigned by the incident commander.

[3] Also see the National Oil and Hazardous Substances Pollution Contingency Plan, 40CFR302.4, for listing of Hazardous Substances.

Hazardous Materials Regulations: Department of Transportation (DOT) Title 49 Code of Federal Regulations (CFR) Parts 106-199.

Hazardous Materials Specialists: individuals who respond with and provide support to hazardous materials technicians. Their duties parallel those of the hazardous materials technician; however, those duties require a more directed or specific knowledge of the various substances they may be called upon to contain. The hazardous materials specialist also serves as the site liaison with Federal, state, local and other government authorities as regards site activities.

Hazardous Materials Technicians: individuals who respond to releases or potential releases for the purpose of stopping the release. They assume a more aggressive role than a first responder at the operations level in that they will approach the point of release in order to plug, patch or otherwise stop the release of a hazardous substance.

Hazardous Operations: includes process operations that are subject to regulatory actions because of the presence of one or more specific hazardous materials or types of materials that meet or exceed established thresholds or guidelines. These include operations with chemicals governed by:

- 29CFR1910.119, "Process Safety Management of Highly Hazardous Chemicals" or 40CFR68.67, "Chemical Accident Prevention Provisions-Process Hazards Analysis;"
- hazard category 1, 2, or 3 nuclear operations as defined in 10CFR830, "Nuclear Safety Management;"
- operations with Beryllium as defined by 10CFR850;
- facilities with "significant" fire hazards as defined by DOE O 420.1A;
- hazardous waste operations as defined in 29CFR1910.120, "Hazardous Waste Operations and Emergency Response;" and
- activities subject to NEPA environmental assessment or environmental impact statements as defined in 10CFR1021.400.

Hazardous (Personal) Property: any personal property, including ***scrap*** (see definition) or waste but excluding property involving a radiological hazard, that is ignitable, corrosive, reactive, or toxic because of its quantity, concentration, or physical, chemical, or infectious characteristics, or that is deemed a hazardous material, chemical substance or mixture, or hazardous waste under the Hazardous Material Transportation Act (HMTA) (49 U.S.C. 5101), the Resource Conservation and Recovery Act (RCRA) (42 U.S.C. 6901-6981), or the Toxic Substances Control Act (TSCA) (15 U.S.C. 2601-2609). Such property may be in solid, liquid, semi-liquid, or contained gas form and may cause or significantly contribute to an increase in mortality or illness, or pose present or potential hazard to human health or the environment when improperly used, treated, stored, transported, disposed of, or mismanaged. ***Hazardous (Personal) Property*** is a category under ***High Risk (Personal) Property*** (see definition).

Hazardous Substance: for the purposes of this document, as defined in 29CFR1910.120: "…A) any substance defined under section 101(14) of CERCLA; B) any biologic agent and other disease causing agent which after release into the environment and upon exposure by ingestion, inhalation, or assimilation by any person, either directly from the environment or indirectly by ingestion through food chains, will or may reasonably be anticipated to cause death, disease, behavioral abnormalities, cancer, genetic mutation, physiological malfunctions (including malfunctions in reproduction) or physical deformations in such persons or their offspring; C) any

substance listed by the U.S. Department of Transportation as hazardous materials under 49CFR172.101 and appendices; and D) hazardous waste either as a waste or combination of wastes as defined in 40CFR261.3, or those substances defined as hazardous wastes in 49CFR171.8….".

Hazardous Waste[4]: those materials or substances, the handling and disposal of which are governed by 40CFR261, 29CFR1910.120, and 29CFR1926.65.

High Risk (Personal) Property[5]: property that, because of its potential impact on public health and safety, the environment, national security interests, or proliferation concerns, must be controlled, and dispositioned in other than the routine manner. The categories of high risk property are (1) Especially designed or prepared property, (2) Export controlled property, (3) Proliferation-sensitive property, (4) Nuclear weapon components or weapon-like components, (5) Hazardous property, (6) Automatic data processing equipment, (7) Export controlled information, (8) Radioactive property, (9) Special nuclear material, and (10) Unclassified controlled nuclear information.

Holding Agency: the Federal agency having accountability for, and generally possession of, the chemicals involved.

Incident Commander: assumes control of the incident scene.

Inside Liquid Storage: a location inside a building that is segregated by either physical barriers or a distance approved by a Fire Protection Engineer and is used to store any liquid chemical except those that are classified as being ***low hazard*** (see definition); a room or building used for the storage of liquids in containers or portable tanks, separated from other types of occupancies.

Inside room: a room totally enclosed within a building and having no exterior walls.

Internal Screening Period: See ***DOE Screening Period*** (definition).

Labeling: a descriptive name, identification number, instructions, cautions, etc. to be placed directly on the primary container of hazardous materials.

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[4] The definition for hazardous waste, as given in 41CFR101-42.001, includes the following caveats:

(a) In general, hazardous materials (see definition) are hazardous wastes when one or both of the following is true:
   1. they have passed through the disposition cycle without having been successfully reutilized, transferred, donated, or sold, and the holding agency declares an intent to discard them.
   2. they are no longer usable for their intended purpose, a valid alternate purpose, or resource recovery.

(b) In general, solid (non-hazardous) wastes, as defined at 40CFR261.2, become hazardous wastes when:
   1. they exhibit one or more of the characteristics of ignitability, corrosivity, reactivity, or EP (Extraction Procedure) toxicity; or
   2. they are predetermined hazardous wastes upon generation as listed in 40CFR261, Subpart D.

[5] Excess chemicals identified as high risk personal property are most likely to belong to category (5), (2) or (3).

Laboratory units: for a complete overview of laboratory units and their definition, see NFPA 45, Fire Protection for Laboratories Using Chemicals.

LC_{50}: the concentration of a vapor or gas that will kill 50% of a test population. Exposure periods are typically for one hour unless otherwise stated.

Low Hazard Chemicals[6]: chemicals that have an NFPA flammability rating of "0" or "1"; a health hazard rating of "0" or "1"; a reactivity rating of "0"; and no special hazard rating such as "oxidizer", "water reactive", or "hazardous polymerization" per NFPA 704, Identification System for Fire Hazards of Materials.

Marking: a descriptive name, identification number, instructions, cautions, weight, specification, or UN marks, or combinations thereof, required on outer packaging of hazardous materials.

MSDS[7]: Material Safety Data Sheet.

Munitions List[8]: articles, services, and related technical data designated as defense articles and defense services by the Arms Export Control Act of 1968, as amended. Items are listed in the International Traffic in Arms Regulation (ITAR) (22CFR121), published by the U.S. Department of State.

nCi/g: Nanocuries per gram.

NFPA Health Hazard Rating of "3" (for a gas): per NFPA 704, "Identification of the Hazards of Materials for Emergency Response", any gas whose ***LC_{50}*** (see definition) for acute inhalation toxicity is greater that 1000 ppm but less than or equal to 3000 ppm.

NFPA Health Hazard Rating of "4" (for a gas): per NFPA 704, "Identification of the Hazards of Materials for Emergency Response", any gas whose LC_{50} for acute inhalation toxicity is less than or equal to 1000 ppm.

No Commercial Value: an item has "no commercial value" when it has neither utility nor monetary value, as an item or as ***scrap*** (see definition).

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[6] **Low Hazard Chemical**: This definition refers to the NFPA 704 hazard identification numbers, which includes information on how to use them to determine if a chemical is a "low hazard" chemical. A well-developed set of criteria is needed in order to determine appropriate ratings for those chemicals that have not been rated. Criteria for these ratings have been well defined in NFPA 704. Those criteria can be used to determine hazard ratings for chemicals that have yet to be evaluated. (While other rating systems exist, none is as well- accepted nor does any have criteria that are as well defined for the evaluation of chemicals as does the NFPA 704 system.) It should be noted, however, that NFPA 704 criteria are developed for acute exposures only. Chronic effects, such as carcinogenicity, should be factored into any evaluation when determining health ratings. Information concerning chronic health hazards can be found in numerous resources such as Tomes®, the ACGIH "Guide to Occupational Exposure Threshold Limit Values", and the NIOSH "Pocket Guide to Chemical Hazards".

[7] **Material Safety Data Sheets (MSDS):** 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 the material is hazardous or not.

[8] The U.S. Munitions List includes military explosives, propellants, toxicological agents, etc.

Non-Appropriated Fund Property: property (i.e., chemicals) procured without the use of Federal government funds.

Nonfriable Asbestos Materials: materials that contain asbestos which is bonded or otherwise rendered unavailable for release into the atmosphere through normal usage and that cannot, when dry, be crumbled, pulverized, or reduced to powder by hand pressure. However, cutting, sanding, crushing, or performing some other disruptive action on items containing nonfriable asbestos can release asbestos fibers into the air.

Nuclear Suppliers Group: a select group of nuclear supplier countries dedicated to nuclear nonproliferation that establishes the ***Trigger List*** (see definition) and ***Dual-use List*** (see definition) in formulating guidelines for the export of nuclear materials, equipment and technology and for the transfer of nuclear-related dual-use nuclear equipment, materials, software and related technology, respectively.

Ozone Depleting Substances: Certain chemical substances that, Public Law 101-549, the Clean Air Act Amendments of 1990 identifies as those chemicals, the use of which are 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.

ODS, Class I Substance: any substance designated as class I by EPA pursuant to 42 U.S.C. 7671(a), including, but not limited to, chlorofluorocarbons, halons, carbon tetrachloride and methyl chloroform.

ODS, Class II Substance: any substance designated as class II by EPA pursuant to 42 U.S.C. 7671(a), including, but not limited to, hydrochlorofluorocarbons.

Onsite: 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.]*

Operational Emergencies: include the spectrum of significant emergency events or conditions that involve or affect facilities and activities by causing or having the potential to cause serious health and safety impacts onsite or offsite to workers or the public, serious detrimental effects on the environment, direct harm to people or the environment as a result or degradation of security or safeguards conditions or release (or loss of control) of hazardous materials.

Oxidizer: as per 29CFR1910.1200, a chemical other than a blasting agent or explosive as defined in 29CFR1910.109(a), that initiates or promotes combustion in other materials, thereby causing fire either of itself or through the release of oxygen or other gases.

Outdoor Storage Locker: a moveable, prefabricated structure, manufactured at a site other than the final location of the structure and transported completely assembled or in a ready to assemble package to the final location. It is intended to meet local, state, and federal requirements for the outside storage of hazardous materials.

PCB Items: materials containing 50 through 499 ppm PCB.

Personal Property: property of any kind, except for real estate and interests therein (such as easements and rights-of-way), and permanent fixtures which are Federal government-owned, chartered, rented, or leased from commercial sources by, and in the custody of, DOE or its designated contractors; source, byproduct, special nuclear materials, and atomic weapons as defined in section 11 of the Atomic Energy Act of 1954 (42 U.S.C. 2014), as amended; and petroleum in the Strategic Petroleum Reserve and the Naval Petroleum Reserves. For purposes of this document, personal property means chemicals/chemical products.

Pollution Prevention: any action that reduces or eliminates the generation of waste, the release of pollutants to the environment, and the use of certain ODSs.

Polychlorinated biphenyls: a class of chlorinated aromatic compounds that is hazardous to human health and the environment. *[NOTE: In 41CFR101-42.1102-2, the same acronym "PCBs" is used to mean substances containing polychlorinated biphenyls at a concentration of 500 ppm or greater.]*.

Precious Metals: a term that refers to gold, silver, and the platinum group metals -- platinum, palladium, rhodium, iridium, ruthenium and osmium.

Process Hazard Analysis: hazard evaluation as defined in 29CFR1910.119, "Process Safety Management of Highly Hazardous Chemicals", subsection (e).

Process Safety Management (PSM): the application of management principles, methods, and practices to prevent and control accidental releases of process chemicals or energy.

Proliferation-sensitive Property: nuclear-related or dual-use equipment, material, or technology as described in the ***Nuclear Suppliers Group*** (see definition) ***Trigger List*** (see definition) and ***Dual-use List*** (see definition), or equipment, material or technology used in the research, design, development, testing, or production of nuclear or other weapons. ***Proliferation-sensitive Property*** is a category under ***High Risk (Personal) Property*** (see definition).

Property Act: the Federal Property and Administrative Services Act of 1949 (63 Stat. 377), as amended (codified, as amended, in various sections of Titles 40 and 41 of the United States Code), the law that centralized Federal property management and disposition functions under the GSA.

Public Agency: any State, political subdivision thereof, including any unit of local government or economic development district; any department, agency, or instrumentality thereof, including instrumentalities created by compact or other agreement between States or political subdivisions; multi-jurisdictional sub-state districts established by or pursuant to State law; or any Indian tribe, band, group, pueblo, or community located on a State reservation.

Public Body: any department, agency, special purpose district, or other instrumentality of a State or local government; any Indian tribe; or any agency of the Federal government.

Regulated Area: an area where entry and exit is restricted and controlled.

Release: any spilling, leaking, pumping, pouring, emitting, emptying, discharging, injecting, escaping, leaching, dumping, or disposing into the environment (including the abandonment or

discarding of barrels, containers, and other closed receptacles) of any chemical, ***extremely hazardous substance*** (see definition), or CERCLA hazardous substance.

Reportable Excess Property: excess property that is reportable to the GSA by the ***holding agency*** (see definition) on Standard Form 120, excluding ***Hazardous Waste*** (see definition), ***Extremely Hazardous Property*** (see definition), ***Scrap*** (see definition), Controlled substances, Chemicals determined to be appropriate for abandonment or destruction, Nuclear-related and ***Proliferation-sensitive Property*** (see definition), National security-sensitive property, NRC-controlled materials, etc. Reportable excess property includes non-hazardous chemicals, drugs and reagents other than controlled substances; nonfriable asbestos materials, excluded PCB products (i.e., those containing less than 49 ppm PCBs), etc..

Reportable Property: excess or surplus property that is reportable to the GSA by the ***holding agency*** (see definition) or receiving organization on an appropriate Standard Form to effect a disposition transaction or to initiate the next phase of screening.

Resource Conservation and Recovery Act (RCRA): the Solid Waste Disposal Act, as amended by the Resource Conservation and Recovery Act of 1976, as amended, 42 U.S.C. section 6901 et seq..

Safety Can: approved container of not more than five (5) gallon capacity having a spring closing lid and a spout cover and so designed that it will safely relieve internal pressure when subjected to fire exposure.

Safety Officer (designated as Hazardous Materials Branch Safety Officer in NFPA regulations): ensures that recognized safe practices are followed and provides other technical safety advice as needed.

Scrap: property that has no value except for its basic material content.

Screening Period: the period in which excess or surplus personal property is made available for excess transfer or surplus donation to eligible recipients.

Segregated warehouse: a separated or detached building used specifically for warehousing-type operations.

Senior Program Official or Designee: controls the acquisition and production of heavy water for a given program.

Shelf-Life: the length of time an age-sensitive material can be stored under prescribed conditions and can still confidently retain its properties such that it will function as intended when being put into service.

Shelf-Life Item: any item that deteriorates over time or has unstable characteristics such that a storage period must be assigned to assure the item is issued within that period to provide satisfactory performance. Management of such items is governed by 41CFR101-27.2, and by DOD instructions, for executive agencies and DOD respectively.

Sprinklered Area: an area that has an overhead system designed and installed according to NFPA 13, "Standard for the Installation of Sprinkler Systems" to spray water down from sprinkler heads during a fire.

Standard Form: used for implementing a disposition action or for reporting purposes.

State Agency for Surplus Property (SASP): the agency designated under State law to receive Federal surplus personal property for distribution to eligible ***donees*** (see definition) within the State as provided for in subsection 203(j) of the Property Act (40 U.S.C. 484(j)).

Storage: a chemical(s) set aside for future use or safekeeping or an inventory of compressed or liquefied gases in containers that are not in the process of being used, examined, serviced, refilled, loaded, or unloaded.

Surplus Chemicals: any excess chemicals that remain with the facility after having undergone internal screening for reutilization within the DOE complex as well as excess screening for transfer to another Federal Agency.

Surplus Property (Surplus): excess personal property no longer required by the Federal agencies as determined by GSA.

Surplus Release Date: the date on which screening of excess chemicals for Federal use is completed and the chemicals are not needed for any Federal use. On that date, excess chemicals become surplus and are eligible for donation to non-federal recipients.

Suspect (Property): any material or property that cannot be guaranteed, without further evaluation, of being free from chemical or radioactive contamination.

Superfund or Superfund Act: common name for CERCLA (Comprehensive Environmental Response, Compensation, and Liability Act of 1980, as amended).

System: piping, pumps and/or containers that are attached together so that the collection can perform some specific function.

Threshold planning quantity (TPQ): the minimum amount of a substance present at a site at which notification is required under 40CFR355. TPQs are listed in appendices A and B of that regulation**.**

Threshold Quantity (TQ): the minimum amount of a toxic, reactive, or flammable chemical judged by OSHA as capable of causing a catastrophic event. The threshold quantity triggers application of the PSM Rule's requirements.

Toxic gas: any gas that has a National Fire Protection Association (NFPA) ***health hazard rating of 3 or 4*** (see definition) per NFPA 704, Identification System for Fire Hazards of Materials.

Transuranic Waste: Transuranic waste (TRU waste) contains alpha-emitting radionuclides with the following characteristics: atomic number greater than 92, half-life greater than 20 years, concentrations greater than 100 *nCi/g* (see definition.).

Trigger List*[9]*: a compilation of Nuclear materials, equipment, and related technology developed by the ***Nuclear Supplier Group*** (see definition) and maintained by the International Atomic Energy Agency (IAEA), as Information Circular INFCIRC 254, Part 1. Items on this list "trigger" the imposition of International Atomic Energy Agency safeguards.

Type I Items: non-extendable shelf-life items that have a definite storage life after which the item or material is considered to be no longer usable for its primary function and should be discarded. Examples of Type I items include drugs and medicines with certain characteristics, and ***unstable/reactive chemicals*** (see definition).

Type II Items: extendable shelf-life items for which successive re-inspection dates can be established when the items or materials have a continued usability as determined by examination based upon criteria that have been agreed upon. Examples of Type II items include paints, coatings and inks.

UL Listed: listed by the Underwriter's Laboratory to indicate special construction requirements have been met.

Universal Waste: any of the following hazardous wastes that are managed under the universal waste requirements of 40CFR273: (1) Batteries as described in 40CFR273.2; (2) Pesticides as described in 40CFR273.3; (3) Thermostats as described in 40CFR273.4; and (4) Lamps as described in 40CFR273.5.

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. Such chemicals may also be identified as ***Type I items*** (see definition). Examples include explosives, reactive monomers, and peroxide formers that produce unstable highly friction-sensitive or shock-sensitive peroxides, etc..

Upright Position: the position a cylinder is in when the valve is located at a position higher than any other on the tank.

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.

[9] The Trigger List includes nuclear grade graphite, deuterium and heavy water.

Acronyms and Abbreviations

ACGIH: American Conference of Governmental Industrial Hygienists.

AL: Acquisition Letter.

ANSI: American National Standards Institute.

ATF: Bureau of Alcohol, Tobacco and Firearms.

CERCLA: the Comprehensive Environmental Response, Compensation and Liability Act of 1980 (also known as "Superfund"), as amended.

CGA: Compressed Gas Association.

CFR: Code of Federal Regulations.

CSA: Controlled Substances Act

LEPC: Committee or Local Emergency Planning Committee.

CRD*:* Contractor Requirements Document.

DOD: U.S. Department of Defense.

DOE: U.S. Department of Energy.

DOE-PMR: Department of Energy Property Management Regulations, 41CFR109.

DOT: U.S. Department of Transportation.

DPMO: Departmental Property Management Officer.

EADS: Energy Asset Disposal System.

EMS: Environmental Management System.

EO: Executive Order.

EPA: U.S. Environmental Protection Agency.

EPCRA: Emergency Planning and Community Right-To-Know Act of 1986, Title III of the Comprehensive Environmental Response, Compensation, and Liability Act (CERCLA)/Superfund Act of 1980.

FEDS: Federal Disposal System.

FM: Factory Mutual.

FMR: Federal Management Regulation, (Title 41, Subtitle C), 41CFR102.

FPMR: Federal Property Management Regulations, (Title 41, Subtitle C), 41CFR101 to 200.

FSC: Federal Supply Classification (as described in the Federal Standard 313).

GSA: General Services Administration.

HAZMAT: Hazardous Materials Response Team.

HMIS: Hazardous Material Information System, sponsored and maintained by the Department of Defense.

HSWA: The Hazardous and Solid Waste Amendments of 1984 to RCRA.

IC: Incident Commander.

ICS: Incident Command System.

ISMS: Integrated Safety Management System.

LEPC: local emergency planning committee.

MSDS[10]: Material Safety Data Sheet.

NFPA: National Fire Protection Association.

NIOSH: National Institute for Occupational Safety and Health.

NNSA: National Nuclear Security Administration.

NRC: Nuclear Regulatory Commission.

ODS: Ozone Depleting Substances.

OPMO: Organizational Property Management Officer.

OSHA: Occupational Safety and Health Administration.

P2: Pollution Prevention.

PCBs: polychlorinated biphenyls.

PHA: Process Hazard Analysis.

[10] **Material Safety Data Sheets (MSDS):** 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 the material is hazardous or not.

RCRA: Resource Conservation and Recovery Act.

ROI: Return-On-Investment.

SARA: Superfund Amendments and Reauthorization Act of 1986 (see definition).

SASP: State Agency for Surplus Property (see definition).

SF: Standard Form.

TBD: to be determined at a later date.

TRU: Transuranic Waste.

TSCA: Toxic Substances Control Act (15 U.S.C. 2601 – 2692).

USC: United States Code.

USCS: United States Code Service

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Chapter 1 - Hazard Analysis

1.0 Introduction

This chapter identifies and consolidates existing user safety and health requirements found in DOE and Federal chemical-related safety and health regulations and National Standards that address hazard analysis of activities involving ***chemicals*** (see definition) and ***chemical products*** (see definition). State and local codes and requirements are NOT included. This chapter specifically consolidates requirements found in the National Fire Protection Association (NFPA), the American National Standards Institute (ANSI), the Compressed Gas Association (CGA), the Occupational Safety and Health Administration (OSHA), and certain Environmental Protection Agency (EPA) regulations and Department of Energy (DOE) Rules and Orders, including technical standards that are made mandatory by their specific reference within a regulation, rule or DOE Order.

This chapter is intended to list chemical-related safety and health requirements and to consolidate those that are overlapping and/or duplicative. The list of requirements includes "pointers" to the sources of those requirements.

This document does NOT create any new or additional requirements.

2.0 Applicability

The information presented here applies to all locations that use chemicals or chemical products. *[NOTE: Throughout this document, the term "chemicals" is used to indicate chemicals and/or chemical products as described in Section 3, below.]* This chapter is intended only to address safety and health-related hazard and risk analysis requirements applicable to chemical user activities. It consolidates existing, core safety and health requirements that all sites must follow when engaged in chemical-related activities.

The requirements included in this chapter come from sources that have different safety purposes. As a result, some of these requirements may not always be applicable to the work being performed at an individual site or facility. It is the responsibility of each user to determine the applicability of specific requirements to their work and how they are implemented. The reference sources for the requirements included in this chapter can be used to determine the applicability of those requirements to the work being performed.

3.0 Definitions and Acronyms

See **Glossary.**

4.0 Requirements for Chemical Hazard Analysis

Sources[11]	Consolidated Requirements [12]

[11] Hyperlinks to ANSI, CGA, and NFPA requirements provided here are for general information only, as they require user subscription to a prescribed service in order to access these organizations' source requirements.
[12] PL 91-596, section 6(a), the General Duty Clause of the Occupational Safety and Health Act of 1970, requires employers to protect their employees from all recognized hazards in the workplace and is a general requirement applicable to all operations/activities involving chemicals.

Sources[11]	Consolidated Requirements [12]
	4.1 General (Applicable to all operations/activities involving chemicals)
ANSI Z49.1, 3.2.2.2; **CGA P-1, 4.1;** **DOE 440.1A , 4(i);** **NFPA 30, 5.2;** **NFPA 45, 7.1;** **NFPA 45, 7.2.1.1,** **NFPA 430, 2.-1.1;** **NFPA 432, 4.7.1;** **10CFR835.204(d)(2);** **29CFR1910.106(e)(8);** **29CFR1910.146(c)(1)-(d)(2);** **29CFR1910.1450(e)(3);** **48CFR970.5204-2(c)(2)[13]**	**4.1.1** Hazards associated with all activities involving chemicals that could put the employee at risk of injury or illness shall be evaluated. Those activities include, but are not limited to a) design of new facilities or modification of existing facilities and equipment, b) operations and procedures and c) equipment, products and services that are selected or purchased. *[NOTE: Numerous other substance-specific hazard analysis requirements can be found in 29CFR1910, Subpart Z]*
DOE O 440.1A, Attachment 1 (1)(b)(2)(d) and Attachment 2 (14)(a)(4); **NFPA 430, 2.1.1;** **NFPA 430, 2.10.1;** **NFPA 432, 4.7.1;** **29CFR1910.132(d)(2)**	**4.1.1.1** The results of the hazard analysis shall be documented and approved by the appropriate safety official or manager.
ANSI Z49.1, 3.2.1.2; **ANSI Z49.1, 3.2.1.3;** **ANSI Z49.1, 3.2.1.5;** **CGA P-1, 4.1;** **NFPA 45, 7. 1;** **NFPA 430, 2.7.1;** **NFPA 432, 4.2;** **29CFR1910.1200(h)(1);** **29CFR1910.1450(f)(1) and (f)(4)(i)(B) and (f)(4)(i)(C);** **29CFR1926.21(b)(2)**	**4.1.2** Before beginning work, employees shall be informed of the hazards present in their work area.

[13] This requirement of the DOE Acquisition Regulations (DEAR, ES&H Clause) requires an identification and evaluation of hazards associated with work, as part of an overall documented safety management system.

Sources[11]	Consolidated Requirements [12]
	4.2 *Hazardous Operations*[14] (see definition)
DOE O 151.1A, Attachment, Chap. IV, 3(a)(1); **DOE O 420.1A, 4.2.1 (5);** **10CFR830, Subpart B;** **10CFR850.21(a);** **10CFR1021.400;** **29CFR1910.119(e);** **29CFR1910.120(c)(1);** **40CFR68.50;** **40CFR68.67(a);** **40CFR1502.14**	**4.2.1** Hazardous processes shall be analyzed for possible natural and man-made events that could lead to or result in a loss of control of hazardous materials
DOE-STD-1120-98; **DOE-STD-3009-94;** **DOE-STD-3011-94;** **DOE-STD-3016-99;** **DOE O 460.1A;** **DOE O 460.1B** *[NOTE: This order, issued on 4/4/2003, cancels the DOE O 460.1A]***;** **10CFR830.7;** **10CFR830 Subpart B, 204(a) and (b);** **29CFR1910.119(e)(2);** **40CFR68.67(b);** **40CFR1502.24**	**4.2.1.1** Hazard analysis techniques shall be selected and used that are appropriate for the hazards and complexities of work processes being analyzed
DOE-STD-1027-92; **10CFR830 Subpart B, Part202(b)(3);** **29CFR1910.119(d);** **29CFR1910.120(c)(3);** **40CFR68.65;** **40CFR1502.15**	**4.2.1.2** Process information relevant to the hazard analysis, such as energy sources and hazardous materials, shall be identified
DOE O 5480.23, 8(c)(3); **10CFR830.204(b)(3);**	**4.2.1.3** Consequences of postulated accidents associated with hazardous processes and their likelihood of occurrence shall be evaluated

[14] The requirements for hazardous operations are <u>in addition</u> to requirements associated with those activities specified in Section 4.1.

Sources[11]	Consolidated Requirements [12]
29CFR1910.119(e)(3); 29CFR1910.120(c)(7); 40CFR68.22; 40CFR68.25; 40CFR68.28; 40CFR68.67(c); 40CFR1502.16; 40CFR1508.8	
10CFR850.21(b); 29CFR1910.119(e)(4); 40CFR68.67(d)	**4.2.1.4** Hazard analyses shall be performed by qualified personnel
10CFR1021.310; 10CFR830 Subpart B, 204(a) and (b); 29CFR1910.119(e)(5); 29CFR1910.120(b)(4); 40CFR68.39; 40CFR68.67(e); 40CFR1508.10	**4.2.1.5** Results of hazard analyses shall be documented and approved by appropriate management
10CFR830 Subpart B, 204(c)(1) and (c)(2); 29CFR1910.119(e)(6); 40CFR68.67(f)	**4.2.1.6** Hazard analyses shall be updated and revalidated periodically
10CFR830.6; 29CFR1910.119(e)(7); 40CFR68.67(g)	**4.2.1.7** Hazard analysis results and documentation, including updates, shall be retained for the life of the process operation

5.0 Source Documents

ANSI Z49.1 (1994), "Safety in Welding, Cutting, and Allied processes".

CGA P-1 (2000), "Safe Handling of Compressed Gases in Containers".

DOE O 151.1, "Comprehensive Emergency Management System".
DOE O 420.1A, "Facility Safety".
DOE O 440.1A, "Worker Protection Management for DOE Federal and Contractor Employees".
DOE O 460.1A, "Packaging and Transportation Safety".
DOE O 460.1B, "Packaging and Transportation Safety" *[NOTE: This order, issued on 4/4/2003, cancels the DOE O 460.1A]*.

DOE-STD-1027-92, “Hazard Categorization and Accident Analysis Techniques for Compliance with DOE O 5480.23, Nuclear Safety Analysis Reports”.
DOE-STD-1120-98, “Integration of Environment, Safety, and Health into Facility Disposition Activities”.
DOE-STD-3009-94, “Preparation Guide for U.S. DOE Nonreactor Nuclear Facility Safety Analysis Reports”.
DOE-STD-3011-94, “Guidance for Preparation of DOE 5480.22 (TSR) and DOE 5480.23 (SAR) Implementation Plans”.
DOE-STD-3016-99, “Limited Standard; Hazard Analysis Reports for Nuclear Explosive Operations”.

NFPA 30 (2000), “Flammable and Combustible Liquids Code”.
NFPA 45 (2000), “Standard on Fire Protection for Laboratories Using Chemicals”.
NFPA 430 (2000), “Storage of Liquid and Solid Oxidizers”.
NFPA 432 (2002), “Storage of Organic Peroxides Formulation”.

P.L. 91-596, Sec. 6(a), “General Duty Clause” of the Occupational Safety and Health Act of 1970

10CFR830, “Nuclear Safety Management,” Subpart B, “Safety Basis Requirements”.
10CFR835, “Occupational Radiation Protection”.
10CFR850, “Chronic Beryllium Disease Prevention Program”.
10CFR1021, “National Environmental Policy Act Implementing Procedures”.
29CFR1910.106, “Flammable and Combustible Liquids”.
29CFR1910.119, “Process Safety Management of Highly Hazardous Chemicals”.
29CFR1910.120, “Hazardous Waste Operations and Emergency Response”.
29CFR1910.132, “Personal Protective Equipment”.
29CFR1910.146, “Permit-required Confined Spaces”.
29CFR1910.1200, “Hazard Communication”.
29CFR1910.1450, “Occupational Exposure to Hazardous Chemicals in Laboratories”.
29CFR1926.21, ”Safety Training and Education”.
40CFR68, “Chemical Accident Prevention Provisions”.
40CFR1500-1508, “Chapter V-Council on Environmental Quality”.
48CFR970, “DOE Management and Operating Contracts”.

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Chapter 2 – Acquisition

1.0 Introduction

This chapter identifies and consolidates existing user safety and health requirements found in DOE and Federal chemical-related safety and health regulations and National Standards that address the acquisition of ***chemicals*** (see definition) and ***chemical products*** (see definition). State and local codes and requirements are NOT included. This chapter specifically consolidates requirements found in the National Fire Protection Association (NFPA), the Occupational Safety and Health Administration (OSHA), the Bureau of Mines, the Bureau of Alcohol, Tobacco and Firearms and certain Environmental Protection Agency (EPA) regulations and Department of Energy (DOE) Rules and Orders, including technical standards that are made mandatory by their specific reference within a regulation, rule or DOE Order.

Direct requirements for acquisition are found in "Federal Acquisition Regulations" (FAR) and "Department of Energy Acquisition Regulations" (DEAR). In addition, there are many regulations and standards that include implied requirements for the acquisition of chemicals and chemical products. Therefore, implied requirements are summarized here but are not included as mandatory requirements in this chapter. Requirements for on-site transportation of chemicals and chemical products can be found in Chapter 4 of this document.

This chapter is intended only to consolidate overlapping and/or duplicative chemical-related safety and health requirements. The listing of consolidated chemical-related safety and health requirements contained here includes "pointers" to the sources of those requirements, showing the user what the requirements are and where each comes from. The procurement requirements in chapter 7 should also be referenced.

This document does NOT create any new or additional requirements.

2.0 Applicability

The information presented here applies to all locations that purchase or use chemicals, chemical products or services that involve the use of chemicals or chemical products. *[NOTE: Throughout this chapter, the term "chemicals" is used to indicate chemicals and/or chemical products as described in Section 3, below.]* This chapter consolidates existing, core safety and health requirements that all sites must follow when engaged in chemical-related activities.

The requirements included in this chapter come from sources that have different safety purposes. As a result, some of these requirements may not always be applicable to the work being performed at an individual site or facility. It is the responsibility of each user to determine the applicability of specific requirements to their work and how they are implemented. The reference sources for the requirements included in this chapter can be used to determine the applicability of those requirements to the work being performed.

3.0 Definitions and Acronyms

See **Glossary.**

4.0 Requirements for the Acquisition of Chemicals

Sources[11]	Consolidated Requirements[12]
	4.1 General (Applicable to all acquisitions involving chemicals)
DOE O 440.1A , 4(i); **48CFR970.5223-1**	**4.1.1** Hazards associated with all activities involving chemicals that could put the employee at risk of injury or illness shall be identified and evaluated before purchase.
10CFR1021; **48CFR970.5223-2**	**4.1.2** Substitution of materials that are less hazardous and/or have less of an environmental impact shall be evaluated before purchase.
DOE O 460.1A , 4(i); **DOE O 460.1B** *[NOTE: This order, issued on 4/4/2003, cancels the DOE O 460.1A]*	**4.1.3** Packaging and Transportation Safety requirements shall be addressed as a part of the acquisition process.
NFPA 45 7.1	**4.1.4** When a chemical is ordered, its hazards shall be determined and that information shall be provided to those who receive, store, use, or dispose of the chemical. Restrictions imposed by local governmental regulations and in-house rules shall be followed.
29CFR1910.1200(g)(6)(iii); **29CFR1910.1200(g)(8);** **29CFR1910.1450(f)(3)(v)**	**4.1.5** The manufacturer's Material Safety Data Sheet shall be obtained for all new chemical purchases and shall be made readily available to those who receive, store, use or dispose of the chemicals. In laboratories subject to 29CFR1910.1450, other reference materials may be used.
	Additional Procurement Requirements *(Non Health and Safety Requirements are provided for Informational purposes)*
	4.2 Alcohol
27CFR22.41; **48CFR908.7107**	**4.2.1** Applications to purchase tax free alcohol shall be submitted to the ATF.
	4.3 Helium
The Helium Act (Pub. L. 86-777, as amended (50 U.S.C. 167(d)); **30CFR602;** **48CFR908.7108;** **49 FR 11945 (3/28/84), as amended;** **59 FR 9105 (2/25/94)**	**4.3.1** DOE and its authorized contractors shall, to the extent that supplies are readily available, whether in gaseous or liquid form, purchase all major requirements large quantities of helium from the Secretary of Interior, Bureau of Mines, or from the Bureau of Mines distribution contractors eligible to sell Bureau of Mines helium to Federal agencies. The purchase document shall contain the following statement: "Helium furnished under this contract shall be Bureau of Mines Helium."

Sources[11]	Consolidated Requirements[12]
	4.4 Fuel and Petroleum
41CFR101-26.602; **48CFR908.7109**	**4.4.1** Acquisitions of fuel and packaged petroleum products by DOE offices and contractors shall be from Defense sources.
41CFR101-26.602; **48CFR908.7110 1.1.8**	**4.4.2** DOE offices and authorized contractors may participate in the Defense Fuel Supply Center (DFSC) coal-contracting program for carloads or larger lots.
	4.5 Arms and Ammunition
48CFR908.7111; **49 FR 11945, Mar. 28, 1984, as amended at 49 FR 38950, Oct. 2, 1984**	**4.5.1** Acquisition of arms and ammunition readily procurable in the civilian market shall be made in accordance with local site acquisition procedures.
	4.6 DOE-specific materials acquisitions[15] Contracting activities shall require authorized contractors to obtain the special materials identified in the following subsections in accordance with the procedures stated therein.
48CFR908.7121	**4.6.1** Heavy water. The Senior Program Official or designee controls the acquisition and production of heavy water for a given program. Requests for the acquisition or production of heavy water orders shall be placed directly with the cognizant Senior Program Official or ***designee*** (see definition).
54 FR 27646, June 30, 1989, as amended at 59 FR 9105, Feb. 25, 1994; **62 FR 2312, Jan. 16, 1997**	**4.6.2** Precious metals[16]. DOE offices and authorized contractors shall coordinate with the Oak Ridge operating contractor regarding the availability of the above metals prior to the purchase of these metals on the open market.
62 FR 2312, Jan. 16, 1997	**4.6.3** Lithium[17.] The DOE Oak Ridge Operations Office supplies of Lithium shall be considered the first source of supply prior to procurement of lithium compounds from any other source.

[15] This section covers the purchase of materials peculiar to the DOE program. While purchases of these materials are unclassified, the specific quantities, destination or use may be classified. See appropriate sections of the Classification Guide.

[16] The DOE Oak Ridge Operations Office is responsible for maintaining the DOE supply of precious metals. These metals are platinum, palladium, iridium, osmium, rhodium, ruthenium, gold, and silver.

[17] Lithium is available at no cost other than normal packing, handling, and shipping charges from the DOE Oak Ridge Operations Office.

Sources[11]	Consolidated Requirements[12]
21CFR1316	**4.7 Controlled Substances** Use of controlled substances in research requires a permit or license.

5.0 Source Documents

DOE O 440.1A, "Worker Protection Management".
DOE O 460.1A, "Packaging and Transportation Safety".
DOE O 460.1B, "Packaging and Transportation Safety" *[NOTE: This order, issued on 4/4/2003, cancels the DOE O 460.1A]*.

The Helium Act (Pub. L. 86-777, as amended (50 U.S.C. 167(d).

NFPA 45 (2000)"Standard on Fire Protection for Laboratories Using Chemicals".

10CFR1021, "National Environmental Policy Act Implementing Procedures".
21CFR1316, "Drug Enforcement Administration; Administrative Functions, Practices, and Procedures".
27CFR22.41, "Distribution and Use of Tax-Free Alcohol, Qualification".
29CFR1910.1200, "Occupational Safety and Health Standards – Hazard Communication".
29CFR1910.1450, "Occupational Safety and Health Standards – Occupational Exposure to Hazardous Chemicals in Laboratories".
30CFR602, Bureau of Mines, Department of the Interior - Chapter VI - Subchapter A--Helium and Coal".
41CFR101-26.602, " Federal Property Management Regulations - Procurement Sources and Program".
48CFR, "Department of Energy Acquisition Regulations".

[49 FR 11945, Mar. 28, 1984, as amended at 49 FR 38950, Oct. 2, 1984].
[49 FR 11945, Mar. 28, 1984, as amended at 59 FR 9105, Feb. 25, 1994].
[54 FR 27646, June 30, 1989, as amended at 59 FR 9105, Feb. 25, 1994].
[62 FR 2312, Jan. 16, 1997].

Chapter 3 - Chemical Inventory and Tracking

1.0 Introduction

This chapter identifies and consolidates existing user safety and health requirements found in DOE and Federal chemical-related safety and health regulations and National Standards that address the inventory and tracking of ***chemicals*** (see definition) and ***chemical products*** (see definition). State and local codes and requirements are NOT included. This chapter specifically consolidates requirements found in the Occupational Safety and Health Administration (OSHA), and certain Environmental Protection Agency (EPA) regulations and Department of Energy (DOE) Rules and Orders, including technical standards that are made mandatory by their specific reference within a regulation, rule or DOE Order.

Direct requirements for an inventory and tracking system are found in OSHA's regulation 29CFR1910.1200, and EPA's 40CFR370.25. In addition, there are many regulations and standards for which an inventory and tracking system is an implied requirement, since inventory information facilitates compliance. Therefore, implied requirements are summarized here but are not included as mandatory requirements in this chapter.

This chapter is intended to list chemical-related safety and health requirements and to consolidate those that are overlapping and/or duplicative. The list of requirements includes "pointers" to the sources of those requirements.

This document does NOT create any new or additional requirements.

2.0 Applicability

The information presented here applies to all locations that use or store chemicals or chemical products. It applies to chemicals prior to their becoming waste (See Disposition, Chapter 9, for requirements for the disposition of chemicals and chemical products.) *[NOTE: Throughout this document, the term "chemicals" is used to indicate chemicals and/or chemical products as described in Section 3, below.]* This chapter consolidates existing, core safety and health requirements that all sites must follow when engaged in chemical-related activities.

The requirements included in this chapter come from sources that have different safety purposes. As a result, some of these requirements may not always be applicable to the work being performed at an individual site or facility. It is the responsibility of each user to determine the applicability of specific requirements to their work and how they are implemented. The reference sources for the requirements included in this chapter can be used to determine the applicability of those requirements to the work being performed.

3.0 Definitions and Acronyms

See **Glossary.**

4.0 Requirements for Chemical Inventory and Tracking

[NOTE: The information that follows is a consolidation of existing federal safety and health requirements and national standards that relate to the inventorying and tracking of chemicals. It

therefore contains "shall" statements that are taken from, or based on "shall" statements in those existing requirements. While requirements from national standards that are referenced here are not, in and of themselves, mandatory, they are made mandatory by DOE and federal requirements, including OSHA regulation 29CFR1910.6, which incorporates them by reference. DOE O 440.1A mandates compliance with OSHA regulations found in Title 29 of the Code of Federal Regulations (CFR). National standard requirements referenced here are thereby made mandatory for DOE contractors through contracts that include DOE O 440.1A. Please see the Introduction to this section of the Chemical Management Handbook for more information.]

Sources[11]	Consolidated Requirements[12]
	4.1 Chemical Inventory Requirements
29CFR1910.1200(e)(1)	**4.1.1** Maintain a list of the hazardous chemicals known to be present using an identity that is referenced on the appropriate material safety data sheet (the list may be compiled for the workplace as a whole or for individual work areas). *[NOTE: Some chemical specific regulations, such as those for Asbestos and Beryllium, may also contain their own inventory tracking requirements.]*
40CFR370.25(a) to (d)	**4.1.2** The owner or operator of a facility shall annually submit an inventory form (Tier 1 or equivalent State or local form) containing information on specified hazardous chemicals present at the facility during the preceding calendar year above specified threshold levels to the state emergency response commission, the local emergency planning committee, and the fire department with jurisdiction over the facility. For any specific hazardous chemical at the facility, the owner or operator may submit a Tier II form (40CFR371.41) in lieu of the Tier I information.
NFPA 45, 7.2.3.3	**4.1.3** For laboratories chemical inventories shall be maintained within facility limits.
While requirements from national standards that are referenced here are not, in and of themselves, mandatory, they are made mandatory by DOE and Federal requirements, including OSHA regulation 29CFR1910.6, which incorporates them by reference. DOE O 440.1A mandates compliance with OSHA regulations found in Title 29 of the Code of Federal Regulations (CFR). National standard requirements referenced here are thereby made mandatory for	**4.2 Implied Chemical Inventory Requirements.** There are many mandatory standards that do not directly require an inventory of hazardous chemicals, but for which use of a chemical inventory and tracking system would be necessary for, or would facilitate compliance. A list of major standards with implied requirements for keeping a chemical inventory and/or for tracking chemicals follows. The applicability of specific DOE Orders will depend on each site's individual contract.

Sources[11]	Consolidated Requirements[12]	
DOE contractors through contracts that include DOE O 440.1A.		
29CFR1910.38	**4.2.1**	Employee Emergency Plans and Fire Prevention Plans. Maintain a list of the major workplace fire hazards and their proper handling and storage procedures; potential ignition sources and their control procedures; and the type of fire protection equipment or systems that can control a fire involving the identified hazards.
29CFR1910.1450	**4.2.2**	Occupational Exposure to Hazardous Chemicals in Laboratories. Requires employee protection for work in laboratory environments with particularly hazardous substances, including carcinogens, reproductive toxins, and substances with a high acute toxicity. Requires an approved Chemical Hygiene Plan covering the tasks, hazards, and controls before beginning the work. Upon assignment, employees must be provided with information and training to ensure that they are apprised of the hazards of chemicals in their work areas. This information and training must be provided to employees prior to the start of any work in the area, including the start-up of any new operation or task.
29CFR1910.1020	**4.2.3**	Access to Employee Exposure and Medical Records. Authorizes employee access to MSDSs or to a chemical inventory or any other record that may reveal the identity of toxic substances or harmful physical agents and where and when they were used in order to give employees some idea of their potential chemical exposures.
DOE O 151.1A	**4.2.4**	Comprehensive Emergency Management System. Uses a hazard assessment to develop an emergency management program that protects workers, the public, and the environment. Additions or deletions of chemical hazards, or changes in the magnitude of a chemical hazard from an up-to-date chemical inventory can be used in development and maintenance of the emergency management hazards assessment. During an emergency response, a real-time chemical inventory can provide the basis for consequence assessments used for protective action determinations.

Sources[11]	Consolidated Requirements[12]	
DOE O 440.1A	**4.2.5**	Worker Protection Management for DOE Federal and Contractor Employees. Mandates an Industrial Hygiene Program with surveys of all work areas and operations to identify and evaluate potential health hazards through appropriate workplace monitoring. A chemical inventory can help to identify locations where chemical health hazards may be present. Managers must ensure that applicable explosives operations comply with DOE M 440.1-1. Requires compliance with OSHA regulations (29CFR1910 and 29CFR1926).
29CFR1910.119	**4.2.6**	Process Safety Management of Highly Hazardous Chemicals (PSM). Establishes requirements to protect workers by preventing or minimizing the consequences of 1) catastrophic releases of toxic, reactive, or flammable chemicals used in quantities at or above specified thresholds or 2) ignition of explosives in manufacturing processes. Chemical tracking is needed to determine where threshold quantities are exceeded. PSM also requires an employer to keep process safety information on the chemicals used and specify the maximum intended inventory of any listed chemical.
DOE O 420.1, Chg 3	**4.2.7**	Facility Safety. All new construction shall, as a minimum, conform to the Model Building Codes applicable for the state or region, supplemented with additional safety requirements associated with the facility hazards. Inventories of chemicals must be tracked in order to ensure that chemical limits specified in applicable regulations are not exceeded.
Local building and fire codes.	**4.2.8**	Local Codes. Establish requirements for the prevention, control and mitigation of dangerous conditions created by hazardous materials and for providing information needed by emergency response personnel. Permits are required to store, dispense, use or handle quantities of hazardous materials exceeding listed permit amounts. The authority having jurisdiction may require that a Hazardous Materials Management Plan and/or Hazardous Materials Inventory Statement accompany the permit. In addition, inventories of chemicals must be tracked in order to determine whether or not listed permit quantities of chemicals have been exceeded. Each facility is responsible for determining the applicability of their local building and fire codes.

Sources[11]	Consolidated Requirements[12]	
The DEAR Clause	**4.2.9**	Department of Energy Acquisition Regulation (DEAR) 970.5204-2, "Integration of Environment, Safety and Health into Work Planning and Execution". The contractor shall comply with, and assist the Department of Energy in complying with ES&H requirements of all applicable laws and regulations, and applicable directives identified in the clause of this contract on Laws, regulations, and DOE Directives. The contractor shall cooperate with Federal and non-Federal agencies having jurisdiction over ES&H matters under his/her contract. Before work is performed, the associated hazards are evaluated and an agreed-upon set of ES&H standards and requirements are established which, if properly implemented, provide adequate assurance that employees, the public, and the environment are protected from adverse consequences. Administrative and engineering controls to prevent and mitigate hazards are tailored to the work being performed and its associated hazards. Emphasis should be on designing the work and/or controls to reduce or eliminate the hazards and to prevent accidents and unplanned releases and exposures. [See also **Safety Management System Policy (DOE P 450.4)** and **Integrated Safety Management System Guide (DOE G 450.4-1B)**].
10CFR830	**4.2.10**	Nuclear Safety Management. The documented safety analysis requires a systematic identification of all natural and man-made hazards associated with the facility. Some DOE contracts may still contain the earlier, more general safety analysis Order, **Nuclear Safety Analysis Reports (DOE O 480.23)**, or it's predecessor**, Safety Analysis and Review System (DOE O 481.1B)** for non-nuclear facilities**.**
40CFR68	**4.2.11**	Chemical Accident Prevention Provisions. Requires offsite consequence analysis, development, and implementation of a Risk Management Plan to protect the public and the environment by preventing or minimizing the consequences of catastrophic releases of toxic, reactive, or flammable chemicals used in quantities at or above specified thresholds. Inventories of chemicals must be tracked in order to ensure that specified chemical limits are not exceeded.
40CFR355	**4.2.12**	Emergency Planning and Notification. Establishes the list of extremely hazardous substances, threshold planning quantities and facility notification responsibilities necessary for development of state and local emergency response plans.

Sources[11]	Consolidated Requirements[12]
40CFR61; 40CFR63	**4.2.13** National Emission Standards for Hazardous Air Pollutants (NESHAPs) Standards are provided for specific types of sources and processes involving hazardous air pollutants (including radionuclides). Requires registration of emission sources and quantity of air contaminant emissions. Contains standards for specific processes involving hazardous chemicals. A chemical inventory is needed to identify and track locations and quantities of chemicals that may be released as hazardous air pollutants.
40CFR82	**4.2.14** Protection of Stratospheric Ozone. A system to track the acquisition and inventory of ozone depleting substances can be used to accomplish the required annual certification that each ozone depleting substance is being used only for laboratory applications and is not being resold or used in manufacturing.

5.0 Source Documents

DEAR 970.5204-2, "Integration of Environment, Safety and Health into Work Planning and Execution".

DOE O 151.1A, "Comprehensive Emergency Management System".
DOE O 420.1 Chg 3, "Facility Safety".
DOE O 440.1A, "Worker Protection Management for DOE Federal and Contractor Employees".

10CFR830, "Nuclear Safety Management".
29CFR1910.38, "Employee Emergency Plans and Fire Prevention Plans".
29CFR1910.119, "Process Safety Management of Highly Hazardous Chemicals".
29CFR1910.1020, "Access to Employee Exposure and Medical Records".
29CFR1910.1200, "Hazard Communication".
29CFR1910.1450, "Occupational Exposure to Hazardous Chemicals in Laboratories".
40CFR61, "National Emission Standards for Hazardous Air Pollutants (NESHAPs)".
40CFR63, "National Emission Standards for Hazardous Air Pollutants for Source Categories".
40CFR68, "Chemical Accident Prevention Provisions".
40CFR82, "Protection of Stratospheric Ozone".
40CFR355, "Emergency Planning and Notification".
40CFR370, "Hazardous Chemical Reporting: Community Right-To-Know".

Chapter 4 - On-Site Chemical Transportation

1.0 Introduction

This chapter identifies and consolidates existing user safety and health requirements found in DOE and Federal chemical-related safety and health regulations and National Standards that address the on-site transport of non-radioactive ***chemicals*** (see definition) and ***chemical products*** (see definition). State and local codes and requirements are NOT included. This chapter specifically consolidates requirements found in DOE O 460.1A and DOE O 460.1B, *[NOTE: This order, issued on 4/4/2003, cancels the DOE O 460.1A]*, Occupational Safety and Health Administration (OSHA) regulations 29CFR1910.101, 29CFR1910.253, and 29CFR1926.350, the American National Standards Institute (ANSI) standard ANSI Z49.1, and the Compressed Gas Association (CGA) Pamphlets G-1 and P-1, including technical standards that are made mandatory by their specific reference within a regulation, rule or DOE Order.

This chapter is intended to list chemical-related safety and health requirements and to consolidate those that are overlapping and/or duplicative. The list of requirements includes "pointers" to the sources of those requirements.

This document does NOT create any new or additional requirements.

2.0 Applicability

The information presented here applies to all transport of chemicals or chemical products on-site. It includes hazardous materials offered for transportation on-site, and the packaging, labeling or marking of hazardous materials for transportation on-site. Packaging and transportation safety requirements apply to the purchasers of hazardous chemicals if they subsequently transfer those chemicals to another location – for on-site transfers, site rules apply; for off-site transfers, DOT rules apply. *[NOTE: Throughout this document, the term "chemicals" is used to indicate chemicals and/or chemical products as described in Section 3, below.]* This chapter consolidates existing, core safety and health requirements that all sites must follow when engaged in chemical-related activities.

The requirements included in this chapter come from sources that have different safety purposes. As a result, some of these requirements may not always be applicable to the work being performed at an individual site or facility. It is the responsibility of each user to determine the applicability of specific requirements to their work and how they are implemented. The reference sources for the requirements included in this chapter can be used to determine the applicability of those requirements to the work being performed.

3.0 Definitions and Acronyms

See **Glossary.**

4.0 Requirements for On-Site Chemical Transportation

Sources[11]	Consolidated Requirements[12]
DOE O 460.1A, 4.b; DOE O 460.1B *[NOTE: This order, issued on 4/4/2003, cancels the DOE O 460.1A]*	**4.1 Onsite Hazardous Materials Transfers -** shall comply with either:

Sources[11]	Consolidated Requirements[12]
49CFR171-179	**4.1.1** the ***Hazardous Materials Regulations*** (see definition) that cover, but are not limited to, such subjects as: shipper's responsibilities, shipping papers, packaging, handling, labeling of material containers, marking packages place carding and emergency response information, OR
DOE O 460.1A, 4.b; **DOE O 460.1B** *[NOTE: This order, issued on 4/4/2003, cancels the DOE O 460.1A]*	**4.1.2** the site- or facility-specific Document , from the cognizant Operations or Field Office, that describes the methodology and compliance process to meet equivalent safety for any deviation from the Hazardous Materials Regulations.
DOE O 460.1A, 4.b; **DOE O 460.1B** *[NOTE: This order, issued on 4/4/2003, cancels the DOE O 460.1A]*	**4.1.2.1** For multiple-tenant DOE sites, safety documents for several contractor organizations may be combined into a single document.
DOE O 460.1A, 4.b; **DOE O 460.1B** *[NOTE: This order, issued on 4/4/2003, cancels the DOE O 460.1A]*	**4.1.2.2** DOE-operated sites (specifically, Morgantown and Pittsburgh Energy Technology Centers) may approve their own Transportation Safety Documents.
DOE O 460.1A, 4.b; **DOE O 460.1B** *[NOTE: This order, issued on 4/4/2003, cancels the DOE O 460.1A]*	**4.1.2.3** Approved Transportation Safety Documents shall be in effect no later than 1 year from incorporation of DOE O 460.1A or DOE O 460.1B into the contractor's contracts.
	4.2 Specific materials
29CFR1910.101(b)	**4.2.1** Compressed Gas Cylinders
CGA P-1	**4.2.1.1** The in-plant handling of all compressed gases in cylinders, portable tanks, rail cars, or motor vehicle cargo tanks shall be in accordance with the ***CGA*** (see definition) P-1.
29CFR1910.253(b)(1)(i); **49CFR171-179**	**4.2.1.2** All portable cylinders used for the shipment of compressed gases shall be constructed and maintained in accordance with the regulations of the U.S. Department of Transportation, 49CFR171-179.
ANSI Z49.1; **29CFR1910.253(b)(1)(ii)**	**4.2.1.3** Compressed gas cylinders shall be legibly marked, for the purpose of identifying the gas content, with either the chemical or the trade name of the gas. Such marking shall be by means of stenciling, stamping, or labeling, and shall not be readily removable. Whenever practical, the marking shall be located on the shoulder of the cylinder.

Sources[11]	Consolidated Requirements[12]
CGA P-1, 3.4.2; **29CFR1926.350(a)(1)**	**4.2.1.4** Valve protection caps shall be in place and secured when not in use or being transported.
ANSI Z49.1,10.8.3.8; **CGA P-1, 3.5;** **CGA P-1, 3.5.2;** **29CFR1926.350(a)(2);** **29CFR1910.253(b)(1)(iv)**	**4.2.1.5** Ropes, chains, or slings shall not be used to suspend cylinders unless provisions have been made on the cylinder for appropriate lifting attachments such as lugs. Where appropriate lifting attachments have not been provided on the cylinder, suitable cradles, sling boards, platforms or pallets to hold the cylinder shall be used for lifting. Lifting attachments or other attachments shall never be welded to cylinders. Cylinders shall not be hoisted or transported by means of magnets or choker slings.
29CFR1926.350(a)(3)	**4.2.1.6** Cylinders shall be moved by tilting and rolling them on their bottom edges. They shall not be rolled in the horizontal position or dragged. They shall not be intentionally dropped, struck, or permitted to strike each other violently.
CGA P-1, 3.5; **29CFR1926.350(a)(4)**	**4.2.1.7** A suitable hand truck, forklift, cylinder pallet system, or similar material-handling device shall* be used with the container properly secured to the device. When powered vehicles transport cylinders, they shall be secured in a vertical position.
ANSI Z49.1, 10.8.3.7; **29CFR1926.350(a)(5)**	**4.2.1.8** Valve protection caps shall not be used for lifting cylinders from one vertical position to another. Bars shall not be used under valves or valve protection caps to pry frozen cylinders loose. Warm, not boiling, water shall be used to thaw frozen cylinders loose.
ANSI Z49.1, 10.8.3.10; **29CFR1926.350(a)(6)**	**4.2.1.9** Unless cylinders are firmly secured on a special carrier intended for this purpose, regulators shall be removed from the cylinders and valve protection caps put in place before cylinders are moved.
ANSI Z49.1, 10.8.3.10; **29CFR1926.350(a)(8)**	**4.2.1.10** When cylinders are moved at any time, the cylinder valve shall be closed.

*The CGA Pamphlet uses the word "should." Since the DOE incorporates the CGA documents by reference the requirement may be interpreted as mandatory.

Sources[11]	Consolidated Requirements[12]
CGA P-1, 4.7.2	**4.2.2** Cryogenic liquid containers - In addition to the requirements listed above for other compressed gases, cryogenic liquids must be moved by use of a four-wheeled hand truck designed to move cryogenic liquefied gas containers with a capacity greater than 20 gal (76L). Hand trucks must be kept in good operating condition.
CGA G-1	**4.2.3** Acetylene - The in-plant transfer of acetylene in cylinders shall be in accordance with CGA G-1.
CGA G-1, 5.1.1	**4.2.3.1** Acetylene shall be called by its proper name, "Acetylene." Acetylene shall not be referred to merely by the word "Gas."
CGA G-1, 5.2.1	**4.2.3.2** When acetylene cylinders are moved, they should* not be subjected to abnormal mechanical shocks that might damage the cylinders, the valves, or the fusible pressure relief devices. Care shall be exercised to ensure that acetylene cylinders are not dropped or permitted to strike each other violently.
CGA G-1, 5.2.2	**4.2.3.3** Acetylene cylinders should* not be dropped while being unloaded or loaded from a truck or dock. *[NOTE: Trucks with elevator tailgates provide a very good means of unloading or loading acetylene cylinders safely.]*
CGA G-1, 5.2.3	**4.2.3.4** When transporting acetylene cylinders by crane or derrick, lifting magnets, slings, ropes or chains, or any other device in which the cylinders themselves form a part of the carrier should* never be used for hoisting acetylene cylinders. When transporting acetylene cylinders by crane, a platform, cage or ladle should* be if will protect the cylinders from damage and will keep them from falling out.
CGA G-1, 5.2.4	**4.2.3.5** A positive method such as chaining should* be used in securing acetylene cylinders that are standing upright. During movement, acetylene cylinders shall not be transported when lying horizontally with the valves unprotected in a position that would allow the valves to collide with stationary objects.
CGA G-1, 5.2.4	**4.2.3.6** Acetylene cylinders should* never be dragged from place to place.

Sources[11]	Consolidated Requirements[12]
CGA G-1, 5.2.5	**4.2.3.7** Valves shall always be closed before acetylene cylinders are moved.
CGA G-1, 5.2.5	**4.2.3.8** Unless acetylene cylinders are to be moved while secured in an upright position to a suitable hand truck, pressure regulators should* be removed and valve protection caps, if provided for in the cylinder design, should* be attached.

*The CGA Pamphlet uses the word "should." Since the DOE incorporates the CGA documents by reference the requirement may be interpreted as mandatory.

5.0 Source Documents

ANSI, Z49.1 (1999), "Safety in Welding, Cutting, and Allied Processes".

CGA G-1 (1996), "Compressed Gas Association General Requirements for Compressed Gases".
CGA P-1 (2000), "Compressed Gas Association Requirements for Acetylene".

DOE O 460.1A, "Packaging and Transportation Safety".
DOE O 460.1B, "Packaging and Transportation Safety" *[NOTE: This order, issued on 4/4/2003, cancels the DOE O 460.1A]*.

29CFR1910.101, "Compressed Gases".
29CFR1910.102, "Acetylene".
29CFR1910.253, "Oxygen-Fuel Gas Welding and Cutting".
29CFR1926.350, "Gas Welding and Cutting".
40CFR302.4, "Listing of Hazardous Substances for the National Oil and Hazardous Substances Pollution Contingency Plan".
49CFR171-179, "Hazardous Materials Transportation".

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Chapter 5 - Chemical Storage

1.0 Introduction

This chapter identifies and consolidates existing user safety and health requirements found in DOE and Federal chemical-related safety and health regulations and National Standards that address the storage of ***chemicals*** (see definition) and ***chemical products*** (see definition). It specifically consolidates requirements found in the American National Standards Institute (ANSI) Z49.1, the Compressed Gas Association (CGA) G-1, and CGA P-1, National Fire Protection Association (NFPA) 30, NFPA 45, NFPA 51, NFPA 55, NFPA 430, NFPA 432, the Occupational Safety and Health Administration (OSHA) regulations found at 29CFR1910.6, 29CFR1910.106, 29CFR1910.134, 29CFR1910.253, 29CFR1926.350, and 29CFR1910.1200. It includes requirements that are cited in either DOE O 440.1A or 29CFR1910.6 ("Incorporation by Reference") and technical standards that are made mandatory by their specific reference within a regulation, rule or DOE Order. State and local codes and requirements are NOT included. USDA regulations are NOT addressed since the impact from these is considered to be negligible at DOE facilities. Similarly, EPA pesticide regulations are NOT addressed in this document since most DOE sites do not routinely store pesticides.

This chapter is intended to list chemical-related safety and health requirements and to consolidate those that are overlapping and/or duplicative. The list of requirements includes "pointers" to the sources of those requirements.

This document does NOT create any new or additional requirements.

2.0 Applicability

This chapter applies to all locations that store chemicals or chemical products.
[NOTE: Throughout this document, the term "chemicals" is used to indicate chemicals and/or chemical products as described in Section 3, below.]

This document does NOT apply to:

- chemicals stored in tanks with a greater than 735-pound water capacity;
- drums that have a greater than 55 gallon capacity;
- chemical distribution ***systems*** (see definition);
- storage containers attached to a system;
- waste chemical storage;
- the building or design of chemical storage areas [a design engineer who is acquainted with those requirements should be consulted before a chemical storage facility is built or before an existing facility is converted to chemical storage.]

Special laboratory requirements presented in this document apply to laboratories that are constructed and operated in accordance with NFPA 45, "Standard on Fire Protection for Laboratories Using Chemicals."

This chapter consolidates existing core safety and health requirements that all sites must follow when engaged in chemical-related activities. The requirements included in this chapter come from sources that have different safety purposes. As a result, some of these requirements may not always be

applicable to the work being performed at an individual site or facility. It is the responsibility of each site or facility to determine the applicability of specific requirements to their work and how they are implemented. The reference sources for the requirements included in this chapter can be used to determine the applicability of those requirements to the work being performed.

3.0 Definitions and Acronyms

See **Glossary.**

4.0 Requirements for Chemical Storage

Sources[11]	Consolidated Requirements[12]
DOE O 440.1A; **29CFR1910.6**	*[NOTE: The information that follows is a consolidation of existing Federal safety and health requirements and National Standards that relate to the storage of chemicals. It therefore contains "shall" statements that are taken from, or based on "shall" statements in those existing requirements. While NFPA and CGA requirements that are referenced here are not, in and of themselves mandatory, they are made mandatory by OSHA regulation 29CFR1910.6, which incorporates them by reference. DOE O 440.1A mandates compliance with OSHA regulations found in Title 29 of the Code of Federal Regulations (CFR). NFPA and CGA requirements referenced here are thereby made mandatory for DOE contractors through contracts that include DOE O 440.1A. Please see the Introduction to this section of the DOE Chemical Management Handbook for more information.]*
	4.1 General
NFPA 45, 7.2.3.3	**4.1.1** Facilities shall be evaluated to determine chemical storage limits, allowable chemical container storage sizes, and stacking limits. Quantities of chemicals stored shall remain within those limits.[18]
NFPA 430, 2.1.1; **NFPA 430, 2.10.1;** **NFPA 432, 4.7.1**	**4.1.2** The identification or design of ***chemical storage areas*** (see definition),or maintenance work on chemical storage areas shall be reviewed.[19]
NFPA 430, 2.6.1	**4.1.2.1** New facility design shall take into account the need for containment to protect the environment from oxidizers, fire suppression agents, and decomposition products.
NFPA 430, 2.6.2	**4.1.2.2** ***Approval*** (see definition) of chemical storage areas shall take into consideration the potential for large quantities of smoke and toxic fumes, especially as storage affects

[18] Facility chemical quantity limits stem primarily from the local fire and building codes. NFPA 45 may modify these for laboratories, by local ordinances or by other codes that are specific to one particular class of chemicals such as NFPA 30, "Flammable and Combustible Liquids".

[19] There are restrictions and requirements for welding and cutting activities at locations where chemicals are used and stored. Consult your local welding and cutting program to determine what these requirements are.

Sources[11]	Consolidated Requirements[12]
	manual fire fighting operations, building egress, and evacuation of adjacent facilities.
NFPA 432, 4.7.2	**4.1.2.3** Cutting and welding operations in areas where organic peroxides are stored shall not be performed until all organic peroxide formulations have been removed.
ANSI Z 49.1, 10.8.2.1; **CGA G-1, 4.2.14;** **CGA P-1, 3.7.3.2;** **NFPA 30, 4.7.4;** **NFPA 51, 2.2.1;** **NFPA 55, 7.1.3.2;** **29CFR1910.253(b)(2)(ii);** **29CFR1926.350(a)(11)**	**4.1.3** Chemical storage areas shall be secured using physical or administrative controls to prevent unauthorized entry. [20]
CGA P-1, 4.2.1.5; **NFPA 55, 7.6.3.2:** **NFPA 430, 2.9.2;** **NFPA 432, 4.6**	**4.1.4** "No smoking" signs shall be posted at all entrances to areas where oxidizers, organic peroxides, or flammable gases are stored.
NFPA 30, 4.10; **NFPA 430, 2.9.1**	**4.1.5** Ignition sources such as open flames, smoking, spark producing equipment, static electricity, and other hot sources shall not be permitted in areas where chemicals are stored unless reviewed and approved.[21]
NFPA 430, 2.2.3; **29CFR1910.1200(f)**	**4.1.6** All chemicals shall be properly labeled.
CGA P-1, 3.7.2; **NFPA 45, 7.2.3.4;** **NFPA 55, 7.1.5.1.1;**	**4.1.7** Chemicals shall be stored compatibly and in a way to prevent contact with incompatible materials. This includes preventing liquids from flowing out of a chemical storage area into another area where they may be exposed to incompatible materials.

[20] It is recommended that a graded approach be used in meeting this requirement.

[21] Restrictions and requirements for welding and cutting activities at locations where chemicals are used and stored are based on specific conditions. Consult your local facility welding and cutting program to determine what requirements are applicable to specific activities and conditions at your site.

[22] This requirement is intended to keep chemicals safe during routine storage and during an upset condition such as a fire. Therefore, chemicals that are only incompatible at elevated temperatures are still considered incompatible during routine storage conditions due to the possibility of fire or other upset condition. This document does not

Sources[11]	Consolidated Requirements[12]
NFPA 432, 2.3	**4.1.7.1** All construction materials in a chemical storage area shall be compatible with those chemicals being stored.
NFPA 430, 2.4.2.1	**4.1.7.2** Special care shall be taken to prevent the contamination of chemicals in storage.
NFPA 430, 2.4.2.2	**4.1.7.3** When flammable and combustible liquids are stored in ***segregated warehouses*** (see definition) with oxidizers, they shall be separated from those oxidizers by a distance of 25 ft. with dikes, drains, or sloping floors present to prevent the flammable liquids from encroaching on the separation.
NFPA 45, 7.2.3.5; **NFPA 45, 10.3.2**	**4.1.8** Chemicals that might become hazardous upon prolonged storage shall be dated when first opened and evaluated for safety every 6 months thereafter.
NFPA 45, 7.2.3.5	**4.1.8.1** Chemicals that are found to be unsafe and cannot be made safe shall be disposed of safely and in compliance with applicable requirements.
CGA G-1, 4.2.2; **CGA G-1, 4.2.6;** **CGA G-1, 4.2.15;** **CGA P-1, 4.2.1.3;** **NFPA 30, 4.3;** **NFPA 45, 7.2.3.6** **NFPA 51, 2.2.2;** **NFPA 51, 2.3.2;** **NFPA 55, 6.17;** **29CFR1910.106(d)(4)(iv)**	**4.1.9** Indoor chemical storage areas shall have either natural or mechanical ventilation designed to provide a minimum of six air exchanges per hour and shall discharge the air a minimum of 50 ft. from any air intakes for air handling systems, air compressors, etc. *[EXCEPTION: Under NFPA 30, 4.3 and NFPA 45, 7-2.3.6 this requirement does not apply to flammable liquid storage cabinets.]*
NFPA 55, 3.-1.3.b; **29CFR1910.106(d)(4)(iv)**	**4.1.9.1** A manual shutoff shall be provided outside the ***toxic gas*** (see definition) and flammable/combustible liquids storage areas adjacent to the entry door and shall be labeled "Ventilation System Emergency Shutoff."
NFPA 55, 6.17.9	**4.1.9.2** Exhaust ventilation shall not be recirculated within any room or building.

intend to direct which compatibility scheme should be used. Each site or facility must determine for itself which compatibility scheme they will use to implement this requirement.

Sources[11]	Consolidated Requirements[12]
NFPA 432, 4.9.1	**4.1.10** Good housekeeping shall be maintained in areas where chemicals are stored.
NFPA 30, 4.4.3.1; **NFPA 30, 4.5.1.2;** **NFPA 30, 5.9.1;** **29CFR1910.106(d)(5)(i)**	**4.1.10.1** Aisles established for the movement or egress of personnel shall be maintained clear of obstructions, including stored chemicals.
NFPA 30, 4.7.4; **NFPA 430, 2.13.1;** **NFPA 432, 4.-9.1**	**4.1.10.2** Accumulation of wastes, debris, weeds, and other combustible materials shall be prohibited.
NFPA 430, 2.13.2; **NFPA 432, 4.9.2**	**4.1.10.3** Spilled chemicals and broken containers shall be immediately managed using appropriate procedures.
NFPA 430, 2.13.3	**4.1.10.4** Each used and empty container shall be stored in a manner appropriate for the chemical that existed in that container until it is disposed of or cleaned; OR stored in a detached or ***sprinklered area*** (see definition) until disposed of or cleaned.
NFPA 430, 2.13.4	**4.1.10.5** Storage operations shall be arranged to prevent the accumulation of fugitive dust from the stored chemical.
NFPA 432, 4.9.3	**4.1.10.6** Specific disposal procedures shall be developed for all areas where organic peroxides are stored.
NFPA 45, 7.2.3.1	**4.1.11** Hazardous chemicals stored in the open in laboratory work areas shall be kept to the minimum necessary for the work being done.
NFPA 45, 8.1.6.5	**4.2 Compressed Gases** *[NOTE: In a laboratory a compressed gas cylinder shall be considered "in use" if it is:* *a) connected through a regulator to deliver gas to a laboratory operation; or* *b) connected to a manifold being used to deliver gas to a laboratory operation; or* **c)** *a single cylinder secured alongside the cylinder in (a) above as the reserve cylinder.]*
CGA P-1, 3.7.1; **NFPA 55, 6.13.1**	**4.2.1** Hazard identification signs shall be placed at all entrances to areas where compressed gas is stored.

Sources[11]	Consolidated Requirements[12]
NFPA 55, 6.1.13(A); NFPA 704	**4.2.1.1** Hazard ratings shall be assigned in accordance with NFPA 704.
NFPA 55, 6.13.2.1	**4.2.1.2** Signs shall not be obscured or removed.
CGA G-1, 4.2.9; CGA P-1, 4.2.1.5; NFPA 55, 6.13.2.2; NFPA 55, 7.1.1; NFPA 55, 7.6.3.2; 29CFR1910.253(b)(3)(i)	**4.2.1.3** Signs shall prohibit smoking or an open flame within 20 ft of where toxic, pyrophoric, oxidizing, or flammable gases are stored.
ANSI Z49.1, 10.8.2.1; CGA G-1, 4.2.4; CGA P-1, 3.7.2; CGA P-1, 3.7.3; NFPA 51, 2.2.1; NFPA 55, 7.1.5.4; NFPA 55, 7.1.5.6; NFPA 55, 7.1.5.9; 29CFR1926.350(a)(11)	**4.2.2** Compressed gas cylinders shall be stored away from stairways, elevators, exit routes, or gangways, in assigned places where they will not be exposed to physical damage (for example, damage from vehicles, damage from falling ice, etc.).
ANSI Z49.1, 10.8.2.1; CGA G-1, 4.2.8; CGA P-1, 3.7.4; NFPA 55, 2.2.1.6; NFPA 55, 7.1.3.4; NFPA 55, 7.2.1.2; 29CFR1910.253(b)(2)(ii)	**4.2.3** Compressed gas cylinders shall be stored in an ***upright position*** (see definition) with their valve protection caps in place and secured to prevent cylinders from falling over or being knocked over. *[EXCEPTION: All requirements cited here indicate that upright storage is not required for lecture bottles or cylinders used in self-contained breathing apparatus.]*
NFPA 55, 6.6.2	**4.2.4** Overhead cover for outdoor storage areas of compressed gases shall be of non-combustible construction, open on three sides and shall not be considered indoor storage.
NFPA 55, 7.1.5.3	**4.2.4.1** Storage areas shall be kept clear of dry vegetation and combustible materials for a minimum distance of 15 ft in all directions.
CGA P-1, 3.7.3.1; CGA G-1, 4.2.13; NFPA 55, 2.1.6.1.b	**4.2.4.2** Cylinders stored outdoors shall not be placed in direct contact with the earth or on surfaces where water can accumulate.

Sources[11]	Consolidated Requirements[12]
ANSI Z49.1, 10.8.1.8; **CGA G-1, 4.2.3;** **CGA P-1, 3.7.2;** **NFPA 51, 2.2.1;** **NFPA 55, 6.6.1;** **NFPA 55, 7.1.5.7**	**4.2.5** Compressed gas cylinders in storage shall not be heated above 125°F [23].
ANSI Z49.1, 10.8.2.2; **ANSI Z49.1, 10.8.2.3;** **CGA G-1, 4.2.5;** **CGA P-1, 4.2.4;** **CGA P-1, 4.4.4;** **NFPA 51, 2.2.1;** **NFPA 51, 2.4.3;** **NFPA 55, 7.1.5.2;** **29CFR1926.350(a)(10;** **29CFR1926.350(a)(11;** **29CFR1910.253(b)(2)(ii);** **29CFR1910.253(b)(4)(iii)**	**4.2.6** Compressed gases in storage shall be segregated from incompatible materials or combustibles in storage by either a distance of 20 ft. or by a noncombustible partition with a fire resistance rating of ½ hour and extending not less than 18 inches above and to the sides of the stored material. The noncombustible barrier shall be five feet high for those cylinders that are less than three and a half feet tall. *[EXCEPTION: Under ANSI Z49.1 and NFPA 55 welding gases located on a weld cart are considered to be "in use" and <u>not</u> in storage. This is also consistent with the NFPA 45 definition of "in use". Under these cited standards, then, this requirement does not apply to oxygen and fuel gases on a weld cart. Similarly, since oxygen and fuel gases on a weld cart are considered to be "in use" under these standards, they also are not required to be segregated from each other.]* *[NOTE: The intent of these requirements is to discourage the manufacture of unsafe weld carts and to prevent the practice of removing welding gases from carts at the end of every work shift or day, since this additional handling of the gases is considered to be inherently more hazardous than is their temporary storage on weld carts. It should be noted , however, that keeping oxygen and fuel gases on a weld cart for excessively long periods without any actual use would counter the intent of these requirements.]*
NFPA 55, 2.2.1.5	**4.2.6.1** Flammable gas cylinders shall be stored a minimum distance of 20 ft. from storage of flammable and combustible liquids and solids.
29CFR1910.253(b)(3)(i)	**4.2.7** The inside storage of more than 2,000 standard cubic ft. (scf) of flammable gas, or more than 300 pounds of liquefied petroleum gas requires a separate room, compartment, or special storage building.

[23] This requirement includes the storage of compressed gas cylinders in direct sunlight where the sunlight may cause the cylinder to overheat.

Sources[11]	Consolidated Requirements[12]
NFPA 55, Chapter 6	**4.2.7.1** Indoor storage in one fire area of multiple groups of cylinders containing flammable gas shall be performed according to specifications in NFPA 55, Chapter 6.
NFPA 55, Chapter 6	**4.2.8** Indoor storage in one fire area of multiple groups of cylinders containing flammable gas shall be performed according to specifications in NFPA 55, Chapter 6.
NFPA 55, 2.2.1.7.b	**4.2.8.1** Groups may be separated from each other by masonry walls with a fire resistance rating of 2 hours instead of by a minimum distance.
NFPA 55, 2.2.1.8	**4.2.8.2** Different flammable gases shall be allowed to be stored together.
CGA G-1 4.2.6; **NFPA 51, 2.3.1;** **NFPA 55, 2.2.2.1.a**	**4.2.9** Flammable gases with a collective volume between 2,501 and 5,000 scf, when stored indoors, shall be stored in rooms or enclosures with a minimum 1-hour fire resistance rating.
NFPA 55, 2.2.2.2.1	**4.2.9.1** Multiple groups of flammable gas cylinders in one sprinklered fire area shall be stored a minimum of 100 ft. apart.
NFPA 51, 2.3.2; **NFPA 55, 2.2.3.1**	**4.2.10** Flammable gases with a collective volume greater than 5,000 scf, when stored indoors, shall be stored in a room or enclosure with a minimum fire resistance of 2 hours.
NFPA 51, 2.3.2; **NFPA 55, 2.2.3.2**	**4.2.10.1** Rooms used to store compressed gases shall be sprinklered according to NFPA 13.
NFPA 55, 7.9.2.1; **NFPA 55, 7.9.6.5;** **NFPA 55, 7.9.6.6**	**4.2.11** Indoor compressed gas storage areas that are used to store toxic or highly toxic gases indoors shall be equipped with a continuous monitoring system that would provide warning of toxic gas concentrations that could present a hazard to life.
NFPA 55, 7.9.2.2; **NFPA 55,7.10.2**	**4.2.12** Outdoor storage areas of toxic gases shall be located 75 ft from a line of property, public ways, places of assembly.
NFPA 55, 7.9	**4.2.13** Other requirements for the storage of toxic and highly toxic gases can be found in NFPA 55, 7.9.
29CFR1910.134	**4.2.14** Where toxic gases are stored, a minimum of two NIOSH approved self-contained breathing apparatus (SCBAs) shall be kept available at all times for use in upset conditions. They shall be cleaned and disinfected after each use, properly maintained and stored, inspected at least monthly, and checked for proper function before and after each use.

Sources[11]	Consolidated Requirements[12]
CGA P-1, 4.5.1.3; CGA P-1, 4.5.1.4	**4.2.14.1** NIOSH approved SCBAs shall also be provided where protection is deemed necessary for entry into atmospheres containing asphyxiant or corrosive gases.[24]
CGA P-1, 4.5.1.4	**4.2.14.2** One of the two SCBAs present shall be in the possession of a qualified backup person present at the scene when the SCBAs are being used.
	4.3 Flammable and Combustible Liquids
NFPA 30, 4.4.3.3; NFPA 30, 4.4.3.4; 29CFR1910.106(d)(4)(v)	**4.3.1** Aisles in areas that qualify as indoor liquid storage areas as per NFPA 30, "Flammable and Combustible Liquids Code", shall be 4 ft wide. Aisles in other flammable liquid storage areas shall be 6 ft wide.
29CFR1910.106(d)(5)(vi)(f)	**4.3.1.1** Aisles at least 3 ft wide shall be provided where necessary to allow for access to doors, windows, or standpipe connections.
NFPA 30, 4.4.3.5; NFPA 30, 4.5.14; NFPA 30, 4.5.2.5	**4.3.2** ***Class I flammable liquids*** (see definition) shall not be stored in basement areas. ***Class II and Class IIIA combustible liquids*** (see definition) shall not be stored in basement areas unless those areas are protected with automatic sprinkler systems.
NFPA 30, 4.5.1.2	**4.3.3** Class I flammable liquids shall not be stored such that a fire in the liquid storage area would prevent egress from the area.
NFPA 30, 4.5.28.(a)	**4.3.4** In general purpose warehouses, flammable and combustible liquids shall not be stored in the same pile or on the same rack as ordinary combustibles.
NFPA 30, 4.4.3.6; NFPA 30, 4.4.3.7; NFPA 30, 4.5.2.8.(b)	**4.3.4.1** Ordinary combustibles, other than those used for packaging flammable liquids, shall be stored a minimum of 8 ft from flammable or combustible liquids.
NFPA 30, 4.5.2.8.(a)	**4.3.4.2** Where flammable liquids are packaged together with ordinary combustibles, such as in kits, storage shall be considered on the basis of whichever commodity predominates.

[24] Any other respirator used must go through a NIOSH approval process for equivalency. This process must be described in the facility's written respiratory protection program.

Sources[11]	Consolidated Requirements[12]
NFPA 30, 4.4.3.7	**4.3.5** Storage of empty or idle pallets inside a flammable liquid storage area shall not exceed 2,500 ft.^{2} and 6 ft. in height.
NFPA 30, 4.-4.3.8; **29CFR1910.106(d)(5)(vi)(c)**	**4.3.6** Containers in piles shall be stacked in such a manner as to provide stability and to prevent excess stress on container walls.
NFPA 4.4.3.8; **29CFR1910.106(d)(5)(vi)(d)**	**4.3.6.1** Portable tanks stored over one tier high shall be nested securely without dunnage.
NFPA 30, 4.4.3.8	**4.3.6.2** Material handling equipment shall be suitable to handle containers and tanks safely at the upper tier level.
NFPA 30, 4.4.4.2; **29CFR1910.106(d)(4)(v)**	**4.3.7** Containers over 30 gallons in size that contain Class I or Class II liquids shall not be stored over one level high in ***inside rooms*** (see definition).
NFPA 30, 4.4.3.9; **29CFR1910.106(d)(5)(vi)(e)**	**4.3.8** No stack of flammable or combustible liquids shall be closer than 3 ft. to the nearest beam, chord, or other construction, and shall be 3 ft. below sprinkler deflectors, discharge orifices of water spray, or other overhead fire protection systems.
NFPA 30, 4.9; **29CFR1910.106(d)(7)(i)**	**4.3.9** Suitable fire control devices shall be available at locations where flammable and combustible liquids are stored.
29CFR1910.106(d)(7)(i)(a); **29CFR1910.106(d)(7)(i)(b)**	**4.3.10** At least one portable fire extinguisher having a rating of not less than 40-B units shall be located outside but not more than 10 ft. from any door to a flammable and combustible liquids storage room or any area where Class I or Class II liquids are stored.
NFPA 30, 4.10.1; **29CFR1910.106(d)(7)(iv)**	**4.3.11** ***Water reactive materials*** (see definition) shall not be stored in the same area with flammable or combustible liquids.[25]

[25] This requirement is intended to protect water reactive chemicals from exposure to water in water based fire suppression systems that may be used where flammable liquids are stored. Spraying water on a water reactive material during an upset condition could increase the severity and danger of the upset condition. While not required, consideration should be given to applying a similar restriction in oxidizer storage areas. See section 4.4.2.

Sources[11]	Consolidated Requirements[12]
NFPA 30, 4.5.2.3	**4.3.12** Class I and Class II liquids in plastic containers shall only be stored in ***flammable liquids storage rooms*** (see definition) or flammable liquid storage cabinets.
NFPA 30, 4.5.1.3	**4.3.13** Liquids used for building maintenance, painting, or other similar infrequent maintenance purposes shall be permitted to be stored temporarily in closed containers outside of flammable liquids storage cabinets or flammable liquids storage areas, if the amount stored does not exceed a 10-day supply at anticipated use rates.
NFPA 45, 2.2.1(a); **29CFR1910.106(e)(2)(ii)(b)(1)**	**4.3.14** The quantity of flammable and combustible liquids that can be stored outside a flammable liquids storage room or flammable liquids storage cabinet is as follows[26]: a. 25 gallons of Class IA liquids in containers per ***fire area*** (see definition), and b. 120 gallons of Class IB, IC, II, or IIIA liquids in containers per fire area. OR a. 570 L (150 gallons) of Class I liquids in sprinklered ***laboratory units*** (see definition), and b. 757 L (200 gallons) of Class I, II, and IIIA liquids in sprinklered laboratory units. *[NOTE: Second set of "a." and "b." refers to Class C laboratories only. See NFPA 45 for proper quantities for Class A, B and D laboratories.]*
NFPA 45, 2.2.1.4	**4.3.15** With the exception of Section 4.3.12 and 4.3.13, all Class I, II, and IIIA flammable and combustible liquids not in a flammable liquids storage room shall be stored in flammable liquid storage cabinets when not in use.
NFPA 30, 4.3.1	**4.3.15.1** The total quantity of liquids shall not exceed 120 gallons per cabinet.
NFPA 30, 4.3	**4.3.15.2** Flammable liquid storage cabinets shall be FM approved or UL listed or built in accordance with NFPA 30.
NFPA 30, 4.3.2	**4.3.15.3** Not more than three flammable liquid storage cabinets are allowed in any one fire area, except as follows: *[EXCEPTION 1: In an industrial occupancy,*

[26] Numerous types of storage areas (e.g., cutoff storage rooms, mercantile storage areas, inside storage rooms, etc.) can exist. Storage limits for laboratories have been defined in 4.3.14. There are many other types of storage areas and limits for each of these are not included in this document. A fire protection engineer should be consulted to determine storage limits for these other storage areas.

Sources[11]	Consolidated Requirements[12]
	additional groups of storage cabinets can be located in any fire area if a minimum100-foot separation is maintained. *EXCEPTION 2: In an industrial occupancy that is protected by an automatic fire sprinkler system, the number of cabinets can be increased to 6 in a group.* *EXCEPTION 3: In a laboratory fire area, the number of flammable liquid storage cabinets is not limited; however, the total quantity of flammable and combustible liquids is limited to the quantities as defined in 4.3.14.4.]*
NFPA 45, 2.2.1.3	**4.3.15.4** The maximum amount of Class I, II, and IIIA flammable and combustible liquids that can be stored in a laboratory fire area is 400 gallons of which the maximum amount of Class I flammable liquids is 300 gallons.
NFPA 30, 4.6.4	**4.3.16** Sites for ***outdoor storage lockers*** (see definition) shall be reviewed to ensure proper placement, separation, etc.
NFPA 30, 4.6.4	**4.3.16.1** Multiple outdoor storage lockers at a given site shall be separated according to requirements in NFPA 30.
NFPA 30, 4.6.4.4.1	**4.3.16.2** In outdoor storage lockers, containers in their original shipping packages shall be permitted to be stored either on pallets or in piles, while unpacked containers shall be stored on shelves or on the floor.
NFPA 30, 4.6.4.4.2	**4.3.16.3** No other flammable or combustible materials shall be stored at designated outdoor storage locker sites.
NFPA 30, 4.6.4.4.3; NFPA 704	**4.3.16.4** Outdoor storage lockers shall be placarded according to NFPA 704.
	4.4 Oxidizers *[NOTE: Additional requirements can be found in NFPA 430, "Code for Storage of Solid and Liquid Oxidizers", when quantities exceed 4,000 pounds of* ***Class 1 oxidizer*** *(see definition), 1,000 pounds of* ***Class 2 Oxidizer*** *(see definition), 200 pounds of* ***Class 3 Oxidizer*** *(see definition), or 10 pounds of* ***Class 4 Oxidizer*** *(see definition). Oxidizer classes are defined in NFPA 430".]*
NFPA 430, 2.2.1	**4.4.1** Oxidizer storage areas shall be conspicuously identified with the words “Class (appropriate classification number) Oxidizers.”
NFPA 430, 2.2.2	**4.4.1.1** Areas used to store oxidizers of different classes shall be marked as containing the most severe hazard.

Sources[11]	Consolidated Requirements[12]
NFPA 430, 2.11.6	**4.4.2** Water based manual fire fighting equipment shall be used in oxidizer storage areas.[27]
NFPA 430, 2.11.6.1	**4.4.2.1** The placement and use of dry chemical extinguishers containing ammonium compounds (Class ABC) shall be prohibited in oxidizer storage areas where oxidizers that can release chlorine are stored.
NFPA 430, 2.11.6.2	**4.4.2.2** Halon extinguishers shall not be used in oxidizer storage areas.
NFPA 430, 2.12	**4.4.3** Combustible construction materials that could come into contact with oxidizers shall be coated with a compatible material to prevent their impregnation with the oxidizers.
NFPA 430, 2.13.5	**4.4.4** Absorptive packing materials, wooden pallets, etc., that are exposed to water containing oxidizers or that contain water soluble oxidizers, and are exposed to water shall be immediately relocated to a safe outside area and properly disposed of.
NFPA 430, 2.8.1	**4.4.5** Oxidizers shall not be stored where they can be heated to within 25°F of their decomposition temperature or above 120°F, whichever is lower.[28]
	4.5 Organic Peroxides
NFPA 432, 4.1	**4.5.1** Chemical storage areas used for the storage of organic peroxides shall be conspicuously identified with the words "Organic Peroxides" and by the class.
NFPA 432, 4.1.1	**4.5.1.1** Areas used to store organic peroxides of different classes per NFPA 432, shall be marked as containing the most severe hazard.
NFPA 432, 4.1.2	**4.5.1.2** Packages containing organic peroxide formulations shall be individually marked with chemical name and other pertinent information to allow proper classification.
NFPA 432, 4.1.3	**4.5.1.3** Packages of organic peroxides that require temperature control shall be marked with the recommended storage range.
NFPA 432, 4.11.2	**4.5.2** A clear space of at least 2 ft. shall be maintained between organic peroxide storage and uninsulated metal walls.

[27]Oxidizer storage areas and flammable liquids storage areas require water- based fire suppression systems. While there are no requirements to keep water reactive materials away from oxidizers, when storing oxidizers, consideration should be given to the additional hazard posed by the presence of water reactive materials when water suppression systems are activated.

[28] Attention should be used to ensure that oxidizers stored in direct sunlight are not heated above allowed temperatures by radiant heating.

Sources[11]	Consolidated Requirements[12]
NFPA 432, 4.11.3.1	**4.5.3** Incompatible materials and flammable liquids shall not be stored within 25 ft. of organic peroxide formulations in chemical storage areas. *[NOTE: Organic peroxide formulations that are also classified as flammable liquids may be stored with other organic peroxide formulations.]*
NFPA 432, 4.11.3.2	**4.5.3.1** If a 25-foot separation cannot be maintained, then a 1-hour, liquid-tight fire barrier shall be permitted.
NFPA 432, 4.11.4	**4.5.4** Only closed containers shall be permitted in an organic peroxide storage area.
NFPA 432, 4.11.6	**4.5.5** Fifty-five-gallon drums of organic peroxide formulations shall not be stacked.
NFPA 432, 4.4.1	**4.5.6** Storage temperatures in chemical storage areas shall be maintained within the recommended storage temperature range for the materials being stored.[29]
NFPA 432, 4.4.2	**4.5.6.1** High and low temperature switches, as applicable, shall be provided in addition to normal temperature controls. These switches shall actuate an alarm to ensure prompt response.
NFPA 432, 4.4.3	**4.5.6.2** Heating systems shall use low-pressure steam, hot water, or indirectly heated air; cooling systems shall not use direct expansion of a flammable gas.
NFPA 432, 4.4.4	**4.5.6.3** Heating or cooling pipes and other heat transfer devices shall not come into contact with organic peroxide containers to cause their overheating or cooling.
NFPA 432, 4.5.2	**4.5.7** Refrigerators used for storing organic peroxide formulations shall be Class I, Group D, and Division I (i.e., "explosion-proof", as defined in Article 500 of NFPA 70.
NFPA 432, 4.5.3	**4.5.8** Unventilated, unrefrigerated storage cabinets used for the storage of organic peroxides shall be considered Class I, Division I as defined in Article 500 of NFPA 70.
NFPA 432, 4.5.4	**4.5.9** Ventilated storage cabinets shall be considered Class I, Division II as defined in Article 500 of NFPA 70. Ventilation must be a minimum of 1 cubic foot/minute/square foot of floor area.

[29] Attention should be used to ensure that **organic peroxides** stored in direct sunlight are not heated above allowed temperatures by radiant heating.

5.0 Source Documents

ANSI Z49.1 (1999), "Safety in Welding, Cutting and Allied Processes".

CGA G-1 (1996), "Acetylene"
CGA P-1 (2000), "Safe Handling of Compressed Gases in Containers".

DOE O 440.1A, "Worker Protection Management For DOE Federal And Contractor Employees".

NFPA 30 (2000), "Flammable and Combustible Liquids Code".
NFPA 45 (2000), "Standard on Fire Protection for Laboratories Using Chemicals".
NFPA 51 (1997), "Standard for the Design and Installation of Oxygen-Fuel Gas Systems".
NFPA 55 (2003), "Standard for the Storage, Use, and Handling of Compressed and Liquefied Gases in Portable Cylinders".
NFPA 430 (2000), "Code for the Storage of Liquid and Solid Oxidizers".
NFPA 432 (2002), “Code for the Storage of Organic Peroxide Formulations”.
NFPA 704 (2001), "Identification of the Hazards of Materials for Emergency Response".

29CFR1910.6, "Incorporation by Reference".
29CFR1910.106, "Flammable and Combustible Liquids".
29CFR1910.134, "Respiratory Protection".
29CFR1910.253, "Oxygen-Fuel Gas Welding and Cutting".
29CFR1910.1200, "Hazard Communication".
29CFR1926.350, "Gas Welding and Cutting".

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Chapter 6 - Hazard Control

1.0 Introduction

This chapter identifies and consolidates existing user safety and health requirements found in DOE and Federal chemical-related safety and health regulations and National Standards that address the control of hazards associated with activities involving ***chemicals*** (see definition) and ***chemical products*** (see definition). State and local codes and requirements are NOT included. This chapter specifically consolidates requirements found in the National Fire Protection Association (NFPA), the American National Standards Institute (ANSI), the Compressed Gas Association (CGA), the Occupational Safety and Health Administration (OSHA), and certain Environmental Protection Agency (EPA) regulations and Department of Energy (DOE) Rules and Orders, including technical standards that are made mandatory by their specific reference within a regulation, rule or DOE Order. This chapter is intended to list chemical-related safety and health requirements and to consolidate those that are overlapping and/or duplicative. The list of requirements includes "pointers" to the sources of those requirements.

This document does NOT create any new or additional requirements.

2.0 Applicability

The information presented here applies to all locations that use chemicals or chemical products. *[NOTE: Throughout this document, the term "chemicals" is used to indicate chemicals and/or chemical products as described in Section 3, below.]* This chapter is intended only to address chemical hazard control requirements applicable to chemical user activities. It consolidates existing, core safety and health requirements that all sites must follow when engaged in chemical-related activities.

The requirements included in this chapter come from sources that have different safety purposes. As a result, some of these requirements may not always be applicable to the work being performed at an individual site or facility. It is the responsibility of each user to determine the applicability of specific requirements to their work and how they are implemented. The reference sources for the requirements included in this chapter can be used to determine the applicability of those requirements to the work being performed.

3.0 Definitions and Acronyms

See **Glossary.**

4.0 Requirements for Hazard Control

Sources[11]	Consolidated Requirements[12]
	4.1 General (Applicable to all operations/activities involving chemicals)

Sources[11]	Consolidated Requirements[12]
DOE O 440.1A, sec. 4(j) **48CFR970.5204, 2(b)(6)[30]**	**4.1.1** A hazard prevention/abatement process shall be implemented to ensure that all identified hazards are managed through final abatement or control.
DOE O 440.1A, sec. 4(j)(1)	**4.1.1.1** Controls shall be incorporated into facility design and procedures.
DOE O 440.1A, sec. 4(j)(2)	**4.1.1.2** Abatement actions shall be prioritized based on risks to workers and promptly implemented for existing hazards identified in the workplace. Workers shall be protected immediately from imminent danger conditions.
DOE O 440.1A, sec. 4(j)(4); **29CFR1910.120(g)(1);** **29CFR1910.134(a);** **29CFR1910.1450(i)**	**4.1.1.3** Hazard controls shall be selected using the following hierarchy: (1) Elimination of the hazard through practices such as chemical substitution or process modification; (2) Engineering controls; (3) Work practices and administrative controls; and (4) Personal protective equipment
DOE O 440.1A, sec. (4)(e); **29CFR1910.1200(h)(1- 3);** **29CFR1910.132(d)**	**4.1.1.4** Workers shall be informed of and involved in identifying and controlling workplace hazards, including decisions on selection of PPE.
DOE O 440.1A, Attachment 1, sec. 5; **DOE O 440.1A, Attachment 2;** **29CFR1910.1450(c) and (e)**	**4.1.2** An industrial hygiene program shall be implemented by professionally- and technically-qualified industrial hygienists to reduce the risk of work-related disease or illness in all chemical operations including laboratories. The program shall specify appropriate process modification (including chemical substitution), engineering, administrative, work practice, and/or personal protective control methods to limit exposures to hazardous materials to acceptable levels.
	4.2 *Hazardous Operations*[31] (see definition)
DOE O 420.1A, 4.2.1; **DOE-STD-1120-98;** **DOE-STD-3009-94;** **DOE-STD-3011-94;** **DOE-STD-3016-99** **10CFR830 Subpart B, 204(b)(4);**	**4.2.1** An appropriate combination of chemical substitution, engineering and administrative controls (including the appropriate application of detection methodologies), safe work practices, and PPE shall be implemented to prevent/mitigate adverse impacts from hazardous chemicals on workers, the public, or environment.

[30] This requirement of the DOE Acquisition Regulations (DEAR, ES&H Clause) requires development and implementation of controls as part of an overall documented safety management system.
[31] The requirements for hazardous operations are in addition to requirements associated with those activities specified in Section 4.1.

Sources[11]	Consolidated Requirements[12]	
10CFR850.25(c); 29CFR1910.119(e)(3)(iii); 29CFR1910.120(c)(1); 29CFR1910.120(d) and (g)(1); 29CFR1910.252(a); 40CFR68.67(c)(3); 40CFR1502.14; 40CFR1502.16		
DOE O 420.1A, 4.2.1(3); 29CFR1910.119(f); 40CFR68.69(b)	**4.2.1.1**	Written operating procedures shall be developed that include (1) precautions necessary to prevent worker exposure to chemical hazards, e.g., chemical substitution/process change, engineering controls, administrative controls and PPE); (2) control measures to be taken if physical contact or airborne exposure to chemical hazards can occur; (3) fire safety procedures that govern the use and storage of combustible, flammable and other hazardous materials; (4) measures for controlling hazardous chemical inventory; and (5) any required safety systems and their functions.
29CFR1910.119(j); 40CFR68.73	**4.2.1.2**	Process safety equipment and engineering controls shall have (1) written procedures on maintaining their integrity; (2) training of personnel involved in process maintenance activities; (3) documented inspection and testing that meets manufacturer's recommendations and good engineering practices; (4) prompt correction of deficiencies that are outside of acceptable operating limits;
29CFR1910.119(f)(4); 29CFR1910.120(d) and (g)(1); 40CFR68.69(d)	**4.2.1.3**	Safe work practices shall be implemented such as lockout/tagout; permitted confined space entry; removal of non-essential personnel from hazardous material areas; and site and building access control.
29CFR1910.119(k) 40CFR68.85	**4.2.1.4**	Hot work operations (e.g., cutting, welding, brazing) conducted on or near hazardous operations shall be in accordance with fire prevention and protection requirements in 29CFR1910.252(a) and shall have a permit that authorizes the work to be performed.

Sources[11]	Consolidated Requirements[12]
	4.3 Requirements for Laboratory Use of Chemicals
29CFR1910.1450(e)(3)	**4.3.1** A chemical hygiene plan shall be prepared for laboratory operations that includes safe operating procedures, hazard control measures, operability requirements for protective equipment, provisions for employee training and medical consultations, designation of individuals responsible for implementing the plan, and provisions for employee protection against extremely hazardous substances.
29CFR1910.1450(e)(3)(viii)	**4.3.1.1** ***Particularly hazardous substances*** include "select carcinogens," reproductive toxins, and substances with a degree of acute toxicity. Provisions, where appropriate, shall include: • Establishment of a designated area for storage • Use of containment devices • Procedures for safe removal of contaminated waste • Decontamination procedures
NFPA 45, 2.2.1.1-4	**4.3.2** Fire Hazard Classification – Laboratory units shall be classified Class A (High Fire Hazard), Class B (Moderate fire Hazard), Class C (Low fire Hazard), or Class D (Minimal Fire Hazard), according to the quantities of flammable and combustible liquids present in the lab (outside of the storage area) as specified in Table 2.2.1(a) and Table 2.2.1(b) in NFPA 45.
NFPA 45, 2.2.1.5	**4.3.2.1** For the purposes of determining laboratory fire hazard classification and the use of tables 2.2.1(a) and (b),, quantities of liquefied flammable gases shall be treated as if they were ***Class I flammable liquids*** (see definition); that is, 4L (1.1gal) of liquefied flammable gas is to be considered equivalent to 4L (1.1 gal) of Class I flammable liquid.
NFPA 45, 4.1-4.6	**4.3.3** All laboratory units shall be provided with fire protection appropriate to the fire hazard, including: automatic fire extinguishing systems, standpipe and hose systems, portable fire extinguishers, fire alarm systems, fire prevention programs, and emergency plans.

Sources[11]	Consolidated Requirements[12]
NFPA 45, 5.1	**4.3.4** If a laboratory contains explosion hazards, as defined in sections 2.3.1 and 2.3.2 of NFPA 45, protection shall be provided by one or more of the following: • limiting the amounts of flammable or reactive chemicals or chemicals with unknown characteristics used in or exposed by experiments; • special preventive or protective measures for the reactions, equipment, or materials themselves (e.g., high-speed fire detection with deluge sprinklers, explosion-resistant equipment or enclosures); • remote control equipment; • sufficient deflagration venting in outside walls; and, • conducting experiments in a detached or isolated building, or outdoors.
NFPA 45, 5.2 -5.5	**4.3.4.1** Other explosion hazard protection may be considered including: • Explosion-resistant construction; • Explosion venting; • Controlled access to laboratory; and, • Regularly scheduled inspection and maintenance
NFPA 45, 7.2	**4.3.5** Handling of laboratory chemicals
NFPA 45, 7.2.1.1	**4.3.5.1** Chemicals shall not be brought into a laboratory work area unless design, construction, and fire protection of the facilities are commensurate with the quantities and hazards of the chemicals involved.
NFPA 45, 7.2.2.1	**4.3.5.2** Receiving, transporting, unpacking, and dispensing of chemicals and other hazardous materials shall be carried out by trained personnel in such locations and in such a manner as to minimize hazards from flammable, reactive, or toxic materials.
NFPA 45, 7.2.2.5	**4.3.5.3** Class I liquids shall not be stored or transferred from one vessel to another in any access corridor, open plan buildings, or ancillary spaces unprotected from the exit access corridor.
NFPA 45, 7.2.2.6	**4.3.5.4** Transfer of Class I liquids to smaller containers from bulk stock containers not exceeding 19L (5 gal.) in capacity shall be performed in one of the following locations: • In a laboratory hood; • In an area provided with ventilation adequate to prevent accumulations of flammable vapor/air mixtures from exceeding 25 percent of the lower flammable limit;

Sources[11]	Consolidated Requirements[12]
	• In a liquid storage area specifically designed and protected for dispensing Class I flammable liquids that meet the requirements of NFPA 30.
NFPA 45, 7.2.2.7	**4.3.5.5** Transfer of Class I liquids from containers of 19L (5 gal.) or more capacity shall be carried out as follows: • In a separate building; OR • In a liquid storage area specifically designed for dispensing Class I flammable liquids that meet the requirements of NFPA 30.
NFPA 45, 7.2.2.8	**4.3.5.6** Class I liquids shall not be transferred between conductive containers of greater than 4L (1.1 gal.) capacity unless the containers are electrically interconnected by direct bonding or indirect bonding through a common grounding system. When dispensing Class I liquids involves nonconductive containers larger than 4L (1.1gal.), which can be difficult to bond or ground, special dispensing procedures commensurate with the electrical characteristics of the liquid shall be developed and implemented.
NFPA 45, 7.2.3.2	**4.3.5.7** Individual containers of flammable or combustible liquids shall not exceed the capacities listed in NFPA 45, Table 7.2.3.2.
NFPA 45, 7.3-5	**4.3.5.8** The quantity of flammable solids, solid or liquid oxidizers, or peroxides allowed shall be limited to the minimum quantity necessary to perform the work being done. Handling of materials shall conform to the manufacturers' recommendations.
NFPA 45, 8.1.4-6	**4.3.6** Laboratory Compressed Gases – In addition to the requirements in Section 4.3, above, compressed gas cylinders in laboratories must also meet the requirements in sections 4.3.6.1-5 below.
NFPA 45, 8.1.4.1	**4.3.6.1** Lecture bottle-sized cylinders of the following gases located in laboratory units shall be kept in a continuously mechanically ventilated hood or other continuously mechanically ventilated enclosure: (1) All gases that have an NFPA 45 Health Hazard Ratings of 3 or 4; (2) All gases that have a NFPA 45 Health Hazard Rating of 2 without physiological warning properties; and (3) Pyrophoric gases

Sources[11]	Consolidated Requirements[12]
NFPA 45, 8.1.4.2	**4.3.6.2** Cylinders of gases that are greater than lecture bottle size and have NFPA 45 Health Hazard Ratings of 3 or 4, and cylinders of gases that have a Health Hazard Rating of 2 without physiological warning properties that are located in laboratory units shall meet both the following conditions: (1) Storage in approved continuously mechanically ventilated gas cabinets; and (2) Compliance with the requirements of Chapter 3, Toxic Gases, of NFPA 55.
NFPA 45, 8.1.4.3	**4.3.6.3** Cylinders of pyrophoric gases that are greater than lecture bottle size that are located in laboratory units shall be kept in approved continuously mechanically ventilated, sprinklered gas cabinets.
NFPA 45, 8.1.5.2.1-2	**4.3.6.4** Regulator systems in laboratory operations shall be equipped with two gauges, either on the regulator or remote from the regulator, installed as to show both the cylinder pressure and the outlet pressure. When the source cylinder is outside of the laboratory, a station regulator and gauge shall be installed at the point of use to show the outlet pressure.
NFPA 45 8.1.6.3-4	**4.3.6.5** Only *in use* cylinders shall be allowed in the immediate work area. A compressed gas cylinder shall be considered in use when it is: (1) connected through a regulator to deliver gas; or (2) connected to a manifold being used to deliver gas; or (3) a single cylinder secured as a reserve cylinder alongside the cylinder described in (1).
NFPA 45, 8.1.6.5	**4.3.6.6** The maximum internal volume (water volume) of all cylinders in each of the listed classifications, in use in the laboratory work area, shall comply with the following [based on internal cylinder volume at 21°, 101 kPa (70°F, 1 atm)]: (a) Maximum Quantity of Flammable Gases. (1) For a laboratory work areas of 500 ft² or less, the internal cylinder volume in standard cubic feet equals 6.0. (2) For a laboratory work area greater than 500 ft² or less, the internal cylinder volume is 0.012 ft³ per ft² lab work area.

Sources[11]	Consolidated Requirements[12]
	(b) Maximum Quantity of Oxidizing Gases. (1) For a laboratory work area of 500 ft² or less, the internal cylinder volume in standard cubic feet equals 6.0. (2) For a laboratory work area greater than 500 ft ² or less, the internal cylinder volume is 0.012³ ft per ft² lab work area. (c) Maximum Quantity of Liquefied Flammable Gases. (1) For a laboratory work area of 500 ft² or less, the internal cylinder volume in standard cubic feet equals 1.2. (2) For a laboratory work area greater than 500 ft², the internal cylinder volume is 0.0018 ft³ per ft² labor work area. (d) Maximum Quantity of Health Hazard 3 or 4 gases. (1) For a laboratory work area of 500 ft² or less, the internal cylinder volume in standard cubic feet equals 0.3. (2) For a laboratory work area greater than 500 ft ², the internal cylinder volume is 0.0006 ft³ per ft² lab work area.
NFPA 45, 9.1.2-9.2.7.2	**4.3.7** Laboratory Operations and Apparatus – NFPA 45 contains additional laboratory safety controls covering: • Operations: heating, distillation, other separation procedures, drying, mixing and grinding, and operations involving reactions at temperatures and pressures above and below ambient conditions. • Apparatus: refrigeration and cooling equipment, heating equipment, pressure equipment, and analytical instruments.
	4.4 Combustible Liquids
NFPA 30, 5.2	**4.4.1** Operations involving flammable or combustible liquids shall be located and operated so that they do not constitute a significant fire or explosion hazard to life or property.
NFPA 30, 5.9.1; **29CFR1910.106(b)(6);** **29CFR1910.106(e)(6)(1)**	**4.4.2** Precautions shall be taken to prevent the unintentional ignition of flammable vapors.

Sources[11]	Consolidated Requirements[12]
NFPA 30, 5.-9.2	**4.4.2.1** Smoking shall be permitted only in designated and properly identified areas.
NFPA 30, 5.-9.3; **29CFR1910.106(e)(8)**	**4.4.2.2** Welding, cutting, and similar spark-producing operations shall not be permitted in areas containing flammable or combustible liquids until a written permit authorizing such work has been issued.
NFPA 30, 5.9.4; **29CFR1910.106(e)(6)(ii)**	**4.4.2.3** All equipment (such as tanks, machinery, and piping) where an ignitable mixture could be present shall be bonded or connected to a ground. The bond or ground or both shall be physically applied or shall be inherently present by the nature of the installation. Electrically isolated sections of metallic piping or equipment shall be bonded to the other portions of the system or shall be individually grounded.
29CFR1910.106(d)(2)(iii)	**4.4.3**[32] Individual containers of flammable or combustible liquids shall not exceed the capacities listed in 29CFR1910.106, Table H-12.
NFPA 30, 4.5.5.2	**4.4.4** In an office occupancy, containers of Class I liquids that are outside of an inside ***liquid storage*** (see definition) area shall not exceed a capacity of one gallon (3.8 liters). *[EXCEPTION:* ***safety cans*** (see definition) *are permitted up to a two-gallon capacity.]*
NFPA 30, 4.5.5.3	**4.4.5** In an office occupancy, not more than ten gallons (37.8 liters) of ***Class I and Class II liquids*** (see definition) combined shall be kept in a single ***fire area*** (see definition) outside of a storage cabinet or an inside liquid storage area, unless the liquids are in ***safety cans*** (see definition).

[32] Glass or plastic containers up to one gallon in size may be used for Class IA or IB liquids if either (1) the liquid would be rendered unfit for its intended use by contact with metal, (2) the liquid would corrode a metal container so as to create a leakage hazard, (3) the process would require more than the allowed quantities of liquid of a single assay lot to be used at one time, or (4) the process would require the maintenance of an analytical standard liquid of a quality which is not met by the specified standards of liquids available, and the quantity of the analytical standard liquid required for any one control process exceeds one-sixteenth the capacity of the container allowed under Table 1.

Sources[11]	Consolidated Requirements[12]	
NFPA 30, 4.-5.5.4	**4.4.6**	In an office occupancy, not more than 25 gallons (94.6 liters) of ***Class I and Class II liquids*** (see definition) combined shall be kept in a single fire area in safety cans outside of a storage cabinet or an inside liquid storage area.
NFPA 30, 4.5.5.5	**4.4.7**	In an office occupancy, not more than 60 gallons (227 liters) of ***Class III liquids*** (see definition) shall be stored outside of an inside liquid storage area or storage cabinet.
NFPA 30, 5.13.2.1	**4.4.8**	Wherever flammable or combustible liquids are used, either fire extinguishers or pre-connected hoses shall be provided in accordance with NFPA 30.
29CFR1910.106(a)(18)(iii)	**4.4.9**	Whenever a combustible liquid is heated for use to within 30°F (16.7°C) of its flash point, it shall be handled in accordance with the requirements for the next lower class of liquids.
NFPA 30, 5.13.4.1	**4.4.10**	An ***approved*** (see definition) means for prompt notification of fire or emergency to those within the plant and to the fire department shall be provided.
NFPA 30, 5.13.4.2	**4.4.11**	Those areas, including buildings, where a potential exists for a flammable liquid spill shall be monitored for the presence of those liquids.
NFPA 30, 5.13.6.1	**4.4.12**	All fire protection equipment, and associated alarms, interlocks, and controls, shall be properly maintained, and periodic inspections and tests shall be done in accordance with both standard practice and the equipment manufacturer's recommendations.
NFPA 30, 5.13.6.2; **29CFR1910.106(e)(9)(i)**	**4.4.13**	Maintenance and operating practices shall control leakage and prevent spillage of flammable liquids.
29CFR1910.106(e)(9)(i)	**4.4.14**	Spills shall be cleaned up promptly.
NFPA 30, 5.13.6.3; **29CFR1910.106(e)(9)(iii)**	**4.4.15**	Combustible waste material and residues in operating areas shall be kept to a minimum, shall be stored in covered metal containers, and shall be disposed of daily.

Sources[11]	Consolidated Requirements[12]
NFPA 30, 5.13.6.4; **29CFR1910.106(e)(9)(iv)**	**4.4.16** Ground areas around facilities where liquids are used shall be kept free of weeds, trash, or other unnecessary combustible materials.
NFPA 30, 5.13.6.5; **29CFR1910.106(e)(9)(ii)**	**4.4.17** Aisles established for movement of personnel shall be maintained clear of obstructions.
NFPA 30, 5.5.2; **29CFR1910.106(e)(2)(iv)(d)**	**4.4.18** Flammable liquids or combustible liquids at temperatures at or above their flash points shall be drawn from or transferred into vessels, containers, or portable tanks using one of the following methods: • from original shipping containers with a capacity of five gallons (19 liters) or less; • from safety cans; • through a closed piping system; • from portable tanks or containers by means of a device that has anti-siphoning protection and that draws through an opening in the top of the tank or container; • by gravity through a listed self-closing valve or self-closing faucet. *[NOTE: **Class I-A liquids** (see definition) shall not be dispensed by gravity from tanks.]*
29CFR1910.106(e)(2)(iv)(d)	**4.4. 19** Transferring flammable or combustible liquids by means of air pressure on the container or tank shall be prohibited.
29CFR1910.106(d)(4)(v)	**4.4.20** Dispensing in inside storage rooms shall be by approved pump or self-closing faucet only.
NFPA 30, 5.5.2.1	**4.4.21** If hose is used in the transfer operation, it shall be equipped with a self-closing valve without a hold-open latch in addition to the outlet valve. Only listed or approved hose shall be used.
NFPA 30, 5.5.2.2	**4.4.22** Means shall be proved to minimize generation of static electricity. Such means shall meet the requirements of NFPA 30.
29CFR1910.106(e)(6)(ii)	**4.4.23** ***Class I liquids*** (see definition) shall not be dispensed into containers unless the nozzle and container are electrically interconnected.

Sources[11]	Consolidated Requirements[12]
NFPA 30, 5.5.2.3	**4.4.24** If pumps are used to transfer liquids, means shall be provided to stop the transfer in the event of a spill or fire.
29CFR1910.106(e)(2)(iii)	**4.4.25** Areas in which flammable or combustible liquids are transferred from one tank or container to another container shall be separated from other operations in the building by adequate distance or by construction having adequate fire resistance. Adequate natural or mechanical ventilation shall be provided.
NFPA 30, 4.4.5.1	**4.4.26** Dispensing of flammable liquids or dispensing of combustible liquids at temperatures at or above their flash points shall not be permitted in cutoff rooms or attached buildings that exceed 1000 ft^2 (93m^2) in floor area or in liquid warehouses unless the dispensing area is suitably cut off from the storage areas in accordance with NFPA 30.
NFPA 30, 4.5.2.9	**4.4.27** Dispensing of flammable liquids or of Class II combustible liquids shall not be permitted in general purpose warehouses unless the dispensing area is suitably cut off from other ordinary combustible or liquid storage areas in accordance with NFPA 30, and otherwise complies with NFPA 30.
29CFR1910.106(e)(2)(iv)(a)	**4.4.28** Flammable liquids shall be kept in covered containers when not actually in use.
29CFR1910.106(e)(2)(iv)(b)	**4.4.29** Where flammable or combustible liquids are used or handled, except in closed containers, means shall be provided to dispose promptly and safely of leakage and spills.
29CFR1910.106(e)(2)(iv)(c)	**4.4.30** Class I liquids shall be used only where there are no open flames or other sources of ignition within the possible path of vapor travel.
	4.5 Compressed Gases
29CFR1910.101	**4.5.1** Compressed gas cylinders shall be used in accordance with the Compressed Gas Association (CGA).
NFPA 55, 4.2; **29CFR1910.253(b)(1)(ii)**	**4.5.2** Compressed gas cylinders shall be appropriately labeled. Whenever possible, labels shall be located near the shoulder of the cylinder.

Sources[11]	Consolidated Requirements[12]
CGA P-1, 3.2.5	**4.5.2.1** The color of the cylinder shall not be the only means used to identify the gas it contains.
ANSI Z49.1, 10.8.1.4 and 5; **CGA G-1, 5.1.3;** **CGA P-1, 3.2.2;** **NFPA 55, .7.1.2.2;** **29CFR1910.253(b)(5)(ii)(L)**	**4.5.2.2** Labels or markings placed on compressed gas cylinders by the manufacturer or distributor shall not be defaced or removed.
ANSI Z49.1, 10.8.1.4	**4.5.2.3** Cylinders not bearing a legible label or other identification shall not be used and shall be returned to the manufacturer or distributor.
NFPA 51, 2.1.3	**4.5.2.4** Gas name markings shall not be cut into the metal of the cylinder by the user.
CGA P-1, 3.3.3	**4.5.3** Compressed gas cylinders shall not be subjected to temperature extremes.
ANSI Z-49.1, 10.8.1.8; **CGA P-1, 3.3.3;** **NFPA 55, 7.1.5.5;** **29CFR1910.253(b)(2)(i)**	**4.5.3.1** Compressed gas cylinders shall not be exposed to temperatures exceeding 125°F
CGA P-1, 3.3.3; **CGA P-1, 4.2.2;** **CGA G-1, 5.1.6;** **CGA G-1, 5.3.3.12;** **NFPA 55, 7.1.5.7;** **29CFR1926.350(b)(3)**	**4.5.3.2** Direct flames or heat shall not be applied to a compressed gas cylinder.
CGA P-1, 3.3.6; **NFPA 55, 7.1.8**	**4.5.3.2.1** Cylinders exposed to fire shall not be shipped or used until the manufacturer or supplier requalifies them in accordance with the pressure and vessel code under which they were manufactured.

Sources[11]	Consolidated Requirements[12]
ANSI Z49.1 10.8.4.13; **29CFR1910.253(b)(5)(ii)(L); 29CFR1926.350(b)(1)**	**4.5.3.2.2** Cylinders shall be kept far enough away from operations such as welding to prevent sparks, hot slag, flames, etc., from reaching them. If cylinders cannot be kept a sufficient distance away, then fire-resistant shields shall be used to separate the cylinders from the hot operations.
CGA P-1, 3.3.4	**4.5.3.3** Cylinders shall not be subjected to artificially low temperatures without the permission of the supplier. Outside storage is not affected by this requirement.
CGA P-1, 3.3.8; **NFPA 55, 7.1.1.2.1; NFPA 55, 7.1.9.1;** **29CFR1926.350(c)(3)**	**4.5.4** No structurally damaged or defective cylinders shall be used. Damaged or defective cylinders shall be removed from service.
ANSI Z49.1, 10.8.1.2; ANSI Z49.1, 10.8.1.3; **CGA P-1, 3.6; CGA G-1, 5.1.7;** **29CFR1910.253(b)(5)(ii)(M); 29CFR1926(c)(2)**	**4.5.5** No person other than the cylinder supplier shall mix or refill gases in cylinders. Used, non-refillable containers shall be disposed of according to the manufacturer's recommendation.
29CFR1926.350(c)(2)	**4.5.5.1** No one shall use a cylinder's contents for purposes other than those intended by the supplier.
ANSI Z49.1, 10.8.3.4; **CGA P-1, 3.2; CGA G-1, 5.1.6;** **29CFR1910.253(b)(5)(ii)(N); 29CFR1910.253(b)(5)(iii)(H)**	**4.5.6** No one shall tamper with safety devices in cylinders or valves.
CGA P-1, 3.2; CGA P-1, 3.3.8; **NFPA 55, 7.1.1.2.1;** **29CFR1910.253(b)(5)(ii)(R) (1) and (2)**	**4.5.6.1** No attempt shall be made to maintain or repair cylinder safety devices. Suppliers instructions as to the disposition of the cylinder shall be followed if a cylinder with a faulty valve or safety device is found or if the cylinder is otherwise found to be defective.

Sources[11]	Consolidated Requirements[12]
29CFR1910.253(b)(5)(ii)(R)(3)	**4.5.6.2** Complete removal of the stem from a diaphragm-type cylinder valve shall be avoided. *[NOTE: Stems may be removed before cylinder disposal.]*
ANSI Z-49.1, 10.8.4.10; **CGA G-1, 5.3.3.11;** **CGA G-1, 4.2.11;** **29CFR1910.253(b)(2)(ii);** **29CFR1910.253(b)(2)(iii);** **29CFR1910.253(b)(5)(ii)(G);** **29CFR1910.253(b)(5)(ii)(H);** **29CFR1926.350(a)(8)**	**4.5.7** When compressed gas cylinders are not in use or are empty, their valves shall be closed.
ANSI Z-49.1, 10.8.3.6; **CGA G-1, 5.1.9;** **CGA G-1, 5.5.1;** **CGA P-1, 3.4.1;** **NFPA 55, 7.1.4.2;** **29CFR1910.253(b)(2)(iv);** **29CFR1910.253(b)(5)(ii)(A);** **29CFR1926.350(a)(1)**	**4.5.8** Where cylinders are designed to accept valve protection caps, caps shall be in place and hand tight at all times except when connected for use.
CGA P-1, 3.4.2; **NFPA 55, 7.1.4.3.1**	**4.5.9** Where valve outlet caps and/or plugs are provided by the manufacturer, the user shall keep the device on the valve outlet at all times except when secured and connected for use.
CGA G-1, 5.5.1; **CGA P-1, 3.4.3**	**4.5.9.2** Valve outlet caps and/or plugs shall be in place and tightened before shipment of the cylinder back to the supplier.
ANSI Z-49.1, 10.8.3.2; **29CFR1910.253(b)(5)(ii)(C);** **29CFR1926.350(a)(5)**	**4.5.10** Pry bars shall not be used under valves or valve protection caps to pry cylinders loose when frozen or otherwise affixed to the ground.
29CFR1926.350(a)(5)	**4.5.10.1** Warm, not boiling water shall be used to thaw cylinders loose.

Sources[11]	Consolidated Requirements[12]
ANSI Z49.1, 10.8.3.3; **CGA P-1, 3.3.1;** **CGA G-1 5.1.10;** **29CFR1910.253(b)(5)(ii)(K);** **29CFR1926, 350(c)(1)**	**4.5.11** Compressed gas cylinders shall not be used as rollers or supports.
29CFR1926. 350(a)(11)	**4.5.12** Compressed fuel gas cylinders shall not be kept in unventilated enclosures such as lockers or cupboards.
ANSI Z-49.1, 10.8.4.14; **CGA P-1, 3.3.2;** **CGA G-1, 5.1.8;** **NFPA 55, 7.1.5.10;** **29CFR1910.253(b)(5)(ii)(J);** **29CFR1926.350(b)(2)**	**4.5.13** Compressed gas cylinders shall not be placed where they can inadvertently become part of an electrical circuit.
CGA P-1, 3.3.2	**4.5.13.1** When used in conjunction with electric welding, compressed gas cylinders shall not be grounded or used for grounding.
ANSI Z49.1, 10.8.4.14; **29CFR1926.350(b)(2);** **29CFR1910.253(b)(5)(ii)(J)**	**4.5.13.2** Electrodes shall not be struck against a compressed gas cylinder to strike an arc.
ANSI Z49.1, 10.8.2.5; **ANSI Z49.1,10.8.4.12;** **CGA P-1, 3.7.4;** **NFPA 45, 8.1.5.1;** **NFPA 55, 7.1.3.4;** **NFPA 55, 7.2.1.2.2;** **NFPA 55, 7.3.1.7.1;** **NFPA 55, 7.3.1.8;** **29CFR1926.350(a)(7) and (9);** **29CFR1926.350(b)(3)**	**4.5.14** Compressed gas cylinders shall be secured in an upright position when being used unless specifically designed for a horizontal application. *[EXCEPTION: Cylinders containing non-flammable liquefied gases may be used in the inverted position when the liquid phase is used.]*

Sources[11]	Consolidated Requirements[12]
ANSI Z49.1, 10.3.3; **ANSI Z49.1, 10.6.5;** **CGA G-1, 5.3.3.4;** **CGA P-1, 3.8.7;** **29CFR1910.253(3)(1);** **29CFR1926.350(f)(1)**	**4.5.15** Oxygen and fuel and other compressed gas cylinders, equipment, pipelines or apparatus shall not be used interchangeably with any other gas and each shall be used only for the service for which it was approved.
ANSI Z49.1, 10.5.2.1; **CGA G-1, 5.3.3.6;** **CGA P-1, 3.8.4;** **NFPA 55, 7.3.1.4.1**	**4.5.16** All connections shall be gas tight and no leaks shall be present in the system.
ANSI Z49.1, 10.5.2.1; **CGA P-1, 4.2.1.5**	**4.5.16.1** A flame shall not be used for the detection of leaks in compressed gas systems. Soapy water is one acceptable method.
CGA P-1, 3.7.5; **CGA P-1, 3.8.2;** **NFPA 55, 7.3.1.4.2**	**4.5.17** Backflow protection shall be used when the backflow of gas can result in a hazardous condition.
NFPA 55, 7.3.1.2; **NPFA 55, 7.5-7.10**	**4.5.18** Compressed gas systems shall be designed for their intended use and shall be designed by persons competent in such design. . *[NOTE: Additional requirements for corrosive, flammable, oxidizing, pyrophoric, toxic/highly toxic, and unstable reactive gases can be found in NFPA 55, 7.5-7.10.]*
ANSI Z49.1, 10.8.4.1; **CGA G-1, 5.3.1;** **CGA P-1, 3.8.8;** **NFPA 45, 8.1.5.2;** **NFPA 51, 3-1.4;** **NFPA 51, 3-2.5;** **NFPA 51, 3-4.5;** **29CFR1926.350(d)(3);** **29CFR1910.253(b)(5)(iii)(I)**	**4.5.19** Compressed gases shall never be used from cylinders or high pressure manifolds without reducing the pressure through a suitable regulator unless the equipment used is designed to withstand full cylinder pressure.

Sources[11]	Consolidated Requirements[12]
29CFR1910.253(b)(5)(ii)(P)	**4.5.19.1** Unless connected to a manifold, oxygen from a cylinder shall not be used without a regulator.
ANSI Z49.1, 10.7.1; **ANSI Z49.1, 10.7.2;** **CGA G-1, 5.3.3.4;** **NFPA 51, 5-6;** **NFPA 45, 8.1.5.2;** **29CFR1910.253(a)(3);** **29CFR1910.253(e)(6)(i)**	**4.5.20** Approved gas regulators and pressure reducing valves shall be used only for the gas and pressures for which they are labeled.
29CFR1926.350(h);	**4.5.21** Regulators, including their related gauges, shall be in proper working order while in use.
ANSI Z49.1, 10.7.3; **29CFR1910.253(e)(6)(iv)**	**4.5.21.1** Union nuts and connections shall be inspected before cylinder use to detect faulty seals, which could cause leakage. Faulty nuts and connectors shall be replaced.
ANSI Z49.1 10.7.6; **CGA G-1, 5.1.5;** **29CFR1910.253(e)(6)(ii)**	**4.5.21.2** A qualified mechanic shall perform repair of regulators or their parts.
ANSI Z49.1, 10.7.5; **ANSI Z49.1, 10.8.4.11;** **CGA G-1, 5.3.3.11;** **CGA P-1, 3.8.6;** **29CFR1910.253(b)(5)(iii)(D);** **29CFR1926.350(d)(4)**	**4.5.22** Before a regulator is removed from a cylinder, the cylinder valve shall be closed and the pressure released from the regulator.
ANSI Z49.1, 10.7.5; **ANSI Z49.1, 10.8.4.4;** **CGA G-1, 5.3.3.7;** **CGA P-1, 3.8.1.1;** **29CFR1910.253(b)(5)(iii)(J);** **29CFR1926.350(d)(2)**	**4.5.23** Cylinder valves shall always be opened slowly to prevent damage to the regulator.
ANSI Z49.1 10.8.4.4; **CGA P-1, 3.8.1**	**4.5.23.1** Personnel shall stand to the side and not in front of the regulator orifice when the cylinder valve is opened.

Sources[11]	Consolidated Requirements[12]
ANSI Z49.1, 10.8.4.7	**4.5.24** When a high pressure gas (non-liquefied) cylinder is in use, the valve shall be fully opened to prevent leakage around the valve stem.
ANSI Z49.1, 10.8.4.6; **CGA G-1, 5.3.3.10;** **CGA P-1, 3.8.1.1;** **29CFR1910.253(b)(5)(ii)(E);** **29CFR1910.253(b)(5)(iii)(L);** **29CFR1926.350(d)(5)**	**4.5.25** Cylinders not having a fixed hand wheel shall have keys, handles or non-adjustable wrenches on valve stems while cylinders are in service.
29CFR1926.350(d)(2)	**4.5.25.1** Manifolded or coupled cylinders shall have at least one such wrench always available.
ANSI Z49.1, 10.8.4.5; **CGA P-1, 3.8.1.1 ;** **CGA G-1, 5.3.3.2;** **29CFR1910.253(b)(5)(ii)(Q)(1)**	**4.5.26** Cylinders having hand wheels shall not be opened using wrenches, hammers or other tools. If the valve cannot be opened by hand, then the manufacturer shall be notified and their directions followed.
ANSI Z-49.1, 10.8.3.10; **CGA G-1, 5.2.5;** **29CFR1910.253(b)(5)(ii)(D);** **29CFR1926.350(a)(6)**	**4.5.27** When cylinders are secured in a suitable hand truck, regulators do not have to be removed and valve protection caps need not be in place before cylinders are moved. When cylinders are to be moved with regulators attached, the cylinder valve must be closed.
ANSI Z-49.1, 10.8.3.5; **CGA P-1, 3.8.1;** **29CFR1910.253(b)(5)(ii)(F);** **29CFR1926.350(a)(8)**	**4.5.28** Cylinder valves shall be closed before moving cylinders.
ANSI Z-49.1, 10.8.3.7; **CGA P-1, 3.5.1;** **29CFR1910.253(b)(5)(ii)(C);** **29CFR1926.350(a)(5)**	**4.5.29** Valve protection caps shall not be used for lifting cylinders.
ANSI Z-49.1, 10.8.3.8; **CGA G-1, 5.2.3;** **29CFR1910.253(b)(5)(ii)(A);** **29CFR1926.350(a)(2)**	**4.5.30** When using a crane, derrick, etc. to transport cylinders, a cradle, boat, pallet, slingboard or other suitable platform shall be used. Compressed gas cylinders shall be secured to the lifting device before they are hoisted.

Sources[11]	Consolidated Requirements[12]
ANSI Z-49.1, 10.8.3.8; **CGA G-1, 5.2.3;** **CGA P-1, 3.5. 2;** **29CFR1910.252(b)(5)(ii)(A);** **29CFR1926.350(a)(2)**	**4.5.30.1** Choker slings, ropes, chains or magnets shall not be used to hoist compressed gas cylinders.
ANSI Z49.1, 10.8.3.1; **CGA G-1, 5.2.1, 2 and 6;** **CGA P-1, 3.5;** **29CFR1910.253(b)(5)(ii)(B) and (O);** **29CFR1910.253(b)(5)(iii)(B);** **29CFR1926.350(a)(3)**	**4.5.31** Compressed gas cylinders shall not be purposely dropped, struck or permitted to strike each other violently.
ANSI Z-49.1, 10.8.3.9; **CGA G-1, 5.2.5;** **29CFR1926.350(a)(4) and (9)**	**4.5.32** When compressed gas cylinders are transported by motor vehicle, they shall be secured in an upright position.
29CFR1926.350(a)(3)	**4.5.33** When large cylinders are moved by hand, they shall be tilted and rolled on their bottom edge.
ANSI Z49.1, 10.8.4.3; **CGA G-1, 5.3.3.3;** **29CFR1910.253(b)(5)(iii)(C);** **29CFR1926.350(d)(1)**	**4.5.34** Before connecting a regulator to an oxygen or fuel cylinder valve, the valve shall be inspected, wiped clean and the valve shall be opened momentarily and then closed immediately. This process is called "cracking".
ANSI Z49.1, 10.8.4.3; **CGA P-1, 3.3.9;** **29CFR1910.253(b)(5)(iii)(C);** **29CFR1926.350(d)(1)**	**4.5.34.1** The person cracking the valve shall stand to one side and not in front of the gas stream. Compressed gas streams shall not be directed towards any person.
ANSI Z49.1, 10.8.4.3; **29CFR1910.253(b)(5)(iii)(D);** **29CFR1926.350(d)(1)**	**4.5.34.2** Fuel cylinder valves shall not be cracked near ignition sources such as flames, welding work, sparks, etc..

Sources[11]	Consolidated Requirements[12]
29CFR1926.350(e)(3)	**4.5.34.3** Hose connections shall be kept free of grease and oil.
ANSI Z 49.1, 10.6.1; **29CFR1910.253(e)(5)(i)**	**4.5.35** Hoses for oxy-fuel gas service shall comply with the Rubber Manufacturers Association IP-7 Specification for Rubber Welding Hose.
ANSI Z49.1, 10.6.2; **29CFR1926.350(f)(1)**	**4.5.36** Fuel gas hoses shall be red and oxygen hoses shall be green when they are used for welding and cutting activities.
ANSI Z49.1, 10.6.3; **29CFR1910.253(e)(5)(ii);** **29CFR1926.350(f)(2)**	**4.5.37** When parallel lengths of oxygen and fuel gas hoses are taped together such as in a welding operation, not more than 4 inches out of every 12 shall be covered by tape.
ANSI Z49.1, 10.6.4; **29CFR1910.253(e)(5)(v);** **29CFR1926.350(f)(3)**	**4.5.38** All hoses used for welding, cutting and other hot work that will be used to carry hazardous gas (for example, oxygen, fuel gases, oxidizers) shall be inspected at the beginning of each working shift that they are to be used and any defective hoses shall be removed from service. *[NOTE: Defects in hoses that shall render the hose no longer useable include leaks, burns, and worn places that render the hose unfit for service.]*
ANSI Z49.1, 10.6.5; **29CFR1910.253(e)(5)(iii)**	**4.5.39** Hose connections shall comply with the CGA Pamphlet E-1, Regulator Connection Standards.
ANSI Z49.1, 10.6.5	**4.5.39.1** Hose connections for welding gas lines shall not be compatible with breathing air equipment.
ANSI Z49.1, 10.6.6; **29CFR1910.253(e)(5)(iv)**	**4.5.39.2** Hose connections shall be able to withstand, without leakage, twice the normal operating pressure and not less than 300 psi.
ANSI Z49.1, 10.6.6; **29CFR1910.253(e)(5)(iv)**	**4.5.39.3** Oil-free air or an oil-free inert gas shall be used to test hose connections.
29CFR1926.350(f)(6)	**4.5.39.4** Storage areas for hoses shall be well ventilated.
ANSI Z49.1, 10,9.3; **ANSI Z49.1, 10.9.4;** **ANSI Z49.1, 10.9.5;** **NFPA 51;** **29CFR1910.253**	**4.5.40** Fuel gas and oxygen manifolds capacity limits, locations and design criteria shall be in accordance with NFPA 51 and 29CFR1910.253.

Sources[11]	Consolidated Requirements[12]
CGA G-1, 5.1.4; **29CFR1910.253(c)(5)(i)**	**4.5.41** Fuel gas and oxygen manifolds shall be installed under the supervision of someone familiar with the proper practices.
ANSI Z49.1, 10.9.2; **29CFR1910.253(c)(5)(ii)**	**4.5.42** All manifolds and their parts shall be used only for those gases for which they are approved.
ANSI Z49.1, 10.9.1; **NFPA 51, 3-2.1;** **NFPA 51, 3-1.1;** **29CFR1910.253(c)(1)(i)**	**4.5.42.1** Manifolds shall be approved either separately for each of their components or as an assembled unit.
29CFR1926.350(e)(1)	**4.5.43** Manifolds shall bear the name of the substance contained inside in letters at least 1 inch high either directly painted upon the manifold or on a sign permanently affixed to the manifold.
NFPA 51, 3-3.5	**4.5.43.1** Low pressure manifolds shall be marked as such to prevent the attachment of high pressure cylinders.
29CFR1926.350(e)(2)	**4.5.44** Fuel gas and oxygen manifolds shall be located in safe, well ventilated, accessible locations and not within enclosed spaces.
29CFR1926.350(e)(3)	**4.5.45** Fuel gas and oxygen manifold hose connections shall be such that hoses cannot be interchanged between fuel gas and oxygen manifolds and supply header connections.
29CFR1926.350(e)(3)	**4.5.45.1** Adapters shall not be used to permit the interchange of hoses.
29CFR1926.350(e)(4)	**4.5.46** When not in use, fuel gas and oxygen manifold and header connections shall be capped.
29CFR1926.350(3)(5)	**4.5.47** Nothing shall be placed on top of a fuel gas and oxygen manifold that will damage the manifold or interfere with the quick closing of the valves.
NFPA 51, 3-4.1	**4.5.48** Portable outlet headers shall not be used indoors except for temporary service as approved by the Occupational Safety and Fire Protection Department.

Sources[11]	Consolidated Requirements[12]
ANSI Z-49.1, 10.3.1; **CGA P-1, 4.4.1;** **29CFR1910.253(b)(5)(i); 29CFR1926.350(h)(i)**	**4.5.49** Oxygen cylinders, cylinder valves, couplings, regulators, hoses, and other apparatus shall be kept free from oil, grease, dirt and other flammable or explosive substances. These materials shall not be handled with oily hands or gloves.
29CFR1910.253(b)(5)(I); 29CFR1926.350(h)(i)	**4.3.49.1** A jet of oxygen gas shall not be directed at an oily surface, greasy clothes, etc.
ANSI Z49.1, 10.7.4; **29CFR1910.253(e)(6)(iii)**	**4.5.50** Gauges used for oxygen service shall be marked "Use No Oil".
ANSI Z49.1, 10.3.2	**4.5.51** Oxygen shall not be used as a substitute for compressed air. For example, it shall not be used in pneumatic tools, to blow out pipelines, to dust off clothing or any similar application.
ANSI Z49.1, 10.7.5	**4.5.52** Oxygen regulators shall be drained of oxygen before they are attached to a cylinder or a manifold or before the cylinder valve is opened.
CGA P-1, 4.4.2	**4.5.53** Oxygen in work areas shall not be allowed to exceed 23 percent by volume.
ANSI Z49.1, 10.8.2.5; **29CFR1910.253(b)(3)(ii); 29CFR1910.253(b)(5)(iii)(A)**	**4.5.54** Fuel gas cylinders shall be used valve end up.
NFPA 55, 7.6.3.1	**4.5.55** Where ignition of a flammable gas by static electricity is possible, means shall be provided to prevent static discharge.
ANSI Z49.1, 10.8.4.9; **CGA G-1, 5.3.3.9;** **29CFR1910.253(b)(5)(iii)(E); 29CFR1926.350(d)(2)**	**4.5.56** Nothing shall be placed on fuel cylinders while in use that could damage safety devices or interfere with the quick closing of the valve.
ANSI Z49.1, 10.8.4.8; **CGA G-1, 5.3.3.8;** **29CFR1910.253(b)(5)(iii)(K); 29CFR1926.350(d)(2)**	**4.5.57** Quick opening valves on fuel gas cylinders shall be opened between ¾ and 1 ½ turns unless otherwise specified by the manufacturer.
ANSI Z49.1, 10.8.4.15	**4.5.58** Withdrawal rates from gas cylinders shall not exceed manufacturer's recommendations.

Sources[11]	Consolidated Requirements[12]
ANSI Z49.1, 10.8.5.1; **CGA G-1, 5.6.2;** **29CFR1926.350(d)(5)**	**4.5.59** If a leak is found around the valve stem of a fuel gas cylinder, then the packing nuts shall be tightened and the cylinder valve closed.
ANSI Z49.1, 10.8.5.2; **CGA G-1, 5.6.3;** **29CFR1910.253(b)(5)(iii)(F);** **29CFR1926.350(d)(5)**	**4.5.59.1** If these actions do not stop the leak (because the leak is in the valve stem, valve seat, cylinder fuse plug, etc.) then the cylinder shall be moved from the work area to a safe location outdoors and the cylinder shall be properly marked.
ANSI Z49.1, 10.8.5.2; **CGA G-1, 5.6.3;** **29CFR1910.253(b)(5)(iii)(G)**	**4.5.59.2** Precautionary signs warning of a fire hazard shall be posted where leaking fuel cylinders are located.
ANSI Z49.1, 10.8.5.2	**4.5.59.3** If a leaking fuel cylinder cannot be moved, then the area shall be evacuated and the fire department shall be summoned for assistance.
ANSI Z49.1, 10.8.5.3	**4.5.59.4** Small fires at fuel gas cylinders shall be extinguished if possible without endangering personnel by either shutting off the valve or by the use of water.
ANSI Z49.1, 10.8.5.3	**4.5.59.4.1** Personnel shall evacuate the area and the fire department summoned for assistance if a cylinder fire cannot be easily extinguished.
NFPA 51, 4-4.2; **NFPA 51, 4-5.2;** **29CFR1910.253(d)(5)(ii)**	**4.5.60** When compressed gas lines are being purged of air, oxygen or combustible gas, then sources of ignition shall not be allowed near uncapped openings.
NFPA 51, 1-3.1	**4.5.61** The use of liquid acetylene is prohibited.
	4.5.62 Details for the following compressed gases can be found in the listed citations:
29CFR1910.102	**4.5.62.1** Acetylene
29CFR1910.103	**4.5.62.2** Hydrogen
29CFR1910.104	**4.5.62.3** Oxygen

Sources[11]	Consolidated Requirements[12]
29CFR1910.105	**4.5.62.4** Nitrous Oxide
	4.6 Specific Chemicals – In addition to the chemical safety controls identified in sections 4.1 through 4.5 of this chapter, there are control requirements for many specific chemicals such as those listed in sections 4.6.1 through 4.6.31 below . Details can be found in the specific citations.
29CFR1910.1014	**4.6.1** 2-Acetylaminofluorene
29CFR1910.1045	**4.6.2** Acrylonitrile
29CFR1910.1011	**4.6.3** 4-Aminodiphenyl
29CFR1910.1018	**4.6.4** Arsenic, inorganic
29CFR1910.1001	**4.6.5** Asbestos
29CFR1910.1028	**4.6.6** Benzene
29CFR1910.1010	**4.6.7** Benzidine
10CFR850	**4.6.8** Beryllium
29CFR1910.1051	**4.6.9** 1,3-Butadiene
29CFR1910.1027	**4.6.10** Cadmium
29CFR1910.1008	**4.6.11** bis-Chloromethyl ether
29CFR1910.1044	**4.6.12** 1,2-dibromo-3-chloropropane
29CFR1910.1007	**4.6.13** 3,3'-Dichlorobenzidine (and its salts)
29CFR1910.1015	**4.6.14** 4-Dimethylaminoazobenzene
29CFR1910.1012	**4.6.15** Ethyleneimine
29CFR1910.1047	**4.6.16** Ethylene oxide
29CFR1910.1048	**4.6.17** Formaldehyde
29CFR1910.1025	**4.6.18** Lead
NFPA 484	**4.6.19** Lithium
NFPA 484	**4.6.20** Magnesium solids and powders
29CFR1910.1006	**4.6.21** Methyl chloromethyl ether
29CFR1910.1052	**4.6.22** Methylene chloride

Sources[11]	Consolidated Requirements[12]
29CFR1910.1050	**4.6.23** Methylenedianiline
29CFR191 0.1004	**4.6.24** alpha-Naphthylamine
29CFR1910.1009	**4.6.25** beta-Naphthylamine
29CFR1910.1003	**4.6.26** 4-Nitrobiphenyl
29CFR1910.1016	**4.6.27** N-Nitrosodimethylamine
29CFR1910.1013	**4.6.28** beta-Propiolactone
NFPA 484	**4.6.29** Titanium
29CFR1910.1017	**4.6.30** Vinyl chloride
NFPA 484	**4.6.31** Zirconium

5.0 Source Documents

ANSI Z49.1 (1999), "Safety in Welding, Cutting, and Allied processes".

CGA P-1 (2000), "Safe Handling of Compressed Gases in Containers".

DOE O 420.1A, "Facility Safety".
DOE O 440.1A, "Worker Protection Management".

DOE-STD-1120-98, "Integration of Environment, Safety, and Health into Facility Disposition Activities".
DOE-STD-3009-94, "Preparation Guide for U.S. DOE Nonreactor Nuclear Facility Safety Analysis Reports".
DOE-STD-3011-94, "Guidance for Preparation of DOE O 5480.22 (TSR) and DOE O 5480.23 (SAR) Implementation Plans".
DOE-STD-3016-99, "Limited Standard; Hazard Analysis Reports for Nuclear Explosive Operations".

NFPA 30 (2000), "Flammable and Combustible Liquids Code".
NFPA 45 (2000), "Standard on Fire Protection for Laboratories Using Chemicals".
NFPA 55 (2003), "Storage, Use, and Handling of Compressed Gases and Cryogenic Fluids in Portable and Stationary Containers, Cylinders, and Tanks".
NFPA 471 (2002), "Recommended Practice for Responding to Hazardous Materials".
NFPA 472 (2002), "Standard on Professional Competence of Responders to Hazardous Materials Incidents".
NFPA 484 (2002), "Standard for Combustible Metals, Metal Powders, and Metal Dusts".

10CFR830, "Nuclear Safety Management," Subpart B, "Safety Basis Requirements".

10CFR850, “Chronic Beryllium Disease Prevention Program”.
10CFR1021, “National Environmental Policy Act Implementing Procedures”.
29CFR1910.101, “Compressed Gases (general requirements)”.
29CFR1910.102, “Acetylene”.
29CFR1910.103, “Hydrogen”.
29CFR1910.104, “Oxygen”.
29CFR1910.105, “Nitrous oxide”.
29CFR1910.119, “Process Safety Management of Highly Hazardous Chemicals”.
29CFR1910.120, “Hazardous Waste Operations and Emergency Response”.
29CFR1910.132, “Personal Protective Equipment”.
29CFR1910.134, “Respiratory Protection”.
29CFR1910.253, “Oxygen-fuel Gas Welding and Cutting”.
29CFR1910.1001, “Asbestos”.
29CFR1910.1003, “13 Carcinogens (4-Nitrobiphenyl, etc.)”.
29CFR1910.1004, “alpha-Naphthylamine”.
29CFR1910.1006, “Methyl chloromethyl ether”.
29CFR1910.1007, “3,3’-Dichlorobenzidine (and its salts)”.
29CFR1910.1008, “bis-Chloromethyl ether”.
29CFR1910.1009, “beta-Naphthylamine”.
29CFR1910.1010, “Benzidine”.
29CFR1910.1011, “4-Aminodiphenyl”.
29CFR1910.1012, “Ethyleneimine”.
29CFR1910.1013, “beta-Propiolactone”.
29CFR1910.1014, “2-Acetylaminofluorene”.
29CFR1910.1015, “4-Dimethylaminoazobenzene”.
29CFR1910.1016, “N-Nitrosodimethylamine”.
29CFR1910.1017, “Vinyl Chloride”.
29CFR1910.1018, “Inorganic Arsenic”.
29CFR1910.1025, “Lead”.
29CFR1910.1027, “Cadmium”.
29CFR1910.1028, “Benzene”.
29CFR1910.1044, “1,2-dibromo-3-chloropropane”.
29CFR1910.1045, “Acrylonitrile”.
29CFR1910.1047, “Ethylene Oxide”.
29CFR1910.1048, “Formaldehyde”.
29CFR1910.1050, “Methylenedianiline”.
29CFR1910.1051, “1,3-Butadiene”.
29CFR1910.1052, “Methylene Chloride”.
29CFR1910.1200, “Hazard Communication”.
29CFR1910.1450, “Occupational Exposure to Hazardous Chemicals in Laboratories”.
29CFR1926.21, “Safety Training and Education”.
40CFR68, “Chemical Accident Prevention Provisions”.
48CFR970, “DOE Management and Operating Contracts“.

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Chapter 7 - Pollution Prevention and Waste Minimization

1.0 Introduction

This chapter identifies and consolidates existing user safety and health requirements found in DOE and Federal chemical-related safety and health regulations and National Standards that address ***pollution prevention (P2)*** (see definition) and waste minimization for ***chemicals*** (see definition) and ***chemical products*** (see definition). This chapter specifically consolidates requirements found in 42 USC, 40CFR; the "Greening the Government" Executive Orders 13101, 13148; DOE O 450.1; DOE Acquisition Letter AL-2002-05; and Secretary of Energy Memorandum November 12, 1999, and includes technical standards that are made mandatory by their specific reference within a regulation, rule or DOE Order.

This chapter is intended to list chemical-related safety and health requirements and to consolidate those that are overlapping and/or duplicative. The list of requirements includes "pointers" to the sources of those requirements.

Requirements for pollution prevention generally involve the integration of P2 into planning, execution, and evaluation of site activities. Chemical users' participation in pollution prevention arises from their use of chemicals, and from the site's procurement, distribution, storage and disposal of chemicals. Safety and health program and environmental pollution prevention program protections are usually mutually beneficial, and their requirements frequently mutually inclusive.

Consolidated chemical-related safety and health requirements here provide a context for the need for the chemical user to incorporate pollution prevention into every phase of work, such as planning, acquisition, operations, waste management/disposal, and continuous improvement. This chapter does not contain requirements for implementation of Environmental Protection Agency (EPA) reporting requirements or for environmental regulatory compliance.

This document does NOT create any new or additional requirements.

2.0 Applicability

The information presented here applies to all locations that use chemicals, chemical products or services that involve the use of chemicals or chemical products. *[NOTE: Throughout this document, the term "chemicals" is used to indicate chemicals and/or chemical products as described in section 3, below.]* This chapter is intended only to address chemical health and safety requirements applicable to chemical user activities. It consolidates existing, core safety and health requirements that all sites must follow when engaged in chemical-related activities.

The requirements included in this chapter come from sources that have different safety purposes. As a result, some of these requirements may not always be applicable to the work being performed at an individual site or facility. It is the responsibility of each user to determine the applicability of specific requirements to their work and how they are implemented. The reference sources for the requirements included in this chapter can be used to determine the applicability of those requirements to the work being performed.

3.0 Definitions and Acronyms

See **Glossary.**

4.0 Requirements for Pollution Prevention and Waste Minimization

Sources[11]	Consolidated Requirements[12]
	4.1 Pollution Prevention Policy
DOE O 450.1 sec. 4(a)(1), CRD sec. 1(a)	**4.1.1** Pollution prevention must be integrated into the planning, execution and evaluation of all site activities.
EO 13148, sec. 303; **42 USC 13101**	**4.1.2** Federal agencies shall preferentially use pollution prevention projects and activities to correct and prevent noncompliance with environmental regulatory requirements.
	4.2 Pollution Prevention Programs
DOE O 450.1 CRD sec. 9; **EO 13148, sec.304**	DOE and its contractors shall develop and implement a pollution prevention program at DOE facilities that compares the life-cycle costs of treatment and /or disposal of waste and pollutant streams to the life-cycle costs of alternatives that eliminate or reduce toxic chemicals or pollutants at the source.
HSWA sec. 3005(h)(i); **40CFR264.73(b)(9); 40CFR262, 264-265; 40CFR270;** **42USC sec. 6922(b) and 6925 (h)**	**4.2.1** A chemical user who generates hazardous waste must have a program in place to reduce the volume or quantity and toxicity of such waste to the degree determined by the generator to be economically practicable.[33]
DOE O 450.1, sec. 4.1.(1)(b), CRD sec.1(a) and 3	**4.2.2** All DOE ***elements*** (see definition) must ensure that sites' ***Integrated Safety Management System (ISMS*** (see definition) includes an ***Environmental Management System (EMS***, see definition) that provides for the systematic planning, integrated execution and evaluation of programs for pollution prevention.

[33] This is an implied or indirect requirement to have a waste and toxicity reduction program. The actual requirement is for a certifying signature on hazardous waste manifests; on permits for treatment, storage, or disposal of hazardous waste; and in Hazardous Waste Generator Biennial Reports as to the existence of a waste and toxicity reduction program. A violation would be for false certification of the existence of a waste and toxicity reduction program, rather than for not having the program.

Sources[11]	Consolidated Requirements[12]
DOE O 450.1, sec. 4.b.(3), CRD sec. 2(c)	**4.2.2.1** DOE contractors must reduce or eliminate the generation of waste, the release of pollutants to the environment, and the use of ***Class I ozone-depleting substances (ODS)***, (see definition) through source reduction, re-use, segregation, and recycling and by procuring recycled-content materials and environmentally preferable products and services. *[NOTE: DOE O 450.1 requires that this be done as part of integrating EMSs into site ISMSs.]*
HSWA 3002, sec. (a)(6)(C)-(D); **40CFR262.41(a)(6)-(7);** **40CFR264.75(h)-(i);** **40CFR265.75(h)-(i);** **42USC sec. 6922 (a)(6)**	**4.2.3** Chemical users who generate hazardous wastes are required to submit biennial reports describing: a) efforts undertaken to reduce the volume and toxicity of waste generated; and b) changes in volume and toxicity of waste actually achieved compared with previous years, to the extent that such information is available.
	4.3 Waste Minimization Goals
DOE O 450.1, sec. 5.c.(3), CRD sec.1(c) and 4; **EO 13101, sec 601(1)(a)**	**4.3.1** Contractors shall include goals in their ISMS that contribute to the accomplishment of DOE P2 goals.[34]
Secretary of Energy Memo to Heads of Departmental Elements, November 12, 1999	**4.3.1.1** Contractors must reduce waste from routine operations by 2005, using a 1993 baseline, for the following waste types: • Hazardous by 90 percent; • Low Level Radioactive by 80 percent; • Low Level-Mixed Radioactive by 80 percent; • Transuranic (TRU) by 80 percent. • Releases of toxic chemicals subject to Toxic Chemical Release Inventory reporting by 90 percent. • Sanitary waste by 75 percent by 2005 and 80 percent by 2010, using a 1993 baseline. • Waste resulting from cleanup,

[34] While goals are not required as a part of ISMSs, the EMSs that are required to be integrated into ISMSs include goals. This requirement refers to the EMS goals that must be included in the ISMSs.

Sources[11]	Consolidated Requirements[12]
	stabilization, and decommissioning activities by 10 percent on an annual basis. a) Appropriate baselines for new sites shall be established in performance agreements in cases where proposed baseline years do not apply. b) Goal requirements shall be included in annual performance plans or agreements. c) By 2005, 45 percent of sanitary wastes from all operations must be recycled, and by 2010, 50 percent of sanitary waste from all operations must be recycled.
DOE O 450.1, sec. 5.c.(3), CDR sec. 1(c); **EO 13148 sec. 204 and 502**	**4.3.1.2** Through innovative pollution prevention, effective facility management, and sound acquisition and procurement practices, contractors shall assist DOE in reducing its reported releases and off-site transfers of toxic chemicals subject to annual toxic release reporting under ***EPCRA*** **(see definition)** (see section 4.6 of this chapter) for treatment and disposal by 10 percent annually, or by 40 percent overall by December 31, 2006 from year 2000 levels.
DOE O 450.1, sec. 5.c.(3), CRD sec. 1(c); **EO 13148, sec. 205 and 503;**	**4.3.1.3** Contractors shall use product substitution and facility management practices, including pollution prevention, to reduce use of selected toxic chemicals,[35] hazardous substances, and pollutants by 50 percent annually, **or** reduce the generation of hazardous and radioactive waste types at facilities by 50 percent by December 31, 2006. *[NOTE: DOE has chosen to use the Secretary's waste reduction goals cited above in 4.3.1.1 to meet this requirement. Sites are still encouraged to reduce chemical usage.]*

[35] At the time of this writing, the EPA has not published the list of chemicals affected by this requirement.

Sources[11]	Consolidated Requirements[12]
	4.4 P2 Opportunities
DOE O 450.1, sec. 5.d.(6), CRD sec. 9	**4.4.1** Contractors shall conduct operational assessments, such as Pollution Prevention Opportunity Assessments of site operations to identify opportunities for source reduction, material segregation, reuse, recycle, or other P2 projects.
DOE O 450.1, sec. 5.d.(6), CRD sec. 9	**4.4.1.1** Based on the results of these assessments, contractors shall implement cost-effective P2 projects, using life-cycle assessment concepts and practices in determining their Return-on-Investment (ROI).
	4.5 Purchasing
DOE O 450.1, CRD sec. 9; **EO 13101, sec. 401**	**4.5.1** In developing plans, drawings, work statements, specifications, or other product descriptions, contractors shall consider, as appropriate, a broad range of factors including: elimination of virgin material requirements; use of biobased products; use of recovered materials; reuse of product; life-cycle cost; recyclability; use of environmentally preferable products; waste prevention (including toxicity reduction or elimination); and ultimate disposal.[36]
DOE O 450.1, sec. 5.d.(3); **EO 13101, sec. 601(1)(b)**	**4.5.2** Contractors shall set goals to increase the procurement of products that are made with recovered materials to maximize the number of recycled products purchased, relative to non-recycled alternatives.
DOE O 450.1, Sec. 4.d.(11), CRD sec. 8	**4.5.3** Contractors shall consider P2 in the specification and acquisition of departmental supplies to cost effectively maximize procurement of environmentally preferable products.
DOE O 450.1, sec. 5.d.(5), CRD sec. 5; **EO 13148, sec. 701(b)**	**4.5.4** Contractors shall consider the feasibility of centralized procurement and distribution programs for purchasing, tracking, distributing, and managing materials with toxic or hazardous content, and implement where appropriate.

[36] These factors should be considered in acquisition planning for all procurement and in the evaluation and award of contracts, as appropriate. Program and acquisition managers should take an active role in these activities.

Sources[11]	Consolidated Requirements[12]
DOE O 450.1, sec. 5.d.(12), CRD sec. 8; **DOE Acquisition Letter AL-2002-05**	**4.5.5** Contractors shall coordinate all acquisitions with the Department's "Green Acquisition Advocates" established pursuant to Acquisition Letter, AL 2000-03 (superceded by AL-2002-05).
DOE O 450.1, CRD sec. 4; **EO 13101, Sec. 507;** **40CFR247.2(d);** **42 USC, sec. 6962 (c)(1)**	**4.5.6** DOE contractor purchase of certain designated items shall be only of those composed of the highest percentage of recovered material practicable, consistent with maintaining a satisfactory level of competition, unless the item is not available within a reasonable length of time, fails to meet performance standards, or is only available at an unreasonable price.
DOE O 450.1, sec. 5.d.(11); **EO 13101, sec. 402;** **40CFR247.6;** **48CFR23.4;** **42 USC sec. 6962(i)(2)**	**4.5.6.1** Chemical users shall support an affirmative procurement program that must be developed to ensure that designated items are procured to the maximum extent possible and consistent with provisions of the Federal Acquisition Regulations (FAR). The program shall contain at a minimum: a) A preference program for purchasing the designated items; b) A program to promote the affirmative procurement program; c) Procedures for obtaining required estimates of the total percentage of recovered material utilized, certification of minimum recovered material content actually used (where appropriate), and reasonable verification procedures for estimates and certification, and; d) Annual review and monitoring of the effectiveness of the program.
40CFR247.5; **48CFR23.4;** **42 USC, sec. 6962, (i)(3)** **Secretary of Energy Memo to Heads of Departmental Elements, November 12, 1999**	**4.5.6.1.1** In developing the preference program described in 4.5.6.1(a), above, the contractor shall consider the following options: a) a policy of awarding contracts to vendors offering an item of highest percentage of recovered materials practicable; b) Contractors must increase purchase of EPA-designated

Sources[11]	Consolidated Requirements[12]
	items with recycled content to 100 per cent except when not available competitively at a reasonable price or that do not meet performance standards.
	4.6 *EPCRA* (see definition)
40CFR372.22-38; **42 USC 13101;** **42 USC 13106, (a) and (b)**	**4.6.1** Each owner or operator of a facility who is required to file an annual toxic chemical release form under 40CFR372.22, "Covered Facilities for Toxic Chemical Release Reporting"[37] shall include a source reduction and recycling report for the preceding calendar year for the toxic chemicals on the report.
40CFR372.22-38; **42 USC 13101;** **42 USC 13306, (a) and (b)**	**4.6.1.1** For each specified toxic chemical meeting inventory threshold quantity, the source reduction and recycling report must list: a) The quantity released into the environment and the percentage change from the previous year (including air emissions, discharge to water/storm water, land, injection); b) The quantity transferred offsite in waste (e.g., to a Publicly Owned Treatment Works or Treatment, Storage, and Disposal Facility) and the type of treatment or disposal used; c) The amount of the chemical recycled (at the facility or elsewhere), the percentage change from the previous year, and the recycling process used; d) The amount of the chemical treated (at the facility or elsewhere) during the year and the percentage change from the previous year; *[NOTE: The specific chemical identity of Trade Secrets may be withheld if the generic class or category of the hazardous chemical, extremely hazardous substance, or toxic chemical is provided in its place.]*
	4.7 Ozone-Depleting Substances
DOE O 450.1, sec. 5.d.(10), CRD 12;	**4.7.1** Contractors shall develop and implement a program and procedures to maximize the use of safe

[37] These reporting requirements are threshold driven.

Sources[11]	Consolidated Requirements[12]
EO 13148, sec. 206	alternatives to ODS whereby: a) procurement of Class I ODS for all non-excepted uses38 is discontinued by December 31, 2010, and b) recovered/reclaimed ODS is transferred to DOD.
	4.8 Recycling
DOE O 450.1; **EO 13101, Sec. 705(a)(1)**	**4.8.1** A program to promote cost-effective waste prevention and recycling of reusable materials shall be developed.
EO 13101, sec. 705(a)(2)	**4.8.1.1** A recycling coordinator shall be designated for each facility or installation.
EO 13101, sec. 705(a)(2)	**4.8.1.1.1** The recycling coordinator shall implement or maintain the waste prevention and recycling programs.

5.0 Source Documents

DOE Acquisition Letter AL-2000-03, "Greening the Government Requirements in Contracting" (May 16, 2000) (Superceded by AL-2002-05).
DOE Acquisition Letter AL-2002-05, "Greening the Government Requirements in Contracting" (July 10, 2002).
DOE O 450.1, "Environmental Protection Program".

Executive Order 13101 of September 14, 1998, "Greening the Government Through Waste Prevention, Recycling, and Federal Acquisition".
Executive Order 13148 of April 21, 2000, "Greening the Government Through Leadership in Environmental Management".

The Hazardous and Solid Waste Amendments of 1984 (HSWA).

Secretary of Energy Memorandum, November 12, 1999, "Pollution Prevention and Energy Efficiency Leadership Goals for Fiscal Year 2000 and Beyond".

40CFR260-282, "The Resource Conservation and Recovery Act of 1976".
48CFR, "Federal Acquisition Regulations".

42 USC 6901 – 6992(k), "The Solid Waste Disposal Act of Oct. 21, 1976".
42 USC 13101 – 13109, "The Pollution Prevention Act of 1990".

[38] Non-excepted uses are developed by EPA under the Montreal Protocol and the Clean Air Act. Clarification of non-excepted uses relevant to ODS is available from the DOE Office of Environmental Policy and Guidance (EH-41) website at http://www.eh.doe.gov/oepa/guidance/ozone/.

Chapter 8 - Chemical Emergency Management

1.0 Introduction

This chapter identifies and consolidates existing user safety and health requirements found in DOE and Federal chemical-related safety and health regulations and National Standards that address emergency management for facilities with activities involving ***chemicals*** (see definition) and ***chemical products*** (see definition). State and local codes and requirements are NOT included. This chapter consolidates requirements found in the National Fire Protection Association (NFPA), the Occupational Safety and Health Administration (OSHA), and certain Environmental Protection Agency (EPA) regulations and Department of Energy (DOE) Rules and Orders, including technical standards that are made mandatory by their specific reference within a regulation, rule or DOE Order. It specifically consolidates requirements found in OSHA's regulations 29CFR1910.38, 29CFR1910.119, 29CFR1910.120, 29CFR1910.1200, and 29CFR1910.1450, EPA's regulations at 40CFR355 and 40CFR68, NFPA 471, 472, and 1620, and DOE O 151.1A.

This chapter is intended to list chemical-related safety and health requirements and to consolidate those that are overlapping and/or duplicative. The list of requirements includes "pointers" to the sources of those requirements.

This document does NOT create any new or additional requirements.

2.0 Applicability

The information presented here applies to all locations that use chemicals or chemical products. *[NOTE: Throughout this document, the term "chemicals" is used to indicate chemicals and/or chemical products as described in Section 3, below.]* This chapter consolidates existing, core safety and health requirements that all sites must follow when engaged in chemical-related activities.

The requirements included in this chapter come from sources that have different safety purposes. As a result, some of these requirements may not always be applicable to the work being performed at an individual site or facility. It is the responsibility of each user to determine the applicability of specific requirements to their work and how they are implemented. The reference sources for the requirements included in this chapter can be used to determine the applicability of those requirements to the work being performed.

3.0 Definitions and Acronyms

See **Glossary.**

4.0 Requirements for Chemical Emergency Management

Sources[11]	Consolidated Requirements[12]
DOE O 151.1A, Chapter XI, sec. 3 and sec. 4; **29CFR1910.38(a);** **29CFR1910.119(n);** **29CFR1910.120(q)**	**4.1 Emergency response plan -** An emergency response plan shall be prepared which documents the emergency management program and the implementation procedures to handle anticipated emergencies, including operational emergencies, prior to the commencement of emergency response operations.

Sources[11]	Consolidated Requirements[12]
40CFR68.95(b)	**4.1.1** The plan shall include procedures for handling releases and shall be in writing and available for inspection and copying by employees, their representatives, and, where applicable, OSHA personnel.
29CFR1910.38(a)	**4.1.2** The plan shall cover those designated actions employers and employees must take to ensure employee safety from fire and other emergencies.
DOE O 151.1A Chapter III, sec. 3.a	**4.1.3** A hazards survey (i.e., qualitative examination) shall be used to identify the conditions to be addressed by the comprehensive emergency management program. Much of the hazards survey should already have been done in the course of meeting other DOE and Federal agency requirements.
DOE O 151.1A, Chapter III, sec. 3.c(1); **DOE O 151.1A, Chapter III, sec. 3.c(2);** **DOE O 151.1A, Chapter III, sec. 3.c(3);** **DOE O 151.1A, Chapter III, sec. 3.c(4);** **DOE O 151.1A, Chapter III, sec. 3.c(5);** **DOE O 151.1A, Chapter III, sec. 5.a(1);** **DOE O 151.1A, Chapter IV, sec. 1-4;** **NFPA 471, Chapter 4;** **NFPA 471, Chapter 6[39];** **NFPA 471, 6.4;** **NFPA 471, Chapter 9** **NFPA 1620[40];** **29CFR1910.38(a);**	**4.1.4** Elements of an emergency response plan.[41] The emergency response shall address, as a minimum, the following areas: • Pre-emergency planning and coordination with outside parties such as State, Tribal, and local agencies. • Personnel roles including Incident Commander, lines of authority, training/competencies, and internal communications (See NFPA 471, 6.4 for more detailed requirements for internal communications.) • Names or regular job titles of persons or departments who can be contacted for further information or explanation of duties under the plan [29CFR1910.38(a)]. • Emergency recognition including criteria for quickly determining if an event is an Operational Emergency, response levels (See NFPA 471, Chapter 4 for more detailed requirements), and prevention. • Emergency shutdown procedures and responsibilities [29CFR1910.38(a)]. • Re-entry planning shall include contingency planning to ensure the safety of re- entry personnel, such as planning for the rescue of re-entry teams.

[39] NFPA 471, Chapter 6 requires site safety considerations including a personnel accountability system, provisions for rest and rehabilitation for responders, the elimination of all ignition sources, and the application of control zones.
[40] Emergency response organizations may use the local emergency response plan or the state emergency response plan or both, as part of their emergency response plan to avoid duplication. Those items of the emergency response plan that are being properly addressed in the SARA Title III plans may be included in the emergency response plan, or otherwise made available to employees.
[41] NFPA 1620 provides extensive details on pre-incident planning that involves the evaluation of protection systems, building construction, contents, and operating procedures that can impact emergency operations. Major topics include physical elements and site considerations, occupant considerations, protection systems and water supplies, special hazard considerations, emergency operations, and plan testing and maintenance.

Sources[11]	Consolidated Requirements[12]
29CFR1910.120(q)(2); 40CFR68.95(a)(1)(i)	• Continued operation of critical plant function]. • Safe distances and places of refuge. • Site security and control. • Evacuation routes and procedures including accounting for all employees after the emergency evacuation has been completed. • Decontamination (See NFPA 471, Chapter 9 for more detailed requirements). • Rescue and Emergency medical treatment and first aid. • Emergency alerting, reporting and response procedures [29CFR1910.38(a)] including prompt initial notification of workers, emergency response personnel, and response organizations, including DOE elements and State, Tribal, local organizations, and the public with continued effective communications throughout emergency as part of an pre-established Emergency Public Information Program. • PPE and emergency equipment.
29CFR1910.38(a)(5)(ii)(A),(B), and (C); 40CFR68.95(a)(4)	**4.1.5** Plan Review - The employer shall review the plan with each employee covered by the plan when the plan is developed; whenever the employee's responsibilities or designated actions under the plan change; and whenever the plan is changed.
	4.1.6 Posting.
29CFR1910.38(a)(5)(iii)	**4.1.6.1** The written plan shall be kept at the workplace and made available for employee review.
29CFR1910.1200	**4.1.6.2** Material Safety data Sheets (MSDS) shall contain emergency procedures.
DOE O 151.1A, Chapter III, sec. 4.a; **29CFR1200(h)(3)(iii); 29CFR1450(f)(4)(i)(C); 29CFR1910.120(q)(6); 40CFR68.95(a)(3)**	**4.2 Training** • Training and other emergency information on site-specific conditions and hazards shall be made available to offsite personnel who may be required to participate in response to an emergency at the DOE or NNSA site/facility. • To ensure the competencies of all responders, training shall be based on the duties and function to be performed by each responder of an emergency response organization. The skill and knowledge levels required for all new responders shall be conveyed to them through training before they are permitted to take part in actual emergency response to an incident. Employees who participate, or who are expected to participate, in emergency response, shall be trained as described below.

Sources[11]	Consolidated Requirements[12]
NFPA 472, Chapter 4[42]; **29CFR1910.120(q)(6)(i)**	**4.2.1** First Responder – ***Awareness Level*** (See definition, Section 3 above, for definitions of this and other levels of emergency personnel). Shall have sufficient training, or have had sufficient experience to objectively demonstrate competencies that include, but are not limited to: • An understanding of what hazardous substances are, and the risks associated with them in an incident. • An understanding of the potential outcomes associated with an emergency created when hazardous substances are present. • The ability to recognize the presence of hazardous substances in an emergency. • The ability to identify the hazardous substances. • An understanding of the role of the first responder awareness individual in the employer's emergency response plan including site security and control and the U.S. Department of Transportation's Emergency Response Guidebook. • The ability to realize the need for additional resources, and to make appropriate notifications to the incident response communication center.
NFPA 472, Chapter 5[43]; **29CFR1910.120(q)(6)(ii)**	**4.2.2** First Responder -Operations Level. In addition to the competencies listed for the awareness level, the employer shall certify that the first responders at the operational level have received at least eight hours of training or have had sufficient experience to objectively demonstrate competencies that include, but are not limited to: • Knowledge of the basic hazard and risk assessment techniques. • Know how to select and use proper personal protective equipment provided to the first responder operational level. • An understanding of basic hazardous materials terms. • Know how to perform basic control, containment and/or confinement operations within the capabilities of the resources and personal protective equipment available with their unit. • Know how to implement basic decontamination procedures. • An understanding of the relevant standard operating procedures and termination procedures.

[42] Details on these and other required competencies are found in NFPA 472, Chapter 4.
[43] Details on these and other required competencies are found in NFPA 472, Chapter 5.

Sources[11]	Consolidated Requirements[12]
NFPA 472, Chapter 6[44]; **29CFR1910.120(q)(6)(iii)**	**4.2.3** Hazardous Materials Technician - The employer shall certify that the hazardous materials technicians have received at least 24 hours of training equal to the first responder operations level and in addition have competencies including, but not limited to: • Knowing how to implement the employer's emergency response plan. • Knowing the classification, identification and verification of known and unknown materials by using field survey instruments and equipment. • Being able to function within an assigned role in the Incident Command System. • Knowing how to select and use proper specialized chemical personal protective equipment provided to the hazardous materials technician. • Understanding hazard and risk assessment techniques. • Being able to perform advance control, containment, and/or confinement operations within the capabilities of the resources and personal protective equipment available with the unit. Understanding and being able to implement decontamination procedures. • Understand termination procedures. • Understanding basic chemical and toxicological terminology and behavior.
29CFR1910.120(q)(6)	**4.2.4** Hazardous materials specialists shall have received at least 24 hours of training equal to the technician level and in addition have competency in the following areas and the employer shall so certify: • Know how to implement the local emergency response plan. • Understand classification, identification and verification of known and unknown materials by using advanced survey instruments and equipment. • Know the state emergency response plan. • Be able to select and use proper specialized chemical personal protective equipment provided to the hazardous materials specialist. • Understand in-depth hazard and risk techniques. • Be able to perform specialized control, containment, and/or confinement operations within the capabilities of the resources and personal protective equipment available. • Be able to determine and implement decontamination procedures.

[44] Details on these and other required competencies are found in NFPA 472, Chapter 6.

Sources[11]	Consolidated Requirements[12]
	• Have the ability to develop a site safety and control plan. • Understand chemical, radiological and toxicological terminology and behavior.
NFPA 472, Chapter 9	**4.2.5** Hazardous materials branch officer must demonstrate competencies including, but not limited to: • Ability to analyze the magnitude of the problem and estimate the potential outcomes. • Know how to plan a response taking into account the abilities of the available personnel and equipment. • Ability to implement a response that will improve the outcomes consistent with standard operating procedures and the local emergency response plan. • Know how to evaluate the on-going progress of the plan implementation and to adjust the plan accordingly. • Know how and when to terminate the incident including, critiques, debriefings, and reports.
NFPA 472, Chapter 10	**4.2.6** Safety officer (also known as Hazardous Materials Branch Safety Officer in NFPA) must demonstrate competencies including, but not limited to the ability to: • Determine the magnitude of the safety problems involved in the incident. • Identify the safety considerations for the response plan. • Monitor the safety of personnel involved in the response. • Evaluate the progress of the plan implementation as to deviations from safety considerations. • Upon incident termination, provide reports, debriefings, and critique of safety.
NFPA 472, Chapter 7[45]; **29CFR1910.120(q)(6)**	**4.2.7** Incident commander - The employer shall certify that the incident commanders have received at least 24 hours of training equal to the first responder operations level and, in addition, have competencies including, but not limited to: • Know and be able to implement the employer's incident command system. • Know how to implement the employer's emergency response plan. • Know and understand the hazards and risks associated with employees working in chemical protective clothing. • Know how to implement the local emergency response plan.

[45] Details on these and other required competencies are found in NFPA 472, Chapter 7.

Sources[11]	Consolidated Requirements[12]
	• Know of the state emergency response plan and of the Federal Regional Response Team. • Know and understand the importance of decontamination procedures.
NFPA 472, Chapters 11,12, and 13[46]; **29CFR1910.120(q)(4)**	**4.2.7** Skilled support personnel shall be given an initial briefing at the site before their participation in any emergency response. The initial briefing shall include instruction in the wearing of appropriate personal protective equipment, what chemical hazards are involved, and what duties are to be performed. All other appropriate safety and health precautions provided to the employer's own employees shall be used to assure the safety and health of these personnel.
29CFR38(a)(5)(i)	**4.2.9** Employee Protection Training and Drills
DOE O 151.1A, Chapter III, sec. 4a	**4.2.9.1** Employee information, training, and drills shall include measures employees can take to protect themselves from exposure to chemicals in emergencies, including specific emergency procedures the employer has implemented to protect employees. This training is required when they are employed, when their expected actions change, or when the emergency plan changes.
DOE O 151.1A, Chapter IV, sec. 4a	**4.2.9.2** Drills shall provide supervised, "hands-on" training for members of emergency response organizations.
29CFR1910.38(a)(5)(1)	**4.2.9.3** Before implementing the emergency action plan, the employer shall designate and train a sufficient number of persons to assist in the safe and orderly emergency evacuation of employees.
29CFR1910.120(q)(7)	**4.2.10** Trainers shall have either: • Satisfactorily completed a training course for teaching the subjects they are expected to teach, such as the courses offered by the U.S. National Fire Academy, OR, • the training and/or academic credentials and instructional experience necessary to demonstrate competent instructional skills and a good command of the subject matter of the courses they are to teach.

[46] NFPA 472 identifies three such skilled support personnel and specifies, in detail, their required competencies: 1) tank car specialist (Chapter 11), 2) cargo tank specialist (Chapter 12), and 3) intermodal tank specialist (Chapter 13). In general, they must be able to analyze the incident, plan the response, and implement the plan.

Sources[11]	Consolidated Requirements[12]
29CFR1910.120(q)(8)	**4.2.11** Refresher training
DOE O 151.1A, Chapter IV, sec. 4a; **29CFR1910.120(q)(8)**	**4.2.11.1** Those employees who are trained in accordance with paragraph 4.2 of this chapter shall receive annual refresher training of sufficient content and duration to maintain their competencies, or shall demonstrate competency in those areas at least yearly.
29CFR1910.120(q)(8)	**4.2.11.2** A statement shall be made of the training (and retraining) or competency, and if a statement of competency is made, the employer shall keep a record of the methodology used to demonstrate competency.
DOE O 151.1A, Chapter III, sec. 4.b	**4.2.12** Exercises • At a minimum, each site/facility shall conduct building evacuation exercises consistent with Federal regulations [e.g., 41CFR101-20.105-1(c)(1)], local ordinances, or National Fire Protection Association Standards. Exercises shall be conducted as often as needed to ensure that employees are able to safely evacuate their work area. • For each site or facility, as applicable, the organization responsible for communications with DOE Headquarters, operations/field offices, and offsite agencies shall test communications systems at least annually or as often as needed to ensure that communications systems are operational.
DOE O 151.1A, Attachment 1, #1	**4.3 Implementation –** A comprehensive emergency management plan, commensurate With the hazards present, shall be implemented at the site/facility/activity level.
DOE O 151.1A, Attachment 1, #9; **NFPA 471, Chapter 6[47];** **NFPA 471, Chapter 8[48]**	**4.3.1.** Ensure immediate mitigative and corrective emergency response actions and appropriate protective actions to minimize the consequences of the emergency, protect worker and public health and safety, provide security, and ensure the continuance of such actions until the emergency is declared terminated.

[47] Also see NFPA 471, Chapter 6, for site safety requirements during an emergency.
[48] NFPA 471, Chapter 8, has details on numerous physical and chemical means of mitigating the incident.

Sources[11]	Consolidated Requirements[12]
DOE O 151.1A,Chapter III, sec. 3.c(1); **29CFR1910.120(q)(3)(i)**	**4.3.2** The senior emergency response official responding to an emergency shall become the Incident Commander (IC). All emergency responders and their communications shall be coordinated and controlled through the IC assisted by the senior official present or by each employer.
29CFR1910.120(q)(3)(ii) and (iii)	**4.3.3** The IC shall identify, to the extent possible, all hazardous substances or conditions present and shall address as appropriate site analysis, use of engineering controls, maximum exposure limits, hazardous substance handling procedures, and use of any new technologies. The IC shall also implement appropriate emergency operations and assure that the personal protective equipment worn is appropriate for the hazards encountered.
29CFR1910.120(q)(3)(iv)	**4.3.4** Employees engaged in emergency response and exposed to hazardous substances, which present an inhalation hazard or potential inhalation hazard, shall wear positive pressure self-contained breathing apparatus while engaged in emergency response, until such time that the IC determines through the use of air monitoring that a decreased level of respiratory protection will not result in hazardous exposures to employees.
DOE O 151.1A, Chapter III, sec. 5.a (1)	**4.3.5** All individuals involved in re-entry shall receive a hazards/safety briefing prior to emergency response activities consistent with Federal, State, and local laws and regulations.
29CFR1910.120(q)(3)(v)	**4.3.6** The IC shall limit the number of emergency response personnel at the emergency site, in those areas of potential or actual exposure to incident or site hazards, to those who are actively performing emergency operations. However, operations in hazardous areas shall be performed using the buddy system in groups of two or more.
29CFR1910.120(q)(3)(vi)	**4.3.7** Back-up personnel shall be standing by with equipment ready to provide assistance or rescue. Qualified basic life support personnel, as a minimum, shall also be standing by with medical equipment and transportation capability.
29CFR1910.120(q)(3)(vii)	**4.3.8** The IC shall designate a safety officer, who is knowledgeable in the operations being implemented at the emergency response site, with specific responsibility to identify and evaluate hazards and to provide direction with respect to the safety of operations for the emergency at hand.

Sources[11]	Consolidated Requirements[12]
29CRF1910.120(q)(3)(viii)	**4.3.9** When activities are judged by the safety officer to be an IDLH (immediate danger in life or health) and/or to involve an imminent danger condition, the safety officer shall have the authority to alter, suspend, or terminate those activities. The safety official shall immediately inform the IC of any actions needed to be taken to correct these hazards at the emergency scene.
29CFR1910.120(q)(3)(x)	**4.3.10** When deemed necessary by the safety officer for meeting the tasks at hand, approved self-contained compressed air breathing apparatus may be used with approved cylinders from other approved self-contained compressed air breathing apparatus provided that such cylinders are of the same capacity and pressure rating. All compressed air cylinders used with self-contained breathing apparatus shall meet U.S. Department of Transportation (USDOT) and National Institute for Occupational Safety and Health (NIOSH) criteria.
DOE O 151.1A, Chapter III, sec. 3.c(5); **40CFR355.40(b)(1);** **40CFR355.40(b)(4)(ii)**	**4.3.11** In addition, if extremely hazardous chemicals are released, the owner or operator of a facility subject to this section shall immediately notify the community emergency coordinator for the LEPC of any area likely to be affected by the release and the State emergency response commission of any State likely to be affected by the release. If there is no LEPC, notification shall be provided under this section to relevant local emergency response personnel (LERP). *[EXCEPTION: An owner or operator of a facility from which there is a transportation-related release may meet the requirements of this section by providing the information indicated below in paragraph 4.3.11.1 to the 911 operators, or in the absence of a 911 emergency telephone number, to the telephone operator. A transportation-related release means a release during transportation or storage incident to transportation if the stored substance is moving under active shipping papers and has not reached the ultimate consignee.]*
40CFR355.40(b)(2)	**4.3.11.1** The notice required under this section shall include the following to the extent known at the time of notification and so long as no delay in notification of emergency response results: a) The chemical name or identity of any substance involved in the release. b) An indication of whether the substance is an extremely hazardous substance.

Sources[11]	Consolidated Requirements[12]
	c) An estimate of the quantity of any such substance that was released into the environment. d) The time and duration of the release. e) The medium or media into which the release occurred. f) Any known or anticipated acute or chronic health risks associated with the emergency and, where appropriate, advice regarding medical attention necessary for exposed individuals. g) Proper precautions to take as a result of the release, including evacuation (unless such information is readily available to the community emergency coordination pursuant to the emergency plan). h) The names and telephone number of the person or persons to be contacted for further information.
40CFR355.40(b)(3)	**4.3.11.2** As soon as practicable after a release which requires notification under 4.3.11 herein, such owner or operator shall provide a written follow-up emergency notice (or notices, as more information becomes available) setting forth and updating the information required under paragraph 4.3.11.1 of this section, and including additional information with respect to: a) Actions taken to respond to and contain the release, b) Any known or anticipated acute or chronic health risks associated with the release, and, c) Where appropriate, advice regarding medical attention necessary for exposed individuals.
DOE O 151.1A, Chapter IV, sec. 4.b-4.i	**4.3.12 Public Information** • During the response phase of an emergency, shall cooperatively ensure that an adequate public information program is established and maintained, commensurate with site hazards, to ensure that information can be provided to the public and the media during an emergency. The emergency public information program shall be adequately staffed with personnel trained to serve as spokesperson and news writer, and to provide support in media services, public inquiry, media inquiry, Joint Information Center management and administrative activities, and media monitoring. Persons with technical expertise

Sources[11]	Consolidated Requirements[12]
	about the emergency and with spokesperson training shall also be assigned to the emergency public information staff. • In situations involving classified information, the Department will provide sufficient unclassified information to explain the emergency response and protective actions required for the health and safety of workers and the public. • An information officer shall be assigned to the emergency public information response team involved in a significant offsite response deployment • A Headquarters official or team shall provide support to the affected Program Offices/ Emergency Management Team and/or requesting operations/field office, as appropriate. • The Director of Public Affairs and the Headquarters Emergency Manager shall be informed of all DOE or NNSA emergency public information actions • Initial news releases or public statements shall be approved by the DOE or NNSA official responsible for emergency public information review and dissemination. Following initial news releases and public statements, updates shall be coordinated with the Director of Public Affairs. • An emergency public information communications system shall be established among Headquarters, operations/field office, and on-scene locations.
DOE O 151.1A, Chapter IV; **29CFR1910.119;** **40CFR68.130;** **40CFR355**	4.4 **Additional Requirements for Significant Quantities of Hazardous Chemicals** - The Operational Emergency Hazardous Material Program adds to the base program. Depending on the findings of the hazards survey DOE or NNSA sites/facilities may be required to establish and maintain a quantitative hazards assessment, which will be used to define the provisions of the Operational Emergency Hazardous Material Program to ensure the program is commensurate with the hazards identified. Such hazards assessments are required if the hazard survey identifies hazardous materials in quantities exceeding the lower of the Threshold Quantities listed in 29CFR1910.119, or 40CFR68.130, or 40CFR355.
DOE O 151.1A, Chapter IV, sec. 3b(2) and 5a	**4.4.1 Emergency Classification** – Provisions shall be established to categorize and classify emergency events. Events shall be classified based on potential severity of the consequences as detailed in Chapter IV of DOE O 151.1A.

Sources[11]	Consolidated Requirements[12]
DOE O 232.1A; **40CFR355.30**	**4.4.2 Emergency Planning Notification**
DOE O 151.1A, Chapter III, sec. 3c(2); **40CFR355.30(a)**	**4.4.2.1** The owner or operator of a facility subject to this section shall notify the Commission that it is a facility subject to the emergency planning Requirements of this part. Such notification shall be within sixty days after a facility first becomes subject to the requirements of this section, whichever is later.
40CFR68.12(b)(3); 40CFR355.30(c)	**4.4.2.2** The owner or operator of a facility subject to this section shall designate a facility representative who will participate on the local emergency planning committee (LEPC) as a facility emergency response coordinator.
40CFR355.30(d)(1)	**4.4.2.3** The owner or operator of a facility subject to this section shall inform the LEPC of any changes occurring at the facility which may be relevant to emergency planning.
40CFR355.30(d)(2)	**4.4.2.4** Upon request of the local emergency planning committee, the owner or operator of a facility subject to this section shall promptly provide to the LEPC any information necessary for development or implementation of the local emergency plan.

Sources[11]	Consolidated Requirements[12]
40CFR355.30(e)	**4.4.3 Calculation of threshold planning quantities (TPQs) for solids and mixtures**
40CFR355.30(e)(1)	**4.4.3.1** If a container or storage vessel holds a mixture or solution of an extremely hazardous substance, then the concentration of extremely hazardous substance, in weight percent (greater than 1 percent), shall be multiplied by the mass (in pounds) in the vessel to determine the actual quantity of extremely hazardous substance therein.
40CFR355.30(e)(2)	**4.4.3.2** Extremely hazardous substances that are solids are subject to either of two threshold planning quantities as shown in appendices A and B of 40CFR355 (i.e., 500 or 10,000 pounds). The lower quantity applies only if the solid exists in powdered form and has a particle size less than 100 microns[49]; or is handled in solution[50] or in molten form[51]; or meets the criteria for an NFPA rating of 2, 3 or 4 for reactivity. If the solid does not meet any of these criteria, it is subject to the upper (10,000 pound) threshold planning quantity as shown in appendices A and B of 40CFR355.
DOE O 151.1A, Chapter IV, sec. 3b(5)	**4.4.4** Provisions shall be established to adequately assess the potential or actual on and offsite consequences of an emergency. Consequence assessments shall (a) be timely throughout the emergency; (b) be integrated with the event classification and protective action process; (c) incorporate monitoring of specific indicators and field measurements; and (d) be coordinated with Federal, State, local, and Tribal organizations.
DOE O 151.1A, Chapter IV, sec. 4b	**4.4.5** A formal exercise program shall be established to validate all elements of the emergency management program over a multi-year period. Each exercise shall have specific objectives and shall be fully documented. Exercises shall be evaluated using an established critique process. Corrective actions shall be identified and incorporated into the program.
DOE O 151.1A, Chapter VIII, sec. 2a	**4.4.6** Provisions shall be established for prompt initial notification of workers and emergency response personnel and organizations, including appropriate DOE and NNSA elements and other Federal, State, Tribal, and local

[49] The 100 micron level may be determined by multiplying the weight percent of solid with a particle size less than 100 microns in a particular container by the quantity of solid in the container.
[50] The amount of solid in solution may be determined by multiplying the weight percent of solid in the solution in a particular container by the quantity of solution in the container.
[51] The amount of solid in molten form must be multiplied by 0.3 to determine whether the lower threshold planning quantity is met.

Sources[11]	Consolidated Requirements[12]
	organizations. Provisions shall also be established for continuing effective communication among the response organizations throughout an emergency.
DOE O 151.1A, Chapter VIII, sec. 3	**4.4.6.1** Adherence to notification and reporting requirements shall be demonstrated in all emergency management exercises.
DOE O 151.1A, Chapter VIII, sec. 4.a	**4.4.6.2** Initial emergency notifications shall be made to workers, emergency response personnel, and organizations, including DOE and NNSA elements and other local, State, Tribal, and Federal organizations.
DOE O 151.1A, Chapter VIII, sec. 4.a(1)(a)	**4.4.6.3** Notify State and local officials and the DOE or NNSA Field and Headquarters Emergency Operations Centers within 15 minutes and all other organizations within 30 minutes of the declaration of an Alert, Site Area Emergency, or General Emergency.
DOE O 151.1A, Chapter VIII, sec. 4.a(1)(b)	**4.4.6.4** Notify the DOE or NNSA Field and Headquarters Emergency Operations Centers within 30 minutes of the declaration of an other than hazardous material Operational Emergency.
DOE O 151.1A, Chapter VIII, sec. 4.a(1)(c)	**4.4.6.5** Notify local, State, and Tribal organizations within 30 minutes or as established in mutual agreements for declaration of an other than hazardous material Operational Emergency.
DOE O 151.1A, Chapter VIII, sec. 4.a(2); **DOE O 151.1A, Chapter VIII, sec. 4.a(2)(a);** **DOE O 151.1A, Chapter VIII, sec. 4.a(2)(b)**	**4.4.6.6** Headquarters Watch Office staff in the Headquarters Emergency Operations Center and Headquarters Emergency Management Team personnel shall be responsible for the following: • Record incoming verbal notifications, receive emergency event information by other data transmission means or mechanisms, and disseminate such information to Cognizant Secretarial Officer representatives and appropriate Headquarters organizations of other Federal agencies. • Facilitate communications among Headquarters organizations, DOE and NNSA field organizations, and contractor personnel.
DOE O 151.1A, Chapter VIII, 4.b	**4.4.6.7** Emergency status reports shall be forwarded to the next-higher Emergency Management Team on a continuing basis until the emergency is terminated.

Sources[11]	Consolidated Requirements[12]
DOE O 151.1A, Chapter VIII, sec. 4.c	**4.4.6.8** Effective communications methods shall be established between event scene responders, emergency managers, and response facilities.
DOE O 151.1A, Chapter III, sec. 3.c(8); **DOE O 151.1A, Chapter IV, sec. 9.c;** **29CFR1910.120(q)(10);** **40CFR68.95(a)(2)**	**4.5 Emergency Equipment and Facilities** - Provision of facilities and equipment adequate to support emergency response, including: • the capability to notify employees of an emergency to facilitate the safe evacuation of employees from the work place, immediate work area, or both; and • operable personal protective equipment and clothing (PPE) to be used by organized and designated HAZMAT team members, or to be used by hazardous materials specialists. PPE shall meet the needs determined by the hazards assessment and the requirements noted in sections 4.5.1 through 4.5.5, below.
29CFR1910.120(g)(3)(i) and (ii)	**4.5.1** PPE shall be selected and used which will protect employees from the hazards and potential hazards they are likely to encounter as identified during the emergency characterization and analysis.
29CFR1910.120(g)(3)(iii)	**4.5.2** Positive pressure self-contained breathing apparatus, or positive pressure air-line respirators equipped with an escape air supply shall be used when chemical exposure levels present will create a substantial possibility of immediate death, immediate serious illness or injury, or impair the ability to escape.
29CFR1910.120(g)(3)(iv)	**4.5.3** Totally-encapsulating chemical protective suits (protection equivalent to Level A protection as recommended in Appendix B of 29CFR1910.120) shall be used in conditions where skin absorption of a hazardous substance may result in a substantial possibility of immediate death, immediate serious illness or injury, or impair the ability to escape.
29CFR1910.120(g)(4)(iii)	**4.5.3.1** Totally encapsulating suits shall be capable of maintaining positive air pressure, and preventing inward test gas leakage of more than 0.5 percent[52].

[52] See Appendix A of 29CFR1910.120 for a test method which may be used to evaluate this requirement.

Sources[11]	Consolidated Requirements[12]
29CFR1910.120(g)(3)(v); 29CFR1910.120, Appendix B	**4.5.4** The level of protection provided by PPE selection shall be increased when additional information or emergency conditions show that increased protection is necessary to reduce employee exposures below permissible exposure limits and published exposure levels for hazardous substances and health hazards. (See Appendix B of 29CFR1910.120 for guidance on selecting PPE ensembles.) *[EXCEPTION: The level of employee protection provided may be decreased when additional information or site conditions show that decreased protection will not result in hazardous exposures to employees.]*
NFPA 471, Chapter 7[53]; 29CFR1910.120(g)(3)(vi); 29CFR1910.120(g)(5); 29CFR1910, Subpart I	**4.5.5** At a minimum, all personal protective equipment shall be selected and used to meet the following elements: • PPE selection based upon site hazards, • PPE use and limitations of the equipment, • Work mission duration, • PPE maintenance and storage, • PPE decontamination and disposal, • PPE training and proper fitting, • PPE donning and doffing procedures, • PPE inspection procedures prior to, during, and after use, • Evaluation of the effectiveness of the PPE program, and • Limitations during temperature extremes, heat stress, and other appropriate medical considerations.
DOE O 151.1A, Chapter III, sec. 3.c(6); 40CFR68.95(a)(1)(ii)	**4.6 Medical Support** • Medical treatment and planning for mass casualty situations shall be provided in accordance with DOE O 440.1A. • In-house medical consultation and surveillance shall be as noted in sections 4.6.1 through 4.6.8, below.
29CFR1910.120(q)(9)(I)	**4.6.1** Members of an organized and designated HAZMAT team and hazardous materials specialists shall receive a baseline physical examination which shall be performed as described below in sections 4.6.2 through 4.6.8.

[53] NFPA 471 Chapter 7, has additional details on personal protective equipment requirements including four levels protection: A – when highest level of respiratory, skin, and eye protection is required; B – when the highest respiratory protection is required, but lesser skin protection is needed; C – when the concentration of airborne contaminants is known and air purifying respirators are required; D – when only nuisance contamination exists. Note: There are numerous other NFPA requirements for PPE, many of which are cited in NFPA 471, Chapter 7.

Sources[11]	Consolidated Requirements[12]
NFPA 471, Chapter 10[54]; **29CFR1910.1450(g)(1)(iii)**	**4.6.2** Any emergency response employees who exhibit signs or symptoms which may have resulted from exposure to hazardous substances during the course of an emergency incident either immediately or subsequently and all employees who are injured, become ill or develop signs or symptoms due to possible overexposure involving hazardous substances or health hazards from an emergency response, shall be provided with medical consultation as follows: • as soon as possible following the emergency incident or development of signs or symptoms; • at additional times, if the examining physician determines that follow-up examinations or consultations are medically necessary.
29CFR1910.120(f)(4)	**4.6.3** Medical examinations required by section 4.6 shall include a medical and work history (or updated history if one is in the employee's file) with special emphasis on symptoms related to the handling of hazardous substances and health hazards, and to fitness for duty including the ability to wear any required PPE under conditions (i.e., temperature extremes) that may be expected at the work site. The content of medical examinations or consultations made available to employees shall be determined by the attending physician. The guidelines in the Occupational Safety and Health Guidance Manual for Hazardous Waste Site Activities should be consulted.
29CFR1910.1200(i)(2)	**4.6.4** Where a treating physician or nurse determines that a medical emergency exists and the specific chemical identity is necessary for emergency or first-aid treatment, the chemical manufacturer, importer, or employer shall immediately disclose the specific chemical identity of a trade secret chemical to that treating physician or nurse, regardless of the existence of a written statement of need or a confidentiality agreement. The chemical manufacturer, importer, or employer may require a written statement of need and confidentiality agreement as soon as circumstances permit.
29CFR1910.120(f)(5)	**4.6.5** All medical examinations and procedures shall be performed by or under the supervision of a licensed physician, preferably one knowledgeable in occupational medicine, and shall be provided without cost to the employee, without loss of pay, and at a reasonable time and place.

[54] NFPA 471, Chapter 10, addresses not only post-entry medical examination requirements, but also requires pre-entry, during entry, follow-up, and treatment procedures.

Sources[11]	Consolidated Requirements[12]
29CFR1910.120(f)(6); 29CFR1910.134	**4.6.6** The employer shall provide one copy of 29CFR1910.120 and its appendices to the attending physician and in addition the following for each employee: • a description of the employee's duties as they relate to the employee's exposures; • the employee's exposure levels or anticipated exposure levels; • a description of any personal protective equipment used or to be used; • information from previous medical examinations of the employee which is not readily available to the examining physician; and, • information required by 29CFR1910.134 (Respiratory Protection).
29CFR1910.120(f)(7)	**4.6.7** The employer shall obtain and furnish the employee with a copy of a written opinion from the examining physician. The written opinion obtained by the employer shall <u>not</u> reveal specific findings or diagnoses unrelated to occupational exposure, but shall contain the following: • the physician's opinion as to whether the employee has any detected medical conditions which would place the employee at increased risk of material impairment of the employee's health from work in hazardous waste operations or emergency response, or from respirator use; • the physician's recommended limitations upon the employees assigned work; • the results of the medical examination and tests if requested by the employee; and, • a statement that the employee has been informed by the physician of the results of the medical examination and any medical conditions which require further examination or treatment.
29CFR1910.120(f)(8); 29CFR1910.1020	**4.6.8** An accurate record of the medical surveillance required by this section shall be retained. This record shall be retained for the period specified and meet the criteria of 29CFR1910.20. The record required of this section shall include at least the following information: • the name and social security number of the employee; • physicians' written opinions, recommended limitations and results of examinations and tests; • any employee medical complaints related to exposure to hazardous substances; and, • a copy of the information provided to the examining physician by the employer, with the exception of the standard and its appendices.

Sources[11]	Consolidated Requirements[12]
DOE O 151.1A, Chapter IV, sec. 5b	**4.7 Post-Incident Requirements –** Predetermined criteria for termination of emergencies shall be established.
29CFR1910.120(b)–(o); 29CFR1910.120(q)(3)(ix); 29CFR1910.120(q)(11)	**4.7.1** After emergency operations have terminated, the IC shall implement appropriate decontamination procedures. If it is determined that it is necessary to remove hazardous substances, health hazards and materials contaminated with them (such as contaminated soil or other elements of the natural environment) from the site of the incident, the employer conducting the clean-up shall comply with one of the following: • meet all the requirements of paragraphs (b) through (o) of 29CFR1910.120 ; OR • where the clean-up is done on plant property using plant or workplace employees, such shall have completed the training requirements of section 4.2 herein and other appropriate safety and health training made necessary by the tasks that they are expected to perform such as the use of personal protective equipment and decontamination procedures. All equipment to be used in the performance of the clean-up work shall be in serviceable condition and shall have been inspected prior to use by a qualified person.
DOE O 151.1A, Chapter III, sec. 5.b	**4.7.2** Recovery shall include notifications associated with termination of an emergency and establishment of criteria for resumption of normal operations.
DOE O 151.1A, Chapter IV, sec. 3.b(4)	**4.7.3** Following termination of emergency response, and in conjunction with the Final Occurrence Report (see DOE O 232.1A), each activated Emergency Management Team shall submit a final report on the emergency response to the Emergency Manager for submission to the Director of Emergency Operations.
DOE O 151.1A, Attachment 1, #11	**4.7.4** Provide for investigation of emergency root cause(s) and corrective action(s) to prevent recurrence in accordance with Departmental requirements (e.g., see DOE O 225.1A and DOE O 5480.19).
DOE O 151.1A, Attachment 1, #14	**4.7.5** Respond to all external evaluation, appraisal, and assessment findings within 90 days of receipt of findings.

5.0 Source Documents

DOE O 151.1A, "Comprehensive Emergency Management System".
DOE O 225.1A, "Accident Investigations".
DOE O 5480.19, "Conduct of Operations Requirements for DOE Facilities".

NFPA 471 (2002), “Recommended Practice for Responding to Hazardous Materials”.
NFPA 472 (2002), “Standard on Professional Competence of Responders to Hazardous Materials Incidents”.
NFPA 1620 (1998), “Recommended Practice for Pre-Incident Planning”.

29CFR1910.20, “Preservation of Records (medical and exposure)”.
29CFR1910.38, “Employee Emergency Plans and Fire Prevention Plans”.
29CFR1910.119, “Process Safety Management (PSM)”.
29CFR1910.120, “Hazardous Waste Operations and Emergency Response (HAZWOPER)”.
29CFR1910.134, “Respiratory Protection”.
29CFR1910.1200, “Hazard Communication”.
29CFR1910.1450, “Occupational Exposure to Hazardous Chemicals in Laboratories”.
40CFR68, “Chemical Accident Prevention Provisions”.
40CFR355, “Emergency Planning and Community Right-to-Know Act (EPCRA)”.

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Chapter 9 - Chemical Disposition

1.0 Introduction

This chapter identifies and consolidates existing user safety and health requirements found in DOE and Federal chemical-related safety and health regulations and National Standards that address the ***disposition*** (see definition) of ***excess chemicals***[55] (see definition) and ***chemical products*** (see definition), including reutilization until final ***disposal***[56] (see definition) as waste. Direct requirements for disposition are found in the Department of Energy Property Management Regulations (DOE-PMR), Federal Property Management Regulations (FPMR), and Federal Management Regulations (FMR). In addition, there are many regulations and standards that include implied requirements for the disposition of excess chemicals. Implied requirements are not included as mandatory requirements in this chapter. This chapter specifically consolidates requirements found in the Department of Energy Personal Property Letter (DOE-PPL) 970-3, 41 Code of Federal Regulations (CFR) 109 (Subchapter H), 41CFR101 (Subchapter H), 41CFR102 Parts 36 and 37, and National Fire Protection Association (NFPA) code 45, including technical standards that are made mandatory by their specific reference within a regulation, rule or DOE Order. State and local codes and requirements are NOT included.

This chapter is intended to list chemical-related safety and health requirements and to consolidate those that are overlapping and/or duplicative. The list of requirements includes "pointers" to the sources of those requirements.

This document does NOT create any new or additional requirements.

2.0 Applicability

The information presented here applies to all locations that store or use chemicals or chemical products. It consolidates existing, core safety and health requirements that all sites must follow when engaged in chemical-related activities. This chapter specifically applies to DOE contractors and field

[55] DOE offices and designated contractors are responsible [41CFR109-43.101, 41CFR102-36.35, 41CFR102-36.45(e)] for identifying chemicals that are no longer needed at DOE facilities as "excess chemicals" and for making them available to other potential users on site, returning them to the vendor (when practical and economical), or for exploring other avenues of reutilization off-site. The following disposition options may be available to an excess chemical in the prescribed order: screening for utilization at other DOE sites; transfers to other federal agencies; donations, via state government agencies, to approved non-profit organizations; or sales to the public (e.g., competitive bid sales or auctions).

The Department of Energy Property Management Regulations (41CFR109), Federal Property Management Regulations (41CFR101) and Federal Management Regulations (41CFR102) govern potential off-site reutilization pathways for excess chemicals. Any surplus chemicals (see definition), remaining after the above disposition routes have been exhausted, should be disposed of under applicable environmental regulations. For certain chemicals (e.g., ethylene glycol, anti-freeze solutions, precious metals) recycling and recovery exist as appropriate options. Pesticides and certain products containing chemicals, including those meeting the OSHA (see definition) Hazard Communication Standard definition of an "article" (29CFR1910.1200(c)) (such as batteries and fluorescent lamps), are potential candidates for regulation as "Universal Waste" (see definition) (40CFR273).

[56] Unused surplus chemicals at the end of the disposition cycle are "commercial chemical products" and do not become solid waste (40CFR260) unless they are discarded, abandoned or disposed of.

organizations that are involved in the utilization and disposition of chemicals and chemical products. It does not cover requirements related to chemical storage (refer to Chapter 5 of this document), transportation (refer to Chapter 4 of this document), or waste operations, including the identification, storage, handling, transportation, treatment and disposal of waste.

[NOTE: Throughout this document, the term "chemicals" is used to indicate chemicals and/or chemical products. For purposes of this document, the terms, "personal property" and "property", as used in the property management regulations, mean chemicals and/or chemical products, unless otherwise specified.]

This chapter addresses the disposition of chemicals belonging to any of the following categories under DOE-PMR, FPMR or FMR, namely, ***high risk (personal) property*** (see definition), ***hazardous property*** (see definition), ***hazardous materials*** (see definition), ***extremely hazardous materials*** (see definition), ***dangerous property*** (see definition), and ***certain categories of property that require special handling*** (see definition). Nuclear materials and radiological materials are excluded from the scope of this chapter.

Among the ten categories of high risk personal property, only excess chemicals identified as hazardous property, ***export controlled property*** (see definition), and ***proliferation-sensitive property*** (see definition) are within the scope of this chapter.

The DOE-PMR (41CFR109) implements and supplements the FPMR (41CFR101) issued by the General Services Administration (GSA) and will supercede the FPMR in the event of a deviation affecting the DOE's personal property management program. The FPMR and DOE-PMR apply to all direct operations and to designated contractors. The DOE-PMR does not apply to facilities and activities conducted under Executive Order 12344, "Naval Nuclear Propulsion Program" (February 1, 1982) and Public Law 98-525, "Department of Energy National Security and Military Applications of Nuclear Energy Authorization Act of 1985".

The FMR (41CFR102) is the successor regulation to the FPMR and it applies to executive agencies such as DOE, unless otherwise extended to Federal agencies in specific parts of the CFR.

The requirements included in this chapter come from sources that have different safety purposes. As a result, some of these requirements may not always be applicable to the work being performed at an individual site or facility. It is the responsibility of each user to determine the applicability of specific requirements to their work and how they are implemented. The reference sources for the requirements included in this chapter can be used to determine the applicability of those requirements to the work being performed.

3.0 Definitions and Acronyms

See **Glossary.**

4.0 Requirements for Chemical Disposition

Sources[11]	Consolidated Requirements[12]
	4.1 Disposition of Excess (or Surplus) Chemicals *[NOTE: Prescribed disposition options, in a descending order of implementation, may include reutilization within the DOE complex,*

Sources[11]	Consolidated Requirements[12]
	transfer to another federal agency, donation to a non-profit organization via a state agency, or sale to a public entity. Available disposition options are limited by the hazard, risk or value characteristics of the chemical. See Appendix A of this chapter for typical screening process steps.]
41CFR102-36.30; 41CFR102-36.35(a); 41CFR102-36.45(e); 41CFR109-43.101	**4.1.1** Identification and Disposition of Excess Chemicals - DOE offices and designated contractors shall promptly identify chemicals under their control that are excess to their needs and make them available for use elsewhere. They must ensure that final disposition complies with applicable environmental, health, safety, and national security regulations.
DOE-PPL 970-3; 41CFR109-1.53	**4.1.2** Disposition of Four Categories of High Risk (Personal Property) Chemicals - Excess chemicals that fall under any of the four specific categories of high risk personal property, namely, Especially designed or prepared property, Export controlled property, Proliferation-sensitive property, and Nuclear weapon components or weapon-like components, shall be subject to the identification, accounting, control, and disposition policy guidance available from DOE-PPL 970-3 and 41CFR109-1.53.
41CFR109-1.5303(b)(2)	**4.1.2.1** The DOE or designated contractor shall process high risk (personal property) chemicals into a reutilization/disposition program only after completing the reviews prescribed by the local high risk property management system.
41CFR109-1.5303(b)(3); 41CFR101 (Subchapter H); 41CFR109 (Subchapter H); DOE Guidelines on Export Control and Nonproliferation	**4.1.2.2** The disposition and handling of high risk property chemicals shall be subject to applicable provisions of Subchapter H of the FPMR (41CFR101), Subchapter H of DOE-PMR (41CFR109), and DOE's "Guidelines on Export Control and Nonproliferation."
41CFR109-1.5303(b)(4)	**4.1.2.3** All applicable documentation, including records related to the chemical's categorization as high risk, shall be included with all property transfers, internal or external to DOE.
41CFR109-1.5303(b)(5)	**4.1.2.4** Unless an alternative disposition path is available, surplus ***Trigger List*** (see definition) chemicals (e.g., those identified under Especially designed/ prepared property, Proliferation-sensitive property, or Export controlled property, as defined in Section 3.0, above) shall either be sold for ***scrap*** (see definition) after being rendered useless for their originally intended function or destroyed, with the destruction verified and documented.

Sources[11]	Consolidated Requirements[12]
41CFR109-1.5303(b)(6)	**4.1.2.5** The Export Restriction Notice specified in 41CFR109-1.5303(b)(6), or an approved equivalent notice, shall be included in all transfers, donations, sales or other disposition actions.
41CFR109-43.305-50; **Standard Form 120**	**4.1.2.6** Excess nuclear-related and proliferation-sensitive chemicals shall not undergo formal internal screening within DOE or be reported to the GSA on Standard Form (SF) 120 (Report of Excess Personal Property). See Sections 4.1.2.2 and 4.1.2.4, above for control and disposition options (such as destruction, conversion to scrap that can be sold to the public, or other DOE authorized option).
29CFR1910.1200; 41CFR101-42.202(a) through (c)	**4.1.3** Identification and Documentation of Hazardous Materials - Actual or potential hazards associated with an excess hazardous material shall be documented with a Material Safety Data Sheet (MSDS) supplied by the manufacturer, distributor or importer. If an MSDS is not available, a Hazardous Materials Identification System (HMIS) record from the automated Department of Defense database is acceptable. If an MSDS or HMIS record is not available, a hazard identification document prepared by the owning DOE organization that meets the MSDS content requirements for hazardous chemicals set forth in the OSHA Hazard Communication Standard (29CFR1910.1200) shall be used.

Sources[11]	Consolidated Requirements[12]
41CFR101-42.202(d); 41CFR101-42.202(a); 41CFR101-42.1101	**4.1.3.1** For hazardous items acquired prior to the implementation of the Federal acquisition standards (i.e., Federal Standards 313 and 123), the owning or ***holding agency*** (see definition) shall identify and document the potential hazards associated with these items. *[NOTE: Hazardous materials are found in most Federal Supply Classification (FSC) classes. Refer to Table B-1 (List of FSC classes composed predominantly of hazardous items) and Table B-2 (Selective list of FSC classes and groups that contain a significant number of hazardous items) in Appendix B of this chapter.]*
41CFR101-42.202(e)	**4.1.3.2** When an item is identified as hazardous, the owning DOE organization shall document the accountable inventory record accordingly.
29CFR1910.1200; 41CFR101-42.202(e)	**4.1.3.3** If the hazardous item (or material) has not been properly labeled by the manufacturer, the owning DOE organization shall label, mark, or tag the item in accordance with the OSHA Hazard Communication Standard requirements regarding the actual or potential hazard associated with the handling, storage, or use of the item (or material).
41CFR101-42.202(e)	**4.1.3.4** Hazard and special care or handling information shall be maintained in the item record for use in preparation of reports of excess property, and reassignment or transfer documentation.
41CFR101-27.204	**4.1.4** Disposition of Unstable/Reactive Chemicals - ***Unstable/reactive chemicals*** (see definition) that are identified as non-extendable shelf-life items (also known as ***Type I items*** (see definition)) shall be safely discarded at the expiration of their designated shelf life.
NFPA 45, Sec. 7.2.3.5; NFPA 45, Sec. 10.3.2	**4.1.5** If shelf life is unknown, unstable/ reactive chemicals that might become hazardous during prolonged storage shall be evaluated or tested, at six-month intervals as a minimum, to assure continued safe use. Material found to be unsafe or incapable of being rendered safe shall be discarded.
41CFR101-27.204; 41CFR101-42.001	**4.1.6** Unless shelf life is extended on the basis of technical evaluation (e.g. for ***Type II extendable shelf-life items*** (see definition)), hazardous materials with an expired shelf life shall be reclassified as "***hazardous waste***" (see definition), if required by federal, state and/or local environmental laws or regulations.

Sources[11]	Consolidated Requirements[12]
41CFR101-42.2; **41CFR101-42.11;** **41CFR102-36;** **41CFR109-42.11;** **41CFR109-43**	**4.2 Utilization of Excess Chemicals** Hazardous Materials – General: The utilization and transfer of hazardous materials and certain categories of property within the Federal government shall be governed by the special policies and methods prescribed by the GSA in 41CFR101-42.2, 41CFR101-42.11 and 41CFR102-36 in addition to any superceding DOE requirements found in 41CFR109-43 and 41CFR109-42.11.
	4.2.1 Offsite Utilization Within DOE Complex - Internal DOE Screening.
41CFR102-36.45(e)(1); **41CFR109-43.304-1.50(a)**	**4.2.1.1** Prior to reporting excess chemicals to the GSA, ***reportable property*** (see definition) shall be screened for reutilization (or reassignment) within DOE using the ***Energy Assets Disposal System (EADS)*** (see definition) for a 15-day period. *[NOTE: Refer to Appendix A of this chapter for a description of typical disposition steps for an excess chemical.]*
41CFR109-43.304-1.50(e)	**4.2.1.2** In general, simultaneous internal DOE screening and Federal agency excess screening shall not be conducted.
41CFR109-43.304-1.51; **SF 122**	**4.2.1.3** Transfer of excess chemicals within DOE generally shall be effected by the completion of a Standard Form (SF) 122 (Transfer Order Excess Personal Property) by the receiving contractor and approval by the cognizant DOE property administrator for the receiving site.
41CFR101-42.203; **SF 122**	**4.2.1.4** Information on the actual or potential hazard shall be included in the SF 122, and the receiving contractor shall identify the nature of the hazard in the accountable inventory record.
41CFR101-42.206	**4.2.1.5** The holding DOE organization shall properly store excess hazardous materials and provide necessary safeguards including warning signs, labels, and the use of personal protective equipment by utilization screeners when inspecting the excess.
	4.2.2 Utilization Reports of Excess Chemicals - General

Sources[11]	Consolidated Requirements[12]
41CFR102-36.230(a); **41CFR102-36.230(b);** **41CFR109-43.304-2;** **SF 120**	**4.2.2.1** To initiate federal excess screening, reportable property (i.e., excess chemicals) will be electronically submitted by EADS directly to GSA's ***Federal Disposal System (FEDS)*** (see definition) following internal DOE screening, OR Paper submissions of Standard Form (SF) 120 (Report of Excess Personal Property) shall be made to the GSA office for the region where the excess chemicals are located.
41CFR101-42.204 (c)	**4.2.2.2** ***Hazardous waste*** (see definition) shall be disposed of by the DOE organization under the EPA, State, and local regulations and it shall not be reported to GSA on the SF 120.
41CFR101-42; **41CFR101-42.204(a);** **41CFR102-36.45(e)(2);** **41CFR102-36.425;** **SF 120**	**4.2.2.3** Hazardous Property/Hazardous Materials/Hazardous Items - Excess chemicals that are identified as hazardous property (including hazardous materials, but excluding hazardous waste and extremely hazardous property) shall be reported promptly on SF 120 to the GSA for further reuse by eligible recipients, together with a full description of the actual or potential hazard associated with the handling, storage, or use of the chemicals.
29CFR1910.1200; **41CFR101-42.204(b);** **SF 120**	**4.2.2.4** If available, a copy of the MSDS or HMIS record that describes the hazardous nature of the item shall be included with the SF 120; if not, an MSDS-equivalent document shall be provided by the owning DOE organization.
29CFR1910.1200; **41CFR101-42.204(b);** **49CFR.178-180**	**4.2.2.5.** The description of the hazard should include a certification by an authorized DOE official that the item has been properly labeled (refer to Section 4.1.3.3, above) and that the container and/or packaging meets or exceeds DOT specifications for a hazardous material container.
	4.2.3 Exceptions to Utilization Reporting of Excess Chemicals

Sources[11]	Consolidated Requirements[12]
41CFR101-42; **41CFR101-42.1102-3;** **41CFR101-42.1102-4;** **41CFR102-36.165;** **41CFR102-36.220(b);** **41CFR102-36.220(c)**	**4.2.3.1** DOE or DOE contractors shall not report the following types of chemicals as excess to the GSA on Standard Form 120 to initiate the excess screening process by federal agencies: • Chemicals determined appropriate for abandonment/ destruction (See Section 4.2.4, below); • ***Non-appropriated fund property*** (see definition). Such property may be transferred to a Federal agency with reimbursement or offered for public sale. It shall not be donated; • Scrap; • Hazardous waste (See Section 4.2.2.2, above); • Controlled substances (refer to 41CFR101-42.1102-3 in Section 4.8.2, below); • Nuclear Regulatory Commission-controlled materials (refer to 41CFR101-42.1102-4 in Section 4.8.2, below); • Property dangerous to public health and safety (e.g., asbestos, ***PCBs*** (see definition), lead-containing paint) (refer to Sections 4.8.3, 4.8.4 and 4.8.2, below); • Classified items or property determined to be sensitive for reasons of national security (e.g., Especially prepared or designed property, Proliferation-sensitive property, Nuclear components or materials, Nuclear technology related components and materials).
41CFR101-42.205 (a); **41CFR101-42.205(b);** **SF 120**	Excess chemicals determined by the holding DOE organization to be extremely hazardous property shall not be reported on SF 120, unless so directed by the GSA. When such an item becomes excess, the holding DOE organization shall notify the appropriate GSA regional office to obtain guidance on a case-by-case basis, on the utilization, donation, sales, or other disposition requirements.
	4.2.4 Abandonment or Destruction of Excess or Surplus Chemicals
41CFR102-36.35(d); **41CFR102-36.305;** **41CFR109-45.901**	**4.2.4.1** The holding DOE organization or designated contractor may abandon or destroy (excess or surplus) property or donate it to public bodies (without reporting to the GSA) only after the ***OPMO*** (see definition) makes a written determination that the property has "no commercial value" or its continued maintenance cost would exceed its estimated sale proceeds.

Sources[11]	Consolidated Requirements[12]
41CFR101-45; 41CFR102-36.315(b); 41CFR102-36.325	**4.2.4.2** In general, DOE or DOE contractor must implement sales procedures (in accordance with 41CFR101-45) in lieu of abandonment/ destruction when an eligible recipient shows interest in purchasing these excess chemicals.
41CFR102-36.325; 41CFR102-36.330	**4.2.4.3** Exceptions to Public Notice - The required public notice of intent (41CFR102-36.325) to abandon/destroy excess chemicals, including an offer to sell them to the public, prior to their actual disposition is not needed in the following cases: • The value of the property, including any expected sale proceeds, is significantly less than the cost of its care and handling pending abandonment/destruction, or • Abandonment or destruction is required because of health, safety, or security reasons; or • When the original acquisition cost of the item (estimated if unknown) is less than $500.
41CFR102-36.310; 41CFR109-45.902-2	**4.2.4.4** Abandonment or Destruction without Public Notice - The head of the DOE field organization shall coordinate with the OPMO, a review of the findings prepared by a designated official, to justify the abandonment or destruction of property without a public notification of the pending action.
41CFR101-42; 41CFR102-36.315(a); 41CFR109-42.11; 41CFR109-43.307; 41CFR109-44.7; 41CFR109-44.702-3; 41CFR109-45.9	**4.2.4.5** The owning DOE organization shall not abandon or destroy excess (or surplus) chemicals in a manner that endangers public health or safety. Specific information can be found in 41CFR109-42.11, 41CFR109-43.307, 41CFR109-44.7, 41CFR109-45, and 41CFR101-42 for hazardous materials.
41CFR102-36.35(d); 41CFR102-36.320	**4.2.4.6** Donation to a ***Public Body*** (see definition) - Excess chemicals determined to be appropriate for abandonment/ destruction may be donated only to a public body without going through the GSA.
41CFR109-44.701	**4.2.4.7** The Director, Office of Administrative Services and heads of field organizations shall designate officials to make required findings and reviews to justify donation of excess or surplus chemicals to public bodies.
41CFR101-42; 41CFR109-42.11; 41CFR109-44.702-3	**4.2.4.8** The Director, Office of Administrative Services and heads of field organizations shall ensure that the donation of excess or surplus hazardous materials to public bodies complies with applicable requirements in 41CFR109-42.11 and 41CFR101-42.

Sources[11]	Consolidated Requirements[12]
	4.3 Off-Site Transfer to Other Federal Agencies -- Federal Excess Screening
29CFR1910.1200; 41CFR101-42.207(a); **SF 122**	**4.3.1** Transfer of Hazardous Materials and Certain Categories of Property - Excess hazardous materials may be transferred between DOE and other Federal agencies except that the Standard Form (SF) 122 (Transfer Order Excess Personal Property), prepared by the transferee (i.e., receiving agency) shall contain a full description of the actual or potential hazard associated with the handling, storage, or use of each item. The description shall consist of an MSDS or HMIS data record, if available, or a written MSDS-equivalent narrative meeting the OSHA Hazard Communication Standard requirements.
41CFR101-42.207(a)	**4.3.2** A certification by an authorized DOE official that the hazardous item has been properly labeled and its packaging meets OSHA and DOT requirements (see Section 4.2.2.5, above), shall be included in the description of the hazard.
41CFR101-42.207(b); **SF 122**	**4.3.3** The transferee agency (i.e., receiving agency) shall document the inventory or control record of the transferred hazardous item to indicate the hazard associated with the handling, storage, or use of the item. If available, an MSDS or HMIS (or equivalent) data record must be filed with the SF 122.
41CFR101-42.208	**4.3.4** Custody of Extremely hazardous materials - Custody of excess extremely hazardous materials shall be the responsibility of the owning or holding DOE site. Custody of other hazardous materials may be fully or partially transferred to another Federal agency with that agency's consent.
41CFR102-36.35(c)	**4.4 Donation or Sale of Surplus Chemicals to the Public** *[NOTE: Surplus chemicals not selected for donation are offered for sale to the public by competitive offerings such as sealed bid sales, spot bid sales or auctions. DOE or DOE contractor may conduct the sale if the GSA is made aware of DOE's intent at the time the excess is reported or the GSA will conduct the sale, by default.]*
	4.4.1 General Requirements
41CFR102-36.35(b)	**4.4.1.1** To comply with the ***Property Act*** (see definition), surplus chemicals (i.e., excess chemicals that have not been transferred to Federal agencies) shall be distributed to eligible recipients by an agency established by each State for this purpose, the State Agency for Surplus Property (SASP).

Sources[11]	Consolidated Requirements[12]
41CFR101-45.102	**4.4.1.2** A need for surplus chemicals expressed by any Federal agency shall take precedence to any disposition action by sale, provided that need is relayed in time for the DOE organization to respond.
41CFR101-45; 41CFR101-45.105-1	**4.4.1.3** Although policies and methods prescribed in 41CFR101-45 for the disposition of surplus chemicals by public sale or abandonment/destruction do not apply to materials acquired for the national stockpile or the supplemental stockpile or to materials acquired under section 303 of the Defense Production Act of 1950, as amended (50 U.S.C. App. 2093), these provisions should be followed to the extent feasible in the disposition of such materials.
41CFR102-37.40	**4.4.1.4** All surplus chemicals are available for donation to eligible recipients, except for the following property categories: • Non-appropriated fund property • Property that requires reimbursement upon transfer • Controlled substances. • Items that may be specified from time to time by the GSA Office of Government-wide Policy
41CFR109-43.307-2.50	**4.4.2** Monitoring of Hazardous Chemicals for Radioactive/Chemical Contamination - To prevent inadvertent release of hazardous personal property from the DOE sites by transfer or sale to the public, all hazardous or suspected hazardous property chemicals shall be checked for radioactive or chemical contamination[57] by environmental, safety, and health officials.
41CFR109-43.307-2.50	**4.4.2.1** Contamination-free chemicals will carry a certification tag authorizing release for transfer or sale.
41CFR109-43.307-2.50	**4.4.2.2** Contaminated chemicals will be referred back to the DOE program office for appropriate action.
41CFR109-43.307-2.51	**4.4.3** Holding Hazardous Property Chemicals - Excess or surplus hazardous property chemicals shall be stored compatibly and not with non-hazardous property chemicals while awaiting disposition action.
	4.4.4 High Risk Property - Export Controlled Property
41CFR109-43.307-50(a)	**4.4.4.1** DOE or the DOE contractor must obtain the necessary

[57] Examples include radioactively-contaminated chemical containers or chemicals stored or used in radioactively-contaminated areas.

Sources[11]	Consolidated Requirements[12]
	export license when chemicals subject to export controls are to be exported directly.
41CFR109-43.307-50(b)	**4.4.4.2** When chemicals subject to export controls are transferred under work-for-others agreements, co-operative agreements, or technical programs, the recipients will be informed in writing about export control restrictions that must be followed in the event of a change in custody of the materials.
	4.4.5 High Risk Property - Nuclear-related or Proliferation-sensitive Personal Property
41CFR109-43.307-52(a)	**4.4.5.1** All nuclear-related and proliferation-sensitive ***personal property*** (see definition) shall be physically tagged with a certification from an authorized DOE program official at the time of excess determination.
41CFR109-43.307-52(b)	**4.4.5.2** Excess nuclear-related and proliferation-sensitive personal property shall be stripped of all of its distinctive characteristics, as determined by the cognizant program office, prior to disposition. To the extent practicable, such action shall be accomplished without compromising any civilian utility or commercial value of the chemical.
41CFR109-43.315(d)	**4.5 Donation of Surplus Hazardous Materials to *Public Agencies* (see definition) via *State Agencies for Surplus Property (SASPs)* (see definition)** - DOE contracting officers shall maintain a record of the number of certified non-Federal agency screeners operating under their authority and shall immediately notify the appropriate GSA regional office of any changes in screening arrangements.
41CFR101-42; **41CFR101-42.3;** **41CFR102-37;** **41CFR109-42.11;** **41CFR109-44.702-3**	**4.5.1** Donation of Hazardous Materials and Certain Categories of Property (General) - The Director, Office of Administrative Services and heads of DOE field organizations shall provide the safeguards, notifications, and certifications required for the donation of hazardous materials consistent with the requirements in 41CFR109-42.11 and 41CFR101-42. *[NOTE: Donation of hazardous materials and **certain categories of property** (see definition) is governed by the special policies and methods prescribed in 41CFR101-42.3 in addition to the requirements of 41CFR102-37.]*
41CFR101-42.301(a)	**4.5.1.1** Surplus chemicals identified as hazardous material and not required for transfer as excess chemicals to Federal agencies shall normally be made available for donation.
41CFR101-42.301(a)	**4.5.1.2** State Agencies for Surplus Property (SASPs) shall not

Sources[11]	Consolidated Requirements[12]
	acquire hazardous materials without first confirming eligible ***donees*** (see definition) for these products.
41CFR101-42.301(a)	**4.5.1.3** Surplus chemicals identified as hazardous may be donated provided the donee is warned about the hazardous nature of the product via MSDS, HMIS data, or equivalent safety documentation and is provided with special handling information.
41CFR101-42.301(b)	**4.5.1.4** The donee shall sign a required certification as prescribed in 41CFR101-42.301(b) to the effect that he/she is aware of the hazards associated with the chemical product and that he/she is legally responsible for the use, storage, handling, transport and disposal of the hazardous material(s).
41CFR101-42.202; **41CFR101-42.203;** **41CFR101-42.302(a)**	**4.5.2** Responsibilities for Donation of Hazardous Materials - The holding agency (i.e., DOE) shall be responsible for the identification and reporting of hazardous materials as stated in 41CFR101-42.202 and 41CFR101-42.203 (see Section 4.1.3, above).
29CFR1910.1200; **41CFR101-42.302(b);** **Standard Form 123**	**4.5.2.1** The State Agency for Surplus Property (SASP) or the donee, when applicable, shall prepare Standard Form (SF) 123 (Transfer Order Surplus Personal Property). A full description of the actual or potential hazard associated with handling, storage, or use of the item must be provided with an MSDS, HMIS data, or an equivalent document that complies with the requirements of the OSHA Hazard Communication Standard.
41CFR101-42.301(b); **41CFR101-42.302(b);** **SF 123**	**4.5.2.2** The SASP and/or donee shall sign the certification stipulated in 41CFR101-42.301(b) and forward it with the SF 123 to the GSA regional office. The certification is an acknowledgment by the donee of the legal transfer of custody of the hazardous material from the DOE organization and the acceptance of liabilities it may entail to the donee.
41CFR101-42.301(b); **41CFR101-42.303;**	**4.5.2.3** Donation of surplus hazardous material distributed by the SASP to the donee shall be effected by the use of State agency distribution document. The donee shall also sign the required certification (see Section 4.5.2.2, above).
41CFR101-42.302(c)	**4.5.2.4** DOE and DOE contractors shall obtain approval from the GSA regional office to transfer hazardous materials for donation.

Sources[11]	Consolidated Requirements[12]
41CFR101-42.304; 41CFR101-42.1102	**4.5.3** Special Requirements for Donation of Certain Hazardous Materials *[NOTE: Special donation requirements for specific hazardous materials are provided in 41CFR101-42.1102. Many hazardous materials require special storage and handling. (See Sections 4.8.2, 4.8.3, and 4.8.4, below.)]*
41CFR102-37.220(d); 41CFR101-42.1102-2	**4.5.3.1** A SASP must obtain written justification from the prospective donee, and submit it to GSA along with the transfer request, prior to allocation of items containing 50 ppm or greater of polychlorinated biphenyl (PCB).
41CFR101-42.304; 41CFR102-37.245	**4.5.3.2** The Federal holding agency or the SASP shall properly store hazardous materials, ensure the use of necessary safeguards, and instruct donation screeners on personal protection when inspecting the surplus.
41CFR101-42.304; 49CFR171	**4.5.3.3** The SASP and/or the donee shall comply with DOT regulations (49CFR171 et seq.) when transporting hazardous materials.
	4.6 Sale Of Hazardous Materials To Public Bodies - General
41CFR101-45.103-2; 41CFR101-45; 41CFR101-46; 41CFR101-42; 41CFR109-42	**4.6.1** Holding Agency Sales - All provisions of 41CFR101-45 and 41CFR101-46 shall be followed in conducting sales of Federal government-owned surplus chemicals, if not superceded by DOE-PMR and 41CFR101-42.
41CFR109-45.105-3; 41CFR101-45	**4.6.1.1** Contractor chemical inventory held by DOE designated contractors is exempted from the GSA conducted sales provisions of 41CFR101-45.
41CFR109-45.300-50	**4.6.1.2** Sales of surplus contractor chemical inventory by designated contractors will be conducted with the approval of heads of field organizations and with oversight by OPMOs and program officials to ensure that chemicals requiring special handling or program office certification are sold in compliance with regulatory requirements.
41CFR109-45.301-51	**4.6.1.3** The Export/import clause specified in 41CFR109-45.301-51, warning the purchaser not to export the chemicals overseas and to inform the next potential owner about export/import restrictions shall be included in all sales invitations for bid.

Sources[11]	Consolidated Requirements[12]
41CFR101-42.400; **41CFR101-42.401;** **41CFR101-42.402;** **41CFR101-42.403;**	**4.6.2** Sales of Hazardous Chemicals through GSA Regional Offices. *[NOTE: Sales of hazardous materials are done through GSA regional offices in accordance with 41CFR101-42.400, 41CFR101-42.401, 402 (reporting), and 403 (Sale methods and Procedures).]*
41CFR101-42.45; **41CFR101-42.400;** **41CFR101-45;** **41CFR109-45**	**4.6.1.1** The sale, abandonment, or destruction of hazardous materials and certain categories of property shall be conducted in accordance with the special policies and procedures prescribed in 41CFR101-42.400 and the additional requirements of 41CFR109-45 and 41CFR101-45.
41CFR101-42.401(a)	**4.6.2.2** Sale of hazardous materials for DOE and DOE contractors shall be conducted through the regional offices of GSA.
41CFR101-42.401(a); **41CFR109-45.304;** **41CFR101-42.403**	**4.6.2.3** DOE designated contractors and field organizations shall follow sales methods and procedures in accordance with 41CFR109-45.304. These holding agency (DOE) sales of hazardous materials shall meet or exceed the requirements in 41CFR101-42.403.
41CFR101-42.401(b); **41CFR101-45.103-2**	**4.6.2.4** Holding agencies shall prepare hazardous materials for sale as provided for in 41CFR101-45.103-2. Pending disposition, each holding agency shall care for and handle its hazardous materials, including posting appropriate warning signs and rendering <u>extremely hazardous property</u> innocuous, or providing adequate safeguards.
41CFR101-42.402; **41CFR101-45.303**	**4.6.3** Reporting hazardous materials for sale - DOE and DOE contractors that elect to have GSA sell their hazardous materials shall report them to the GSA regional office for the region in which the surplus chemicals are located in the following manner:
41CFR101-42.402(a)	**4.6.3.1** <u>Reportable property</u> - Hazardous materials reported for utilization screening, if not transferred or donated, will be programmed for sale by the GSA regional office.
41CFR101-45.303(b); **41CFR101-42.402(b);** **SF 126**	**4.6.3.2** <u>Non-reportable property</u> - Hazardous materials not required to be reported for utilization screening, and for which any required donation screening has been completed, shall be reported to the appropriate GSA regional office on Standard Form (SF) 126 (Report of Personal Property for Sale).

Sources[11]	Consolidated Requirements[12]
29CFR1910.1200; 41CFR101-42.202(e); 41CFR101-42.204; 41CFR101-42.402(c); 49CFR178-180; **SF 126**	**4.6.3.3** Description and certification - The SF 126 shall contain a certification from an authorized DOE official that the hazardous item has been properly labeled and packaged as required in 41CFR101-42.202(e) (see Section 4.1.3.3, above) and 41CFR101-42.204 (see Section 4.2.2.5, above).
29CFR1910.1200; 41CFR101-42.402(c); **SF 126**	**4.6.3.4** The SF 126 shall also include a full description of the actual or potential hazard associated with handling, storage, or use of the item. This description shall be furnished by providing: an MSDS, or a copy of the HMIS record, or an MSDS-equivalent narrative that complies with the requirements of the OSHA Hazard Communication Standard.
41CFR101-42.403; 41CFR101-45.304	**4.6.4** Sale Methods and Procedures for Hazardous materials. Hazardous materials shall be sold in accordance with the provisions of 41CFR101-45.304 and the following special methods and procedures:
41CFR101-42.403(a)	**4.6.4.1** Sales that offer hazardous materials shall be conducted separately from other sales. Sale catalogs or listings shall be sent to only those parties with an active interest in purchasing such materials.
41CFR101-42.403(b)	**4.6.4.2** Sale catalogs, listings, and invitations for bids, shall • limit the hazardous materials in each lot to a single Federal supply group; • indicate if an MSDS is available for the product being sold; and • indicate if a hazardous item is being sold only for its material content.
41CFR101-42.403(c)	**4.6.4.3** For a bid to be considered for award, the bidder must sign the certification specified in 41CFR101-42.403(c) to the effect that he/she will comply with all applicable regulations related to the care, handling, storage, shipment, resale, export, or other use of the hazardous material being purchased and that he/she will assume all legal liabilities after the purchase.
29CFR1910.1200; 41CFR101-42.403(d)	**4.6.4.4** MSDSs, HMIS records, where applicable, or a written description in compliance with the requirements of the OSHA Hazard Communication Standard shall be sent to purchasers of hazardous materials with their notice of award.

Sources[11]	Consolidated Requirements[12]
	4.6.5 Sale of High Risk Personal Property
41CFR109-43.307-2.50; 41CFR109-45.304; 41CFR109-45.309; 41CFR109-45.309-2.50	**4.6.5.1** Suspect (definition) hazardous property shall be made available for sale only after the review and certification requirements for contamination-free status (see Section 4.4.2, above) have been met.
41CFR109-43.307-50; 41CFR109-45.309-51	**4.6.5.2** Export controlled property shall be made available for sale only after the export license requirements (see Section 4.4.4, above) have been met.
41CFR109-43.307-52; 41CFR109-45.309-53	**4.6.5.3** Nuclear-related or proliferation-sensitive property shall be made available for sale only after the stripping and certification requirements (see Section 4.4.5, above) have been met.
41CFR101-42.403(e)	**4.6.6** Sale of Extremely Hazardous Property – DOE or DOE contractor shall not sell extremely hazardous property unless authorized by the appropriate GSA regional office. Any authorized sale requires the DOE/DOE contractor to provide adequate safeguards for the material or render it innocuous (without a loss of its utility or commercial value) (see Section 4.6.2.3, above).
41CFR101-42.404; 41CFR101.42.1102	**4.6.7** Sale of Certain Hazardous Materials - DOE or DOE contractors shall follow the special sales requirements provided in 41CFR101.42.1102 for certain hazardous materials (e.g., asbestos, polychlorinated biphenyls, controlled substances, etc.) (see Sections 4.8.1 through 4.8.4, below). The holding agency (DOE) shall properly store hazardous items and provide information to ensure that prospective bidders are aware of the hazards, as well as the precautions they should take to protect themselves.
41CFR101-42.1102; 41CFR102-36.305 through 102-36.330	**4.7 Abandonment or Destruction[58] of Surplus Hazardous Materials and Certain Categories of Property** - DOE and DOE contractors shall follow the requirements for the abandonment or destruction of surplus hazardous chemicals as prescribed in 41CFR102-36.305 through 102-36.330 and additional requirements found in 41CFR101-42.1102.
41CFR102-37.565; 41CFR102-37.570; 41CFR109-44.701	**4.7.1** A written finding must be made by an authorized DOE official (see Sections 4.2.4.1 and 4.2.4.7 above) that a surplus chemical has "no commercial value" or its continued maintenance would cost more than its estimated sale proceeds, before it can be abandoned or destroyed, or donated to public bodies.

[58] Surplus chemicals remaining after normal donation screening are generally subject to the sale process in accordance with the provisions of 41CFR101-45. However, if the criteria in 41CFR102-36.305 are met, these chemicals may be destroyed. [41CFR102-37.80]

Sources[11]	Consolidated Requirements[12]
41CFR101-42.406; 41CFR101-42.1102; 41CFR102-36.305 through 102-36.330; 41CFR102-37.570; 41CFR109-44.702-3	**4.7.2** In addition to the requirements in 41CFR102-36.305 through 102-36.330 and 41CFR101-42.1102, surplus hazardous materials, including empty hazardous material containers, shall be abandoned or destroyed in accordance with appropriate Federal, State, and local waste disposal, and air and water pollution control standards.
41CFR102-37.35(c); 41CFR102-37.125(a)(2) ; 41CFR102-37.125(b); 41CFR102-37.570	**4.7.3** Donation[59] to Public Bodies - The holding DOE organization or designated contractor shall not donate chemicals that require destruction for health, safety, or security reasons (see Section 4.2.4.8, above).
41CFR101-42.1101(a)	**4.8 Disposition of Special Types of Hazardous Materials and Certain Categories of Property** Hazardous material identification is required for all material that, by virtue of its potentially dangerous nature, requires controls to assure adequate safety to life, property, and the environment.
41CFR101-42.1101; 41CFR101-42.1101(b); **Federal Standard 313**	**4.8.1** Federal Supply Classification (FSC) Groups and Classes that Contain Hazardous Materials. *[NOTE: To facilitate identification of hazardous materials or items using Federal Supply Classification (FSC) groups or classes, two listings, based on Federal standard 313, are provided in Appendix B of this chapter. Table B-1 contains a complete list of FSC classes composed predominantly of hazardous items and Table B-2 contains a selective listing of FSC classes and groups that contain a significant number of hazardous items.]*
41CFR101-42.1102; 41CFR101-42.1102-3; 41CFR101-42.1102-4; 41CFR101-42.1102-5; 41CFR101-42.1102-7; 41CFR101-42.1102-8; 41CFR101-42.1102-9	**4.8.2** Special Requirements for Disposition of Certain Hazardous Materials and Certain Categories of Property *[NOTE: Special requirements for the utilization, donation, sale, and disposition of chemical products, including those belonging to certain Federal Supply Classes or Groups, that contain hazardous chemicals such as asbestos, polychlorinated biphenyls (PCBs), explosives, etc. are covered in various sections of 41CFR101.42.1102, as listed below:* • *Controlled substances (refer to 41CFR101-42.1102-3)* • *Nuclear Regulatory Commission (NRC)-controlled materials (refer to 41CFR101-42.1102-4)*

[59] The holding DOE organization may donate surplus chemicals, which would otherwise be abandoned or destroyed, directly to public bodies, without going through the GSA, in accordance with Subpart H of DOE-PMR (41CFR109) and Subpart H of FPMR (41CFR101). As there is no special form to process donations, the holding agency may use any document that has an audit trail to record the transaction. [41CFR102-37.35(c); 41CFR102-37.575]

Sources[11]	Consolidated Requirements[12]
	• *Drugs, biologicals, and reagents other than controlled substances (refer to 41CFR101-42.1102-5)* • *Lead-containing paint and items bearing lead-containing paint (refer to 41CFR101-42.1102-7)* • *U.S. Munitions list items which require demilitarization (refer to 41CFR101-42.1102-8)* • *Acid-contaminated and Explosives-contaminated property (refer to 41CFR101-42.1102-9)]*
41CFR101-42.1102-1	**4.8.3** Asbestos - Special Requirements *[NOTE: The following disposition requirements apply to chemical products containing friable asbestos (see Section 4.8.3.1, below) and nonfriable asbestos (see Section 4.8.3.2, below)]*
	4.8.3.1 ***Friable Asbestos Materials*** (see definition)
41CFR101-42.1102-1 (b)(1); **SF 120**	**4.8.3.1.1** Utilization – Excess chemicals known to contain friable asbestos shall not be reported to the GSA on SF 120 or transferred among Federal agencies.
41CFR101-42.1102-1(c)(1); **41CFR101-42.1102-1(d)(1)**	**4.8.3.1.2** Donation and sales[60] - Surplus chemicals containing friable asbestos shall not be donated or sold.
41CFR101-42.1102-1(e)(1); **40CFR61.156**	**4.8.3.1.3** Abandonment and destruction - Excess or surplus personal property, which contains friable asbestos, shall be buried in an EPA-approved site, in accordance with the requirements of 40CFR61.156.
	4.8.3.2 ***Nonfriable Asbestos Materials*** (see definition)
41CFR101-42.1102-1(b)(2)(i); **41CFR102-36;** **SF 120;** **SF 122**	**4.8.3.2.1** Utilization –Excess chemicals containing nonfriable asbestos shall be reported to the GSA and processed routinely, except that a required cancer hazard warning, as specified in 40CFR101-42.1102-1(b)(2)(i), shall be included in the Standard Forms 120 and 122.
41CFR101-42.1102-1(b)(2)(ii)	**4.8.3.2.2** All excess chemical products known to contain nonfriable asbestos shall be labeled with a cancer hazard warning as prescribed in 41CFR101-42.1102-1(b)(2)(ii).

[60] Exception: DOE and DOE contractors may, on a case-by-case basis, request approval from the GSA Central Office to transfer, donate, or sell (excess/surplus) chemicals containing friable asbestos. [41CFR101-42.1102-1(a)(4)]

Sources[11]	Consolidated Requirements[12]
41CFR101-42.1102-1(c)(2)(i); 41CFR102-37; **SF 123**	**4.8.3.2.3** Donation – Surplus chemicals containing nonfriable asbestos may be donated in the normal manner, except that the Standard Form (SF) 123 shall include the cancer hazard warning stipulated in Section 4.8.3.2.1, above.
41CFR101-42.1102-1(c)(2)(ii); 41CFR101-42.1102-1(d)(2)(ii)	**4.8.3.2.4** All surplus chemicals to be donated or sold, that contain nonfriable asbestos, shall be labeled as stated in Section 4.8.3.2.2, above.
41CFR101-42.1102-1(d)(2)(i); 41CFR101-45	**4.8.3.2.5** Sale – Surplus chemicals containing nonfriable asbestos may be sold, except that all sale-related documentation including product literature, advertisements, and post-sale agreements shall include a cancer hazard warning as specified in Section 4.8.3.2.1, above.
41CFR101-42.1102-1(e)(2); 41CFR102-36.305 through 102-36.330	**4.8.3.2.6** Abandonment and destruction – Surplus chemicals containing nonfriable asbestos which are not transferred, donated, or sold shall be abandoned or destroyed as provided for in 41CFR102-36.305 through 102-36.330. However, if DOE is concerned about the nonfriable asbestos within the chemical product having the potential to become friable during the process of abandonment or destruction, the product shall be disposed of by burial (See Section 4.8.3.1.3 above).
41CFR101-42.1102-2(a)(2)	**4.8.4** Polychlorinated biphenyls – Special Requirements
41CFR101-42.1102-2(a)(3); 41CFR101-45; 41CFR102-36; 41CFR102-37	**4.8.4.1** ***Excluded PCB products*** (see definition) are not subject to Federal restrictions and may be transferred, donated, sold, or otherwise processed under 41CFR Parts 102-36, 102-37, and 101-45, provided such processing conforms to all applicable State[61] and local laws.
41CFR101-42.1102-2(a)(4)	**4.8.4.2** All ***PCBs*** (see definition) and ***PCB items*** (see definition) to be transferred, donated, or sold shall be labeled or marked clearly with a toxic hazard warning as specified in 41CFR101-42.1102-2(a)(4).

[61] Some States regulate PCB concentrations more strictly than does the Federal government.

Sources[11]	Consolidated Requirements[12]
41CFR101-42.1102-2(a)(5)	**4.8.4.3** Unmarked or unlabeled items containing PCBs or PCB items with an unknown level of concentration of PCBs shall not be transferred, donated, or sold.
41CFR101-42.1102-2(b)(1)	**4.8.4.4** Utilization - PCBs and PCB items shall be reported for utilization screening as a hazardous property (see Sections 4.2.2.3 and 4.2.2.4, above).
40CFR761; **41CFR101-42.1102-2(b)(2);** **SF 122**	**4.8.4.5** To obtain GSA's approval for transfers of excess PCBs or PCB items, (a) the items shall be intact, non-leaking, and totally enclosed, and (b) the SF 122 shall cite the specific provision in 40CFR761 that allows continued use of the item, and contains a certification that the product has been inspected by the transferee and that it complies with all applicable provisions of 40CFR761.
40CFR761; **41CFR101-42.1102-2(b)(3)**	**4.8.4.6** When a PCB or PCB item is transferred as excess, the receiving agency shall note in its property accountability records the nature and concentration of the PCB and shall list the provisions of 40CFR761 authorizing its use.
40CFR761; **41CFR101-42.1102-2(c)(1);** **41CFR102-37;** **SF 123**	**4.8.4.7** Donation - In order for PCB or PCB-contaminated items to be approved by the GSA for donation under 41CFR102-37, the following must be met: • the required toxic hazard certification (see Section 4.8.4.2, above) must appear on the SF 123 (Transfer Order Surplus Personal Property); • the specific donee must have been selected; and • a justification from the recipient (i.e., the SASP or the donee) must be attached stating the proposed use and citing the specific provision in 40CFR761 that permits continued use of the item.
41CFR101-42.1102-2(c)(2)	**4.8.4.8** All PCBs and PCB items must be in usable condition to be eligible for donation.
41CFR101-42.1102-2(c)(3)	**4.8.4.9** Items to be donated must be intact, totally enclosed, and non-leaking.
40CFR761; **41CFR101-42.1102-2(d)(1);** **41CFR101-42.1102-2(d)(2)**	**4.8.4.10** Sales - The GSA or the holding DOE organization normally shall not sell surplus PCBs or PCB items. These items are regarded as extremely hazardous and shall be disposed of by DOE and DOE contractors under the EPA regulations. *[NOTE: Holding DOE organizations may request the authority to sell or that the GSA sell a specific PCB or PCB item, by citing the specific provision in 40CFR761 that authorizes such sale, along with a justification for*

Sources[11]	Consolidated Requirements[12]
	sale of the item instead of disposal under EPA regulations.]
41CFR42.1102-2(a)(4); 41CFR101-42.1102-2(d)(3)	**4.8.4.11** If PCBs or PCB items are to be sold, the invitation for bid (IFB), any Standard Form that lists such items, and any sales literature related to these items shall contain the warning as prescribed in 41CFR42.1102-2(a)(4).
40CFR761; 41CFR101-42.1102-2(e)(1)	**4.8.4.12** Abandonment and destruction - PCBs and PCB items not disposed of via utilization, donation, or sale shall be destroyed or otherwise disposed of in accordance with the EPA regulation (40CFR761) and applicable State laws.
41CFR109-42.11; 41CFR109-42.1100.50	**4.9 Utilization and Disposition of Hazardous Materials that are Radioactively or Chemically Contaminated** *[NOTE: 41CFR109-42.11 sets forth policies and procedures for the utilization and disposition outside of DOE of excess and surplus chemicals, which have been radioactively or chemically contaminated.]*
41CFR109-42.1100.51	**4.9.1** DOE or DOE contractor shall dispose of contaminated chemicals in accordance with applicable Federal regulations governing radiation/chemical exposure and environmental contamination. Appropriate state and local regulations shall be followed in cases where Federal regulations do not exist or apply.
41CFR109-42.1102.51(a)	**4.9.2** Suspect Personal Property - Excess chemicals (including scrap) having a history of use in an area where radioactive or chemical contamination may occur shall be considered suspect and shall be monitored.
41CFR109-42.1102.51(b)	**4.9.3** If economically feasible, every effort shall be made to reduce the level of contamination of excess or surplus chemicals to the lowest practicable level. Contaminated chemicals that exceed applicable contamination standards shall not be utilized or disposed outside of DOE.
41CFR109-42.1102.51(c)	**4.9.4** If contamination is suspected and the property is of such size, construction, or location as to make testing for contamination impossible, the property shall not be utilized or disposed outside of DOE.
41CFR109-42.1102.52; 41CFR109-45.5005-1(a); 49CFR171-179	**4.9.5** Low Level Contaminated Personal Property - If monitoring of suspect chemicals indicates that contamination does not exceed applicable standards, they may be utilized and disposed of in the same manner as uncontaminated chemicals, provided the guidance in 41CFR109-45.5005-1(a) has been considered.

Sources[11]	Consolidated Requirements[12]
	However, recipients shall be advised of the hazards where levels of radioactive contamination require specific controls for shipment as provided in DOT regulations (49CFR171-179) for shipment of radioactive personal property.
41CFR109-42.1102.52	**4.9.6** When any contaminated chemical is screened within DOE, reported to GSA, or otherwise disposed of, the kind and degree of contamination must be clearly indicated on all relevant documents.
41CFR101-42; **41CFR109-42;** **41CFR109-43.307-50;** **41CFR109-43.307-51;** **41CFR109-43.307-52;** **41CFR109-45.50;** **41CFR109-45.5005-1**	**4.9.7** High Risk Personal Property - Excess and surplus chemicals identified as Nuclear-related, proliferation-sensitive, low level contaminated property and Classified personal property shall not be transferred, sold, exchanged, leased, donated, abandoned, or destroyed without approval of the cognizant DOE program office. Disposition of such chemicals is subject to the restrictions contained in applicable sections of the DOE-PMR and FPMR.
	4.10 Storage and Handling of Excess or Surplus Chemicals *[NOTE: Chemicals categorized as hazardous materials, extremely hazardous materials, dangerous property, and hazardous property require special handling and storage considerations. Requirements identified in Chapter 5 ("Chemical Storage") of this document continue to apply for the storage and handling of excess (or surplus) chemicals while avenues for their disposition are being sought until the time the chemicals are identified as waste for final disposal.]*

5.0 Source Documents

Department of Energy (July 1999), "Guidelines on Export Control and Nonproliferation".
Department of Energy Personal Property Letter, Issue Number 970-3, Revision 1 (Feb. 3, 1998).

Executive Order 12344 (February 3, 1982), "Naval Nuclear Propulsion Program", 47 Federal Register 4979.

Federal Standard 123 (or FED-STD-123), "Marking for Shipment (Civil Agencies)".
Federal Standard 313 (or FED-STD-313), "Material Safety Data, Transportation Data and Disposal Data for Hazardous Materials Furnished to Government Activities".

International Atomic Energy Agency (IAEA), Information Circular (INFCIRC) 254, Part 1 ("Trigger List") and Part 2 ("Dual-use List").

NFPA 45 (2000), "Standard on Fire Protection for Laboratories Using Chemicals".

Public Law 98-525 (10/19/84), “Department of Defense Authorization Act, 1985”; also called “Department of Energy National Security and Military Applications of Nuclear Energy Authorization Act of 1985”.

10CFR110, Nuclear Regulatory Commission, "Export and Import of Nuclear Equipment and Material”.
10CFR810, Department of Energy, "Assistance to Foreign Atomic Energy Activities".
15CFR Subpart C (Parts 730 to 774), Department of Commerce, “Export Administration Regulations” (EAR); in particular, 15CFR734, “Scope of the Export Administration Regulations”, 15CFR744, "Control Policy: End-User and End-Use Based", and 15CFR774, “The Commerce Control List”.
22CFR Subchapter M (Parts 120-130), Department of State, "International Traffic in Arms Regulations" (ITAR), and in particular, 22CFR121, “The United States Munitions List”.
29CFR1910, “Occupational Safety and Health Standards”.
29CFR1910.120, “Hazardous Waste Operations and Emergency Response”.
29CFR1910.1001, “Asbestos”.
29CFR1910.1200, “Hazard Communication”.
29CFR1926.65, “Hazardous Waste Operations and Emergency Response”.
40CFR61.156, “Cross-reference to Other Asbestos Regulations” (National Emission Standards for Hazardous Air Pollutants).
40CFR261, “Identification and Listing of Hazardous Waste”.
40CFR273, “Standards for Universal Waste Management”.
40CFR761, “Polychlorinated Biphenyls (PCBs) Manufacturing, Processing, Distribution in Commerce, and Use Prohibitions”.
40CFR763, “Asbestos”.
41CFR101, “Federal Property Management Regulations” (Parts 101-1 to 101-99); in particular, Subpart H (Parts 42 to 99).
41CFR101-27.2, “Management of Shelf-Life Materials.”
41CFR102, “Federal Management Regulation (FMR)” (Parts 102-1 to 102-220); in particular, 41CFR102-36, “Disposition of Excess Personal Property” *[NOTE: This Part is cross-referenced by 41CFR101-43, “Utilization of Personal Property”, which is no longer in print]*, and 41CFR102-37, “Donation of Surplus Personal Property” *[NOTE: This Part is cross-referenced by 41CFR101-44, “Donation of Personal Property”, which is no longer in print]*.
41CFR109, “Department of Energy Property Management Regulations”; in particular, Subpart H (Parts 42 to 50).
49CFR.171-180 (Subchapter C), “Hazardous Materials Regulations”.

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Appendix A - Typical Screening Process Steps

DISPOSITION OF EXCESS OR SURPLUS CHEMICALS USING FEDS/ EADS: DOE-PMR, FPMR AND FMR REQUIREMENTS

The potential avenues of disposition open to an excess chemical depend on its hazard/risk/value characteristics. Excess precious metals shall be returned to DOE's Precious Metals Pool located in Oak Ridge, Tennessee. As shown in Table A-1, the first step in the typical disposition cycle is to screen excess chemicals for reutilization within the DOE complex through the Energy Asset Disposal System (EADS) for a 15-day period. At the conclusion of internal DOE screening, four categories of High risk property identified as Export controlled property, Proliferation-sensitive property, Especially designed or prepared property, and Nuclear weapon components or weapon-like components[62] shall be dispositioned in accordance with the DOE Personal Property Letter 970-3 and 41CFR109-1.53, with prior review and approval by the OPMO. An Export Restriction Notice signed by the recipient organization shall accompany any resulting property transfers, sales, or other offerings.

Among the remaining six High risk property categories is Hazardous property (as defined in DOE-PPL 970-3 and 41CFR109-1.100-51(a)), which includes hazardous materials as defined in the FPMR (41CFR101). These chemicals may be screened through the Federal Excess Disposal System (FEDS) for a period of 21 days, once the internal DOE screening has concluded in accordance with 41CFR109-42, 41CFR101-42, and 41CFR102-36. Excess chemicals may be transferred to another federal agency using the federal excess screening process in FEDS. The remaining surplus chemicals will become eligible for donation to non-profit donees through surplus screening by the State Agencies for Surplus Property (SASPs). The next step in the disposition process is a sale conducted by the GSA regional office (or by the DOE contractor with approval from GSA) to the public through a competitive bid or auction sale process. The ultimate fate of any remaining surplus chemicals rests with the owning DOE organization, which may elect to put the chemicals back into the disposition cycle or declare them as solid waste (unless they are recyclable under the universal waste provisions) and dispose of them under appropriate EPA, State, and local laws and regulations.

In cases involving excess or surplus chemicals with no market value, when holding a sale is not an economically viable option, abandonment or destruction (see Table A-2) may be permitted, with approval by the authorized DOE property management official. Where feasible, sale to the public as scrap or donation to public bodies (i.e., any public agency, Indian tribe, or agency of the Federal government) is the preferred option in lieu of abandoning or destroying the property. Donation is not an option for chemical products that require destruction for health, safety, or security reasons. A public notice of intent to destroy shall not be issued in such cases.

Any U.S. Munitions List item (MLI) or Commerce Control List item (CCLI) that requires demilitarization is identifiable by an assigned demilitarization code that indicates the type of and scope of demilitarization and/or export controls that must be undertaken before the item could be transferred to a non-DOD entity. For a listing of these codes and additional guidance, refer to "DOD Demilitarization and Trade Security Control Manual", DOD 4160.21-M-1. Only demilitarized property may be offered for public sale or donated to public bodies.

[62] Nuclear materials and radiological materials fall outside the scope of this chapter.

STANDARD FORMS USED IN CHEMICAL DISPOSITION:

Standard Form 120 or SF 120, "Report of Excess Personal Property" – submitted by the holding agency (i.e., DOE) to the GSA at the end of internal DOE screening to report excess chemicals that are available for federal screening. If DOE plans to conduct a sale after donation screening, it should so inform GSA at this time. *[NOTE: Do not report extremely hazardous property on SF 120 unless so directed by a GSA Regional office or GSA Central office. Do not screen within DOE or report to the GSA any Nuclear-related and Proliferation-sensitive property.]*

Standard Form 122 or SF 122, "Transfer Order Excess Personal Property" – used for the transfer of excess chemicals among Federal agencies, including the DOE. Prepared by the transferee (i.e., receiving agency) and approved by the GSA regional office (responsible for the region where the property is located).

Standard Form 123 or SF 123, "Transfer Order Surplus Personal Property" – used for the donation of surplus chemicals to a non-Federal recipient (e.g., a State agency for Surplus Property (SASP) or Donee). Prepared by the SASP or donee when applicable and submitted to the GSA regional office (responsible for the region where the property is located) for approval.

Standard Form 126 or SF 126, "Report of Personal Property for Sale and Certification" – used for reporting hazardous materials that are not required to be reported on SF 120 for utilization screening, and for which any required donation screening has been completed. Prepared by the owning DOE organization and submitted to the GSA regional office for sale.

TABLE A-1. TYPICAL DISPOSITION OF EXCESS CHEMICALS

DISPOSITION OPTION	DESCRIPTION OF ACTIVITY	ELIGIBLE RECIPIENT	EADS or FEDS	SCREENING PROCESS TIME FRAME	REQUIRED FORMS	REGULATION[63]
1. Unneeded (or Excess) Chemical Reutilization or Redistribution	Internal Screening for transfers within DOE	Any site in DOE Complex	EADS	15 day DOE Reutilization Screening	SF 122 and Approval by DOE for Transfer; SF 120 (Reporting of Excess) for remaining chemicals	41CFR109-43.304-1.50; 41CFR109-43.304-1.50(d); 41CFR109-43.304-1.51; 41CFR101-42; 41CFR102-36
	EXCESS RELEASE DATE					
2. Excess Chemical Transfer	Excess Screening or Federal Screening	Any Federal agency	FEDS	21 day Federal Excess Screening	SF 122	41CFR109-43; 41CFR101-42.207; 41CFR101-42.1102; FMPR; 41CFR102-36
	SURPLUS RELEASE DATE					
3. Surplus Chemical Donation	Donation to Public agencies through State government (SASP) screeners	State agency or agency-approved organization	FEDS	Surplus Donation Screening	SF 123	41CFR109-44; 41CFR109-43.307; 41CFR101-42.3; 41CFR101-42.1102; FMPR; 41CFR102-37
4. Surplus Chemical Sale	Sale to Public by competitive bid sales or auction	Public or private company	FEDS	Sale Process	SF 126	41CFR109-45.3; 41CFR101-45; 41CFR101-42.4; 41CFR101-42.1102; FMPR; 41CFR102-37

[63] CFR citations listed in the Regulation column are for illustration purposes only, and are not intended to be all-inclusive.

TABLE A-2. DISPOSITION OF EXCESS OR SURPLUS CHEMICALS SUBJECT TO ABANDONMENT OR DESTRUCTION

DISPOSITION OPTION	DESCRIPTION OF ACTIVITY	ELIGIBLE RECIPIENT	EADS or FEDS	PROCESS PRIOR TO DISPOSITION	REQUIRED FORMS/ APPROVAL	REGULATION[64]
Sale to the Public or Donation to Public bodies	Option in lieu of abandonment or destruction	Sold to public as scrap or Donated to public bodies	Not applicable	Public notice/ advertisements of intent to destroy or sell	SF 126 to report sale transactions; No Standard Forms to record a donation -- an auditable document suffices	41CFR109-44.7; 41CFR109-45; 41CFR102-36; 41CFR102-37; 41CFR101-42; 41CFR101-45
Abandonment or Destruction	Applicable to property with "no commercial value" or estimated maintenance and storage costs exceeding potential sale proceeds, or High risk property with health, safety or security concerns	Not applicable	Not applicable	Public notice/ advertisements of intent to destroy or sell prior to actual disposition; Notice may be waived with DOE review and approval; Some property may be converted to scrap or rendered innocuous or unfit for use	Written justification and approval by DOE, pending disposition action; Eye witness certification of destruction	41CFR109-45.9; 41CFR109-1.53; 41CFR101-42.406; 41CFR101-42.1102; 41CFR101-45.309-3; 41CFR102-36.35; 41CFR102-36.305 through 102-36.330; 41CFR102-36.430; 41CFR102-37.80; 41CFR102-37.570

[64] CFR citations listed in the Regulation column are for illustration purposes only, and are not intended to be all-inclusive.

Appendix B

FEDERAL SUPPLY CLASSES AND GROUPS RELATED TO CHEMICALS

Table B-1. List of Federal Supply Classes Composed Predominantly of Hazardous Items

FSC Code	Federal Supply Class (FSC)
6810	Chemicals
6820	Dyes
6830	Gases: Compressed and liquefied
6840	Pest control agents and disinfectants
6850	Miscellaneous chemical specialties
7930	Cleaning and polishing compounds and preparations
8010	Paints, dopes, varnishes, and related products
8030	Preservative and sealing compounds
8040	Adhesives
9110	Fuels, solid
9130	Liquid propellants and fuels, petroleum base
9135	Liquid propellant fuels and oxidizers, chemical base
9140	Fuel oils
9150	Oils and greases: Cutting, lubricating, and hydraulic
9160	Miscellaneous waxes, oils, and fats

Table B-2. Selective List of Federal Supply Classes and Groups that Contain a Significant Number of Hazardous Items

[NOTE: The following is shown for illustrative purposes; for a complete listing, see 41CFR101-42.1101(c)]

Federal Supply Class/Group	Title	Examples of Hazardous Materials Requiring Identification
1375	Demolition materials	Explosive device.
Group 34	Metalworking machinery.	Equipment containing hazardous hydraulic fluids including PCBs.
3433	Gas welding, heat cutting, and Metalizing equipment.	Compressed gases.
3439	Miscellaneous welding, soldering and brazing supplies and accessories.	Hazardous items such as cleaners, acids, flux and supplies that contain or produce hazardous fumes.
3610	Printing, duplicating, and bookbinding equipment.	Flammable or toxic lithographic solutions.
4240	Safety and rescue equipment	Items which involve oxygen, or compressed gases, or contain emitting charges.
5660	Wallboard, building paper, and thermal insulation materials.	Asbestos cloth which has loose fibers or particles that may become airborne and materials containing formaldehyde.
5910	Capacitors	Items that contain polychlorinated biphenyls (PCBs) or sulfuric acid.
5950	Coils and transformers.	Items containing polychlorinated biphenyls (PCBs).
5970	Electrical insulators and insulating materials.	Items containing flammable solvents.
6135	Batteries, primary.	Lead-acid, lithium and mercury batteries and Alkaline (with electrolyte).
6140	Batteries, secondary.	Items that are wet or moist containing corrosive or other hazardous compounds.
6505	Drugs, biologicals and official reagents.	Hazardous items as defined in 40CFR101-42.001.

Table B-2. (Continued)		
Federal Supply Class/Group	**Title**	**Examples of Hazardous Materials Requiring Identification**
6508	Medicated cosmetics and Toiletries.	Hazardous items as defined in 40CFR101-42.001.
6640	Laboratory equipment and supplies.	Items containing flammable compounds, mercury, or asbestos.
6685	Pressure, temperature, and humidity and measuring and Controlling instruments.	Items containing mercury or compressed gases.
6750	Photographic supplies.	Items containing hazardous chemicals, solvents, thinners, and cements.
7510	Office supplies	Hazardous items, such as thinners, cleaning fluids, flammable inks, and varnishes.
8510	Perfumes, toilet preparations, and powders.	Shipping containers, pressurized containers with flammable or nonflammable propellants.
8720	Fertilizers.	Items containing weed and pest control or other harmful ingredients or because of their composition, are hazardous.
9390	Miscellaneous fabricated nonmetallic materials.	Items containing flammable solvents or asbestos.

Chapter 10 - Training

1.0 Introduction

This chapter identifies and consolidates existing user safety and health requirements found in DOE and Federal chemical-related safety and health regulations and National Standards that address training requirements associated with the handling and use of ***chemicals*** (see definition) and ***chemical products*** (see definition). This chapter specifically consolidates requirements found in Occupational Safety and Health Administration (OSHA) Regulations 29CFR1910 and 29CFR1926, 10CFR850, and National Fire Protection Association (NFPA) Codes 55, 430, and 432, including technical standards that are made mandatory by their specific reference within a regulation, rule or DOE Order. State and local codes and requirements are NOT included.

This chapter is intended to list chemical-related safety and health requirements and to consolidate those that are overlapping and/or duplicative. The list of requirements includes "pointers" to the sources of those requirements.

This document does NOT create any new or additional requirements.

2.0 Applicability

This chapter consolidates existing, core safety and health requirements that all sites must follow when engaged in chemical-related activities. It is intended only to address safety and health-related training requirements applicable to chemical user activities. This chapter applies to DOE Contractors and Field Organizations who handle or use chemicals and chemical products. This chapter does NOT apply to:

- waste operations (the Resource Conservation and Recovery Act (RCRA) requires training prior to the generation of waste; see 40CFR264.16);
- transportation (training requirements for transporting chemicals are covered in Chapter 4 of this document, "Transportation".)
- emergency management (training requirements for Emergency Management are covered in Chapter 8 of this document, "Emergency Management".)

[NOTE: Waste operations are NOT included in this consolidation of Chemical User Safety and Health Requirements. Hence, RCRA is not included is this document. However, RCRA requires training and must be adhered to as appropriate for site/facility operations.]

The information presented here applies to all locations that use chemicals or chemical products. *[NOTE: Throughout this document, the term "chemicals" is used to indicate chemicals and/or chemical products as described in Section 3, below.]* This chapter consolidates existing, core safety and health requirements that all sites must follow when engaged in chemical-related activities.

The requirements included in this chapter come from sources that have different safety purposes. As a result, some of these requirements may not always be applicable to the work being performed at an individual site or facility. It is the responsibility of each user to determine the applicability of specific requirements to their work and how they are implemented. The reference sources for the requirements included in this chapter can be used to determine the applicability of those requirements to the work being performed.

3.0 Definitions and Acronyms

See **Glossary.**

4.0 Requirements for Training

Sources[11]	Consolidated Requirements[12, 65, 66]
29CFR1910.1200(h)(1); 29CFR1910.1450(f)	**4.1 General Employee Information and Training** - Employers shall provide employees with effective information and training on hazardous chemicals in their work area at the time of their initial assignment, and whenever a new physical or health hazard the employees have not previously been trained about is introduced into their work area. Information and training may be designed to cover categories of hazards (e.g., flammability, carcinogenicity) or specific chemicals.
29CFR1910.1450(f)(2)	**4.1.1** The frequency of refresher information and training shall be determined by the employer.
29CFR1910.1200(h)(1)	**4.1.2** Chemical-specific information must always be available through labels and material safety data sheets.
29CFR1910.1200 (h)(2)	**4.1.3** Information - Employees shall be informed of:
29CFR1910.1200(h)(2)(i); 29CFR1910.1450(f)(3)(i)	**4.1.3.1** The contents of 29CFR1910.1200 and 1450 and their appendices, and,
29CFR1910.1200(h)(2)(ii)	**4.1.3.2** Any operations in their work area where hazardous chemicals are present; and,
29CFR1910.1200(h)(2)(iii)	**4.1.3.3** The location and availability of the written hazard communication program, including the required list(s) of hazardous chemicals, and material safety data sheets required by this section.
	4.1.4 Training – Employee training shall include at least:
29CFR1910.1200 (h)(3)(i); 29CFR1910.1450(f)(4)(i)(A)	**4.1.4.1** Methods and observations that may be used to detect the presence or release of a hazardous chemical in the work area (such as monitoring conducted by the employer, continuous monitoring devices, visual appearance or odor of hazardous chemicals when being released, etc.);
29CFR1910.1200 (h)(3)(ii); 29CFR1910.1450(f)(4)(i)(B)	**4.1.4.2** The physical and health hazards of the chemicals in the work area;

[65] Some chemical safety requirements contain generalized training statements such as: "employees shall be properly trained in this area." These general requirements are NOT included here. Only specific training requirements with some details are cited.

[66] 29CFR1910.120(q), HAZWOPER, as required for all emergency response operations are NOT repeated here, and can be found in Chapter 8 ("Consolidated Requirements for Chemical Emergency Management") of this volume of the Chemical Management Handbook.

Sources[11]	Consolidated Requirements[12, 65, 66]
29CFR1910.1200(h)(3)(iii); 29CFR1910.1450(f)(4)(i)(C)	**4.1.4.3** The measures employees can take to protect themselves from these hazards, including specific procedures the employer has implemented to protect employees from exposure to hazardous chemicals, such as appropriate work practices, emergency procedures, and personal protective equipment to be used; and,
29CFR1910.1200(h)(3)(iv)	**4.1.4.4** The details of the hazard communication program developed by the employer, including an explanation of the labeling system and the material safety data sheet, and how employees can obtain and use the appropriate hazard information.
29CFR1910.1450(f)	**4.2 Chemical Laboratories –** In addition to the requirements of Section 4.1 above, employees in chemical laboratories shall also be trained as follows:
29CFR1910.1450(f)	**4.2.1** Information:
29CFR1910.1450(f)(3)(ii)	**4.2.1.1** The location and availability of the employer's Chemical Hygiene Plan;
29CFR1910.1450(f)(3)(iii)	**4.2.1.2** The permissible exposure limits for OSHA-regulated substances or recommended exposure limits for other hazardous chemicals where there is no applicable OSHA standard;
29CFR1910.1450(f)(3)(iv)	**4.2.1.3** Signs and symptoms associated with exposures to hazardous chemicals used in the laboratory; and
29CFR1910.1450(f)(3)(v)	**4.2.1.4** The location and availability of known reference material on the hazards, safe handling, storage and disposal of hazardous chemicals found in the laboratory including, but not limited to, Material Safety Data Sheets received from the chemical supplier.
29CFR1910.1450(f)(4)(ii)	**4.2.2** Training – The employee shall be trained on the applicable details of the employer's written Chemical Hygiene Plan.
29CFR1910.132(f)(1)	**4.3** The employer shall provide training to each employee who is required by this section to use PPE.
29CFR1910.134(k)	**4.4 Respirators.** The employer shall provide effective training to employees who are required to use respirators. The training must be comprehensive, understandable, and recur annually and more often if necessary.

Sources[11]	Consolidated Requirements[12, 65, 66]
29CFR1910.134, App. D	**4.4.1** This paragraph also requires the employer to provide the basic information on respirators found in Appendix D of 29CFR1910.134 to all employees who wear respirators, including those who do so voluntarily (this includes dust masks).
29CFR1910.134(k)(1)	**4.4.2** The employer shall ensure that each employee can demonstrate knowledge of at least the following:
29CFR1910.134(k)(1)(i)	**4.4.2.1** Why the respirator is necessary and how improper fit, usage, or maintenance can compromise the protective effect of the respirator;
29CFR1910.134(k)(1)(ii)	**4.4.2.2** What the limitations and capabilities of the respirator are;
29CFR1910.134(k)(1)(iii)	**4.4.2.3** How to use the respirator effectively in emergency situations, including situations in which the respirator malfunctions;
29CFR1910.134(k)(1)(iv)	**4.4.2.4** How to inspect, put on and remove, use, and check the seals of the respirator;
29CFR1910.134(c)(1)(v); 29CFR1910.134(c)(1)(viii); 29CFR1910.134(k)(1)(i); 29CFR1910.134(k)(1)(v)	**4.4.2.5** What the procedures are for cleaning, maintenance and storage of the respirator;
29CFR1910.134(k)(1)(vi)	**4.4.2.6** How to recognize medical signs and symptoms that may limit or prevent the effective use of respirators; and
29CFR1910.134(k)(1)(vii)	**4.4.2.7** The general requirements for Respiratory Protection found in 29CFR1910.134.
29CFR1910.134(k)(2)	**4.4.3** The training shall be conducted in a manner that is understandable to the employee.
29CFR1910.134(k)(3)	**4.4.4** The employer shall provide the training prior to requiring the employee to use a respirator in the workplace.
29CFR1910.134(k)(4)	**4.4.5** An employer who is able to demonstrate that a new employee has received training within the last 12 months that addresses the elements specified in paragraphs 4.3.2.1through 4.3.2.7, above, is not required to repeat such training provided that the employee can demonstrate knowledge of those elements. Previous training not provided by the current employer must be repeated under the auspices of the current employer no later than 12 months from the date of that previous training.
29CFR1910.134(k)(5)	**4.4.6** Retraining shall be administered annually, and when the following situations occur:
29CFR1910.134(k)(5)(i)	**4.4.6.1** Changes in the workplace or the type of respirator render previous training obsolete.

Sources[11]	Consolidated Requirements[12, 65, 66]
29CFR1910.134(k)(5)(ii)	**4.4.6.2** Inadequacies in the employee's knowledge or use of the respirator indicate that the employee has not retained the requisite understanding or skill.
29CFR1910.134(k)(5)(iii)	**4.4.6.3** Any other situation arises in which retraining appears necessary to ensure safe respirator use.
29CFR1910.134(k)(6); 29CFR1910.134, App. D	**4.4.7** The basic advisory information on respirators, as presented in Appendix D, shall be provided by the employer in any written or oral format, to employees who wear respirators, when such use is not required by 29CFR1910.134 or the employer.
29CFR1910.119	**4.5** ***Highly Hazardous Chemicals*** **(see definition)**
29CFR1910.119(g)	**4.5.1** Initial Training
29CFR1910.119(g)	**4.5.1.1** Each employee presently involved in operating a process, and each employee, before being involved in operating a newly assigned process, shall be trained in an overview of the process and in the operating procedures. The training shall include emphasis on the specific safety and health hazards, emergency operations including shutdown, and safe work practices applicable to the employee's job tasks.
29CFR1910.119(g)(1)(ii)	**4.5.1.2** In lieu of initial training for those employees already involved in operating a process on May 26, 1992, an employer may certify in writing that the employee has the required knowledge, skills, and abilities to safely carry out the duties and responsibilities as specified in the operating procedures.
29CFR1910.119(g)(2)	**4.5.2** Refresher training shall be provided at least every three years, and more often if necessary, to each employee involved in operating a process to assure that the employee understands and adheres to the current operating procedures of the process. The employer, in consultation with the employees involved in operating the process, shall determine the appropriate frequency of refresher training.
29CFR1910.119(g)(3)	**4.5.3** Training documentation - The employer shall ascertain that each employee involved in operating a process has received and understood the training required by this paragraph. The employer shall prepare a record which contains the identity of the employee, the date of training, and the means used to verify that the employee understood the training.
29CFR1910.119(h)(3)	**4.5.4** Contract employers shall:
29CFR1910.119(h)(3)(i)	**4.5.4.1** assure that each contract employee is trained in the work practices necessary to safely perform his/her job, and

Sources[11]	Consolidated Requirements[12, 65, 66]
29CFR1910.119(h)(3)(ii)	**4.5.4.2** assure that each contract employee is instructed in the known potential fire, explosion, or toxic release hazards related to his/her job and the process, and the applicable provisions of the emergency action plan, and
29CFR1910.119(h)(3)(iii)	**4.5.4.3** document that each contract employee has received and understood the training required by this paragraph. The contract employer shall prepare a record, which contains the identity of the contract employee, the date of training, and the means used to verify that the employee understood the training.
29CFR1910.119(j)(3)	**4.5.5** Training for process maintenance activities - The employer shall train each employee involved in maintaining the on-going integrity of process equipment in an overview of that process and its hazards and in the procedures applicable to the employee's job tasks to assure that the employee can perform the job tasks in a safe manner.
29CFR1926.21	**4.6 Construction**
29CFR1926.21(b)(2)	**4.6.1** The employer[67] shall instruct each employee in the recognition and avoidance of unsafe conditions and the regulations applicable to his work environment to control or eliminate any hazards or other exposure to illness or injury.
29CFR1926.21(b)(3)	**4.6.2** Employees required to handle or use poisons, caustics, and other harmful substances shall be instructed regarding their safe handling and use, and be made aware of the potential hazards, personal hygiene, and personal protective measures required to safely handle or use harmful substances.
29CFR1926.21(b)(5)	**4.6.3** Employees required to handle or use flammable liquids, gases, or toxic materials shall be instructed in the safe handling and use of these materials and made aware of the specific requirements contained in Subparts D, F, and other applicable subparts of 29CFR1926.
29CFR1926.21(b)(6)(i)	**4.6.4** All employees required to enter into confined or enclosed spaces shall be instructed as to the nature of the hazards involved, the necessary precautions to be taken, and in the use of protective and emergency equipment required. The employer shall comply with any specific regulations that apply to work in dangerous or potentially dangerous areas.

[67] Employers should avail themselves of the safety and health training programs provided by the Secretary of Labor.

Sources[11]	Consolidated Requirements[12, 65, 66]
	4.7 Training requirements for specific materials
NFPA 55, 1-3	**4.7.1** Compressed and Liquefied Gases in Portable Cylinders – Persons responsible for or working in the areas where compressed gases are produced, stored, handled, or used shall be trained in the chemical and physical properties of the materials and the appropriate emergency response.
NFPA 430, 2-7.1 and 2-7.2	**4.7.2** Storage of Liquid and Solid Oxidizers – Persons involved in operations where oxidizers are stored shall receive instruction in handling the materials in a safe manner, including the manufacturer's and processor's recommendations. Particular attention shall be given to proper disposal of spilled material to prevent contamination.
NFPA 432, 2-2	**4.7.3** Storage of Organic Peroxides – Personnel involved in operations in organic peroxide storage areas shall be instructed in proper and safe handling of such materials, proper use of personal protective equipment, proper and safe disposal of spilled material, and proper emergency procedures. Manufacturer's instructions shall be consulted for each specific formulation.
29CFR1910.253	**4.7.4** Oxygen-fueled Gas Welding and Cutting
29CFR1910.253(a)(4)	**4.7.4.1** Workmen in charge of the oxygen or fuel-gas supply equipment, including generators, and oxygen or fuel-gas distribution piping systems shall be instructed and judged competent by their employers for this important work before being left in charge. Rules and instructions covering the operation and maintenance of oxygen or fuel-gas supply equipment including generators, and oxygen or fuel-gas distribution piping systems shall be readily available.
29CFR1910.253(e)(6)(ii)	**4.7.4.2** Regulators shall be repaired only by skilled mechanics with appropriate training.

Sources[11]	Consolidated Requirements[12, 65, 66]
29CFR1910.1003; 29CFR1926.1003-1016	**4.7.5** OSHA's Regulated Carcinogens – Non-laboratory use of the following 13 carcinogens requires additional training as prescribed in sections 4.6.5.1 and 4.6.5.2 below. Nitrobiphenyl (CAS No.) 92933; alpha-Naphthylamine, CAS No. 134327; methyl chloromethyl ether, CAS No. 107302; 3,3'-Dichlorobenzidine (and its salts) CAS No. 91941; bis-Chloromethyl ether, CAS No. 542881; beta-Naphthylamine, CAS No. 91598; Benzidine, CAS No. 92875; 4-Aminodiphenyl, CAS No. 92671; Ethyleneimine, CAS No. 151564; beta-Propiolactone, CAS No. 57578; 2-Acetylaminofluorene, CAS No. 53963; 4-Dimethylaminoazo-benezene, CAS No. 60117; N-Nitrosodimethylamine, CAS No. 62759.
29CFR1910.1003(e)(5)(i)	**4.7.5.1** Each employee prior to being authorized to enter a ***regulated area*** (see definition), shall receive a training and indoctrination program including, but not necessarily limited to:
29CFR1910.1003(e)(5)(i)(A)	**4.7.5.1.1** the nature of the carcinogenic hazards of a carcinogen addressed by this section, including local and systemic toxicity;
29CFR1910.1003(e)(5)(i)(B)	**4.7.5.1.2** the specific nature of the operation involving carcinogen addressed by this section that could result in exposure;
29CFR1910.1003(e)(5)(i)(C)	**4.7.5.1.3** the purpose for and application of the medical surveillance program, including, as appropriate, methods of self-examination;
29CFR1910.1003(e)(5)(i)(D)	**4.7.5.1.4** the purpose for and application of decontamination practices and purposes;
29CFR1910.1003(e)(5)(i)(E)	**4.7.5.1.5** the purpose for and significance of emergency practices and procedures;
29CFR1910.1003(e)(5)(i)(F)	**4.7.5.1.6** the employee's specific role in emergency procedures;
29CFR1910.1003(e)(5)(i)(G)	**4.7.5.1.7** specific information to aid the employee in recognition and evaluation of conditions and situations which may result in the release of a carcinogen addressed by this section;

Sources[11]	Consolidated Requirements[12, 65, 66]
29CFR1910.1003(e)(5)(i)(H)	**4.7.5.1.8** the purpose for and application of specific first aid procedures and practices;
29CFR1910.1003(e)(5)(i)(I)	**4.7.5.1.9** a review of this section at the employee's first training and indoctrination program and annually thereafter.
29CFR1910.1003(e)(5)(ii)	**4.7.5.2** Specific emergency procedures shall be prescribed, and posted, and employees shall be familiarized with their terms, and rehearsed in their application.
	4.7.6 Other Specific Chemicals – In addition to the chemical safety training requirements for the materials above, there are also training requirements for other specific chemicals as shown in the following. Details can be found in the specific citations.
29CFR1910.1045	**4.7.6.1** Acrylonitrile
29CFR1910.1018	**4.7.6.2** Arsenic, inorganic (also see 29CFR1926.1118, construction)
29CFR1910.1001	**4.7.6.3** Asbestos (also see 29CFR1926.1101, construction)
29CFR1910.1028	**4.7.6.4** Benzene (also see 29CFR1926.1128, construction)
10CFR850	**4.7.6.5** Beryllium
29CFR1910.1051	**4.7.6.6** 1,3-Butadiene
29CFR1910.1027	**4.7.6.7** Cadmium (also see 29CFR1926.1127, construction)
29CFR1910.1044	**4.7.6.8** 1,2-dibromo-3-chloropropane (also see 29CFR1926.1144, construction)
29CFR1910.1047	**4.7.6.9** Ethylene oxide (also see 29CFR1926.1147, construction)
29CFR1910.1048	**4.7.6.10** Formaldehyde (also see 29CFR1926.1148, construction)
29CFR1910.1025	**4.7.6.11** Lead (also see 29CFR1926.62, construction)
29CFR1910.1052	**4.7.6.12** Methylene chloride (also see 29CFR1926.1152, construction)
29CFR1910.1050	**4.7.6.13** Methylenedianiline (also see 29CFR1926.60, construction)
29CFR1910.1017	**4.7.6.14** Vinyl chloride (also see 29CFR1926.1117, construction)

Sources[11]	Consolidated Requirements[12, 65, 66]
See the specific standards listed for each chemical above for the source of the requirements listed in the sections that follow.	**4.7.6.15** General Training Requirements[68] for 14 chemicals listed above:
	4.7.6.15.1 Training shall be provided at the time of initial assignment, or upon institution of the training program, and at least annually thereafter.
	4.7.6.15.2 The employer shall assure that each employee is informed of the following: • The information contained in the appendices in each of the specific chemical requirements cited;[69] • The quantity, location, manner of use, release, or storage, and the specific nature of operations which could result in exposure, as well as any necessary protective steps; • The purpose, proper use, cleaning, maintenance, storage and limitations of respirators and personal protective clothing; The purpose for, and a description of the medical surveillance program required by the chemical-specific regulations cited; • The emergency procedures developed, as required by the chemical-specific regulations cited; • Engineering and work practice controls, their function, and the employee's relationship to these controls; and • A review of the chemical-specific regulations cited.

[68]This section contains a summary of the training requirement that are common to most of the chemicals listed. The exact requirements for each chemical may vary, and the chemical-specific regulation cited should be reviewed for specific training details.

[69] These appendices contain additional information regarding the chemicals' physical and chemical properties, safety and health data, medical surveillance, emergency actions, etc.

Sources[11]	Consolidated Requirements[12, 65, 66]
	4.7.6.15.3 The employer shall make a copy of the specific chemical standard and its appendices readily available to all affected employees.

5.0 Source Documents

NFPA 55 (1998), "Storage, Use, and Handling Of Compressed and Liquefied Gases in Portable Cylinders".
NFPA 432 (1997), "Storage of Organic Peroxide Formulations".

10CFR850, "Chronic Beryllium Disease Prevention Program".
29CFR1910.119, "Process Safety Management of Highly Hazardous Chemicals".
29CFR1910.132, "Personal Protective Equipment. General Requirements."
29CFR1910.134, "Respiratory Protection".
29CFR1910.253, "Oxygen-fuel Gas Welding and Cutting".
29CFR1910.1001, "Asbestos".
29CFR1910.1003, "4-Nitrobiphenyl".
29CFR1910.1017, "Vinyl Chloride".
29CFR1910.1018, "Inorganic Arsenic".
29CFR1910.1025, "Lead".
29CFR1910.1027, "Cadmium".
29CFR1910.1028, "Benzene".
29CFR1910.1044, "1,2-dibromo-3-chloropropane".
29CFR1910.1045, "Acrylonitrile".
29CFR1910.1047, "Ethylene Oxide".
29CFR1910.1048, "Formaldehyde".
29CFR1910.1050, "Methylenedianiline".
29CFR1910.1051, "1,3-Butadiene".
29CFR1910.1052, "Methylene Chloride".
29CFR1910.1200, "Hazard Communication".
29CFR1910.1450, "Occupational Exposure to Hazardous Chemicals in Laboratories".
29CFR1926.21, "Safety Training and Education".

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Complete List of Sources[70]

ANSI Z49.1 (2000), “Safety in Welding, Cutting, and Allied processes”.

CGA G-1 (1996), "Acetylene".
CGA P-1 (1999), "Safe Handling of Compressed Gases in Containers".

Department of Energy (July 1999), “Guidelines on Export Control and Nonproliferation”.
Department of Energy Acquisition Regulation (DEAR) 970.5204-2, “Integration of Environment, Safety and Health into Work Planning and Execution”.
Department of Energy Personal Property Letter, Issue Number 970-3, Revision 1 (February 3, 1998).

DOE Acquisition Letter AL-2000-03, “Greening the Government Requirements in Contracting” (May 16, 2000) (Superceded by AL-2002-05).
DOE Acquisition Letter AL-2002-05, “Greening the Government Requirements in Contracting” (July 10, 2002).

DOE O 151.1, “Comprehensive Emergency Management System”.
DOE O 225.1A, “Accident Investigations”.
DOE O 420.1A, “Facility Safety”.
DOE O 440.1A, “Worker Protection Management for DOE Federal and Contractor Employees”.
DOE O 450.1, “Environmental Protection Program”.
DOE O 460.1A, “Packaging and Transportation Safety”.
DOE O 460.1B, “Packaging and Transportation Safety” *[NOTE: This order, issued on 4/4/2003, cancels the DOE O 460.1A]*.
DOE O 5480.19, “Conduct of Operations Requirements for DOE Facilities”.

DOE-STD-1027-92, “Hazard Categorization and Accident Analysis Techniques for Compliance with DOE O 5480.23, Nuclear Safety Analysis Reports”.
DOE-STD-1120-98, “Integration of Environment, Safety, and Health into Facility Disposition Activities”.
DOE-STD-3009-94, “Preparation Guide for U.S. DOE Nonreactor Nuclear Facility Safety Analysis Reports”.
DOE-STD-3011-94, “Guidance for Preparation of DOE 5480.22 (TSR) and DOE 5480.23 (SAR) Implementation Plans”.
DOE-STD-3016-99, “Limited Standard; Hazard Analysis Reports for Nuclear Explosive Operations”.

Executive Order 12344 (February 3, 1982), “Naval Nuclear Propulsion Program”, 47 Federal Register 4979.
Executive Order 13101 of September 14, 1998, “Greening the Government Through Waste Prevention, Recycling, and Federal Acquisition”.
Executive Order 13148 of April 21, 2000, “Greening the Government Through Leadership in Environmental Management”.

[70] Hyperlinks to ANSI, CGA, and NFPA requirements provided here are for general information only, as they require user subscription to a prescribed service in order to access these organizations’ source requirements.

Federal Standard 123 (or FED-STD-123), “Marking for Shipment (Civil Agencies)”.
Federal Standard 313 (or FED-STD-313), “Material Safety Data, Transportation Data and Disposal Data for Hazardous Materials Furnished to Government Activities”.

The Hazardous and Solid Waste Amendments of 1984 (HSWA).

The Helium Act (Pub. L. 86-777, as amended (50 U.S.C. 167(d).

International Atomic Energy Agency (IAEA), Information Circular (INFCIRC) 254, Part 1 (“Trigger List”) and Part 2 (“Dual-use List”).

NFPA 30 (2000), “Flammable and Combustible Liquids Code”.
NFPA 45 (2000), “Standard on Fire Protection for Laboratories Using Chemicals”.
NFPA 51 (2002), "Standard for the Design and Installation of Oxygen-Fuel Gas Systems".
NFPA 55 (2003), "Standard for the Storage, Use, and Handling of Compressed and Liquefied Gases in Portable Cylinders".
NFPA 430 (1995), "Code for the Storage of Liquid and Solid Oxidizers".
NFPA 430 (2000), “Storage of Liquid and Solid Oxidizers”.
NFPA 432 (2002), “Code for the Storage of Organic Peroxide Formulations”.
NFPA 471 (2002), “Recommended Practice for Responding to Hazardous Materials”.
NFPA 472 (2002), “Standard on Professional Competence of Responders to Hazardous Materials Incidents”.
NFPA 484 (2002), “Standard for Combustible Metals, Metal Powders, and Metal Dusts”.
NFPA 704 (2001), "Identification of the Hazards of Materials for Emergency Response".
NFPA 1620 (1998), “Recommended Practice for Pre-Incident Planning”.

Public Law 91-596 (12/29/70), “The Occupational Safety and Health Act, 1970”
Public Law 98-525 (10/19/84), “Department of Defense Authorization Act, 1985”; also called “Department of Energy National Security and Military Applications of Nuclear Energy Authorization Act of 1985”.

Secretary of Energy Memorandum, November 12, 1999, “Pollution Prevention and Energy Efficiency Leadership Goals for Fiscal Year 2000 and Beyond”.

10CFR110, Nuclear Regulatory Commission, "Export and Import of Nuclear Equipment and Material”.
10CFR810, Department of Energy, "Assistance to Foreign Atomic Energy Activities".
10CFR830, “Nuclear Safety Management”.
10CFR835, “Occupational Radiation Protection”.
10CFR850, “Chronic Beryllium Disease Prevention Program”.
10CFR1021, “National Environmental Policy Act Implementing Procedures”.
15CFR Subpart C (Parts 730 to 774), Department of Commerce, “Export Administration Regulations” (EAR); in particular, 15CFR734, “Scope of the Export Administration Regulations”, 15CFR744, "Control Policy: End-User and End-Use Based", and 15CFR774, “The Commerce Control List”.
21CFR1316, “Drug Enforcement Administration; Administrative Functions, Practices, and Procedures”.
22CFR Subchapter M (Parts 120-130), Department of State, "International Traffic in Arms Regulations" (ITAR), and in particular, 22CFR121, “The United States Munitions List”.
27CFR22.41, “Distribution and Use of Tax-Free Alcohol, Qualification”.

29CFR1910, “Occupational Safety and Health Standards”.
29CFR1910.6, "Incorporation by Reference".
29CFR1910.20, “Preservation of Records (medical and exposure)”.
29CFR1910.38, “Employee Emergency Plans and Fire Prevention Plans”.
29CFR1910.101, “Compressed Gases (general requirements)”.
29CFR1910.102, “Acetylene”.
29CFR1910.103, “Hydrogen”.
29CFR1910.104, “Oxygen”.
29CFR1910.105, “Nitrous oxide”.
29CFR1910.106, “Flammable and Combustible Liquids”.
29CFR1910.119, “Process Safety Management of Highly Hazardous Chemicals”.
29CFR1910.120, “Hazardous Waste Operations and Emergency Response”.
29CFR1910.132, “Personal Protective Equipment”.
29CFR1910.134, "Respiratory Protection".
29CFR1910.146, “Permit-required Confined Spaces”.
29CFR1910.253, "Oxygen-Fuel Gas Welding and Cutting".
29CFR1910.1001, “Asbestos”.
29CFR1910.1003, “13 Carcinogens (4-Nitrobiphenyl, etc.)”.
29CFR1910.1004, “alpha-Naphthylamine”.
29CFR1910.1006, “Methyl chloromethyl ether”.
29CFR1910.1007, “3,3’-Dichlorobenzidine (and its salts)”.
29CFR1910.1008, “bis-Chloromethyl ether”.
29CFR1910.1009, “beta-Naphthylamine”.
29CFR1910.1010, “Benzidine”.
29CFR1910.1011, “4-Aminodiphenyl”.
29CFR1910.1012, “Ethyleneimine”.
29CFR1910.1013, “beta-Propiolactone”.
29CFR1910.1014, “2-Acetylaminofluorene”.
29CFR1910.1015, “4-Dimethylaminoazobenzene”.
29CFR1910.1016, “N-Nitrosodimethylamine”.
29CFR1910.1017, “Vinyl Chloride”.
29CFR1910.1018, “Inorganic Arsenic”.
29CFR1910.1020, “Access to Employee Exposure and Medical Records”.
29CFR1910.1025, “Lead”.
29CFR1910.1027, “Cadmium”.
29CFR1910.1028, “Benzene”.
29CFR1910.1044, “1,2-dibromo-3-chloropropane”.
29CFR1910.1045, “Acrylonitrile”.
29CFR1910.1047, “Ethylene Oxide”.
29CFR1910.1048, “Formaldehyde”.
29CFR1910.1050, “Methylenedianiline”.
29CFR1910.1051, “1,3-Butadiene”.
29CFR1910.1052, “Methylene Chloride”.
29CFR1910.1200, "Hazard Communication".
29CFR1910.1450, “Occupational Exposure to Hazardous Chemicals in Laboratories”.
29CFR1926.21, ”Safety Training and Education”.
29CFR1926.65, “Hazardous Waste Operations and Emergency Response”.
29CFR1926.350, "Gas Welding and Cutting".
30CFR602, Bureau of Mines, Department of the Interior - Chapter VI - Subchapter A--Helium and Coal”.

40CFR61, “National Emission Standards for Hazardous Air Pollutants” (NESHAPs).
40CFR61.156, (National Emission Standards for Hazardous Air Pollutants) “Cross-reference to Other Asbestos Regulations”.
40CFR63, “National Emission Standards for Hazardous Air Pollutants for Source Categories”.
40CFR68, “Chemical Accident Prevention Provisions”.
40CFR82, “Protection of Stratospheric Ozone”.
40CFR260-282, “The Resource Conservation and Recovery Act of 1976”.
40CFR261, “Identification and Listing of Hazardous Waste”.
40CFR273, “Standards for Universal Waste Management”.
40CFR302.4, “Listing of Hazardous Substances for the National Oil and Hazardous Substances Pollution Contingency Plan”.
40CFR355, “Emergency Planning and Notification”.
40CFR370, “Hazardous Chemical Reporting: Community Right-To-Know”.
40CFR761, “Polychlorinated Biphenyls (PCBs) Manufacturing, Processing, Distribution in Commerce, and Use Prohibitions”.
40CFR763, “Asbestos”.
48CFR970, “DOE Management and Operating Contracts“.
40CFR68, “Chemical Accident Prevention Provisions”.
40CFR1500-1508, “Chapter V-Council on Environmental Quality”.
41CFR101, “Federal Property Management Regulations” (Parts 101-1 to 101-99); in particular, Subpart H (Parts 42 to 99).
41CFR101-26.602, “Federal Property Management Regulations - Procurement Sources and Program”.
41CFR101-27.2, “Management of Shelf-Life Materials”.
41CFR102, “Federal Management Regulation” (Parts 102-1 to 102-220); in particular, 41CFR102-36, “Disposition of Excess Personal Property” *[NOTE: This Part is cross-referenced by 41CFR101-43, “Utilization of Personal Property”, which is no longer in print]*, and 41CFR102-37, “Donation of Surplus Personal Property” *[NOTE: This Part is cross-referenced by 41CFR101-44,“Donation of Personal Property”, which is no longer in print]*.
41CFR109, “Department of Energy Property Management Regulations”; in particular, Subpart H (Parts 42 to 50).
48CFR, “Federal Acquisition Regulations”.
48CFR, “Department of Energy Acquisition Regulations System”: (Chapters 1 and 9).
48CFR970, “DOE Management and Operating Contracts”.
49CFR171-180, (Subchapter C), “Hazardous Materials Regulations”.
49CFR171-179, “Hazardous Materials Transportation”.

49 FR 11945, Mar. 28, 1984, as amended at 49 FR 38950, Oct. 2, 1984.
49 FR 11945, Mar. 28, 1984, as amended at 59 FR 9105, Feb. 25, 1994.
54 FR 27646, June 30, 1989, as amended at 59 FR 9105, Feb. 25, 1994.
62 FR 2312, Jan. 16, 1997.

42 USC 6901 – 6992(k), “The Solid Waste Disposal Act of Oct. 21, 1976”.
42 USC 13101 – 13109, “The Pollution Prevention Act of 1990”.

CHAPTER OVERVIEWS

CHAPTER 1: HAZARD ANALYSIS

This chapter consolidates existing DOE and other federal safety and health requirements and National Standards that address the identification of chemical hazards. State and local code requirements are not included. The consolidated requirements addressed here apply to all locations involved in the storage and/or use of chemicals and chemical products (see def.).

While this chapter is very short, its importance cannot be overstated. Several objectives of the hazard analysis requirements consolidated in this chapter include the:

- identification and analysis of potential hazards so that appropriate preventive and mitigative measures can be taken to protect workers and the general public;
- communication of hazards and associated controls to workers;
- identification of the presence and magnitude of certain hazards in order to determine the applicability of relevant safety standards (e.g., threshold quantities established in certain federal regulations).

This chapter is divided into two sections. The first section, 4.1, contains a consolidation of requirements for hazard analysis and hazard communication associated with the general use of chemicals. Section 4.2 details consolidated requirements for analyzing hazards when certain hazardous operations are involved. This section is similar to section 4.1, but contains more specificity and additional rigor regarding hazard analysis methods and documentation.

Key to this chapter is the recognition that hazard identification, though generally implied rather than being directly stated, is an underlying principle of hazard analysis, since without first being properly identified, hazards cannot be analyzed or evaluated for ultimate mitigation.

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CHAPTER 2: CHEMICAL ACQUISITION

This chapter covers those existing DOE and other federal requirements that govern the acquisition of chemicals, and applies to all locations involved in the storage and/or use of chemicals and chemical products (see def.). State and local requirements are not included. It consolidates direct health and safety-related acquisition requirements applicable to the procurement of chemicals and summarizes implied requirements for the acquisition of chemicals and chemical products that are included in various regulations and standards but are not directly mandated by them. This chapter is divided into seven major sections. Each section of the chapter contains consolidated requirements for the procurement of a specific class or type of chemical or chemical product.

Section 4.1 of this chapter consolidates general Health and Safety requirements that must be addressed when chemicals are procured. The remaining sections of this chapter consolidate additional non-safety and health-related acquisition requirements for specific classes of chemicals and chemical products and are provided for informational purposes only. Section 4.2 consolidates requirements for the procurement of alcohol, section 4.3 requirements for the procurement of helium, section 4.4 requirements for Fuel and Petroleum, section 4.5 requirements for Arms and Ammunition, section 4.6 requirements for DOE-specific materials (Heavy Water, Precious Metals, Lithium), and 4.7 requirements for Controlled Substances.

The first section includes general requirements that are applicable to all chemical procurements. Key to this chapter are the requirements for hazard identification and analysis prior to purchasing chemicals that are consolidated in sections:

- 4.1.1 – Pre-purchase hazard identification and analysis.
- 4.1.2 – Pre-purchase evaluation for lower hazard and/or lower environmental impact.
- 4.1.3 – Pre-purchase determination of packaging and transportation requirements.
- 4.1.4 – Dissemination of hazards information to those individuals or groups which may be involved in the receiving, storage, use, or disposal of the chemicals.
- 4.1.5 – Availability of the manufacturers MSDS for those individuals or groups which may be involved in the receiving, storage, use, or disposal of the chemicals.

It is important to note that, as with all of the requirements consolidated in this document, those associated with the acquisition of all classes of chemicals are consistent with OSHA's general duty clause* which requires employers to protect their employees from all recognized hazards in the workplace.

* P.L. 91-596, Sec. 6. (a)

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CHAPTER 3: INVENTORY AND TRACKING

This chapter identifies and consolidates existing chemical user safety and health requirements that address the inventory and tracking of chemicals and chemical products. It addresses relevant DOE and Federal chemical-related regulations and National Standards applicable to all locations involved in the storage and/or use of chemicals and chemical products (see def.) and excludes State and local code requirements.

Key to this chapter is its inclusion of the many regulations and standards for which an inventory and tracking system is an implied requirement that is necessary for proper compliance. Of additional importance in this regard is that whether direct or implied, requirements for the inventory and tracking of all classes of chemicals are consistent with OSHA's general duty clause* which requires employers to protect their employees from all recognized hazards in the workplace.

This chapter is divided into two major sections. The first section, 4.1, includes requirements that are directly applicable to the inventory and tracking of all chemicals. The second section, 4.2, consolidates additional, implied requirements specific to various health and safety regulations.

Section 4.1 consolidates the inventory and tracking requirements for the workplace, and includes specific regulatory reporting requirements. Section 4.2 consolidates those requirements that do not directly require an inventory of hazardous chemicals, but for which use of a chemical inventory and tracking system would be necessary for compliance with mandatory standards, or would facilitate compliance. The requirements covered include those for:

- Emergency plans and Fire Prevention plans (4.2.1);
- Worker exposure to hazardous chemicals in laboratories (4.2.2);
- Exposure and medical records (4.2.3);
- Hazard assessment in Emergency Management (4.2.4);
- DOE Federal and Contractor worker protection programs (4.2.5);
- Process Safety Management (4.2.6);

- Facility Safety and building codes (4.2.7 and 4.2.8);
- DOE Acquisition Regulations (4.2.9);
- Nuclear Safety Management (4.2.10);
- Chemical Accident Prevention (4.2.11);
- Emergency Planning Notification (4.2.12);
- National Emissions Standards for Hazardous Air Pollutants (4.2.13); and
- Protection of Stratospheric Ozone (4.2.14).

*P.L. 91-596, Sec. 6.(a)

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CHAPTER 4: ON-SITE CHEMICAL TRANSPORTATION

This chapter identifies and consolidates existing user safety and health requirements found in DOE and other federal chemical-related safety and health regulations and national standards (especially those of the Compressed Gas Association (CGA)) applicable to all locations involved in the on-site transport of chemicals and chemical products (see def.). This includes hazardous materials offered for transportation on-site, and the packaging, labeling, or marking of hazardous materials for transportation on-site. State and local codes and requirements are not included.

On-site transportation of chemicals is regulated by DOE and other Federal Hazardous Materials Regulations, site-specific documents, and DOE and other Federal regulations applicable to the transport of specific materials. Section 4.1 consolidates these requirements for the on-site transfers of hazardous materials and addresses acceptable alternatives for sites' compliance with the Department of Transportation's Hazardous Materials Regulations.

Section 4.2 consolidates the requirements for on-site transport of specific materials, including compressed gas cylinders, cryogenic liquid containers, and acetylene cylinders. This section covers such subjects as cylinder construction, labeling/marking, securing and lifting, and protection caps.

Of particular note in this chapter is that the CGA uses the word "should" for its non-mandatory "requirements". Since the DOE incorporates CGA documents by reference, these requirements may be interpreted as mandatory. Of additional note in this chapter is that packaging and transportation safety requirements apply to the purchasers of hazardous chemicals is they subsequently transfer those chemicals to another location – for on-site transfers, site rules apply; for off-site transfers, DOT rules apply.

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CHAPTER 5: CHEMICAL STORAGE

This chapter covers those existing DOE and other federal requirements that govern the storage of chemicals and chemical products (see def.). State and local requirements are not included. The consolidated requirements addressed here apply to all locations involved in the use of chemicals and chemical products. The chapter is divided into five major sections. Section 4.1 consolidates general storage requirements for chemicals and chemical products, section 4.2 requirements specific to compressed gases, section 4.3 requirements for flammable and combustible liquids, section 4.4 requirements for oxidizers, and 4.5 requirements for organic peroxides.

The first section (4.1) includes general requirements that are applicable to all areas where chemicals and chemical products are stored. Consolidated requirements concerning quantity limits for each class of chemicals stored in an area and how chemical storage areas must be identified and constructed are addressed in sections 4.1.1, 4.1.2, and 4.1.9.

This chapter also consolidates various requirements for special signage issues associated with the storage of chemicals. For example, there are specific requirements for "No Smoking" signs outside of all chemical storage areas (4.1.4), hazard identification signs for areas storing compressed gases (4.2.1) and signs conspicuously identifying areas where either oxidizers (4.4.1) or organic peroxides (4.5.1) are stored. Requirements for these signs are primarily intended for visitors and for emergency responders who must be apprised of the hazards that are present when they respond to an upset condition. Other requirements that are consolidated in this chapter are those that address security at chemical storage areas. These are intended to prevent unauthorized entry (4.1.3) and relate to issues such as terrorism, illegal drug manufacturing, and malevolent acts.

Compatible chemical storage is a subject that involves both the storage area and those chemicals being stored. Not only must chemicals be stored to ensure against their reaction with other chemicals, but to ensure that they do not come into contact with incompatible building materials or be stored in incompatible secondary containers (4.1.7.1, 4.4.3, 4.4.4, 4.5.3). While the term "incompatible" is used in broad terms in the regulatory literature, the overall intent is to prevent chemicals from interacting in such a way that additional hazards are created. These additional hazards could range from such things as fire or explosion hazards arising from interacting chemicals, to reactions with containers that could result in product leakage or the creation of new hazards (e.g., toxic products, flammable gases, etc.). It is important to note that requirements for compatible chemical storage apply to ALL classes of chemicals – not just to those that are described in selected requirement sources (e.g., flammable liquids, compressed gases, oxidizers, and organic peroxides). The compatible storage of all classes of chemicals is consistent with OSHA's "General Duty Clause"* which requires employers to protect their employees from all recognized hazards in the workplace.

Other requirements consolidated in this chapter include those regarding the proper and secure labeling of chemicals in storage areas to assure the continued clear identity of each stored chemical is maintained (4.1.6), as well as those requirements relating to housekeeping issues intended to minimize potential spills and other accidents (4.1.10). The consolidated requirements for the storage of those chemicals that may generate additional hazards upon prolonged storage (4.1.8) is meant to effectively manage time-sensitive chemicals such as peroxide formers (e.g., diethyl ether) as well as those chemicals whose containers might degrade or those that may otherwise become more hazardous over time. Other general requirements consolidated in this chapter address compatibility issues for the storage of specific classes chemicals.

Of special interest in this chapter are those consolidated requirements intended to protect users of these chemicals from the safety and health hazards associated with the potential energy present in compressed gas systems (4.2.3); temperature requirements for compressed gases (4.2.5), oxidizers (4.4.5), and organic peroxides (4.5.6); storage cabinets used for the storage of toxic and highly toxic gases (4.2.13), flammable liquids (4.3.15), and organic peroxides (4.5.7-9); and required limits on quantities of various chemical types or classes that can be stored in each storage area (4.2.7-10, 4.3.14-15).

*P.L. 91-596, Sec. 6.(a)

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CHAPTER 6: HAZARD CONTROL

This chapter consolidates existing DOE and other federal safety and health requirements and National Standards that address the control of the hazards associated with chemicals and chemical products (see def.). The consolidated requirements addressed here apply to all locations involved in the use of chemicals and chemical products. State and local code requirements are not included.

Of particular note in this chapter are the hazard identification requirements since successful control of the hazards of chemicals and chemical products begins with the timely and accurate identification of those hazards.

The requirements consolidated in this chapter are divided into six (6) major sections. The first section, 4.1, addresses requirements for the implementation of a hazard prevention/abatement process and an industrial hygiene program.

Section 4.2 consolidates the requirements for control of hazardous operations (see def.) including written operating procedures, safety equipment and engineering controls, safe work practices, and fire prevention and fire protection.

Section 4.3 addresses the requirements for the control of chemicals used in laboratories, including particularly hazardous substances. The requirements consolidated in this section include those that address: the preparation of a chemical hygiene plan; fire hazard classification; fire protection plans and equipment; special protections for explosives; the handling, transfer and transport of flammable, reactive or toxic chemicals and compressed gases in laboratories; and additional laboratory safety controls.

Section 4.4 consolidates requirements for controlling the hazards associated with operations involving the use of combustible liquids. Topics include: controlling ignition sources (e.g., smoking, welding, cutting, and other spark-producing operations); work with various classes of liquids and capacity control; safety cans; fire protection equipment; alarms; and dispensing and transfer methods.

Section 4.5 addresses requirements for the safe use of compressed gases including labeling, temperature control, cylinder valves and caps, electrical protection, cylinder placement and protection, pressure regulators, cylinder transportation, hoses and connections, manifolds, gauges, leaking cylinders and specific requirements for acetylene, hydrogen, and oxygen.

Finally, section 4.6 references the requirement sources for additional controls for the hazards associated with thirty-one (31) chemicals such as acrylonitrile, benzene, lead, and vinyl chloride.

The key theme of this chapter is that the timely and proper implementation of the requirements consolidated here will greatly reduce the probability of a chemical incident and the concomitant risk of harm to employees, property, the public, or the environment.

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CHAPTER 7: POLLUTION PREVENTION AND WASTE MINIMIZATION

This chapter addresses existing DOE and Federal chemical-related safety and health requirements applicable to user activities as they relate to pollution prevention and waste minimization. It applies to all locations involved in the use of chemicals and chemical products (see def.). This chapter includes requirements found in 42 USC, 40CFR, various Executive Orders, DOE Orders and DOE Memoranda.

Note that it does not include EPA reporting requirements for regulatory compliance, nor does it include state and local requirements.

The sections of this chapter consolidates requirements for:

- 4.1 the establishment of a pollution prevention policy;
- 4.2 the elements and drivers for pollution prevention programs;
- 4.3 setting waste minimization goals for hazardous waste, low-level waste, mixed radioactive waste, transuranic waste, sanitary waste, waste resulting from cleanup activities and Toxic Release Inventories (TRI Toxics);
- 4.4 the conduct of operational assessments to identify opportunities for pollution prevention and implementation of resulting findings;
- 4.5 the use of the purchasing activity to implement and support goals of the pollution prevention program;
- 4.6 completion of an annual toxic chemical release form under the Emergency Planning and Community Right-to-Know Act (EPCRA) which must include a source reduction or recycling report;
- 4.7 the establishment of a program to maximize the use of safe alternatives to ozone-depleting substances; and
- 4.8 provisions for a recycling program including the designation of a recycling coordinator.

Of key importance in the intent of the requirements consolidated in this chapter is the integration of pollution prevention into planning, execution and evaluation of all site activities and a major message of this chapter is that safety and health programs and environmental pollution prevention program protections are usually mutually beneficial and their requirements frequently mutually inclusive. Requirements included here provide the context in which the chemical user incorporates pollution prevention into every phase of work, such as planning, acquisition, operations, waste management and disposal and the continuous improvement in managing a site's chemical-related activities to achieve the goals of pollution prevention and waste minimization.

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CHAPTER 8: EMERGENCY MANAGEMENT

This chapter consolidates existing DOE and federal safety and health requirements and National Standards that govern the management of emergencies involving chemicals. State and local requirements are not included. The requirements included here apply to all locations that use chemicals or chemical products (see def.). If a DOE site/facility engages in activities that involve chemicals, then that site/facility must comply with the requirements that are referenced and consolidated in this chapter.

The chapter is divided into seven (7) major sections that consolidate requirements for: the development of emergency response (ER) plans (Section 4.1); ER training (Section 4.2); ER plan implementation (Section 4.3); additional requirements for emergencies involving significant quantities of hazardous chemicals (Section 4.4); emergency response equipment (Section 4.5); medical support for chemical emergencies (Section 4.6); and post-incident actions (Section 4.7).

The requirements consolidated in section 4.1 are key to successful emergency response. They address the basic elements of the written emergency response plan, including a hazards survey; pre-emergency planning and coordination with other government agencies (local, state, and federal); criteria for emergency recognition; personnel titles and roles; emergency shutdown procedures and responsibilities; re-entry plans; security; evacuation plans; etc.

Section 4.2 covers the knowledge, abilities and training required for specific emergency responders and their roles in an emergency (e.g., First Responders, Incident Commander, Hazardous Materials Technicians and Specialists, Safety Officer, and other skilled support personnel). This section also consolidates the requirements for general employee training and drills, emergency response trainers, refresher training courses, and emergency training exercises.

Section 4.3 consolidates the requirements for implementing the ER plan commensurate with the hazards present. These requirements include those that address, for example, immediate corrective and mitigating actions; specific actions that must be taken by the Incident Commander; the use of backup personnel; the use of self-contained breathing apparatus; notification of the local emergency planning committee (LEPC) and the specific information that must be included in that notification; when to suspend certain operations due to immediate danger to life or health (IDLH); and details regarding the release of information that must be provided to the public.

Section 4.4 covers the additional requirements for situations involving significant quantities of hazardous chemicals, (i.e., those that exceed the lowest of the threshold quantities listed in the Occupational Safety and Health Administration (OSHA) standard 29CFR1910.119, or the Environmental Protection Agency (EPA) Rules found at 40CFR68.130 or 40CFR355. These requirements address, for example, categorizing and classifying emergencies based on the potential severity of the consequences; additional details regarding emergency planning notification and increased involvement with the LEPC; calculations of threshold planning quantities (TPQs) for solids and mixtures; provisions to adequately assess potential consequences on and offsite; a documented training exercise program with specific objectives and a critique process; and a written, detailed emergency notification program for employees, the public, and local, state, and federal agencies.

Section 4.5 consolidates requirements for the availability and use of emergency equipment and facilities such as a system to rapidly notify and evacuate employees; operable and appropriate personal protective clothing and equipment (PPE) including totally-encapsulating chemical protective suits, respirators and other breathing apparatus; and other requirements for the selection and use of emergency response PPE.

Section 4.6 consolidates the requirements for medical support for chemical emergencies. It includes requirements for medical planning and treatment for mass casualty situations; immediate medical consultation and surveillance; baseline physical examinations for hazardous materials response team members and hazardous materials specialists; specifications for the treatment of emergency response employees; and other detailed requirements for emergency response personnel and other employee medical programs and records.

Finally, Section 4.7 consolidates post-incident requirements, including decontamination and cleanup; notifications; final reports; investigations of root cause(s) and corrective actions; and rapid response to external evaluation and assessment findings.

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CHAPTER 9: CHEMICAL DISPOSITION

This chapter consolidates existing DOE and federal safety and health requirements that address the disposition of chemicals and chemical products (with the exception of nuclear materials and radiological materials) when they are no longer needed at a DOE site. State and local requirements are not included.

This chapter applies to all locations involved in the storage or use of chemicals and chemical products (see def.). An important point of this chapter is that these consolidated requirements apply until the time the chemicals are identified as "solid waste" for final disposal (see def.) under the provisions of the Resource Conservation and Recovery Act (RCRA).

The requirements consolidated in this chapter are derived primarily from DOE and federal property management regulations, and are captured in ten major sections:

4.1 - Disposition of Excess (or Surplus) Chemicals

4.2 - Utilization of Excess Chemicals

4.3 - Off-site Transfer to Other Federal Agencies

4.4 - Donation or Sale of Surplus Chemicals to the Public

4.5 - Donation or Sale of Surplus Hazardous Materials to Public Agencies

4.6 - Sale of Hazardous Materials to Public Bodies

4.7 - Abandonment or Destruction of Surplus Hazardous Materials

4.8 - Disposition of Special Types of Hazardous Materials

4.9 - Utilization and Disposition of Hazardous Materials that are Radioactively or Chemically Contaminated

4.10 - Storage and Handling of Excess or Surplus Chemicals

Sections 4.1 through 4.9 address various methods available for the disposition of excess/ surplus chemicals, and Appendices A and B provide explanatory and supporting material associated with the requirements consolidated in this chapter.

Two key aspects (Section 4.1.3) pertinent to the disposition of a chemical product are:

- identifying actual or potential hazards and
- documenting that information with a Material Safety Data Sheet (MSDS) or a Hazardous Materials Identification System (HMIS) record, if available. In the absence of either document, an MSDS-equivalent document (consistent with the MSDS content requirements of the OSHA Hazard Communication Standard, 29CFR1910.1200) must be prepared by the DOE site. It is important to note that an MSDS or equivalent hazard identification document must accompany all offsite transfers, donations and sales.

Appendix A, including Table A-1, summarizes the sequential steps that constitute the typical disposition process: screening within the DOE complex (Section 4.2.1), screening for utilization at other federal agencies (Sections 4.2.2, 4.2.3 and 4.3), donations to approved state organizations (Sections 4.4 and 4.5), and sales to the public (Sections 4.4 and 4.6). Available disposition routes are limited by the hazard, risk or value characteristics of the chemical.

Table A-2 in Appendix A displays disposition options for chemicals that are subject to abandonment or destruction (Section 4.7). Such non-typical disposition methods, which require prior DOE authorization, may be appropriate for chemicals identified as High Risk property (see definition; also Section 4.1.2) that have the potential to adversely impact national security interests, proliferation concerns, public health and safety, or the environment.

Section 4.8 covers the identification of hazardous materials/items using the Federal Supply Classification (FSC) classes or groups (Section 4.8.1), examples of which are listed in Tables B-1 and B-2 of Appendix B. Section 4.8.2 provides the source references for the consolidated requirements for the disposition of certain types of hazardous materials and certain categories of property (e.g., controlled substances, drugs, biological materials, reagents, lead-containing paint, etc.). In particular, Sections 4.8.3 and 4.8.4 consolidate special requirements applicable to hazardous products containing asbestos and polychlorinated biphenyls (PCBs), respectively.

Section 4.9 consolidates requirements for the utilization and disposition outside of DOE of hazardous materials that are radioactively or chemically contaminated.

In general, except for special requirements that apply to High Risk property and extremely hazardous property (see def.), the storage and handling of excess or surplus chemicals (see Section 4.10) must comply with the requirements consolidated in Chapter 5 ("Chemical Storage") of this handbook. Chemical transfers on site must be in compliance with the requirements consolidated in Chapter 4 ("On-Site Chemical Transportation") and off-site, with DOT, state and local regulations.

A key theme of this chapter is the reutilization of chemicals via available disposition routes. Any surplus chemicals still remaining at the end of the disposition cycle may re-enter it or be subject to final disposal as solid waste. Exceptions include chemicals that qualify for recycling and recovery (e.g., precious metals, ethylene glycol, anti-freeze solutions) or can be classified as Universal waste (see def.) under applicable environmental regulations. These pollution prevention and waste-minimization activities are covered in Chapter 7 ("Pollution Prevention and Waste Minimization"). However, requirements related to waste operations, such as the identification, storage, handling, transportation, treatment and disposal of waste fall outside the scope of the present chapter on chemical disposition.

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CHAPTER 10: TRAINING

This chapter covers existing DOE and other federal requirements for the training of employees involved in the handling, storage and use of chemicals. State and local requirements are not included. The requirements included here apply to all locations that use and/or store chemicals or chemical products. The key message of this chapter is that those who work with chemicals must be appropriately trained to recognize both the hazards of the chemicals they work with and the ways in which they may protect themselves from those hazards – i.e., they must be trained to safely perform their jobs and follow prescribed procedures.

There are six (6) major sections of this chapter which consolidate requirements for general information and training required for all employees working in areas where chemicals are present (section 4.1); additional training required for employees working in chemical laboratories (section 4.2); specific training for employees who are required to use respirators (section 4.3); additional training required for employees involved with highly hazardous chemicals (see definition) (section 4.4); training for

construction workers (section 4.5); and special training for the use and handling of specific materials, e.g., compressed gases, organic peroxides, etc. (section 4.6).

Section 4.1 consolidates the requirements for general employee information and training on hazardous chemicals in the workplace such as the location, availability and content of material safety data sheets (MSDSs) for the chemicals and chemical products being used or stored, methods to detect the presence of hazardous chemicals, personal protective measures, the details of the workplace hazard communications program, etc.

Section 4.2 consolidates the requirements specific to chemical laboratory workers such as the location, availability and details of the employer's Chemical Hygiene Plan; permissible exposure limits; signs and symptoms of exposures; and the availability and location of chemical information sources and reference materials, e.g., MSDSs.

Section 4.3 consolidates the requirements for respirator training as found at 29CFR1910.134, the Occupational Safety and Health Administration's (OSHA) Respiratory Protection Standard, including the requirement that each employee can demonstrate sufficient knowledge of respirators. This section also covers the requirements for retraining employees on basic aspects of respirator use such as proper respirator fit, respirator limits, how to inspect, clean, and store respirators, etc.

Section 4.4 covers training for highly hazardous chemicals including initial training, refresher training, training documentation, contractor employee training, and training for process maintenance activities.

Section 4.5 consolidates the requirements for the training of construction workers who handle harmful substances such as poisons, caustics, flammable liquids and gases, and other toxic substances. This section also covers the training of employees required to enter enclosed or confined spaces.

Finally, section 4.6 consolidates the special training requirements for specific materials including compressed and liquefied gases in portable cylinders; the storage of liquid and solid oxidizers and organic peroxides; oxygen-fueled gas welding and cutting; OSHA regulated carcinogens; and 14 other specific chemicals, e.g., acrylonitrile, beryllium, lead and methylene chloride.

CONCLUDING MATERIAL

Review Activity:
DOE
DP, EH, EM, NE, SC, OS, NA

Operations Offices
ID, OAK, ORO, RL, SRO

National Laboratories
PNNL, INEEL, LANL, RF, SRS, SNL,

Area Offices

External Agency
DNFSB

Preparing Activity:
DOE-EH-52

Project Number:
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