DLAI 4145.11
TM 38-410
NAVSUP PUB 573
AFJMAN 23-209
MCO 4450.12A

DLSC-LDD

13 January 1999

STORAGE AND HANDLING OF HAZARDOUS MATERIALS

[This publication has been revised significantly
and must be reviewed in its entirety.]

A. REFERENCES

1. TM 38-410/NAVSUP PUB 573/AFR 69-9/MCO 4450-12/DLAM 4145.11, May 92

2. DoD 4140.1-R, DoD Material Management Regulation

B: PURPOSE. This instruction:

1. Supersedes reference A1.

2. Implements the policy established in reference A2.

3. Establishes uniform procedures for the receipt, storage, and handling of hazardous materials and wastes by Department of Defense (DoD) components, installations, and activities. It is to be used in conjunction with pertinent Service-specific and DoD hazardous materials procedures, regulations, manuals, and guidance documents to support safe, effective, and environmentally sound management of hazardous materials throughout their life-cycle

4. Serves as a source of technical know-how regarding the management of hazardous materials, especially for warehouse personnel. For this reason it touches on a number of topics, such as transportation and safety and health, that are covered in other DoD documents. For these areas it is a source of information for knowledge and general awareness to assist these personnel in performing their jobs more effectively and is not intended to replace or supersede pertinent DoD documents.

5. The Paperwork Reduction Act of 1974, as amended in 1996, affects this manual.

C. APPLICABILITY AND SCOPE

1. The provisions of this instruction are applicable to the Department of the Army (DA), the Department of the Air Force, the Department of the Navy, the Marine Corps, and the Defense Logistics Agency (DLA) which will be referred to collectively as "DoD Components". In addition, this instruction applies to overseas DoD locations. When there is a conflict between the provisions of this instruction and the host nation, the more stringent should be applied.

2. Ammunition and explosives, defined as United Nations (UN) Class 1 items regardless of Division, form a unique subset of all hazardous materials. Receipt, storage, and handling of ammunition and explosives at DoD activities are governed by DoD 6055.9-STD, DoD Ammunition and Explosives safety manuals and regulations. However, general broad procedures applicable to the storage of ammunition and explosives are provided in Chapter 10 for reference and to assist warehousing personnel in performing their jobs more effectively.

3. This publication may be supplemented at the installation or activity level by written local procedures, regulations, instructions, etc. When more stringent service/agency policies and procedures exist, they should be followed as appropriate.

D. DEFINITIONS. See Appendix H of this publication.

E. PROCEDURES

1. The procedures described in this publication are written around the requirements as specified in the appropriate Codes of Federal Regulations and should be followed as a minimum. More specific or more stringent regulations, procedures, or instructions established by DoD components should be followed as appropriate.

2. Because this publication is written from a broad hazardous materials management perspective, the procedures as they apply to areas such as the shipment of hazardous materials, personal protective equipment, occupational safety and health programs, and environmental programs are general and should be viewed as an initial starting point and supplemented with the appropriate service/agency regulations and procedures.

3. When necessary, DoD components may authorize temporary deviations to this instruction when compliance with mandatory provisions is not practical or the deviation is required as an emergency measure. Temporary deviations will not exceed 90 days unless appropriately authorized by the DoD component. DoD components may authorize deviations from the mandatory provisions of this directive provided they do not violate environmental, occupational, safety and health, or domestic and host nation laws and regulations. Any authorized deviations which may extend beyond 90 days will be forwarded to Defense Logistics Support Command, Attn: DLSC-LDD, 8725 John J. Kingman Rd., Suite 2533, Ft. Belvoir, VA 22060-6221, for a determination as to whether or not it should be incorporated into this publication.

4. Organization and Use.

a. Organization. This publication is organized into chapter and appendices. Each chapter covers a major subject and is divided into sections. A table of contents reflects the scope of subjects included.

b. Table of Contents. The organization of this publication makes it possible to locate desired information down to the paragraph level.

c. Illustrations. The purpose of illustrations is to show by means of drawings, charts, or completed sample forms, the principles and procedures explained in the text. The illustrations do not necessarily show current names, dates, and figures, but are included to clarify the principles outlined in the text. The use of commercial forms for samples does not constitute an endorsement of the firm by the DoD.

d. Processing Changes. Any organization or user of this publication should submit changes, in writing, to Defense Logistics Support Command, Attn: DLSC-LDD, 8725 John J. Kingman Rd., Suite 2533, Ft. Belvoir, VA 22060-6221.

F. RESPONSIBILITIES

1. The Commanders or Directors of DoD Components will implement as appropriate the procedures of this instruction.

2. The Defense Logistics Support Command, DLSC-LDD, will maintain this document.

G. EFFECTIVE DATE. This instruction is effective immediately.

H. INFORMATION REQUIREMENTS. (Reserved for future use.)

BY ORDER OF THE DIRECTOR, DEFENSE LOGISTICS AGENCY, AND THE SECRETARIES OF THE ARMY, THE AIR FORCE, THE NAVY, AND THE COMMANDANT OF THE MARINE
CORPS

NORMAN B. HODGES III
Colonel, USA
Headquarters Complex Commandant

DENNIS J. REIMER
General, United States Army
Chief of Staff

Official:

JOEL B. HUDSON
Administrative Assistant to the
Secretary of the Army

W. J. Maguire
Captain, SC, USN
Deputy Commander for
Fleet Logistics Operations

MICHAEL E. RYAN
General, USAF
Chief of Staff

Official:

JOHN W. HANDY
Lieutenant General, USAF
Deputy Chief of Staff/Installations & Logistics

G. B. HIGGINBOTHAM
Major General, U. S. Marine Corps
Deputy Chief of Staff for
Installations and Logistics

STORAGE AND HANDLING OF HAZARDOUS MATERIALS

TABLE OF CONTENTS

CHAPTER 1 GENERAL
SECTION I. PURPOSE, AND ORGANIZATION
1.1 Purpose
1.2 Organization of this Publication
SECTION II. FEDERAL REGULATORY REQUIREMENTS
1.3 Federal Laws and Regulations

CHAPTER 2 IDENTIFICATION OF HAZARDOUS MATERIALS
SECTION I. PURPOSE AND APPLICABILITY
2.1 Purpose
2.2 Applicability
2.3 SECTION II. BACKGROUND
2.3 General
2.4 Identification
SECTION III. COMMUNICATING THE HAZARDS OF MATERIALS
2.5 Occupational Safety and Health Administration Requirements
2.6 Department of Transportation Requirements.
2.7 Environmental Protection Agency Requirements
2.8 DoD Requirements
2.9 Non-Regulatory Requirements
2.10 Sources of Regulatory Information
2.11 Retention of DOT Markings, Placards, and Labeling

CHAPTER 3 RECEIPT OF HAZARDOUS MATERIALS
SECTION I. PURPOSE AND APPLICABILITY
3.1 Purpose
3.2 Applicability
SECTION II. PLANNING AND COORDINATING THE RECEIVING OPERATION
3.3 Planning for Receiving Operations
3.4 Advance Planning and Coordination
SECTION III. IMPACT OF FEDERAL REGULATIONS, OTHER THAN TRANSPORTATION, ON RECEIVING OPERATIONS
3.5 Defense Installations
3.6 Processing Pesticides.
3.7 Thefts or Losses of Explosives
3.8 Radioactive Material Incidents

SECTION IV. HAZARD CHARACTERISTIC CODES (HCCs)
3.9 Hazardous Materials Management and HCCs
SECTION V. ARRIVAL OF HAZARDOUS MATERIALS AT THE INSTALLATION
3.10 Hazardous Material Receipts
3.11 Security Personnel Responsibility
3.12 Visual Inspection
SECTION VI. REPORTS OF HAZARDOUS MATERIALS INCIDENTS
3.13 Regulatory Requirements
3.14 Notification Responsibility
3.15 Releases of Reportable Quantities
SECTION VII. RECEIVING INSPECTION OF HAZARDOUS MATERIALS
3.16 Purpose of Inspection
3.17 Preliminary Inspection
3.18 Inspection of Receipts From Procurement
3.19 Customer and Unit Returns
3.20 Inspection of Radioactive Material
3.21 Astray/Misdirected Shipments
3.22 Inspection of Pesticides (Insecticides, Herbicides, Fungicides, Rodenticides, Repellents, Growth Regulators, Defoliants, Desiccants, or Biocides)
3.23 Pilferable or Security Material
3.24 Inspection of Compressed Gases in Cylinders
3.25 Discrepancies in Shipment
SECTION VIII. HAZARDOUS MATERIALS RECEIPT PROCESSING PROCEDURES
3.26 Current Processing Procedures
3.27 In the Event an HCC Has Not Been Assigned
3.28 How to obtain an HCC
SECTION IX. RECEIVING QUALITY CONTROL
3.29 Purpose
3.30 Minimum Quality Control Procedures
SECTION X. WASTE MINIMIZATION APPLICABLE TO RECEIVING
3.31 General
3.32 Guidelines

CHAPTER 4 STORAGE AND CARE OF HAZARDOUS MATERIALS
SECTION I. GENERAL
4.1 Purpose and Applicability
4.2 Reporting of Storage Space
4.3 Hazardous Waste Minimization Responsibilities
SECTION II. HAZARDOUS MATERIALS STORAGE REQUIREMENTS
4.4 General
4.5 Storage Compatibility Considerations
4.6 Types of Storage Facilities
4.7 Features of Hazardous Materials Storage Facilities
4.8 Types of Hazardous Materials Storage Areas
4.9 DoD Storage Type A: Radioactive Material Storage

4.10 DoD Storage Type C: Corrosive Material Storage
4.11 DoD Storage Type D: Oxidizer Material Storage
4.12 DoD Storage Type E: Explosive Material Storage
4.13 DoD Storage Type F: Flammable Material Storage
4.14 DoD Storage Type G: Compressed Gas Cylinder Storage
4.15 DoD Storage Type L: Low Hazard Material (General Purpose) Storage
4.16 DoD Storage Type P: Organic Peroxide Material Storage
4.17 DoD Storage Type R: Reactive Material Storage
4.18 DoD Storage Type T: Poison Material Storage
4.19 Special Storage and Handling
4.20 Storage of Operating Stock of Hazardous Materials in General Purpose Storage Areas
SECTION III. STORAGE QUALITY CONTROL
4.21 General
4.22 First-In First-Out (FIFO) Method
4.23 Surveillance Programs
4.24 Disposal of Excess Stocks
4.25 Control of Storage Locations
4.26 Physical Inventory of Hazardous Materials
SECTION IV. RECOUPMENT OF HAZARDOUS MATERIALS
4.27 Purpose and Applicability
4.28 Background
4.29 Impact of Federal Regulations
4.30 Planning and Coordinating Recoupment Operations
SECTION V. RECEIVING HAZARDOUS MATERIALS AT A RECOUPMENT FACILITY
4.31 General
4.32 Receiving Inspection
4.33 Accepting Receipt
SECTION VI. PROCESS HOLDING OF HAZARDOUS MATERIALS AT A RECOUPMENT FACILITY
4.34 General
4.35 Holding Storage Area Requirements
4.36 Holding Area Procedures
SECTION VII. FACILITY AND EQUIPMENT REQUIREMENTS FOR HAZARDOUS MATERIALS RECOUPMENT
4.37 Requirements for Hazardous Materials Recoupment
SECTION VIII. PROCEDURAL REQUIREMENTS FOR HAZARDOUS MATERIALS RECOUPMENT
4.38 General
4.39 Preparation for Open Container Transfer
4.40 Decontamination and Cleanup
4.41 Emergency Procedures for Hazardous Materials Recoupment
SECTION IX. RECOUPMENT QUALITY CONTROL
4.42 General

CHAPTER 5 SELECTION AND ISSUE OF HAZARDOUS MATERIALS
SECTION I. GENERAL
5.1 Purpose and Applicability
5.2 Planning and Coordinating the Operation
5.3 Impact of Federal Regulations on Issue Operations
5.4 Hazardous Waste Minimization Responsibilities
SECTION II. ISSUE PROCESSING
5.5 Processing Release Documents
5.6 Stock Selection Procedures
5.7 Temporary Staging of Hazardous Materials
5.8 Direct Shipments From Storage Areas
5.9 Material Found Damaged During Stock Selection
5.10 Processing Disposal Release Orders (DRO)
5.11 Reports of Hazardous Materials Incidents
SECTION III. ISSUE PROCESSING QUALITY CONTROL
5.12 General

CHAPTER 6 PREPARATION FOR MOVEMENT
SECTION I. GENERAL
6.1 Purpose and Applicability
6.2 Installation Packaging Responsibilities
6.3 Regulations Applicable to Installations
6.4 Hazardous Waste Minimization Responsibilities
6.5 DOT Exemptions and DoD Certificates of Equivalency (COE)
6.6 Waivers of Military Air Packaging Requirements
SECTION II. PLANNING THE PACKAGING OPERATION
6.7 General
6.8 Packaging Operation Layout
6.9 Pack Area and Inspection
SECTION III. PACKAGING, MARKING, AND LABELING OF HAZARDOUS MATERIAL
6.10 General Packaging Requirements
6.11 Packaging Process
6.12 Marking Requirements
6.13 Labeling Requirements
SECTION IV. PACKING, MARKING, AND LABELING OF HAZARDOUS WASTE
6.14 General
6.15 Salvage Drums
SECTION V. PACKAGING QUALITY CONTROL
6.16 General.
SECTION VI. LOADING HAZARDOUS MATERIALS FOR SHIPMENT
6.17 Purpose and Applicability
6.18 Impact of Federal Regulations on Loading Hazardous Materials for Shipment
6.19 Maximum Penalties
6.20 Criminal Penalties
6.21 Hazardous Waste Minimization Responsibilities

SECTION VII. SHIPMENT PLANNING
6.22 General
6.23 Understanding the Shipping Environment
6.24 Installation Loading Responsibilities
6.25 Loading Rules for Rail Carriers
6.26 Loading Rules For MILVAN/SEAVAN Containers
SECTION VIII. REGULATORY REQUIREMENTS BY SHIPMENT MODE
6.27 Rail Shipments
6.28 Highway Shipments
6.29 Water Shipments
6.30 Military Air Shipments
SECTION IX. DOCUMENTATION OF HAZARDOUS MATERIALS SHIPMENTS
6.31 DOT Requirements
6.32 DoD Documentation Requirements
6.33 Commercial Air Documentation
6.34 Commercial Shipping Papers, International
6.35 Placarding Requirements
SECTION X. REPORTS OF HAZARDOUS MATERIALS INCIDENTS
6.36 Notification of Incidents
6.37 Reportable Quantities

CHAPTER 7 ENVIRONMENTAL PROTECTION
SECTION I. GENERAL
7.1 Purpose and Applicability
7.2 Federal Regulatory Requirements
7.3 DoD Directive 5030.41
SECTION II. SPILL PREVENTION MANAGEMENT
7.4 General
7.5 SPCC Plan Requirements
SECTION III. SPCC MANAGEMENT PRACTICES
7.6 General
7.7 The Human Factor
7.8 Physical Security
7.9 Equipment
7.10 Housekeeping
7.11 Condition of Stored Material
SECTION IV. SPILL CONTINGENCY PLANNING
7.12 General
7.13 Installation Spill Contingency Plan Development and Content
7.14 Contingency Plan Implementation
SECTION V. OTHER CONTINGENCY PLAN REQUIREMENTS
7.15 General
7.16 Emergency Planning and Community Right-to-Know Act of 1986
7.17 Planning for Accidents Involving Radioactive Materials
7.18 Transportation Accident Contingency Planning
7.19 Environmental Compliance Assessments

CHAPTER 8 SAFETY AND HEALTH
SECTION I. GENERAL
8.1 Purpose and Applicability
8.2 Federal Regulatory Requirements
8.3 DoD Regulatory Requirements
SECTION II. SAFETY AND HEALTH RESPONSIBILITIES
8.4 Installation Commander
8.5 Supervisory Personnel
8.6 Employee Responsibilities and Rights
SECTION III. WRITTEN HAZARD COMMUNICATION PROGRAM
8.7 Program Requirements
8.8 Determination of Chemical Hazards
8.9 Labeling of Containers of Chemicals in the Workplace
8.10 Material Safety Data Sheets
8.11 Employee Information and Training
SECTION IV. INSPECTIONS AND OPERATIONAL PROCEDURES
8.12 General
8.13 Inspections and Maintenance
8.14 Standard Operating Procedures
SECTION V. PERSONAL PROTECTIVE EQUIPMENT
8.15 General
8.16 Eye and Face Protection
8.17 Respiratory Protection Program
8.18 Occupational Head Protection
8.19 Occupational Foot Protection
8.20 Hand Protection
SECTION VI. OTHER REQUIREMENTS
8.21 Medical Surveillance Program
8.22 Occupational Radiation Protection Program
8.23 Process Safety Management

CHAPTER 9 HAZARDOUS MATERIALS TRAINING
SECTION I. GENERAL
9.1 Purpose and Applicability
SECTION II. FEDERAL AND INTERNATIONAL REQUIREMENTS FOR HAZARDOUS MATERIALS TRAINING
9.2 General
9.3 DOT Requirements
9.4 EPA Requirements
9.5 OSHA Requirements
9.6 Nuclear Regulatory Requirements
9.7 International Requirements
9.8 DoD Hazardous Material Training Requirements

SECTION III. THE TRAINING PLAN
9.9 General
9.10 Responsibility for Training
9.11 Support by Storage Managers
9.12 Training Plan Content
9.13 Kinds and Methods of Training
9.14 Coordination with Other Installation Activities
9.15 Sources of Training Information
9.16 Hazardous Material Training Programs
9.17 Suggested Training Program

CHAPTER 10 AMMUNITION AND EXPLOSIVES
SECTION I. PURPOSE AND SCOPE
10.1 Purpose and Scope
SECTION II. GENERAL
10.2 General
10.3 Establishment of Safety Organizations
SECTION III. TYPES OF FACILITIES
10.4 Magazine
10.5 Igloo Magazine or Arch-type Magazine
10.6 Earth-Covered Magazines (barricaded)
10.7 Earth-Covered Magazines (unbarricaded)
10.8 Standard Igloo Magazine
10.9 Special-Type Magazines
10.10 Above Ground Magazines
10.11 Open Storage
SECTION IV. STORAGE PLAN
10.12 Preparation and Maintenance
SECTION V. WAREHOUSING
10.13 General
10.14 Quantity-Distance Tables
10.15 Storage Compatibility Charts or Tables
10.16 Aisles
10.17 Space Layout and Utilization
10.18 Preferred Storage for Certain Ammunition and Explosive Items
10.19 Storage Aids
10.20 Storage of Pilferable Ammunition
10.21 Storage of Ammunition Bearing Security Classification of Confidential or Higher
10.22 Storing and Stacking of Dunnage
10.23 Fusible Links on Magazines
10.24 Rewarehousing
10.25 Termite Control
10.26 Protection Against Moisture Damage
SECTION VI. RECEIVING RAILCARS AND MOTOR VEHICLES
10.27 General

SECTION VII. CARE OF AMMUNITION IN STORAGE
10.28 Responsibility
10.29 Storage Selection
10.30 Inspection of Incoming Ammunition
10.31 Inspection of Ammunition in Storage
10.32 Preservation and Cleaning Methods
SECTION VIII. SHIPPING
10.33 General
10.34 Preparation for Delivery
SECTION IX. LOCATOR SYSTEM
10.35 Locator Records
SECTION X. INVENTORY
10.36 Procedures
SECTION XI. SAFETY
10.37 General
10.38 Safety Rules
10.39 Posting Instructions
10.40 Standard Handling Methods
10.41 Educational Program

CHAPTER 11 HAZARDOUS PROPERTY DISPOSAL
SECTION I. PURPOSE
11.1 Purpose
SECTION II. BACKGROUND
11.2 General
SECTION III. DEPARTMENT OF DEFENSE POLICY
11.3 Policy
SECTION IV. HAZARDOUS WASTE DISPOSAL RESPONSIBILITIES
11.4 Defense Reutilization and Marketing Service
11.5 DoD Components
SECTION V. RELATED TOPICS
11.6 Hazardous Waste Minimization
11.7 Storage
11.8 Packing, Marking and Labeling
11.9 Hazardous Waste and Emergency Response Operations
11.10 Training

APPENDICES

APPENDIX A References
APPENDIX B Hazard Characteristic Codes and Definitions
APPENDIX C Storage Segregation Matrix: HCCs to Storage Segregation
APPENDIX D Assignment of Temporary Hazardous Characteristic Codes (HCCs)
APPENDIX E A Guide for Determining Packaging, Marking, and Labeling Requirements for Hazardous Materials
APPENDIX F Blocking and Bracing of Hazardous Materials for Transportation
APPENDIX G Training Requirements for Hazardous Materials Management
APPENDIX H Explanation of Acronyms, Terms, and Definitions
APPENDIX I HMIS Focal Points
APPENDIX J Miscellaneous Addresses

List of Illustrations

Figure	*Title*
2-1	MSDS for Sodium Hydroxide
2-2	Example of DoD Format of OSHA Hazard Communication Standard Warning Label
2-3	Placarded Trucks and TOFC
2-4	Typical Commercial Shipping Paper, Road or Rail
2-5	IATA Shippers Declaration of Dangerous Goods
2-6	IMDG Shippers Declaration of Dangerous Goods (Vessel)
2-7	FIFRA Table of Toxicity Categories by Hazard Indicator
4-1	Hazardous Material Storage Segregation Chart
6-1	Movement of a Ship at Sea
6-2	Segregation and Separation Chart of Hazardous Materials for Rail Shipments
6-3	Segregation and Separation Chart of Hazardous Materials for Carriage by Public Highway
6-4	General Segregation Requirements for Hazardous Materials for Carriage by Vessel
6-5	Segregation Table for Hazardous Materials for Military Air
F-1	Typical Load for Hazardous Materials in 55-Gallon Closed-Head Steel Drums in a 40-Foot Trailer/Container
F-2	Bulkhead and Strut Assembly
F-3	Typical Load of Hazardous Materials in 55-Gallon Closed-Head Drums in a 20-Foot Trailer/Container
F-4	Typical Load of Hazardous Materials in 55-Gallon Open-Head Drums in a 40-Foot trailer/Container
F-5	Typical Load of Hazardous Materials in 55-Gallon Closed-Head Drums Braced with a Unitized Rear Bay in 40-Foot Trailer/Container
F-6	Unitized Rear Bay Brace
F-7	Extended Bottom Deck Assembly
F-8	Typical Load of Hazardous Materials in DOT Specification Portable Tanks in 40-Foot Trailer/Container
F-9	Assembly of Side Blocking Gate and Antisway Brace
F-10	Typical Load of Hazardous Materials in DOT Specification Portable Tanks in 40-Foot Trailer/Container
F-11	Typical Load of Hazardous Materials in Compressed Gas Cylinders in a 40-Foot Trailer/Container
F-12	Typical Mixed Load of Hazardous Materials in Various Containers in 40-Foot Trailer/Container
F-13	Typical Mixed Load of Hazardous Materials in Various Containers in 40-Foot Trailer/Container
F-14	Steel Strap Method with Signode Chessie Floor Plates in 40-Foot Trailer
F-15	Signode Chessie Floor Plate with Wall Anchor
F-16	Steel Strap Method with Wall Anchors in 40-Foot Trailer
F-17	Self-Locking Skid Method Using Drumtite Units in 40-Foot Trailer
F-18	Load Distribution

List of Tables

Number	*Title*
2-1	Shipping Labels
B-1	Hazard Characteristic Codes
B-2	Hazard Characteristic Code Definitions
B-3	Relationship Between HCCs and Various Regulatory Categories Shown in Order of Assignment Preference Using 49 CFR as a Basis
C-1	Storage Segregation Matrix
D-1	DOT Transportation Labels
D-2	Recommended Storage Based on Precautionary Label Text (ANSI Z129.1)
D-3	Toxic and Hazardous Substances Listed in Title 29 CFR, Part 1910, Subpart Z
D-4	Class or Division Cross-reference to Storage Areas
G-1	Summarization of Selected Depot Personnel Function Specific Training Requirements
G-2	Detailed Description of HAZMAT Training Courses
G-3	Summary of HAZMAT Training Courses - Compliance Training: Initial Courses
G-4	Summary of HAZMAT Training Courses - Compliance Training: Refresher Courses
G-5	Summary of HAZMAT Training Courses - Compliance Training: Implied Training Courses

CHAPTER 1

GENERAL

SECTION I. PURPOSE AND ORGANIZATION

1.1 Purpose

This chapter describes the overall approach to the organization of this publication and provides a general introduction to the various regulatory requirements governing the management of hazardous materials.

1.2 Organization of this Publication

The chapters of this publication are organized to describe the various processes involved in a storage facility as related to hazardous materials. Chapter two emphasizes the importance of the proper identification of hazardous materials and describes the various tools available to personnel to accomplish this. Then chapter three describes the receipt process and the importance placed on this critical function in storing hazardous materials. Chapter four, the heart of the entire document, describes the various types of hazardous materials storage facilities and addresses the critical need for proper segregation. Chapter five addresses the concerns that must be addressed when the material is selected and chapter six discusses topics involving the preparation for movement. Chapter seven addresses environmental protection, chapter eight addresses safety and health issues and chapter nine addresses training requirements from a regulatory perspective. Chapter ten discusses ammunition and explosives and chapter eleven discusses hazardous property disposal. The chapters are followed by appendices which support and amplify the topics discussed in the chapters. It should be noted that the topics discussed in chapters six, seven, eight, and ten are addressed in specific detail in other DoD publications. Thus these chapters are somewhat broad and are intended to provide an overview and general awareness to storage personnel so they can perform their jobs more effectively.

SECTION II. FEDERAL REGULATORY REQUIREMENTS

1.3 Federal Laws and Regulations

Federal laws dealing with the health, safety and the environment have a great impact on all operations within the DoD. The National Environmental Policy Act is one of our nation's highest priorities and requires major changes in nearly every military functional area. The following Federal regulations are summarized to help identify those that may be applicable to a specific operation:

A. Title 49 CFR Parts 171-177: The US Congress issued the Hazardous Materials Transportation Act (HMTA) of 1974 and the Hazardous Materials Uniform Safety Act of 1990 delegating the responsibility for regulating hazardous materials to the Department of Transportation (DOT). DOT, in turn, issues Title 49 Code of Federal Regulations (CFR) which governs the classification, description, packaging, marking, labeling, placarding, and proper condition of Hazardous Materials

(HM) being offered or accepted for transportation in interstate or intrastate commerce. Additionally, Title 49 CFR authorizes the use of the Canadian Government Transport of Dangerous Goods (TDG), the International Maritime Dangerous Goods Code (IMDGC), and the International Civil Aviation Organization (ICAO) Technical Instruction for shipments into and out of the United States. These communication systems help to quickly identify hazardous materials requiring special shipping, storage and handling requirements. In cases of an emergency that may involve hazardous materials, first responders have immediate indicators of their presence.

B. Title 40 CFR, Parts 1-799, Protection of Environment: The following statutes are relevant to the identification of Hazardous Wastes and are administered by the Environmental Protection Agency (EPA).

1. The Resource Conservation and Recovery Act (RCRA) of 1976, as amended in 1984, focuses on regulating Hazardous Wastes (HWs). RCRA defines hazardous wastes by their characteristic of ignitability, corrosivity, reactivity, toxicity, or a special EPA listing. The regulations established a cradle-to-grave manifest system for tracking hazardous wastes. Owners of underground storage tanks containing petroleum products and regulated substances must notify the states of the existence of all underground tanks.

2. The Comprehensive Environmental, Response, Compensation and Liability Act (CERCLA) of 1980, as amended by the Superfund Amendments and Reauthorization Act (SARA) of 1986, provides a system for identifying and cleaning up chemical and hazardous substances released into the air, water, groundwater, and on land. CERCLA requires that spills or discharges of over 700 substances in excess of 1 to 5,000 pounds (depending on the substance) be reported immediately to the National Response Center. In the event of a hazardous substance release, EPA may initiate an emergency response which follows the procedures and methods set forth in the National Contingency Plan, including discovery, investigation, evaluation and removal activities. Executive Order 12856 of 1993 directed all Federal agencies to comply with SARA Title III, Emergency Planning and Community Right-to-Know. Each facility is required to notify their State Emergency Response Commission (SERC) and Local Emergency Planning Committee (LEPC) that they have a Threshold Planning Quantity (TPQ) of any Extremely Hazardous Substance (EHS) in concentrations greater than 1 percent (or 0.1 percent for carcinogens). Hazardous chemicals at facilities may be identified by reviewing MSDSs which are required by the Occupational Safety and Health Administration (OSHA). Inventories of hazardous chemicals in excess of 10,000 lb. or EHSs in excess of 500 lb. shall be identified in the Tier I or Tier II report submitted to the SERCs and LEPCs. The annual Form R is submitted to EPA and the SERC for toxic chemical releases which exceed threshold levels. Facilities must also immediately report to the proper authorities any emergency release that exceeds the Reportable Quantity (RQ) of EHS or CERCLA listed substances.

3. The Toxic Substances Control Act (TSCA) of 1976 gave EPA the broad authority to regulate chemical substances which were not covered by other laws and which have the potential to create adverse health or environmental effects. Chlorofluorocarbons (CFC), because they deplete stratospheric ozone, and Polychlorinated Biphenyls (PCBs), because of their chronic health effects, are two examples of TSCA regulated chemicals. Chemical manufacturers and importers shall provide EPA with a Premanufacture Notice and provide available health and environmental effects

data at least 90 days prior to the manufacture and sale of any chemical. EPA can approve the chemical, request further testing, control the manufacture and sale of the chemical, or prohibit its manufacture.

4. Under the Federal Insecticide, Fungicide, and Rodenticide Act (FIFRA) of 1972, manufacturers must register all new pesticides with the EPA, who then evaluates its environmental and health effects. All amounts of active ingredients along with use restrictions are printed on the EPA label along with a signal word and hazard statement.

C. The Occupational Safety and Health Act of 1970 assigns national worker protection authority to the Occupational Safety and Health Administration (OSHA). Title 29 CFR Part 1910.1200, the Hazard Communication Standard, requires that the hazards of all chemicals produced or imported are evaluated, and that information concerning their hazards is made available to employers and employees. A comprehensive hazard communication program requires container labeling and other forms of warning, MSDSs, and employee training. Part 120 outlines training requirements for hazardous waste operations and emergency response. Part 1450 outlines the requirements for establishing hazard communication programs and chemical hygiene plans for laboratories.

D. Title 42 CFR, Part 72, Public Health. This regulation contains the requirements for packaging and labeling of etiologic agents/biomedical materials (infectious substances) for transportation.

E. Title 10 CFR, Energy. This regulation contains the Nuclear Regulatory Commission (NRC) requirements for radioactive material use, possession, storage, marking, posting, transport, and disposal.

CHAPTER 2

IDENTIFICATION OF HAZARDOUS MATERIALS

SECTION I. PURPOSE AND APPLICABILITY

2.1 Purpose

This chapter addresses strategies for the identification of Hazardous Materials other than bulk petroleum products that are received, stored, and handled by DoD installations. Guidance applicable to bulk petroleum storage and handling is set forth in MIL-HDBK-201, Petroleum Operations.

2.2 Applicability

The provisions of this chapter are applicable to all personnel whose duties involve the identification of materials with hazardous characteristics.

SECTION II. BACKGROUND

2.3 General

Many commodities used by DoD are hazardous or contain hazardous materials that have special requirements for storage and handling. The dangers posed by these items can be serious and personnel need to be aware of the domestic and international laws and regulations associated with them. These laws and regulations place special emphasis on communicating the hazards associated with these products because exposure can result in serious personal injury, permanent disabilities and even death. Property and the environment may also be damaged or destroyed. It is imperative that all workers recognize and understand the hazards associated with these commodities. No single functional area is exempt from these risks to health, safety and property.

2.4 Identification

It is essential that hazardous materials are accurately identified to insure safe storage, handling and disposal. Federal regulatory agencies require manufacturers and distributors to identify the physical, health and environmental hazards of their commodities in several ways. Placards, labels, markings, and MSDS are just some of the means used to convey this information. The methods and procedures of identification and classification in this document are in a simplified outline. This does not relieve individuals working with these materials from the responsibility of having full awareness and understanding of the requirements for hazard communications. Also, hazardous material personnel shall be responsible, unless otherwise specified, for full compliance with the mandatory provisions referenced in this publication.

2.5 Occupational Safety and Health Administration Requirements

A. General Requirements. The OSHA Hazard Communication Standard (HCS) requires evaluation of the hazards of all chemicals in the workplace and that information concerning the potential hazards and protective measures are provided to both employers and employees. The HCS generally applies to any chemical which is a health or physical hazard to which employees may be exposed under normal use conditions or in a foreseeable emergency. Ensure that the following information is available for all chemicals stored, handled, or used in the workplace:

1. Copies of any Materials Safety Data Sheets are received and maintained so that employees have access to the information. This requirement may be met through the use of the DoD Hazardous Materials Information System (HMIS).

2. Chemical warning labels are affixed to each container and are not removed or defaced.

3. Where hazardous chemicals are packaged, handled, reacted, transferred, or used a written hazard communication program is required. This written plan should not be complicated, but must identify how the requirements for labels and other forms of warning, MSDSs, and employee information and training will be met at a particular location.

B. Both the MSDS and HCS warning label contain substantial information concerning the hazards of a substance. An example of an MSDS is shown in Figure 2-1. Specific manufacturer's MSDS information is readily available to DoD personnel through the DoD Hazardous Materials Information System (HMIS). This system distributes the manufacturer's MSDS information in a standardized format and is based upon the MSDS received from the manufacturer. More details on this system are provided below.

C. DoD 6050.5, HMIS

1. Title 29, Code of Federal Regulations (CFR), part 1910.1200, Hazard Communication, requires that chemical manufacturers or importers assess the hazards of chemicals they produce or import and provide this information in the form of MSDSs, labeled products, and other forms of warning. The Federal Government has implemented this requirement through contractual requirements to its suppliers. The document which specifies MSDS requirements for government purchases is Federal Standard 313 (FED-STD-313). With respect to MSDSs, the method used by DoD to comply with this rule is defined in DoDI 6050.5, DoD Hazard Communication Program.

2. The DoD HMIS was implemented as an automated data base of hazardous materials information primarily derived from manufacturer MSDSs. Transportation data, hazard warning labels data, and environmental data have been added to supplement the data base. The system provides a means of distributing MSDSs on demand without requiring the shipment of hard copies with the materials. The HMIS is distributed quarterly using Compact Disc-Read Only Memory (CD-ROM) media and on-line access is planned, to include worldwide web access. Additionally, the

HMIS CD-ROM version provides a means of delivering hazard warning labels for use in the storage area and workplace. These labels can be used when the manufacturer's warning label has been removed or obliterated. An example of this DoD label is shown in Figure 2-2. The system can produce either a large or small label on both a preprinted label form or on blank label stock. Personnel who handle, store, ship, use, or dispose of hazardous materials must have access to the HMIS at or near storage and shipping facilities. Activities requiring copies of HMIS should contact their respective service/agency focal point to request distribution. Service focal points are listed in Appendix I.

3. The HMIS provides a means for the identification and classification of hazardous materials through the assignment and use of the Hazard Characteristic Code (HCC). The definitions for the HCCs can be found in Appendix B of this publication. The HCC can be assigned to each specific item when an MSDS is provided prior to purchase. However, an MSDS is not always required for items regulated by transportation, environmental protection, and other rules. An HCC can be assigned for any item the service/agency desires to manage as a hazardous material. When the assigned HCC is entered into HMIS, it becomes a tool in determining storage segregation and compatibility requirements which are described in Appendix C.

4. To assure that proper MSDS information is received (as required by Title 29 CFR) and forwarded to the HMIS, specific procedures have been developed within the DoD. For centrally-managed and local purchase items, the contracting organization places requirements in the solicitation mandating the submission of an MSDS and use of OSHA compliant hazard warning labels on the product. Warning labels are important since they are usually the first indication to users and/or receiving activities that hazards are associated with the products. Upon receipt, the MSDS is forwarded to the service/agency focal point for review. The focal point is responsible for reviewing the MSDS for completeness, technical accuracy, and consistency. Following the review, the focal point will forward the MSDS to DLA for entry into the HMIS. Some local contracting offices are required to submit the MSDS to their local safety/industrial hygiene/bioenvironmental engineering office for review. When this is the case, that office is responsible for forwarding the MSDS to the service/agency focal point following their review.

5. The HMIS is distributed in two versions. The version which contains proprietary data is DoD 6050.5-LR and the version without the proprietary data is DoD 6050.5-L. The decision regarding which activity is authorized access to the proprietary version is made by the focal point of each service/agency.

6. The HMIS database is a useful system for maintaining technical information on hazardous materials; and to the extent possible, operational ADP systems should utilize the data to enhance their daily operational processing of hazardous materials. File structures for the HMIS files may be obtained from the DLA focal point for CD-ROM distribution at DGSC-VBB listed in Appendix I.

D. Title 29 CFR, Part 1910, Subpart Z-Toxic and Hazardous Substances, specifies precautionary labels for OSHA regulated items having substance-specific health hazards. The exact minimum wording required on these labels is unique for each hazardous material. OSHA considers most of these to be known or suspected carcinogens. This Subpart also has requirements for warning signs to be posted in restricted limited access areas where exposure to these chemicals may be excessive.

2.6 Department of Transportation Requirements

DOT imposes communication criteria for materials defined as hazardous for the purpose of transportation. The marking, labeling, placarding, and shipping paper requirements are the techniques used to communicate hazards in the transportation environment and these requirements apply to persons who offer hazardous materials for transportation and carriers who transport them by air, highway, rail, or water. The applicable sections in Title 49 are described below in general terms for information purposes and are also discussed in Chapter 6. Specific details should be obtained from the regulations.

A. Placarding. Unless excepted, ensure that placards are affixed to each side and on each end of a transport vehicle, freight container, bulk packaging, unit load device, and rail car containing hazardous materials. An example is shown in figure 2-3. Placard according to Title 49 CFR, Part 172, Subpart F.

B. Shipping Papers. Shipping Papers provide additional information on hazardous materials not provided by placards or labels. Accomplish shipping papers according to Title 49 CFR, Part 172, Subpart C and applicable transportation modal regulations.

1. An example of a commercial Bill of Lading (shipping paper) for hazardous materials is illustrated in Figure 2-4.

2. When hazardous materials are offered for transportation by commercial air, complete a "Shipper's Declaration of Dangerous Goods" form for each consignment in addition to the Air Waybill or Bill of Lading. There are specific requirements for the size and coloration of the form. The form must be in English and signed appropriately. As with the shipping paper requirements under Title 49, there are a number of specific requirements regarding the documentation on the form which are spelled out in the International Air Transport Association (IATA) Dangerous Goods Regulations. An example of the IATA shippers declaration form is shown in Figure 2-5. Documentation requirements for Military Air shipments are spelled out in AFJMAN 24-204/TM 38-250/NAVSUP PUB 505/MCO P4030.19G/DLAI 4145.3, Preparing Hazardous Materials for Military Air Shipments.

3. When hazardous materials are packed into freight containers or road transport vehicles for shipment by vessel, the person offering the consignment must certify that the packaging conforms to all the requirements of the International Maritime Dangerous Goods (IMDG) Code. This certification requires completion of an IMDG Shipper's Declaration of Dangerous Goods (Vessel) form. As with Title 49 and IATA, there are specific requirements for the documentation on the declaration which are spelled out in the IMDG regulations. While a specific form is not mandated, an example of an IMDG declaration is shown in Figure 2-6. This particular form is available through the DoD Personal Computer - Performance Oriented Packaging (PC-POP) program which is maintained by the Defense Distribution Center, DDC-TO, 2001 Mission Drive, New Cumberland, PA 17070.

C. Shipping Labels. Unless excepted in 49 CFR 172.400a, all non-bulk packages and bulk packages of less than 640 cubic feet or 1000 gallons containing hazardous materials that meet one or more hazard class definitions and are offered for transportation must have a hazardous material shipping label. Each hazard class or division has a specific label design that is widely recognized and understood, helping to rapidly identify the type of packaged material. Label according to Title 49 CFR, Part 172, Subpart E and applicable transportation modal regulations. Examples of warning labels and a description of each is provided in Table 2-1.

D. Marking. Mark each package, freight container, or transport vehicle offered for transportation containing a hazardous material as specified in Title 49 CFR, Part 172, Subpart D and MIL-STD-129.

2.7 Environmental Protection Agency Requirements. The labeling requirements for pesticides are contained in Title 40 CFR Part 156. Every pesticide product shall bear an EPA label containing the information specified by FIFRA, including warning and precautionary statements. The front panel statements are determined by the toxicity category of the pesticide, category I being the most toxic and IV the least. Toxicity category I requires the "DANGER!" signal word, category II "WARNING!", and category III and IV "CAUTION!". If a category I is assigned based on oral, inhalation or dermal toxicity, the word "POISON" in red is added. The signal word is followed by precautionary statements about hazards to humans and domestic animals, hazards to the environment, and physical or chemical hazards. The table used to assign a toxicity category is illustrated in Figure 2-7. Pesticides in toxicity categories I and II are usually regulated, labeled and/or marked for transportation, but category III and IV pesticides are not. These pesticides with the "CAUTION" label should be evaluated for hazardous materials storage. The category IV pesticides have a very low hazard and do not require hazardous materials storage.

2.8 DoD Requirements

A. MIL-STD-129, "Marking for Shipment and Storage", provides the uniform marking of military supplies and equipment for shipment and storage. Marking is defined as the application of numbers, letters, labels, tags, symbols, or colors to provide identification and to expedite handling during shipment and storage. Unless exempted at the time of acquisition, all DoD supplies and equipment, including material shipped from storage, are marked in accordance with MIL-STD-129.

B. Markings and Labels. Even if a material is not regulated as hazardous for transportation, it may pose an unreasonable risk to health, safety and property when stored, used or discarded. The following examples are other labels and markings that may indicate an item is hazardous:

1. If the Federal Supply Classification (FSC) of the material is listed in Table I of FED-STD-313, "Material Safety Data, Transportation Data and Disposal Data for Hazardous Materials Furnished to Government Activities", it is possible that the item contains a hazardous material. The Table I FSCs are primarily in the 6800, 8000, and 9100 series and are chemical type items. All FSCs listed in Table I generally require the submission of an MSDS. Those listed in Table II require an MSDS if they are identified by the manufacturer as hazardous. It should be recognized, however, that not all chemical items are hazardous. The MSDS will provide the data to allow health professionals and other technical personnel to determine if a hazard exists.

2. If the manufacturer or vendor is a known chemical company or their company name indicates an association with chemicals, the item may contain hazardous materials.

3. The item nomenclature may indicate the item contains hazardous materials.

4. In Title 49 CFR, a flashpoint marking of less than 141°F indicates that the material is FLAMMABLE and a flashpoint marking of 141°F or more but less than 200°F indicates that the material is COMBUSTIBLE under transportation regulations. However, under 29 CFR 1910.106 a flashpoint marking of less than 100°F indicates that the material is FLAMMABLE and a flashpoint marking of 100°F or more but less than 200°F indicates that the material is COMBUSTIBLE. These materials require hazardous and/or specialized storage under 29 CFR 1910.106.

5. If the package has a United Nations (UN) standard marking (performance oriented packaging (POP)), it normally contains a hazardous material. However, nonhazardous material may be shipped in a package containing a UN POP marking.

6. Items with shelf-life markings may be unstable and become hazardous if they deteriorate.

2.9 Non-Regulatory Requirements

A. ANSI Z129.1. "American National Standard for Hazardous Industrial Chemicals - Precautionary Labeling" contains recommended labeling information for communicating the immediate (acute) and delayed (chronic) health hazards of chemicals. The precautionary label usually identifies the hazardous material followed by a signal word, the type of hazard, precautionary measures, first aid instructions, antidotes, notes to physicians, instructions in case of fire and spill or leak, and instructions for container handling and storage. The signal words DANGER!, WARNING! and CAUTION! indicate the relative degree of severity of an immediate hazard in decreasing order. The word POISON suggests a highly toxic chemical. The acute effects referred to most frequently are irritation, corrosivity, sensitization and lethal dose. The chronic effects are usually carcinogenicity, teratogenicity and mutagenicity. Although these are important health effects, they do not adequately cover the considerable range of acute and chronic effects which may occur as a result of occupational exposure. If a package is labeled with a precautionary label but not a DOT label, the material may not be a physical safety hazard for transportation or storage, but is a potential health risk when handled or used.

B. Another commonly used warning labeling system is one developed by the National Fire Protection Association (NFPA) which is used primarily by the fire protection community. It is a diamond shaped label which is divided into four quadrants with a number ranging from 0 to 4 in the upper three quadrants to denote the degree of hazard (0 being the lowest and 4 the highest) and the bottom quadrant used to identify a specific hazard symbol for additional fire fighting information. These numbers are intended to provide, at a glance, a general idea of the severity of the health, fire, and reactivity hazards as they relate to fire prevention, exposure and control. The objectives are to provide an appropriate alerting signal and on the spot information to safeguard the lives of firefighting personnel. While the label is satisfactory for the intended purpose of fire protection, it is not acceptable for hazard communication purposes nor can it be visible during shipment as it can be confused with a DOT shipping label. NFPA labels (when used) should be applied to hazardous materials in storage only.

2.10 Sources of Regulatory Information. Employees who identify hazardous materials for receipt, storage, or packaging purposes must only use current reference documents and regulations. Annual editions of the Code of Federal Regulations may be purchased from the United States Government Printing Office (US GPO) and reprints are available from a number of private sources. The Code of Federal Regulations is kept up to date by the individual issues of the Federal Register. These two publications must be used together to determine the latest version of any given rule. Free label and placard charts are available from DOT, which also include regulatory references. A particularly useful chart, DOT Hazardous Material Warning Labels/Placards (DOT Chart 10), may be obtained from the Department of Transportation, Research and Special Programs Administration, Washington, DC 20590.

2.11 Retention of DOT Markings, Placards, and Labeling

A. Retain all required hazard markings, labels, and placards on hazardous material packagings until the package is sufficiently cleaned of residue and purged of vapors to remove any potential hazards. This requirement is specified in 29 CFR 1910.1201.

B. For non-bulk packages which will not be reshipped, the provisions are met if a label or other acceptable
marking is affixed in accordance with the Hazard Communication Standard (29 CFR 1910.1200).

Material Safety Data Sheet May be used to comply with OSHA's Hazard Communication Standard 29 CFR 1910.1200. Standard must be consulted for specific requirements.	**U.S. Department of Labor** Occupational Safety and Health Administration (Non-Mandatory Form) Form Approved OMB No. 1218-0072
IDENTITY (*As Used on Label and List*) Sodium Hydroxide	*Note: Blank spaces are not permitted. If any item is not applicable, or no information is available, the space should be marked to indicate that.*

Section I

Manufacturer's Name ABC Chemical Co.	Emergency Telephone Number (804) 279-3131
Address (Number, Street, City, State, and ZIP Code) 2347 Elm Street	Telephone Number for Information (804) 279-5222
Richmond, VA 23297-5680	Date Prepared 22 Feb 95
	Signature of Preparer (optional)

Section II -- Hazardous Ingredients/Identity Information

Hazardous Components (Specify Chemical Identity; Common Names(s))	OSHA PEL	ACGIH TLV	Other Limits Recommended	% (optional)
Sodium Hydroxide (CAS 1310-73-2)	2MG/CU Meter	2 MG/CU Meter	N/A	96
Inert Ingredients	N/A	N/A	N/A	4

N/A = Not Applicable

Section III -- Physical/Chemical Characteristics

Boiling Point	2534°F	Specific Gravity (H_2O = 1)	2.13
Vapor Pressure (mm Hg.)	N/A	Melting Point	604°F
Vapor Density (AIR = 1)	N/A	Evaporation Rate (Butyl Acetate = 1)	N/A

Solubility in Water
Appreciable

Appearance and Odor
White, Hygroscopic Pellets

Section IV -- Fire and Explosion Hazard Data

Flash Point (Method Used)	Flammable Limits	LEL	UEL
N/A - Non Flammable		N/A	N/A

Extinguishing Media
Extinguish with agent suitable for surrounding fire

Special Fire Fighting Procedures
Use NIOSH approved SCBA and full protective equipment, use water spray to cool nearby containers exposed to fire.

Unusual Fire and Explosion Hazards
Hot/molten material can react violently with water. Can react with certain metals such as aluminum to generate hydrogen gas

(Reproduce locally) OSHA 174, Sept. 1985

Figure 2-1. MSDS for Sodium Hydroxide

Section V -- Reactivity Data

Stability	Unstable		Conditions to Avoid
			Very Hygroscopic. Can slowly pick up moisture from air and react with
	Stable	X	CO_2 in air to form sodium carbonate.

Incompatibility *(Materials to Avoid)*
Acids, flammable liquids, chlorinated organic CMPOS, organic peroxides, metals

Hazardous Decomposition or Byproducts
Sodium oxide

Hazardous Polymerization	May Occur		Conditions to Avoid
			N/A
	Will Not Occur	X	

Section VI -- Health Hazard Data

Route((s) of Entry:	Inhalation?	Skin?	Ingestion?
	Yes	Yes	Yes

Health Hazards *(Acute and Chronic)*
Eyes: Corrosive, irritation, burns, blindness. Skin: Corrosive, irritation, burns, scarring. Inhalation: Severe irritation. Damage to upper respiratory tract. Severe pneumonitis may occur. Ingestion: Corrosive, burns mouth, throat, stomach, death.

Carcinogenity:	NTP?	IARC Monographs?	OSHA Regulated?
	No	No	No

Signs and Symptoms of Exposure
Irritation to severe burns of skin and eyes. Abdominal pain, bloody vomiting and diarrhea, sore throat, coughing and dyspnea.

Medical Conditions
Generally Aggreviated by Exposure Skin disorders or eye problems or impaired respiratory function.

Emergency and First Aid Procedures
Eyes/Skin: Flush with water for at least 15 min. Remove clothes. Get immediate medical help. DO NOT induce vomiting. Give water/milk followed by citrus fruit juice.

Section VII -- Precautions for Safe Handling and Use

Steps to Be Taken in Case Material Is Released or Spilled
Clean-up personnel require protective clothing and respiratory protection from dust. Sweep, scoop or pick up spilled material. Avoid dusting. DO NOT flush to sewer. Neutralize residue with 5% acetic acid.

Waste Disposal Method
Transfer waste to DOT approved container for shipment to approved disposal facility. Local/State/Federal regulations must be followed.

Precautions to Be Taken in Handling and Storing
Store in cool, dry, well ventilated, low fire risk area. Protect from heat, shock, friction. Keep containers closed.

Other Precautions
Keep from incompatible materials. Always add the caustic to the water while stirring, never the reverse.

Section VIII

Respiratory Protection *(Specify Type)*
Dust/mist respirator with chemical goggles for up to 10 times TLV.

Ventilation	Local Exhaust	Special
	Recommended	N/A
	Mechanical *(General)*	Other
	Recommended	N/A

Protective Gloves	Eye Protection
Impervious rubber	Safety goggles and/or full face shield

Other protective Clothing or Equipment
Boots, lab coat, apron, coveralls to prevent skin contact. Safety shower.

Work/Hygienic Practices
Wash thoroughly after handling.

U.S.G.P.O.: 1986-491-529/45775

Figure 2-1. MSDS for Sodium Hydroxide (continued)

H A Z A R D O U S C H E M I C A L W A R N I N G L A B E L

1. CHEMICAL/COMMON NAME: SODIUM HYDROXIDE

2. HAZARD CODE
B1

3. NSN/LSN:
6810002708177

4. PART NUMBER:
SODIUM HYDROXIDE

5. ITEM NAME:
SODIUM HYDROXIDE, TECHNICAL

6. HAZARDS:	(1) Acute (Immediate)				(2) Chronic (Delayed)
	NONE	SLIGHT	MODERATE	SEVERE	
a. HEALTH:			X		YES
b. CONTACT:				X	
c. FIRE:	X				
d. REACTIVITY:			X		

7. SPECIFIC HAZARDS & PRECAUTIONS: (Including Target Organ Effects)
WARNING!
EYES: CORROSIVE, IRRITATION, BURNS, BLINDNESS; SKIN: CORROSIVE, IRRITATION,BURNS, SCARRING; INHALATION: SEVERE IRRITATION, DAMAGE OF UPPER RESPIRATORY TRACT. INGESTION: CORROSIVE, BURNING OF MOUTH, THROAT, STOMACH, DEATH. CHRONIC: DERMATITIS, CORNEAL, NASAL, BRONCHIAL AND GASTRIC ULCERATION. STORE IN COOL, DRY, WELL VENTILATED AREA. FIRST AID: EYES: FLUSH WITH WATER FOR AT LEAST 15 MIN. GET MEDICAL HELP. SKIN: WASH WITH WATER, REMOVE CONTAMINATED CLOTHES & SHOES. SEE DOCTOR. INHALATION: REMOVE TO FRESH AIR. IF NOT BREATHING GIVE CPR/OXYGEN. GET MEDICAL HELP. INGESTION: DO NOT INDUCE VOMITING. GIVE WATER/MILK FOLLOWED BY FRUIT JUICE

(See MSDS for further information)

8. PROTECT: (X all that apply)	X	EYES	X	SKIN	X	RESPIRATORY

9. CONTACT
a. COMPANY NAME: ABC CHEMICAL CO.
b. ADDRESS
Street: 2347 ELM ST.
P.O. Box:
City: RICHMOND
State: VA Zip Code: 23297-5680 Country: US
c. EMERGENCY TELEPHONE NUMBER: 804-279-3131
10. PROCUREMENT YEAR FOR HAZARDOUS CHEMICAL:
DD Form 2521, DEC 88

Figure 2-2. Example of DoD Format of OSHA Hazard Communication Standard Warning Label

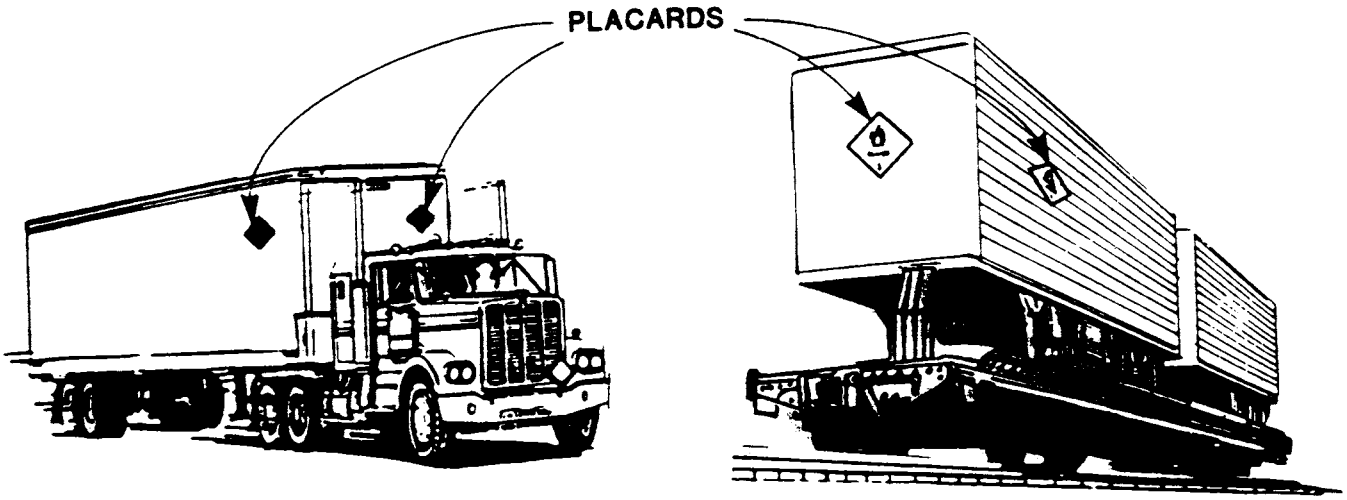


Figure 2-3. Placarded Trucks and TOFC

STRAIGHT BILL OF LADING

ORIGINAL -- NOT NEGOTIABLE

Shipper No: _____

Carrier No. SALIX 2

Page 1 of 1

Overpass Truck Lines
Name of Carrier (SCAC)

Date _____

On Collect on Delivery shipments, the letters "COD" must appear before consignee's name & or as otherwise provided in item 430, Sec 1.

TO:
Consignee: Defense Depot Richmond
Street: 8000 Jefferson Davis Highway
City: Richmond State: VA Zip Code: 23297

FROM:
Shipper: Overpass Truck Lines Terminal #4
Street: 118 Oakgrove Lane
City: Garrisonville State: VA Zip Code: 22463
24 hr. Emergency Contact Tel. No. 800-851-8061

Route

Vehicle Number:

No. of Units & Container Type	HM	BASIC DESCRIPTION Proper Shipping Name, Hazard Class, Identification Number (UN or NA), Packing Group, per 172.101, 172.202, 172.203	TOTAL QUANTITY (Weight, Volume, Gallons, etc.)	WEIGHT (Subject to Correction)	RATE	CHARGES (For Carrier Use Only)
10 Drum	RQ	Xylenes, 3, UN1307, PG II	2082 L			
3 Roll		Paper, Printing Newsprint	2070 lb			
1 Drum	X	Calcium Resinate, 4.1, UN1313, PG III	205 Kg			
40 Cyl	X	Nitrogen, Compressed, 2.2, UN1066	363 Kg			
		Placarded: Dangerous				

PLACARDS TENDERED: YES X NO

REMIT C.O.D. TO ADDRESS:

Note - Where the rate is dependent on value, shippers are required to state specifically in writing the agreed or declared value of the property.

The agreed or declared value of the property is hereby specifically stated by the shipper to be not exceeding

$ _____per _____

I hereby declare that the contents of the consignment are fully and accurately described above by proper shipping name and are classified, packed, marked and labeled, and are in all respects in proper condition for transport by ▮ Rail ▮ Highway ▮ Water (DELETE NON-APPLICABLE MODE OF TRANSPORT) according to applicable international and national governmental regulations.

_____Signature

COD **Amt: $**

C.O.D. FEE:
PREPAID ☐
COLLECT ☐ $

Subject to Section 7 of the conditions, if this shipment is to be delivered to the consignee without recourse on the consignor, the consignor shall sign the following statement: The carrier shall not make delivery of the shipment without payment of freight and other lawful charges.

_____
(Signature of Consignor)

TOTAL CHARGES: $

FREIGHT CHARGES
FREIGHT PREPAID except when box at right is checked
Check box if charges ☐ are to be collect

RECEIVED, subject to the classification and tariffs in effect on the date of the issue of this Bill of Lading, the property described above in apparent good order, except as noted (contents and condition of contents of packages unknown), marked, consigned, and destined as indicated above which said carrier (the word carrier being understood throughout the contract as meaning any person or corporation in possession of the property under contract) agrees to carry to its usual place of delivery at said destination, if on its route, otherwise to deliver to another carrier on the route to said destination. It is mutually agreed as to each carrier of all or any of, said property over all or any portion of said route to destination and as to each party at any time interested in all or any said property, that every service to be performedhereunder shall be subject to all the bill of lading terms and conditions in the governing classification on the date of shipment.

Shipper hereby certifies that he is familiar with all the bill of lading terms and conditions in the governing classification and the said terms and conditions are hereby agreed to by the shipper and are accepted for himself and his assigns.

SHIPPER

PER

CARRIER

PER

DATE

Permanent post-office address of shipper

Figure 2-4. Typical Commercial Shipping Paper, Road or Rail

SHIPPERS DECLARATION FOR DANGEROUS GOODS **(Provide at least two copies to the airline)**

Shipper DEFENSE DEPOT RICHMOND VIRGINIA RICHMOND, VA 23297	**Air Waybill No.** **Page** 1 **of** 1 **Pages** **Shipper's Reference Number** *(optional)*
Consignee DISHOO GOVERNMENT OF ISRAEL MINISTRY OF DEFENSE MAPA MESHUTAFIM ISRAEL	
Two completed and signed copies of this Declaration must be handed to the operator	**WARNING** **Failure to comply in all respects with the applicable Dangerous Goods Regulations may be in breach of the applicable law, subject to legal penalties. This Declaration must not, in any circumstances, be completed and/or signed by a consolidator, a forwarder or an IATA cargo agent.**
TRANSPORT DETAILS	
This shipment is within the limitations prescribed for ***(delete non-applicable)*** **PASSENGER AND CARGO AIRCRAFT** | ~~**CARGO AIRCRAFT ONLY**~~ **Airport of Departure**	
Airport of Destination	**Shipment type** ***(delete non-applicable)*** **NON-RADIOACTIVE** | ~~**RADIOACTIVE**~~

NATURE AND QUANTITY OF DANGEROUS GOODS

Dangerous Goods Identification							
Proper Shipping Name	Class or Division	UN or ID No.	Packing Group	Subsidiary Risk	Quantity and type of packing	Packing Inst.	Authorization
XYLENES	3	UN1307	III		1 STEEL DRUM (1A2) X 0.94 LITRES	309	

Additional Handling Information STORE IN A COOL, WELL-VENTILATED AREA AWAY FROM SOURCES OF HEAT, FLAME, SPARKS, COMBUSTIBLE MATERIALS OR OXIDIZERS. CONTAINERS MUST BE KEPT TIGHTLY CLOSED TO PREVENT EVAPORATION OF FLAMMABLE LIQUIDS. 24 HOUR EMERGENCY CONTACT NUMBER 1-800-851-8061

I hereby declare that the contents of this consignment are fully and accurately described above by the proper shipping name, and are classified, packaged, marked and labelled/placarded, and are in all respects in proper condition for transport according to applicable international and national governmental regulations.	**Name/Title of Signatory** Quinton McHale, Packing Specialist **Place and Date** Richmond, VA 23297 3 Jan 95 **Signature** ***(see warning above)*** Q. Mc Hale

Figure 2-5. IATA Shippers Declaration of Dangerous Goods

SHIPPER'S DECLARATION FOR DANGEROUS GOODS (VESSEL)

SHIPPER (Name and Address): DEFENSE DISTRIBUTION DEPOT RICHMOND RICHMOND, VIRGINIA 23297-5000	TRANSPORTATION CONTROL NUMBER: FB2073-5065-000 1 XXX NAME OF CARRIER or DESIGNATED AGENT: CONSOLIDATED SHIPPERS INC.
CONSIGNEE: SAUDI NATIONAL GOVERNMENT PORT OF DAHARAN SAUDI ARABIA	. RADIOACTIVE . X . NON-RADIOACTIVE PORT/PLACE OF DEPARTURE: NORFOLK, VIRGINIA PORT/PLACE OF DESTINATION: DAHRAN, SAUDI ARABIA

MEANS OF TRANSPORT: THIS SHIPMENT IS WITHIN THE LIMITATIONS PRESCRIBED FOR WHICH TYPE OF VESSEL: . PASSENGER AND CARGO VESSEL . X . CARGO VESSEL ONLY

NATURE AND QUANTITY OF DANGEROUS GOODS

PROPER SHIPPING NAME: ISOPROPANOL

TECHNICAL NAME (nos):

HAZARD CLASS/DIVISION: 3.2

ID No.: UN1219	PACKING GROUP: II	FLASH POINT: 12 C	SUBSID CLASS:
GROSS MASS (KG): 15	NET QUANTITY: 12 CANS	CUBE: 4.6 CU FT	LIMITED QUANTITY: . YES . X . NO
No. OF PIECES: 1	TYPE OF CONTAINER: FIBREBOARD BOX 4G	HAZARD LABEL: FLAMMABLE LIQUID	MARINE POLLUTANT: . YES . X . NO
DOT EXEMPTION NO. : N/A		CAA No.: N/A	NEW: N/A KG
EMERGENCY RESPONSE 24 HOUR NUMBER: l-800-851-8061		NSN OR Manufacturer's Part Number: 6810-00-32l-9200	

ADDITIONAL INFORMATION:

DECLARATION: I hereby declare that the contents of this consignment are fully and accurately described above by correct proper shipping name, technical name; are classified, packaged, marked, and labeled; and are in all respects in proper condition for transport by vessel according to the applicable international and national government regulations.

SIGNATURE: E Bilko DATE: 03/10/95

NAME: ERNEST BILK0

TITLE: PACKAGING SPECIALIST

PLACE: RICHMOND, VIRGINIA

Figure 2-6. IMDG Shippers Declaration of Dangerous Goods (Vessel)

EPA REGULATIONS FOR USE OF HUMAN HAZARD SIGNAL WORDS ON PESTICIDE LABELS

Signal words assigned by levels of toxicity

I. (A) Toxicity Category I.

All pesticide products meeting the criteria of Toxicity Category I shall bear on the front panel the signal word "Danger". In addition if the product was assigned to Toxicity Category I on the basis of its oral, inhalation or dermal toxicity (as distinct from skin and eye local effects) the word "Poison" shall appear in red on a background of distinctly contrasting color and the skull and crossbones shall appear in immediate proximity to the word "Poison".

II. (B) Toxicity Category II.

All pesticide products meeting the criteria of Toxicity Category II shall bear on the front panel the signal word "Warning".

III. (C) Toxicity Category III.

All pesticide products meeting the criteria of Toxicity Category III shall bear on the front panel the signal word "Caution".

IV. (D) Toxicity Category IV.

All pesticide products meeting the criteria of Toxicity Category IV shall bear on the front panel the signal word "Caution".

V. (E) Use of signal words.

Use of any signal word(s) associated with a higher Toxicity Category is not permitted except when the Agency determines that such labeling is necessary to prevent unreasonable adverse effects on man or the environment. In no case shall more than one human hazard signal word appear on the front panel of a label.

A. Toxicity Categories

Hazard Indicator	I	II	III	IV
Oral LD 50	Up to and including 50 mg/kg	From 50 through 500 mg/kg	From 500 through 5000 mg/kg	Greater than 5000 mg/kg
Inhalation LC 50	Up to and including .2 mg/liter	From .2 through 2 mg/liter	From 2 through 20 mg/liter	Greater than 20 mg/liter
Dermal LD 50	Up to and including 200 mg/kg	From 200 through 2000 mg/kg	From 2000 through 20,000 mg/kg	Greater than 20,000 mg/kg
Eye Effects	Corrosive, corneal opacity not reversible within 7 days	Corneal opacity reversible in 7 days; irritation persisting for 7 days	No corneal opacity; irritation reversible	No irritation
Skin Effects	Corrosive	Severe irritation at 72 hours	Moderate irritation at 72 hours	Mild or slight irritation at 72 hours

Figure 2-7. FIFRA Table of Toxicity Categories by Hazard Indicator.

Table 2-1. Shipping Labels

Label	Color	HazMat Class	Typical Material
	Black letters on orange background with graphic of explosion plus division and compatibility group letter.	Explosive 1.1, 1.2, 1.3	TNT (1.1) Rocket Engines and Projectiles (1.2, 1.3)
	Black letters on orange background with number and compatibility group letter.	Explosive 1.4	Lighters, fuse
	Black letters on orange background with number and compatibility group letter.	Explosive 1.5	Explosive, blasting, Type E
	Black letters on orange background with number and compatibility group letter.	Explosive 1.6	Articles, explosive, extremely insensitive
	Black or white letters on red background.	Flammable Gas (UN Class 2) (Division 2.1)	Acetylene
	Black or white letters on green background.	Nonflammable Gas (UN Class 2) (Division 2.2)	Nitrogen
	Black letters on yellow background.	Nonflammable Gas (UN Class 2) (Division 2.2)	Oxygen

Table 2-1. Shipping Labels - Continued

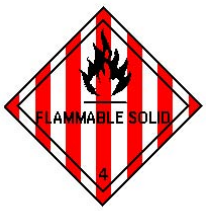
Label	Color	HazMat Class	Typical Material
	Black letters on white background.	Poison Gas (UN Class 2) (Division 2.3)	Phosgene gas
	Black letters on white background with symbol colors reversed in upper corner	Poison Inhalation Hazard (UN Class 2) (Division 2.3)	Hydrogen Sulfide
	Black or white letters on red background.	Flammable Liquid (UN Class 3)	Acetone
	Black letters on red and white striped background.	Flammable Solid (UN Class 4) (Division 4.1)	Matches
	Black letters on White top and red bottom background.	Spontaneously Combustible (UN Class 4) (Division 4.2)	Charcoal
	Black or white letters on blue background.	Dangerous When Wet (UN Class 4) (Division 4.3)	Calcium Carbide
	Black letters on yellow background.	Oxidizer (UN Class 5) (Division 5.1)	Hydrogen Peroxide

Table 2-1. Shipping Labels - Continued

Label	Color	HazMat Class	Typical Material
	Black letters on yellow background.	Organic Peroxide (UN Class 5) (Division 5.2)	Methyl Ethyl Ketone Peroxide (MEKP)
	Black letters on White background.	Poison (UN Class 6) (Division 6.1) (Packing Group I, II, and III - intrn'l)	Calcium Cyanide (PG I) Cresylic Acid (PG II)
	Black letters on white background with symbol colors reversed in upper corner	Poison Inhalation Hazard (UN Class 6) (Division 6.1) (Hazard Zone A and B)	Phenyl Isocyanate
	Black letters on White background.	Poison (UN Class 6) (Division 6.1) (Packing Group III - domestic only)	Dichloromethane
	Black letters on White background.	Poison (UN Class 6) (Division 6.2)	Infectious substances affecting humans and animals.
	Black letters with red I on white background.	Radioactive I (UN Class 7)	Nuclear weapons

Table 2-1. Shipping Labels - Continued

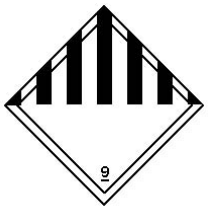
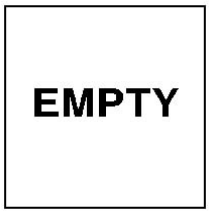
Label	Color	HazMat Class	Typical Material
	Black letters with red II on yellow top and white bottom background.	Radioactive II (UN Class 7)	U-235 Fissile II
	Black letters with red III on yellow top and white bottom background.	Radioactive III (UN Class 7)	Nuclear Isotopes
	Black figure on white top background and white letters on black bottom background.	Corrosive (UN Class 8)	Battery Electrolyte
	Black stripes on top on white background.	Miscellaneous Dangerous (UN Class 9)	Polychlorinated Biphenyls (PCB)
	Black letters on white background. (square label)	Empty	Empty Containers
	Black letters on orange background. (square label)	Danger	Products not allowed on passenger aircraft

Table 2-1. Shipping Labels - Continued

Label	Color	HazMat Class	Typical Material
	Blue figure on top with blue letters on white background on bottom.	Magnetized material	Magnetic materials

CHAPTER 3

RECEIPT OF HAZARDOUS MATERIALS

SECTION I. PURPOSE AND APPLICABILITY

3.1 Purpose. The purpose of this chapter is to prescribe procedures that incorporate, where appropriate, regulatory requirements as they apply to the receipt of hazardous materials. This chapter also contains procedures for processing damaged hazardous materials, packaging discrepancies, and it specifies actions to be taken in the event a spill or leakage is detected during the receiving process. Compliance with the specific requirements identified in this chapter will substantially reduce the risks to personnel, installations, and the environment while ensuring compliance with both Federal laws and DoD policies.

3.2 Applicability. The contents of this chapter are applicable to all personnel involved in the receipt of hazardous materials.

SECTION II. PLANNING AND COORDINATING THE RECEIVING OPERATION

3.3 Planning for Receiving Operations. Planning for receiving operations requires complete coordination among organizational elements responsible for the different phases of the operation. Detailed planning assumes even greater importance in the case of hazardous materials. Proper evaluation of advance information and planning action taken prior to the actual arrival of the material will help ensure that appropriate steps are taken to receive it as efficiently, economically, and safely as possible. Any correspondence concerning due-in hazardous materials should be considered in the planning process. Prepositioned Material Receipt Documents (PMRDs), contract schedules, reshipments, advance copies of bills of lading, or other shipping documents should be used to determine approximate arrival dates and the type and quantity of material due in. Pertinent information on significant due-in receipts of hazardous material must be given to personnel concerned with warehousing, transportation, preservation, packing, and inspection.

3.4 Advance Planning and Coordination. Advance planning and coordination will promote effective storage space utilization, efficient assignment of labor and equipment resources, and timely identification and classification of materials requiring specialized handling due to their hazard characteristics. While the reservation of specific storage space for due-ins is not recommended, advance planning will permit tentative storage determinations and, in turn, will facilitate receipt processing.

SECTION III. IMPACT OF FEDERAL REGULATIONS, OTHER THAN TRANSPORTATION, ON RECEIVING OPERATIONS

Personnel must be aware of Federal regulations and their possible impact on receiving operations. These regulatory requirements are discussed in greater detail in chapter 4, Storage and Care of Hazardous Materials, chapter 7, Environmental, and chapter 8, Safety and Health. While processing receipts of hazardous material, personnel must be particularly alert to the following:

3.5 Defense Installations. Defense installations, are subject to the regulatory requirements of Title 40 CFR concerning the processing and reporting of releases of hazardous substances that may occur in connection with the unloading and movement of hazardous materials. Also, determination of the applicability of 29 CFR 1910.119, Process Safety Management of Highly Hazardous Chemicals should be made by the appropriate personnel.

3.6 Processing Pesticides. During the course of processing receipts from procurement, personnel may receive pesticides that are off specification, outdated, or in broken containers. Such material cannot be forwarded to storage, but must be processed through the local Defense Reutilization Marketing Office (DRMO) where it will be processed according to existing procedures.

3.7 Thefts or Losses of Explosives. Thefts or losses during transportation of materials classified as explosives must be reported to the Bureau of Alcohol, Tobacco, and Firearms, Department of the Treasury, within 24 hours of discovery.

3.8 Radioactive Material Incidents. The radioactive material receipt and reporting requirements for potential incidents involving release are contained in CFRs 10 and 49.

SECTION IV. HAZARD CHARACTERISTIC CODES (HCCs)

3.9 Hazardous Materials Management and HCCs. It is absolutely essential that hazardous materials management be properly planned to prevent interactions that adversely affect personnel, installations, and the environment during receipt, storage, and handling. To reduce the risk of hazards associated with incorrect classifications or categorizations by untrained personnel, a two-digit alphanumeric HCC has been developed for categorizing hazardous materials. This code has been developed to assist personnel in receiving, storing, and issuing material categorized by law or regulation as hazardous. HCCs are assigned by qualified safety, health, and transportation personnel representing service HMIS focal points. Use of the HCC assures uniformity in the identification and management of hazardous materials and will assist in proper recognition and safe storage by compatibility. Current HCCs, including hazardous characteristic groups and definitions are shown in Appendix B. Storage and warehousing should utilize the HCCs as a tool to effect the proper storage of hazardous materials.

SECTION V. ARRIVAL OF HAZARDOUS MATERIALS AT THE INSTALLATION

3.10 Hazardous Material Receipts

A. Hazardous material receipts may arrive with little or no advance notice. Consequently, the identification process commences upon arrival of the carrier's vehicle or transport conveyance at the installation's main gate or other designated point of entry. Activity entrance personnel (Security or Transportation) must be sufficiently trained in hazardous materials identification on the basis of placards and shipping papers. Directing the vehicle to the desired unloading site accomplishes the following:

1. Minimizes travel distances from the point of base access to the receiving or storage area.

2. Minimizes materials handling equipment (MHE) operations.

3. Confines unloading operations to areas of the installation where experienced supervisory and other personnel are likely to be available to respond to leakage or spills.

B. Any MSDSs arriving with the freight must remain with the material until it arrives at the actual warehouse receipt area to assure that workers are fully aware of what they are handling during the receipt process. Also, this will assure that the MSDS will be forwarded to the HMIS focal point for entry into the HMIS if needed.

3.11 Security Personnel Responsibility. Security personnel should, upon arrival of transport vehicles, conduct a visual inspection of the conveyance for evidence of leaks or the presence of odors that might be indicative of damage. This inspection will include a review of shipping papers and an identification of placards that may have been affixed to the exterior of the conveyance. If a placard has been affixed, personnel should determine from the vehicle operator the exact location of the hazardous materials on the conveyance. When it is determined that the material can be off-loaded without double handling, the shipment may be spotted directly at the appropriate storage area designated for the hazard class or division involved.

3.12 Visual Inspection. If the visual inspection discloses evidence of suspected leakage or spills, no effort will be made to open the conveyance for further investigation. Damaged containers must be repaired or overpacked before further transportation is authorized. Personnel will, under no circumstances, insist that the carrier remove damaged hazardous materials from the confines of the installation. Personnel will immediately notify the appropriate office in accordance with the installation spill plan. Spill Response Team deployment, package repair or overpack, or other disposition of the material must be completed before the conveyance is permitted to proceed to the storage area, central receiving, or returned to the supplier.

SECTION VI. REPORTS OF HAZARDOUS MATERIALS INCIDENTS

3.13 Regulatory Requirements. There is a voluminous and complex array of federal reporting requirements that are applicable during a hazardous materials incident. In addition, personnel must comply with all state and local reporting mandates. When such incidents occur during the course of transportation, the requirements of 49 CFR 171.15 and 171.16 are applicable and will be followed as a minimum. Individual service/agency regulations that may be applicable will be followed as appropriate. For the purposes of this publication, transportation includes loading, unloading, and temporary holding while under active shipping papers.

3.14 Notification Responsibility. Notification responsibility will be determined on the basis of circumstances. If a hazardous substance or etiologic agent is released during off-loading operations performed by carrier representatives, notification of the DOT is a carrier responsibility. If, however, the release occurs during off-loading by noncarrier/ receiving personnel, or after release of the carrier's vehicle, notification is the responsibility of the installation commander, or designated representative, in accordance with Title 49 CFR. Under the circumstances described above, the release is likely to occur on military property so it is in the best interest of the facility to assure that the notification is made regardless of who has the

formal responsibility. Military service/agency headquarters should also be advised after the appropriate notifications are made.

3.15 Releases of Reportable Quantities. Notification by the installation commander is also required to report releases of hazardous substances equal to or greater than their reportable quantities. Reportable quantities (RQ) can be found either in CFR 40, Section 302.4 or CFR 49, Appendix A to Section 172.101. The employee having first knowledge of the incident will immediately inform his or her supervisor. The supervisor will report the incident in accordance with the Installation Spill Contingency Plan (ISCP). In addition, the responsible supervisor will limit access to the spill area until spill response teams or other trained personnel arrive at the scene. A written report concerning the releases of hazardous substances will be made so that preventative measures can be reviewed or implemented. In addition, reportable quantity releases of hazardous substances will be reported, in accordance with Title 40 CFR, part 302.6, and to the National Response Center (NRC) at (800) 424-8802 (toll free) or (202) 426-2675 (toll). Also, a written report is required for releases of hazardous waste in any quantity during transport, loading, or unloading. The specific requirements of the report are given in 49 CFR 171.16.

SECTION VII. RECEIVING INSPECTION OF HAZARDOUS MATERIALS

3.16 Purpose of Inspection. The purpose of inspecting hazardous materials upon receipt is to verify that the material is properly identified, documented, packaged, safe to handle, and in accordance with contractual documents. In preparing for inspection of hazardous materials, shipping papers will serve as the basic source of identification. Based upon this information, the vehicle or rail container will be positioned in an area or at a dock that will facilitate the inspection and off-loading of the material. Once the hazard class has been determined, the off-loading process may commence; however, a preliminary visual inspection will be performed before any cargo is off-loaded. In addition, receiving and inspection personnel must ensure that arriving material is compatible with other material located in the receiving area.

3.17 Preliminary Inspection

A. Prior to commencing the off-loading of cargo known to include hazardous materials, a preliminary inspection will be performed to detect damage that might have been caused during transit by improper loading, blocking, or bracing. One of the first indications of such damage will be crushed or fallen containers or evidence that the load has shifted to such a degree that safe unloading is impeded. Particular care also must be taken to ensure that leakage or spills of liquids or solids are detected at this time. An indication of concealed damage is the presence of odors.

B. Should the preliminary inspection disclose actual or suspected damage, the conveyance will be closed and receipt processing actions will be terminated immediately. The circumstances will be reported to the immediate supervisor who will take actions to report and resolve the matter in accordance with locally published procedures.

C. Care must be exercised during off-loading operations to ensure that incompatible hazardous materials are adequately segregated on the receiving dock. Incompatible materials will be separated as directed in Title 49 CFR. For a more precise determination of material segregation

on a receiving or freight dock, refer to Title 49 CFR, part 177.848 which is reprinted in Figure 6-3. The HCC segregation chart (Appendix C) may also be consulted as a guide for proper segregation.

3.18 Inspection of Receipts From Procurement

A. The purpose of inspecting procurement receipts is to assure that the material actually received corresponds with that specified in the procurement documentation. Since movements to storage will, at least in part, be made on the basis of labels, shipping papers, and MSDSs, receiving personnel also must be alert to the quality of shipping papers and the appropriateness of labels. Hazardous materials, like other commodities, generally become the property of the Government at the point of origin or manufacture, or at a commercial redistribution facility (FOB origin). The point of origin inspection, normally conducted by a Quality Assurance Representative (QAR) of the appropriate Defense Contract Management District (DCMD) or the General Services Administration (GSA), is limited to a statistical sampling of the lot of material to be shipped. Consequently, deficiencies may exist in the uninspected portion of the shipment. For this reason, it is imperative that receiving personnel have the procurement documentation available to them. In addition, receiving personnel must be knowledgeable of the regulations and procedures governing the packaging, marking, labeling, and handling of hazardous materials. Also, this is the proper point in the process to assure that an MSDS record is in the HMIS. This is very important because the HMIS assigns an MSDS serial number to the MSDS when the record is introduced into the system. A number of warehousing systems use this number as a basis for matching the product in storage with the correct MSDS in the HMIS thus establishing a method for calculating the daily balance of hazardous materials which must be reported each year.

B. Inbound hazardous materials will be inspected for piece count, evidence of external damage, and identification verification. In addition, material procured FOB destination normally has not been previously inspected by a QAR or other Government inspector for completeness, proper identification, packaging requirements, and condition code, and will require inspection for compliance with the procurement documentation.

1. During the off-loading process, personnel will carefully inspect all incoming material to ensure that the packaging is in full compliance with the quality assurance specifications and conditions of the contract. Only when it can be positively determined by inspection that the packaging meets contractual requirements will such material be forwarded to the designated hazardous materials storage area.

2. When it is determined that the packaging does not meet contractual requirements, the deficiencies will be noted immediately and a Supply Discrepancy Report (SDR)/Report of Discrepancy (ROD) will be prepared as specified in paragraph 3.25. Material found not meeting contractual specifications will be suspended under supply condition code L. Suspended material will be held in the appropriate hazardous materials storage area pending the receipt of disposition instructions from the appropriate item manager or contracting officials. Containers found to be leaking or otherwise not in compliance with DOT regulations will be overpacked in accordance with DOT regulations. Packages requiring marking or minor packaging repairs will be

forwarded to the packaging facility for restoration. Compliance with Title 49 CFR, parts 174.48, 174.50, and 177.854 as appropriate is required.

3. Proper palletization of hazardous materials should be accomplished incident to shipment in accordance with MIL-STD-147, Palletized Unit Loads.

3.19 Customer and Unit Returns

A. Base or retail supply level hazardous materials facilities must perform the same basic receiving functions listed in paragraphs 3-17 and 3-18. In addition, the following guidelines should be incorporated in local operating procedures, customer handbooks, and other media:

1. Serviceable hazardous material returns should be coordinated between the local using activity and the base supply or support activity. The using unit should provide information such as condition of the material, condition of the container(s) or package(s), material nomenclature, shelf life information, and appropriate MSDSs.

2. Based on the information provided, the base supply activity will either accept the material or provide additional disposition instructions. Base supply activities that issue and receive hazardous materials must not add excessive requirements that could cause illegal dumping. Many unit level activities do not have proper storage facilities for excessive amounts of hazardous materials and waste and this should be taken into account when developing local policies.

B. The base supply activity will inspect customer returns for serviceability. This inspection will be performed by personnel trained in the identification, packaging, and storage of hazardous materials. Materials determined to be unserviceable will be disposed of in accordance with local DRMO or base environmental office procedures.

C. Excess serviceable hazardous materials will be reported to the responsible Material Management Center (MMC) or Inventory Control Point (ICP) for disposition instructions.

D. Use should be made of the automated Hazardous Material Management System and/or other automated tracking systems to assure complete control of hazardous materials at the facility.

3.20 Inspection of Radioactive Material

A. Radioactive material may be received as part of a larger shipment of other hazardous materials, or the Government may be required to pick it up at a carrier's terminal. Procedures followed relating to package pickup, monitoring of external package surfaces, notification of appropriate authorities, and maintenance of records and written procedures will be followed as specified in Title 10 CFR part 20.1906. The results of monitoring will, in all cases, be documented. It should be noted that while Title 10 CFR, part 20.1906, exempts certain packages from immediate monitoring, all packages containing radioactive material will be monitored prior to opening.

B. During the preliminary inspection, each package containing radioactive material will be

examined for evidence of possible leakage. The package or material suspected of containing radioactive contamination as a result of leakage will be segregated from personnel contact, and the Radiation Protection Officer (RPO) will be contacted for advice. When the exterior of a radioactive material container shows signs of damage or leakage, the transport vehicle will be monitored for contamination. Prior to returning a previously contaminated vehicle to service, it will be decontaminated to the levels specified in Title 49 CFR, part 173.443. The shipper and any carrier(s) will be informed of potential contamination of transport vehicles and the need for possible radiation surveys.

C. Leaking containers will, in all cases, be resealed in the presence of the RPO or other properly trained personnel designated to represent the RPO. When the cause of leakage has been determined (e.g., packaging deficiency or damage in transit), a discrepancy report will be submitted in accordance with paragraph 3.25 below.

D. Radioactive material will be inspected for identification, packaging requirements, quantity, and labeling as required by Title 49 CFR, part 172.

3.21 Astray/Misdirected Shipments

A. It is entirely possible that installations will, in the course of off-loading and processing inbound shipments of hazardous material, receive material consigned to other installations. Title 49 CFR, part 177.811, requires that a carrier or installation in possession of an astray shipment of hazardous materials, other than explosives, forward it promptly to its intended destination, if known. However, such material will not be forwarded until it has been confirmed by inspection that the package is in proper condition for transportation.

B. When an incident involving hazardous materials occurs during this transportation process, a report may be required in accordance with Title 49, parts 171.15 and 171.16.

3.22 Inspection of Pesticides (Insecticides, Herbicides, Fungicides, Rodenticides, Repellents, Growth Regulators, Defoliants, Desiccants, or Biocides)

A. Receipt processing procedures for pesticides (FSC 6840) will vary somewhat from those prescribed for other hazardous materials. If inspection of incoming pesticides discloses that the manufacturer's labels have been mutilated or obliterated and rendered unfit for further issue under FIFRA, the following actions will be taken:

1. The pesticide will be processed as a receipt and immediately suspended in supply condition code L.

2. The office administering the contract will immediately be alerted to the labeling problem. Within 24 hours, a discrepancy report will be prepared and forwarded in accordance with paragraph 3.25 below.

3. Installation personnel will immediately contact the item manager or contracting officer and request that the pesticides be relabeled by or returned to the manufacturer. As the EPA

registrant, the manufacturer is the only person allowed to affix a label to a package intended for distribution or sale. A SDR/ROD will be submitted to the appropriate DLA Supply Center.

4. If the pesticide is determined to be sufficiently toxic to justify storage in a designated poison storage area (i.e., FIFRA categories I, II, or III), the pesticide will be temporarily stored in such area pending other disposition. Signs indicating the common name of the pesticide (e.g., malathion, etc.) and the appropriate signal word(s) (e.g., "Danger," "Poison," or "Caution") will be affixed to the exterior of the storage area.

B. When instructed by the manufacturer, the item manager, or the office administering the contract, via response to the SDR/ROD, to return the pesticide, the package, container, and overpack will be clearly marked with the following information:

1. NSN and appropriate MIL-STD 129 markings.
2. Nomenclature and percentage of active ingredient.
3. Total quantity (gallons for liquids and pounds for solids).
4. Date of return to the contractor (month/year).
5. The phrase "For Return To Manufacturer's Location For Reprocessing."

C. In the event the manufacturer does not respond/concur to the ICP request for relabeling or is no longer in business, the pesticide will be declared unserviceable and will be placed in supply condition code H pending receipt of disposition instructions from the item manager. The exterior of the package or container will be marked as shown in paragraph 3.22B above except "For Disposal Only" will be substituted for the term "For Return To Manufacturer's Location For Reprocessing."

D. Pesticides identified for transfer to the DRMO will be processed in accordance with the procedures outlined in Title 40 CFR, part 165, Regulations for the Acceptance of Certain Pesticides and Recommended Procedures for the Disposal and Storage of Pesticides and Pesticide Containers; DoD 4160.21- M, Defense Materiel Disposition Manual; and DRMS-M 6050.1, Environmental Compliance for the DRMS Hazardous Property Program.

E. If inspection discloses that a container or package of pesticides is leaking due to damage in transit, that package will automatically classify, under RCRA, as a waste pesticide. Such material will be processed in accordance with paragraph 3.22A.

3.23 Pilferable or Security Material. Highly pilferable or security material will be processed in accordance with component directives addressed to the subject.

3.24 Inspection of Compressed Gases in Cylinders. Inspection of compressed gases in cylinders will be performed in accordance with the procedures contained in section 4, DLAR 4145.25/AR-700-68/ NAVSUPINST 4440.128/MCO 10330.2/AFR 67-12, Storage and Handling of Compressed Gases in Cylinders and Compressed Gas Association Pamphlet P-1-1965 (29 CFR 1910.101).

3.25 Discrepancies in Shipment

A. The purpose of reporting discrepancies in shipment is to provide claim offices with documented facts to support loss and damage claims against a carrier or contractor to ensure recovery of Government funds. The two commonly used discrepancy reports are as follows:

1. SF 361 Transportation Discrepancy Report (TDR). SF 361 is used for notifying or confirming notification of damages to material while in transit. SF 361 will be prepared in accordance with AR 55-38/NAVSUPINST 4610.33C/AFJI 24-228/MCO P4610.19/DLAR 4500.15.

2. SF 364 Supply Discrepancy Report (SDR)/Report of Discrepancy (ROD). SF 364 is used for reporting, adjusting, and accounting for supply (item) discrepancies; packaging and supply item identification marking deficiencies; and lost or damaged parcel post shipments. SF 364 will be prepared in accordance with DLAR 4140.55/AR 735-11-2/SECNAVINST 4355.18/AFJM 23-215.

SECTION VIII. HAZARDOUS MATERIALS RECEIPT PROCESSING PROCEDURES

3.26 Current Processing Procedures. Current processing procedures, outlined in various local manuals and regulations will apply when processing receipts of hazardous materials. In addition, all system requirements pertaining to report performance criteria, adjustment actions, etc., will apply.

3.27 In the Event an HCC Has Not Been Assigned. In the event an HCC has not been assigned, and there are indications that the item may in fact be hazardous (e.g., special requirements codes, type cargo codes, transportation compatibility codes, labels, etc.), appropriate procedures will be followed to obtain a valid HCC and enter it into the appropriate system. Assistance on HCC assignment may be obtained from the service focal points listed in Appendix I.

3.28 How to Obtain an HCC. The HCC will be obtained from the local on-line data base or from the DoD HMIS. If an HCC is not available from either of these sources, or if the HCC is determined to be incorrect, the data should be challenged according to established procedures. If an HCC is needed immediately, a temporary HCC may be assigned in accordance with the following procedures:

A. For packages to which a DOT label has been affixed, refer to appendix D, table D-1.

B. For packages reflecting precautionary label text as recommended by ANSI Z129.1, refer to appendix D, table D-2.

C. For material listed in Title 29 CFR, part 1910, subpart Z, refer to appendix D, table D-3.

D. Pesticides that do not have a DOT label attached to the shipping package or container will be assigned a temporary HCC T5. Refer to appendix B. If a DOT label is attached to a pesticide container, refer to appendix D, table D-1. If the pesticide is not packaged for shipment, a temporary HCC T4 will be assigned.

E. In the event a package or container does not contain a pesticide, bear a DOT shipping label or an ANSI precautionary signal word, or if doubt remains on the part of installation personnel as to the exact nature of the hazard, call the DoD Hazardous Technical Information Service (HTIS) at 1-800-848-HTIS, DSN 695-5168, or commercial (804)-279-5168.

F. It should be noted that appendix D, except for table D-3, in addition to providing HCCs, reflects the recommended storage area, both primary and by subdivision.

SECTION IX. RECEIVING QUALITY CONTROL

3.29 Purpose. The general purpose of quality control programs is to inform management of the effectiveness of installation operations by detection of defects in materials and errors in procedures. The basic aim is to provide reliable, timely, and comprehensive data to be used as a guide in directing corrective actions. Since installation operations in hazardous materials management are governed by Federal laws and regulations, installation quality control programs must be expanded to include specific procedures for ensuring that such laws and regulations are not violated. Noncompliance with Titles 29, 40, and 49 CFR may subject installation commanders and responsible managers to criminal and civil penalties. Because of the high political and legal visibility associated with hazardous materials management, consistent compliance with enforcement standards designed to protect human life and the environment is required.

3.30 Minimum Quality Control Procedures. Minimum quality control procedures governing the installation receiving function will incorporate additional periodic sampling procedures designed to ensure:

A. That leaking packages of hazardous materials, or packages requiring minor repair, are monitored during their movement to the recoupment or packaging facility, as appropriate, and during their return to the normal receiving process or disposal.

B. That HCCs and storage locations are properly assigned.

C. That all reports and/or notifications are made in connection with accidental releases of hazardous materials within allowable time frames.

D. That types and quantities of hazardous wastes generated are accurately determined for the purposes of determining waste generator category and, in turn, the extent of compliance required.

SECTION X. WASTE MINIMIZATION APPLICABLE TO RECEIVING

3.31 General. Because of the volume of hazardous materials received and stored, many defense activities are considered potential sources of hazardous waste generation. Consequently, defense activities must have in place a formal waste minimization program as directed by the Office of the Assistant Secretary of Defense (OASD). Waste minimization has been defined by OASD as "any action that reduces the need for disposal of hazardous waste." Accidental releases or spills occurring within activities are considered uncontrollable waste generation actions. There are however, a number of waste minimization actions considered to be controllable. Installation

waste minimization plans shall include, as a minimum, the following elements for the receiving function:

A. Training of material handlers in the identification of hazardous materials on the basis of placards, labels, and shipping papers. Warehouse workers, including supervisory personnel, should receive general awareness and hazard communication training in accordance with 29 CFR 1910.120 and 1910.1200.

B. Procedures for identifying releases and spills and notifying spill response teams and authorities.

C. Compliance with the provisions of DoD 4140.27-M regarding the documentation of the initial packaging date and the remaining shelf-life of incoming hazardous materials.

D. Compliance with the requirements of this document and appendixes B and D regarding the assignment of HCCs.

E. Detailed plans for minimizing the need to handle hazardous materials within the receipt processing area. The likelihood of accidental spills can be significantly reduced by lessening the amount of hazardous materials handling during the receiving process. Such plans should provide for the prepositioning of these materials to facilitate pickup by MHE. MHE operators must not exceed the rated capacity of MHE when moving hazardous materials.

3.32 Guidelines. The above elements are not intended to serve as an all inclusive list of required actions, but rather as a guideline in developing waste minimization procedures tailored to fit the local operating environment. Employees should be encouraged to submit recommendations for achieving waste minimization goals. In addition to the requirement for legal compliance, Federal Law 5 USC 4503 (Beneficial Suggestion Program) allows payment of incentive bonuses to civilian personnel whose extra effort produces savings.

CHAPTER 4

STORAGE AND CARE OF HAZARDOUS MATERIALS

SECTION I. GENERAL

4.1 Purpose and Applicability

A. This chapter provides general requirements for allocating space for the storage of hazardous materials, defines the various types of storage required to satisfy safety and regulatory requirements, outlines storage procedures, and prescribes a storage quality control program.

B. The provisions of this chapter are applicable to all personnel involved in the storage and care of hazardous materials.

4.2 Reporting of Storage Space. Storage Space Status Reports are current records of space utilization and occupancy. All warehouse space dedicated to the storage of hazardous materials will be accurately reported in DD Form 805, Storage Space Management Report as specified by TM 38-400/NAVSUP PUB 572/AFJMAN 23-210/MCO 4450.14/DLAM 4145.12, Joint Service Manual for Storage and Materials Handling.

4.3 Hazardous Waste Minimization Responsibilities

A. Installations are legally compelled to take positive and specific actions in day-to-day management of hazardous materials and hazardous waste. Standards for hazardous waste generators are established in Title 40 CFR, part 262. Installations, as generators, are required to submit a report every two years to the Regional Administrator of the EPA. In addition to covering generator activities during the previous calendar year, the report must include a description of the efforts taken during the year to reduce the volume and toxicity of waste generated. Within the Warehousing Division, a significant source of hazardous waste will be associated with the movement of material into and out of storage locations and the deterioration of materials in storage.

B. Hazardous waste minimization plans should include, but not be limited to, the following elements:

1. Improved Material Handling Practices. While material handling practices may vary, the basic principles remain constant. These principles are outlined in TM 38-400/NAVSUP PUB 572/AFJMAN 23-210/MCO 4150.14/DLAM 4145.12 and are particularly applicable to the movement of hazardous materials, since it is much easier to prevent an incident than to respond to one. The goal of material handling practices should be to prevent accidents and spills that damage the environment and the material being moved, either directly or indirectly. Warehouse workers must be sensitive to the fact that damage to a pallet or outer container will often result in a spill, an accident, or damage to the material at a later time. Warehouse workers and materials handling equipment (MHE) operators must understand the hazardous properties of the materials. They should be aware that certain items are sensitive to an increase in temperature or to vibration, and that other items may react adversely to water. MHE operators must be thoroughly trained to:

a. Avoid handling incompatible materials at the same time.

b. Select the proper piece of equipment to move specific items.

c. Safely operate MHE.

d. Report spills of any size when they occur.

e. Identify items as hazardous materials prior to moving them.

f. Properly use Personal Protective Equipment (PPE) (refer to Chapter 8).

2. Storage Location Accuracy. Stock location systems must pinpoint an exact storage location in a simple, easily understood manner. Suitable location markings must be clearly displayed. Procedures must be established to ensure positive control of all additions, deletions, and changes to the Stock Locator File. Stock locator systems will be validated at least annually or more often if warranted to ensure accuracy.

3. Care of Supplies In Storage (COSIS) Program. The use of quality control techniques will enable a COSIS program to be accomplished at minimum cost with maximum efficiency. Quality control and deterioration data will be generated and used to improve storage serviceability standards. COSIS program actions include performing scheduled inspections of material in storage; properly identifying items; determining the adequacy of the storage environment, preservation, packing, and marking; and arresting all forms of deterioration that will adversely affect the end use of the item. Periodic inspections of hazardous materials in storage are an important step in quality surveillance of such material. While the material is in storage, until it is shipped to the user, it must be systematically inspected to detect degradation, deterioration, corrosion damage, and other deficiencies caused by improper storage methods, expiring shelf-life, or the material's inherent deterioration characteristics. The focus should be on detecting minor deficiencies before they become significant, thus providing time for corrective actions before the material becomes unserviceable or unusable and requires disposal as hazardous waste.

4. Shelf-Life Management. Storage personnel are responsible for executing the control programs directed by their component and installation. Effective shelf-life control at the warehouse level requires vigilance by all personnel, careful supervision, and understanding of the intent and purpose of the control procedures prescribed by DoD 4140.27-M, Shelf-Life Management Manual. Issues shall be directed against the oldest stocks (those with the least remaining shelf life). Under normal circumstances, this policy prescribes a strict application of first-in first-out (FIFO) issue control techniques unless exceptions are authorized in accordance with chapter IV, DoD 4140.27-M.

5. Hazardous Waste Storage Practices. If an installation elects to store hazardous waste in containers (defined in Title 40 CFR, section 260.10, as any portable device in which material is stored, transported, treated, disposed of, or otherwise handled), the following requirements are

prescribed by the EPA and are applicable to permitted facilities under Part 264 and interim permitted facilities under part 265:

a. Each container will comply with the requirements of Title 40 CFR, part 262, subpart C, and be clearly labeled with the words "Hazardous Waste" and with the date the installation began to collect waste in that container.

b. Containers must be kept in good condition, compatible with waste, handled carefully, and leaking ones must be replaced immediately in accordance with Title 40 CFR, part 264.171 and 265.171, as appropriate.

c. Hazardous waste will not be stored in a container if it may cause rupture, leaks, corrosion, or other failure in accordance with Title 40 CFR, part 264.171 and 265.171, as appropriate.

d. Containers will be kept closed except when being filled or emptied in accordance with Title 40 CFR, part 264.173 and 265.173, as appropriate.

e. Containers will be inspected weekly for leaks or corrosion in accordance with Title 40 CFR, part 264.174 and 265.174, as appropriate.

f. To create a buffer zone when storing ignitable or reactive wastes, containers will be placed as far as practicable inside the installation property lines, but at least 50 feet away in accordance with Title 40 CFR, part 264.176 and 265.176, as appropriate.

g. Wastes that could react together to cause fire, leaks, or other releases must not be placed in the same container in accordance with Title 40 CFR, part 264.177 and 265.177, as appropriate. Also, incompatible wastes must be separated from one another to prevent the possibility of accidental mixing that could result in a reaction.

h. Generators may accumulate hazardous wastes on-site for 90 days for large quantity generators and 180 days for small quantity generators (270 days if the waste is transported 200 miles or more) provided certain provisions are met as specified in Title 40 CFR, part 262.34.

i. Permitted facilities must have a secondary containment system for hazardous wastes as specified in Title 40 CFR, part 264.175.

j. The date upon which each period of accumulation begins must be clearly marked and visible for inspection on each container in accordance with Title 40 CFR, part 262, subpart C.

k. Examples of potentially incompatible wastes are contained in Title 40 CFR, parts 264 and 265, appendix V.

l. A determination as to the applicability of Title 40, part 264 or 265 (as appropriate), parts 1080-1091, Organic Air Emission Standards for Tanks, Surface Impoundments, and Containers should be made.

6. Ozone Depleting Substances (ODS). The DoD ODS program is administered by DLA and is responsible for ensuring that:

a. All ODS material shipped from the Military Services and Defense Agencies is accepted by the Defense ODS Reserve, including fire extinguishers, system spheres, and canisters.

b. Proper storage and handling practices are implemented in the receipt, reclamation, recycling, storage, and transportation of Reserve ODS material.

SECTION II. HAZARDOUS MATERIALS STORAGE REQUIREMENTS

4.4 General. It is not the intent of this chapter to provide definitive guidance for the design and construction of hazardous materials storage facilities. The considerations outlined are purposely broad to serve as a general guide for storing commodities possessing chemical and physical properties that involve serious risk to personnel, the facility, and the environment. Actual facility design criteria are derived from several sources within DoD, various Federal agencies, and industry. National Fire Protection Association (NFPA) standards, for example, are consensus standards developed in committee by representatives of industry, Government standards agencies, and specialized consulting firms. Consequently, such standards reflect a mixture of both subjective and objective criteria that may or may not meet the specific requirements of the DoD. A facility designed to store hazardous materials in compliance with DoD requirements will address the following, as a minimum, in the system safety analysis (SSA): roof/ceiling, walls/columns, walking/working surfaces, climate control, ventilation, access/egress, electrical systems, lighting, alarms, monitors, communications, plumbing, fire suppression, heat/smoke and explosion venting, spill control and containment, emergency eyewash/shower and first aid, storage aids, and training and emergency spill procedures. Specific guidance addressing fire protection for facilities is available in MIL-HNBK-1008, Fire Protection for Facilities, Engineering, Design, and Construction. Comply with MIL-HNBK-1008 for fire protection of hazardous materials storage facilities.

4.5 Storage Compatibility Considerations

A. In developing storage layout plans, it should be noted that hazardous materials have characteristics that require the materials be specially stored or handled to prevent risks to personnel or to the facility in which they are stored. Identification of such materials on the basis of transportation placards and labels was discussed in chapter 2. While this method of identification helps to ensure that such materials are directed to a designated storage area, it should be recognized that transportation codes and regulations do not necessarily apply to the storage of materials. Transportation and storage are two different operations requiring different controls. The guidelines in this section are designed to ensure the maximum possible protection against commingling of incompatible items in storage. To ensure the maximum correct storage controls and protection of the safety and health of workers, a hazardous material/chemical inventory is required of all hazardous materials being stored. This inventory must consist of the same product identity as specified on the MSDS, the quantity on hand, and the date the inventory was established. The inventory should be revised as often as needed depending on the severity of the hazardous chemicals and specific control requirements as delineated in 29 CFR, part 1910, subpart Z, Toxic and Hazardous Substances.

B. In developing the current system of identification by transportation placards and labels, terminology such as compatibility and reactivity has been considered. However, these terms should be used with extreme caution since so many variables are involved. Generally, contact between incompatible materials will produce a reaction such as fire, explosion, polymerization, boiling or spattering, severe heat, or the release of poisons or hazardous gases. The matter is made even more complex by the fact that reactivity of chemicals with the same molecular formula may differ because they possess different structures. The unpredictability and complexity of the hazard must be understood when planning and allocating storage facilities. The following examples are presented for information:

1. Certain chemicals may have the same molecular formula but be assigned different hazard classes when offered for transportation because the DOT regulation is open to interpretation in some cases.

2. Varying interpretations of regulations, or sometimes conflicting regulations published by different agencies, may result in the same chemical being classified in different hazard classes for purposes of transportation further complicating the problem of assuring that incompatible hazardous materials are properly segregated in storage. For example, one manufacturer has shipped 110-gallon containers of p-toluidine as NA1993, combustible liquid, n.o.s., or as IMO Division 6.1, poison, for export via ocean going vessels. On the other hand, another has shipped the same material as a nonregulated solid. Still another company has simply described the material as a combustible liquid (OSHA-regulated class III).

C. Storage areas shall be arranged in a manner that facilitates manual (4-foot aisles) and/or MHE (10-foot aisles) access and handling, maintains stability, allows inspections, and promotes good housekeeping.

4.6 Types of Storage Facilities

A. The definitions applicable to types of storage facilities are found in the Joint Service Manual for Storage and Materials Handling (TM 38-400/NAVSUP PUB 572/AFJMAN 23-210/MCO 4450.14/DLAM 4145.12) and include:

General Purpose Warehouse
Controlled Humidity (CH)
Refrigeration
Hazardous Materials Facility
Dry tank
Shed
Transitory
Above-ground Magazine
Earth-covered Magazine
Nontraditional Warehouse
Open Storage Space

B. Within facilities, two other defined areas are required:

1. Separate Inside Storage. A room or building used for the storage of materials in containers or portable tanks, separated from other types of storage occupancies.

2. Segregated Storage. Segregated storage is when materials are physically separated by sills, curbs, and distance. The distance used to separate materials may be occupied by nonhazardous, compatible material. If used, the distance between hazardous materials must be maintained even if nonhazardous, compatible material is moved.

4.7 Features of Hazardous Materials Storage Facilities. In view of the inherent risks to personnel and facilities posed by the storage of hazardous materials, protective features must be considered in designing and allocating storage space. MIL-HDBK-1032-2, Covered Storage, outlines requirements for climate control; electrical lighting; plumbing; fire protection; automatic sprinklers; alarms; monitors; communications; heat/smoke and explosion venting; ventilation; and shelving/rack systems. Storage aids should be extensively utilized for storage of hazardous materials to preclude double and triple stacking of pallet loads that cannot survive the load bearing weight of the top pallet. Containers frequently collapse under this pressure and the stacks start to fall.

4.8 Types of Hazardous Materials Storage Areas. Hazardous materials are generally classified by their primary hazard characteristic since it is not practical to provide a completely detailed, item-by-item listing of these materials and their storage requirements. The 10 broad areas of hazardous materials storage are:

HAZARD STORAGE AREA CODES

A	**Radioactive**
C	**Corrosive**
D	**Oxidizer**
E	**Explosive**
F	**Flammable**
G	**Gas, Compressed**
L	**Low Hazard (General Purpose)**
P	**Peroxide, Organic**
R	**Reactive**
T	**Poison**

They provide for separation of materials with a view towards reducing the risks of hazardous reactions. They also provide a means, when used in conjunction with Appendix C, for directing

hazardous materials to the storage area most appropriate for the item being stored. Within each of the 10 major storage areas, as shown in Figure 4-1, further segregation is required based on the compatibility of the individual items whose general properties indicate they may be stored in the same storage area. This concept is also addressed in appendix C in the form of notes relating to secondary storage within the primary storage area. These notes are not intended to solve a space problem when a primary storage area is full. That issue should be resolved at the local installation level after consultation with base safety and health, fire department, and environmental personnel as well as higher headquarters personnel.

4.9 DoD Storage Type A: Radioactive Material Storage

A. Purpose. The radioactive storage area will be used to store items of Government property composed in whole or in part of radioactive materials, which can be identified by NSN or part number.

B. Hazard Considerations. Radioactive materials are substances that spontaneously decay and emit energetic rays or particles in the process. There are two types of radiation hazards, external exposure and internal exposure.

1. An external radiation hazard is ionizing radiation contacting the body from an external source. Background radiation is naturally occurring external radiation; however, the hazard described here is additional to background radiation and is caused by radiation emanating from materials being handled. External radiation exposure may be reduced by limiting the time warehouse workers are exposed, increasing the distance between them and the source of radiation, and increasing the amount of source shielding.

2. An internal radiation hazard is any radioactive material that is consumed, inhaled, or absorbed through the skin. Internal radiation exposure could occur while handling leaking sources, working in contaminated areas or in airtight storage areas containing leaking gaseous sources, and during accidents. Internal radiation hazards may be reduced by following these procedures:

a. By prohibiting smoking, eating, and drinking in areas where radioactive materials may have been handled.

b. By prohibiting the storage of foods, beverages, and eating and drinking utensils in the radioactive materials storage areas.

c. By requiring personnel to wash their hands and faces upon leaving the radioactive materials storage areas.

d. By following proper procedures in handling unsealed sources or ensuring availability of protective clothing to handle potential accidental release of radioactive material.

3. The risk of radiation exposure is compounded by the fact that emissions from radioactive materials cannot be directly detected by any of the human senses. Significant levels of radiation exposure under emergency conditions could cause acute injury or death. Radioactive materials present no unusual fire hazards, because their fire characteristics are the same as the fire

characteristics of the nonradioactive form of the same compound. Radioactive materials may be expected to melt, vaporize, become airborne, or oxidize under fire conditions. The principal reason radioactive materials are sealed is to prevent the spread of contamination. A sealed source may burst if its contents are subject to fire. Under these conditions, it is conceivable that certain radioactive materials might be oxidized to a radioactive dust or smoke. In addition, such radioactive commodities may lose their integrity during storage and use, possibly releasing radioactive material and creating a potentially hazardous situation.

C. Applicable HCCs. The following HCC should be stored in storage type A:

1. A1, Licensed Radioactive Material (gamma, alpha, or beta emitters) (except depleted uranium (DU) munitions).

2. A2, Radioactive Material, License Exempt.

3. A3, Radioactive Material, License Exempt, Authorized.

D. Storage Arrangement. Areas used for the storage of radioactive materials shall be kept to the minimum needed for adequate control. Radioactive materials shall not be stored in the same warehouse section with explosives, flammable materials, photosensitive items (e.g., photographic film), food products, or other incompatible commodities. An exception applies for DU munitions which are stored as conventional ordnance. Smoking, eating, and drinking shall be prohibited in areas where radioactive materials are stored and handled. Commodities that contain radioactive gases or radium should be stored in well-ventilated structures.

E. References. Additional information may be found in:

1. MIL-STD-129, Marking for Shipping and Storing.

2. DoDI 6050.5, Hazardous Material Information System (HMIS).

3. AR 700-64/DLAM 4145.8/NAVSUPINST 4000.34B/AFR 67-8/MCO P4400.105C, Radioactive Commodities in the DoD Supply Systems.

4. NFPA Standard 801, Recommended Fire Protection Practice for Facilities Handling Radioactive Materials.

4.10 DoD Storage Type C: Corrosive Material Storage

A. Purpose. This area should be used to store liquid or solid materials classified by UN class 8 as corrosive materials. These materials may, in addition to being corrosive, be either acidic or alkaline.

B. Hazard Considerations. Materials packaged and labeled as corrosive have a destructive effect on tissue and a corrosive effect on both steel and aluminum. It should be noted that, on packages labeled as corrosive for transportation, no distinction is made between acidic or alkaline materials. Corrosive solutions are measured by their pH value. A value of 1 up to 7

indicates acidity and a value of greater than 7 up to 14 indicates alkalinity. A value of 7 indicates neutrality. If a corrosive material also meets the DOT criteria for classification as another hazard (e.g., oxidizer, flammable, poison, etc.), a second label describing the additional hazard will be affixed to the package. Many acids, when mixed with other acids, undergo hazardous reactions that may, in turn, result in an explosion. For this reason, each material must be individually evaluated to determine specific storage and/or safety requirements. An additional problem arises in the case of material that is received in the warehouse, packaged and labeled for transportation as corrosive, but that later loses its transportation label identity when the package is opened for issue. Since only the outer package or wrapping was labeled corrosive for transportation, the remaining units of the original package may not provide any indication that the material is corrosive. For example, wet electric storage batteries, transported as corrosive, are embossed with "EXPLOSIVE" and "POISON" warnings, but are not labeled as either for transportation. When the outer packaging, bearing the "corrosive" label, is removed and discarded, care must be taken to ensure that the material is treated as "corrosive" for storage purposes. Acetic acid, for example, must be protected against physical damage and separated from oxidizing materials. Storage near combustible materials must be avoided, and it must be kept above its freezing point (62°F) to avoid rupture of carboys and glass containers. Other corrosives must be protected from excessive heat. Organic acids should always be stored under automatic water sprinklers, whereas sprinkler protection is not required for mineral acids. Combustible and oxidizing acids must be appropriately segregated from each other and from other combustible or incompatible materials. It should also be noted that, although a building or area may be dedicated to corrosive storage, each material stored therein must be evaluated individually to determine its special storage and/or safety requirements. Peroxyacetic acid, a strong oxidizer, for example, must never be stored on wooden pallets since a leak may cause a fire or explosion. Hydrochloric acid, on the other hand, should never be stored on a metal pallet since a leak may cause explosive hydrogen vapors to form.

C. Applicable HCCs. The following HCCs should be stored in storage type C:

1. B1, Alkali, Corrosive, Inorganic.

2. B2, Alkali, Corrosive, Organic.

3. C1, Acid, Corrosive, Inorganic.

4. C2, Acid, Corrosive, Organic.

5. C4, Acid, Corrosive and Oxidizer, Inorganic.

6. C5, Acid, Corrosive and Oxidizer, Organic.

D. Storage Arrangement. Corrosives should be stored on pallets that are compatible with the material being stored. Pallet racks or box pallets may be used to store corrosive solids. The storage arrangement should permit constant surveillance and monitoring to detect leaking containers. When corrosive materials are stacked in pallet racks, incompatible materials should not be placed above or below each other. Acids (C1, C2, C4, C5) and alkalis (B1, B2) are

incompatible corrosives that should be separated by a wall or an aisle equal to or greater in width than the pile heights of the corrosives.

E. References. Additional information pertaining to the storage of corrosives may be found in:

1. NFPA Standard 43A, Code for the Storage of Liquid and Solid Oxidizing Materials.

2. National Safety Council Data Sheet 1-523-Rev 81, Chemical Burns.

3. DLAM 6055.5-M, Occupational Health Surveillance Manual.

4.11 DoD Storage Type D: Oxidizer Material Storage

A. Purpose. This type of storage should be used for UN division 5.1, oxidizing materials.

B. Hazard Considerations. Several important groups of chemicals known as oxidizing agents readily yield oxygen or other oxidizing gases (e.g., chlorine, bromine, fluorine, etc.) for combustion. Although most oxidizing chemicals are not combustible, they may increase the ease of ignition of flammable or combustible materials and usually will increase the intensity of burning. A few oxidizing agents such as calcium hypochlorite, are unstable and susceptible to hazardous decomposition when in contact with moisture and organic or other flammable or combustible materials. This situation provides all of the ingredients for a fire or explosion. Calcium hypochlorite should be stored in a cool, dry, and well-ventilated place, away from flammable or combustible materials.

C. Applicable HCCs. The following HCCs should be stored in storage type D:

1. D1, Oxidizer.

2. D2, Oxidizer and Poison.

3. D3, Oxidizer and Corrosive, Acidic

4. D4, Oxidizer and Corrosive, Alkali

D. Storage Arrangement. Some general requirements are:

1. The arrangement and quantity of oxidizers in storage depends upon their NFPA class (1, 2, 3, or 4), type of container, type of storage (segregated, cutoff, or detached), type of fire protection provided, and manufacturer's instructions.

2. Approval of the storage arrangement shall take into consideration the potential evolution of large quantities of toxic vapors that would present a severe hazard to surrounding areas.

3. Oxidizers shall be stored to avoid contact with incompatible materials such as

combustibles, flammable liquids, greases, and those materials, including other oxidizers, that could react with the oxidizer or catalyze its decomposition.

4. Oxidizing chemicals shall not be stored in the same storage area with combustible materials and flammable liquids. Combustible packaging and wood pallets may represent a severe hazard and should be eliminated from the oxidizers storage areas to the maximum practicable extent.

E. References. Additional information may be found in:

1. NFPA 43A, Code for the Storage of Liquid and Solid Oxidizing Materials.

2. Title 29 CFR, parts 1900-1910.

4.12 DoD Storage Type E: Explosive Material Storage

A. Purpose. The primary purpose of type E (magazine) storage is for DoD-managed ammunition and explosives assigned a DoDAC. Low-risk explosives may also be stored in type E storage when space is available. Chapter 10 of this document provides generalized guidance for ammunition and explosives. More specific storage of military ammunition and explosives is addressed by specialized DoD and service directives and should be followed as appropriate.

B. Applicable HCCs. The following HCCs should be stored in storage type E:

1. E1, Explosive, Military.

2. E2, Explosive, Low Risk. (alternative to storage type L, if space available).

C. References. Additional information may be found in:

1. DoD 6055.9-STD, Ammunition and Explosives Safety Standards.

2. Joint Service Manual for Storage and Materials Handling (TM 38-400/NAVSUP PUB 572/AFJMAN 23-210/MCO 4450.14/DLAM 4145.12).

4.13 DoD Storage Type F: Flammable Material Storage

A. Purpose. Flammable and combustible liquids, solids, aerosols, and flammable liquids with corrosive properties shall be stored in a flammable storage area.

B. Hazard Considerations. Strictly speaking, flammable and combustible liquids do not "cause" fires; they are merely fuel. Flammable vapors, rather than liquids, in the presence of air and an ignition source cause fires. The principal hazard of storing closed containers is the rupture of the containers resulting from increased internal pressure when they are exposed to fire. This release and vaporization of liquid adds to the intensity of a fire and may cause the rupture of other containers, resulting in a rapidly spreading fire. Flammable solids include chemicals that are solids at 100°F. or above. Flammable aerosols include flammable liquids in small pressurized spray cans such as hair sprays or paints that have a demonstrated ability to rupture

violently from internal pressure when heated in a fire. Upon explosion, these items are fireballs that become rocketing projectiles that may leave a trail of burning liquid. Aerosol products have been directly involved in and sometimes responsible for extensive, costly warehouse fires.

C. Basic Requirements. Flammable storage areas at facilities include detached flammable liquid warehouses and areas within general purpose warehouses that have been modified to make them acceptable. Flammable liquids in containers will be stored in pallets or pallet racks subject to the quantities and height limitations prescribed in 29 CFR 1910.106. Single or double storage racks will be utilized. Every inside storage room must be provided with either a gravity or mechanical exhaust ventilation system, having complete change of air within the room at least six times per hour.

1. Outdoor storage of flammable liquid products in metal drums is not recommended. The risk associated with a pressure buildup in the drums due to thermal loading from the sun, and the likelihood of subsequent rupture, or drum failure due to corrosion or handling, creates a significant spill containment and environmental hazard. The cost of cleanup and negative public reaction to hazardous materials spills far exceeds the benefits of outdoor storage.

2. Detached flammable liquids warehouses or areas within general purpose warehouses modified for the storage of flammables should include the protective features for hazardous materials storage identified in the reference given in paragraph 4.7 with additional consideration given to the following:

3. Aerosol Can Storage: Aerosol cans should be stored in a room separate from other flammables if space permits. A barrier should separate aerosol cans from other flammables, and it should be capable of containing aerosol cans that can become self-propelled projectiles and airborne sources of ignition. If aerosol cans must be stored in the same area with other flammables, then a wire mesh, expanded metal, or chain-link type of material should be used as a floor-to-ceiling or completely surrounding cage type barrier. Personnel access/egress must be addressed in accordance with NFPA 101, Life Safety Code. If access through the aerosol can barrier is required by MHE to service pallet racks, then a self-closing gate should be used to maintain the effectiveness of the barrier.

D. Applicable HCCs. The following HCCs should be stored in DoD storage type F:

1. F1, Flammable Liquid, Packing Group I, OSHA IA.

2. F2, Flammable Liquid, Packing Group II, OSHA IB.

3. F3, Flammable Liquid, Packing Group III, OSHA IC.

4. F4, Flammable Liquid, Packing Group III, OSHA II.

5. F5, Flammable and Poison.

6. F6, Flammable Liquid and Corrosive, Acidic.

7. F7, Flammable Liquid and Corrosive, Alkali.

8. F8, Flammable Solid.

9. V2, Aerosol, Nonflammable.

10. V3, Aerosol, Flammable.

11. V4, DOT Combustible Liquid, OSHA IIIA.

E. Storage Arrangement. Liquids in containers should be stored on pallets or pallet racks subject to the quantities and height limits prescribed in Title 29 CFR. Storage racks, either single- or double-row, should be used.

F. References. Additional information may be found in:

1. NFPA standard 231C, Rack Storage of Materials.

2. NFPA standard 30, Flammable and Combustible Liquids Code.

3. Title 29 CFR, section 1910.106.

4.14 DoD Storage Type G: Compressed Gas Cylinder Storage

A. Purpose. The following products should be stored in this area:

1. Filled cylinders containing compressed gases classified by DOT as poison, flammable, or nonflammable for transportation.

2. Filled cylinders containing compressed gases classified by DOT as poison, flammable, or nonflammable but having the additional hazard of being oxidizers, corrosives, or poisons.

3. Filled cylinders assigned a DOT hazard classification of flammable liquid, poison, or other hazard.

4. New, purged, and clean cylinders that have not been used and that contain a positive pressure of dry, oil-free air or nitrogen.

5. Previously used but still clean and serviceable cylinders that have been cleaned of all hazardous materials, purged and charged with a positive pressure of an inert gas (e.g., nitrogen) or dry, oil-free air.

6. DOT specification 8 and 8AL cylinders classified as new for transportation and storage purposes. These cylinders contain a porous filler saturated with flammable acetone or a similar solvent but are not regulated for purposes of transportation and storage. However, they will be stored in the flammable gas storage area.

7. Fire extinguishers containing a compressed gas will be stored in the compressed gas area according to the assigned HCC.

B. Hazard Considerations. Cylinders may contain poisonous, flammable, corrosive, reactive, oxidizing, or other hazardous materials. Many cylinders are filled with hazardous and nonhazardous gases under moderately or extremely high pressures. The prolonged storage of cylinders at temperatures in excess of 125°F., may also cause leakage, distortion, failure of safety release devices, or explosion. Care must be exercised to ensure that unprotected valve outlets are not physically damaged during storage and handling.

C. Basic Requirements.

1. All storage facilities for compressed gases should be separated from other buildings by at least 50 feet. Compressed gases should be stored in roofed, open-sided sheds on an above-grade concrete slab if climatic conditions are favorable and security precautions are adequate. Sheds should be constructed of light, noncombustible materials. Cylinders of flammable gases and gases that support combustion must be stored in separate sheds with a distance of at least 50 feet between sheds or by an approved firewall or fire barrier. The storage arrangement should protect the cylinders from direct exposure to sunlight.

2. An enclosed storage facility, if used, should be a single story detached, compressed gas warehouse or cutoff area within a general purpose warehouse modified for the storage of compressed gases. It should include the protective features for hazardous materials storage identified by the reference cited in paragraph 4.7. In addition, consideration should be given to the recommendations identified for the specific hazards associated with each cylinder (e.g., chapter 4, section II, flammables - paragraph 4.13; poisons - paragraph 4.18; corrosives - paragraph 4.10; and oxidizers - paragraph 4.11 outlined under each type of hazardous materials storage in this chapter.

3. To assure complete identification, compressed gas cylinders should be tagged/labeled with the stock number for the full cylinder and the stock number for the empty cylinder.

D. Applicable HCCs. The following HCCs should be stored in storage type G:

1. G1, Gas, Poison (Nonflammable).

2. G2, Gas, Flammable.

3. G3, Gas, Nonflammable.

4. G4, Gas, Nonflammable, Oxidizer.

5. G5, Gas, Nonflammable, Corrosive.

6. G6, Gas, Poison, Corrosive (Nonflammable).

7. G7, Gas, Poison, Oxidizer (Nonflammable).

8. G8, Gas, Poison, Flammable.

9. G9, Gas, Poison, Corrosive, Oxidizer (Nonflammable).

E. Storage Arrangement. Storage aids for compressed gas cylinders should be noncombustible and should include steel edge protectors, frames and frame supports, separators, battens, and pallets. Cylinders of compressed gases should not be stored near readily ignitable substances or combustibles. Precautions should also be taken to ensure that cylinders are not stored near unprotected platform edges or in other locations where they are likely to be struck by heavy, moving objects or MHE. Storage temperatures should not exceed 125°F. as measured at the surface of the cylinder. When stored inside, cylinders should not be stored near exits.

F. References. Additional information may be found in:

1. Title 29 CFR, section 1910.101 and 1910.253.

2. DLAR 4145.25/AR 700-68/NAVSUPINST 4440.128/MCO 10330.2C/AFR 67-12, Storage and Handling of Compressed Gases and Liquids in Cylinders.

3. MIL-STD-147, Palletized Unit Loads.

4. TM 38-400/NAVSUP PUB 572/AFJMAN 23-210/MCO 4450.14/DLAM 4145.12, Joint Service Manual for Storage and Materials Handling.

5. Handbook of Compressed Gases published by The Compressed Gas Association, Arlington, VA.

6. Matheson Gas Data Book published by the Matheson, Co., East Rutherford, NJ.

4.15 DoD Storage Type L: Low Hazard Material (General Purpose) Storage

A. Purpose. This area is a general purpose storage area and should be used to store products that are classified as low hazard (low risk) materials.

B. Hazard Considerations.

1. For purposes of this chapter, it would be impossible to provide a detailed listing of all the products involved and the rationale for their classification as low hazard material. Low hazard is generally assigned on the basis of physical and chemical properties of the material and a review of the constituents listed on the MSDS with consideration being given to the hazard manifested to personnel and the environment while in storage. Such a decision relies on the professional judgment and experience of the person reviewing the relevant data and assigning the HCC. Although not always regulated by DOT for transportation purposes, these materials sometimes contain constituents that could be hazardous under circumstances other than routine storage and handling. While these circumstances are considered in the decision process, the primary factor influencing the classification is how the material is stored within the DoD. Sodium bicarbonate,

saline solution, calcium chloride, and distilled water, for example, are assigned NSNs in FSC 6800 (Chemicals), but are handled as low hazard material under normal storage and handling conditions.

2. Low-risk explosive materials should be packaged and labeled in accordance with UN division 1.4S and 1.6 explosives. These substances and articles present only a small hazard in the event of ignition during transportation. The effects are largely confined to the package, and no projection of fragments of appreciable size or range is expected. When exposed to external fire, virtually instantaneous explosion of most of the package's contents must not occur.

3. Materials which have been grouped as "general" miscellaneous hazardous materials (V1, V5, V6, and Z series, except Z6) may be stored in low hazard general purpose storage areas.

4. Under certain circumstances individual services or agencies may allow small quantities of selected hazardous materials to be stored in general purpose storage areas when a specific mission may otherwise be adversely impacted. The risk to be avoided in these situations is the one encountered through the accumulation of small quantities of these miscellaneous hazardous materials in sufficient quantities to create a high risk storage situation. In addition local, state, and federal occupational and environmental regulations must be followed. The decision to deviate from these guidelines should be situation specific and the decision process fully documented and coordinated. Paragraph 4.20 provides recommendations for storage under these circumstances as they relate to the Hazard Characteristic Codes.

C. Basic Requirements. Since the materials are assigned a low risk hazard classification, they may be stored in a general purpose (i.e. low hazard) warehouse.

D. Applicable HCCs. The following HCCs should be stored in storage type L:

1. C3, Acid, Low Risk.

2. B3, Alkali, Low Risk.

3. E2, Explosive, Low Risk (alternatively may be stored in an explosive area (type E) if space is available).

4. M1, Magnetized Material.

5. N1, Not Regulated as Hazardous

6. T4, Poison, Food Contaminant.

7. T5, Pesticide, Low Risk.

8. T6, Health Hazard.

9. V1, Miscellaneous Hazardous Materials Class 9.

10. V5, High Flash Point Liquids, OSHA IIIB.

11. V6, Petroleum Products.

12. V7, Environmental Hazards.

13. Z1, Article Containing Asbestos.

14. Z2, Article Containing Mercury.

15. Z3, Article Containing Polychlorinated Biphenyl (PCB)

16. Z4, Article, Battery, Lead Acid, Nonspillable

17. Z5, Article, Battery, Nickel Cadmium, Nonspillable

18. Z7, Article, Battery, Dry Cell

E. Storage Arrangement. Storage aids should offer the most practical and efficient use of space while simultaneously protecting the material from physical damage. Such aids may consist of pallet racks, pallet support sets, bins, cantilever racks, drive-through racks, and gravity flow racks. Bulk storage space should be available to accommodate single height palletized loads of material that do not require storage aid support. Stacking heights of materials to be stored should be limited based on ceiling heights, material weight, floor load weight limitations, and minimum clearance required to accommodate fire suppression equipment.

F. References. Additional information may be found in:

1. Title 29 CFR, part 1910.

2. ASNI/NFPA standard 101, Life Safety Code.

4.16 DoD Storage Type P: Organic Peroxide Material Storage

A. Purpose. This storage area should be used to store those DOT-regulated organic peroxide formulations that are classified by NFPA standard 43B as class I, II, or III. Classes IV and V are considered low risk and may be stored in either type L or P storage.

1. Class I describes formulations that are capable of deflagration but not detonation.

2. Class II describes formulations that burn very rapidly and present a severe reactivity hazard.

3. Class III describes formulations that burn rapidly and present a moderate reactivity hazard.

4. Class IV describes formulations that burn in the same manner as ordinary combustibles and present a minimal reactivity hazard.

5. Class V describes formulations that do not sustain combustion and present no reactivity hazard.

B. The organic peroxides that fall under NFPA classes I, II, and III are required to be labeled with a DOT "ORGANIC PEROXIDE" label (UN Class 5.2) for transportation purposes, which also facilitates directing them to type P storage. Classes IV and V may or may not be identified with the DOT "ORGANIC PEROXIDE" label.

C. Hazard Considerations.

1. Class I organic peroxide formulations present a hazard through easily initiated, rapid, explosive decomposition. Class I may include formulations that are relatively safe only under closely controlled temperatures. Excessively high or low temperatures may increase the potential for severe explosive decomposition.

2. Class II organic peroxide formulations present a severe fire hazard similar to that presented by NFPA class I flammable liquids; however, the decomposition is not as rapid, violent, or complete as that produced by class I formulations. As with class I formulations, this class may include formulations that are relatively safe under controlled temperatures or when diluted.

3. Class III organic peroxide formulations present a fire hazard similar to NFPA class II combustible liquids. They are characterized by rapid burning and high heat liberation, due to decomposition.

4. All organic peroxide formulations are incompatible with strong acids, strong alkalis, strong oxidizers, acetone, transition metal salts, promoters, and reducing agents.

D. Basic Requirements. Detached organic peroxide storage areas within general purpose warehouses modified for the storage of organic peroxides should include the protective features for hazardous materials storage identified in the reference cited in paragraph 4.7 with additional consideration given to:

1. All storage areas containing organic peroxide formulations should be conspicuously identified by the words "ORGANIC PEROXIDE" (SF 443 or DOT placards are acceptable) and by class, and if more than one class is stored in the same area, then it should be marked for the most severe class present.

2. Packages containing organic peroxides requiring temperature control should be marked with the recommended storage temperature range, and they should be stored in an environment within that range (i.e., refrigerated).

E. Applicable HCCs. The following HCC should be stored in storage type P:

1. P1, Peroxide, Organic, DOT regulated, NFPA classes I, II, and III.

2. P2, Peroxide, Organic, Low Risk, NFPA classes IV and V.

F. Storage Arrangement. The quantity of organic peroxide formulations and pile height/width limits stored in a single area shall not exceed the maximum allowable quantities specified in table 2-11 of NFPA standard 43B. Unsealed or open packages of organic peroxides shall not be permitted in the storage area at any time. Fifty-five gallon drums of organic peroxides shall be stored only one-drum high. Incompatible materials shall not be stored in the same storage area with organic peroxides. Bulk storage in bins or piles shall not be permitted.

G. Reference. Additional information can be found in NFPA standard 43B, Code for the Storage of Organic Peroxide Formulations.

4.17 DoD Storage Type R: Reactive Material Storage

A. Purpose. This storage area should be used to store materials that are air and/or water reactive (spontaneously combustible or pyrophoric) or water reactive (dangerous when wet), but not simultaneously in the same room. Also, lithium batteries are stored in this area.

B. Hazard Considerations. The risk of fire is the principal hazard associated with spontaneously combustible or water reactive (dangerous when wet) materials. Some of these materials may also emit toxic gases when burning. Nearly all hazardous materials handled by facilities and classified as spontaneously combustible or dangerous when wet are flammable. However, since such materials may ignite upon contact with air and/or water, they should not be stored with flammable liquids or solids because they provide the ignition source required for flammable materials to catch fire. Title 49 CFR requires that these materials be packaged in clean, dry, waterproof, airtight containers meeting the Performance Oriented Packaging drum configuration such as 1A2, when offered for transportation. Consult DOT Regulations (Title 49) for the exact packaging configuration. The same packaging requirement also applies to these materials when stored at freight terminals or warehouse facilities. These materials do not present an unacceptable storage risk when (1) properly stored in an environment compatible with the material, (2) stored in original containers, (3) handled with care to avoid container damage, and (4) the manufacturer's recommended shelf-life items are not exceeded.

The following additional hazard considerations for water and/or air reactive materials also apply:

1. Significant fire hazards are associated with spontaneously combustible materials that may be water and/or air reactive. Significant quantities of heat are released during reactions, making combustible material capable of self-ignition. Therefore, incompatible materials should not be permitted in reactives storage areas. Materials such as aluminum hydride, aluminum alkyls, yellow phosphorous, and other similar chemicals must be stored in a manner that prevents contact with air. Yellow phosphorous, for example, must be stored underwater. On the other hand, materials such as aluminum alkyls that react with both air and water must be stored under a liquid or gas that is inert to the material.

2. Dangerous when wet water reactive materials such as anhydrides, carbides, hydrides, sodium hydrosulfite, and similar chemicals, must be stored in dry areas and kept off the floor by use of pallets or rack storage. Dangerous when wet materials should never be stored directly beneath active water sprinklers.

C. Basic Requirements. A modified general-purpose warehouse storage area should be used for the storage of reactive materials. Particular emphasis should be placed on the type of floor construction and its maintenance. There should be no basement or depressions below the storage area into which water could flow or fall. Specific requirements for reactives storage areas include:

1. For R1, spontaneously combustible materials (UN Class 4.2), specific storage requirements should be evaluated on a case-by-case basis. Sources of storage information include the manufacturer of the material, technical information data sheets or pamphlets, material safety data sheets, military specifications (MILSPECS), and other DoD sources.

2. R2, dangerous when wet materials, shall be stored in the original shipping container or in a compatible container of equal or greater strength. Storage areas shall be conspicuously posted with signs or notices indicating "DANGEROUS IF NOT KEPT DRY - KEEP WATER AND FLAMES AWAY" or equivalent wording.

D. Applicable HCCs. The HCCs of materials to be stored in this storage area include:

1. R1, Reactive Chemicals, Flammable, includes:

a. Spontaneously combustible materials, UN class 4.2.

b. Pyrophoric liquids that ignite in dry or moist air at or below a temperature of 130°F as defined in 29 CFR 1910.1200.

2. R2, Water Reactive Chemicals, includes dangerous when wet, UN class 4.3.

3. Z6, Article, Battery, Lithium.

E. Storage Arrangement. Reactive materials should be palletized in a manner that prevents direct contact between the material and the floor or ground. Pallet racks or single height stacks should be used to prevent excessive stress on the containers. MHE and load width will dictate the amount of aisle space required. All aisles should be kept clear of obstructions.

1. Particular emphasis should be placed on the physical condition of the package or container in which the item is stored. Packages should show no evidence of damage or deterioration, and all warning statements or labels shall be completely legible. Care shall be exercised to ensure that warning statements and labels are not covered or obliterated when applying tape. Items should be arranged in a manner that will facilitate both periodic inspection and adherence to the FIFO principle of issue control. These materials should not be stored in Supply Condition Code A beyond the manufacturer's shelf-life expiration date.

2. Water reactive materials and materials that are both water reactive and pyrophoric should not be stored in a facility equipped with active overhead water sprinkler systems. The specific area of a facility used for the storage of water reactive materials should be isolated by a waterproof or water-resistant barrier (e.g., plastic sheeting or tarpaulin) to protect the materials from water in the event the sprinkler system is activated elsewhere in the facility. Prior to storing

reactive materials, all combustible rubbish, dry or oiled paper wrapping material, and other combustible materials shall be removed from the storage area. The area should be conspicuously marked or posted to indicate the material being stored. Access to the reactive materials storage area should be restricted. Personnel should not be permitted to enter the area unless accompanied by an individual familiar with the hazards of the material stored in the area.

F. References. Additional information may be found in:

1. Title 29 CFR, part 1910.

2. ANSI/NFPA standard 101, Life Safety Code.

4.18 DoD Storage Type T: Poison Material Storage

A. Purpose. This area should be used to store packaged materials meeting the definition of UN class 6.1, inhalation hazards, packing group I or II, carcinogens, infectious or cytotoxic drugs, or oxidizers or flammable liquids that are also poisons.

B. Hazard Considerations. The release of materials stored in this area may adversely affect the environment and/or cause personnel injury through inhalation, skin absorption, or ingestion. Materials stored in this area are likely to be assigned multiple hazards. Such materials may be flammable, combustible, oxidizing, or corrosive, in addition to being poisonous. Determining a suitable storage area for material assigned the single hazard poison, for example, may be relatively simple. When a poison is assigned a secondary hazard, the material must be further segregated in storage on the basis of the combined hazard. To avoid the risk of fire or explosion, for example, material assigned hazard classifications of both poison and oxidizer cannot be permitted to come into direct contact with flammables or combustibles. Determination of a suitable storage area for materials assigned multiple hazards, however, must be made on a case-by-case basis and must consider both the primary and secondary hazards. The storage layout plan should provide for positive horizontal and vertical isolation of incompatible materials. Isolation may be achieved by using separate inside storage or detached storage.

C. Basic Requirements. Poison storage sites should be selected with due regard to the amount, toxicity, and environmental hazards of the poisons stored, and the number and size of containers to be handled. Storage areas containing poisons shall be conspicuously marked with signs or placards identifying them. The manufacturer's recommendations regarding the temperature range required to maintain the effectiveness of pesticides to be stored should be considered when determining the suitability of a particular poisons storage area for individual pesticides. The ventilation system should assure that vapors from the poison storage areas do not migrate to other storage areas, staging areas, access aisles, etc. within the building. There should be a means to verify airflow such as a manometer or suspended air strips.

1. Access/Egress. Provisions should be made to prevent unauthorized entry with door locking mechanisms that do not impede emergency exits.

2. Spill Control and Containment. Particular emphasis should be placed on control and

containment of water sprinkler runoff because of the insidious threat to personnel and animals of the hazardous materials stored in the poisons storage areas. Incidents which result in the release of any carcinogen, identified in 29 CFR 1910.1003, into any area where workers may be potentially exposed, must be reported within 24 hours to the nearest OSHA Area Director. A follow-up written report is required within 15 calendar days.

D. Applicable HCCs. The following HCCs should be stored in storage type T:

1. K1, Infectious Substance.

2. K2, Cytotoxic Drug.

3. T1, DOT Poison - Inhalation Hazard.

4. T2, UN Poison, Packing Group I.

5. T3, UN Poison, Packing Group II.

6. T7, Carcinogen.

E. Storage Arrangement. Pallet racks, box pallets, or shelving should be used when vertical storage is required. Poisonous materials should be stored in a manner that will prevent direct contact of the material with the floor. Only compatible materials of the same hazard class should be placed in any single vertical rack. Materials with multiple hazard classes should be placed in separate vertical racks. Poisons should never be stored, even temporarily, next to food, food items, or other items intended for consumption by humans or animals. Cyanides and cyanide mixtures must not be stored with acids or acidic materials to prevent their accidental combination and the subsequent release of hydrogen cyanide.

1. Access to areas where cytotoxic drugs are stored should be limited to authorized personnel. Such areas should be posted with a large warning sign, a list of all drugs covered by cytotoxic drug policies, and a sign detailing spill response procedures. Detailed spill procedures are contained in Chapter 7. If possible, facilities used for storing cytotoxic drugs, should not be used for other drugs and should be designed to prevent drugs from falling to the floor. Warning labels should be applied to all containers as well as to shelves and bins where these containers are permanently stored.

2. To prevent diversion to unlawful use, cyanide in pellet or other easily pilferable forms shall be accorded high security, sensitive item storage status.

F. References. Additional information is available in:

1. Title 29 CFR, section 1910.106, Criteria for Flammable and Liquid Warehouses or Storage Buildings.

2. Title 40 CFR, section 165.10, Recommended Procedures and Criteria for Storage of Pesticides and Pesticide Containers, and NFPA standard 43D, Procedures and Criteria for the

Storage of Pesticides.

3. Title 49 CFR, section 177.848(d), Segregation and Storage of Hazardous Materials.

4. Title 29 CFR, part 1910, subpart Z, Toxic and Hazardous Substances.

5. DoDI 6055.1, Department of Defense Occupational Safety and Health Program.

4.19 Special Storage and Handling

A. Purpose. This area is a locally designated storage area intended for the storage of those products which in the technical opinion of local safety, fire, or other officials offers such unique hazards to local personnel or property that it must be completely segregated from all other products.

B. Hazard Considerations. The products stored in this area can cover a wide variety of hazards. When the MSDS for the item appears in the HMIS, it will be assigned one of the other standard HCCs which, in the opinion of the technical personnel reviewing the MSDS, reflect the hazard characteristics of the product. However, local authorities familiar with their own facilities may elect to completely segregate the product because of unique local conditions, regulations, or practices.

C. Basic Requirements. The decision to segregate a product into a separate storage area must be supported by documentation such as an MSDS, product bulletin, other technical literature, independent research, or through documented experience which has proved that the item possesses unique hazards. Any decision to segregate such a product relies heavily on the professional judgment of the technical personnel at the installation.

D. Storage Arrangement. Products placed in this area must be separated from all other products by at least a physical distance determined by local authorities and preferably by a wall or in another building. Storage sites should be selected with due regard to the amount, the potential safety and environmental hazards associated with the product, and the number and size of containers to be handled. Storage areas containing these items shall be limited to authorized personnel and conspicuously marked with signs or placards identifying them. The manufacturer's recommendations and other technical literature regarding the type of storage aids, fire protection, storage temperature, security measures, etc. should be considered when determining the suitability of a particular storage area. The ventilation system should assure that vapors from the poison storage areas do not migrate to other storage areas, staging areas, access aisles, etc. within the building. There should be a means to verify airflow such as a manometer or suspended air strips and a periodic air sampling program should be established.

E. References. Additional information may be found in:

1. Manufacturers technical literature.

2. Various technical references.

3. DoD 6050.5, DoD Hazardous Materials Information System.

4.20 Storage of Operating Stock of Hazardous Materials In General Purpose Storage Areas

A. Each military service or agency may allow small quantities of hazardous materials to be stored in general purpose storage areas provided a specific limitation is placed on the types of hazardous materials which can be stored, the unit container size, and the maximum volume to be stored. In addition, the guidance provided must address the type of storage device allowed, such as storage room or cabinet, and the specifications for construction of the storage device. The guidance must not be less restrictive than applicable federal, state, local, and/or host nations regulations.

B. This section is intended to address primarily those storage needs associated with accomplishment of a mission where the amount of hazardous materials stored is incidental to the accomplishment of that mission. It is not intended to limit the quantity of hazardous materials brought into an area for immediate use. The recommended limits below are based on the requirement that storage cabinets meeting 29 CFR 1910.106(d)(3) will be used although it is recognized that the regulations apply only to flammable liquids. All applicable regulatory ventilation and electrical requirements for the storage cabinets must be followed.

C. The guidance below is provided as a guideline for the storage of hazardous materials in a general purpose area and may be amended as appropriate by the military service or agency. The authority to issue storage guidelines may be delegated to lower commands by service/agency headquarters.

RECOMMENDED STORAGE LIMITS FOR HAZARDOUS MATERIALS IN GENERAL PURPOSE AREAS

TYPE MATERIAL	HCC	OSHA CLASS	LIMITS PER BLDG/FIRE AREA MAX UI SIZE	MAX QTY	OSHA MAX QTY
FLAMMABLE LIQUID	F2	IB	32 oz/1000 ml	25 Gal	25 Gal
FLAMMABLE LIQUID	F3	IC	32 oz/1000 ml	25 Gal	25 Gal
FLAMMABLE LIQUID	F4	II	64 oz/2000 ml	120 Gal	120 Gal
COMB LIQUID	V4	IIIA	1 Gal/4000 ml	120 Gal	120 Gal
AEROSOL, FLAM	V3		16 oz/500 ml	25 Gal	25 Gal
AEROSOL, NONFLAM	V2		16 oz/500 ml	--	--
ALKALI, CORROSIVE, INORGANIC	B1		1 Gal/4000 ml (Liquids)	180 Gal	--
			2.5 Lb/1.14 Kg (Solids)	990 Lb	--
ALKALI, CORROSIVE, ORGANIC	B2		1 Gal/4000 ml (Liquids)	180 Gal	--
			2.5 Lb/1.14 Kg (Solids)	990 Lb	--
ACID, CORROSIVE, INORGANIC	C1		1 Gal/4000 ml (Liquids)	180 Gal	--
			2.5 Lb/1.14 Kg (Solids)	990 Lb	--
ACID, CORROSIVE, ORGANIC	C2		1 Gal/4000 ml (Liquids)	180 Gal	--
			2.5 Lb/1.14 Kg (Solids)	990 Lb	--
OXIDIZER	D1		6 oz/188 ml (Liquids)	10 Gal	--
			2.5 Lb/1.14 Kg (Solids)	250 Lb	--
OXIDIZER & POISON	D2		6 oz/188 ml (Liquids)	10 Gal	--
			2.5 Lb/1.14 Kg (Solids)	250 Lb	--
FLAM LIQUID AND CORROSIVE, ACID	F6		4 oz/125 ml (Liquids)	10 Gal	25 Gal
FLAM LIQUID AND CORROSIVE, ALKALI	F7		4 oz/125 ml (Liquids)	10 Gal	25 Gal
FLAMMABLE SOLID	F8		No Limit	30 Lb	--
FLAMMABLE & POISON	F5		4 oz/125 ml (liquids)	10 Gal	--
GAS, FLAMMABLE	G2		1 Lb	220 Lb	--
GAS, NONFLAMMABLE	G3		10 Lb	300 Lb	--
UN POISON, PG II	T3		16 oz/500 ml (Liquids)	45 Gal	--
			3 oz/85 Gm (Solids)	7.5 Lb	--

Notes:
1. For flammable liquids, maximum quantity based on 29 CFR 1910.106(e)(2)(b) based on the application of horizontal standard for storage of materials.
2. Progression in U/I sizes chosen based on maximum quantity of 1 gal. as desirable for storage.
3. All HAZMAT in general purpose storage area would be placed in storage cabinets meeting requirements of 29 CFR 1910.106(d)(3). Maximum of 3 storage cabinets allowed in fire area. Additional group of up to 3 cabinets must be separated from other cabinets or group of cabinets by at least 100 ft. as specified by NFPA 30.
4. In lieu of storage cabinets, separate storage rooms constructed as specified in 29 CFR 1910.106(d)(4) are allowed.
5. Maximum storage for flammable aerosols based on fact that flammable aerosols are considered same as OSHA IA liquids for storage purposes per the definition in 29 CFR 1910.106 (A)(13).
6. Maximum quantity of corrosives chosen based on fact that maximum desired amount in storage should not equal EPCRA reportable quantity of Sulfuric Acid and Sodium Hydroxide as these are common corrosives.
7. Storage of kits containing multiple types of hazardous materials will be determined by the most restrictive size/quantity limitations, compatibility constraints, and most severe hazard classification.
8. Incompatible products shall be placed in separate storage cabinets in the same manner as specified in Figure 4.1.

SECTION III. STORAGE QUALITY CONTROL

4.21 General. The general purpose of the storage quality control program is to assure compliance with established DoD storage management principles, and regulatory requirements of Titles 29, 40, and 49 CFR. In addition to the quality control procedures contained in local SOPs, installation quality control programs should provide for rigid compliance with the principles described in the following paragraph to assure achievement of hazardous waste minimization goals.

4.22 First-In First-Out (FIFO) Method

A. The basic principle affecting the storage quality control plan is the FIFO method. Care must be taken to ensure that hazardous materials items with the least remaining shelf-life are arranged in the storage location in a manner that will allow access while minimizing the need to move or handle such material.

B. Action will be taken to ensure that all hazardous materials shelf-life items are assigned a shelf-life code. If a shelf-life code has not been assigned to an item that is in fact a shelf-life item, it may deteriorate in storage and, in turn, introduce unnecessary safety or health risks and disposition/disposal costs.

4.23 Surveillance Programs

A. Necessary surveillance will be provided to ensure that hazardous materials items are always in a ready-for-issue condition in accordance with applicable DoD standards or other appropriate technical documentation. Storage personnel performing routine surveillance should be alert for expired shelf-life dates (Type I items) or for inspection/test dates which have past (Type II items) and ensure that the appropriate office is notified when these stocks are discovered.

B. To assist in operating shelf life programs, the Naval Inventory Control Point (NAVICP), Mechanicsburg, PA administers the Shelf-Life Extension System (SLES) which consists of two major databases. They are the Material Quality Control Storage Standards (MQCSS) and the Quality Status List (QSL). In addition, a course entitled DoD Shelf-Life Management is available from NAVICP. This course explains how to use the databases and provides knowledge and skills to determine the condition of shelf-life material upon receipt, in storage, during surveillance, upon shipment, and when test or restorative actions are required to maintain or return stocks to a ready-for-issue status. For further information contact DSN 430-1506, (717) 605-1506.

4.24 Disposal of Excess Stocks. Services operating HAZMIN centers and shelf life extension programs shall follow guidelines and policy set forth by their respective headquarters. Once it is determined that hazardous materials shelf-life items are excess and disposal action is required, they should be processed through the DRMO or recoupment facility, as appropriate, without delay. Prompt disposal action will reduce disposal cost and lessen other environmental problems. Some States, under their environmental laws, interpret the expiration of shelf-life for hazardous materials as the point at which the item becomes classifiable as hazardous waste. See chapter 11 for procedures to process hazardous materials to DRMO.

4.25 Control of Storage Locations

A. Installations will ensure that procedures are established to provide for positive control of all hazardous material removed from permanent storage locations to temporary storage areas, packaging, or the recoupment facility, for correction of deficiencies detected during routine surveillance inspection.

B. Necessary surveillance will be provided to ensure that all hazardous materials in storage have been assigned the proper HCC and that such material is in fact stored in the proper storage area.

4.26 Physical Inventory of Hazardous Materials

A. Before being permitted to participate in physical inventories of hazardous materials, personnel shall be thoroughly indoctrinated in the hazards involved. Refer to chapter 9 of this publication for training requirements.

SECTION IV. RECOUPMENT OF HAZARDOUS MATERIALS

4.27 Purpose and Applicability

A. The purpose of this section is to prescribe procedures to safely receive, inspect, store, segregate, and recoup hazardous materials. Implementation of the requirements identified in this chapter should reduce the risks to personnel, installations, and the environment while assuring compliance with Federal, DoD, and host nation regulations. DoD services/activities operating facilities with established hazardous materials/hazardous waste management systems shall follow guidelines and policy set forth by their respective headquarters.

B. If recoupment facilities, equipment, or personnel are not available or are inadequate for the material involved, then prepare the hazardous material for disposal as outlined in Chapter 11.

C. The contents of this chapter are applicable to personnel involved in the physical recoupment of hazardous materials or in the decision making process of recoupment operations.

4.28 Background

A. During the recoupment process, stock items in a Not Ready for Issue (NRFI) state are reclaimed, brought back to an issuable state, and returned to stock. Most hazardous materials relegated to a recoupment facility are deteriorated or were damaged during handling or storage; however, some materials may have been damaged during shipment. Damage or deterioration may be superficial and may only require replacement of labels, markings, or packing. However, damage or deterioration (e.g., dented, leaking packages) may require transfer of the material to a new package. Replacement of labels, markings, or packing is a packaging function; replacement of packages will be the responsibility of recoupment facilities. Materials with an expired shelf-life may be mistakenly relegated to a recoupment facility. Recoupment personnel must then assure that quality assurance directives are followed.

B. Recoupment, an important part of an installation's hazardous materials operation, has three primary objectives: (1) minimizing hazardous waste; (2) minimizing loss of stock; and (3) maintaining product quality. Returning NRFI items to stock through recoupment, rather than relegating them to disposal for sale as excess personal property or as hazardous waste, is a positive and specific action directed toward decreasing stock loss and hazardous waste generated by installation operations. An effective recoupment operation must have fast turnaround of damaged stock with no loss of product quality.

C. A recoupment operation depends on a variety of factors: recoupment processes, the physical state of the material (e.g., solid, liquid, powder), the hazards associated with the material (e.g., flammability, reactivity, corrosivity, toxicity), and the type and size of the package. Actual recoupment operations that can safely be performed depend on the types of transfer, materials handling, and safety equipment available and on the design of recoupment facilities. Relabeling the hazardous material poses little threat to personnel health. However, operations that involve open packages of hazardous materials (e.g., transfer of hazardous materials to new packages, handling damaged/leaking packages of hazardous materials) pose a risk to personnel, the environment, and the facilities. The degree of risk is a function of the material and its associated hazards. The probability of a hazardous material mishap resulting in a serious incident (e.g., commingling of incompatible materials, fire, explosion, toxic fume generation, environmental/personnel exposure) is higher during recoupment operations than during normal operations because open packages of hazardous materials are involved. Strict procedural and engineering controls must be incorporated into recoupment operations to prevent any damage or injury to personnel, facilities, or the environment.

4.29 Impact of Federal Regulations. Recoupment personnel must be aware of pertinent Federal regulations and their impact on recoupment operations. In addition to the requirements identified in this publication, recoupment personnel must be particularly alert to the following:

A. To comply with the Federal Insecticide, Fungicide, and Rodenticide Act (FIFRA) and Title 40 CFR, concerning pesticides, manufacturers and formulators must submit pesticide labels to EPA for registration before distribution of the pesticide; use of any other label for distribution is unlawful. Recoupment of damaged or deteriorated pesticide labels, packs, or packaging cannot be performed. NRFI pesticides must be returned to the manufacturer for recycling or must be processed through the DRMO as waste.

B. Radioactive substances exceeding exempt concentrations require licensing by the NRC according to Title 10 CFR. Radioactive materials not licensed by the NRC may require licensing by the DoD component. If a licensed radioactive material is damaged, emergency procedures and reporting should be implemented. No sealed radioactive material source shall be opened. All maintenance operations with radioactive materials must be licensed or authorized by NRC or the appropriate service licensing official.

C. Management of hazardous waste generated during recoupment operations, including contaminated equipment and residues from damaged containers, must conform with regulations in Title 40 CFR concerning hazardous waste disposal. Hazardous wastes must either be turned in to the DRMO or disposed of by service contract with a licensed commercial firm or through interservice/interagency support agreements.

D. To comply with the Clean Air Act, regulated by the EPA under Title 40 CFR, each State must develop and enforce an air quality control plan that will attain and maintain the levels of specified air pollutants at the national standard. Recoupment of hazardous materials may result in the emission of air pollutants regulated by air quality control plans (e.g., hydrocarbon vapors). Recoupment personnel at each facility should contact the Environmental Office to determine whether recoupment operations affect the installation's emissions.

4.30 Planning and Coordinating Recoupment Operations

A. To conduct safe and efficient recoupment operations, advance planning and coordination of activities are required. Recoupment personnel should receive advance notification of NRFI materials including identification of the material (e.g., national stock number (NSN), noun name), the unit of issue, the quantity, and the nature of the damage. Recoupment personnel (in conjunction with competent authorities) must assure that sufficient interim storage space is available, that proper equipment and sufficient personnel are available to perform recoupment operations, ensure items are safe to accept, and that recoupment procedures and emergency planning specific to a material can be prepared. Proper advance planning and coordination will promote a safe environment for the receipt, interim storage, and recoupment of NRFI materials and, in turn, will expedite the return of materials to stock.

B. After receiving notice of materials requiring recoupment, recoupment personnel should prepare for the arrival of NRFI items as follows:

1. Determine, from the description of the item's condition, whether recoupment should be performed immediately upon receipt or whether the item can be placed in temporary storage until recoupment operations may be conveniently scheduled. Packages that show evidence of leaks, punctures, or deterioration should be recouped as soon as possible; these materials should be placed in overpacks or salvage drums before transport to recoupment facilities.

2. If the item is to be placed in interim storage, assure that sufficient and acceptable storage space is available. If space is not available, reschedule the date of arrival for a time when space will be available, or coordinate with the Installation Environmental Office to find a suitable storage area.

3. Based on the material identification and HCC recoupment personnel should determine the hazards associated with the specific material, plan the recoupment procedures, and determine the necessary emergency response procedures (if not already identified in the Installation Spill Contingency Plan (ISCP)). Information concerning a material's hazards can be determined from material-specific references such as an MSDS or the HMIS.

4. Assure that appropriate labels, packaging materials, and packages are available that conform to UN packaging requirements and NSN specifications.

C. To assure that personnel can safely perform recoupment operations, competent authorities at each installation must assess the equipment and facilities available to determine which hazard classes can be processed. This assessment should take into consideration any Federal, state, local, DoD or host nation regulations concerning storage and handling of hazardous materials

(e.g., Titles 29, 40, 49, 16, and 10 CFR); applicable building codes (including NFPA codes, the National Electric Code, structural codes); and system safety analyses that have been performed on recoupment facilities or operations. Only the hazard classes certified by authorized personnel may be processed at a recoupment facility.

D. The following materials may not be recouped at any facility because of regulatory limitations or the high risk to personnel:

1. Radioactive commodities (HCC A1) that are unsealed as a result of being damaged. Damaged packaging can be replaced if the source is undamaged and sealed, if the installation possesses a license for the item, and if the RPO has authorized the action.

2. Pesticides. Pesticides (HCC T5) will be returned to the manufacturer/formulator for relabeling or repackaging, or processed for disposal in accordance with chapter 11.

3. Aerosols. Aerosols (V2, V3) must be sent for disposal or crushing to a state- or Federal-permitted facility that has the engineering controls and safety features comparable to those of an aerosol-filling facility. This action can be coordinated through the DRMO.

4. Explosives. Explosives (E1, E2) must be disposed of in accordance with DoD 6055.9, Department of Defense Ammunition and Explosives Safety Standards.

5. Compressed Gases. Compressed Gases (G1 - G9) in Cylinders and Flasks. These must be processed in accordance with DLAR 4145.25/AR 700-68/NAVSUPINST 4440.128/MCO 10330.2C/AFR 67-12, Storage and Handling of Compressed Gases and Liquids in Cylinders.

6. Spontaneously Combustible Materials. Spontaneously Combustible (R1) materials must be sent for disposal to a state- or Federal-permitted facility that has engineering controls, and safety features on the same order as those of a manufacturing facility. This action may be coordinated through the DRMO.

7. K1 Infectious Substances. For disposal of infectious substances (K1), contact the medical officer, veterinary officer, or Defense Personnel Support Center, or process in accordance with Title 42 CFR.

E. The recoupment operation must ensure the following:

1. Ensure contract number, batch, and CAGE code are perpetuated when recontainerizing to negate loss of identity of contractor/manufacturer.

2. Only stage workload that can be physically processed in any given shift. Material, unless seriously leaking or potentially harmful to personnel or the environment, should stay in conforming storage until workload allows recoupment.

3. Perform proper recordkeeping in order to establish an audit trail of costs incurred for man-hours and materials. This will ensure reimbursement to proper parties.

4. Pay particular attention to section 3.22 of this publication in regards to toxic materials they may or may not be able to recoup.

SECTION V. RECEIVING HAZARDOUS MATERIALS AT A RECOUPMENT FACILITY

4.31 General

A. Upon arrival of the hazardous material at a recoupment facility, a visual inspection of the exterior should be performed to assure a release has not occurred. Prior to an actual physical inspection of the interior, the manifest should be reviewed to determine if a potential exists for an adverse impact if any breakage did occur. If so, personnel should suit-up in appropriate personal protective equipment to include respiratory protection prior to opening and/or entering the vehicle for the inspection. Physical evidence for a potential release includes crushed/fallen/shifted loads. If the inspection reveals a hazardous materials spill, personnel should discontinue receiving operations and implement emergency procedures as outlined in chapter 7 of this publication.

B. Material sent to a recoupment processing facility should be accompanied by a Storage Quality Control Report (DD Form 1225). This report identifies the material and describes the corrective action required to return the material to an issuable status.

4.32 Receiving Inspection

A. The purpose of inspection is to assure that materials are properly identified and assigned the appropriate HCC, and that the facility is equipped to perform recoupment of the material.

B. Receiving inspection should be performed prior to offloading; however, if this is impractical, materials should be offloaded onto a staging area for inspection. Incompatible materials must be segregated as outlined in section II.

C. Receiving inspection should verify that the following information is available:

1. Material identification including NSN, manufacturer's name, product identity (part number/trade name), MSDS, and HCC.

2. Unit of issue and type of package, including number of packages per pack.

3. Quantity of material.

4. Shelf-life code (i.e., type I or II), expiration date or inspection/test date.

5. Identification of activity or organization turning in materials for recoupment.

6. Details of the cause and nature of the defect, including whether personnel suspect the material has been contaminated.

D. Recoupment personnel should verify that the specific recoupment operation can be performed at the recoupment facility. If the material cannot be recouped, process the material for disposal as outlined in chapter 11.

E. Discrepancies discovered during the receiving inspection should be resolved per local procedures.

4.33 Accepting Receipt

A. If no discrepancies are discovered during the receiving inspection, recoupment personnel should accept receipt of the material. If an HCC has not been assigned, the HMIS focal point should be contacted and an HCC assignment requested.

B. At the time of receipt, materials should be included on the recoupment schedule. The recoupment schedule should be a prioritized list. The materials that must be recouped right away should appear first (e.g., leaking, punctured, or open packages that are overpacked; Condition Code E materials with pending back orders). These should be followed by the materials that should be recouped as soon as possible (e.g., packages that are likely to leak; rusting containers; materials with an extendible, expired shelf-life or with an extendible shelf-life expiration date within 3 months). Any remaining materials (e.g., slightly damaged containers) should have the lowest priority.

C. When it is determined that the material can be safely offloaded and that receipt can be accepted, the materials should be carefully removed from the transport vehicle or staging area and placed directly into the appropriate recoupment, processing, or holding area. Incompatible materials must be segregated as outlined in section II at all times during storage and transport.

D. If test samples have not already been taken, at this time samples should be drawn of materials suspected to be contaminated and of materials with an extendible, expired shelf-life. These tests are required to assure that product quality is within specifications. Quality Assurance should be contacted concerning test sampling (see section IX of this chapter).

SECTION VI. PROCESS HOLDING OF HAZARDOUS MATERIALS AT A RECOUPMENT FACILITY

4.34 General. The purpose of a holding area at recoupment facilities is to provide a means of segregating incompatible materials until they can be recouped. NRFI items turned in to recoupment facilities have a higher probability of leaking during handling or storage than during normal operations. Efficient segregation and procedural controls are required to prevent commingling of materials that may result in hazardous reactions (e.g., fire, explosion, toxic fume generation, etc.).

4.35 Holding Storage Area Requirements

A. The holding area must provide segregated storage for each storage group that is processed through a facility (as defined by Hazard Storage Area Code (HSAC) and HCCs in this chapter).

A list of HSACs follows, with corresponding HCCs to be handled at facilities. A segregated storage area should be provided for each HSAC. (HCCs that should not be processed within a facility are not included.)

1. HSAC A: HCCs A2, A3

2. HSAC C: HCCs C1, C2, B1, B2, C4, C5

3. HSAC D: HCCs D1, D2, D3, D4

4. HSAC R: HCCs R2, Z6

5. HSAC F: HCCs F1, F2, F3, F4, F5, F6, F7, F8, V4

6. HSAC L: HCCs C3, B3, M1, N1, P2, T4, T6, V1, V5, V6, V7, Z1, Z2, Z3, Z4, Z5, Z7

7. HSAC T: HCCs K2, T1, T2, T3, T7

8. HSAC P. HCCs P1

B. Incompatible storage areas must be segregated. Segregation within compatible storage areas is detailed in Appendix C.

4.36 Holding Area Procedures

A. Materials brought to recoupment facilities should be segregated and placed, according to HCC, in a compatible holding area as outlined previously in this section.

B. Materials that are leaking or likely to leak must be placed in spill pans or overpack drums before being stored in the recoupment facility.

C. Personnel should simultaneously handle compatible materials only. Incompatible materials must be segregated during all phases of recoupment operations. Segregation within compatible holding areas defined by HSACs C and L is required as follows:

1. HSAC C: HCCs C1, C2, C4 and C5 a minimum of 6 feet from HCC B1, and B2.

2. HSAC L: HCC P2 a minimum of 6 feet from combustible/high flash materials (V4, V5, V6).

D. A walkthrough inspection of the holding area by supervisory Personnel should be frequently performed to detect actual or potential release of hazardous materials. If a release is discovered, recoupment personnel should implement emergency procedures as directed in chapter 7 of this publication.

SECTION VII. FACILITY AND EQUIPMENT REQUIREMENTS FOR HAZARDOUS MATERIALS RECOUPMENT

4.37 Requirements for Hazardous Materials Recoupment

A. A hazardous materials recoupment facility must provide a safe working environment that protects personnel against injury or illness, protects the facility against costly damage, prevents hazardous materials from contacting incompatible materials or conditions, and prevents release of hazardous materials into the environment. Ideally, structural, electrical, and mechanical components incorporated into the facility design (in conjunction with transfer, emergency, and safety equipment) should accomplish the tasks listed below. However, personnel and procedural controls (discussed in section VIII) may be required to fully achieve these goals. The facility design must accomplish the following:

1. Minimize personnel exposure to hazardous materials and prevent personnel exposure to toxic materials (especially HCCs D2, F5, K2, T1 through T4, and T7).

2. Segregate incompatible materials to prevent dangerous reactions.

3. Eliminate conditions that may decrease a material's stability or usefulness (e.g., ignition sources, water, warm temperatures, cool temperatures, contamination).

4. Prevent escape of hazardous materials into the external environment.

B. This section will describe basic criteria that must be incorporated into the design of recoupment facilities; however, authorities at each installation must perform a final assessment to determine which hazard classes can be safely processed in the available facilities. To make this determination, personnel must comply with appropriate Federal, state, local, DoD, component, and host nation regulations concerning handling, transfer, and dispensing of hazardous materials; applicable building codes (e.g., NFPA codes, NEC), and system safety analyses. Requirements for flammable/combustible liquids have been included in this section, since a majority of materials handled by recoupment facilities belong to this hazard class.

C. A recoupment facility should be a completely enclosed building without crawl spaces or basements. In some cases, recoupment can be performed in a multipurpose facility as long as walls with a minimum 2-hour fire resistance rating isolate the recoupment area from the rest of the locations, per NFPA 30. Interior firewalls should extend from the floor to the ceiling and should extend a minimum of 32 inches through the ceiling if the ceiling has less than a 1.5-hour fire resistance rating. Exterior walls should have a minimum fire resistance rating of 2 hours.

D. To provide sufficient segregation for safe recoupment of incompatible materials, the facility layout should have a minimum of six (and preferably seven) isolated recoupment workrooms. Each workroom should be assigned a group of compatible materials, based on the HCCs, as follows: (1) flammable/combustible materials (HCCs F1 through F8 and V4); (2) acidic materials (HCCs C1, C2, C4, C5); (3) alkaline materials (HCCs B1, B2) (these materials also may be recouped in workrooms assigned to toxic materials or to flammable/combustible materials); (4) oxidizing materials (HCCs D1 through D4); (5) organic peroxides (HCCs P1 and

P2); (6) dangerous when wet materials (HCC R2); (7) toxic and low hazard materials (HCCs K2, M1, N1, T1, T2, T3, T4, T6, T7, V1, V5, V6, Z1 through Z5, Z7); and radioactive materials (HCCs A2, and A3). Recoupment in workrooms should be restricted to the assigned hazard categories only. However, if a sufficient number of workrooms are unavailable, recoupment of different hazard categories can be performed in the same workroom as long as the following procedures are followed: (1) the workroom is completely decontaminated between operations, including cleaning up spills and removing wastes that have been generated; (2) transfer equipment (e.g., funnels, tubing) is used for compatible materials only; and (3) flammable/combustible liquids and solids are not recouped in the same room as acids, oxidizers, organic peroxides, and water reactive materials.

E. A personnel change/decontamination area should be incorporated into recoupment facilities consisting of a "clean" room (used for donning work clothes and PPE) and a "contaminated" room (used for showering and for removing contaminated work clothes and PPE).

F. Spill control and containment features must be incorporated to prevent spread of spills, commingling of incompatible materials, and release of hazardous materials into the environment. This includes diking around the perimeter of each room in the recoupment facility; continuous, nonporous surfaces; sealed construction joints; and sealed, impervious finish of floor surfaces. Dikes should be capable of containing accumulation from sprinkler system waterflow (in accordance with NFPA 15). Ramps should be incorporated to provide access for personnel and MHE with a maximum slope of 12 percent for personnel exits and a maximum slope of 8 percent for cargo exits.

G. A spill control/containment system is also required for the facility's load/unload pad. This system should include the features mentioned above and a containment trench with a release valve to allow drainage of rainwater accumulation.

H. Each room in the facility should have two emergency exit routes. However, recoupment workrooms may be too small to accommodate an additional emergency exit. In such cases, workstations within a workroom should be arranged so that personnel will have a clear, unobstructed exit route if an emergency occurs. Emergency exits must be equipped with panic hardware and illuminated exit signs and must open in the line of egress.

I. All rooms (including recoupment workrooms) should be separated by walls rising to and integral with the roof. Fire-rated observation windows should be installed (in doors or walls) to allow personnel to view rooms prior to entry.

J. A ventilation system capable of functioning in both a general use mode and an emergency mode should be provided. The ventilation system should supply and exhaust air via mechanical or passive means or a combination of both, and should maintain negative pressures in recoupment workrooms relative to adjacent rooms (including interior corridors and staging areas). The ventilation system should not interfere with the airflow of local exhaust hoods (see transfer equipment requirements in 4.37.K.2.b), but should provide a minimum of 6 room air changes per hour. Exhaust air ducts should be situated a maximum of 12 inches above the floor

for recoupment of NFPA class I flammable liquids. The ventilation system should ensure that shop air is not shared with any administrative areas where personnel unprotected by PPE may be working.

K. Electrical components should consist of inconduit wiring and conform to NEC class I, division 2 standards as specified in NFPA 70, Article 500. In areas where NFPA class I flammable liquids will be recouped, all electrical components within 3 feet must conform to class I, division 1 standards. Areas where flammable liquids are transferred from one to another are included in division 1 whereas division II includes storage areas where the liquid is normally confined in closed containers and can escape only in an accidental release.

1. An automatic fire suppression system is required for recoupment of flammable or oxidizing materials. The system should use an appropriate extinguishing medium. Upon activation, the fire suppression system should deactivate ventilation systems and activate alarm systems.

2. Equipment Requirements for Hazardous Materials Recoupment

a. Recoupment facilities must be equipped with a variety of equipment to safely transfer hazardous materials to new packages. Transfer equipment is required to prevent release of a material or its vapors and to facilitate transfer with a minimal loss of the product. Safety and emergency equipment must be provided that will prevent or minimize personnel exposure/injury and damage if a mishap occurs. This section describes the equipment requirements for a hazardous materials recoupment facility.

b. A variety of factors influence the specific transfer equipment required for recoupment, including a material's physical characteristics (e.g., vapor pressure, physical state), a material's hazardous characteristics (e.g., flammability, corrosivity, toxicity), and the package. Transfer equipment, in conjunction with controls (e.g., spill control/containment, ventilation, eye washes, deluge showers, etc.), should prevent release of materials or dispersal of vapors or dust into the work environment during recoupment operations. Transfer equipment requirements include the following:

(1) Transfer equipment, including pumps and funnels, must not react with or absorb the material being recouped. Particular care should be taken when equipment is chosen for solvents, corrosives, and reactives.

(2) When recouping flammable, reactive, or shocksensitive materials, transfer equipment should be nonsparking and designed to minimize friction and static charge buildup. Equipment must be bonded or grounded when flammable/combustible materials (including organic peroxides) are transferred between containers that are conductive (e.g., metal cans) or nonconductive and with capacity greater than 5 gallons (e.g., plastic-lined drums). Bonding or grounding should be achieved by one of the following methods: (1) by keeping transfer equipment (e.g., fill spout, nozzle, fill pipe, funnel, strainer) in continuous contact with the edge of the fill opening; (2) by attaching a bond wire between metal parts of both containers; or (3) by attaching a ground wire between metal parts of each container and the ground.

(3) Whenever practical, recoupment operations that release or generate airborne

contaminants must be equipped with engineering controls that prevent operators from receiving exposures that exceed the occupational exposure limits. Engineering control methods include, but are not limited to, containment in cabinets or hoods, reduced temperature for vapor reduction, wet methods for dust control, and local exhaust ventilation to remove contaminants from the air. Controls must be designed to maintain toxic vapor/particulate concentrations below the permissible exposure limits established by OSHA in Title 29 CFR, part 1910, and by ACGIH, and to maintain flammable vapor concentrations at a maximum of 25 percent of the Lower Explosive Limit (LEL). If properly designed and used, control devices will minimize personnel exposure to hazardous substances and prevent the buildup of an explosive atmosphere. The Industrial Hygiene Office should periodically monitor recoupment workrooms to assure that the control devices are functioning properly.

(4) Special MHE, such as a hydrolift carrier, may be required for managing large containers.

(5) Recoupment of highly toxic materials, infectious substances, and cytotoxic drugs should be performed in a glove box or biological safety cabinet.

c. Safety and emergency equipment must protect personnel from exposure or injury and the facility from damage in the event of a mishap involving hazardous materials. Safety and emergency equipment requirements include the following:

(1) Appropriate personal protective equipment (PPE) generally consisting of gloves, goggles, boots, and coveralls. Additional PPE such as respirators, face shields, and chemical-resistant coveralls, may be required depending on the material's hazardous characteristics. When selecting PPE, consideration must be given to the chemical and physical characteristics and related hazards of the material and to the protection already given by facility and equipment controls. A job safety analysis must be conducted to determine the exact PPE requirements based on the tasks being performed and the materials used. The safety and health officer and/or industrial hygienist should be consulted concerning additional PPE requirements.

(2) Eyewash/shower stations that conform to the "American National Standard for Emergency Eyewash and Shower Equipment" (ANSI Z358.1), or the individual military service equivalent, must be provided. Eyewash/shower stations should be situated within 25 feet from each recoupment workstation. Competent authorities should assure that tempered water (i.e., 60°F. to 95°F.) is provided to eyewash/shower stations and that valves are designed to provide a continuous flow of water for at least 15 minutes without the need for constant activation. A shutoff valve should be provided to enable deactivation of the system when required.

(3) First-aid kits and fire blankets should be strategically located within the facility unless individual military service policy specifies otherwise.

(4) Spill control and containment equipment including absorbents, neutralizers, and chemical mops should be available.

(5) Fire extinguishers containing the appropriate fire extinguishing media should be provided in each recoupment workroom and interim storage area.

(6) The facility should be equipped with a pull-box alarm at each exit, and heat/smoke detectors that activate alarms both locally and at the fire department should be installed.

SECTION VIII. PROCEDURAL REQUIREMENTS FOR HAZARDOUS MATERIALS RECOUPMENT

4.38 General

A. Recoupment of hazardous materials can be divided into two categories, "care and preservation" and "open container transfer." Care and preservation recoupment requires relabeling, remarking, cleaning, or repacking materials without opening the original package. Care and preservation recoupment will be performed by packaging personnel under the COSIS Program. Open container transfer recoupment involves the transfer of hazardous materials from damaged packages to new packages and thereby exposes personnel and facilities to the hazards associated with the material (e.g., flammability, toxicity, corrosivity, reactivity). To safely transfer these materials, procedural controls must be implemented that will augment the safety provided by recoupment facility and equipment controls. This section will describe the procedures required to safely and efficiently return to an issuable state materials with severely damaged or deteriorated packages in need of replacement. General procedural requirements are detailed in this section. Preparation for transfer and transfer procedures are detailed in section 4.39, decontamination and cleanup procedures in section 4.40, and emergency procedures relevant to recoupment operations in section 4.41.

B. During all phases of recoupment operations, incompatible materials must be segregated as outlined in section II for holding areas. Also, recoupment personnel should assure that incompatible conditions that may reduce the stability of a product are eliminated from the environment in which the material is recouped. Incompatible conditions may include flame, heat, sparks, sunlight, water, humidity, air, or other manufacturer-identified conditions.

C. The quality of the product must be maintained. Before beginning recoupment, recoupment personnel should verify that the shelf-life has not expired, and during open container transfer operations, personnel should assure that the material is not contaminated. Quality control procedures detailed in section IX should be implemented.

D. Recoupment personnel should maintain the following records:

1. An inventory of hazardous materials in the holding area and recoupment area should be maintained, and periodic updates should be sent to the fire department and spill response team. This should provide a means for emergency response personnel to quickly assess the hazards present in the facility in the event of a mishap.

2. A record of recoupment operations should be maintained, including the identity of personnel who performed the recoupment, the identity and quantity of material recouped (including NSN, hazardous constituents, and type of package), the type of recoupment performed, and any mishaps that occurred during recoupment (e.g., spill, personnel exposure). These records can be used to improve recoupment operations and may be vital in determining the health condition and required treatment of injured personnel.

3. An inspection and maintenance log should be maintained for each piece of equipment. The log should identify as a minimum equipment inspected/tested, the nature of the defect discovered, corrective action taken, and the responsible party.

4. An entry/exit log should be maintained identifying the personnel and visitors present in the facility.

E. Access to recoupment facilities and interim storage areas must be restricted at all times. Visitors should be escorted by authorized recoupment personnel.

F. Eating, drinking, smoking, and chewing should be prohibited in recoupment work areas and interim storage areas. An isolated area should be provided for personnel breaks.

G. Recoupment personnel should perform operator's maintenance or assure that operator's maintenance is performed on equipment and mechanical components. If equipment requires repair, personnel should schedule repair work with appropriate maintenance personnel as soon as possible. If repair work is performed on equipment that protects personnel or facilities (e.g., ventilation system, fire suppression system, emergency eyewash/shower), competent authorities should verify that the equipment functions properly.

H. The recoupment supervisor and personnel must have appropriate training, which should include the following as a minimum:

1. Safe procedures for handling, storage, and transfer of hazardous materials.

2. Recognition and classification of hazards associated with materials brought to recoupment facilities.

3. Personal protective equipment program requirements.

4. Emergency response procedures, especially first aid.

5. Understanding and use of MSDS.

I. Materials should be transferred from holding areas to recoupment areas at the time recoupment is to be performed. Recouped materials should be returned to stock as soon as possible.

J. When replacing a material's cushioning/dunage or outer container, packaging personnel should verify that the material's packaging has not deteriorated or become damaged. If the packaging has deteriorated or has been damaged, the material must be processed through a recoupment facility meeting criteria specified in section VII.

4.39 Preparation for Open Container Transfer

A. Open container transfer recoupment involves the transfer of hazardous materials from a

damaged or deteriorated package to a new package. During open container transfer operations, recoupment personnel and facilities are at risk of exposure to materials and their related hazards. For safe transfer of the material to new packages, recoupment personnel must prepare for the specific operation and must implement procedural controls to assure that a mishap (e.g., spill, personnel exposure, fire) does not occur.

B. To assure that transfer operations will run smoothly and safely, the following actions must be taken before recoupment operations begin:

1. The recoupment supervisor shall request that local qualified safety and health personnel evaluate the workplace and assure that the facility is adequate for hazardous materials recoupment. Periodic testing of facility equipment (e.g., local exhaust hoods, ventilation systems) may be required.

2. Recoupment personnel and supervisors should review and be aware of a material's hazards including its toxicity, incompatible materials and conditions that should be avoided, and necessary emergency procedures to follow if a mishap occurs.

3. Specific recoupment procedures, including safety procedures, should be developed and reviewed before operations begin. These may be compiled into a safety/procedural manual, to be used by recoupment personnel, describing the procedures for recoupment of hazard classes that may be encountered.

4. The recoupment supervisor shall request that local qualified safety and health personnel evaluate the workplace and select appropriate personal protective equipment (PPE) for use by workplace personnel. Minimal PPE requirements are gloves, chemical splash goggles, boots, and coveralls; however, additional PPE may be required. When selecting PPE, personnel should first evaluate the available equipment and determine the equipment's effectiveness in reducing the material's hazards. Next, the types of PPE (e.g. face shields, respirators) must be selected that will provide complete protection to recoupment personnel. Selected PPE must resist degradation, penetration, and permeation by the materials being recouped; must not limit personnel mobility; must be resistant to tears and punctures; and must be disposable or easy to clean.

5. The recoupment supervisor should assure that equipment is functioning properly and that appropriate hazard warning signs are posted.

C. Transfer of hazardous materials must be performed in a manner that will prevent personnel exposure to the material, that will prevent exposure of the material to incompatible materials and conditions, and that will prevent any release of the material. The following procedures should be incorporated into all transfer operations:

1. A minimum of three recoupment personnel should be present during all transfer operations, so that, if personnel injury occurs, one person can assist the injured person, and the remaining employee can call for help.

2. Personnel and visitors present in recoupment areas shall wear appropriate PPE.

3. Transfer of hazardous materials must be in a work area segregated from incompatible materials. Equipment must be used for compatible materials only.

4. Incompatible conditions (e.g., ignition sources, water) must be eliminated from recoupment work areas.

5. During transfer operations, ventilation systems (including local exhaust hoods) shall be activated, and to assure that a proper airflow is maintained, doors to the work area shall be kept closed.

6. When using local exhaust hoods, recoupment personnel should position package openings as close as possible to the hood's intake vent.

7. Recoupment personnel should assure that they have a clear emergency egress route during all phases of recoupment operations. Exit routes must not be blocked by equipment, debris, or materials being processed through the recoupment facility.

8. Transfer operations of liquids should assure that splashing of the material does not occur.

9. Transfer operations of volatile materials should assure that hazardous concentrations do not accumulate in the workroom and that appropriate control measures for hazardous waste air emissions as specified in 40 CFR, Part 264 are implemented when appropriate.

10. Transfer operations should assure that dispersion of powdered material does not occur.

11. Transfer operations of flammable or shock-sensitive materials should assure that friction does not occur and that a static charge does not build up. All equipment and packages should be grounded or bonded during recoupment of these materials as directed in section VII paragraph 4.37.K.2.b.2 and in NFPA 77.

12. If the specifications of a material have changed due to transfer operations (e.g., remnants of a 55-gallon drum were transferred to 5-gallon cans), recoupment personnel should assure that a new and appropriate NSN is assigned, and that action is taken to label new packages with the correct NSN, manufacturer's name or CAGE and part number/trade name and to make necessary adjustments to stock records.

13. New packages and their labeling must conform to DOT regulations (Title 49 CFR, parts 171 through 178) and to NSN specifications. Only package configurations that have been tested to performance oriented packaging specifications may be used to package hazardous materials.

4.40 Decontamination and Cleanup

A. After recoupment is complete and at the end of each workday, appropriate cleanup and decontamination procedures should be followed to assure that waste generated during operations is disposed of properly and that recoupment personnel are not exposed to hazardous residues.

B. Solid or liquid waste, including disposable contaminated equipment and PPE, should be collected and placed in airtight sealed containers. Incompatible wastes must be placed in separate containers. Waste should be disposed of in accordance with chapter 11 of this publication.

C. Old packages containing residues of materials listed in Title 40 CFR, part 261.33(e), must be triple rinsed with an appropriate solvent. The rinsed liquid residue must be disposed of as hazardous waste as outlined in chapter 11, and the triple-rinsed packages should be slashed and processed as scrap or sent to a landfill. If these packages are not triple rinsed, they must be processed as hazardous waste in accordance with chapter 11 of this publication and the installation's hazardous waste management plan.

D. Equipment and PPE must be decontaminated, cleaned, and dried before it can be reused in another recoupment operation. Equipment and PPE should be reused with compatible materials only. If equipment or PPE cannot be cleaned, it must be disposed of as hazardous waste. Contaminated cleaning solutions, detergents, rags, etc. must be disposed of as hazardous waste. Consult the installation hazardous waste management plan for specific disposal requirements.

E. Floors and working surfaces (including workbenches) must be decontaminated, cleaned, and dried at the end of each workday. Residues should be completely cleaned up and processed according to its hazard.

F. Personnel handling hazardous materials must wash their faces and hands before taking personal or administrative breaks. Each person should take a complete shower at the end of each working day before leaving the recoupment facility.

4.41 Emergency Procedures for Hazardous Materials Recoupment

A. If an hazardous materials spill occurs or a fire starts during any part of recoupment operations, personnel should evacuate the area, immediately notify the spill response team and/or fire department, and follow procedures outlined in chapter 7.

B. If a worker is injured or exposed to hazardous materials during a mishap, recoupment staff will take immediate action necessary to save the injured person's life, if it has been verified that there is no danger that the rescuer may also be overcome by the chemical vapors, and to notify rescue personnel. (Follow the procedures in chapter 7.)

SECTION IX. RECOUPMENT QUALITY CONTROL

4.42 General

A. Procedures should be included in recoupment operations to assure the integrity of recouped materials. Materials cannot be issued when they do not conform to product specifications, when their quality has deteriorated, or when they have been contaminated. Recoupment operations must return materials to stock in a condition as good as that of the original unused product.

B. If facility or recoupment personnel suspect that material has deteriorated, the appropriate personnel should be contacted to draw a sample. If sampling would result in a residual quantity unsuitable for a specification NSN (paragraph D below), the recoupment will be discontinued and the material should be turned in to the DRMO or disposed of through contract with a licensed commercial firm or through interservice/interagency support agreements. Samples should be tested to assure that the material meets specifications. Situations that will require testing include the following:

1. When facility or recoupment personnel know or suspect that the material has been contaminated (during transport, warehousing, or recoupment operations).

2. If the shelf-life has expired (or if the shelf-life will expire within 3 months) and the installation is applying for an extension of the shelf-life; the shelf-life can be extended for materials with a Type II shelf-life code only.

C. If the test sample proves that the material has not deteriorated, recoupment procedures can continue. However, if the product has deteriorated or if the shelf-life cannot be extended, the material should be turned in to the DRMO or disposed of through contract with a licensed commercial firm or through interservice/interagency support agreements.

D. Another aspect of maintaining product quality is to assure that no loss of material has occurred. Personnel must assure that a recouped package contains the full amount of material as specified by the NSN. If a partially empty package is turned in for recoupment, the material will have to be transferred to smaller packages that will meet specifications.

E. Personnel obtaining samples shall follow all safety requirements as specified in this publication.

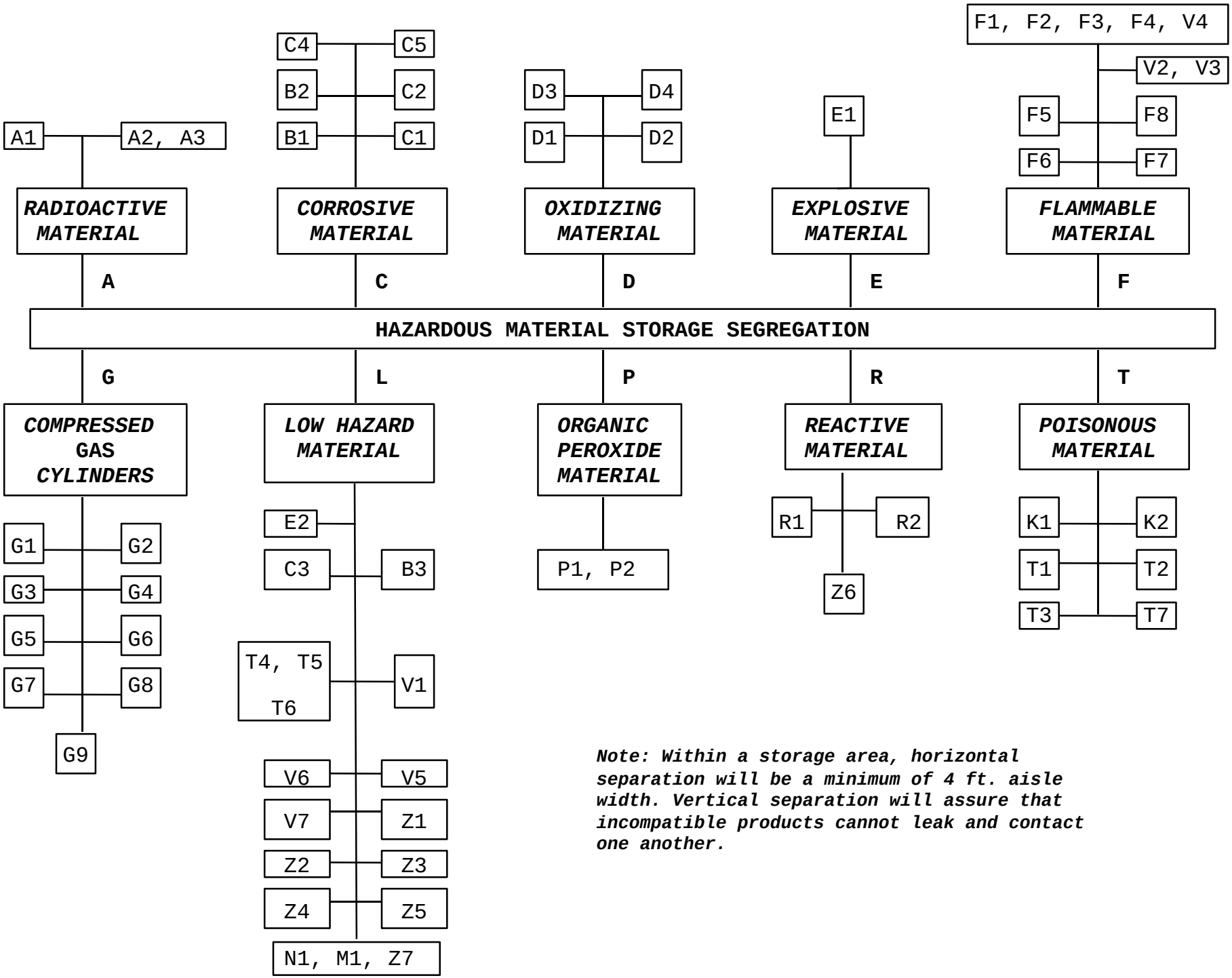


Figure 4-1. Hazardous Material Storage Segregation Chart

CHAPTER 5

SELECTION AND ISSUE OF HAZARDOUS MATERIALS

SECTION I. GENERAL

5.1 Purpose and Applicability

A. The issue function is a critical function for the entire logistics operation. The basic objective is to satisfy the customers' demands on time and at the lowest cost possible to the Government. In the case of hazardous materials, however, cost considerations must include the additional effort required to ensure compliance with regulations designed to minimize the risk of environmental damage and cost associated with cleanup and disposal of hazardous wastes. Because of the additional costs associated with the movement of hazardous materials, it is essential that they be properly identified and segregated during movement from storage locations to the packaging branch. It is equally important that sound judgment be exercised when consolidating the materials for shipment to ensure compliance with Federal regulations.

B. The provisions of this chapter apply to all personnel involved in processing release documents, selecting stock, staging, and moving hazardous materials to the packaging line.

5.2 Planning and Coordinating the Operation. The effectiveness of the shipping operation depends on how well storage tracking operations have been performed during the stock selection process. In some cases, the only indication that the material is hazardous will be that it is located in a warehouse dedicated to the storage of hazardous materials. When unit and/or intermediate container quantities necessitate the removal of material from the outer container during stock selection and issue, the DOT shipping and warning labels normally will not be on the inner containers. Provisions must be made to effectively segregate incompatible materials from the time of stock selection until movement to the packaging operation is completed. The packaging section will repackage, if required, and/or apply the DOT shipping and warning labels prior to the material being offered for transportation. Transportation load planning for hazardous materials must be in accordance with the load/compatibility requirements specified by the regulation or tariff governing the mode of transportation selected. Effective coordination is required, therefore, between storage operations, packaging operations, and the facility transportation officer. Outgoing shipments must be consolidated into shipping units (SU) and, in turn, into transportation units (TU) to minimize costs. Many facilities effectively track hazardous materials through the use of computerized data systems. Such systems are generally designed to store and pick materials based on preprogrammed criteria. Care must be exercised to assure that the criteria used follow the latest regulatory requirements.

5.3 Impact of Federal Regulations on Issue Operations. Hazardous materials arrive at the installation packed and labeled in accordance with the provisions of Title 49 CFR. During the storage period, the material is subject to the provisions of Title 29 CFR, 40 CFR, and to DoD regulations. When the material is removed from stock and prepared for reentry into domestic and international transportation systems, the provisions of Title 49 CFR again become applicable.

5.4 Hazardous Waste Minimization Responsibilities. Hazardous waste minimization responsibilities are generally applicable to material issue operations. However, the following measures are of particular importance during stock selection and movement of material to the packaging line:

A. Unless otherwise excepted by DoD Directive 4140.27-M, stock selectors will strictly adhere to the FIFO principle. Issues will be directed against the oldest stocks or those with the least remaining shelf-life unless those stocks are restricted from issue to specific units, activities, or geographical areas due to short shelf-life expectancy (e.g., Supply Condition Code B or C).

B. During the course of stock selection, employees must be alert to material for which the shelf-life has expired (Type I) or past inspection/test date (Type II), and for packages that have been damaged during storage. In those instances where type II material is past the inspection/test date, action should be initiated to determine if the material can be extended. When the shelf-life of an item is extended, employees are to ensure the extension is documented with a DD Form 2477 or its equivalent.

C. Precautions must be taken to prevent accidental damage to materials during removal from storage locations and subsequent movement to staging areas or the packaging operation. Release of hazardous substances discovered during stock selection will be reported in accordance with the provisions of chapter 7 as otherwise specified herein.

SECTION II. ISSUE PROCESSING

5.5 Processing Release Documents

A. Release documents will be received via AUTODIN or other means. Each release document will be mechanically subjected to a validation audit to assure that all essential data is complete. Unacceptable or invalid release documents will be returned to the originator.

B. Acceptable release documents will subjected to additional consolidation logic prior to release for issue processing. (Note that the Distribution Standard System (DSS) uses the Variation Code and the Hazardous Materials Information System (HMIS) uses the Part Number Indicator to distinguish between different formulations under the same CAGE and NSN.) SUs will, be consolidated based on load/storage compatibility requirements specified by DOT, ICAO, IMO, and AFJMAN 24-204/TM 38-250/NAVSUP PUB 505/MCO P4030.19/DLAI 4145.3 as applicable. Maintain segregation of incompatible materials during the stock selection process.

5.6 Stock Selection Procedures

A. Hardcopy release documents will be distributed in the sequence logic set by the system. When radio frequency (RF) capability is used, the user will be notified when a pick is available based on logic set in the system.

B. Material will be selected from stock based on the data contained in parameter tables in the system and information contained on the requisition. The exact quantity specified on the release document will be selected whenever possible. The DD Form 1348-1 (Issue Release/Receipt Document) displays pertinent information such as document number, quantity, NSN, and condition, etc. An RF device or hardcopy pick ticket displays information pertaining to locations.

C. If the required quantity is not available in the location shown on the pick ticket/RF device, the release document will be processed in accordance with denial action procedures.

D. Stock will be selected based upon SHELF LIFE criteria/FIFO principles for shelf life items. For non shelf life items, the policy is to use most efficient pick path thereby limiting the number of locations to pick from.

E. If the NSN is under inventory, follow local selection procedures.

F. At some point in the receiving process or prior to offering for transportation, the product must be queried to ensure an MSDS is in the HMIS. If not, an MSDS must be obtained in accordance with local procedures, input into the HMIS, and offered with each shipment until the HMIS MSDS input has been confirmed. In the event of Foreign Military Sales (FMS), an MSDS must be offered with each shipment since FMS recipients generally do not have access to the HMIS.

5.7 Temporary Staging of Hazardous Materials. When circumstances dictate that material not be moved directly from storage to the packaging operation, provisions must be made for segregating the material in a manner that will preclude commingling of incompatible materials. The probability of accidental damage or release of hazardous substances is significantly increased during this phase of operations. In some cases, material originally packaged and labeled for transportation will have lost its hazard identity when outer packagings and labels were discarded for various reasons. It is imperative, therefore, that segregation requirements be rigidly maintained from the time material is removed from stock to the time it has again been packaged and labeled for transportation. When space considerations permit, the required segregation may be achieved by retaining the material in the immediate vicinity of the storage location from which it was selected. When an alternative central staging area is used, precautions must be taken to ensure that segregation is maintained throughout all movements until the material is received at the hazardous materials packaging operation. The primary method of segregation used should be the HCC system described in Chapter 4. This method should be followed until the material is staged prior to loading. At this point, segregation requirements are determined based on the hazard class of the material and the segregation table for carriage by public highway, shown as Figure 6-3 of this document, and printed in 49 CFR 177.848.

5.8 Direct Shipments From Storage Areas. In some cases, it will be more practicable to issue and ship directly from the storage area than to move the hazardous materials to a staging area or freight consolidation area. This is particularly true in the case of bulk shipments, drummed

products or compressed gas cylinders stored in open areas. Local procedures should be developed to provide complete control of issue and transportation documentation during such transactions.

5.9 Material Found Damaged During Stock Selection. Packages found to be damaged or leaking during the stock selection process will be immediately reported to the supervisor and managed in accordance with the host Hazardous Material/Hazardous Waste Management Plan and the Installation Spill Contingency Plan (ISCP). Operations in the immediate area will be suspended and will not be resumed until authorized by the supervisor. If the material can be repackaged, it will be processed through recoupment and returned to stock. If the material has been neutralized or overpacked by the spill response team, it will be processed as outlined in chapter 11 for DRMO.

5.10 Processing Disposal Release Orders (DRO). As DROs are received, they should be subjected to a validation audit in the same manner specified for release documents. In the case of hazardous materials, however, the material will not be removed from the stock location until the turn-in has been coordinated with the servicing DRMO. DRMO acceptance of physical custody of hazardous materials depends on a conforming storage determination by the DRMO and the availability of proper equipment and trained personnel to accept turn-in. Defense activities will forward turn-in documentation to the DRMO, which may, in turn, schedule a prereceiving visit to the facility. Physical custody of the material will be determined during this visit. Detailed procedures are contained in DoD 4160.21-M, Defense Materiel Disposition Manual, and in DRMS standard operating procedures.

5.11 Reports of Hazardous Materials Incidents

A. Notifications of incidents involving personnel exposure to ionizing radiation, property damage, or releases of radioactive material will be made to the Nuclear Regulatory Commission and appropriate service/agency officials in accordance with AR700-64/DLAM 4145.8/NAVSUPINST 4000.34/AFR 67-8/MCO P4400.105, Radioactive Commodities in the DoD Supply Systems, and local directives.

B. In the event of an accidental release or spill of an item assigned an RQ, the report will be submitted in accordance with the provisions of chapter 7 of this publication or in accordance with military service procedures.

C. Title 29 CFR, part 1904.8, requires that an oral or written report be made to the nearest office of the Area Director of OSHA, US Department of Labor, in the case of accidents involving a fatality or the hospitalization of three or more employees. This report will be made within 8 hours after the occurrence.

SECTION III. ISSUE PROCESSING QUALITY CONTROL

5.12 General. Minimum quality control procedures applicable to the issue or stock selection function shall incorporate additional periodic sampling procedures designed to ensure that:

A. The FIFO principle is adhered to in selecting stock for issue.

B. All reports and notifications are made in connection with accidental releases of hazardous substances or exposure to ionizing radiation occurring in connection with issue processing.

C. The identity of hazardous material items is perpetuated throughout the issue and packaging process. This identity must go down to and include the part number/trade name under which the product is sold.

D. Required segregation of hazardous materials is maintained from time and point of issue until material is moved to the packaging operation.

CHAPTER 6

PREPARATION FOR MOVEMENT

SECTION I. GENERAL

6.1 Purpose and Applicability

A. This chapter outlines the general requirements for packaging, marking, and labeling hazardous materials to ensure compliance with Federal and International regulations. Its provisions apply to all hazardous materials received, stored, and distributed by installations.

B. The provisions of this chapter are applicable to all installation employees whose duties involve care of supplies in storage (COSIS) or the packaging, marking, and labeling of hazardous materials in preparation for shipment.

6.2 Installation Packaging Responsibilities. Installations supporting a packaging activity have the following responsibilities:

A. To repackage items in storage as required by the results of periodic surveillance inspections. During prolonged storage, packaging materials may deteriorate or become damaged, thus failing to provide the required protection. This is particularly true in the case of hazardous materials.

B. To package repaired or modified items for storage or shipment. At the installation level, packages containing hazardous materials will occasionally require repackaging as a result of recoupment actions.

C. To package outbound shipments in accordance with the specific requirements outlined in applicable transportation modal regulations.

6.3 Regulations Applicable to Installations

A. DLAR 4145.7/AR 700-15/NAVSUPINST 4030.28/AFR 71-6/MCO 4030.33, Packaging of Materiel. This regulation covers packaging requirements, specifications, levels of protection, and project information exchange requirements. Policies and procedures for UN standard packaging (performance oriented packaging) and the protection of electrostatic discharge sensitive items are incorporated.

B. DLAD 4145.41/AR 700-143/NAVSUPINST 4030.55A/AFPD 24-210/MCO 4030.40A, Packaging of Hazardous Material. This publication establishes uniform procedures for the Military Services and DLA for packaging hazardous materials for safe, efficient, and legal storage, handling, and transportation.

C. Prepare hazardous materials for transportation according to the applicable modal regulation. Regulations governing commercial shipments are introduced in paragraph 1.5A. Prepare

shipments for transportation by military or DoD commercial contract aircraft according to AFJMAN 24-204/TM 38-250/NAVSUP PUB 505/MCO P4030.19/DLAM 4145.3, Preparing Hazardous Materials for Military Air Shipments.

6.4 Hazardous Waste Minimization Responsibilities. The responsibilities outlined in Chapter 4, Section I, Paragraph 4.3 are applicable to packaging operations.

6.5 DOT Exemptions and DoD Certificates of Equivalency (COE)

A. DOT Exemption. Title 49 CFR, Part 107, Subpart B, prescribes procedures for obtaining administrative relief from DOT requirements. An exemption is authority granted by the DOT to deviate from the requirements of Title 49 CFR, parts 100-199, based on proof that an equivalent level of safety is provided by the deviation. DoD is required to transport hazardous materials that are forbidden from carriage by passenger aircraft or that are packaged in quantities exceeding those allowable in Title 49 CFR for cargo aircraft only.

B. DoD COE. A COE is approval issued by the responsible command that the proposed packaging for shipment of hazardous materials equals or exceeds the requirements of Title 49 CFR, Parts 100-199.

C. Competent Authority Approval (CAA). A CAA is authority granted by DOT to deviate from specific requirements of the IMDG Code or ICAO Technical Instructions for international shipments.

6.6 Waivers of Military Air Packaging Requirements. Comply with AFJMAN 24-204/TM 38-250/NAVSUP PUB 505/MCO P4030.19/DLAM 4145.3, for shipments of hazardous materials and their packaging by military air. Activities must obtain waiver approval before releasing materials or packaging not in compliance with this publication into the Military Air transportation system. Chapters 2 and 3 of the above publication covers deviations, waivers, and special requirements.

SECTION II. PLANNING THE PACKAGING OPERATION

6.7 General. Much of the difficulty associated with the storage, handling, and transportation of hazardous materials could be substantially reduced if the importance of proper packaging were recognized by all concerned. Packaging personnel must, therefore, have a thorough understanding of the hazard class of the material to be packaged and the mode(s) of transportation that will be involved. In addition, they must ensure that the material being processed is safely packaged and, when offered for transportation, meets all packaging, marking, and labeling requirements of the appropriate modal regulation (i.e. Title 49 CFR, ICAO, IMDG, military regulations), and MIL-STD-129.

6.8 Packaging Operation Layout. General guidelines for planning a packaging operation layout are in accordance with component directives. The actual layout, which will vary by installation, will be based on the total volume of material to be packaged, available space, and

various other local operating conditions. In addition to basic layout factors, the requirement for the segregation of incompatible materials must be considered. While a separate packaging line is not required for each hazard class or HCC, strict precautions must be taken to reduce the possibility of accidental co-mingling of incompatible materials during this phase of the operation.

6.9 Pack Area and Inspection. Immediately after the material is moved to the pack area, it will be inspected for damage that may have occurred during stock selection or subsequent movement from the storage area to the packaging operation. Installation employees performing this inspection must be aware that their failure to identify and correct deficiencies at this time may cause additional hazards during transportation. If inspection discloses that the damage or deficiency is minor (e.g., obliterated labels or markings, minor package abrasions or tears, etc.) and the material is not a pesticide, it may be moved directly to the packaging operation where required repairs will be made. In the case of pesticides, corrective action will be taken in accordance with Chapter 3, Section VIII, Paragraph 3.22 of this document. In the event of substantial package damage or evidence of leaks or suspected leaks, the supervisor will be notified and spill response procedures initiated in accordance with Chapter 7 of this document.

SECTION III. PACKAGING, MARKING, AND LABELING OF HAZARDOUS MATERIAL

6.10 General Packaging Requirements

A. The general packaging requirements for hazardous materials are outlined in Title 49 CFR, Section 173.24. Each package used for the shipment of hazardous materials shall be designed, constructed, maintained, filled, and closed so that under normal conditions of transport:

1. There will be no identifiable release of hazardous material to the environment.

2. The effectiveness of the package will not be substantially reduced. That is, impact resistance, strength, and packaging compatibility must be maintained for minimum and maximum temperature changes encountered during transport.

3. There will be no mixture of gases or vapors in the package which could through increase of heat or pressure significantly reduce the effectiveness of the packaging.

B. Outage and Filling Limits. When packagings or receptacles are filled with liquid hazardous materials, sufficient ullage (outage) must be left to ensure there is no leakage or permanent distortion of the packaging or receptacle as a result of expansion due to temperature changes encountered during transportation. Liquids must not completely fill a receptacle at a temperature of 55° C (131° F) or less.

C. Authorized Packagings. A package is authorized to contain a hazardous material only if the packaging is cited in the specific packaging section in Column 8 of the 49 CFR 172.101 Table for that material and conforms to the special provision requirements of Column 7 of the 172.101 Table. Specification packagings (including UN standard packagings) must meet the

requirements in Parts 178 and 179 of Title 49 CFR. UN packagings must meet the performance test requirements specified in Part 178, Subpart M of Title 49 CFR for the packing group shown in Column 5 of the 172.101 Table.

D. Title 49 CFR, Section 173.27 cites the general requirements that apply to packages offered or intended for transportation by aircraft. The requirements of this section are in addition to the requirements of Title 49 CFR, Section 173.24.

E. Export Shipments. Often the shipper will not know the ultimate mode of transportation for export shipments. When this happens, the item may be packaged for surface while intermediate shippers may plan for air shipment. When this possibility exists, the original shipper should attempt to contact downline shippers and forwarders to determine if air eligible packaging and certification is required because this can generally be accomplished in a more cost effective manner if performed by the original shipper rather than by downstream shippers. It is the originating shipper's responsibility to prepare the shipment for transportation to the ultimate destination.

F. Palletization. Proper palletization should be accomplished incident to shipment in accordance with MIL STD 147, Palletized Unit Loads.

6.11 Packaging Process

A. The first step in determining packing, marking, and labeling requirements is to select the mode of transportation to be used. This will be governed by the nature of the material, mode restrictions, transportation priority, required delivery date, weight and cube of the shipment, cost of transportation, distance to be shipped, and mode(s) of transportation serving the installation and the consignee.

B. When the mode of shipment has been determined, specific packing, marking, and labeling requirements can be determined. Although a central data base may provide information on packing, marking, and labeling requirements, packaging personnel must have a working knowledge of Title 49 CFR and other regulations governing the shipment of hazardous materials. Personnel involved in this operation must have current copies of the regulations available for use.

C. After the mode of shipment has been selected and the material has been inspected for packaging configuration, the packager will consult the regulation that governs that mode of transportation and the DoD PC POP data base. A general guide for determining the packaging requirements is shown in Section I, Appendix E of this publication.

D. When required to construct a hazardous material package, DoD personnel will use the Personal Computer - Performance Oriented Packaging (PC-POP) program to determine packaging configurations that have been tested to the performance standards. For access to this program, contact the Defense Distribution Center, DDC-TO, 2001 Mission Drive, New Cumberland, PA 17070.

6.12 Marking Requirements

A. Packages containing hazardous materials that are offered by installations for shipment must be marked in accordance with the requirements outlined in Title 49 CFR, Part 172, Subpart D, DoD POP data base, and MIL-STD-129.

B. A guide for determining marking requirements is shown in Section II, Appendix E of this publication.

6.13 Labeling Requirements

A. Requirements for labeling are cited in Title 49 CFR, Part 172, Subpart E. Each person who offers for transportation or transports a hazardous material must label the package with labels specified for the material in Column 6 of the table in 49 CFR, Section 172.101.

B. Exception to Labeling Requirements. Certain exceptions to labeling requirements are provided for limited quantities as applicable in Part 173 of Title 49 CFR.

C. Selected labeling requirements which may be of special interest to DoD personnel are summarized as follows:

1. A label is not required on a package or unit of military explosives, including ammunition, shipped by or on behalf of the DoD when in freight container load, carload or truckload shipment, if loaded and unloaded by the shipper or DoD. A label is also not required for unitized or palletized break-bulk shipments by cargo vessel under charter to DoD if at least one required label is displayed on each unitized or palletized load.

2. A label is not required on a package containing a hazardous material other than ammunition that is loaded and unloaded under the supervision of DoD personnel and escorted by DoD personnel in a separate vehicle.

D. In addition to transportation labels, the OSHA Hazard Communication Standard (HCS) requires hazard warning labels on a package. Prior to leaving the installation, each container of hazardous materials will be labeled with the: (1) identity of the hazardous chemical(s), (2) appropriate hazard warnings, and (3) name and address of the chemical manufacturer, importer, or other responsible party. New labels need not be affixed if existing labels already convey the required information. When the manufacturer's label has been removed or obliterated, the DoD OSHA Hazard Communication Standard warning label may be produced from the CD-ROM version of the HMIS.

E. A guide for determining transportation related labeling requirements is shown in Section III, Appendix E of this publication.

SECTION IV. PACKING, MARKING, AND LABELING OF HAZARDOUS WASTE

6.14 General

A. Hazardous wastes are regulated by Title 40 CFR (EPA). The EPA requires that a hazardous waste generator package, mark, and label hazardous wastes in accordance with DOT regulations (Title 49 CFR) before transporting or offering it for transportation off-site.

B. Packing. Hazardous wastes generated as a result of accidental spills, damage, expired shelf-life, process wastes, etc., must be packaged in accordance with the applicable DOT regulations under Title 49 CFR, Parts 173, 178, and 179. Used containers, in lieu of new containers, may be used as long as the package conforms with the applicable DOT regulations.

C. Marking. Title 40 CFR, section 262.32, requires that, prior to offering hazardous waste for transportation off site, each generator must mark each package of non-bulk hazardous waste in accordance with DOT requirements of Title 49 CFR. Use of commercially procured Hazardous Waste Warning labels meeting the requirement of Title 40 CFR may be substituted for marking requirements on non-bulk containers. Each non-bulk container must have as a minimum the following words and information displayed in accordance with the requirements of Title 49 CFR, Section 172.304:

1. HAZARDOUS WASTE - Federal Law Prohibits Improper Disposal. If found, contact the nearest police or public safety authority or the US Environmental Protection Agency

2. Generator's name and address

3. Manifest document number

D. Title 40, CFR, Section 262.34(a)(2) specifies that the date upon which each period of hazardous waste accumulation begins is clearly marked and visible for inspection on each container.

E. Labeling. Hazardous Waste must be labeled in accordance with the applicable DOT regulations under Title 49 CFR, Section 172.101, Column 6.

6.15 Salvage Drums. Packages of hazardous materials that are damaged, defective, or found leaking and hazardous materials that have spilled or leaked may be placed in a metal or plastic removable head salvage drum and shipped for repackaging or disposal in accordance with Title 49 CFR, Part 173.3 under the following conditions:

A. The drum must be a UN 1A2, 1B2, 1N2 or 1H2 tested and marked for Packing Group II or higher for liquids or solids and a leakproofness test of 20 kPa (3 psi). The capacity of the drum may not exceed 450 Liters (119 gallons).

B. Each drum will be provided sufficient cushioning to prevent excessive movement and adequate absorption material to absorb any liquids that may leak.

C. Each drum will be marked with the PSN and the name and address of the consignee. The drum will be marked "Salvage Drum".

D. Each drum will be properly labeled for the material it contains.

E. The shipper will prepare shipping papers in accordance with Title 49 CFR, Part 172, Subpart C. For hazardous wastes the shipping paper will be a Hazardous Waste Manifest.

SECTION V. PACKAGING QUALITY CONTROL

6.16 General. Minimum quality control procedures applicable to installation functions shall incorporate additional sampling procedures designed to ensure that:

A. Incompatible hazardous materials are not co-mingled during the packaging process.

B. UN specification containers are authorized for the commodity being packaged.

C. Leaking containers are not packaged and prepared for shipment.

D. Leaking containers are properly overpacked and disposal action initiated.

E. Containers are not marked as meeting UN specifications unless they do.

F. Improperly packaged material is not offered for shipment.

G. Labels on outer containers represent mixed packages of hazardous materials when appropriate.

H. Labels on containers are consistent with the hazard class of the material.

I. Color and/or size of labels meet the standards of Title 49 CFR, section 172.407.

J. Commodity descriptions, or PSNs, are marked on containers.

K. Containers shipped under DOT exemptions reflect the DOT exemption number on the outer container.

L. Combination packages having inner packagings containing liquid hazardous materials are marked with package orientation markings (UP ARROWS).

M. Reconditioned drums are properly marked.

N. MIL-STD-129 and the applicable modal regulation’s marking requirements are met.

SECTION VI. LOADING HAZARDOUS MATERIALS FOR SHIPMENT

6.17 Purpose and Applicability

A. The purpose of this section is to provide information on the fundamental principles and approved methods and techniques used when loading hazardous materials for shipment. The objective is to achieve waste minimization goals by reducing the loss and damage to shipments caused by improper loading. To this end, the chapter provides information on blocking, bracing, and anchoring of shipments. Included are the basic requirements to load hazardous materials for shipment via highway, rail, air, and water. It is not intended to supersede the Defense Transportation Regulation, individual service regulations or CFR Title 49. It is presented under the concept that storage and warehousing personnel need to have a basic understanding of the procedures and regulations affecting the shipment of products in order to assure the smooth processing of hazardous materials to the ultimate customer.

B. The provisions of this section do not apply to the shipment of explosives.

C. The contents of this section are provided as general guidance to personnel whose duties may impact the loading of hazardous materials for shipment.

6.18 Impact of Federal Regulations on Loading Hazardous Materials for Shipment. Personnel must be knowledgeable of Federal regulations governing the loading of hazardous materials for shipment. Each mode of transport has specific requirements for loading and segregation as defined in the modal regulations.

6.19 Maximum Penalties

A. Personnel who knowingly violate the requirements of the HAZARDOUS MATERIALS TRANSPORTATION ACT and CFR Title 49 are subject to disciplinary action based on the seriousness of the offense according to the Uniform Code of Military Justice, the Federal Personnel Manual (FPM) supplement 751, and Agency Code of Penalties (AFI 36-704/AR CPRS1/NAV CMMI 751.1/MC NCPI 750/DLAR FPM Chapter 751). DOT imposed fines may be up to $25,000 for each violation each day. This applies to any person who manufactures, fabricates, marks, maintains, reconditions, repairs, tests, prepares, or otherwise causes the material to be shipped.

B. Before reviewing specific loading and securing regulations for each mode of transportation, it is important to consider Title 49 CFR, section 173.1(b), the key regulation under which installations and other shippers in the United States must operate:

"A shipment of hazardous materials that is not prepared in accordance with this subchapter may not be offered for transportation by air, highway, rail, or water. It is the responsibility of each HAZMAT employer subject to the requirements of this subchapter to ensure that each HAZMAT employee is trained in accordance with the requirements prescribed in this subchapter. It is the duty of each person who offers hazardous materials for transportation to instruct each of his officers, agents, and employees having any responsibility for preparing hazardous materials for shipment as to applicable regulations in this subchapter."

6.20 Criminal Penalties

A person who knowingly violates Title 49 CFR, section 171.2(g) or willfully violates a provision of the Act or an order or regulation issued under the Act shall be fined under Title 18, United States Code, or imprisoned for not more than 5 years, or both.

6.21 Hazardous Waste Minimization Responsibilities. The general hazardous waste minimization responsibilities outlined in chapter 3 are applicable to the functions addressed in this section.

SECTION VII. SHIPMENT PLANNING

6.22 General. After hazardous materials have been packaged, marked, and labeled for transportation, segregation of incompatible materials must still be maintained. Commanders will, if feasible, designate an appropriate area of a warehouse or freight terminal as a dedicated temporary storage area for hazardous materials awaiting shipment. Title 49 CFR, section 174.55(e), further requires that hazardous materials be stored in a secure location while they are held for delivery or loading. Section 174.55(e) also requires that only persons involved in the loading effort be permitted access to such materials.

6.23 Understanding the Shipping Environment

A. In recent years, there has been a gradual shift from breakbulk shipments to intermodal transportation of hazardous materials. It is commonplace today for intermodal containers to move, in a single trip, via three modes of transport: by highway, by rail (COFC), and by water. Trailers can move on railcars (TOFC) and on ships (RO/RO).

B. The first step in planning a load is to understand the forces to which the load will be subjected during shipment. Each mode of transport represents a different shipping environment that must be accommodated in the load plan. The range of forces encountered in a single mode, or in the combination of modes, makes proper loading and securing of hazardous materials packages imperative. Loading and securing of freight in containers or trailers is as important as packaging in the process of shipment preparation. Improperly loaded and secured freight can result in underutilization of space, damaged packaging, loss of product, damage to other freight or to the carrier's equipment, and even personnel injury and environmental damage. A container carried on a chassis via highway, for example, will be subject to different forces than a container carried on a rail flatcar, and therefore, a different system may be required to secure the load. Appendix F provides some illustrations of various types of blocking and bracing applicable to hazardous materials.

C. Since trailer loads are rarely subjected to high impacts, the highway mode is considered the least severe shipping environment. The forward movement of improperly braced loads will be caused by applying brakes on steep descents or by stopping suddenly to avoid hitting people or other vehicles. Rearward movement of loads will be caused by ascending steep hills, by load rebounds after the sudden application of brakes, or by sudden increases in speed. Sideward movement of loads is caused by rounding corners on sharp curves, traveling on high crowned or

banked roads, or swerving to avoid accidents. Full loads also must be snug and adequately braced to reduce stress resulting from impact against loading docks, braking, acceleration, and sway.

D. Shipping by water is different. As illustrated in Figure 6-1, a ship at sea may move in all of the following six directions: pitching about a vertical axis; yawing about a vertical axis; rolling about a longitudinal axis; surging in a fore and aft motion; swaying in a side-to-side motion; and heaving in an up and down motion. In addition, wave impact or water entry into faulty containers can affect loads and damage containers.

E. Rail transport includes railcars, TOFC, and COFC. Typical forces encountered in the rail transport environment include vertical, sideward, and lengthwise pressures.

1. Vertical pressure or vibrations, over and above the overhead weight of the load, are the most numerous forces but are small in magnitude and cumulative. Generally, the damaging action from vertical pressure or vibrations is absorbed by interior cushioning or bracing within the individual package or container.

2. Sideward pressure toward the sidewalls happens when a car rounds a curve, an action that tends to move the containers out of alignment with adjacent containers. Also, sideward pressures tend to crush the containers on the off-side as the car rounds a curve. Although those pressures are of small magnitude, if the containers are out of alignment, subsequent lengthwise forces can cause damage because of uneven distribution of pressure.

3. Lengthwise forces on the load result from cars accelerating or decelerating at a rate different from that of the whole train because of coupler slack. The impact of lengthwise force is normally negligible, since coupling impact is regulated by Title 49 CFR. Hazardous materials in railcars are to be coupled with no more force than is necessary to complete the coupling. Additionally, Title 49 CFR, section 174.83, states that no railcar moving under its own momentum may strike a flatcar carrying a placarded trailer or freight container (humping). Other forces affecting rail transport include suspension system and track dynamic vibration, and sway, a side-to-side motion resulting from curves or uneven track.

F. While loading of aircraft may not be an installation responsibility, personnel should be aware of some of the complexities involved and that only properly trained and designated individuals can certify proper packaging and marking of hazardous materials on the Shippers Declaration for Dangerous Goods form. Characteristics vary by aircraft type. Each cargo compartment floor is limited as to the weight it can carry per square inch or square foot. Furthermore, the dimensions of cargo must be known to determine the size limits of cargo that can be placed within each compartment. The potential for movement of hazardous cargo aboard passenger aircraft is somewhat restrained because the cargo is stowed in compartments. In the case of both civilian and military cargo aircraft, however, movement pressures are of more concern. Sideward movement of loads caused by aircraft banking or turning maneuvers must be considered while aircraft are loaded. A sudden, abrupt ascent or descent might cause some vertical movement of unsecured cargo; however, lengthwise movement is a primary consideration. On takeoff, improperly secured cargo is subject to rearward movement. On

landing, however, cargo may be initially subject to forward movement during descent, rearward movement during the landing roll, and a sudden forward movement again as the brakes are applied. For these and other reasons, many military supplies are classified as restricted cargoes for air transport purposes, and Federal and DoD restrictions are imposed upon them. Strong magnetic materials, for example, are legally restricted because a sufficiently strong magnetic field strength could cause false readings on the compass sensing devices of the aircraft.

6.24 Installation Loading Responsibilities

A. In view of the transportation environments described in the preceding paragraphs, it should be obvious that hazardous materials must be loaded to withstand the normal hazards of transportation. Installations and all other shippers are required to load freight carried at carload rates, unless otherwise required by tariff. They are also required to load heavy or bulky freight that is carried as LCL rates, but that cannot be handled at stations where the carrier's facilities are not sufficient for handling. In addition, installations must observe the rules of both the carrier and Title 49 CFR for safe loading of material and protection of equipment.

B. In addition to selecting the proper type of conveyance, the following precautions shall be taken to preclude the use of defective or unclean conveyances.

1. The interior of the vehicle or conveyance should be examined for evidence of defective sides, roof, or floor that might cause snagging, tearing, scarring, or rupture of the container, or permit entry of rain, dirt, or other matter likely to damage the cargo.

2. Protruding nails or other obstructions not part of the conveyance should be removed.

3. Weather seals of doors should be inspected for damage or distortion.

4. The doors should be checked for evidence of loose, worn, or damaged hinges, latches, levers, bolts, nuts, and pins.

5. The general condition of mechanical bracing systems should be determined by inspection. All crossmembers should be present, and bolt rails should be inspected to ensure that they are firmly attached to sidewalls.

6. The above are not intended to serve as a comprehensive checklist of inspection items, since items to be inspected will vary by conveyance type. The important point is that hazardous materials should not be loaded in vehicles or containers that are clearly not suitable for this purpose. Conveyances that cannot be suitably conditioned for the transportation of hazardous materials, without mechanical or extensive repairs, will be rejected by the installation.

C. The Defense Transportation Regulation, DoD 4500.9-R, Part ii, Cargo Movement, requires that all motor vehicles (commercial or government/MOV) used for the transportation of ammunition, explosives, poisons, and the high-hazard items listed in table 1, section 172.504, Title 49 CFR, be inspected by the shipping activity. DD Form 626, Motor Vehicle Inspection (Transporting Hazardous Material) will be used for this purpose. Vehicles for which

unsatisfactory conditions are noted on DD Form 626 shall not be accepted for loading. Vehicles will not be rejected, however, if deficiencies are corrected before loading. The distribution of the completed DD Form 626 shall be as follows:

1. One copy will be kept by the installation performing the inspection (for commercial vehicles only) with a copy of the appropriate GBL attached.

2. On truckload or LTL shipments, the original will be given to the driver at origin and will be surrendered by the driver to the consignee.

3. When a commercial vehicle tendered for loading is rejected or the driver of the vehicle is found to be unsatisfactory, a copy of the completed form will be sent to each of the following:

a. Nearest field office of the US DOT.

b. Home office of the carrier concerned.

c. MTMC, ATTN: MTOP-OS, 5611 Columbia Pike, Falls Church, VA 22041-5050.

6.25 Loading Rules for Rail Carriers. Personnel engaged in or responsible for loading, blocking, and bracing hazardous materials should have available and be familiar with the general rules for proper loading and securing of shipments. By complying with the applicable rules, procedures, and methods, the installation has accomplished the first step in assuring safe and economical carloading. Installations should have the following publications available:

A. Mandatory Requirements. Rule 27 of the Uniform and Consolidated Freight Classifications requires a shipper to observe carriers' rules regulating the safe loading of freight and the protection of equipment. Mandatory rules are contained in the Association of American Railroads (AAR) Circular No. 42-E, General Rules Concerning Loading of Carload Shipments of Commodities in Closed Cars, and all AAR pamphlets covering the loading and securing of shipments on open top cars.

B. Minimum Requirements. The various methods and specifications contained in all AAR carloading pamphlets will be observed as minimum requirements for the proper loading, blocking, and bracing of shipments for movement of rail freight on or in open top and closed cars.

C. Loading Methods Not Specified. When freight is to be loaded on or in open top or closed cars, and no loading or securing methods are provided, the cars will be blocked and braced according to the best procedure that can be devised from AAR pamphlets or other sources covering similar methods.

6.26 Loading Rules For MILVAN/SEAVAN Containers. MILVAN containers are reusable, steel cargo containers 8 feet wide, 8 feet high, and 20 feet long with a capacity of 39,100 pounds. MILVANs are used for transporting materials in highway, rail, and water modes. Detailed instructions for loading, blocking, and bracing of MILVAN/SEAVAN containers are contained in MIL-STD-1386 (Navy), Loading of Hazardous Materials in MILVAN Containers.

6.27 Rail Shipments

A. Each package of hazardous materials being transported by railcar must be loaded, blocked, and braced as prescribed by Title 49 CFR, section 174.55. The purpose of blocking and bracing is to prevent the packages from changing position, falling to the floor, or sliding into each other under shocks normally incident to transportation. Bureau of Explosives (BOE) pamphlets Nos. 6 and 6c contain recommended methods of blocking and bracing in railcars.

B. Title 49 CFR, section 174.55, also provides that hazardous materials may be handled mechanically, but care must be taken to ensure that they are not dropped. A heavy package or container of hazardous materials may be trucked, rolled on pallet rollers, or moved by skid, forklift, or other handling devices. Planks for rolling trucks from platforms to cars must have beveled edges.

C. Each package of hazardous materials bearing the package orientation marking (up arrows) must be handled, loaded, blocked, and braced in the car to remain in the position indicated by the markings during transportation.

D. Hazardous materials may not be loaded or transported except as specified in Title 49 CFR, section 174.81. This segregation chart is reprinted in Figure 6-2.

E. The loading of trucks, trailers, or freight containers holding hazardous materials is regulated by Title 49 CFR, section 174.61. These conveyances must be loaded so that the hazardous materials will not rupture under normal transportation.

6.28 Highway Shipments

A. General requirements for the transport of hazardous materials by highway are outlined in Title 49 CFR, section 177.834. Any tank, barrel, drum, cylinder, or other packaging not permanently attached to the vehicle, containing any flammable liquid, compressed gas, corrosive material, poisonous material, or radioactive material, must be secured against movement within the vehicle in which it is being transported. In addition, such materials must be braced to prevent movement relative to the vehicle while in motion.

1. Forward movement can be prevented by positioning the load firmly against the front bulkhead of the vehicle. The front bulkhead serves to square the load and equalize forces across the frontal area of the vehicle.

2. Movement of the cargo to the rear can be prevented by use of a rear bulkhead or gate. The rear bulkhead or gate must be braced to the doorposts of the vehicle with diagonal supports, or against the doorposts and the bulkhead or gate by secured risers. Backup blocks must be driven into place and nailed to the risers and gate to eliminate slack.

3. Sideward movement can be eliminated by the use of lengthwise separators, steel strapping,

and rigid block and bracing devices. DOT has approved some restraint systems specifically designed for highway transport. Those include steel strap and self-locking skid systems.

4. Flammable solids, oxidizing materials, or corrosive liquids, when transported on a motor vehicle with other authorized lading, must be loaded in a manner that provides ready access for shifting or removal.

B. Appendix F illustrates various blocking and bracing techniques.

C. Segregation of hazardous materials will be maintained in accordance with the segregation and separation chart shown in Title 49 CFR, section 177.848 and reprinted in Figure 6-3.

6.29 Water Shipments

A. The loading of hazardous materials to be transported by water is regulated by provisions of Title 49 CFR, section 176.76. Except as provided in paragraphs (b) through (f) of section 176.76, hazardous materials authorized to be transported by vessel may be carried on board a vessel in a transport vehicle or freight container subject to the following conditions:

1. The material must be in proper condition for transportation according to the requirements of Title 49 CFR Section 176.76.

2. All packages in the transport vehicle or freight container must be secured to prevent movement in any direction. If the shapes of the packages and the stuffing pattern preclude shifting of the load, vertical restraint is not required.

3. Bulkheads made of dunnage that extend to the level of the cargo must be provided unless the packages are stowed flush with the sides or ends.

4. Dunnage must be secured to the floor when the cargo consists of dense materials or heavy packages.

5. Each package marked with the orientation marking must be so stored.

6. Any slack spaces between packages must be filled with dunnage.

7. The weight of a container must be distributed as evenly as possible throughout, and the maximum permissible weight must not be exceeded.

8. Adjacent levels of baggaged and baled cargo must be stored in alternate directions so that each tier binds the tier above and below it.

9. The cargo or lading must be contained entirely within the freight container or vehicle body without overhang or projection; however, oversized machinery such as tractors or vehicles with batteries attached may overhang or project outside the intermodal container, provided all of the

portion of lading consisting of hazardous material is contained entirely within the freight container. No open bed container or vehicle is permitted to carry hazardous materials unless it is equipped with a means of properly securing the lading.

B. Segregation requirements for hazardous materials transported by vessel, in highway vehicles, railroad vehicles, or freight containers are prescribed in Title 49, Section 176.83 and are reprinted in Figure 6-4.

C. Segregation requirements aboard ship will be maintained as required by the IMDG Code, Section 15.

6.30 Military Air Shipments

A. DoD personnel will be involved in the preparation of unitized and palletized loads to be transported by military air. The following general guidelines apply to such loads:

1. Loads must be stable and secure, consistent with the type of aircraft, pallets, and handling equipment being used. Installations offering materials for air shipment must assure that loads are capable of being handled at aerial ports.

2. Unitized loads will be configured to be as stable as single containers.

3. Unitized loads will be configured to provide easy accessibility to individual packages in case of inflight emergency. Use of fiberboard or plywood side boards is not permitted unless specifically required by the governing joint regulation, AFJMAN 24-204/TM 38-250/ NAVSUP PUB 505/MCO P4030.19/DLAM 4145.3, Preparing Hazardous Materials for Military Air Shipments.

4. Containerized loads (CONEX, MILVAN, etc.) are not to be stowed on aircraft unless they are accessible during flight in case of an in-flight incident.

5. All hazardous materials must be accompanied by a Shippers Declaration for Dangerous Goods form signed by an individual who has been properly trained and designated to certify hazardous materials shipments.

B. Loading and Storage Segregation requirements are shown in attachment 18 of AFJMAN 24-204/TM 38-250/NAVSUP PUB 505/MCO P4030.19F/ DLAM 4145.3 and reprinted in Figure 6-5.

SECTION IX. DOCUMENTATION OF HAZARDOUS MATERIALS SHIPMENTS

6.31 DOT Requirements

A. Except as otherwise provided in Title 49 CFR, subpart C, each person who offers hazardous materials for transportation shall describe the materials on the shipping paper in the manner required in Title 49 CFR, subpart C. For purposes of this section, the shipping paper is the Government Bill of Lading (GBL), SF 1103. The GBL will be prepared as follows:

1. Hazardous materials entries must be entered first on the GBL or in a color that clearly contrasts with any description of nonhazardous materials appearing on the GBL or;

2. The material must be identified as hazardous by entry of an "X" placed before the proper shipping name in the column of the GBL captioned "HM" (block 17). The "X" may be replaced by "RQ" when appropriate.

3. The description of hazardous materials on shipping papers must conform in all respects with the applicable requirements of Title 49 CFR, Subpart C, Sections 172.202 and 172.203.

B. Unless specifically provided for in Title 49 CFR, a shippers certification statement conforming to one of those delineated in Title 49 CFR, Section 172.204, will be entered on the face of the GBL.

6.32 DoD Documentation Requirements. For shipments of hazardous materials by military airlift, the Shippers Declaration for Dangerous Goods is required to accompany the material. Instructions for completion and distribution of the shipper's certification is contained in attachment 17 of AFJMAN 24-204/TM 38-250/NAVSUP PUB 505/MCO P4030.19/DLAM 4145.3.

6.33 Commercial Air Documentation. The Shipper's Declaration for Dangerous Goods is the shipping paper used for commercial air transport. ICAO TIs are used to prepare shipping papers for air transport as authorized by Title 49 CFR, section 171.11; however, most commercial air carriers use IATA Dangerous Goods Regulations to prepare commercial air shipping papers. The US Government, specifically DOT, does not recognize IATA as an official regulatory body. Shippers using IATA will verify that the latest edition of the IATA Dangerous Goods Regulations is used to prepare hazardous materials for commercial air shipment.

6.34 Commercial Shipping Papers, International. Shipping papers for hazardous materials to be transported by water are prepared as described in the IMDG Code as authorized by Title 49 CFR, sections 171.12, 171.12a, 172.102, and 176.24. In addition IMDG requires a certification that containers and vehicles have been properly packed and secured as specified in sections 12.3.7 and 17.7.7 of that regulation.

6.35 Placarding Requirements

A. Placards are required on motor vehicles or freight containers shipped domestically by highway or rail as specified by Title 49, Section 172.504 and 172.505.

B. Installations will provide the motor carrier with the required placards for the material being shipped prior to shipment or at the same time the material is offered for transportation as required by section 172.506 of Title 49 CFR. Installations will obtain written acknowledgment from the motor carrier that placards were provided.

C. General specifications for placards are found in Title 49, CFR, Section 172.519.

D. Instructions for placarding areas where aircraft are parked are contained in AFJMAN 24-204/TM 38-250/NAVSUP PUB 505/MCO P4030.19/DLAM 4145.3, Preparing Hazardous Materials for Military Air Shipments.

SECTION X. REPORTS OF HAZARDOUS MATERIALS INCIDENTS

6.36 Notification of Incidents. Notification of incidents occurring during preparation and loading of hazardous materials involving personnel exposure to ionizing radiation, property damage, death, or injury necessitating hospitalization will be reported in accordance with Chapter 5, Section II, paragraph 5.11 of this document. Additionally, Title 49 CFR, Section 172.604 specifies that any person who offers a hazardous material for transportation must provide a 24-hour emergency response telephone number (including the area code or international access code) for use in the event of an emergency involving the hazardous material.

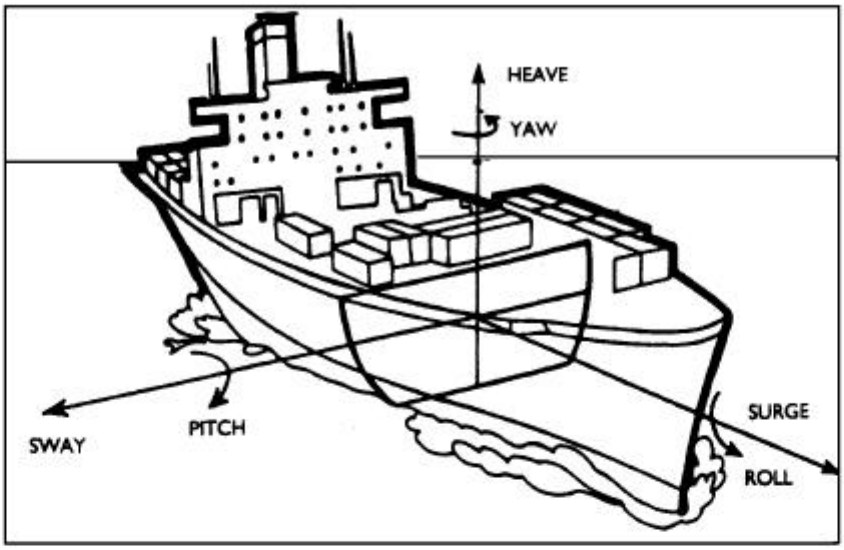
6.37 Reportable Quantities. If a package, drum, or other container marked with the letters "RQ" is ruptured during loading operations and a release of a hazardous substance occurs, the following action will be taken:

A. The employee first having knowledge of the release will notify their immediate supervisor of the incident.

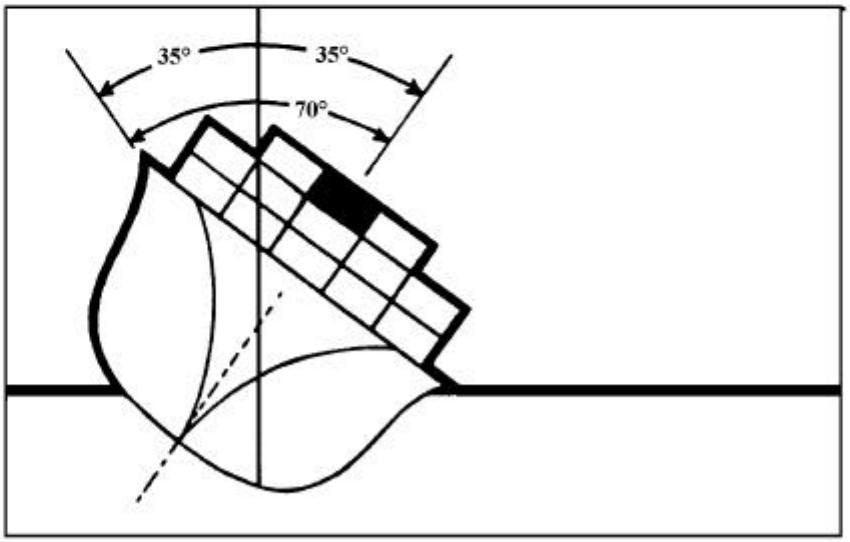
B. Personnel not equipped with proper protective clothing and equipment will be excluded from the spill area.

C. The Spill Contingency Plan outlined in chapter 7 will be activated.

D. Reports of the release will be made in accordance with locally established procedures.



A ship at sea may move in six different directions.



This container may travel 70 degrees with each complete roll, as often as 7 to 10 times each minute.

Figure 6-1. Movement of a Ship at Sea

Class or Division		Notes	1.1, 1.2	1.3	1.4	1.5	1.6	2.1	2.2	2.3 gas Zone A	2.3 gas Zone B	3	4.1	4.2	4.3	5.1	5.2	6.1 liquids PG I Zone A	7	8 liquids only
Explosives	1.1 and 1.2	A	*	*	*	*	*	X	X	X	X	X	X	X	X	X	X	X	X	X
Explosives	1.3		*	*	*	*	*	X		X	X	X		X	X	X	X	X		X
Explosives	1.4		*	*	*	*	*	O		O	O	O		O				O		O
Very insensitive explosives	1.5	A	*	*	*	*	*	X	X	X	X	X	X	X	X	X	X	X	X	X
Extremely insensitive explosives	1.6		*	*	*	*	*													
Flammable Gases	2.1		X	X	O	X				X	O							O	O	
Non-Toxic, non-flammable gases	2.2		X			X														
Poisonous gas Zone A	2.3		X	X	O	X		X				X	X	X	X	X	X			X
Poisonous Gas Zone B	2.3		X	X	O	X		O				O	O	O	O	O	O			O
Flammable Liquids	3		X	X	O	X				X	O					O		X		
Flammable Solids	4.1		X			X				X	O							X		O
Spontaneously combustible materials	4.2		X	X	O	X				X	O							X		X
Dangerous when wet materials	4.3		X	X		X				X	O							X		O
Oxidizers	5.1	A	X	X		X				X	O	O						X		O
Organic Peroxides	5.2		X	X		X				X	O							X		O
Poisonous liquids PG I Zone A	6.1		X	X	O	X		O				X	X	X	X	X	X			X
Radioactive Materials	7		X			X		O												
Corrosive liquids	8		X	X	O	X				X	O		O	X	O	O	O	X		

Instructions for using the segregation table for hazardous materials are as follows:
(1) The absence of any hazard class or division or blank space in the Table indicates that no restrictions apply.
(2) The letter "X" in the Table indicates that these materials may not be loaded, transported, or stored together in the same transport vehicle or storage facility during the course of transportation.
(3) The letter "O" in the Table indicates that these materials may not be loaded, transported, or stored together in the same transport vehicle or storage facility during the course of transportation unless separated in a manner that, in the event of leakage from packages under conditions normally incident to transportation, commingling of hazardous materials would not occur. Notwithstanding the methods of separation employed, Class 8 (corrosive) liquids may not be loaded above or adjacent to Class 4 (flammable) or Class 5 (oxidizing) materials; except that shippers may load truckload shipments of such materials together when it is known that the mixture of contents would not cause a fire or a dangerous evolution of heat or gas.
(4) The "*" in the Table indicates that segregation among different Class 1 (explosive) materials is governed by the compatibility table in paragraph (f) of 49CFR174.81.
(5) The note "A" in the second column of the Table means that, notwithstanding the requirements of the letter "X", ammonium nitrate fertilizer may be loaded or stored with Division 1.1 (Class A explosive) or Division 1.5 (blasting agents) materials.
(6) When the 172.101 Table or 172.401 of 49 CFR requires a package to bear a subsidiary hazard label, segregation appropriate to the subsidiary hazard must be applied when that segregation is more restrictive than that required by the primary hazard. However, hazardous materials of the same class may be stowed together without regard to segregation required by any secondary hazard if the materials are not capable of reacting dangerously with each other and causing combustion or dangerous evolution of heat, evolution of flammable, poisonous, or asphixiant gases, or formation of corrosive or unstable materials

Figure 6-2. Segregation and Separation Chart of Hazardous Materials for Rail Shipments

Class or Division		Notes	1.1, 1.2	1.3	1.4	1.5	1.6	2.1	2.2	2.3 gas Zone A	2.3 gas Zone B	3	4.1	4.2	4.3	5.1	5.2	6.1 liquids PG I Zone A	7	8 liquids only
Explosives	1.1 and 1.2	A	*	*	*	*	*	X	X	X	X	X	X	X	X	X	X	X	X	X
Explosives	1.3		*	*	*	*	*	X		X	X	X		X	X	X	X	X		X
Explosives	1.4		*	*	*	*	*	O		O	O	O		O				O		O
Very insensitive explosives	1.5	A	*	*	*	*	*	X	X	X	X	X	X	X	X	X	X	X	X	X
Extremely insensitive explosives	1.6		*	*	*	*	*													
Flammable Gases	2.1		X	X	O	X				X	O							O	O	
Non-Toxic, non-flammable gases	2.2		X			X														
Poisonous Gas Zone A	2.3		X	X	O	X		X				X	X	X	X	X	X			X
Poisonous Gas Zone B	2.3		X	X	O	X		O				O	O	O	O	O	O			O
Flammable Liquids	3		X	X	O	X				X	O					O		X		
Flammable Solids	4.1		X			X				X	O							X		O
Spontaneously combustible materials	4.2		X	X	O	X				X	O							X		X
Dangerous when wet materials	4.3		X	X		X				X	O							X		O
Oxidizers	5.1	A	X	X		X				X	O	O						X		O
Organic Peroxides	5.2		X	X		X				X	O							X		O
Poisonous liquids PG I Zone A	6.1		X	X	O	X		O				X	X	X	X	X	X			X
Radioactive Materials	7		X			X		O												
Corrosive liquids	8		X	X	O	X				X	O		O	X	O	O	O	X		

Instructions for using the segregation table for hazardous materials are as follows:
(1) The absence of any hazard class or division or blank space in the Table indicates that no restrictions apply.
(2) The letter "X" in the Table indicates that these materials may not be loaded, transported, or stored together in the same transport vehicle or storage facility during the course of transportation.
(3) The letter "O" in the Table indicates that these materials may not be loaded, transported, or stored together in the same transport vehicle or storage facility during the course of transportation unless separated in a manner that, in the event of leakage from packages under conditions normally incident to transportation, commingling of hazardous materials would not occur. Notwithstanding the methods of separation employed, Class 8 (corrosive) liquids may not be loaded above or adjacent to Class 4 (flammable) or Class 5 (oxidizing) materials; except that shippers may load truckload shipments of such materials together when it is known that the mixture of contents would not cause a fire or a dangerous evolution of heat or gas.
(4) The "*" in the Table indicates that segregation among different Class 1 (explosive) materials is governed by the compatibility table in paragraph (F) of 177.848 of 49 CFR.
(5) The note "A" in the second column of the Table means that, notwithstanding the requirements of the letter "X", ammonium nitrate fertilizer may be loaded or stored with Division 1.1 (Class A explosive) or Division 1.5 (blasting agents) materials.
(6) When the 172.101 Table or 172.402 of 49 CFR requires a package to bear a subsidiary hazard label, segregation appropriate to the subsidiary hazard must be applied when that segregation is more restrictive that that required by the primary hazard. However, hazardous materials of the same class may be stowed together without regard to segregation for any secondary hazard if the materials are not capable of reacting dangerously with each other and causing combustion or dangerous evolution of heat, evolution of flammable, poisonous, or asphyxiant gases, or formulation of corrosive or unstable materials.

Figure 6-3. Segregation and Separation Chart of Hazardous Materials for Carriage by Public Highway

Class	1.1 1.2 1.5	1.3	1.4 1.6	2.1	2.2	2.3	3	4.1	4.2	4.3	5.1	5.2	6.1	6.2	7	8	9
Explosives, 1.1, 1.2, 1.5	(*)	(*)	(*)	4	2	2	4	4	4	4	4	4	2	4	2	4	X
Explosives, 1.3	(*)	(*)	(*)	4	2	2	4	3	3	4	4	4	2	4	2	2	X
Explosives, 1.4, 1.6	(*)	(*)	(*)	2	1	1	2	2	2	2	2	2	X	4	2	2	X
Flammable Gases, 2.1	4	4	2	X	X	X	2	1	2	X	2	2	X	4	2	1	X
Non-Toxic, non-flammable gases, 2.2	2	2	1	X	X	X	1	X	1	X	X	1	X	2	1	X	X
Poisonous gases 2.3	2	2	1	X	X	X	2	X	2	X	X	2	X	2	1	X	X
Flammable Liquids 3	4	4	2	2	1	2	X	X	2	1	2	2	X	3	2	X	X
Flammable Solids 4.1	4	3	2	1	X	X	X	X	1	X	1	2	X	3	2	1	X
Spontaneously combustible substances 4.2	4	3	2	2	1	2	2	1	X	1	2	2	1	3	2	1	X
Substances which are dangerous when wet 4.3	4	4	2	X	X	X	1	X	1	X	2	2	X	2	2	1	X
Oxidizing substances 5.1	4	4	2	2	X	X	2	1	2	2	X	2	1	3	1	2	X
Organic peroxides 5.2	4	4	2	2	1	2	2	2	2	2	2	X	1	3	2	2	X
Poisons 6.1	2	2	X	X	X	X	X	X	1	X	1	1	X	1	X	X	X
Infectious substances 6.2	4	4	4	4	2	2	3	3	3	2	3	3	1	X	3	3	X
Radioactive materials 7	2	2	2	2	1	1	2	2	2	2	1	2	X	3	X	2	X
Corrosives 8	4	2	2	1	X	X	X	1	1	1	2	2	X	3	2	X	X
Miscellaneous dangerous substances 9	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X

Numbers and symbols relate to the following terms as defined in this section:

1 - "Away from."
2 - "Separated from."
3 - "Separated by a complete compartment or hold from."
4 - "Separated longitudinally by an intervening complete compartment or hold from."
X - The segregation, if any, is shown in the section 172.101 Table.
*** - See section 176.144 of Title 49 for segregation within Class 1.**

Figure 6-4. General Segregation Requirements for Hazardous Materials for Carriage by Vessel

Class or Division Note 7	Notes	1.1 1.2	1.3	1.4	1.5	1.6	2.1	2.2	2.3 Gas Zone A	2.3 Gas Other than Zone A	3	4.1	4.2	4.3	5.1	5.2	6.1 Liquid PG I Zone A	7	8 Liquid Only
1.1 and 1.2	1	*	*	*	*	*	X		X	X	X	X	X	X	X	X	X	X	X
1.3		*	*	*	*	*	X		X	X	X	X	X	X	X	X	X	X	X
1.4		*	*	*	*	*	0		0	0	0		0				0		0
1.5		*	*	*	*	*	0		0	0	0		0				0		0
1.6		*	*	*	*	*	0		0	0	0		0				0		0
2.1		X	X	0	0				X	0			0	0	0	0	0	0	0
2.2																			
2.3 Zone A		X	X	0	0		X				X	X	X	X	X	X			X
2.3 Other than Zone A		X	X	0	0		0				0	0	0	0	0	0			0
3		X	X	0	0	0			X	0		0	0	0	0	0	X		
4.1		X	X						X	0	0						X		0
4.2		X	X	0	0	0	0		X	0	0						X		X
4.3		X	X				0		X	0	0						X		X
5.1	1	X	X				0		X	0	0						X		0
5.2		X	X				0		X	0	0						X		0
6.1 Liquid PG I Zone A	4	X	X	0	0	0	0				X	X	X	X	X	X			X
7	2,3	X	X				0												
8	4,5 6	X	X	0	0	0	0		X	0		0	X	X	0	0	X		

1. Ammonium nitrate fertilizer may be loaded, transported, stored with Class 1.1 materials.
2. Do not load, transport, or store fissile class III radioactive material (Class 7) on the same aircraft with any other hazardous material.
3. Normal uranium, depleted uranium, and thorium metal in solid form radioactive materials (Class 7) may be loaded and transported with Class 1.1, 1.2, and 1.5 (explosives).
4. Do not load, transport, or store cylinders or cyanide mixtures (Class 6.1) with any Class 8 materials.
5. Separate nitric acid (Class 8) in carboys by 2.2 m (88 inches) in all directions from other corrosive materials in carboys when loaded on the same aircraft.
6. Do not load, transport, or store charged electric batteries (Class 8) on the same aircraft with any Class 1.1 or 1.2.
7. Class 6.1 poisonous liquids (other than PG 1, Zone A) corrosive solids, ORM-D, Class 9, and hazardous materials in Excepted Quantities may be transported with each other and all other hazardous materials without compatibility restrictions.

Figure 6-5. Segregation Table for Hazardous Materials for Military Air

CHAPTER 7

ENVIRONMENTAL PROTECTION

SECTION I. GENERAL

7.1 Purpose and Applicability

A. The purpose of this chapter is to outline requirements for spill prevention management, contingency planning requirements, and basic emergency response procedures. More stringent Military Service or Agency policy and procedures will be followed as appropriate.

B. The provisions of this chapter are applicable to all personnel involved in planning, development, coordination, and execution of plans to prevent accidental releases, minimize risk, and control damage resulting from hazardous materials incidents.

7.2 Federal Regulatory Requirements

A. A significant Federal law affecting oil and hazardous substances is the Comprehensive Environmental Response, Compensation, and Liability Act (CERCLA), as amended by the Superfund Amendments and Reauthorization Act (SARA). Important elements of CERCLA and SARA are in Title 40 CFR, part 300.

1. SARA requires installations to report releases of reportable quantities (RQ) of CERCLA hazardous substances to the National Response Center (NRC).

2. The establishment of the National Contingency Plan (NCP). The NCP accomplishes the following:

a. Assigns and divides responsibilities for oil and hazardous substance spill response actions among Federal, State, and local governments.

b. Requires Federal, regional, and local oil and hazardous substance spill contingency plans.

c. Requires oil and hazardous substance spill contingency plans at installations which have the capacity for spilling a reportable quantity of a hazardous substance or for harming the environment.

d. Establishes procedures for responding to oil and hazardous substance spills.

B. The Toxic Substances Control Act (TSCA) requires facilities storing transformers or other equipment containing PCBs to report to the EPA regional office releases of more than 1 pound of oil or fluid containing over 50 ppm of PCBs. TSCA also requires the reporting of any release of materials containing 50 ppm PCBs that directly contaminates surface or drinking water, sewers, grazing land, or vegetable gardens. Local agencies may have more stringent requirements.

C. Title 29 CFR requires that the OSHA area director be informed, within 24 hours, when any employee is exposed to suspect carcinogens listed in part 1910, subpart Z, of the Title.

D. The Resource Conservation and Recovery Act (RCRA) defines hazardous wastes in Title 40 CFR, part 261. When a hazardous materials release occurs, the spilled material may be a hazardous waste and, if so, must be handled as such. RCRA includes requirements for inspections, housekeeping, and personnel training for hazardous waste operations in Title 40 CFR, parts 260 through 265.

E. The Clean Water Act (CWA) contains provisions for a Spill Prevention Control and Countermeasures (SPCC) Plan in Title 40 CFR, part 112. Facilities storing oil in quantities large enough to potentially harm the environment or spill in reportable quantities must be included in an installation's SPCC plan. In addition, these facilities must have spill prevention equipment and practice spill prevention measures so that the facility will prevent an oil spill from occurring.

7.3 DoD Directive 5030.41. DoD-adopted Federal requirements for individual military installations in DoD Directive 5030.41, Implementation of the National Oil and Hazardous Substances Pollution Contingency Plan. Title 40 CFR, section 300.105, requires Federal agencies to coordinate their planning and response mechanisms with affected State and local governments and private entities. Federal agencies with facilities or other resources that may be useful in a Federal response situation are required to make those facilities or resources available within agency capabilities and authority. The DoD directive requires each facility or activity with oil or hazardous materials that could be accidentally spilled to have both an SPCC plan and an Installation Spill Contingency Plan (ISCP).

SECTION II. SPILL PREVENTION MANAGEMENT

7.4 General. DoD installations with facilities that may discharge oil, hazardous materials, hazardous wastes, or hazardous substances in RQs may be required by statute to prepare an SPCC plan. The SPCC plan is oriented toward prevention of spills and releases of hazardous materials. The effects of a spill or release can range from superficial damage with few or no injuries to a mishap of catastrophic proportions involving loss of life, widespread damage, and major environmental damage. Regardless of the extent of the damage, productive time is nearly always lost as personnel and facilities are evacuated, damage is assessed, and the release is cleaned up. In more severe cases, the facility's ability to perform its assigned mission may be impaired either temporarily or for a prolonged period if it becomes necessary to suspend operations. When the total cost of a hazardous materials mishap is considered, including lost productivity, cleanup and restoration, and replenishment of lost Government-owned stocks, the appropriateness of the expression "an ounce of prevention is worth a pound of cure" is obvious in the case of hazardous materials management.

7.5 SPCC Plan Requirements

A. Facility SPCC plans will, as a minimum, specifically address the following areas per Title 40 CFR, part 112:

1. Maintenance of complete record of all spills or releases, federally reportable or not, occurring at the facility. The spills occurring during the past 12 months will be identified and listed together with corrective actions taken in each case. Specific plans implemented to prevent recurrences in each case will also be listed.

2. Predictions of the direction of flow, rate, and maximum quantities of oil or hazardous substances that might be spilled or released for each storage location or handling site.

3. Containment provisions and diversion structures or equipment in place or planned for use to prevent the discharge from reaching surface waters or other sensitive resources. Preventive systems may include dikes, berms, curbs, gutters or other drainage systems, booms, diversion or retention ponds, or absorbent materials.

4. Conformance to EPA guidelines published in Title 40 CFR pertaining, where applicable, to drainage, bulk storage tanks, transfer operations, pumping, in-plant processes such as recoupment, or tank car or truck loading and unloading.

5. Regular SPCC inspections must be conducted. Signed records of inspections must be retained as part of the SPCC plan for 3 years.

6. Security procedures and precautions.

7. Requirements for personnel training and spill prevention procedures briefings.

8. Any of the following information that can be developed separately or included in the above listing:

a. Identification of populations at risk. In addition to considering nearby civilian population centers, consideration will be given to onbase populations in administrative offices, family housing, etc.

b. Identification of environmentally sensitive areas, probable need for waterfowl conservation efforts, and the presence of endangered species and other protected resources.

c. Consideration of local geography, hydrology, and climate.

d. Most probable locations for pollution incidents.

B. SPCC plans must be updated every 3 years and approved by a registered professional engineer. In addition, the SPCC plan must be amended and recertified whenever there is a change to a facility that would effect the facility's potential for an oil or hazardous substance spill (e.g., a new tank is installed, berms are modified, etc.).

SECTION III. SPCC MANAGEMENT PRACTICES

7.6 General. An effective spill prevention management program and SPCC for warehousing

activities must anticipate possible interactions between the hazardous material, the people, and the equipment involved in its handling from the time it is received until the time it is shipped. Once these interactions are identified, measures can be developed and implemented to eliminate or reduce the probability of spills or chemical releases.

7.7 The Human Factor

A. Supervisors are responsible for ensuring employee compliance with safety and health standards. The supervisors, with environmental personnel, are responsible for identifying hazards in the workplace and initiating action to eliminate such hazards, and must be considered a principal participant in SPCC development.

B. Investigation reports frequently conclude that spills and releases of hazardous substances are the result of human error or negligence. Because of the complexity of human behavior and varying individual attitudes, the human factor is perhaps the most difficult to address. The role of human error as a contributing factor in spills can be reduced to some extent by appealing to the employee's instinct for survival. If they are aware that negligence in the workplace might cost them their lives, they are more likely to exercise caution when handling hazardous materials. It becomes the supervisor's responsibility to ensure employee awareness of the hazards associated with the chemicals they handle. Employees must be adequately indoctrinated before entering the work area where hazardous materials are handled and must receive periodic refresher briefings. They must also clearly understand how their present duties and responsibilities relate to the overall facility and national objectives of spill prevention programs.

C. Required internal controls must be in effect to reduce the probability of accidental spills and releases in the warehouse. Such controls include limiting the speed of materials handling equipment (MHE), restricting forklifts carrying hazardous materials to specific aisles, and using personal protective clothing and equipment. Individual work habits must also be continuously observed to ensure that they conform to accepted standards. Supervisors are encouraged to consider spill prevention goals when developing employee written performance standards. This should be done in consultation with the local personnel office.

7.8 Physical Security. Physical security is defined as those measures designed to safeguard personnel; prevent unauthorized access to equipment, facilities, materials, and documents; and safeguard them against sabotage, espionage, damage, and theft. Facility coordinators will ensure that command security plans specifically include hazardous materials. SPCC security provisions will provide for effective and efficient utilization of personnel and equipment and will be flexible enough to permit timely changes to meet emergencies.

7.9 Equipment

A. MHE, both mechanized and nonmechanized, must be considered a key factor in developing SPCCs. Operators must be thoroughly trained in MHE operation. Movement of hazardous materials within the warehouse should be kept to a minimum. Movement paths should be continuously studied for the possibility of reducing "back-tracking" and length of moves. Equipment capabilities should never be exceeded. Overloading causes excessive equipment

wear and creates greater accident potential. Proper loading and unloading of hazardous materials will prevent damage. In most cases, loose material is subjected to more damage than properly packed material. Adequate planning should precede any loading operation, including factors such as the carrier's center of gravity, the placement of heavy material on the bottom, the carrier's rated capacity, and the possibility of packaging, container, and product damage while the material is in transit.

B. Required daily inspections should be performed to identify deficiencies that, if not corrected, might result in a malfunction or failure and, in turn, a mishap resulting in a spill or chemical release. Required periodic and regular servicing must be performed and documented to provide a maintenance history.

C. Manual handling of hazardous materials must also be carefully considered. Accidents and injuries frequently arise from employee attempts to manually handle material that should have been moved using mechanized equipment. Actions must be compatible with human strength, speed, accuracy, and reach limitations.

D. MHE shall conform to the requirements of 29 CFR 1910.176(a) and 1910.178.

7.10 Housekeeping. The immediate supervisor will inspect the workplace daily to identify housekeeping and safety deficiencies. Housekeeping rules will be established and explained. Adequate lighting will be provided at all times. Machines, equipment, and working spaces will be kept clean and orderly. Scrap and waste will be cleaned up as soon as work is completed. Broken straps, exposed nails, or wire from containers or unit loads will be removed. Any spilled flammable liquids, greases, or other dangerous or slippery substances will be immediately cleaned up. Ample space will be provided in aisles and work areas to avoid congestion.

7.11 Condition of Stored Material

A. Preceding chapters have addressed the requirement that hazardous materials be subjected to a thorough inspection upon receipt and prior to being placed in storage. The potential for spills and chemical releases can be significantly reduced by early detection of unsatisfactory conditions or deficiencies caused by improper storage, extended periods of storage, or the inherent deterioration characteristics of the material. The SPCC must, therefore, provide for an effective cyclic inspection program. Effective and efficient execution of inspections will ensure that stored material is inspected at intervals indicated by the assigned shelf-life code, inspection frequency code, or type of storage afforded the material. Inspections should also be oriented toward detection of improper segregation of hazardous materials.

B. The importance of an effective shelf-life program for hazardous materials cannot be overemphasized. Certain products can become increasingly hazardous under prolonged and unfavorable storage conditions. Calcium hypochlorite, for example, is unstable and has a very limited shelf life, even under optimum storage conditions. If the decomposition process is allowed to continue unchecked, the material will, under the right circumstances, present a fire and/or explosion risk.

SECTION IV. SPILL CONTINGENCY PLANNING

7.12 General. Under the National Contingency Plan, Title 40 CFR, part 300, Federal installations are to respond to their own oil and hazardous substance spills. Thorough preplanning of oil and hazardous substance spill response is necessary so that when a spill occurs, facility personnel can respond quickly and effectively, minimizing damage to human health and the environment. Contingency planning must take into consideration the following phases of spill response: discovery; notification; assessment; containment; cleanup; and disposal.

7.13 Installation Spill Contingency Plan (ISCP) Development and Content

A. To prepare an ISCP, the various tasks should be assigned to local fire and police teams who may already have considerable information about accidents within the facility and the nearby community. Planning shall routinely include the participation of the Environmental Office, Safety Office, Command Security Office, Public Affairs Office, Radioactive Control Officer, On-Scene Commander designated in the Facility Contingency Plan, and other appropriate individuals who might have specific responsibility in the event of a spill. If the required information cannot be obtained and developed by installation personnel, local industry sources or consultants should be contacted. In addition the Local Emergency Planning Commission should be advised as appropriate.

B. In general, spill contingency plans contain certain types of advanced preparedness information, including amounts and locations of response equipment and materials, but are primarily oriented toward specifying procedures to be followed in the event of a spill or release of oil or hazardous chemicals. More specifically, ISCPs will contain:

1. Names, addresses, and 24-hour phone numbers of the On-Scene Commander and alternates.

2. Emergency equipment and response materials, location(s), and capabilities.

3. An evacuation plan, including signals, evacuation routes, and alternate routes.

4. A description of arrangements with local fire and police departments, hospitals, contractors, and State and local emergency response teams for response or coordination of services.

5. A description of personnel actions and responsibilities required in response to known or suspected personnel exposures, fires, explosions, or any unplanned sudden or gradual release of oil, hazardous materials, hazardous substances, or hazardous wastes to air, soil, or surface water at the facility or nearby community. This response is generally described in the following sequence:

a. Phase I: discovery and notification (including both internal reporting and notification of participating outside organizations).

b. Phase II: containment and countermeasures (such as public health protection, source control, barrier placement, etc.).

c. Phase III: cleanup, mitigation, and disposal.

d. Phase IV: documentation (including external reporting and follow-up written reports).

C. A good ISCP should, in addition, contain the following:

1. Designation of duties and responsibilities for specific organizations and the On-Scene Commander.

2. Facility response team composition and training, and operations center location and procedures.

3. Facility response team alert and mobilization procedures, including use of communications systems for timely response.

4. Surveillance procedures for early detection.

5. Key installation personnel and community officials to be notified in the event of a release.

D. The ISCP must be reviewed and updated every 3 years. It must also be tested at least once a year and amended as needed. An actual spill may be used as a test situation.

E. A suggested document for developing a spill contingency plan is FEMA-10 (Federal Emergency Management Agency Planning Guide and Checklist for Hazardous Materials Contingency Plans and Hazardous Materials Planning Guide).

7.14 Contingency Plan Implementation

A. Hazardous Materials Defined. The first requirement in ISCP development is that the planners identify the hazardous materials on the facility and have a clear understanding of the materials to which the ISCP applies. For the purpose of emergency response planning, the term "hazardous materials" includes hazardous materials, dangerous goods, hazardous substances, and hazardous wastes. For purposes of this section, these terms will be collectively referred to as HAZMAT. It should be noted that these terms are defined for different purposes by different agencies. The regulatory sources of the definitions are as follows:

1. Hazardous materials are defined by the DOT in Title 49 CFR, paragraph 171.8.

2. Dangerous goods are defined by the United Nations Recommendations of the Committee of Experts on the Transport of Dangerous Goods, and contained in the UN publication "Transport of Dangerous Goods." This publication is commonly referred to as the "Orange Book."

3. Hazardous substances are defined by EPA and listed in Title 40 CFR, part 302.

4. Hazardous wastes are defined by EPA and listed in Title 40 CFR, paragraph 261.3 to 262.

B. Emergency Response Teams.

1. Title 29 CFR, section 1910.120, outlines the legal requirements for ensuring that reasonably comprehensive protection is provided for all employees engaged in hazardous waste operations and emergency response. Title 29 CFR further states that HAZMAT teams will be employed to plug, patch, or otherwise temporarily control or stop leaks from containers holding hazardous substances or health hazards. For purposes of this section, the term "HAZMAT team" will be used to describe the organizational unit designated to respond to spill emergencies; however, the terms "emergency response team" or "spill response team" are equally acceptable designations.

2. The requirement that a HAZMAT team be available to respond to accidental spills or releases of hazardous materials may be satisfied either by designating and training employees or by arranging for the services of HAZMAT teams established and maintained by other agencies. If the team is composed of facility employees, the Commander is responsible for ensuring that team members are physically examined, provided with personal protective equipment, and trained in accordance with the specific requirements of Title 29 CFR, section 1910.120. Employees assigned to the HAZMAT team should be those who, through their experience and regularly assigned duties, are best qualified, equipped, and trained to respond to emergencies involving hazardous materials.

3. If local circumstances preclude the use of employees as HAZMAT team members, team requirements may be satisfied by any of the following:

a. Formal, written agreements with state and local governments to provide HAZMAT teams on an "as required" basis.

b. Interagency or Interservice Support Agreements with Federal agencies or military departments.

c. Local contract arrangements to retain the services of qualified and licensed commercial HAZMAT teams.

d. Emergency response personnel representing the manufacturer or supplier of the hazardous materials involved in the incident.

e. Industry emergency response mutual-aid representatives that respond to emergencies involving specific materials (e.g., CHLOREP of the Chlorine Institute for emergencies involving chlorine).

C. Dissemination of the Facility Contingency Plan.

1. The appropriateness of the initial response to an emergency will depend, in large part, on the work force's degree of awareness. Title 29 CFR requires the commander to ensure that employees are informed of hazards that may be present in the workplace. This requirement is

addressed in detail in Chapter 8 of this publication. It is, therefore, equally essential that employees be aware of the actions to be taken in the event of an accidental spill or release of a hazardous material.

2. To instill and sustain employee awareness of emergency response requirements, commanders should, as a minimum, take the following actions:

a. Ensure that employees, upon being assigned to duties involving hazardous materials, are formally briefed regarding purpose of the ISCP, response requirements, and individual responsibilities under the plan.

b. Ensure that signs are prominently displayed at strategic locations throughout the workplace, clearly indicating the individual and telephone number to be notified in the event of a spill or release of a hazardous material.

c. Display appropriate posters in the workplace, rest and dining facilities, and locker rooms, emphasizing safety in the hazardous materials work environment.

d. Ensure that refresher training is periodically provided to all employees assigned to hazardous materials storage and handling areas.

e. Ensure that facility newspapers or periodicals regularly include articles designed to stimulate employee awareness of hazards and emergency response actions.

D. Deployment of the HAZMAT Team. A critical but often difficult consideration in ISCP development and execution is determining, in advance, the circumstances under which the HAZMAT team will be deployed. In the case of a stack of acid carboys being toppled by a forklift operator cutting a corner too closely, or the ignition of vapors near cans of degreasers caused by a carelessly tossed lit cigarette, the "trigger" event is clear. In numerous other instances, the requirement for a response by the HAZMAT team will be less clear and on-scene judgments will have to be made. Since there are no definitive rules for determining the "trigger" event in advance, it becomes the responsibility of each facility to determine and publish criteria for HAZMAT team deployment based on a thorough evaluation of the type of hazardous materials, prevailing risk factors, and resource availability. Circumstances at some facilities may favor deployment of the HAZMAT team for all spills and releases regardless of the degree of hazard involved. In other cases, ISCPs will necessarily have to be developed around flexible criteria for deployment. The objective should be to achieve a balance between achieving production goals and simultaneously ensuring that the response to any given emergency is the most appropriate one. Protection of personnel, facilities, and the environment will, in all cases, be the overriding consideration.

E. Emergency Response Operations.

1. The number of discernible emergency response operations will vary according to the format and type of ISCP developed. The Federal Emergency Management Agency (FEMA), for

example, breaks response operations into 11 phases. For purposes of this section, however, discussion will be limited to the discovery, notification, containment, collection, and recovery phases.

2. In the discovery phase, the behavior of the individual discovering the emergency is an important factor in determining the most appropriate level of response. The employee first becoming aware of the actual or suspected emergency shares, in a large measure, the responsibility for the correctness of the initial response. The credibility of their assessment will be directly related to their experience and the quality of training provided by the command. The ISCP should clearly delineate the responsibilities assigned to the individual that first discovers the emergency situation. That individual, if not injured, may simply be required to report the situation to their immediate supervisor or a designated emergency response center. The employee may, on the other hand, be responsible for making a tentative assessment of who and what is at risk prior to any notification. Whether the discovering employee notifies the HAZMAT team directly or notifies their supervisor must be determined by planners based on their evaluation of all pertinent factors. The important consideration is that the ISCP clearly outlines both circumstances and responsibilities for notification, scope of initial assessment, activation of alarms, rescue of injured personnel, etc. Specific requirements must be defined for both normal working hours and emergency incidents that may occur outside normal working hours.

3. In the notification phase, one of the primary requirements is that the immediate supervisor be informed of the incident as soon as possible. If the emergency incident occurs during normal working hours, the supervisor's assessment of the situation may determine the sequence and scope of response actions. If the ISCP does not specify immediate activation of a HAZMAT team, it should be the supervisor's responsibility to determine the presence of poisonous, flammable, or corrosive materials; the structural integrity of containers; and the behavior of personnel. It is in this phase that the ISCP should clearly define requirements for notifying higher headquarters, Federal agencies, and LEPCs if the accident is determined to pose a risk to members of the local community outside facility boundaries.

4. The containment phase should address controlling the immediate spread of the material. For purposes of this publication, containment is defined as the employment of fixed resources and deployment of temporary resources to stop and prevent, after accidental release from their primary storage locations or containers, the further discharge of the hazardous material into the external environment where contamination of ground, water, or atmosphere may occur. During this phase, the first priority must be to stop the further discharge of the solid, liquid, or gaseous material involved. The ISCP or locally developed SOPs should outline procedures for containment, including shutting off the source, predicting movement, contacting representatives of the manufacturer, etc. Types of equipment and materials to be used should also be clearly specified.

5. During the collection or cleanup phase, hazardous materials are removed from the spill area using approved techniques. It should be noted that, for spills or releases occurring at a facility, the facility is, by law, responsible for cleaning up the spill. Whether the facility elects to clean up the material using its resources or by calling in a commercial firm, the facility remains fully

responsible. With regard to cleanup by personnel, caution must be exercised in determining the items that may be safely cleaned up by employees and those that must be cleaned up by the more specialized and better equipped HAZMAT team. If employees other than those assigned to the HAZMAT team are permitted to cleanup the material, the items permitted to be cleaned up and exact procedures of techniques should be clearly defined. Unless circumstances dictate otherwise, the supervisor should have maximum flexibility to use employees in cleaning up materials that, on the basis of guidelines and professional judgment, do not warrant deployment of the HAZMAT team. Examples of materials that may be safely cleaned up by employees include low risk materials such as lubricating oils, antifreeze, or household cleaning materials. Employees may also be trained and equipped to routinely cleanup certain corrosives, and to shut off leaks from certain compressed gas cylinders under the conditions outlined in, Storage and Handling of Compressed Gases and Liquids in Cylinders (DLAR 4145.25/AR-700-68/NAVSUPINST 4440.128C/MCO 10330.2C/AFR 67-12). Criteria for cleanup by warehouse personnel may also be established on the basis of DOT transportation labels and hazard characteristic codes (HCCs).

6. Released materials may be recovered (e.g., sodium hydroxide flakes), may become hazardous wastes (e.g., pesticides), or waste hazardous substances (e.g., 1-1-1- trichloroethane), or may be insignificant (e.g., nitrogen released from a leaking cylinder). Materials to be recovered (repackaged) or to be disposed of must be properly labeled, packaged or overpacked, and stored while awaiting final disposition.

7. Material that can be reclaimed or recycled will be forwarded to the recoupment facility for processing in accordance with the procedures outlined in Section IV, Chapter 4 of this publication.

F. Packaging of Spilled Material. Packagings, packs, or salvage drums used by personnel in connection with cleanup operations will meet or exceed UN specifications for the material being packaged as required by Title 49 CFR, parts 171 through 178. A person qualified (trained) in HAZMAT packaging will inspect all packagings to ensure that the package is:

1. Compatible with the material being packaged.

2. Of UN approved/tested specification construction for the material being packaged.

3. Marked, labeled, and properly prepared for transportation in accordance with Title 49 CFR, parts 171 through 178 and MIL-STD-129.

G. Suggested References. The following references are suggested for developing emergency responses to hazardous materials:

1. Association of American Railroads, 1984, Emergency Action Guides.

2. National Pest Control Association, 1976, Managing Pesticide Spills.

3. Armed Forces Pest Management Board, 1980, Technical Information Memorandum Number 15: Pesticide Spill Prevention and Management.

4. Environment Canada, 1986, Report EPS 9/SP/2: A Survey of Chemical Spill Countermeasures.

5. US EPA, 1979, EPA-600/9-79-045: National Pollutant Discharge Elimination System Best Management Practices Guidance Document.

6. North American Emergency Response Guidebook.

7. US Federal Emergency Management Agency, 1981, FEMA-10: Planning Guide and Checklist for Hazardous Materials Contingency Guides.

8. National Fire Protection Association, FPH1686: Fire Protection Handbook.

9. Hazardous Materials Planning Guide (National Response Team).

SECTION V. OTHER CONTINGENCY PLAN REQUIREMENTS

7.15 General. In addition to the plans described above, facilities are required to have other contingency plans in effect to provide assistance to Federal, state, and local governments when necessary. The problem is that federal regulations addressing emergency planning and response have been promulgated by EPA, OSHA, DOT and other agencies, and the requirements are often duplicative. It is likely that methodologies have been developed to prepare a single plan to meet all federal requirements for hazardous materials emergency planning and response. A word of caution is appropriate in regard to such an approach: such plans are a relatively new concept to both installations and regulators. Hence, installations may experience varying degrees of resistance from their state and federal regulators when attempting to implement a single plan approach to hazardous materials emergency planning and response. Regardless of the number of plans that might be necessary, it is essential that there be a clearly defined command structure, notification procedure, and set of assigned personnel roles.

7.16 Emergency Planning and Community Right-to-Know Act of 1986

A. SARA's Title III of 1986, also known as the Emergency Planning and Community Right-to-Know Act is intended to encourage and support emergency planning efforts at the State and local government levels. Its purpose is to protect communities living near commercial industrial facilities from catastrophic releases of toxic substances such as the tragic releases in Bhopal, India, in 1984. Title III mandates the type of program advocated by the EPA's Community Emergency Preparedness Program (CEPP), a voluntary program designed to aid in planning for emergency response in the event of a hazardous release. The emergency planning requirements of the act recognize the need to establish and maintain contingency plans for responding to chemical accidents that can inflict health and environmental damage as well as cause significant disruption within a community.

B. The following is a summary of the key statutory provisions of the act:

1. Section 301 of SARA required each State to establish an Emergency Response Commission by April 17, 1987. These commissions were responsible for establishing emergency planning districts and for appointing, supervising, and coordinating LEPCs.

2. Under section 302, EPA is required to publish a list of extremely hazardous substances and threshold planning quantities (TPQ) for such substances. This list is published in Title 40 CFR, part 355, appendix A. Since this list will be subject to periodic change, it has not been included in this publication. The facility's Environmental Officer will be consulted for assistance in determining items applicable to a particular facility. This list is intended to help communities focus on the substances and facilities of the most immediate concern for emergency planning and response. The act requires any facility that has an extremely hazardous substance in an amount exceeding the TPQ to notify the State commission.

3. Section 303 of the Act governs the development of comprehensive emergency response plans by LEPCs and provision of information to the committee. The LEPC was responsible for completing an emergency plan meeting the requirements of section 303 by October 17, 1988. Under section 303(d), facilities subject to emergency planning must designate a representative who will participate in the local emergency planning effort as an emergency response coordinator. Facilities are required by statute to provide the committee with information relevant to development or implementation of the local response plan. This information includes inventories of extremely hazardous substances and MSDSs.

4. Section 304 establishes requirements for the immediate reporting of certain releases of hazardous substances to the LEPC and the State Emergency Response Commission; the requirements are similar to the release reporting provisions of CERCLA. Follow-up reports are also required, including the effects of the release and the response action taken.

5. Sections 311/312 establish the requirement for community right-to-know provisions which provides for public access to information submitted under these sections. Specifically, section 311 is the one-time submission of either the MSDSs or a listing of the MSDSs for all hazardous chemicals present at the facility at any one time in amounts equal to or greater than 10,000 pounds and for all extremely hazardous substances at the facility in an amount greater than 500 pounds or the Threshold Planning Quantity, whichever is lower. Revisions to this submission must be made within three months after discovery of significant new information concerning the hazardous chemical or if new hazardous chemicals arrive on the facility. Section 312 provides for the annual submission by 1 March of the Tier I or Tier II hazardous chemical inventory reports. This information identifies the location, amounts, and methods of storage of hazardous chemicals stored on a facility and supplements the data provided under section 311.

6. Section 313 establishes a procedure for the collection of information on releases of hazardous materials to all environmental media. This supports state and local planning efforts and identifies environmental "hot spots" or areas of greater pollution. The section applies to facilities, with the equivalent of 10 or more full time employees, that manufacture (including import), or process 25,000 pounds or more per year or otherwise use 10,000 or more pounds per year of any of the toxic chemicals listed in 40 CFR 372.65. If one of these thresholds are exceeded, the facility is required to submit an EPA Form R for that toxic chemical.

C. Applicable Guidance of SARA Title III to DoD.

1. On August 3, 1993, the President signed Executive Order 12856 directing all Federal agencies to comply with the Emergency Planning and Community Right-to-Know Act of 1986 (EPCRA) and the Pollution Prevention Act of 1990 (PPA). The Executive Order emphasizes two goals. First, it directs Federal agencies to become leaders in providing communities and emergency planners with appropriate information on hazardous substances and toxic chemicals stored at government facilities. Second, the Federal government must demonstrate pollution prevention leadership by improving facility management, incorporating environmental principles in acquisition practices, establishing comprehensive pollution prevention plans, and developing innovative technologies. This section will concentrate on the first objective.

2. Federal facilities are required to comply with the EPCRA rules in the same manner as private facilities. It is important that Federal facilities are recognized as leaders in the environmental arena and that they are committed to the protection of the environment. To this end, the following actions will be taken:

a. Existing contingency plans will be expanded to cover releases during catastrophic events such as a major warehouse fire.

b. Representatives will be appointed to LEPCs where appropriate.

c. LEPCs will be fully notified in the event of a release that might result in exposure to persons outside the facility boundary.

d. Cooperative agreements with local fire and hazardous materials spill response agencies will be entered into.

e. Outside response facilities will be included where appropriate.

3. The development of EPCRA required reports and the technical data to back up those reports can be time consuming and labor intensive. Significant resources can be saved by relying on automated information systems (AIS) to track inventory, calculate threshold levels, etc. DoD systems such as the Hazardous Materials Information System (HMIS) plus those Service and Agency operational systems developed to facilitate reporting should be used to the maximum extent possible. These systems should be used to provide reports as well as to document why a report is not required.

7.17 Planning for Accidents Involving Radioactive Materials

A. DoD components are required to provide radiological assistance to Federal, state, and local agencies, as available, in the event of a nuclear weapon significant incident of a radiological accident. Radiological accidents are defined as a loss of control over radiation or radioactive materials that presents a hazard to life, health, or property.

B. Installations will, when requested by FEMA, and within the constraints of national security,

cooperate with FEMA in developing radiological emergency plans with State and local authorities. This requirement applies only to installations where the potential for an accident involving radioactive materials exists. Factors to be included in emergency response planning and to be transmitted to state and local authorities include:

1. Environment where the release is possible (atmosphere, geologic, or hydrologic).

2. Type of material that may be released (isotopes and chemical and physical characteristics).

3. General characteristics of accidents (e.g., fire, impact, loss of cooling, explosion, etc.).

4. Pertinent timing (duration of release and delay before significant off-site exposures are expected).

5. Radiologic levels for protective actions to be used.

6. Specific response actions to be taken by the facility and possible response actions by State and local authorities.

7. Specific response actions to be taken in the event of a release, including:

a. Prompt notification of state and/or local authorities.

b. Augmentation of resources and activation of emergency response organizations to the extent feasible.

c. Detailed guidance is contained in DoD Instruction 5100.52, Radiological Assistance in the Event of an Accident Involving Radioactive Materials.

7.18 Transportation Accident Contingency Planning

A. Military installations are frequently requested by local civilian authorities to render assistance in a variety of mishaps occurring outside installations boundaries. These mishaps may or may not involve DoD materials. When requested by local authorities, Federal agencies are required by Title 40 CFR, part 300, to render assistance following or in prevention of a discharge or release of a hazardous substance.

B. While no formal requirement exists for DoD installations to provide assistance outside the fence line, it is recommended they develop a basic contingency plan for the following purposes:

1. To serve as the DoD component receiving first notification of a transportation accident involving DoD hazardous materials.

2. To be prepared to dispatch a representative directly to the scene of a hazardous materials accident, if requested by local civilian authorities. That individual will serve as the DoD representative to the civilian On-Scene Emergency Coordinator until relieved by a competent authority.

3. To be prepared to provide communications support as part of the DoD response to the accident.

4. To be prepared to provide specific hazard and precautionary information for shipments that may have originated at the facility (e.g., public evacuation distance, toxicity, fire hazard, personal protective equipment requirements, etc.).

5. To be prepared to temporarily receive and hold hazardous materials until proper reloading can be effected and onward transportation arranged.

6. To report to the Staff Duty Officer the occurrence of a transportation accident and alerting response forces.

C. DoD Instruction 6055.13, Transportation Accident Prevention and Emergency Response Involving Conventional DoD Munitions and Explosives, requires any DoD activity which receives notice of a transportation mishap involving DoD munitions or explosives to contract the Army Operations Center (AOC) located in the Pentagon ((703) 697-0218 or DSN 227-0218).

7.19 Environmental Compliance Assessments

A. DoD facilities engage in many operations and activities that can cause environmental impacts on public health and the environment if not properly managed. Many of these activities are regulated by Federal, state, and local regulations and by DoD component regulations and policies. To assist in identifying areas that need correction, an environmental assessment checklist approach is recommended. This approach provides a systematic procedure for identifying all of the processes on an installation that may present a potential environmental impact and it provides a method of program assessment by higher headquarters during environmental compliance audits.

B. The US Army Corps of Engineers Construction Engineering Research Lab, Champaign, IL, in cooperation with DoD components has developed a comprehensive Environmental Assessment and Management (TEAM) Guide. This publication combines Code of Federal Regulations and management practices into checklists that show legal requirements and the specific operations or items to review. This publication can serve as a guide to facilities developing environmental assessment checklists. The guide is divided into 13 sections that correspond to major compliance categories.

1. Air Emissions Management
2. Cultural Resources Management
3. Hazardous Materials Management
4. Hazardous Waste Management
5. Natural Resource Management
6. Other Environmental Issues
7. Pesticide Management
8. Petroleum, Oil, and Lubricant (POL) Management
9. Solid Waste Management

10. Storage Tanks Management
11. Toxic Substances Management
12. Wastewater Management
13. Water Quality Management (potable water)

C. Copies of the guide may be obtained from the National Technical Information Service, 5285 Port Royal Road, Springfield, VA 22161

CHAPTER 8

SAFETY AND HEALTH

SECTION I. GENERAL

8.1 Purpose and Applicability

A. The preceding chapters of this publication emphasized the dangers associated with the receipt, storage, and handling of hazardous materials. Personnel accidents associated with any industrial-type warehousing operation can have an adverse effect on productive man-hours and planned production schedules. In the case of hazardous materials the potential for injuries and lost production time is significantly increased. The purpose of this chapter is to outline safety and occupational health requirements and to provide general guidance for compliance with Federal and DoD programs. DoD services/activities will follow specific guidelines and policy set forth by their respective headquarters.

B. The provisions of this chapter are applicable to all personnel involved in the planning and execution of activity safety and health programs.

8.2 Federal Regulatory Requirements

A. National occupational safety and health requirements are contained in Public Law 91-596, Occupational Safety and Health Act, published in Title 29 CFR, the Occupational Safety and Health Standards. Presidential Executive Order 12196, 26 February 1980, Occupational Safety and Health Programs for Federal Employees, made the provisions of this Act mandatory for Federal agencies. This Executive Order provides the heads of Federal agencies with the flexibility to implement their programs in a manner that is consistent not only with their respective missions, sizes, and organizations, but also with the standards published in Title 29.

B. Both Title 29 CFR and Executive Order 12196 specifically require each Federal agency to:

1. Publish an agency Occupational Safety and Health Program to carry out the provisions of the Act.

2. Develop a set of procedures to ensure effective implementation of the general policy and of the program.

3. Establish goals and objectives to reduce and eliminate occupational accidents, injuries, and illnesses.

4. Assure that the Safety and Health Office at each agency is designated at appropriate levels and given sufficient authority to represent the interest and support of the agency head responsible for the management and administration of the program.

C. All activities must have a written Hazard Communication Program (Title 29 CFR, section 1910.1200). The purpose of this plan is to ensure that all chemicals in the workplace are evaluated, and that information concerning their hazards is transmitted to employers and employees. This information is to be transmitted through comprehensive communications programs, container labeling or other forms of warning, MSDSs, and employee training.

D. Title 29 CFR, section 1910.119, Chemical Process Safety Management (PSM) Standard, establishes OSHA requirements for preventing or reducing the consequences of catastrophic releases of toxic, reactive, flammable, or explosive chemicals. Further discussion is contained in section 8.23.

8.3 DoD Regulatory Requirements

A. DoDI 6055.1, Department of Defense Occupational Safety and Health Program, establishes safety and health goals for DoD and incorporates the general requirements of Title 29 CFR and Executive Order 12196.

B. DoDI 6055.8, Occupational Radiation Protection Program, supplements DoDD 1000.3, Safety and Occupational Health Policy for the Department of Defense, and updates procedures for the Occupational Radiation Protection Program for DoD. It provides Radiation Protection Program requirements and DoD occupational exposure guides.

C. DoD 6050.5, DoD Hazard Communication Program, establishes the DoD's hazard communication program as required by 29 CFR 1910.1200, updates policy responsibilities, requires compliance with OSHA standards, specifies training, MSDS, and labeling procedures, and establishes the Hazardous Materials Information System.

SECTION II. SAFETY AND HEALTH RESPONSIBILITIES

8.4 Installation Commander.

Title 29 CFR, section 1960.8, requires Commanders to provide employees with a place of employment free from recognized hazards that cause, or are likely to cause, death or serious physical harm. Commanders are solely responsible for this function and cannot delegate it. They are required to display the same aggressive leadership in this that they display for other elements of command.

8.5 Supervisory Personnel. Title 29 CFR, section 1960.9, requires supervisors to comply with the occupational safety and health standards applicable to DoD, including applicable OSHA standards. Mishap prevention is an operating function that may not be transferred to a staff organization. To accomplish this responsibility, supervisors will ensure that personnel are trained to work safely, enforce safety and health rules, and correct unsafe/unhealthful acts and unsafe/unhealthful mechanical or physical conditions. Supervisors will also investigate mishaps and promptly report hazardous conditions to the Safety and Health Manager or other designated superior.

8.6 Employee Responsibilities and Rights

A. Title 29 CFR, section 1960.10, requires employees to comply with the DoD standards, rules, regulations, and orders applicable to their actions and conduct. The Act also requires employees to use safety equipment, PPE, and other devices and procedures provided or directed by the Act, DoD, or the commander as necessary for their protection.

B. Under Title 29 CFR, section 1960.10, and Executive Order 12196, employees have the right to report unsafe and unhealthful working conditions to appropriate officials including the members of safety and health councils. The purpose of these councils is to foster mutual cooperation and open channels of communication, to make recommendations to the commander, and to perform such additional safety and health duties as the commander or council chairperson may direct. Employees also have the right to information relevant to their duties, including information on the nature and hazards of substances in workplaces. Executive Order 12196 also states that employees will not be subject to restraint, interference, coercion, discrimination, or reprisal for filing a report on an unsafe or unhealthy working condition, or for other participation in Occupational Safety and Health Program activities.

SECTION III. WRITTEN HAZARD COMMUNICATION PROGRAM

8.7 Program Requirements

A. Title 29 CFR, section 1910.1200, requires DoD components to establish and maintain a written Hazard Communication Program. The purpose of this program is to ensure that employees are apprised of and protected from workplace chemical hazards to help prevent occupational illnesses and injuries. This program requires that the potential hazards of chemicals in the workplace be evaluated, that employees be informed of hazards and appropriate protective measures, and that hazard awareness training be provided and documented.

B. The written Hazard Communication Program will include, as a minimum, procedures for accomplishing the following:

1. Providing labeling or other forms of warning to employees regarding the hazards of chemicals in workplaces.

2. Making MSDSs accessible at all times to employees in the workplace.

3. Training employees about the hazards of chemicals present in the workplace.

4. Providing employees with a list of chemicals known to be present in the workplace, using an identity that is referenced on the appropriate MSDS.

5. Informing employees of the hazards of nonroutine tasks and of the hazards associated with chemicals contained in unlabeled pipes in their work areas.

6. Informing other than regularly assigned employees of chemical hazards that may be present

in the workplace (e.g., employees of a construction firm working onsite, employees performing routine maintenance and repair work, or members of the inventory team). This includes providing these employees with copies of MSDSs, or making them available at a central location, for each hazardous chemical the employees may be exposed to while working. In addition, commanders will ensure that the program informs these employees of the measures necessary to protect themselves under normal operating conditions and in foreseeable emergencies. The installation program will also provide methods for informing these employees of the labeling system.

C. The written Hazard Communication Program will be made available, upon request, to employees, their designated representatives, the Secretary of Labor, or the Director, National Institute for Occupational Safety and Health, US Department of Health and Human Services, in accordance with the requirements of Title 29 CFR, section 1910.1200.

8.8 Determination of Chemical Hazards. Title 29 CFR requires chemical manufacturers or importers to assess the hazards of chemicals that they produce or import. Since they are required to provide this information to DoD in the form of MSDSs, labels, and other forms of warning, the evaluation and determination of chemical hazards in the case of mission stocks is not an installation responsibility. In the case of locally purchased hazardous chemicals (either standard or nonstandard stock), MSDSs will be required and obtained prior to contract award by the Purchasing or Contracting Office. Those MSDSs will, in turn, be forwarded to the DoD HMIS focal point for the service or agency under which the installation operates for inclusion in the DoD HMIS data base. Contracts will not be awarded if the MSDS is not provided. Since the MSDS is required prior to contract award, an MSDS is not required with the shipment although some companies routinely provide the document along with the shipment.

8.9 Labeling of Containers of Chemicals in the Workplace

A. Title 29 CFR, section 1910.1200, requires that all chemicals in the workplace be labeled, tagged, or marked with the identity of the hazardous chemical, the appropriate hazard warnings (including target organs), and the name and address of the chemical manufacturer or other responsible party. The Act further provides, however, that in work operations where employees handle only chemicals sealed in containers that are not opened under normal conditions such as those found in a warehouse, employers need only ensure that labels on incoming containers are not removed or defaced. Consequently, mission stocks will not require additional labeling as long as the integrity of the original label is maintained and the label meets the requirements of the standard.

B. A warning label is required on containers of chemicals used in other workplaces such as industrial operations. This requirement also applies to chemicals in tanks and pipes. For this purpose, the installation is permitted to use signs, placards, process sheets, batch tickets, operating procedures, or other written materials in lieu of affixing labels to individual stationary process containers, as long as the alternative method identifies the containers to which it applies and conveys the information shown in subparagraph A above. The written materials must be

available to the employees in their work area throughout each work shift. The following additional requirements apply to the labeling of chemicals in the workplace:

1. The commander is not required to label portable containers into which hazardous containers are transferred from labeled containers, and which are for the use of the employee who performs the transfer within that shift.

2. Labels or other forms of warning will be written legibly and in English, and will be prominently displayed on the container or readily available in the work area throughout each shift. Facilities located in a region where another language is prominent may present the information in the other language and in English.

C. For the DoD hazardous chemical warning label, DLA has developed a file of labeling information for all hazardous chemicals used by DoD. This information is disseminated via the DoD Hazardous Materials Information System which was established under DoDI 6050.5. Activities are not required to relabel existing stocks with the DoD label if the manufacturer's supplied label meets the requirements of 29 CFR 1910.1200. The label provided in the HMIS is available if the manufacturer's label has been removed or obliterated. The CD-ROM version of the HMIS will produce two sizes of the label onto a preprinted DD form 2521 or 2522 or onto blank label stock or paper.

8.10 Material Safety Data Sheets

A. Title 29 CFR requires that chemical manufacturers or importers provide their customers with an appropriate MSDS with each initial shipment of a hazardous chemical and again when a change of formulation has occurred. The MSDS must be available and accessible to employees during each work shift when in the work area. The HMIS may be used to meet this requirement. It should be understood that because of an interpretation by the Solicitor General of OSHA, manufacturers are not required to automatically provide updated copies of their MSDSs to the Federal Government. Instead, the Government must require the MSDS through its contractual process. Thus, the Government will not likely receive updated MSDSs until it buys the product from the manufacturer again.

B. When employees must travel between workplaces during a work shift (e.g., work is carried out in different warehouses or geographical locations), MSDSs may be kept in a central location at the primary workplace as long as the information is available to employees immediately in the event of an emergency. Keep in mind, the key concept here is ready access.

C. MSDSs may be kept in any form, including operating procedures or electronic format, and may be designed to cover groups of hazardous materials in a work area where it may be appropriate to address the hazards of a process rather than of individual hazardous chemicals. However, the commander will ensure that, in all cases, the required information is provided for each chemical and is readily accessible to employees during each work shift.

D. New MSDSs and hazard determinations are not required for hazardous chemicals that are

redistilled or recycled by personnel as a result of the recoupment process described in chapter 4 of this document.

8.11 Employee Information and Training

A. Commanders are required by Title 29 CFR, section 1910.1200, to provide employees with information and training on hazardous chemicals in their work area at the time of their initial assignment and whenever a new hazard is introduced into their work area. Specifically, employees will be informed of:

1. The requirements of the Hazard Communication Program as prescribed by Title 29 CFR, section 1910.1200.

2. Any operations involving hazardous chemicals in their work area.

3. The location and availability of the written Hazard Communication Program, including the list(s) of hazardous chemicals and the MSDSs required by Title 29 CFR, section 1910.1200.

4. Specific training required by Title 29 CFR, section 1910.1200, will be addressed in chapter 9 of this document.

SECTION IV. INSPECTIONS AND OPERATIONAL PROCEDURES

8.12 General

A. Mishap prevention surveys and inspections and sound operating procedures are among the principal elements of a total safety and health program. In addition to these inspections, installations are subject to both announced and unannounced inspections conducted by OSHA under authority of Title 29 CFR.

B. Inspections of workplaces in which hazardous materials are stored and handled are the responsibility of each employee assigned to work in these areas. Although the commander and supervisory personnel are ultimately responsible, each employee, from the beginning to the end of the work shift, must be alert to conditions that, if not corrected, might later pose a more serious risk to all employees. These conditions include, but are not limited to, damaged or leaking containers, overturned drums, fallen stacks of material, or employee smoking in prohibited areas. The purpose of this section is to provide general guidance concerning inspections, operating procedures, and physical examination requirements. Specific guidelines and policy set forth by services and agencies will be followed as appropriate.

8.13 Inspections and Maintenance

A. Buildings designated for the storage of hazardous materials will generally have certain engineering features incorporated into their design for the specific purpose of controlling or minimizing the hazards of the stored materials. The unexpected sudden or gradual failure of these systems is, therefore, probably of greater concern than it would be in a nonhazardous

storage facility. For this reason, periodic inspections and required servicing at prescribed intervals are key elements in ensuring that these systems serve their purpose reliably.

B. Since facilities vary by type, purpose, year of construction, and design features, establishment of specific inspection and maintenance intervals is beyond the scope of this publication. The Facility Engineer, in consultation with the Environmental Protection Office and with an Industrial Hygienist, will develop detailed requirements. Inspection and maintenance intervals will be based upon manufacturer's recommendations or I.G. established time frames unless local maintenance history files suggest the need for more stringent requirements. The Installation Inspection and Maintenance Program will address, as a minimum, the following systems or components:

1. Roofs, ceilings, walls, and floors of hazardous materials storage areas.

2. Ventilation systems, including ventilation rates for each storage area.

3. Heating and air-conditioning systems.

4. Electrical, lighting, and plumbing systems.

5. Emergency exits and cargo openings, including emergency lights and exit signs.

6. Facility alarm systems.

7. Fire suppression systems.

8. Spill control and containment features.

8.14 Standard Operating Procedures

A. Although many hazards in the workplace will be eliminated or controlled through engineering controls, isolation of hazardous operations, and substitution of safer procedures, additional procedural controls may be required to achieve overall hazard abatement objectives. From a mishap prevention viewpoint, unsafe or unhealthy acts or conditions are the result of one or more basic causes. One frequent cause is the absence of command emphasis for sound operating procedures tailored to suit the local operating environment.

B. Defense installations will develop and publish local guidance for employees not otherwise provided in official manuals or authoritative publications. Such procedures may be available in the Operating and Support Hazard Analysis of the System Safety Analysis, if such an analysis has been performed on the specific warehouse or facility. Suggested areas to be covered include the following:

1. Procedures for an inspection of the workplace prior to the entry of employees at the

beginning of the workday or shift for the purpose of detecting and correcting unsafe or unhealthy conditions that may have developed while the building was unmanned.

2. Means of informing visitors and other personnel not regularly assigned to the workplace of the chemicals and hazards present, the precautions to be taken, and the location of MSDSs, as required by Title 29 CFR, section 1910.1200.

3. Controls or measures for logging employees and visitors in and out of hazardous materials storage or working areas (for emergency purposes).

4. Procedures and responsibilities for periodic inspections of ventilation, lighting, alarm, fire suppression systems, and emergency eyewash and shower facilities.

5. Assignment of responsibility for a periodic determination of the adequacy of first-aid supplies and equipment.

6. Plans for daily employee orientation briefings concerning planned events such as processing receipts and issues, rewarehousing actions, inventory, presence of employees in the workplace who are not normally assigned, and anticipated requirements for personal protective clothing.

7. Designation of no smoking or outside smoking areas.

8. Designation of dining areas.

9. Procedures for inspections to ensure that hazardous materials are stored away from heat and ignition sources.

10. Local operating principles and safety instructions governing the operation of power and manually operated MHE including safe operating speeds for forklifts handling hazardous materials, truck loading and unloading operations, and intrainstallation movement of hazardous materials.

SECTION V. PERSONAL PROTECTIVE EQUIPMENT

8.15 General. Title 29 CFR, Subpart I requires the employer to assess hazards, select and provide PPE, and train the employees to use them where hazards might be present. Each service/agency will have a written Occupational Safety and Health (OSH) program covering the selection, use, and training of PPE. This section describes the general requirements described in Subpart I. DoD services/activities with established OSH programs shall follow guidelines and policy set forth by their respective headquarters.

8.16 Eye and Face Protection. Eye and face protection is required by section 1910.133. Approved eye and face protection shall be used when employees are exposed to eye and face hazards from flying particles, molten metal, liquid chemicals, acids or caustic liquids, chemical gases or vapors, or potentially injurious light radiation.

8.17 Respiratory Protection Program. Section 1910.134, states that, in controlling occupational diseases caused by breathing air contaminated with harmful dusts, fogs, fumes, mists, gases, smokes, sprays, or vapors, the primary objective will be to prevent atmospheric contamination. This will be accomplished as far as feasible by accepted engineering control measures such as enclosure or confinement of the operation, general and local ventilation, and substitution of less toxic materials. When this is not feasible, respirators will be used.

8.18 Occupational Head Protection. Section 1910.135 specifies that employees shall wear protective helmets when working in areas where there is a potential for injury to the head from falling objects. Further, protective helmets designed to reduce electrical shock hazard shall be worn by each affected employee when near exposed electrical conductors which could contact the head.

8.19 Occupational Foot Protection. Safety-toe footwear is required by section 1910.136. Employees shall wear protective footwear when working in areas where there is a danger of foot injuries due to falling and rolling objects, or objects piercing the sole, and where employees' feet are exposed to electrical hazards.

8.20 Hand Protection. Section 1910.138 specifies that employers shall select and require employees to use appropriate hand protection when employees' hands are exposed to hazards such as those from skin absorption of harmful substances, severe cuts or lacerations, severe abrasions, punctures, chemical burns, thermal burns, and harmful temperature extremes.

SECTION VI. OTHER REQUIREMENTS

8.21 Medical Surveillance Program. Title 29, Section 1910.120f specifies the requirement that employers institute a medical surveillance program when its employees are engaged in certain hazardous waste operations or emergency response operations. When applicable, installations will institute such programs that are at least as stringent as the OSHA requirements. The specific policy and guidance provided in service/agency programs will be followed by the installations. Employees should contact the installation OSH officer for specifics regarding the medical surveillance program.

8.22 Occupational Radiation Protection Program. DoDI 6055.8, Occupational Radiation Protection Program, requires that DoD installations conducting operations involving occupational radiation exposure establish and maintain radiation protection programs to reduce occupational exposures to radiation to a level as low as reasonably achievable (ALARA). Detailed requirements and exempted installations are contained in DoDI 6055.8. Additionally, each component has specific regulations for control of licensed radioactive materials which implement the US Nuclear Regulatory Commission's rules and regulations. These regulations must also be consulted.

8.23 Process Safety Management

A. Process Safety Management prevents or minimizes the consequences of a catastrophic

release of toxic, reactive, flammable, or explosive materials from a process into the workplace, and possibility into the surrounding community. This is a systematic approach to the management of process hazards in evaluating the process design, technology, changes, operational and maintenance procedures, non-routine procedures, emergency prepardness plans and procedures, training programs, and other elements.

1. For certain chemicals, PSM requires that:

a. Information be gathered for highly hazardous chemical operations, or chemical process hazard analysis be performed.

b. An appropriate PSM program be in place where the standard applies.

2. This standard applies to all activities with operations at or above listed threshold quantities of highly hazardous chemicals outlined in 29 CFR 1910.119. This standard pertains to all of the chemicals listed in 29 CFR 1910.119, Appendix A, List of Highly Hazardous Chemicals, Toxics, and Reactives (Mandatory). It also applies to explosives and pyrotechnics as defined in 29 CFR 1910.109, Explosives and Blasting Agents, paragraphs (a)(3) and (10) respectively, and as discussed in 29 CFR 1910.109(k) and it requires compliance with the Risk Management Program, 40 CFR 68.. The PSM standard applies only to individual or physically connected chemical processes. It does not apply where the separation distance is sufficient to prevent interaction and where the processes are not physically interconnected. Certain functions such as fuel storage or fuel dispensing are excepted from the standard's requirements.

3. DoD Military Services and Agencies will ensure system support, and Safety management will provide program supplements and program oversight as necessary. DoD elements will follow their Service or Agency policies concerning PSM and ensure that their operations and storage practices are consistent with the spirit and intent of the PSM standard.

CHAPTER 9

HAZARDOUS MATERIALS TRAINING

SECTION I. GENERAL

9.1 Purpose and Applicability

A. The preceding chapters of this document outlined procedural requirements unique to the identification, receipt, storage, and handling of hazardous materials. It should be readily apparent that the presence of these materials in the workplace significantly increases the responsibilities of the activity Commander and the senior managers. The command responsibility to protect employees and the environment has been expanded and redefined, to some extent, by recent domestic legislation and rule changes by international regulatory agencies. Consequently, some operations previously governed largely by DoD policies and regulations are now being regulated by Federal statute and international regulations and rules. Some of these new procedural requirements may seem more complex and demanding, but in each case their common objective is the safe handling and transportation of goods and materials defined as dangerous or hazardous. The requirements' collective impact on operations is an increased requirement for sound and effective training programs to ensure full compliance with national and international regulations to protect personnel and the environment.

B. The purpose of this chapter is to summarize training requirements relating to the management of hazardous wastes and materials as published in various Federal and DoD regulations and, in addition, to provide general guidelines for developing local training programs. The design and conduct of personnel training programs can reduce serious injury and provide for environmental protection. Less obvious is the fact that such a program reflects a concern for the welfare of the individuals and their working environment. A visible and active training program, therefore, complements other morale-promoting activities.

C. The provisions of this chapter may be used to supplement existing service/agency training programs.

SECTION II. FEDERAL AND INTERNATIONAL REQUIREMENTS FOR HAZARDOUS MATERIALS TRAINING

9.2 General. Training requirements have been established by DOT, EPA, OSHA, and NRC. These requirements are contained in various parts of the CFR, and are summarized in the following paragraphs. Specific requirements are contained in the regulations. These regulatory training requirements each address their own specific areas of responsibility and are not intended to supersede one or another. Also, military service and agency training requirements may be more stringent than regulatory training requirements and should be followed where directed by service and agency policy.

9.3 DOT Requirements

A. A HAZMAT employer must ensure that each of its HAZMAT employees is trained in accordance with the requirements of 49 CFR, Subpart H, of Part 172. A HAZMAT employee who performs any function regulated by the hazardous materials regulations (HMR) may not perform that function unless he or she has received training as described in Subpart H of Part 172. Each HAZMAT employer has a duty to comply with the applicable requirements of the hazardous materials regulations and to thoroughly instruct each HAZMAT employee on how to comply with the regulations.

B. The required training may be provided by the HAZMAT employer or other public or private sources. Every HAZMAT employee must receive both initial and recurrent training that includes:

* General awareness/familiarization training
* Function-specific training
* Safety training
* Testing

C. Each HAZMAT employer is responsible for compliance with the DOT regulations for shippers, transporters, and manufacturers, regardless of whether the training required by the DOT HAZMAT training regulations has been completed. This means that compliance with the substantive rules cannot be put off until training is completed, and that providing training does not excuse violations of the rules. The employer must provide both initial and recurrent training as specified in 49 CFR subpart H.

D. Driver Training. In addition to other training requirements of the hazardous materials regulations, 49 CFR 177.816 requires that no carrier may transport, or cause to be transported, a hazardous material unless each HAZMAT employee who will operate a motor vehicle has been trained in the applicable requirements of 49 CFR parts 390-397, and the procedures necessary for the safe operation of that motor vehicle.

9.4 EPA Requirements. Title 40 CFR, section 264.16, requires that employees assigned duties at a hazardous waste storage facility successfully complete a program of classroom instruction or on-the-job training that teaches them to perform their duties in a way that ensures the facility's compliance with the requirements of Title 40 CFR, part 264. This program must be directed by a person trained in hazardous waste management procedures (including contingency plan implementation) relevant to the positions in which they are employed. As a minimum, the training program must ensure that facility employees are able to respond effectively to emergencies by familiarizing them with emergency procedures, emergency equipment, and emergency systems.

9.5 OSHA Requirements

A. Occupational Safety and Health (General).

1. Training of Management Officials. Title 29 CFR, section 1960.54, requires the training of top management officials. Each agency must provide top management officials with orientation and other learning experiences that will enable them to manage their agency's Occupational Safety and Health Programs.

2. Training of Supervisors. Title 29 CFR, section 1960.55, requires the provision of occupational safety and health training that covers the supervisors' responsibility to provide and maintain safe and healthful working conditions for employees, the agency Safety and Health Program, Title 29 CFR, section 19, Executive Order 19126, and the occupational safety and health standards applicable to the assigned workplace.

3. Training of Safety and Health Personnel. Training requirements for Safety and Health Specialists, Safety and Health Inspectors, and employees assigned collateral Safety and Health Committee responsibilities are covered in Title 29 CFR, sections 1960.56, 1960.57, and 1960.58, respectively.

4. Training of Employees and Employee Representatives.

a. Title 29 CFR, section 1960.59, requires that each agency provide appropriate safety and health training for employees, including specialized job safety and health training appropriate to the work performed by the employee. Training shall also inform employees of the agency Occupational Safety and Health Program and will emphasize employee rights and responsibilities.

b. Agencies should provide appropriate occupational safety and health training for agency employees who are representatives of recognized employee groups (e.g., labor organizations). This will enable the group to function appropriately in ensuring safe and healthful working conditions and practices in the workplace and enable them to assist in conducting workplace inspections.

B. Hazard Communication Standard.

Title 29 CFR, section 1910.1200, requires that employers provide employees with information and training on hazardous chemicals in their work area at the time of their initial assignment and whenever a new hazard is introduced into their work areas. This employee training shall include at least:

1. Methods and observations that may be used to detect the presence or release of a hazardous chemical in the work area (e.g., monitoring conducted by the employer, continuous monitoring devices, visual appearance or odor of hazardous chemicals when being released).

2. The physical and health hazards of all chemicals in the work area.

3. The measures employees can take to protect themselves from these hazards, including specific measures the employer has implemented to protect employees from exposure to

hazardous chemicals, such as appropriate work practices, emergency procedures, and PPE to be used.

4. The details of the Hazard Communication Program developed by the employer, including an explanation of the labeling system and the MSDS, and how the employees can obtain and use the appropriate hazard information.

C. Hazardous Waste and Emergency Response.

1. Title 29 CFR, section 1910.120, requires that employers develop and implement a written safety and health program. As part of this program, employers are required to inform and train employees. Training must make workers aware of the potential hazards they may encounter and provide the necessary knowledge and skills to perform their work with minimal risk to their safety and health. Training must also inform workers of the procedures to follow in case of an emergency. The standard covers three primary groups of workers:

a. Employees engaged in mandatory or voluntary clean-ups at uncontrolled hazardous waste sites, including corrective actions at Resource Conservation and Recovery Act (RCRA) treatment, storage, and disposal (TSD) facilities.

b. Employees engaged in routine and emergency hazardous waste operations at TSD facilities regulated under RCRA.

c. Employees engaged in emergency response operations for releases of, or substantial threats of releases of, hazardous substances without regard to location.

2. Training must be completed before an employee is permitted to take part in an actual emergency operation or incident. Only those employees who have been appropriately trained may perform hazardous waste operations or emergency response

3. Training areas covered on 29 CFR 1910.120 are very detailed covering such areas as what the training should include, initial training, management and supervisor training, trainer qualifications, certification required, emergency response requirements, refresher training, and equivalent training. DoD activities will as a minimum comply with the requirements of this section. Service/Agency training requirements may be more stringent and will be followed as directed by policy.

4. Specific attention is directed to the training requirement for employees engaged in emergency response operations for releases of, or substantial threats of releases of, hazardous substances without regard to location. Training shall be based on the duties and function to be performed by each responder of an emergency response organization. Employees who participate, or are expected to participate, in emergency response, shall be given training in accordance with requirements in 29 CFR 1910.120 under one of the following levels:

a. First Responder, awareness level
b. First Responder, operation level

c. Hazardous materials technician
d. Hazardous materials specialist
e. On scene incident commander

D. Other OSHA Training.

29 CFR 1910.1003 address occupational safety and health standards that have been established for 13 carcinogens and must be complied with as appropriate.

9.6 Nuclear Regulatory Requirements

A. Title 10 CFR, section 19.12, requires that all individuals working in or frequenting any portion of a restricted area containing licensed radioactive material shall be kept informed of the storage, transfer, or use of these materials or of radiation in such portions of the restricted area. The extent of information provided will be commensurate with potential radiological health problems in the restricted area.

B. In addition, employees assigned to work in areas where radioactive materials are stored or used will be instructed in the following:

1. Precautions to take or procedures to follow to minimize exposure.

2. The purposes and functions of protective devices employed.

3. Observing to the extent within the worker's control, the applicable provisions of Commission regulations and licenses for the protection of personnel from exposures to radiation or radioactive materials occurring in such areas.

4. Their responsibility to report promptly to the licensee any condition that may lead to or cause a violation of Commission regulations and licenses or unnecessary exposure to radiation or radioactive material. At DoD installations, the licensee is the Installation Environmental Officer.

5. The appropriate response to warnings made in the event of any unusual occurrence or malfunction that may involve exposure to radiation or radioactive material.

6. Radiation exposure reports that workers may request of employers in accordance with the provisions of Title 10 CFR, section 19.13.

9.7 International Requirements

A. The Technical Instructions for the Safe Transport of Dangerous Goods by Air published by the ICAO and the Dangerous Goods Regulations published by IATA require that initial and recurrent Dangerous Goods Training programs be established and maintained by regular shippers of dangerous goods.

B. To assist with the planning of training courses, the minimum required by subject matter relating to the transport of dangerous goods by air, for various categories of personnel, is indicated below:

1. Personnel engaged in the ground handling, storage, and loading of dangerous goods must be trained in general philosophy, labeling and marking, handling and loading procedures, compatibility, and emergency procedures.

2. Packers must be trained in the classes of dangerous goods, list of dangerous goods, general packaging requirements, equivalents, specific packaging instructions, and labeling and marking.

3. Shippers must be trained in the classification of dangerous goods, list of dangerous goods, prohibitions, packaging instructions, labeling and marking, shipper's responsibilities, and dangerous goods transport documents.

9.8 DoD Hazardous Material Training Requirements

A. Preparing Hazardous Materials for Military Air Shipment.
Training for military airlift must be in accordance with AFJMAN 24-204/TM 38-250/NAVSUP PUB 505/MCO P4030.19/DLAM 4145.3. This regulation specifies that commanders assign hazardous material workers into one of four functional groups and determine the level of training required. This method forms a building block approach which provides basic hazardous materials training applicable to all personnel at the first level. Trainers then provide more detailed training to supplement the basic level of training (additional levels added) based on specific job responsibilities. Section 1.19 specifies that personnel must receive initial training and subsequent refresher training at 24 month intervals and section 1.20 specifies documentation of training records.

B. DoD 4500.9R, Defense Transportation Regulation (DTR), requires that all personnel involved with the preparation and shipment of hazardous materials by commercial carriers or by military vehicles must be trained. The specifics of this training are found in the DTR, Chapter 204, Hazardous Materials, paragraph E, Training. The DTR chapter provides information regarding mandatory training requirements, refresher training, training records, and a listing of DoD schools.

SECTION III. THE TRAINING PLAN

9.9 General. Training's primary purpose and goal must be trained and competent personnel, adequate and properly maintained equipment, intelligent job planning, alert supervision, and satisfactory organization morale. Attainment of this goal in today's complex storage and materials operations, further complicated by numerous Federal laws and regulations, is very difficult. It is, however, a goal that installations must constantly strive to attain if they are to have efficient and safe storage and materials handling. Training is also the best preparation for emergencies. Training for emergencies must produce fast action and authoritative, decision-oriented operational responses across all levels. Training should also begin with the premise that, whatever the emergency might be, trained individuals can minimize the impact of

emergencies on life, property, and the environment. Lastly, training courses must train managers, supervisors, and employees to actually manage emergencies, not just to talk about emergency management.

9.10 Responsibility for Training. Installation Commanders must assume direct responsibility for initiating, directing, supervising, and conducting all training pertaining to storage and hazardous materials handling activity. Training is more effective when it is made a part of operations and is not considered to be disconnected from the job. Operations personnel must have a thorough knowledge of their work and must have the confidence of their associates and subordinates. Operating supervisors must consider training an integral part of the daily workload.

9.11 Support by Storage Managers. Since training is part of the daily workload, storage managers must strongly support and participate in the program. Such support and participation should ensure the necessary balance between operations and training, with the training program receiving proper emphasis. It is important that this be a continuous program and not an isolated, temporary interest.

9.12 Training Plan Content. The first step in installing a training program is to institute an overall survey determining areas in which training is needed. Appendix G to this document has been developed as a suggested means of determining possible areas in which training may be needed and groups of personnel that might need the various types of training shown. Although its emphasis is on depot personnel, the concepts may apply to other personnel as well. Since it is possible that training could be needed in many or all of the areas indicated in appendix G, priorities must be assigned so needs are met on the basis of urgency. An important point to remember is that attempting too much training at one time will interfere with operations and decrease training benefits. Thus, a well thought out and balanced plan, increasing or decreasing in intensity and scope as conditions require, is essential to the success of a training program.

9.13 Kinds and Methods of Training

A. All key personnel shall receive general training in all hazardous materials procedures and standard practices; in addition, they must receive detailed instructions in those procedures with which they are specifically concerned. The amount of time devoted to training in each functional item as well as in operational procedures should be determined by the complexity of the job and the level of detail required.

B. A modified conference method of training with group participation and discussion, within the bounds of the training objective and under the control and guidance of the leader, should be used to present material related to principles of hazardous materials operations and detailed operating procedures.

C. The last phase of the training program should concentrate on actual job instruction for nonsupervisors. Included in this phase (but not confined to it) will be on-the-job instruction and step-by-step demonstrations using working models of packaged hazardous materials, labels, shipping papers, films, charts, diagrams, etc. Activities such as equipment operation, receipt

inspection and processing, segregation of incompatible materials, spill cleanup, and all other phases of hazardous materials storage and handling should be covered in this phase. Training in safety practices should be inherent in this type of training.

9.14 Coordination with Other Installation Activities. Coordination should be maintained between the storage and material handling or warehousing division and other affected elements of the installation (e.g., the Command Security Office, the Safety and Health Manager, the Industrial Hygiene Officer, and the Environmental Protection Office). In this manner, the installation's overall policies and objectives can be incorporated into the specific training programs of the separate activities or operations being trained. In addition specific training policies and procedures mandated by service/agencies can be incorporated.

9.15 Sources of Training Information. The following publications are recommended as source documents for the development of an installation Hazardous Materials Training Program and curriculum outline:

A. Federal Regulations.

1. Title 10 CFR, Nuclear Regulatory Commission.

2. Title 29 CFR, Occupational Safety and Health.

3. Title 40 CFR, Environmental Protection.

4. Title 42 CFR, Public Health.

5. Title 49 CFR, Department of Transportation.

B. Codes, Publications, and Standards.

1. American Conference of Governmental Industrial Hygienists (ACGIH).

   a. Guidelines for the Selection of Chemical Protective Clothing.

   b. Industrial Ventilation.

   c. TLV Handbook.

2. ANSI standards pertaining to procedures, equipment, and materials.

3. Association of American Railroads (AAR), Bureau of Explosives (BOE).

   a. Emergency Action Guides.

   b. Emergency Handling of Hazardous Materials in Surface Transportation.

4. ASTM Manual 10, Hazardous Materials Accidents

5. NFPA.

a. Fire Protection Guide on Hazardous Materials.

b. Fire Protection Handbook.

c. Manual of Hazardous Chemical Reactions.

d. National Electrical Codes.

e. National Fire Codes.

f. Hazardous Materials Response Handbook (NFPA 471/472).

6. NIOSH.

a. Occupational Diseases, A Guide to Their Recognition.

b. Occupational Health Guidelines for Chemical Hazards.

c. NIOSH Pocket Guide to Chemical Hazards.

d. Registry of Toxic Effects of Chemical Substances (RTECS).

e. The Industrial Environment, Its Evaluation and Control.

7. National Safety Council, Accident Prevention Manual.

C. DoD.

1. DoD 6050.5, HMIS.

2. DoD 6055.9, Ammunition and Explosives Standards.

3. AR 700-64/DLAM 4145.8/NAVSUPINST 4000.34/AFR 67-8/MCO P4400.105, Radioactive Commodities in the DoD Supply System.

4. DLAR 4145.25/AR-700-68/NAVSUPINST 4440.128-/MCO 10330.2-/AFR 67-12, Storage and Handling of Compressed Gases and Liquids in Cylinders, and of Cylinders.

5. DoD 6050.5-G-1, Federal Hazard Communication Training Program - Trainers Guide.

6. DoD 6050.5W, Federal Communication Training Program - Students Workbook.

D. Miscellaneous Publications.

1. A Method for Determining the Compatibility of Hazardous Wastes, EPA.

2. RCRA Inspection Manual, EPA.

3. Condensed Chemical Dictionary, Van Nostrand Reinhold Company.

4. Emergency Response Guidebook, DOT P 5800.3.

5. Handbook of Compressed Gases, Compressed Gas Association, Inc.

6. Fisher Scientific Company Handling, Storage, and Disposal Guide for Toxic and Hazardous Chemicals, Fisher Chemical Index 83C.

7. The Merck Index, Merck and Co., Inc.

8. Dangerous Properties of Industrial Materials, by Irving Sax.

9.16 Hazardous Material Training Programs. Installation's hazardous materials training programs may be supplemented by various programs conducted by industry or Government agencies. Major chemical companies offer a wide variety of seminars and conferences designed to satisfy Federal training requirements as outlined in the CFR. These courses or seminars may be particularly useful in qualifying activity training specialists.

9.17 Suggested Training Program. Appendix G presents a suggested training program that has been developed by the Defense Logistics Agency and is available for use by DoD activities. It describes a curriculum of courses that installation personnel can take and addresses both basic and refresher courses as well as courses that are implied/required by various regulations.

CHAPTER 10

AMMUNITION AND EXPLOSIVES

SECTION I. PURPOSE AND SCOPE

10.1 Purpose and Scope. The purpose of this section is to establish standard policies and principles governing the receipt, storage and issue, and care and preservation of ammunition and explosives at DoD establishments.

SECTION II. GENERAL

10.2 General. These policies and principles are general in nature. Contingencies not covered will require the exercise of discretion and judgment in complying with the requirements of this section. Detailed operational procedures are not included but will be found in the publications of the military services. The Department of Defense Explosives Safety Board also publishes information concerning ammunition and explosives. Military ammunition and explosives are products of war and as such are manufactured primarily to kill and destroy. Such products have inherent hazards that affect all handling operations from time of manufacture until expended or disposition actions are completed. With a knowledge of the hazards involved, the first and foremost principle that should be considered in any discussion of ammunition storage is that ammunition and explosives must be handled, stored, and shipped in a manner that will afford optimum protection against deterioration, accidental ignition, and detonation. The basic principle to apply is to limit the exposure to a minimum number of persons, for a minimum amount of time, to the minimum amount of ammunition and explosives consistent with safe and efficient operations.

10.3 Establishment of Safety Organizations. Safety organizations should be established for the purpose of supervising a single coordinated safety program including safety committee activities, accident prevention inspection, correction of day-to-day unsafe conditions and practices, employee training programs, publicity, accident cause investigation, and first aid training. Diligent and vigorous efforts should be made to prevent and eliminate hazards and unsafe practices. The planning of the handling of ammunition for any reason must be performed carefully and by competent, experienced personnel to ensure that all hazards have been recognized and that adequate safeguards are provided.

SECTION III. TYPES OF FACILITIES

10.4 Magazine. Any building or structure, except an operating building, used for the storage of explosives, ammunition, or loaded ammunition components (see TM 38-400/DLAM 4145.12/ NAVSUP PUB 572/AFJMAN 23-210/MCO P4450.14, Joint Service Manual (JSM) for Storage and Materials Handling).

10.5 Igloo Magazine or Arch-type Magazine. An arch-type earthcovered magazine which may be constructed of concrete or metal.

10.6 Earth-Covered Magazines (barricaded). Earth-covered magazines which are so located that the earth-covered sides or backs are toward each other, or the front of one magazine with a door barricade is toward an earth-covered side, back, or barricaded front of another magazine.

10.7 Earth-Covered Magazines (unbarricaded). Earth-covered magazines which are so located that the front of one magazine without a door barricade is toward an earth-covered side or back of another magazine.

10.8 Standard Igloo Magazine. An earth-covered, reinforced concrete, arch-type magazine, with or without a separate door barricade, constructed according to approved standard service drawings.

10.9 Special-Type Magazines. Includes but are not limited to:

A. Magazines with steel (instead of concrete) arches and steel, wood, or concrete end walls.

B. Earth-covered, reinforced concrete magazines such as Corbetta, dome, or box type.

10.10 Aboveground Magazines. Any type of approved magazine which is not earth covered. They may be either barricaded or unbarricaded.

10.11 Open Storage. This type of storage is undesirable and should be only an emergency expedient when authorized by the controlling authority.

SECTION IV. STORAGE PLAN

10.12 Preparation and Maintenance. A storage plan will be prepared and maintained on a current basis by each establishment storing ammunition. The storage plan should include as a minimum the following:

A. The quantity and kinds of buildings in which ammunition and explosives are stored.

B. The quantity distance restrictions on each storage building and storage site, loading dock, holding yards and areas, installation rail classification yards, and ammunition work shops and operating sites.

SECTION V. WAREHOUSING

10.13 General. Preparation for receipt of ammunition and explosives should commence as soon as it is known that ammunition will be received. Storage compatibility charts or tables, explosive weight content of the item, and other characteristics of the item being received should be checked prior to determining the storage location for the item. Within the restrictions mentioned above, a storage building should be selected to effect maximum utilization of space. When dunnage is required, a type of dunnage should be selected that will assure stack stability, proper ventilation, and ease in handling and subsequent rehandling of the item.

10.14 Quantity-Distance Tables. Quantity-distance tables established by the appropriate military service will govern quantities of ammunition or explosives that may be stored in a single location based on the distance the storage site is located from other storage sites, public highways and railroads, inhabited buildings, air fields, runways and boundary lines, and utilities and utility lines.

10.15 Storage Compatibility Charts or Tables. The factors which determine grouping are: effects of explosion of the item, rate of deterioration, sensitivity to initiation, type of packing, effects of fire involving the item, and quantity of explosive per unit. Storage compatibility groupings should not be confused with hazard classifications established for quantity-distance requirements. The appropriate military service will issue detailed storage compatibility groupings.

10.16 Aisles

A. Inspection aisles should not be maintained except when specific instructions to the contrary are issued by the controlling authority.

B. The widths of operation aisles in magazines should be adjusted to conform to widths required for specific types of available material handling equipment (MHE) and/or other operational needs.

C. Aisles should be provided for use of MHE, inventory, surveillance, or as necessary to distribute the load within the floor capacity, provide adequate ventilation, etc., as prescribed by the appropriate military service. Although aisles should not be maintained solely for inventory purposes if storage density is a factor, storage patterns should be arranged to facilitate material inventory whenever possible.

10.17 Space Layout and Utilization.

A. The military services are responsible for publishing instructions in the form of drawings, sketches, narratives, or combinations of these media on the approved methods of storage of all types of ammunition.

B. Having given due consideration to safety and preferred magazine usage, the managing authorities should establish controls to assure the most effective use of existing storage space.

10.18 Preferred Storage for Certain Ammunition and Explosive Items. This list is not complete. More details may be obtained from publications of the appropriate military service.

A. General. Ammunition will be stored in accordance with published storage compatibility charts or tables.

B. Storage of small arms ammunition. Small arms ammunition may be stored in aboveground magazines, providing service security requirements are satisfied. When there is more than one

type of structure available, the type offering the most protection against fire and pilferage will be selected.

C. Storage of bombs with high explosive (HE) components. Bombs should be stored in approved earth-covered magazines where possible.

D. Storage of separate-loading shells or projectiles. Separate-loading shells or projectiles should be stored in earth-covered magazines where possible.

E. Storage of pyrotechnic items. Pyrotechnic items will be given preferential storage in magazines which are well ventilated, dry, and in good repair.

10.19 Storage Aids

A. General. Ammunition should be stored and shipped palletized to effect a reduction in handling time. For proper grounding of ammunition and explosives while in storage, reference should be made to applicable publications of the appropriate military service. The following methods of palletization are permitted when authorized by the appropriate military service in the handling, storage, and shipping of ammunition:

1. Unstrapped pallets. Conventional double-faced pallets.

2. Short dunnage. Short dunnage of varying lengths used as horizontal dunnage in lieu of pallets and where authorized by the appropriate military service drawings.

3. Palletized unit loads. Applies to an assemblage of a particular commodity, packaged or unpackaged, or strapped or tied together in a bundle. When a unit load is strapped or fastened to a pallet, it becomes a "palletized unit load." This method is commonly employed for the storage and shipment of separate-loading shells or projectiles and should be used to the maximum extent possible for storage and shipment of other items.

B. Box Pallets

1. Small quantities of ammunition may be retained in box pallet storage to meet current issue demands.

2. Box pallets may be used for storage of irregular-shaped, hard to stack and crushable items such as container packed items, fiber containers, bagged goods, loose small items, etc.

C. Dunnage

1. Dunnage should be placed beneath the first layer of ammunition or explosives to keep the ammunition or explosives from coming in contact with the floor or ground. The type dunnage is specified on agency storage drawings, sketches, and/or narratives.

2. Steel racks which are grounded may be used for storage of separate-loading shells, bombs, and other cylindrical objects of ammunition.

10.20 Storage of Pilferable Ammunition. Appropriate security procedures as set forth in military department/agency regulations will be applied for all small arms ammunition, demolitions, and explosives such as blasting caps, igniters, detonators, fuses, and related items. The use of special locks and keys is required as directed by the controlling authority. Key and lock control procedures as set forth in appropriate military department/agency regulations will be applied.

10.21 Storage of Ammunition Bearing Security Classification of Confidential or Higher. The responsibility for taking the proper security measures involving the receipt, storage, and issue of classified material will rest with the commander of the installation involved. Structural standards, key and lock control, and applicable security procedures should conform to standards set forth in DoD 5200.1-R and appropriate military department/agency regulations.

10.22 Storing and Stacking of Dunnage. The storage of dunnage in a permanent open storage site should conform with the provisions of TM 38-400/NAVSUP PUB 572/AFJMAN 23-210/MCO 4450.14/DLAM 4145.12, chapter V, section I, Lumber, in so far as conditions permit. The location of dunnage yards will be governed by regulations published by the appropriate military service.

10.23 Fusible Links on Magazines. Fusible links will be listed on the current approved list published by Underwriters Laboratories, Inc. or other recognized testing laboratories. The melting point will be between 155° F and 165° F with a minimum rated breaking strength of 20 pounds for the door ventilator link and 8 pounds for the rear-stack ventilator link. Fusible links will not be painted.

10.24 Rewarehousing. Rewarehousing of ammunition will be kept to the minimum consistent with safety and operational needs.

10.25 Termite Control

A. One method of controlling subterranean termites in ammunition magazines is to provide a layer of poison soil under the slabs or around footing during construction. This principle may also be applied to structures already in place.

B. Earth-covered magazines will be treated only when vacant. If necessary, one section at a time may be treated.

10.26 Protection Against Moisture Damage. Every effort should be made to protect wood boxes from excessive moisture. As moisture content increases, the possibility of attack by various types of fungi, particularly mildew, also increases. Wood boxes of ammunition exhibiting fungi should be stacked on a pallet in a manner that will provide for air circulation around the boxes. Use of dunnage between layers is a method of allowing for air circulation.

SECTION VI. RECEIVING RAILCARS AND MOTOR VEHICLES

10.27 General. Railcars and motor vehicles containing ammunition and explosives that are received at military establishments will be inspected for sabotage, mechanical defects, and condition of the loading at an established inspection point. All shipments received in damaged or otherwise unsatisfactory condition because of deficiencies such as improper preservation, packing, or marking will be reported on SF 364 (Report of Discrepancy) in accordance with AR 735-11-2/DLAR 4140.55/SECNAVINST 4355.18/AFR 400-54 or SF 361 in accordance with AR 55-38 (RCS MTMC-54-R1)/NAVSUPINST 4610-33/AFR 75-18/MCO P4610-19/DLAR 4500.15.

SECTION VII. CARE OF AMMUNITION IN STORAGE

10.28 Responsibility. It is the responsibility of the commander of an installation to maintain stocks of ammunition in an issuable condition. When it becomes known that stocks of ammunition need preservation maintenance, the commander should schedule the operation per applicable military service policies and assure that the required maintenance is accomplished with minimal delay.

10.29 Storage Selection. Proper storage for ammunition to afford adequate protection should be selected in accordance with policies and regulations of the appropriate military service.

10.30 Inspection of Incoming Ammunition. Incoming ammunition should be inspected to determine condition and whether adequate preservative protection has been applied. Those packages of ammunition which have been opened and are being returned to the installation as excess should be cautiously checked. The examination should verify the materials serviceability/condition code and identify any preservation and/or packaging requirements.

10.31 Inspection of Ammunition in Storage. Inspections of ammunition in storage should be conducted to determine if the preservation and packaging protective measures are still adequate. A definitive inspection schedule should be established and followed.

10.32 Preservation and Cleaning Methods. The primary inventory control activity's packaging office will establish proper cleaning procedures, methods of preservation, packaging, and marking requirements.

SECTION VIII. SHIPPING

10.33 General. Ammunition shall be packaged in the containers prescribed by the drawings and specifications for the specific stock number involved. In addition, the individual military services publish standard carloading and truckloading drawings, sketches, and narratives in compliance with DOT and US Coast Guard regulations. Additional transportation requirements are specified by DoD 4500.9-R, Defense Transportation Regulation., Part II, Cargo Movement.

10.34 Preparation for Delivery

A. Shipping activities will comply with DOT and departmental regulations, whichever apply to the most restrictive anticipated mode of transportation.

B. All ammunition shall be loaded in accordance with the applicable outloading drawings and standards. Where such a drawing or standard does not exist, guidance may be obtained from the US Army Defense Ammunition Center and School (USADACS), Savanna, IL, or the Navy Packaging, Handling, Storage and Transportation Center, Colts Neck, NJ,. Also, general guidance contained in BOE Pamphlet Nos. 6, 6A, and 6C shall be followed where applicable. These pamphlets can be obtained from Bureau of Explosives, Association of American Railroads, 1920 L Street NW, Washington, DC 20036.

C. All shipments will be documented and marked in accordance with DoD regulation 4500.32-R, Military Standard Transportation and Movement Procedures, MIL-STD-129, Marking for Shipment and Storage, and applicable modal regulations.

D. Certification for shipment by military air will be made in accordance with AFJMAN 24-204/TM 38-250/NAVSUP PUB 505/MCO P4030.19G/DLAI 4145.3. For shipment by commercial aircraft, DOT or ICAO/IATA regulations are applicable.

E. Ammunition lot integrity should be maintained in storage and shipment from the time of manufacture and assembly through the supply action to troops. Lots should not be mixed in storage and shipment.

F. Placards should be placed on the outside of both railcar doors, indicating on which side of the railcar the documents are to be found.

G. Components of DoD will give technical aid and assistance to rail and motor carriers in the event of an incident involving explosives and ammunition. All such incidents will be reported in conformance with regulations of the appropriate military department.

H. Lumber and nails used for blocking and bracing of shipments will be of the size, variety, and grade specified and approved by DOT, BOE, the PICA and/or individual military service drawings, sketches, or narratives.

I. Adequate safeguards will be taken to ensure that ammunition being shipped agrees with the item and condition specified on the shipping directives.

J. Preparation for intransit security should conform to standards as set forth in appropriate military service/agency regulations for shipment of classified and/or sensitive material.

SECTION IX. LOCATOR SYSTEM

10.35 Locator Records. Locator records will be established at all military facilities where ammunition and explosives are stored. There should be two records established which can be

cross referenced. One should be a record of each lot of ammunition and the locations in which it is stored (the ammunition lot record cards may be used as this part of the locator system) and the second record should be a planograph for each storage building or a loose leaf book by magazine number with contents listed. Automated products may be used as long as they convey the appropriate information.

SECTION X. INVENTORY

10.36 Procedures. Detailed inventory procedures are prescribed by the individual DoD Components.

SECTION XI. SAFETY

10.37 General. An integral part of all ammunition handling operations is consideration for the safety of personnel, property, ammunition, and explosives. It is the policy of DoD that its agencies establish adequate controls consistent with a safe and efficient operation. The controlling authority is responsible for ensuring that safe practices are being observed in all operations in which ammunition and explosives are handled. That line of responsibility remains unbroken until it reaches that person who handles the item.

10.38 Safety Rules. Each military service is responsible for the publication of safety rules, regulations, and procedures to be followed in the handling of ammunition.

10.39 Posting Instructions. General instructions governing the storage and care of explosives should be posted in each magazine and building where ammunition and explosives are stored. These general instructions will include as a minimum the following:

A. Always handle explosives and ammunition carefully.

B. Remove dirt, grit, and foreign materials from containers and ammunition before placing in storage.

C. Do not store explosives and ammunition in damaged containers.

D. Keep all containers in magazine effectively closed.

E. Store all material lot numbers separately. The location configuration will be stable and designed to allow free circulation of air to all parts of the stack. Where dunnage is required to keep containers and ammunition off the floor, metal dunnage is preferred.

F. Do not open, repair, pack, or repack containers in or within 100 feet of a magazine, except as specifically authorized by the controlling authority.

G. Do not keep empty containers, tools, or other materials in magazine containing ammunition or explosives except as specifically authorized by the controlling authority.

H. Good housekeeping practices such as cleanliness and order must be maintained.

I. Use only electric lights approved for use in magazines.

J. Do not smoke or bring matches or other flame or spark producing devices into the ammunition area.

K. Do not allow unauthorized persons in the controlled ammunition area.

L. Keep magazine sparktight, with ventilators well screened and no openings around doors or foundations.

M. Keep doors locked when magazine is unattended. Close doors when vehicle is approaching platform unless vehicle is equipped with spark arrestor on exhaust.

N. Keep the 50-foot cleared space around aboveground magazines free from combustible materials and keep adequate cleared space around igloo magazine ventilators.

O. Two or more doors, when available, must be open when personnel are working in a magazine containing explosives or ammunition.

10.40 Standard Handling Methods. Standard handling methods, consistent with the safety rules and regulations of each military service, should be established for handling all serviceable ammunition packed in accordance with approved drawings and specifications. For all items not packed in accordance with approved drawings and specifications, or if an item is considered to be extremely hazardous, an SOP should be developed and approved by the commander of the installation prior to starting the operation. As a minimum, SOPs should be prepared for all preservation, renovation, and modification operations.

10.41 Educational Program

A. An educational program should be instituted in each installation to develop and maintain employees' interest in the safety program and to train employees in safe practices and safe procedures. Some of the mediums available for employee education are posters, bulletin boards, score boards, special exhibits, safety contests, articles in establishment publications, safety rules, hand out cards, pamphlets, warning signs for specific hazards, suggestion system, essay contests, or sound slide films of motion pictures for groups.

B. Appropriate "off-the-job" accident presentation features should be included in the program, and the safety organization should stimulate the interest of and cooperate with outside agencies concerned with this phase of the accident prevention program.

CHAPTER 11

HAZARDOUS PROPERTY DISPOSAL

SECTION I. PURPOSE

11.1 Purpose. This chapter provides general information on disposing of hazardous materials and hazardous wastes.

SECTION II. BACKGROUND

11.2 General

A. Proper disposal of hazardous property is essential to the protection of human health and the environment. Generally, the same type of prudent care and handling procedures that apply to hazardous materials are necessary in the management of hazardous wastes. Mismanagement or improper disposal of a hazardous waste may involve expensive cleanup costs, and the potential for imposition of heavy fines or penalties.

B. EPA promulgated regulations for the protection of human health and the environment are established under RCRA. These regulations hold generators liable for the proper disposal of their wastes under a "cradle to grave" concept. This concept involves the use of a uniform manifest which provides an audit trail for verifying compliance with disposal regulations.

C. EPA administers the national environmental protection program and enforces the regulations. However, operational and enforcement authority has been delegated to those individual states which set up hazardous waste programs that are equivalent to the Federal requirements. The states may also promulgate regulations that are more stringent than the Federal regulations. Generators of hazardous wastes must be aware of these variances.

SECTION III. DEPARTMENT OF DEFENSE POLICY

11.3 Policy. DoD policy is to store and dispose of hazardous property in an environmentally acceptable manner in accordance with applicable environmental laws and regulations, including state and local laws. Various implementing regulations and guidance manuals have been published by the individual components of the Department as well as joint publications.

SECTION IV. HAZARDOUS WASTE DISPOSAL RESPONSIBILITIES

11.4 Defense Reutilization and Marketing Service. DLA, through the Defense Reutilization and Marketing Service, has the mission responsibility for centralized disposal management of certain categories of DoD generated hazardous property. DRMS administers contracts with commercial hazardous waste disposal firms for the removal and ultimate disposal of these wastes. These contracts are also used for disposing of excess hazardous material for which there is no reutilization, transfer, donation, or sales potential.

A. Guidance for turning in hazardous property to DRMO is contained in DoD 4160.21-M, Defense Materiel Disposition Manual, Chapter 10. Contact the local DRMO to receive a handout that contains hours of operation, points of contact, and sample documentation. Prior to turning in property, it is recommended that customers coordinate with the DRMO. This will enable the DRMO to schedule the turn in and will provide customers with an opportunity to obtain information regarding any recent changes to existing turn-in requirements.

B. Generators are responsible for the costs of disposing of hazardous wastes. Funding for hazardous waste disposal is arranged through the MILLSBILLS interfund system. Any exceptions to this arrangement will be documented accordingly. DRMS does not establish or identify a MILLSBILLS fund code. The service/agency financial organizations do this. Generators should contact their supporting Defense Finance and Accounting Service (DFAS) and ask for the Interfund POC. To establish a generator account for hazardous waste disposal, contact DRMS-SHP at DSN 932-4784 or 616-961-4784. For inquiries regarding hazardous waste billing, contact DRMS-OFA at DSN 932-5838/5818 or 616-961-5838/5818.

C. Accurate identification of hazardous waste is essential for proper disposal. Misidentified or unknown hazardous wastes present special problems which may result in unusually excessive lab analysis testing costs and cause delays in disposal action. As a general rule, different types of wastes should not be combined, commingled, or mixed. Collecting different types of wastes in the same container makes the identification process more difficult, may increase liabilities, and could cause hazardous conditions if incompatible chemicals are combined. Combining different wastes may also result in a mixture that requires a more complex method of treatment or disposal, resulting in increased costs to the generator. Some wastes have a sales potential for recycling, use as a fuel, or for use in an industrial process. However, if such wastes are contaminated with other products, the marketability may be destroyed and the generator will be required to pay for disposal on a commercial service contract. DoD generators are required to provide DOT approved containers for turn-in of hazardous wastes to DRMOs in accordance with DoD 4160.21-M, Chapter 10.

D. Under certain circumstances, some service commands are authorized to administer disposal of their hazardous wastes. When this occurs, the service procedures should be followed.

E. All generated wastes must be properly packaged, marked, labeled, and certified in accordance with the appropriate shipping regulations before they can be shipped or before the DRMO will accept them.

11.5 DoD Components. DoD components are individually responsible for disposal of those categories of waste (e.g., municipal trash, radioactive waste, infectious medical items, munitions, etc.) which, for practical and economical reasons, were not assigned to DLA. Specific categories are provided in DoD 4160.21-M, Chapter 10.

SECTION V. RELATED TOPICS

11.6 Hazardous Waste Minimization. Hazardous waste minimization issues applicable to receiving are covered in chapter 3, section X of this publication.

11.7 Storage. Hazardous waste storage responsibilities are addressed in chapter 4, section II of this publication.

11.8 Packing, Marking and Labeling. Packing, marking, and labeling of hazardous waste is addressed in chapter 6, section IV, of this publication.

11.9 Hazardous Waste and Emergence Response Operations. Hazardous waste and emergency response operations are addressed in chapter 7, section IV of this publication.

11.10 Training. Training requirements for employees handling hazardous waste are addressed in chapter 9, section II, this publication.

APPENDIX A
REFERENCES

AFI 32-7042	Solid and Hazardous Waste Compliance
AFPAM 32-7043	Hazardous Waste Management Guide
AFI 32-4002	Hazardous Material Emergency Planning and Response Compliance
AFMAN 32-4013	Hazardous Material Emergency Planning and Response Guide
AR 55-38 DLAR 4500.15 NAVSUPINST 4610.33 AFR 75-18 MCO P4610.19	Reporting of Transportation Discrepancies in Shipments
DoD 4500.9-R	Defense Transportation Regulation
AR 700-64 DLAM 4145.8 NAVSUPINST 4000.34 AFR 67-8 MCO P4400.105	Radioactive Commodities in the DoD Supply Systems
DLAR 4145.25 AR 700-68 NAVSUPINST 4440.128 MCO 10330.2C AFR 67-12	Storage and Handling of Compressed Gases and Liquids in Cylinders, and of Cylinders
AR 735-11-2 DLAR 4140.55 SECNAVINST 4355.18 AFR 400-54	Reporting of Item and Packaging Discrepancies
ANSI/NFPA STD 101	Life Safety Code
ANSI Z129.1	American National Standards Institute for Hazardous Industrial Chemical-Precautionary Labeling

DA PAM 740-1 NAVSUP PUB 442 AFP 71-14 MCO P4030.23D DLAH 4145.1	Instructional Guide for Basic Military Preservation and Packing
DLAM 4145.2, Vol. 1 TM 38-230-1 AFP 71-15, Vol. 1 NAVSUP PUB 502, Rev Vol. 1 MCO P4030.31C	Packaging of Material - Preservation (Volume 1)
DLAM 4145.2, Vol. II TM 38-230-2 AFP 71-16 NAVSUP PUB 503, Vol. II MCO P4030.21C	Packaging of Material - Packing (Volume II)
TM 38-400 NAVSUP PUB 572 AFJMAN 23-210 MCO 4450.14 DLAM 4145.12	Joint Service Manual for Storage and Materials Handling
AR700-15 NAVSUPINST 4030.28 AFR 71-6 MCO 4030.33 DLAR 4145.7	Packaging of Materiel
DLAR 4155.37 AR702-18 AFJMAN 22-223 MCO 4450.13 NAVINST 4410.56	Material Quality Control Storage Standards
DoD 4160.21-M	Defense Materiel Disposition Manual
DoD 4500.32-R	Military Standard Transportation and Movement Procedures (MILSTAMP), Volume I
DoDI 6050.5	DoD Hazard Communication Program

DoD 6050.5-LR	DoD Hazardous Materials Information System (with proprietary data)
DoD 6050.5-L	DoD Hazardous Materials Information System (without proprietary data)
DoD Catalog 5010.16	Defense Management Education and Training (DMET)
DoDD 1000.3	Safety and Occupational Health Policy for the Department of Defense
DoD 4140.27-M	Shelf-Life Item Management Manual
DoDD 6055.9	Department of Defense Explosive Safety Standards
DoDI 6050.5	DoD Hazard Communication Program
DoDI 6055.1	Department of Defense Safety and Health Program
DoDI 6055.5	Occupational Health Surveillance Manual Reprint
DoDI 6055.8	Occupational Radiation Protection Program
DOT (RSPA)	North American Emergency Response Guidebook
DRMS-M 6050.1	Environmental Considerations in DRMS Disposal Process
FED-STD-313	Federal Standard 313, Material Safety Data, Transportation Data and Disposal Data for Hazardous Materials Furnished to Government Activities
IATA	International Air Transport Association
ICAO	International Civil Aviation Organization (ICAO) Technical Instructions
IMO	International Maritime Organization
IMDG Code	International Maritime Dangerous Goods Code
MIL-HDBK-201	Petroleum Operations
MIL-HDBK-600	Guidelines for Identification Marking, Labeling, Storage, and Transportation of Radioactive Commodities
MIL-HNBK-1008	Fire Protection for Facilities, Engineering, Design, and Construction

MIL-STD-129	Marking for Shipment and Storage
MIL-STD-147	Palletized Unit Loads
MIL-STD-1386 (Navy)	Loading of Hazardous Materials in MILVAN Containers
Title 10 CFR	Energy, Nuclear Regulatory Commission
Title 29 CFR	Occupational Safety and Health, Department of Labor
Title 40 CFR	Protection of Environment, Environmental Protection Agency
Title 42 CFR	Public Health
Title 49 CFR	Transportation, Department of Transportation
TM 38-236 DLAM 4145.7 NAVSUP PUB 504 AFR 71-8 MCO P4030.30	Preparation of Freight for Air Shipments
AFJMAN 24-204 TM 38-250 NAVSUP PUB 505 MCO P4030.19G DLAI 4145.3	Preparing Hazardous Materials for Military Air Shipments
AR 700-143 AFPD 24-210 NAVSUPINST 4030.55A MCO 4030.40A DLAD 4145.41	Packaging of Hazardous Materials
DoDI 4145.5	Storage Space Management
FM 38-746 DLAM 4145.6 NAVSUP PUB 539 AFR 71-19 MCO P4030.24	Logistics Packaging Management

APPENDIX B
HAZARD CHARACTERISTIC CODES AND DEFINITIONS

1. Number of Characters: Two

2. Type of Code: Alpha/Numeric

3. The Hazard Characteristic Code (HCC) is a two digit alpha-numeric code that is used to provide a means of categorizing hazardous materials (HM). It is an identification and tracking mechanism which links the stock number with details of the product hazards. HCCs are assigned by trained scientific or engineering personnel using the data provided on the Material Safety Data Sheet (MSDS), thereby, uniformly identifying hazardous materials managed by all Government activities. This information is captured in the DoD Hazardous Materials Information System (HMIS) and it allows the systemic tracking and identification for any regulatory purpose. HCCs allow relatively untrained personnel to properly receive, handle, store, process and manage hazardous materials at a high level and are most effective when used in conjunction with the detailed regulations of Title 10, 29, 40, and 49 of the Code of Federal Regulations. The HCC also serves as an identifier for automated processing of hazardous materials transactions, space utilization management, and compatible storage.

4. Every effort has been made to associate the HCC definitions with a specific regulatory definition, principally Title 49, but with references to Titles 29, 40 and 10 of the Code of Federal Regulations. Some of the HCC definitions were developed to identify items that are believed to present certain hazards (or lack thereof) but are not regulated by the CFRs. Such classifications (i.e. C3, C4, N1, T6) rely heavily on language contained in the MSDS, product literature, labels, and other technical literature and are subject to interpretation by qualified technical personnel. Questions regarding the assignment of these and the other more regulatory based HCCs should be addressed to the appropriate HMIS Focal Point personnel.

5. Two HCCs, H1 and X1, are defined in this appendix and are only visible in certain data systems but are not used for physical storage and are not assigned in the HMIS based on specific data from an MSDS.

6. There are three tables presented in this appendix. Table B-1 is a summarization of the HCCs with abbreviated definitions. Table B-2 contains the complete technical definitions. Table B-3 is a listing of the HCCs in order of preference of assignment. This table lends itself to development of hierarchical assignment programs and decision matrices for assignment of products at storage depots. The order of ranking was developed with consideration being given to the order of preference for hazard class assignment specified in 49 CFR 173.2a as a guide.

Table B-1. Hazard Characteristic Codes

Code	Hazard Group	Abbreviated Definition
A1	Radioactive, Licensed	RADIOACTIVE, LICENSED
A2	Radioactive, License Exempt	RADIOACTIVE, EXEMPT
A3	Radioactive, License Exempt, Authorized	RADIOACTIVE, EXEMPT AUTHORIZED
B1	Alkali, Corrosive, Inorganic	ALKALI, CORR, INORGANIC
B2	Alkali, Corrosive, Organic	ALKALI, CORR, ORGANIC
B3	Alkali, Low Risk	ALKALI, LOW RISK
C1	Acid, Corrosive, Inorganic	ACID, CORR, INORGANIC
C2	Acid, Corrosive, Organic	ACID, CORR, ORGANIC
C3	Acid, Low Risk	ACID, LOW RISK
C4	Acid, Corrosive and Oxidizer, Inorganic	ACID, CORR/OXID, INORGANIC
C5	Acid, Corrosive and Oxidizer, Organic	ACID, CORR/OXID, ORGANIC
D1	Oxidizer	OXIDIZER
D2	Oxidizer and Poison	OXIDIZER, POISON
D3	Oxidizer and Corrosive, Acidic	OXIDIZER, CORR, ACIDIC
D4	Oxidizer and Corrosive, Alkali	OXIDIZER, CORR, ALKALI
E1	Explosive, Military	EXPLOSIVE, MILITARY
E2	Explosive, Low Risk	EXPLOSIVE, LOW RISK
F1	Flammable Liquid, DOT Packing Group I, OSHA IA	FLAM DOT PG I, OSHA IA
F2	Flammable Liquid, DOT Packing Group II, OSHA IB	FLAM DOT PG II, OSHA IB
F3	Flammable Liquid, DOT Packing Group III, OSHA IC	FLAM DOT PG III, OSHA IC
F4	Flammable Liquid, DOT Packing Group III, OSHA II	FLAM DOT PG III, OSHA II
F5	Flammable Liquid and Poison	FLAM, POISON
F6	Flammable Liquid and Corrosive, Acidic	FLAMMABLE, CORR, ACIDIC
F7	Flammable Liquid and Corrosive, Alkali	FLAMMABLE, CORR, ALKALI
F8	Flammable Solid	FLAM SOLID
G1	Gas, Poison (Nonflammable)	GAS, POISON
G2	Gas, Flammable	GAS, FLAM
G3	Gas, Nonflammable	GAS, NON FLAM
G4	Gas, Nonflammable, Oxidizer	GAS, NON FLAM, OXIDIZER
G5	Gas, Nonflammable, Corrosive	GAS, NON FLAM, CORROSIVE
G6	Gas, Poison, Corrosive (Nonflammable)	GAS, POISON, CORROSIVE
G7	Gas, Poison, Oxidizer (Nonflammable)	GAS, POISON, OXIDIZER
G8	Gas, Poison, Flammable	GAS, POISON, FLAM
G9	Gas, Poison, Corrosive, Oxidizer (Nonflammable)	GAS, POISON, CORR, OXIDIZER
H1	Hazard Characteristics Not Yet Determined *	HAZ CHAR NOT DETERMINED
K1	Infectious Substance	INFECTIOUS SUB
K2	Cytotoxic Drugs	CYTOTOXIC DRUG
M1	Magnetized Material	MAGNETIZED MATERIAL
N1	Not Regulated as Hazardous	NON HAZARDOUS
P1	Peroxide, Organic, DOT Regulated	PEROXIDE, ORGANIC, DOT
P2	Peroxide, Organic, Low Risk	PEROXIDE, ORGAN, LOW RISK
R1	Reactive Chemical, Flammable	REACTIVE CHEM, FLAMMABLE
R2	Water Reactive Chemical	WATER REACTIVE CHEMICAL
T1	DOT Poison - Inhalation Hazard	DOT POISON INHAL HAZARD
T2	UN Poison, Packing Group I	UN POISON, PG I
T3	UN Poison, Packing Group II	UN POISON, PG II
T4	UN Poison, Packing Group III	POISON FOOD CONTAMINANT
T5	Pesticide, Low Risk	PESTICIDE LOW RISK
T6	Health Hazard	HEALTH HAZARD
T7	Carcinogen (OSHA, NTP, IARC)	CARCINOGEN
V1	Miscellaneous Hazardous Materials - Class 9	MISC HAZ MATL CLASS 9
V2	Aerosol, Nonflammable	AEROSOL, NONFLAMMABLE
V3	Aerosol, Flammable	AEROSOL, FLAMMABLE
V4	DOT Combustible Liquid, OSHA IIIA	COMBUSTIBLE LIQUID
V5	High Flash Point Materials, OSHA IIIB	HIGH FLASH LIQUID
V6	Petroleum Products	PETROLEUM PRODUCTS
V7	Environmental Hazard	ENVIRONMENTAL HAZARD
X1	Multiple Hazards Under One NSN *	MULTIPLE HAZARDS
Z1	Article Containing Asbestos	ARTICLE, ASBESTOS
Z2	Article Containing Mercury	ARTICLE, MERCURY
Z3	Article Containing Polychlorinated Biphenyl (PCB)	ARTICLE, PCB
Z4	Article, Battery, Lead Acid, Nonspillable	BATT, LEAD ACID, NONSPIL
Z5	Article, Battery, Nickel Cadmium, Nonspillable	BATT, NICAD, NONSPIL
Z6	Article, Battery, Lithium	BATTERY, LITHIUM
Z7	Article, Battery, Dry Cell	BATTERY, DRY CELL

*** System derived HCC. Not assigned directly in HMIS.**

Table B-2. Hazard Characteristic Code Definitions

A1 - Radioactive Material, Licensed. Any radioactive material that requires the issuance of a specific or general license, according to Title 10, Code of Federal Regulations (CFR), to persons who manufacture, produce, transfer, receive, possess, acquire, own, or use by-product material. Each package of radioactive shall be labeled and marked for transportation purposes in accordance with US Department of Transportation (DOT), Title 49 CFR.

A2 - Radioactive Material, License Exempt. Any radioactive material that does not require the issuance of a specific or general license according to Title 10, CFR, Parts 30 and 40. The package shall be labeled and marked, if required, in accordance with Title 49 CFR, if any material has a specific activity greater than 0.002 microcuries per gram (μCi/g).

A3 - Radioactive Material, License Exempt, Authorized. Radioactive material, exempt from specific or general license requirements of Title 10, CFR, but for which the appropriate military services or agency representative has determined that an authorization or permit is required for the receipt, transfer, ownership, possession, or use. Included are electron tubes, smoke detectors, or other devices containing material not exceeding the Nuclear Regulatory Commission (NRC) license-exempt quantities listed in Title 10, CFR.

B1 - Alkali, Corrosive, Inorganic. An inorganic alkali (not hydrocarbon based), either liquid or solid, meeting the definition of a Corrosive Material (Class 8) under DOT Title 49, Section 173.136, or EPA 40 CFR 370.2, or OSHA 1910.1200, Appendix A that causes visible destruction or irreversible alterations in human skin tissue at the site of contact, or a liquid that has a severe corrosion rate on steel or aluminum, in accordance with any one of the following criteria:

(a) A material is considered to be destructive or to cause irreversible alteration in human skin tissue if, when tested on the intact skin of an albino rabbit, the structure of the tissue at the site of contact is destroyed or changed irreversibly after an exposure period of 4 hours or less; or

(b) A liquid is considered to have a severe corrosion rate if its corrosion rate exceeds 6.25 mm (0.246 inches) per year on steel (SAE 1020) or aluminum (nonclad 7075-T6) at a test temperature of 55°C (131°F). An acceptable test is described in NACE Standard TM-01-69; or

(c) It is aqueous and has a pH in aqueous solution greater than or equal to 12.5 as determined by the test method specified in Title 40 CFR, Section 261.22.

B2 - Alkali, Corrosive, Organic. An organic alkali (hydrocarbon based), either liquid or solid, meeting the definition of a Corrosive Material (Class 8) under DOT Title 49, Section 173.136, or EPA 40 CFR 370.2, or OSHA 1910.1200, Appendix A that causes visible destruction or irreversible alterations in human skin tissue at the site of contact, or a liquid that has a severe corrosion rate on steel or aluminum, in accordance with any one of the following criteria:

(a) A material is considered to be destructive or to cause irreversible alteration in human skin tissue if, when tested on the intact skin of an albino rabbit, the structure of the tissue at the site of contact is destroyed or changed irreversibly after an exposure period of 4 hours or less; or

(b) A liquid is considered to have a severe corrosion rate if its corrosion rate exceeds 6.25 mm (0.246 inches) per year on steel (SAE 1020) or aluminum (nonclad 7075-T6) at a test temperature of 55°C (131°F). An acceptable test is described in NACE Standard TM-01-69; or

(c) It is aqueous and has a pH in aqueous solution greater than or equal to 12.5 as determined by the test method specified in Title 40 CFR, Section 261.22.

B3 - Alkali, Low Risk. A liquid or solid product that exhibits alkali (caustic/basic) properties and does not meet the definition of HCCs B1 or B2 but which through experience or through documentation on the MSDS or product bulletin would cause severe skin or eye irritation, dermatitis, or allergic skin reaction. Any classification of a material into this category is a process which relies heavily on the professional judgment of the evaluator recognizing that individuals react differently to exposure to chemicals. Factors to consider are the pH, the intended use of the product, the type of package, and the concentration of the active ingredient(s).

C1 - Acid, Corrosive, Inorganic. An acid (not hydrocarbon based), either liquid or solid, meeting the definition of a Corrosive Material (UN Class 8) under DOT Title 49, Section 173.136, or EPA 40 CFR 370.2, or OSHA 29 CFR 1910.1200, Appendix A that causes visible destruction or irreversible alterations in human skin tissue at the site of contact, or a liquid that has a severe corrosion rate on steel or aluminum, in accordance with any one of the following criteria:

(a) A material is considered to be destructive or to cause irreversible alteration in human skin tissue if, when tested on the intact skin of an albino rabbit, the structure of the tissue at the site of contact is destroyed or changed irreversibly after an exposure period of 4 hours or less; or

(b) A liquid is considered to have a severe corrosion rate if its corrosion rate exceeds 6.25 mm (0.246 inches) per year on steel (SAE 1020) or aluminum (nonclad 7075-T6) at a test temperature of 55°C (131°F). An acceptable test is described in NACE standard TM-01-69; or

(c) It is aqueous and has a pH in aqueous solution less than or equal to 2 as determined by the test method specified in Title 40 CFR, Section 261.22.

C2 - Acid, Corrosive, Organic. An acid (hydrocarbon based), either liquid or solid, meeting the definition of a Corrosive Material (UN Class 8) under DOT Title 49, Section 173.136, or EPA 40 CFR 370.2, or OSHA 29 CFR 1910.1200, Appendix A that causes visible destruction or irreversible alterations in human skin tissue at the site of contact, or a liquid that has a severe corrosion rate on steel or aluminum, in accordance with any one of the following criteria:

(a) A material is considered to be destructive or to cause irreversible alteration in human skin tissue if, when tested on the intact skin of an albino rabbit, the structure of the tissue at the site of contact is destroyed or changed irreversibly after an exposure period of 4 hours or less; or

(b) A liquid is considered to have a severe corrosion rate if its corrosion rate exceeds 6.25 mm (0.246 inches) per year on steel (SAE 1020) or aluminum (nonclad 7075-T6) at a test temperature of 55°C (131°F). An acceptable test is described in NACE standard TM-01-69; or

(c) It is aqueous and has a pH in aqueous solution less than or equal to 2 as determined by the test method specified in Title 40 CFR, Section 261.22.

C3 - Acid, Low Risk. A liquid or solid product that exhibits acidic properties and does not meet the definition of HCCs C1 or C2 but which through experience or through documentation on the MSDS or product bulletin would cause severe skin or eye irritation, dermatitis, or allergic skin reaction. Any classification of a material into this category is a process which relies heavily on the professional judgment of the evaluator recognizing that individuals react differently to exposure to chemicals. Factors to consider are the pH, the intended use of the product, the type of package, and the concentration of the active ingredient(s).

C4 - Acid, Corrosive and Oxidizer, Inorganic. An inorganic acid (HCC C1) that also meets the definition of an Oxidizer (HCC D1).

C5 - Acid, Corrosive and Oxidizer, Organic. An organic acid (HCC C2) that also meets the definition of an Oxidizer (HCC D1).

D1 - Oxidizer. A material regulated as an Oxidizer, UN Class 5.1, by DOT under 49 CFR 173.127 or is listed in Section 43A of the National Fire Protection Association (NFPA) Fire Codes Subscription Service as a Class 1, 2, 3, or 4 oxidizer other than a compressed gas, that can undergo an explosive reaction when catalyzed or exposed to heat, shock, or friction; or will cause a severe increase in the burning rate of combustible material with which it comes in contact; or which will undergo vigorous self-sustained decomposition when catalyzed or exposed to heat; or will moderately increase the burning rate or which may cause spontaneous ignition of combustible or flammable material with which it comes in contact.

D2 - Oxidizer and Poison. An oxidizing material (HCC D1), other than a compressed gas (HCC G4), that also meets the definition of a poison (HCCs T1, T2, T3, or T4).

D3 - Oxidizer and Corrosive - Acidic. An oxidizing material (HCC D1), other than a compressed gas (HCC G4), that also meets the definition of a corrosive material, acidic (HCC C1 or C2).

D4 - Oxidizer and Corrosive - Alkali. An oxidizing material (HCC D1), other than a compressed gas (HCC G4), that also meets the definition of a corrosive material, alkali (HCC B1 or B2).

E1 - Explosives, Military. Items classed as explosives, UN Class 1, Division 1.1, 1.2, 1.3, 1.4 (except 1.4S), and 1.5 as defined in 49 CFR 173.50 and all Military Explosives identified by a Department of Defense Ammunition Code (DoDAC). (See DoD Standard DoD 6055.9, for hazard classification and compatibility groups).

E2 - Explosives, Low Risk. Items classed as explosives, UN Class 1, Division 1.4S and 1.6, as defined in 49 CFR 173.50. Division 1.4S consists of explosives that present a minor explosion hazard. The explosive effects are largely confined to the package and no projection of fragments of appreciable size or range is to be expected. An external fire must not cause virtually instantaneous explosion of almost the entire contents of the package. The compatibility group "S" indicates that the item is so packed or designed that any hazardous effects arising from accidental functioning are confined within the package. If the package has been degraded by fire, all blast or projection effects are limited to the extent that they do not significantly hinder fire fighting or other emergency response efforts in the immediate vicinity of the package. Division 1.6 consists of extremely insensitive items which do not have a mass explosion hazard and which demonstrate a negligible probability of accidental initiation or propagation.

F1 - Flammable Liquid, Packing Group I, OSHA IA. A product meeting the definition of a flammable liquid (UN Class 3) under 49 CFR 173.120 and classed as a Packing Group I under 49 CFR 173.121 with an initial boiling point less than or equal to 95°F (35°C). Included in this definition are OSHA IA liquids except those that have a boiling point between 95°F and 100°F. The definitions for OSHA classes of flammable liquids are found in 29 CFR 1910.106.

F2 - Flammable Liquid, Packing Group II, OSHA IB. A product meeting the definition of a flammable liquid (UN Class 3) under 49 CFR 173.120 and classed as a Packing Group II under 49 CFR 173.121 with a flash point less than 73°F (23°C) and an initial boiling point of more than 95°F (35°C). Included in this definition are OSHA IB liquids and the balance of OSHA IA liquids with boiling points between 95°F and 100°F.

F3 - Flammable Liquid, Packing Group III, OSHA IC. A product meeting the definition of a flammable liquid (UN Class 3) under 49 CFR 173.120 and classed as a Packing Group III under 49 CFR 173.121 with a flash point greater than or equal to 73°F (23°C) but less than 100°F (38°C). Included in this definition are OSHA IC liquids.

F4 - Flammable Liquid, Packing Group III, OSHA II. A product meeting the definition of a flammable liquid (UN Class 3) under 49 CFR 173.120 and classed as a Packing Group III under 49 CFR 173.121 but with a flash point greater than or equal to 100°F (38°C) and less than or equal to 141°F (60.5^{o}C). Included in this definition are OSHA II liquids.

F5 - Flammable Liquid and Poison. UN Class 3 Flammable Liquids (HCCs F1, F2, F3, or F4) that also have the hazards of UN division 6.1, Poisons (HCCs T1, T2, T3, T4, or T6)

F6 - Flammable Liquid and Corrosive, Acidic. UN Class 3 Flammable Liquids (HCCs F1, F2, F3, or F4) that also have the hazards of UN Class 8 Corrosive materials and are acidic in nature meeting the definition of HCC C1 or C2.

F7 - Flammable Liquid and Corrosive, Alkali. United Nations Class 3 Flammable Liquids (HCCs F1, F2, F3, or F4) that also have the hazards of United Nations Class 8 Corrosive materials and are alkali (caustic/basic) in nature meeting the definition of HCC B1 or B2.

F8 - Flammable Solid. Any product which is required to be shipped as UN Class 4.1 under 49 CFR 173.124 which under conditions normally incident to transportation or storage is likely to cause fires through friction, retained heat from manufacturing or processing, or which can be readily ignited and when ignited burns so vigorously and persistently as to create a serious transportation hazard.

G1 - Gas, Poison (Nonflammable). Any product which is required to be shipped as UN Class 2.3 under 49 CFR 173.115 (c) (Gas poisonous by inhalation) and is required to be marked "Inhalation Hazard" under 49 CFR 172.313. This means a material which is a gas at 20°C (68°F) or lower at one atmosphere of pressure (101.3 kPa, 14.7 psi)(a material which has a boiling point of 20°C (68°F) or lower at 1 atmosphere) and which:

(a) Is known to be so toxic to humans as to pose a hazard to health during transportation; or

(b) In the absence of adequate data on human toxicity, is presumed to be so toxic to humans, because when tested on young adult albino rats for 1 hour, it has an LC50 (inhalation rat) less than 5000 ml/m^3 (ppm); and

(c) Meets the definition of Nonflammable Gas (HCC G3).

Codes 1,2,3,4,5,6, or 13 are listed in the special provisions column of 49 CFR 172.101 for those shipping names that are poison-inhalation hazard and would require this HCC.

G2 - Gas, Flammable. Any product, other than a flammable aerosol, which is required to be shipped as a UN Class 2.1 (Flammable gas) under 49 CFR 173.115 (a). This means any material which is a gas at 20°C (68°F) or lower at 1 atmosphere of pressure (101.3 kPa, 14.7 psi) (a material which has a boiling point of 20°C (68°F) or lower at 1 atmosphere) and which:

(a) Is ignitable at 1 atmosphere when in a mixture of 13 percent or less by volume with air; or

(b) At 1 atmosphere with air has a flammable range of at least 12 percent regardless of the lower limit.

(c) The limits specified above shall be determined at 1 atmosphere of pressure and a temperature of 20°C (68°F) in accordance with ASTM E681-85 (or latest version), Standard Test Method for Limits of Flammability of Chemicals.

G3 - Gas, Non-flammable. Any product (includes compressed gas, liquefied gas, pressurized cryogenic gas and compressed gas in solution) which is required to be shipped as UN Class 2.2 under 49 CFR 173.115 (b). This means a "non-flammable, non-poisonous compressed gas" material (or mixture) which:

(a) Exerts in the packaging a pressure of 41 psia (280 kPa) or higher at 20°C (68°F), and

(b) Does not meet the definition of a Flammable Gas (HCC G2), a Poison Gas (HCC G1), a Corrosive Gas (HCC G5), or an Oxidizing Gas (HCC G4).

G4 - Gas, Nonflammable, Oxidizer. A Nonflammable Gas, Oxidizer is a material (or mixture) which:

(a) Meets the definition of a Nonflammable Gas (HCC G3), except is an oxidizer; and

(b) Does not meet the definition of Poison Gas (HCC G1) or Flammable Gas (HCC G2); and

(c) Requires an Oxidizer label and a Nonflammable Gas label for transportation under 49 CFR.

G5 - Gas, Nonflammable, Corrosive. A Nonflammable Gas, Corrosive is a material (or mixture) which:

(a) Meets the definition of a Nonflammable Gas (HCC G3), except it is corrosive; and

(b) Does not meet the definition of Poison Gas (HCC G1) or Flammable Gas (HCC G2); and

(c) Requires a Corrosive label and a Nonflammable Gas label for transportation under 49 CFR.

G6 - Gas, Poison, Corrosive (Nonflammable). A Gas, Poison, Corrosive, (Nonflammable) is a material (or mixture) which:

(a) Meets the definition of a Nonflammable Gas (HCC G3), except it is poisonous and corrosive; and

(b) Does not meet the definition of a Flammable Gas (HCC G2) or an Oxidizing Gas (HCC G4); and

(c) Meets the definition of a Poison Gas (HCC G1); and

(d) Requires a Corrosive label and a Poison Gas label for transportation under 49 CFR.

G7 - Gas, Poison, Oxidizer (Nonflammable). A Gas, Poison, Oxidizer (Nonflammable) is a material (or mixture) which:

(a) Meets the definition of a Nonflammable Gas (HCC G3), except it is oxidizing and poisonous; and

(b) Does not meet the definition of a Flammable Gas (HCC G2) or a Corrosive Gas (HCC G5); and

(c) Meets the definition of a Poison Gas (HCC G1); and

(d) Meets the definition of an Oxidizing Gas (HCC G4).

G8 - Gas, Poison, Flammable. Any product which is required to be shipped as a UN Class 2.3 under 49 CFR 173.115(c) (Gas, poisonous by inhalation), and is required to be marked "Inhalation Hazard" under 49 CFR 172.313. This means a material which is a gas at 20°C (68°F) or lower at one atmosphere of pressure (101.3kPa, 14.7 psi) (a material which has a boiling point of 20°C (68°F) or lower at one atmosphere) and which:

(a) Is known to be so toxic to humans as to pose a hazard to health during transportation; or

(b) In the absence of data on human toxicity, is presumed to be so toxic to humans, because when tested on young albino rats for 1 hour, it has a LC50 (inhalation rat) less than 5000 ml/m^3 (ppm); and

(c) Meets the definition of a Flammable Gas (HCC G2).

G9 - Gas, Poison, Corrosive, Oxidizer (Nonflammable). A Gas, Poison, Corrosive, Oxidizer (Nonflammable) is a material (or mixture) which:

(a) Meets the definition of a Nonflammable Gas (HCC G3), except it is poisonous, oxidizing, and corrosive; and

(b) Does not meet the definition of a Flammable Gas (HCC G2); and

(c) Meets the definition of a Poison Gas (HCC G1), and an Oxidizer Gas (HCC G4); and

(d) Requires a Corrosive label, an Oxidizer label, and a Poison Gas label for transportation under 49 CFR.

H1 - Hazard Characteristics Not Yet Determined. Definitive hazard characteristics are not yet determined. The source of this code is the Federal Logistics Information System (FLIS).

K1 - Infectious Substance. A viable micro-organism or its toxin, which causes or may cause animal or human disease as published in Title 42 CFR, Section 72.3. Includes Infectious Substances Affecting Animals only (UN 2900), Infectious Substances Affecting Humans (UN 2814), and Etiologic Agent, N.O.S. (NA 2814).

K2 - Cytotoxic Drugs. Antineoplastic (Chemotherapy) drugs used in the treatment of cancer and determined and listed by the Directorate of Medical Material, Defense Supply Center Philadelphia, Philadelphia, PA.

M1 - Magnetized Material. Any material meeting the definition of a magnetized material as defined in the International Air Transport Association (IATA) regulations 3.9.1.3. The best method for determining magnetic properties is specified in IATA Packing Instruction 902, Method 2. This method specifies using a magnetic compass, accurate to one degree increments, that is placed on one of two points positioned 4.6 m (15 ft) apart which are aligned in an East/West direction in an area that is free from any magnetic interference other than the earth's magnetic field. The packaged item to be tested is placed on the other point and rotated 360 degrees in its

horizontal plane for indication of compass deflection. When the maximum compass deflection observed is two degrees or less the material is not considered to be magnetic. When the deflection of an item exceeds 2 degrees, the item is magnetic and shielding must be applied until the maximum deflection is not more than 2 degrees.

N1 - Not regulated as Hazardous. Any material, which does not meet the definition of any other HCC, is not regulated as hazardous by any regulatory organization, and through technical evaluation is generally regarded as nonhazardous for storage. Supporting documentation regarding the lack of storage hazards must be available through documents such as the MSDS, product labels, manufacturer's literature, and the advisory sources listed in Appendix C of 29 CFR 1910.1200, OSHA Hazard Communication Standard. An absence of the product from known listings of hazardous materials, while not conclusive of the lack of storage hazards, may be considered in the decision process and relies heavily on the professional judgment and experience of the evaluator. Note: Hazards associated with the actual *use* of the item should be made by qualified Industrial Hygiene Personnel.

P1 - Peroxide, Organic, DOT Regulated. A product classed as a UN Class 5.2 (Organic Peroxide) by the US DOT as defined in 49 CFR 173.128 and listed in the Organic Peroxides Table in 49 CFR 173.225 and is defined in NFPA Code 43B as NFPA Classes I, II, or III organic peroxides based on information provided by the supplier or manufacturer.

NFPA Class I organic peroxides present a deflagration hazard through easily ignited, rapid explosive decomposition. NFPA Class I includes some formulations that are relatively safe only under closely controlled temperatures. Either excessively high or low temperatures may increase the potential for severe explosive decomposition.

NFPA Class II organic peroxides present a severe fire hazard similar to NFPA Class I flammable liquids. The decomposition is not as rapid, violent, or complete as that produced by Class I formulations. As with Class I formulations, this class includes some formulations that are relatively safe when under controlled temperatures or when diluted.

NFPA Class III organic peroxides present a fire hazard similar to NFPA Class II combustible liquids. They are characterized by rapid burning and high heat liberation, due to decomposition.

Typical Class I, II, and III organic peroxides are listed in Volume 2, Appendix 43B of the National Fire Protection Association (NFPA) National Fire Codes Subscription Service.

P2 - Peroxide, Organic, Low Risk. A product that is an Organic Peroxide that is not regulated by the US DOT and meets the definition of NFPA Code 43B, Class IV organic peroxides that burn as ordinary combustibles and present minimal reactivity hazard. Class IV formulations present fire hazards that are easily controlled. Reactivity has little effect on fire intensity. Also included are Organic Peroxides that are not regulated by the US DOT and meet the definition of NFPA Code 43B, Class V organic peroxides. Class V formulations do not themselves burn and do not present a decomposition hazard. This definition includes Organic Peroxides regulated by the FDA. Typical Class IV and V organic peroxides are listed in Volume 2, Appendix 43B of the NFPA National Fire Codes Subscription Service.

R1 - Reactive Chemical, Flammable. Any product meeting the definition of UN Class 4.2 (Spontaneously Combustible) as defined in 49 CFR 173.124(b), which is likely to heat spontaneously under conditions normal to transportation or storage, or is likely to heat up in contact with air and catch fire. Included in this group are pyrophoric liquids that ignite spontaneously in dry or moist air at or below 130°F (54.4^{o}C) as defined in 29 CFR 1910.1200.

R2 - Water Reactive Chemical. Any product meeting the definition of UN Class 4.3 (Dangerous when Wet) as defined in 49 CFR 173.124(c), which on interaction with water, is liable to become spontaneously ignitable or to give off flammable gases in dangerous quantities.

T1 - DOT Poison-Inhalation Hazard. A material, other than a poisonous gas (HCC G1), meeting the definition of UN Class 6.1 (Poisonous Material) under 49 CFR 173.132(a)(1)(iii) and assigned to Hazard Zone A or B in accordance with 49 CFR 173.133(a) and required to be marked or labeled "Inhalation Hazard" under 49 CFR 172.313 or 49 CFR 172.416 or 49 CFR 172.429. Codes 1, 2, 5, 6, or 13 are listed in the special provisions column of 49 CFR 172.101 for those shipping names that are poison-inhalation hazards and would require this HCC.

T2 - UN Poison, Packing Group I. A material, other than a poisonous gas (HCC G1) or Poison-Inhalation Hazard (HCC T1), that is classed as a UN Class 6.1 (Poisonous Material), that for packing purposes has been assigned Packing Group I (Great Danger) as defined in 49 CFR 173.133 (a)(1). This means that the toxicity is as specified below:

Toxicity Ranges for Packing Group I

Route of Entry	Range	Test Animal
Oral Toxicity	Less than or equal to 5 mg/kg	Albino Rat
Dermal Toxicity	Less than or equal to 40 mg/kg	Albino Rabbit
Inhalation Toxicity	Less than or equal to 0.5 mg/L	Albino Rat

T3 - UN Poison, Packing Group II

A material, other than a poisonous gas (HCC G1) or Poison-Inhalation Hazard (HCC T1), that is classed as a UN Class 6.1 (Poisonous Material), that for packing purposes has been assigned Packing Group II (Medium Danger) as defined in 49 CFR 173.133 (a)(1). This means that the toxicity is as specified below:

Toxicity Ranges for Packing Group II

Route of Entry	Range	Test Animal
Oral Toxicity	Greater than 5 mg/kg and less than or equal to 50 mg/kg	Albino Rat
Dermal Toxicity	Greater than 40 mg/kg and less than or equal to 200 mg/kg	Albino Rabbit
Inhalation Toxicity	Greater than 0.5 mg/L and less than or equal to 2 mg/L	Albino Rat

T4 - UN Poison, Packing Group III

A material, other than a poisonous gas (HCC G1) or Poison-Inhalation Hazard (HCC T1), that is classed as a UN Class 6.1 (Poisonous Material), that for packing purposes has been assigned Packing Group III (Minor Danger) as defined in 49 CFR 173.133 (a)(1) and may be labeled "Keep Away From Food". This means that the toxicity is as specified below:

Toxicity Ranges for Packing Group III

Route of Entry	Range	Test Animal
Oral Toxicity	Solids: Greater than 50 mg/kg and less than or equal to 200 mg/kg. Liquids: Greater than 50 mg/kg and less than or equal to 500 mg/kg	Albino Rat
Dermal Toxicity	Greater than 200 mg/kg and less than or equal to 1000 mg/kg	Albino Rabbit
Inhalation Toxicity	Greater than 2 mg/L and less than or equal to 10 mg/L	Albino Rat

T5 - Pesticide, Low Risk

Any product meeting the definition of a pesticide or pesticide product as defined in 40 CFR 152.3 which is in Toxicity Categories II, III, or IV as specified for warning label purposes in 40 CFR 156.10(h) and is not otherwise classed as a hazardous material under 49 CFR, and does not meet the definition of any other HCC. The toxicity categories are provided below:

Toxicity Ranges for Low Risk Pesticides

Hazard Indicator	I	II	III	IV
Oral LD 50	Up to and including 50 mg/kg	From 50 through 500 mg/kg	From 500 through 5000 mg/kg	Greater than 5000 mg/kg
Inhalation LC 50	Up to and including .2 mg/liter	From .2 through 2 mg/liter	From 2 through 20 mg/liter	Greater than 20 mg/liter
Dermal LD 50	Up to and including 200 mg/kg	From 200 through 2000 mg/kg	From 2000 through 20,000 mg/kg	Greater than 20,000 mg/kg
Eye Effects	Corrosive, corneal opacity not reversible within 7 days	Corneal opacity reversible in 7 days; irritation persisting for 7 days	No corneal opacity; irritation reversible	No irritation
Skin Effects	Corrosive	Severe irritation at 72 hours	Moderate irritation at 72 hours	Mild or slight irritation at 72 hours

T6 - Health Hazard

Any product defined as hazardous in 29 CFR 1910.1200, which cannot be assigned any other HCC and which is supported by documentation such as an MSDS or product bulletin, or through experience is a known health hazard. Any classification of a material into this category is a process which relies heavily on the professional judgment of the evaluator, particularly in the area of potential chronic hazards. Such classification should be considered in light of the fact that although the primary purpose of the HCCs is to assure safe storage of products, there may be some application of the HCCs in screening products from a pollution prevention as well as safety and health standpoint. However, hazards associated with the actual use of the item should be made by qualified Industrial Hygiene personnel.

T7 - Carcinogen (OSHA, NTP, IARC)

A material not meeting the definition of any other HCC and which meets the definition of a carcinogen under the OSHA Hazard Communication standard and is so specified on the MSDS. This means that:

(a) It is listed by the International Agency for Research on Cancer (IARC) as a carcinogen or potential carcinogen in IARC Monographs on the Evaluation of the Carcinogenic Risk of Chemicals to Man (latest edition); or

(b) It is listed as a carcinogen or potential carcinogen in the Annual Report on Carcinogens published by the National Toxicology Program (NTP) (latest edition); or

(c). It is regulated and listed by the Occupational Safety and Health Administration (OSHA) as a carcinogen in 29 CFR 1910, subpart Z.

V1 - UN Class 9 Miscellaneous Hazardous Materials. Materials meeting the definition of a United Nations Class 9 material as defined in Title 49 CFR, Section 173.140, the UN IMDG Code, or the IATA Dangerous Goods Regulations. This category includes any material which has anesthetic, noxious, or other similar properties that could cause extreme annoyance or discomfort to a flight crew member so as to prevent the correct performance of assigned duties. It also includes any material designated as a hazardous substance with a reportable quantity (RQ) listed in Title 49 CFR, Section 172.101 Appendix A, an elevated temperature material, a hazardous waste, or a marine pollutant which does not meet the definition of any other transportation hazard class.

V2 - Aerosol, Nonflammable. An aerosol product not exceeding 1 liter capacity which can be shipped under the shipping name "Aerosols, Nonflammable" Hazard Class 2.2 UN1950 or the shipping name "Consumer Commodity" ORM-D as specified in 49 CFR 173.306 (h).

V3 - Aerosol, Flammable. An aerosol product, not exceeding 1 liter capacity, which can be shipped under the shipping name "Aerosols, Flammable", Hazard Class 2.1, UN1950 or the shipping name "Consumer Commodity", ORM-D, as specified in 49 CFR 173.306 (h). An aerosol is regarded as flammable if it produces positive results when tested as described in 49 CFR 306(i).

Note: Recognized standard test methods utilizing procedures similar to those specified above which produce similar results may also be used. Also includes any aerosol that is required to be labeled "Flammable" under the US Federal Hazardous Substance Act. Included are ICAO Flammable non-refillable receptacles made of metal, glass, or plastic and containing a gas compressed, liquefied or dissolved under pressure, with or without a liquid, paste, or powder, and fitted with a self-closing release device allowing the contents to be ejected as solid or liquefied particles in suspension in a gas, as a foam, paste or powder, or in a liquid or gaseous state. Excluded are refillable compressed gas cylinders or flasks which are assigned a "G" series code.

V4 - DOT Combustible Liquid, OSHA IIIA. Any product that does not meet the definition of any other hazard class or HCC and has a flash point (closed cup) above 141°F (60.5^{o}C) and at or below 200°F (93°C). OSHA Class IIIA items are included in this definition.

V5 - High Flash Point Materials, OSHA IIIB. Materials, not meeting the definition of any other HCC, that have a flash point above 200°F (93°C). Excluded from this definition are Petroleum Oils and Lubricants (POLs) as they have a separate HCC (V6). OSHA Class IIIB liquids are included in this definition.

V6 - Petroleum Products. Materials, not meeting the definition of any other HCC, containing petroleum products which could cause an environmental hazard if spilled on water or land. This category includes oils, greases, and lubricants that could be categorized in Federal Supply Class 9150 or 9160 as defined in the Federal Supply Classification Cataloging Handbook H2-1.

V7 - Environmental Hazard. Materials, not meeting the definition of any other HCC, which contain an Extremely Hazardous Substance listed in 40 CFR, Part 355, Appendix A or B, or a CERCLA Hazardous Substance listed in 40 CFR, Part 302.4, or a Toxic Chemical listed in 40 CFR, Part 372.65. In deciding whether or not a product falls into this category, determine if the concentration of a chemical exceeds the established de minimis limits which compare to the requirement for reporting the existence of the chemical under 29 CFR 1910.1200 section (g)(2)(i)(C)(1).

X1 - Multiple Hazards Under One National Stock Number (NSN). System generated code to reflect the existence of more than one HCC for an NSN. It reflects the fact that different products under the NSN have different hazards and consequently different HCCs.

Z1 - Article Containing Asbestos. An article in accordance with 29 CFR 1910.1200 which contains asbestos, or an item containing asbestos which under conditions of storage would not be expected to release hazardous materials and would not pose a physical hazard or health risk to employees. This category includes, but is not limited to, asbestos gaskets, brake shoes, or other products in which the asbestos is bound or otherwise immobilized to the point that exposure to personnel in a storage environment is minimal.

Z2 - Article Containing Mercury. An article in accordance with 29 CFR 1910.1200 which contains mercury, or an item containing mercury which under conditions of storage would not be expected to release hazardous materials and would not pose a physical hazard or health risk to employees. This category includes, but is not limited to, electron tubes, mercury switches and relays, mercury vapor lamps and tubes, fluorescent lamps, manometers, pumps, thermometers, or other devices in which the mercury is contained in such a fashion that exposure to personnel in a storage environment is minimal. For batteries which contain mercury use HCC Z7.

Z3 - Article Containing Polychlorinated Biphenyl (PCB). An article in accordance with 29 CFR 1910.1200 which contains Polychlorinated Biphenyls (PCB), or an item containing PCB which under conditions of storage would not be expected to release hazardous materials and would not pose a physical hazard or health risk to employees. This category includes, but is not limited to transformers, capacitors, or other devices in which the PCBs are contained in such a fashion that exposure to personnel in a storage environment is minimal.

Z4 - Article, Battery, Lead Acid, Nonspillable. A nonspillable battery consisting of a lead anode, a lead dioxide cathode, and sulfuric acid electrolyte that is designed and constructed so as to positively prevent leakage of the electrolyte, irrespective of the position of the battery. It must meet the definition of a "Nonspillable Battery" as defined in 49 CFR, Section 173.159(d).

Z5 - Article, Battery, Nickel Cadmium, Nonspillable. A nonspillable battery consisting of a cadmium anode, a nickel oxyhydroxide cathode, and potassium hydroxide electrolyte that is designed and constructed so as to positively prevent leakage of the electrolyte, irrespective of the position of the battery. It must meet the definition of a "Nonspillable Battery" as defined in 49 CFR, Section 173.159(d).

Z6 - Article, Battery, Lithium. A battery consisting of a lithium anode, a solid or liquid cathode, and electrolyte. The battery must meet the conditions established by 49 CFR, 173.185. Examples of typical lithium batteries and their compositions are provided below.

TYPICAL LITHIUM ANODE/SOLUBLE CATHODE CELLS

NAME	ELECTROLYTE MIXTURE	CATHODE
Lithium-Sulfur dioxide	Sulfur dioxide/Acetonitrile/ Lithium bromide	Sulfur dioxide on Carbon
Lithium-Thionyl chloride	Thionyl chloride/Lithium tetrachloroaluminate	Thionyl chloride on Carbon
Lithium-Sulfuryl chloride	Sulfuryl chloride/Aluminum tetrachloride	Sulfuryl chloride on Carbon

TYPICAL LITHIUM ANODE/SOLID CATHODE CELLS

NAME	ELECTROLYTE MIXTURE	CATHODE
Lithium-Manganese dioxide	Propylene carbonate/1,2 Dimethoxy-ethane/Lithium tetrachloroaluminate	Manganese dioxide
Lithium-Carbon monofluorite	Dimethyl sulfide/Lithium hexafluoro-arsenate or Butyrolactone/1,2 Dimeth oxyethane/Tetrahydrofuran/Lithium borofluoride	Carbon monofluorite and Carbon
Lithium-Copper(II) oxide	Propylene carbonate /Tetrahydrofuran /Lithium perchlorate	Copper(II) oxide and Carbon
Lithium-Iron disulfide	Propylene carbonate/1,2 Dimethoxyethane/Lithium perchlorate	Iron sulfide and Carbon or Iron disulfide and Carbon
Lithium-Vanadium pentoxide	Methylformate/Lithium hexafluoroarsenate or Methyl formate/Lithium tetrafluoroborate	Vanadium pentoxide and Carbon
Lithium-Iodine	Lithium iodide	Iodine and Poly (2 vinylpyridine)

Z7 – Article, Battery, Dry Cell. A sealed, non-vented battery containing electrolyte immobilized in the form of a paste or gel and not regulated for transportation by 49 CFR. Examples of typical dry cell batteries and their compositions are provided below:

TABLE 6 – TYPICAL DRY CELL BATTERIES

NAME	ANODE	CATHODE	ELECTROLYTE
Carbon-Zinc	Zinc	Manganese dioxide	Ammonium chloride or Zinc chloride
Alkaline-Manganese dioxide	Zinc	Manganese dioxide	Potassium hydroxide or sodium hydroxide
Mercury-Zinc	Zinc	Mercuric oxide	Potassium hydroxide or sodium hydroxide
Zinc-Air	Zinc	Oxygen/Catalyst	Potassium hydroxide or sodium hydroxide
Silver-Zinc	Zinc	Silver oxide	Potassium hydroxide
Mercury-Cadmium	Cadmium	Mercuric oxide	Potassium hydroxide
Magnesium-Manganese dioxide	Magnesium	Manganese dioxide	Magnesium perchlorate, lithium chlorate, and Barium chromate

Table B-3. Relationship between HCCs and Various Regulatory Categories Shown in Order of Assignment Preference Using 49CFR as a Basis

HCC	EPA 40CFR370.2	OSHA 29CFR1910.1200	DOT 49CFR
A1	NOT REGULATED	LONG TERM HEALTH HAZARD	CLASS 7
A2	NOT REGULATED	LONG TERM HEALTH HAZARD	CLASS 7
A3	NOT REGULATED	LONG TERM HEALTH HAZARD	CLASS 7
E1	SUDDEN RELEASE OF PRESSURE	EXPLOSIVE	CLASS 1.1-1.3
E2	SUDDEN RELEASE OF PRESSURE	EXPLOSIVE	CLASS 1.4-1.6
G1	PRESSURE+ACUTE/CHRONIC HEALTH	COMPRESS GAS + HI TOXIC/TOXIC	CLASS 2.3
G9	PRESSURE+ACUTE/CHRONIC HEALTH+ FIRE HAZARD	COMP GAS+HI TOXIC/TOXIC+CORROSIVE +OXIDIZER	CLASS 2.2+POISON+CORROSIVE + OXIDIZER
G8	PRESSURE+ACUTE/CHRONIC HEALTH + FIRE HAZARD	COMPRESS GAS+HI TOXIC/TOXIC + FLAMMABLE	CLASS 2.3 + FLAMMABLE
G7	PRESSURE+ACUTE/CHRONIC HEALTH + FIRE HAZARD	COMP GAS+HI TOXIC/TOXIC + OXIDIZER	CLASS 2.2+POISON+OXIDIZER
G6	PRESSURE + ACUTE HAZARD	COMP GAS+HI TOXIC/TOXIC + CORROSIVE	CLASS 2.2+POISON+CORROSIVE
G2	PRESSURE + FIRE HAZARD	COMP GAS + FLAMMABLE	CLASS 2.1
G4	PRESSURE + OXIDIZER	COMPRESS GAS + OXIDIZER	CLASS 2.2 + OXIDIZER
G5	PRESSURE + ACUTE HEALTH	COMPRESSED GAS + CORROSIVE	CLASS 2.2 + CORROSIVE
G3	SUDDEN RELEASE OF PRESSURE	COMPRESSED GAS	CLASS 2.2
T1	ACUTE HEALTH HAZARD	HIGHLY TOXIC	CLASS 6.1 INHALATION HAZARD
F5	FIRE HAZ+ACUTE/CHRON HEALTH	FLAM/COMB + HI TOXIC/TOXIC	CLASS 3+6.1, PG I-III
F6	FIRE HAZ+ACUTE HEALTH HAZARD	FLAM LIQ/COMB + CORROSIVE	CLASS 3 + CLASS 8
F7	FIRE HAZ+ACUTE HEALTH HAZARD	FLAM LIQ/COMB + CORROSIVE	CLASS 3 + CLASS 8
F1	FIRE HAZARD	FLAMMABLE LIQUID, CLASS IA	CLASS 3 (PG I)
F2	FIRE HAZARD	FLAMMABLE LIQUID, CLASS IB	CLASS 3 (PG II)
F3	FIRE HAZARD	FLAMMABLE LIQUID, CLASS IC	CLASS 3 (PG III)
F4	FIRE HAZARD	COMBUSTIBLE LIQUID, CLASS II	CLASS 3 (PG III)
D2	FIRE HAZ+ACUTE/CHRONIC HEALTH	OXIDIZER + HI TOXIC/TOXIC	CL 5.1 + 6.1, PG I-III
D3	FIRE HAZ+ACUTE HEALTH HAZARD	OXIDIZER + CORROSIVE	CLASS 5.1 + CLASS 8
D4	FIRE HAZ+ACUTE HEALTH HAZARD	OXIDIZER + CORROSIVE	CLASS 5.1 + CLASS 8
D1	FIRE HAZARD	OXIDIZER	CLASS 5.1
R2	REACTIVE	WATER REACTIVE	CLASS 4.3
F8	FIRE HAZARD	PYROPHORIC	CLASS 4.1
R1	REACTIVE + FIRE HAZARD	PYROPHORIC	CLASS 4.2
P1	REACTIVE + FIRE HAZARD	ORGANIC PEROXIDE	CLASS 5.2
V3	SUDDEN RELEASE OF PRESSURE	COMPRESSED GAS	CLASS 2.1
V2	SUDDEN RELEASE OF PRESSURE	COMPRESSED GAS	CLASS 2.2
C4	ACUTE HEALTH HAZARD	CORROSIVE + OXIDIZER	CLASS 8 + CLASS 5.1
C5	ACUTE HEALTH HAZARD	CORROSIVE + OXIDIZER	CLASS 8 + CLASS 5.1
C1	ACUTE HEALTH HAZARD	CORROSIVE	CLASS 8
C2	ACUTE HEALTH HAZARD	CORROSIVE	CLASS 8
B1	ACUTE HEALTH HAZARD	CORROSIVE	CLASS 8
B2	ACUTE HEALTH HAZARD	CORROSIVE	CLASS 8
K1	ACUTE + CHRONIC HEALTH HAZARD	SHORT TERM HEALTH HAZARD	CLASS 6.2
T2	ACUTE HEALTH HAZARD	HIGHLY TOXIC	CLASS 6.1, PG I
T3	ACUTE HEALTH HAZARD	HIGHLY TOXIC	CLASS 6.1, PG II
T4	ACUTE HEALTH HAZARD	TOXIC	CLASS 6.1, PG III
V4	FIRE HAZARD	COMBUSTIBLE LIQUID	COMBUSTIBLE LIQUID
V5	NOT REGULATED	CLASS IIIB	NOT REGULATED
Z2	NOT REGULATED - ARTICLE	NOT REGULATED - ARTICLE	CLASS 8
V1	ACUTE HEALTH HAZARD	SHORT TERM HEALTH HAZARD	CLASS 9
Z1	NOT REGULATED - ARTICLE	NOT REGULATED - ARTICLE	CLASS 9
Z3	NOT REGULATED - ARTICLE	NOT REGULATED - ARTICLE	CLASS 9
Z6	NOT REGULATED - ARTICLE	NOT REGULATED - ARTICLE	CLASS 9
T7	CHRONIC HEALTH HAZARD	CARCINOGEN	NOT REGULATED
T6	ACUTE/CHRONIC HEALTH HAZARD	IRRIT/SENSITIVE/LONG TERM HLTH HAZ	NOT REGULATED
T5	ACUTE/CHRONIC HEALTH HAZARD	TOXIC	NOT REGULATED
K2	ACUTE + CHRONIC HEALTH HAZARD	SHORT TERM HEALTH HAZARD	NOT REGULATED
P2	REACTIVE	ORGANIC PEROXIDE	NOT REGULATED
V7	ACUTE/CHRONIC HEALTH HAZARD	NOT REGULATED	NOT REGULATED
C3	NOT REGULATED	NOT REGULATED	NOT REGULATED
B3	NOT REGULATED	NOT REGULATED	NOT REGULATED
V6	NOT REGULATED	NOT REGULATED	NOT REGULATED
M1	NOT REGULATED	NOT REGULATED	MAGNETIC
Z4	NOT REGULATED - ARTICLE	NOT REGULATED - ARTICLE	NOT REGULATED
Z5	NOT REGULATED - ARTICLE	NOT REGULATED - ARTICLE	NOT REGULATED
Z7	NOT REGULATED - ARTICLE	NOT REGULATED - ARTICLE	NOT REGULATED
N1	NOT REGULATED	NOT REGULATED	NOT REGULATED

APPENDIX C
STORAGE SEGREGATION MATRIX: HCCs TO STORAGE SEGREGATION

1. The storage segregation matrix in this appendix consists of four essential elements: (1) The Hazard characteristic Code (HCC); (2) the HCC group name in the clear; (3) the primary segregation required by Hazard Storage Area Code (HSAC); and (4) the secondary storage required (if any) within the primary storage area.

2. The 63 HCCs are associated with one of the 10 HSACs in the matrix. Once a hazardous material has been assigned a permanent or temporary HCC, the primary storage site may be determined by using the matrix. Two HCCs, H1 and X1, which are defined in Appendix B are not included in this segregation matrix as they are system derived HCCs which are not actually used for physical storage.

3. The storing installation is further responsible for segregating hazardous materials within the primary area if secondary segregation is required. For instance, HCC F6, a multiple hazard material, which is both flammable and corrosive, acid will be assigned to primary segregation code "F", Flammable Storage Area. HCC F7, another multiple hazard material, which is both an flammable and corrosive, alkali will also be assigned to primary segregation code "F", Flammable Storage Area. These two HCCs are incompatible with each other and must be kept separate by at least one 4 foot aisle width horizontally. Vertical separation must assure that incompatible products cannot leak and contact one another.

4. To further assist in the secondary segregation of hazardous materials, a system of notes has been established. The purpose of this system is to highlight those products that offer truly unique and unusual problems in storage. These products may require secondary segregation within the primary storage area or may present such unusual problems that they must be completely segregated from all other products.

PRIMARY SEGREGATION CODE

A	Radioactive	G	Gas, Compressed
C	Corrosive	L	Low Hazard (General Purpose)
D	Oxidizer	P	Peroxide, Organic
E	Explosive	R	Reactive
F	Flammable	T	Poison

Table C-1. Storage Segregation Matrix

HCC	HAZARD CHARACTERISTICS GROUP	PRIMARY SEGREGATION										SECONDARY SEGREGATION
		A	C	D	E	F	G	L	P	R	T	
A1	Radioactive, Licensed	*										Note A
A2	Radioactive, License Exempt	*										Note A
A3	Radioactive, License Exempt, Authorized	*										Note A
B1	Alkali, Corrosive Inorganic		*									Note B
B2	Alkali, Corrosive Organic		*									Note C
B3	Alkali, Low Risk							*				Note F
C1	Acid, Corrosive Inorganic		*									Note D
C2	Acid, Corrosive Organic		*									Note E
C3	Acid, Low Risk							*				Note F
C4	Acid, Corrosive and Oxidizer, Inorganic		*									Note D
C5	Acid, Corrosive and Oxidizer, Organic		*									Note E
D1	Oxidizer			*								None
D2	Oxidizer and Poison			*								Note G
D3	Oxidizer and Corrosive Acidic			*								Note G
D4	Oxidizer and Corrosive Alkali			*								Note G
E1	Explosive, Military				*							Note H
E2	Explosive, Low Risk							*				Note A
F1	Flammable Liquid DOT PG I, OSHA IA					*						Note J
F2	Flammable Liquid DOT PG II, OSHA IB					*						Note J
F3	Flammable Liquid DOT PG III, OSHA IC					*						Note J
F4	Flammable Liquid DOT PG III, OSHA II					*						Note J
F5	Flammable Liquid and Poison					*						Note L
F6	Flammable Liquid & Corrosive, Acidic					*						Note L
F7	Flammable Liquid & Corrosive, Alkali					*						Note L
F8	Flammable Solid					*						Note K
G1	Gas, Poison (Nonflammable)						*					Note M
G2	Gas, Flammable						*					Note N
G3	Gas, Nonflammable						*					Note P

Secondary segregation applies to storage within assigned primary areas

Table C-1. Storage Segregation Matrix - Continued

HCC	HAZARD CHARACTERISTICS GROUP	PRIMARY SEGREGATION										SECONDARY SEGREGATION
		A	C	D	E	F	G	L	P	R	T	
G4	Gas, Nonflammable, Oxidizer						*					Note R
G5	Gas, Nonflammable, Corrosive						*					Note S
G6	Gas, Poison, Corrosive (Nonflammable)						*					Note T
G7	Gas, poison, Oxidizer (Nonflammable)						*					Note U
G8	Gas, Poison, Flammable						*					Note V
G9	Gas, poison, Corrosive, Oxidizer (Nonflammable)						*					Note W
K1	Infectious Substance										*	Note X
K2	Cytotoxic Drugs										*	Note Y
M1	Magnetized Material							*				None
N1	Not Regulated as Hazardous							*				None
P1	Peroxide, Organic, DOT Regulated								*			None
P2	Peroxide, Organic (Low Risk)								*			None
R1	Reactive Chemical, Flammable									*		Note Z
R2	Water Reactive Chemical									*		Note AA
T1	DOT Poison - Inhalation Hazard										*	None
T2	UN Poison, Packing Group I										*	None
T3	UN Poison, Packing Group II										*	None
T4	UN Poison, Packing Group III							*				Note BB
T5	Pesticide, Low Risk							*				None
T6	Health Hazard							*				None
T7	Carcinogen (OSHA, NTP, IARC)										*	Note CC
V1	Miscellaneous Hazardous Materials - Class 9							*				None
V2	Aerosol, Nonflammable					*						Note EE
V3	Aerosol, Flammable					*						Note EE
V4	DOT Combustible Liquid, OSHA IIIA					*						None
V5	Hi-Flash Point Liquids, OSHA IIIB							*				None
V6	Petroleum Products							*				None
V7	Environmental Hazard							*				None

Secondary segregation applies to storage within assigned primary areas

Table C-1. Storage Segregation Matrix - Continued

HCC	HAZARD CHARACTERISTICS GROUP	PRIMARY SEGREGATION										SECONDARY SEGREGATION
		A	C	D	E	F	G	L	P	R	T	
Z1	Article Containing Asbestos							*				None
Z2	Article Containing Mercury							*				None
Z3	Article Containing Polychlorinated Biphenyls (PCB)							*				None
Z4	Article, Battery, Lead Acid, Nonspillable							*				None
Z5	Article, Battery, Nickel Cadmium, Nonspillable							*				None
Z6	Article, Battery, Lithium									*		Note DD
Z7	Article, Battery, Dry Cell							*				None

Secondary segregation applies to storage within assigned primary areas

DEFINITION OF NOTES

NOTE A - Security Storage - must be well ventilated with limited access.
NOTE B - Inorganic Alkali Storage - store away from acids by at least one 4 ft aisle width and away from organic alkalis by at least one 4 ft aisle width.
Note C - Organic Alkali Storage - store away from acids by at least one 4 ft aisle width and away from inorganic alkalis by at least one 4 ft aisle width.
NOTE D - Inorganic Acid Storage - store away from alkalis (caustics) by at least one 4 ft aisle width and away from organic acids by at least one 4 ft aisle width. Separate from other acids with subsidiary risk labels by at least one 4 ft aisle width.
NOTE E - Organic Acid Storage - store away from alkalis (caustics) by at least one 4 ft aisle width and away from inorganic acids by at least one 4 ft aisle width. Separate from other acids with subsidiary risk labels by at least one 4 ft aisle width.
NOTE F - Further separate into Acid and Alkali Storage within the low hazard storage area to keep potentially incompatible products from mixing.
NOTE G - Separate from other oxidizers and oxidizers with secondary hazards by at least one 4 ft aisle width.
NOTE H - Magazine Storage.
NOTE J - Segregate into flammable liquid storage separate from flammable solids by at least one 4 ft aisle width.
NOTE K - Segregate into flammable solid storage separate from flammable liquids by at least one 4 ft aisle width.
NOTE L - Separate from other flammables and flammables with secondary hazards by at least one 4 ft aisle width.
NOTE M - Further segregate into Poison Gas storage within compressed gas area.

NOTE N - Further segregate into Flammable Gas storage within compressed gas area.
NOTE P - Further segregate into Nonflammable Gas storage within compressed gas area.
NOTE R - Further segregate into Oxidizer Gas within the Nonflammable Gas storage that is within the compressed gas area.
NOTE S - Further segregate into Corrosive Gas within the Nonflammable Gas storage that is within the compressed gas area.
NOTE T - Further segregate into Corrosive Gas within the Poison Gas storage that is within the compressed gas area.
NOTE U - Further segregate into Oxidizer Gas within the Poison Gas storage that is within the compressed gas area.
NOTE V - Further segregate into Flammable Gas within the Poison Gas storage that is within the compressed gas area.
NOTE W - Further segregate into Corrosive and Oxidizer Gas within the Poison Gas storage that is within the compressed gas area.
NOTE X - Further segregate into Biomedical storage within the Poison Storage area.
NOTE Y - Further segregate into a Medical Security storage within the Poison Storage area.
NOTE Z - Further segregate into a Spontaneously Combustible storage within the Reactive Storage area.
NOTE AA - Should not store in areas protected with water sprinkler system. Fire protection should be non water based.
NOTE BB - Store away from food.
NOTE CC - Further segregation within Poison Storage area may be necessary if secondary hazards exist (i.e. flammable, corrosive, etc.)
NOTE DD - Separate from other products within the Reactive Storage area.
NOTE EE - Store aerosols from flammables by placing in separate room or barrier such as floor to ceiling wire mesh, chain link fence, etc. to protect personnel from aerosols that can become self-propelled projectiles.

APPENDIX D
ASSIGNMENT OF TEMPORARY HAZARD CHARACTERISTIC CODES (HCCs)

Table D-1. DOT Transportation Labels

DOT Label	Interim HCC	Recommended Storage Area	
		Primary	Secondary
Explosive 1.1	E1	Explosive	Magazine
Explosive 1.2	E1	Explosive	Magazine
Explosive 1.3	E1	Explosive	Magazine
Explosive 1.4	E2	Explosive	Security
Explosive 1.5	E2	Explosive	Security
Explosive 1.6	E2	Explosive	Security
Poison Gas	G1	Compressed Gas	Poison Gas Cylinder
Flammable Gas (Cylinder)	G2	Compressed Gas	Flammable Gas Cylinder
Flammable Gas (Aerosol Nonrefillable tank or Canister)	V3	Flammable	Aerosol Containers
Non-Flammable Gas	G3	Compressed Gas	Nonflammable Gas Cylinder
Flammable Liquid	F1-F4	Flammable	Flammable Liquid
Flammable Solid	F8	Flammable	Flammable Solid
Spontaneously Combustible	R1	Reactive	Spontaneously Combustible
Dangerous When Wet	R2	Reactive	Dangerous When Wet, No water sprinklers
Oxidizer	D1	Oxidizer	None
Organic Peroxide	P1	Peroxide Organic	None
Poison	T2	Poison	None
Harmful Keep Away From Food	T4	Low Hazard	Away From Food
Infectious Substance	K1	Poison	Biomedical
Radioactive I	A1	Radioactive	Security
Radioactive II	A1	Radioactive	Security
Radioactive III	A1	Radioactive	Security
Corrosive	C1,C2,C4,C5 (Acid)*	Corrosive	Acid
Corrosive	B1, B2 (Alkali)*	Corrosive	Alkali
Class 9	V1	Low Hazard	None
Magnetized Material	M1	General Purpose	None

* If it is not known if a corrosive is acid or alkali, contact HMIS to get a technical determination from MSDS.

Table D-2.
Recommended Storage Based on Precautionary Label Text (ANSI Z129.1)

Signal Word	Examples of Statement of Hazard	Suggested Temporary HCC	Recommended Primary Storage Area	Recommended Secondary Storage Area
DANGER!	MAY BE FATAL IF SWALLOWED	T2	Poison	None
WARNING!	HARMFUL IF SWALLOWED	T3	Poison	None
WARNING!	HARMFUL IF SWALLOWED	T4	Low Hazard	Away from Food
DANGER!	MAY BE FATAL IF ABSORBED THROUGH SKIN	T2	Poison	None
WARNING!	HARMFUL IF ABSORBED THROUGH SKIN	T6	Low Hazard *	None
DANGER!	CAUSES (SEVERE)** BURNS	C1,C2, C4,C5	Corrosive	Acid
DANGER!	CAUSES (SEVERE)** BURNS	B1,B2	Corrosive	Alkali
DANGER!	EXTREMELY FLAMMABLE	F1	Flammable	Flammable Liquid
WARNING!	FLAMMABLE	F2,F3	Flammable	Flammable Liquid
WARNING!	FLAMMABLE	F8	Flammable	Flammable Solid
CAUTION!	COMBUSTIBLE	F4	Flammable	Flammable Liquid
CAUTION!	COMBUSTIBLE	V4	Flammable	None
DANGER!	EXTREMELY FLAMMABLE, CATCHES FIRE IF EXPOSED TO AIR	R1	Reactive	Spontaneously Combustible
DANGER!	STRONG OXIDIZER. CONTACT WITH OTHER MATERIALS MAY CAUSE FIRE	D1	Oxidizer	None
DANGER!	MAY BE FATAL IF INHALED	T1	Poison	None
WARNING!	HARMFUL IF INHALED	T2	poison	None
WARNING!	MAY CAUSE ALLERGIC RESPIRATORY REACTION	T6	Low Hazard *	None
CAUTION!	(VAPOR GAS)** REDUCES OXYGEN AVAILABLE FOR BREATHING	T6	Low Hazard *	None
WARNING!	CAUSES EYE IRRITATION	T6,C3,C4	Low Hazard *	None
WARNING!	CAUSES IRRITATION	T6,C3,C4	Low Hazard *	None
WARNING!	MAY CAUSE ALLERGIC SKIN REACTION	T6,C3,C4	Low Hazard *	None

* Material bearing precautionary label text will not be assigned a Low Hazard (General Purpose) location without notification of and approval by the installation Physical Science or Safety and Health Office.
** Enter proper term as appropriate.

Table D-3. Toxic and Hazardous Substances Listed in Title 29 CFR, Part 1910, Subpart Z			
Material	Temporary HCC	Recommended Primary Storage Area	Recommended Secondary Storage Area
4-Nitrobiphenyl	T7	Poison	None
Alpha-naphthylamine	T7	Poison	None
Methyl chloromethyl ether (anhydrous)	F5	Flammable	Poison
3-3'-Dichlorobenzidine (and its salts)	T7	Poison	None
Bis-Chlorodimethyl ether (sym-Dichlorodimethyl ether - UN 2249)	F5	Flammable	Poison
Beta-Naphthylamine	T7	Poison	None
Benzene	F5	Flammable	Poison
Benzidine	T7	Poison	None
4-Aminodiphenyl (Biphenylamine)	T7	Poison	None
Ethyleneamine (Inhibited)	F5	Flammable	Poison
Beta-propiolactone	T7	Poison	None
2-Acetylaminofluorene	T7	Poison	None
4-Dimethylaminoazobenzene	T7	Poison	None
N-Nitrosodimethylamine	T7	Poison	None
Vinyl Chloride	G8	Compressed Gas	Poison/Flammable Gas
Inorganic Arsenic	T7	Poison	None
1,2-Dibromo-3-chloropropane	T7	Poison	Pesticide
Acrylonitrile	F5	Flammable	Poison
Ethylene Oxide	G8	Compressed Gas	Poison/Flammable

Note: Primary and Secondary storage criteria are same as specified in Table C-1. Permanent storage criteria for items listed above must be coordinated with the Installation Safety and Health Office.

Table D-4. Class or Division Cross-Reference to Storage Areas				
This Table outlines a method recommended for determining where to store hazardous materials not assigned an HCC based on the class or division numbers found in Title 49 CFR, Part 172.101. The number is displayed at the bottom of the placard or label, or on a shipping paper after the shipping name.				
Class/ Division	HCC	Name	Primary Storage Area	Secondary Storage Area
1.1	E1	Explosives	Explosive	Magazine
1.2	E1	Explosives	Explosive	Magazine
1.3	E1	Explosives	Explosive	Magazine
1.4	E1	Explosives	Explosives	Magazine
1.4S	E2	Explosives	Low Hazard	Security
1.5	E1	Explosives	Explosive	Magazine
1.6	E1	Explosives	Explosive	Magazine
2.1	G2	Flammable Gases	Gas, Compressed	Flammable Gas
2.2	G3,G4, G5	Nonflammable Gases	Gas, Compressed	Nonflammable Gas
2.3	G1,G6, G7,G8, G9	Poison Gases	Gas, Compressed	Poison Gas
3	F1	Flammable Liquids, PG I	Flammable	Flammable Liquid
3	F2	Flammable Liquids PG II	Flammable	Flammable Liquid
3	F3,F4	Flammable Liquids PG III	Flammable	Flammable Liquid
4.1	F8	Flammable Solids	Flammable	Flammable Solid
4.2	R1	Spontaneously Combustible	Reactive	Spontaneously Combustible
4.3	R2	Dangerous When Wet	Reactive	Non Water Based Fire Protection
5.1	D1	Oxidizers	Oxidizer	None
5.2	P1	Organic Peroxides	Peroxide, Organic	None
6.1	T1,T2, T3	Poisonous Materials	Poison	None
6.1	T4	Poisonous Materials	Poison	Away from Food
6.2	K1	Infectious Substance	Poison	Biomedical
7	A1,A2, A3	Radioactives	Radioactive	Security
8	C1,C2, C4,C5	Corrosives	Corrosive	Acid
8	B1,B2	Corrosives	Corrosive	Alkali
9	V1	Miscellaneous Hazardous Material	Low Hazard *	None

* Material bearing warning label will not be assigned to a general purpose location without notification of approval by the installation Safety and Health Office.

APPENDIX E

A GUIDE FOR DETERMINING PACKAGING, MARKING, AND LABELING REQUIREMENTS FOR HAZARDOUS MATERIALS

SECTION I: PACKAGING REQUIREMENTS

GENERAL REQUIREMENTS (49 CFR, Section 173.24)

SPECIFIC REQUIREMENTS (See Section 172.101, 49 CFR for applicable material and packaging requirements)

* Determine the Mode of Transportation for shipment

* Determine PSN

* Consult 49 CFR, Section 172.101, Hazardous Materials Table

* Read across to column 8, Packaging Authorizations Hazardous Materials Table

Hazardous Materials Table

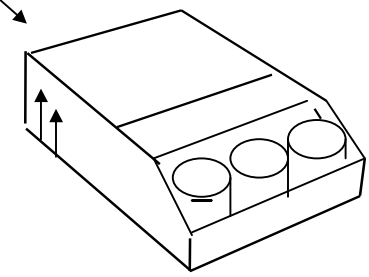
Symbols	Hazardous materials description and proper shipping names	Hazard class or Division	Identification Numbers	Packing group	Label(s) required (if not excepted)	Special provisions	(8) Packaging authorizations (§ 173.***)			(9) Quantity limitations		(10) Vessel stowage requirements)	
							Exceptions	Non-bulk packaging	Bulk packaging	Passanger aircraft or railcar	Cargo aircraft only	Vessel stowage	Other stowage provisions
(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8A)	(8B)	(8C)	(9A)	(9B)	(10A)	(10B)
.....	Flammable liquids, corrosive, n.o.s.				FLAMMABLE LIQUID, CORROSIVE	T42	None	201	243	0.5 L	2.5 L	E	40
	.....	.....	.....	II	FLAMMABLE LIQUID, CORROSIVE	T15, T26	None	202	243	1 L	5 L	B	40
	.....	.....	.....	III	FLAMMABLE LIQUID, CORROSIVE	B1, T15, T26	150	203	242	5 L	60 L	A	40
D	Flammable liquids, elevated temperature material, n.o.s.	3	NA9276	III	FLAMMABLE LIQUID	.....	None	None	247	Forbidden	Forbidden	D	
.....	Flammable liquids, n.o.s.	3	UN1993	I	FLAMMABLE LIQUID	T42	150	201	243	1 L	30 L	E	
	.....	.....	.....	II	FLAMMABLE LIQUID	T8, T31	150	202	242	5 L	60 L	B	

EXAMPLE

* Determine if "Limited Quantity"
  Column 8a, Exceptions Apply

How Much Material?

You observe - Fiberboard box with
12 - l Liter containers inside the package.



Turn to Section 173.150 noted in Column 8a.
* Read Section 173.150

* Does any provision of Section 173.150 coincide with the configuration you observed?

173.150 Exceptions for Class 3 (flammable and combustible liquids)

(b) Limited quantities. Limited quantities of flammable liquids (Class 3) are excepted from labeling requirements, unless offered for transportation or transported by aircraft, and the specification packaging requirements of this subchapter when packaged in combination packagings according to this paragraph. In addition, shipments of limited quantities are not subject to subpart F (Placarding) of part 172 of this subchapter. Each package must conform to the packaging requirements of subpart B of this part and may not exceed 30 kg (66 pounds) gross weight. The following packagings are authorized:

(1) For flammable liquids in Packing Group I, inner packaging not over 0.5 L (00.1 gallon) net capacity each, packed in strong outer packagings;

(2) For flammable liquids in Packing Group II, inner packagings not over 1.0 L (0.3 gallon) net capacity each, packed in strong outer packagings; and

(3) For flammable liquids in Packing Group III, inner packagings not over 5.0 L (1 gallon) net capacity each, packed in strong outer packagings.

* This is a "Limited Quantity" package, and, as such, it is excepted from specification packaging requirements which are referred to in column 8b (173.202) of the Hazardous Material Table. Limited Quantity packages being shipped by air are not excepted from labeling as indicated in 173.150(b).

* If packaging configuration does not meet the requirements outlined in the "Limited Quantity" section, read across to column 8b as shown below.

* See columns 9a and 9b for additional air shipment requirements.

172.101 Hazardous Materials Table - Continued

Symbols	Hazardous materials description and proper shipping names	Hazard class or Division	Identification Numbers	Packing group	Label(s) required (if not excepted)	Special provisions	(8) Packaging authorizations (§ 173.***)			(9) Quantity limitations		(10) Vessel stowage requirements)	
							Exceptions	Non-bulk packaging	Bulk packaging	Passanger aircraft or railcar	Cargo aircraft only	Vessel stowage	Other stowage provisions
(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8A)	(8B)	(8C)	(9A)	(9B)	(10A)	(10B)
.....	Flammable liquids, corrosive, n.o.s.				FLAMMABLE LIQUID, CORROSIVE	T42	None	201	243	0.5 L	2.5 L	E	40
	.....	.....	.....	II	FLAMMABLE LIQUID, CORROSIVE	T15, T26	None	202	243	1 L	5 L	B	40
	.....	.....	.....	III	FLAMMABLE LIQUID, CORROSIVE	B1, T15, T26	150	203	242	5 L	60 L	A	40
D	Flammable liquids, elevated temperature material, n.o.s.	3	NA9276	III	FLAMMABLE LIQUID	.....	None	None	247	Forbidden	Forbidden	D	
.....	Flammable liquids, n.o.s.	3	UN1993	I	FLAMMABLE LIQUID	T42	150	201	243	1 L	30 L	E	
	.....	.....	.....	II	FLAMMABLE LIQUID	T8, T31	150	202	242	5 L	60 L	B	

* The DoD PC-POP Program is available to identify those packaging configurations that have been tested and passed the performance tests specified in 49 CFR, Subpart M. The database can be downloaded from the DDC web page or obtained by e-mail. Contact the DDC at DSN 977-8238, (717) 770-8238 for further information.

SECTION II: MARKING REQUIREMENTS

GENERAL REQUIREMENTS (Section 172.301 and MIL-STD-129)

* PSN

* Identification Number

* Technical names (in parentheses) for materials described by certain generic or n.o.s. descriptions.

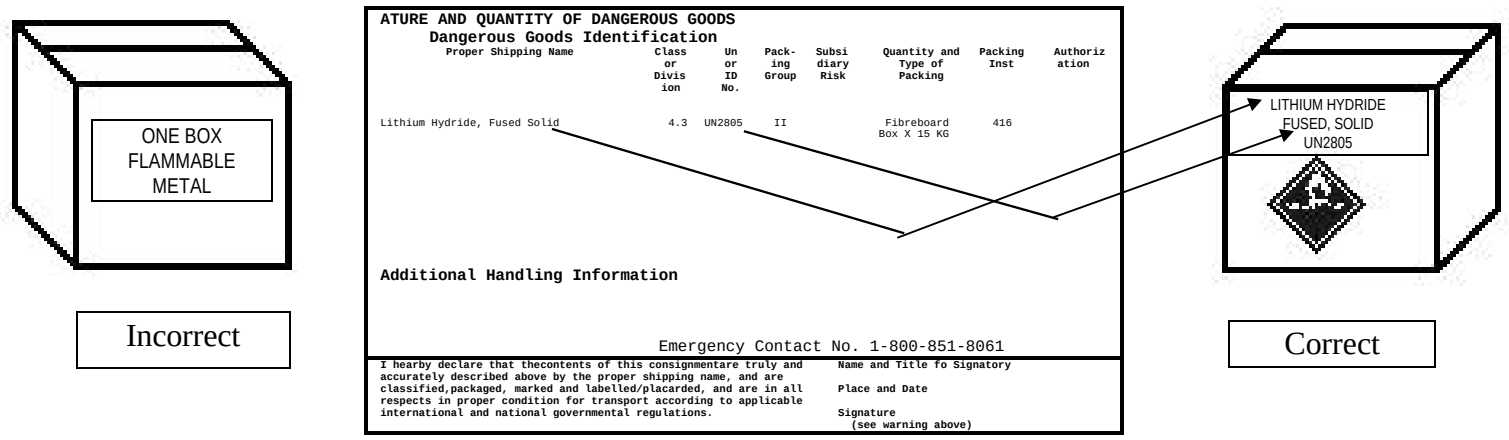
* Consignee's or Consignor's name and address (section 172.301)

Note:

The name and address is not required when the package is:

(1) Transported by highway only and will not be transferred from one motor carrier to another; or

(2) Part of a carload lot, truckload lot or freight container load, and the entire contents of the rail car, truck, or freight container are shipped from one consignor to one consignee.



* Compare PSN and identification number on the shipping paper to markings on the package.

SPECIFIC REQUIREMENTS

* Liquid hazardous material (section 172.312) requires that each non-bulk combination packaging having inner packagings containing liquid hazardous materials be legibly marked with orientation arrows on at least two opposite verticle sides.

* Hazardous substances (section 172.324) shall have the name of the hazardous substance as part of the PSN if it is not included in the PSN. If shipping a reportable quantity, the letters "RQ" shall be marked on the package in association with the PSN.

* ORM D (section 172.316) must be marked with the ORM-D designation within a rectangle on at least one side or end immediately following or below the PSN of the material.

* DOT exemptions (section 172.301) shall be marked with "DOT-E" followed by the assigned exemption number.

* Poisonous hazardous materials (section 172.313) that are poisonous by inhalation will be marked "Inhalation Hazard" in association with the required labels or placards.

SECTION III: LABELING REQUIREMENTS

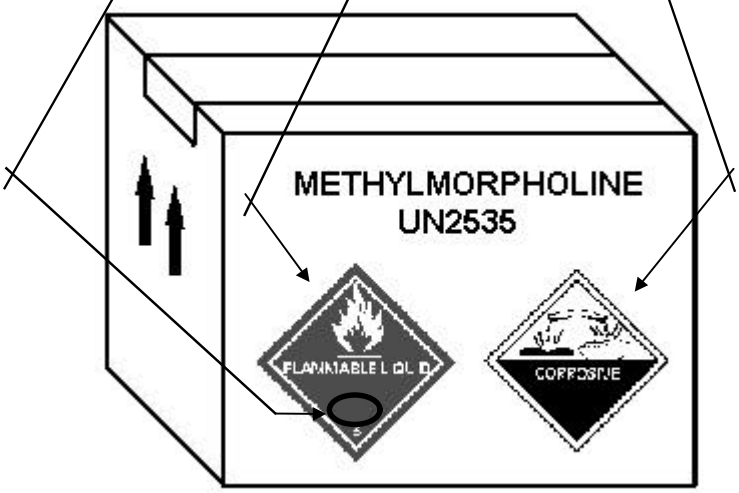
* Packages containing a hazardous material must bear the label(s) specified in Column 6 of the Hazardous Material Table (Primary and Subsidiary hazard labels). This requirement does not apply to limited quantities.

* Labels are prohibited on packages that do not contain a hazardous material (section 172.401).

* Labels must be printed on or affixed to the surface of the package near the PSN (section 172.406).

* Multiple labels must be placed next to each other within 150mm (section 172.406 (c)).

Symbols	Hazardous materials description and proper shipping names	Hazard class or Division	Identification Numbers	Packing group	Label(s) required (if not excepted)	Special provisions	(8) Packaging authorizations (§ 173.***)			(9) Quantity limitations		(10) Vessel stowage requirements)	
							Exceptions	Non-bulk packaging	Bulk packaging	Passanger aircraft or railcar	Cargo aircraft only	Vessel stowage	Other stowage provisions
(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8A)	(8B)	(8C)	(9A)	(9B)	(10A)	(10B)
	Methylmorpholine	3	UN2535	II	FLAMMABLE LIQUID, CORROSIVE	B6, T8	None	202	243	1 L	5 L	B	40
	Methylpentadienes	3	UN2461	II	FLAMMABLE LIQUID	T7	150	203	242	60 L	220 L	A	
	2-Methylpentan-2-ol	3	UN2560	III	FLAMMABLE LIQUID	B1, T1	150	203	242	60 L	220 L	A	
	Methylpentanes, see Hexanes												
	Methylphenyldichlorosilane	8	UN2437	II	CORROSIVE	T8 T26	154	202	242	1 L	30 L	C	40



Example of Package Where Two Labels are Required

Primary requires class code. Secondary does not.

ADDITIONAL LABELING REQUIREMENTS

* "Cargo Aircraft Only" -- Required for packages authorized for transport aboard cargo carrying aircraft only.

* Mixed Packaging -- A label must be displayed for each class of material when different hazardous classes are packed in the same packaging.

* Consolidated Packaging -- An overpack that contains two or more classes of hazardous materials must be labeled for each class of hazardous materials in the overpack.

* Examples of DOT warning labels are shown in Chapter 2.

APPENDIX F

BLOCKING AND BRACING OF HAZARDOUS MATERIALS FOR TRANSPORTATION

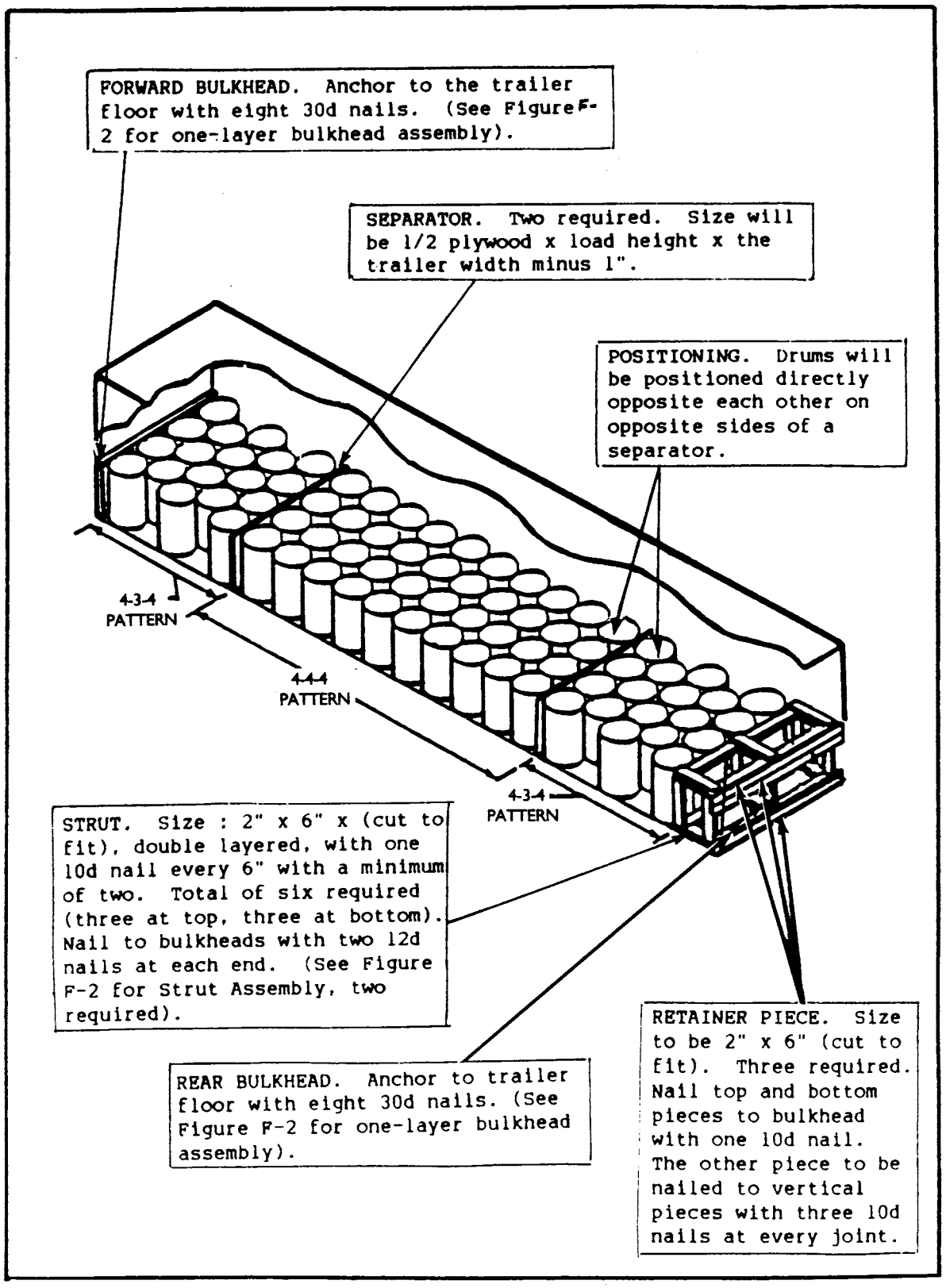


Figure F-1. Typical Load of Hazardous Materials in 55-Gallon Closed-Head Steel Drums in a 40-foot Trailer/Container

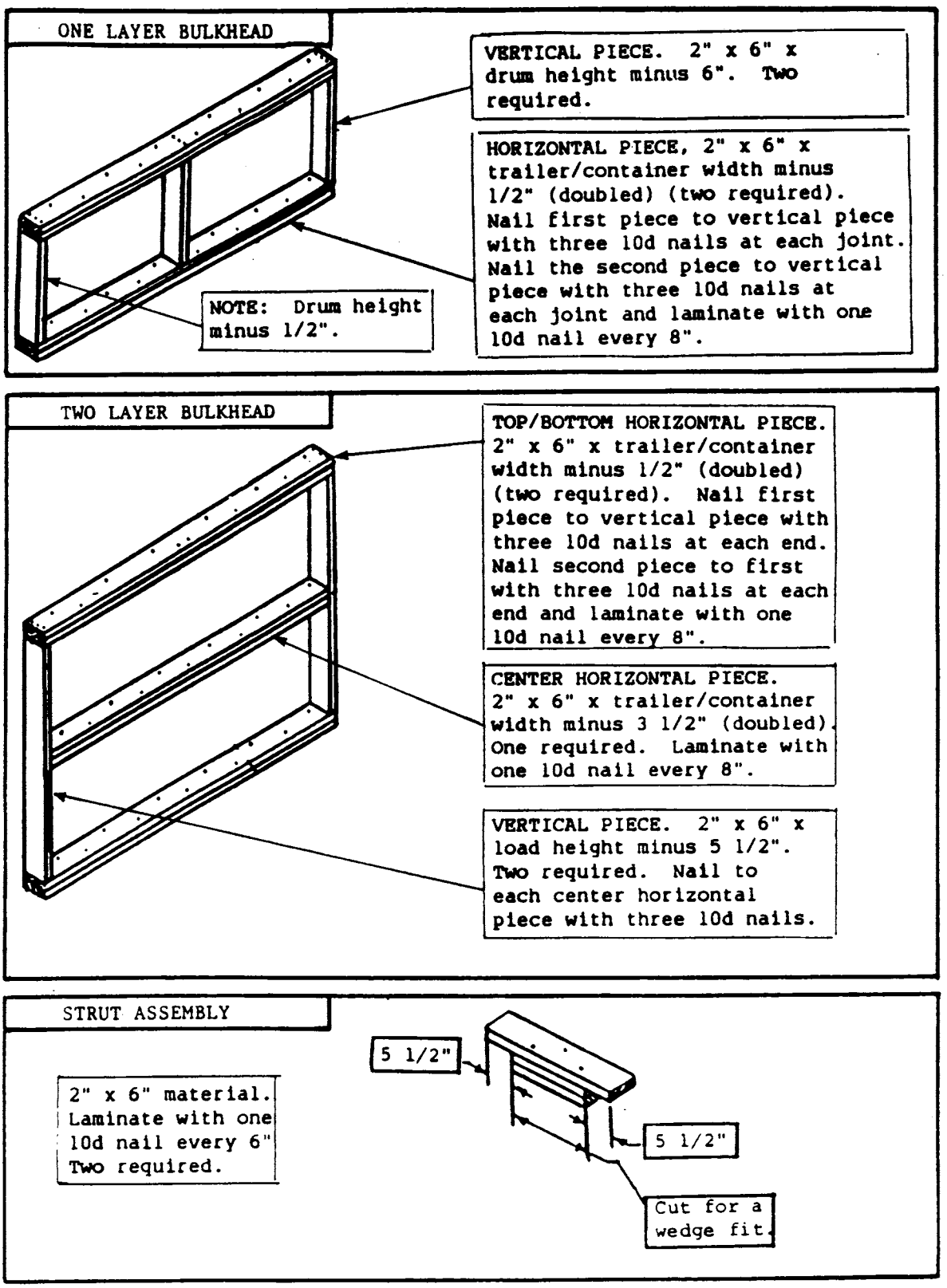


Figure F-2. Bulkhead and Strut Assembly

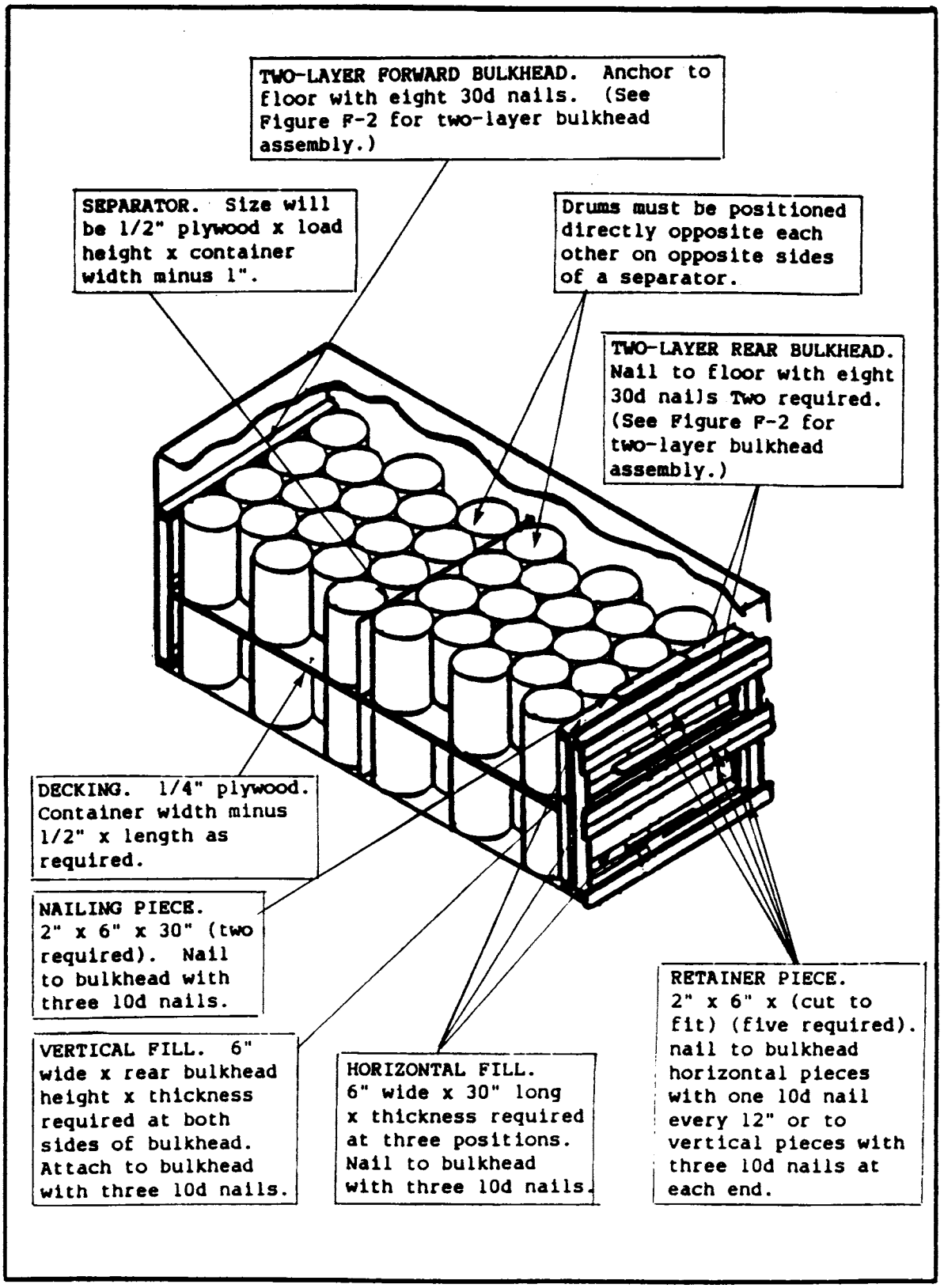


Figure F-3. Typical Load of Hazardous Materials in 55-Gallon Closed- Head Drums in a 20-foot Trailer/Container

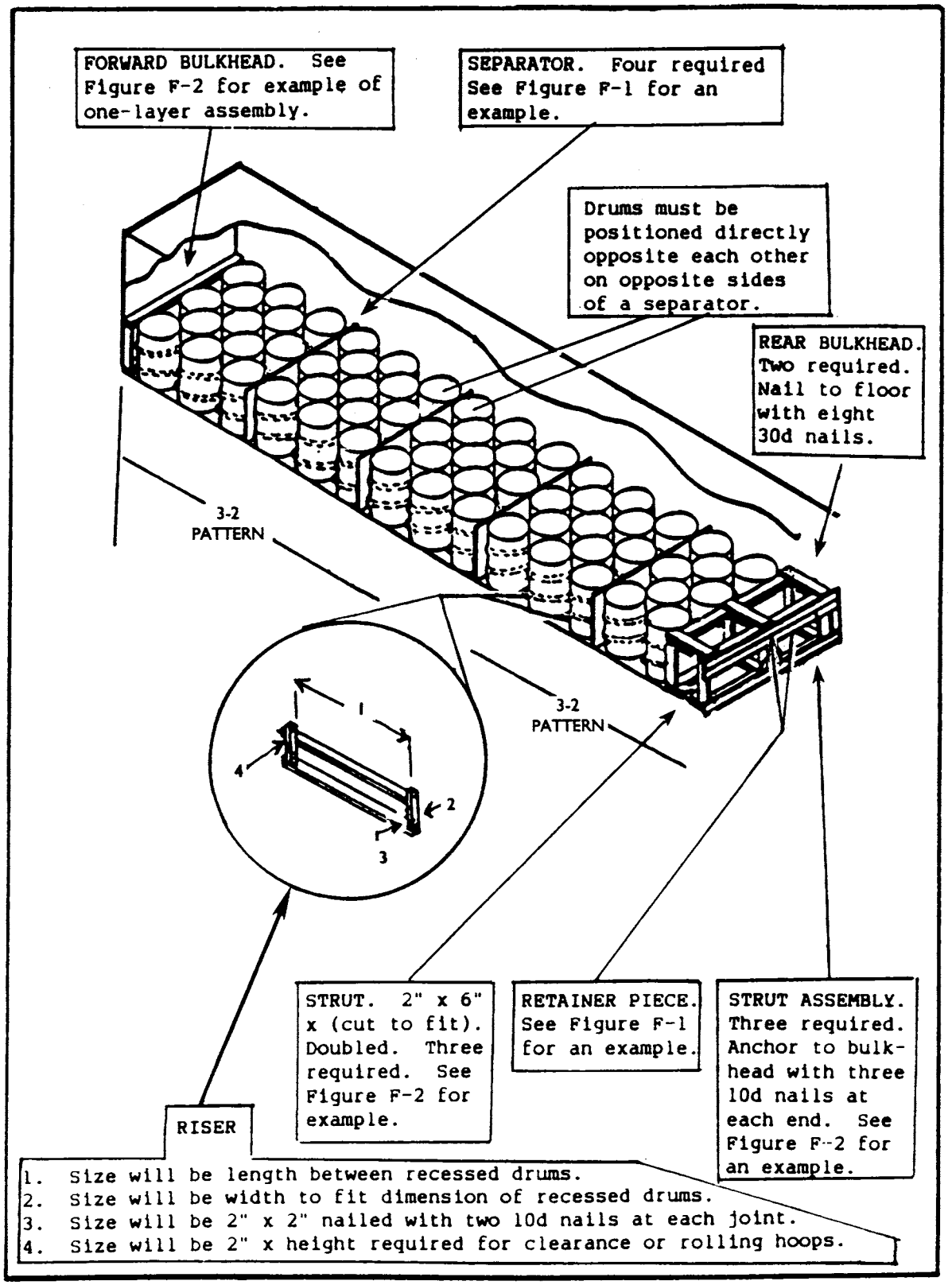


Figure F-4. Typical Load of Hazardous Materials in 55-Gallon Open-Head Steel Drums in a 40-foot Trailer/Container

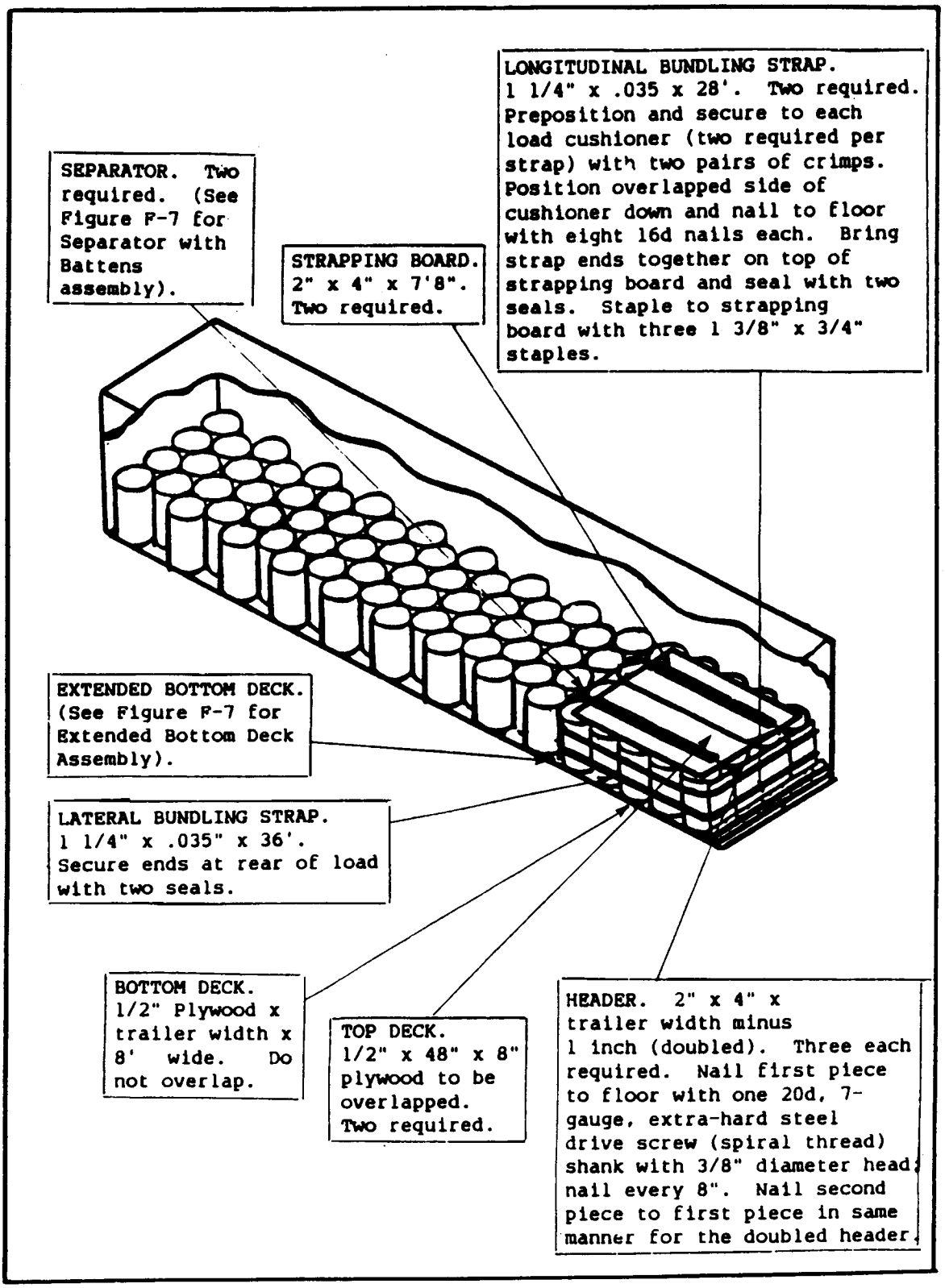


Figure F-5. Typical Load of Hazardous Materials in 55-Gallon Closed-Head Drums Braced with a Unitized Rear Bay in 40-foot Trailer/Container

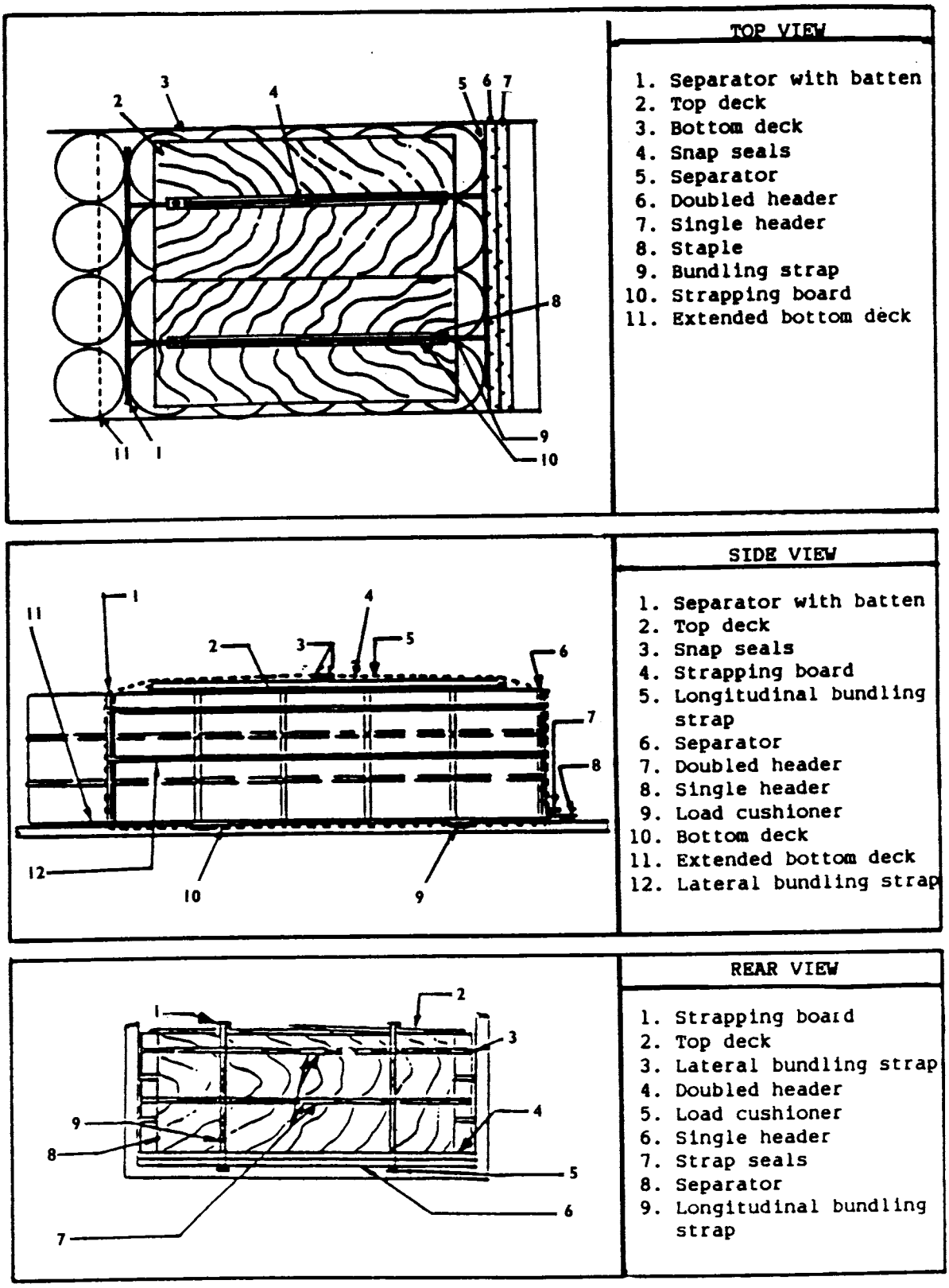
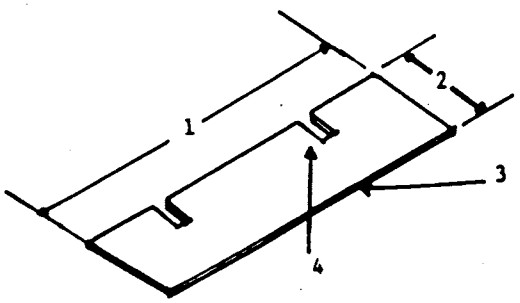
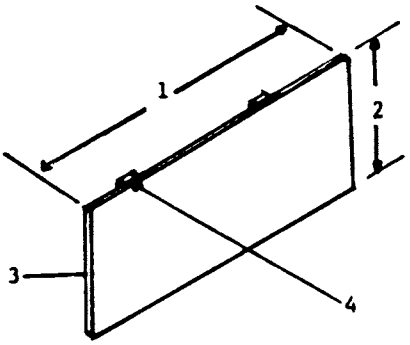


Figure F-6. Unitized Rear Bay Brace



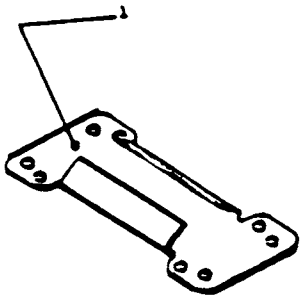
EXTENDED BOTTOM DECK

1. Size: width of trailer of container minus 1/2"
2. Width will be that required to accommodate the load
3. Thickness of plywood to be 1/2"
4. Deck will be notched to provide for strap clearance



SEPARATOR WITH BATTENS

1. Size: 6' 10"
2. Height will be that of the load
3. Size of vertical piece will be 1" x 4" x height of drum
4. Bearing piece will be 1/2" plywood, 6' 10" long x drum height in width. One required. Nail to vertical piece with one 6d nail every 8" and clinch



LOAD CUSHIONER

1. Install with the side show in a downward position

"POLE BARN" NAIL

Size: 20d, 4" long, 7 gauge extra-hard steel, drive screw (spiral thread) shank; with 3/8" diameter

Figure F-7. Extended Bottom Deck Assembly

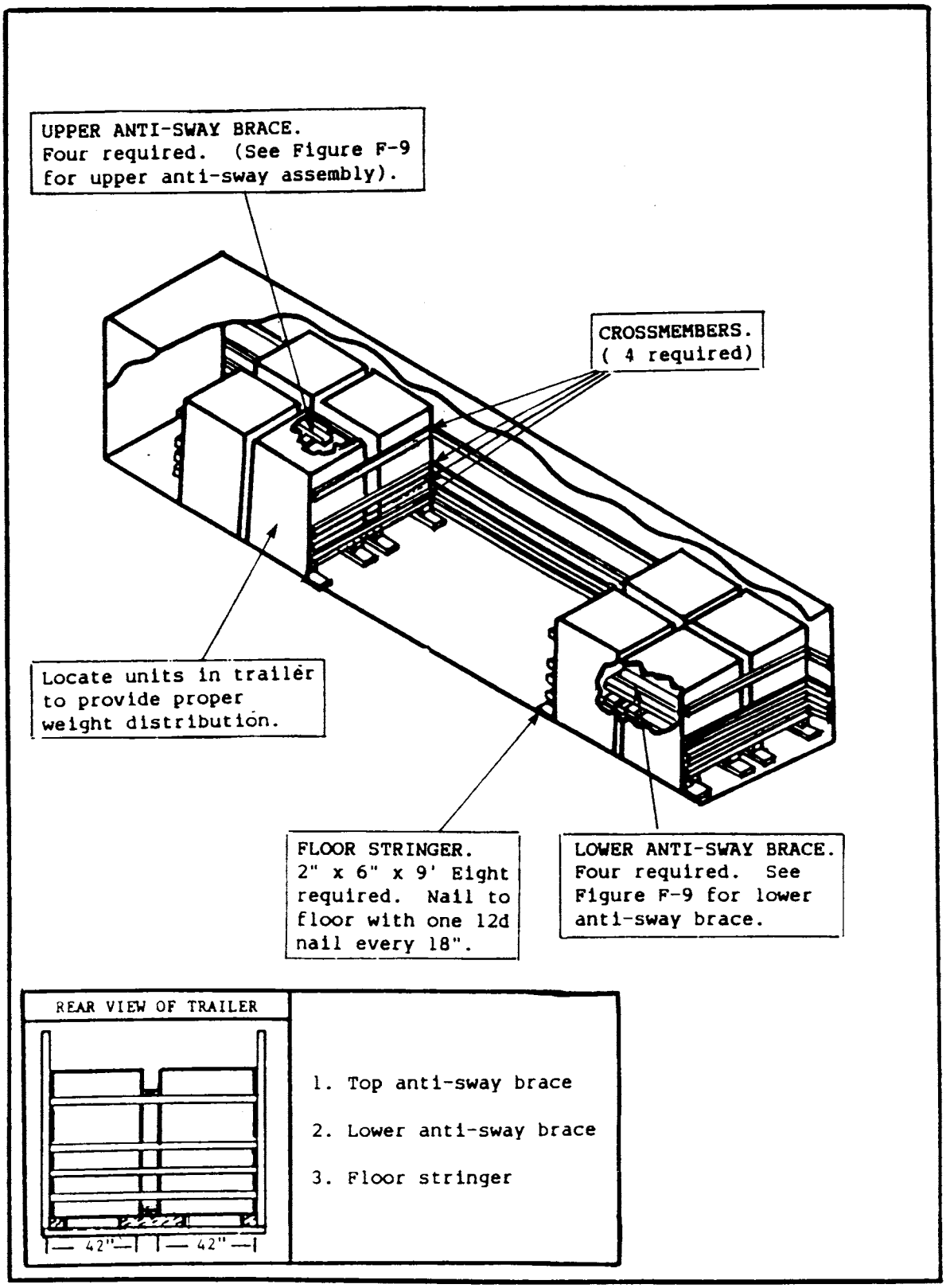
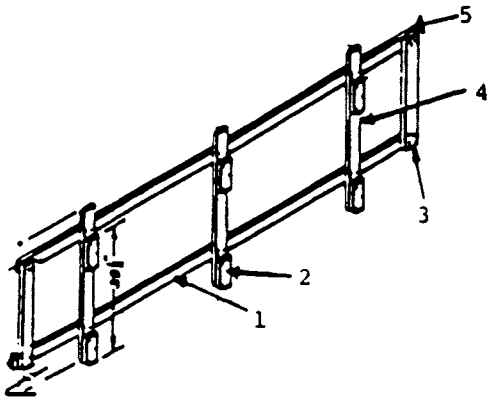


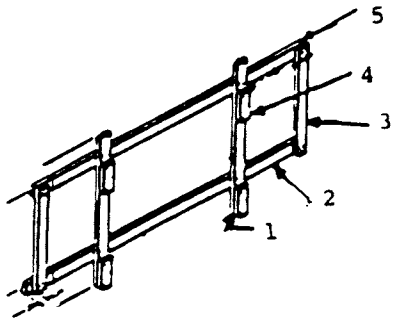
Figure F-8. Typical Load of Hazardous Materials in DOT Specification Portable Tanks in 40-foot Trailer/Container

SIDE BLOCKING GATE "A"



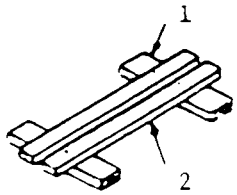
1. Bottom horizontal piece will be 2" x 12' 3". One required.
2. Strut ledger will be 2" x 4" x 9". Six required. Nail to vertical piece with three 10d nails.
3. Stop piece will be 2" x 4" 2 33 1/2". Two required. Nail to horizontal piece with three 10d nails at each end.
4. Vertical piece will be 2" x 4" 2 x 48". Three required. Nail to the horizontal pieces with three 10d nails at each joint.
5. Top horizontal piece will be 2" x 4" x 12' 6". One required.

SIDE BLOCKING GATE "B"



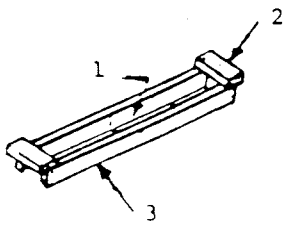
1. Vertical piece will be 2" x 4" x 48". Two required. Nail to horizontal piece with three 10d nails to each joint.
2. Bottom horizontal piece will be 2" x 4" x 8' 6". One required.
3. Stop piece will be 2" x 4" x 33 1/2". Two required. Nail to horizontal pieces with three 10d nails at each end.
4. Strut ledger will be 2" x 4" x 9". Four required. Nail to vertical pieces with three 10 d nails.
5. Top horizontal piece will be 2" x 4" x 8' 3". One required.

LOWER ANTI-SWAY BRACE



1. Size will be 2" x 6" x 24". Two required.
2. Size will be 2" x 4" x 45". Two required. Nail with four 10d nails at each joint.

UPPER ANTI-SWAY BRACE



1. Spacer piece will be 2" x 4" x (cut to fit). Three required.
2. Support piece will be 2" x 4" x (cut to fit). Two required. Nail with three 10d nails.
3. Bearing piece will be 2" x 4" x (cut to fit). Two required. Nail to spacer pieces with two 10d nails at each joint.

Figure F-9. Assembly of Side Blocking Gate and Antisway Brace

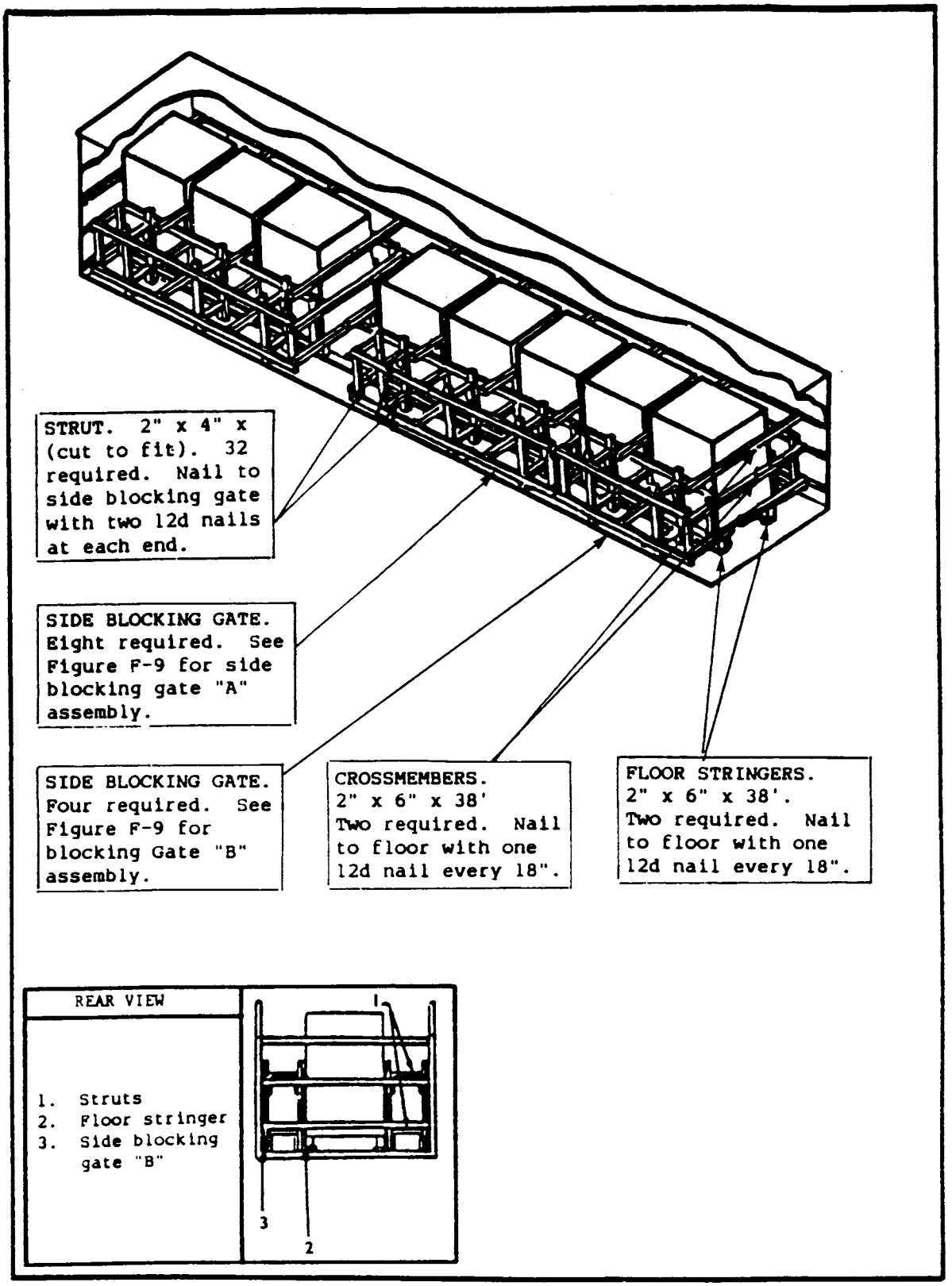


Figure F-10. Typical Load of Hazardous Materials in DOT Specification Portable Tankls in 40-foot Trailer/Container

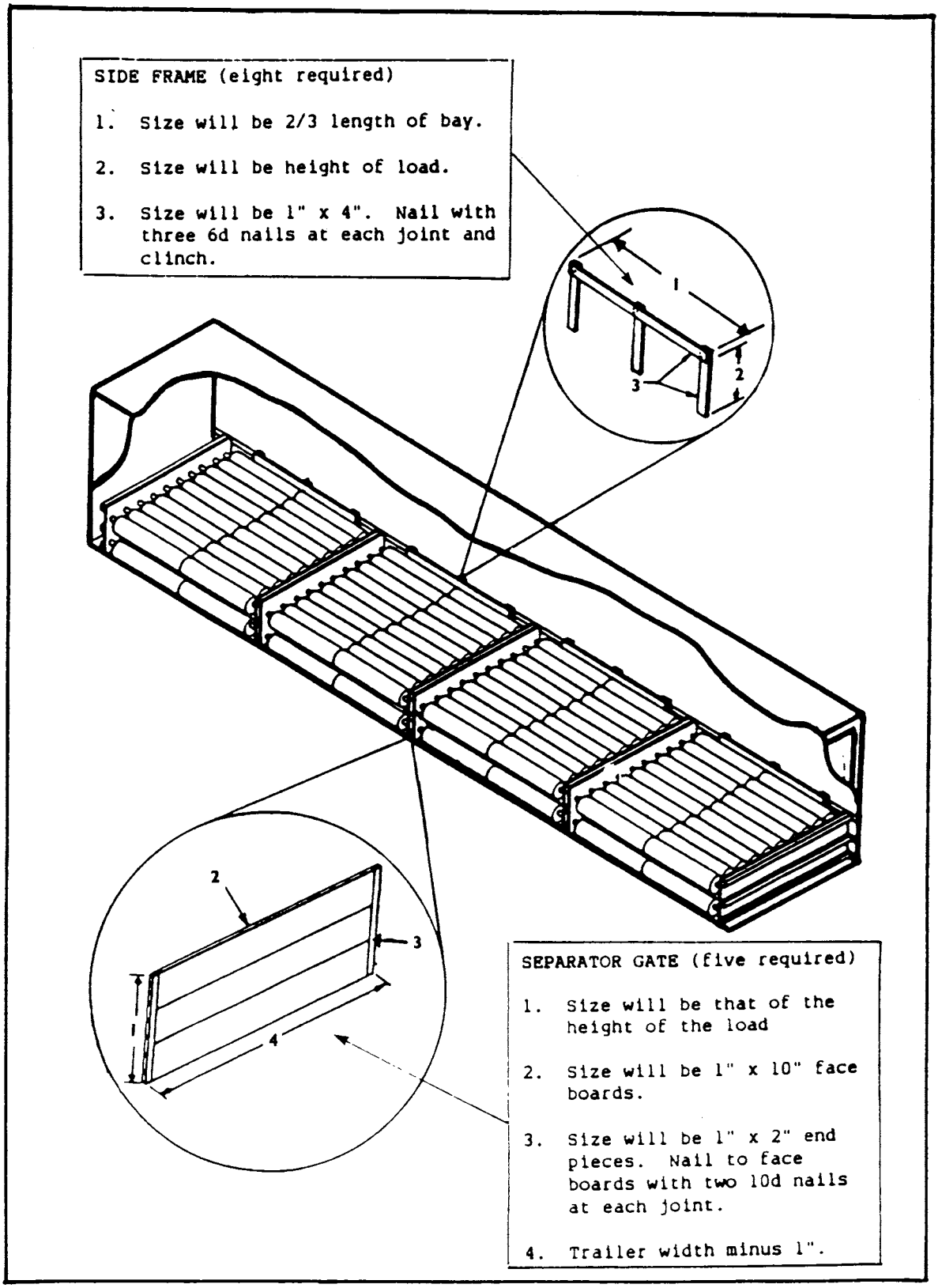


Figure F-11. Typical Load of Hazardous Materials in Compressed Gas Cylinders in a 40-foot Trailer/Container

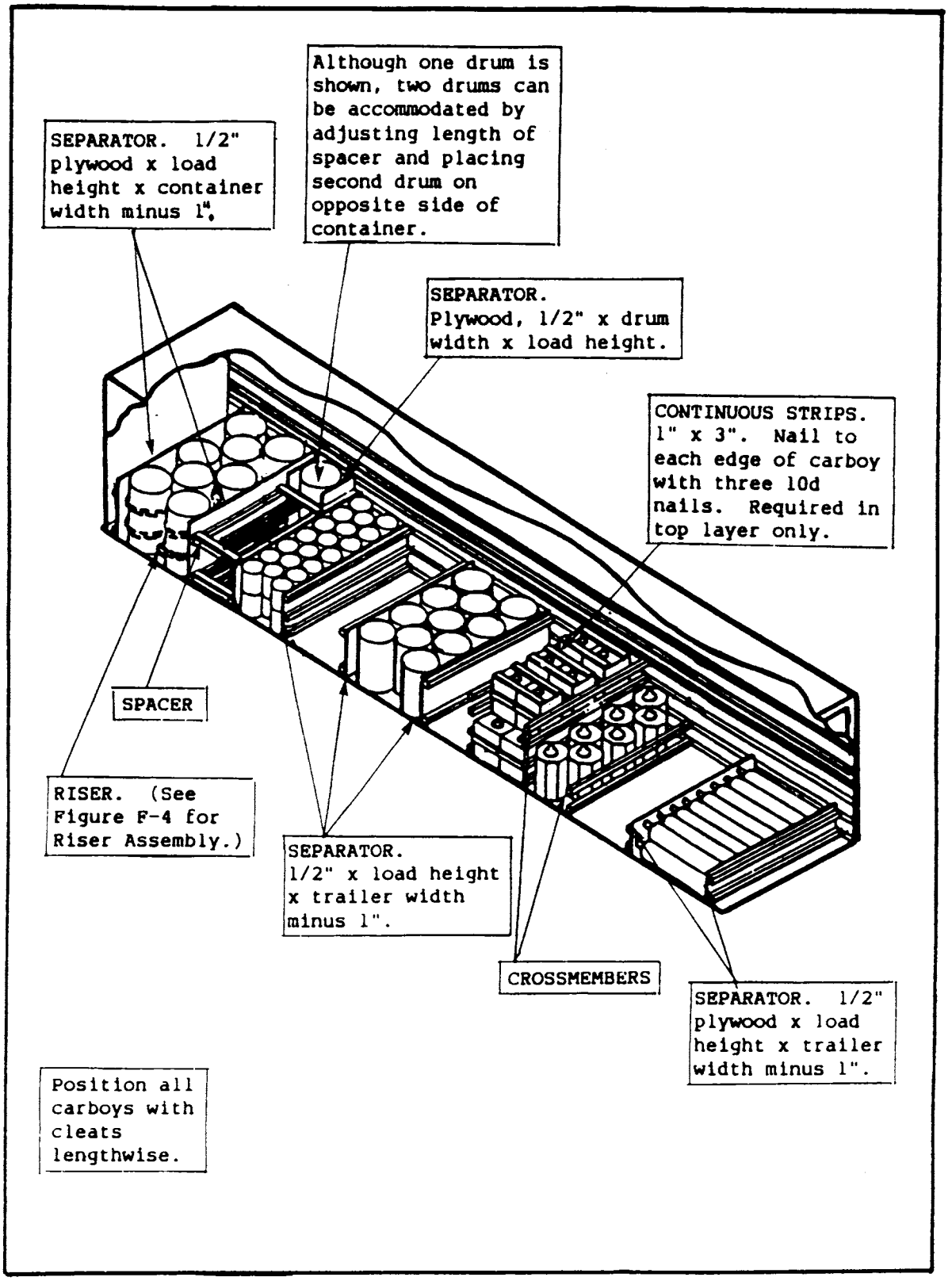


Figure F-12. Typical Mixed Load of Hazardous Materials in Various Containers in 40-foot Trailer/Container

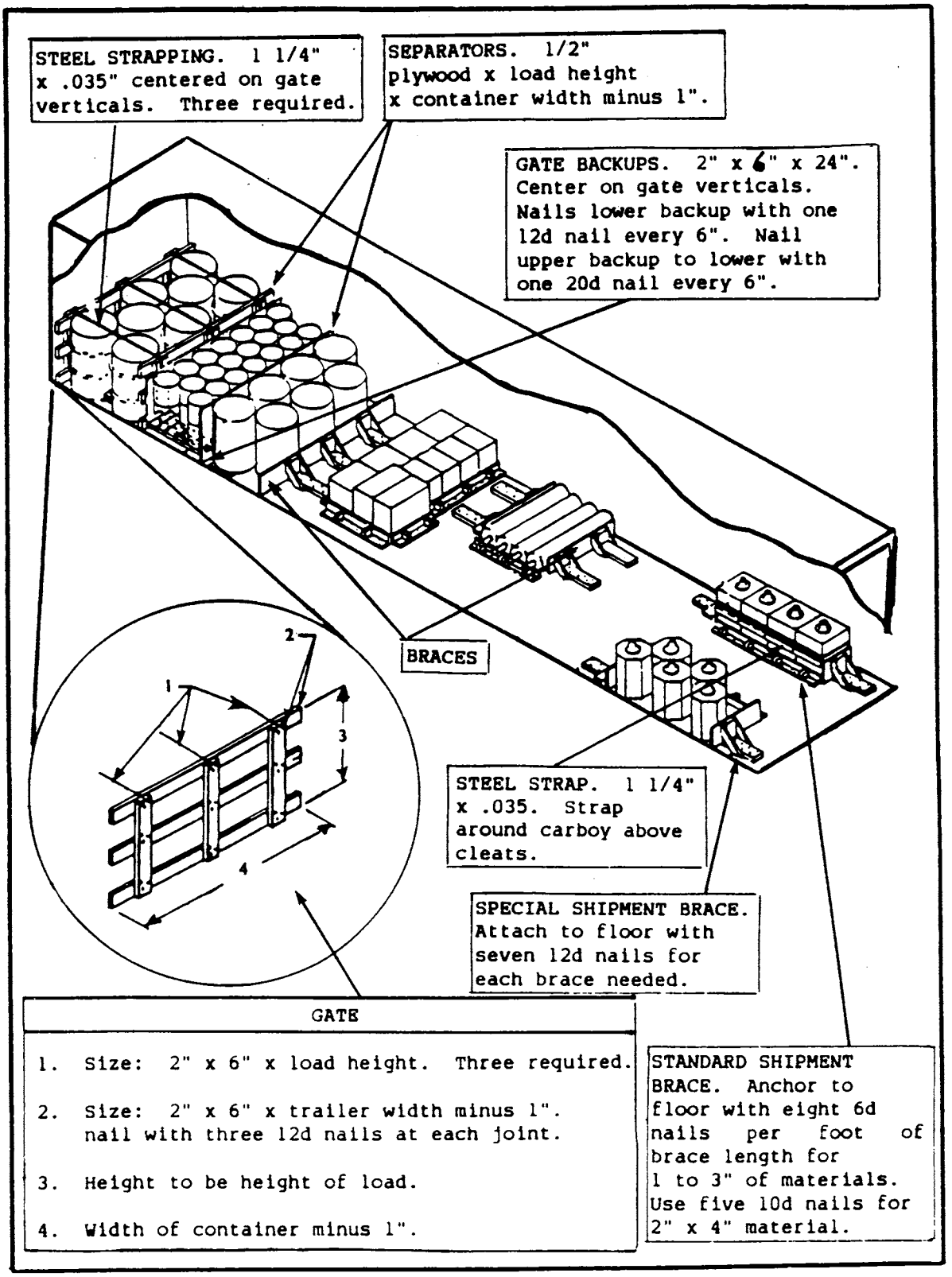


Figure F-13. Typical Mixed Load of Hazardous Materials in Various Containers in 40-foot Trailer/Container

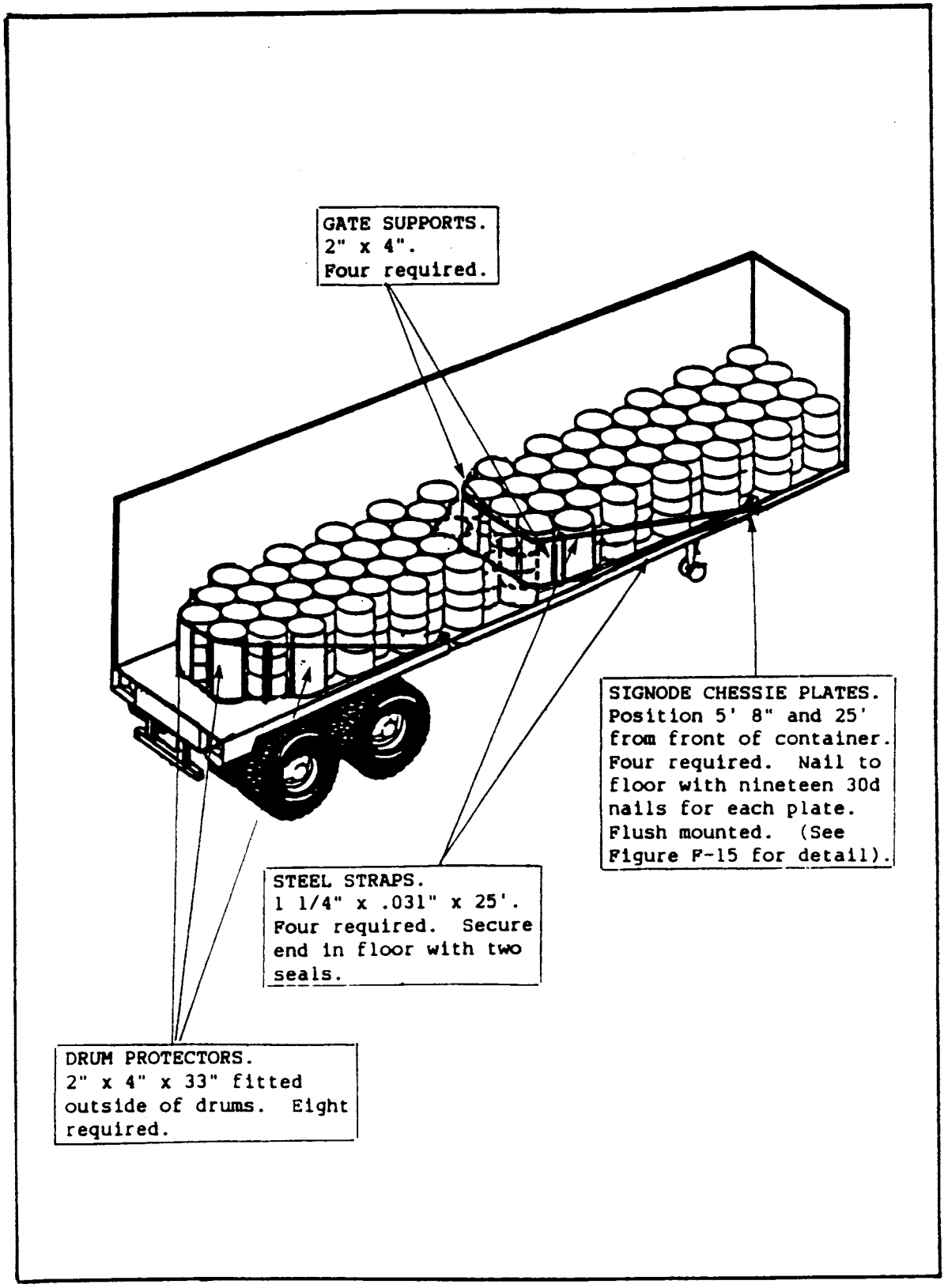


Figure F-14. Steel Strap Method with Signode Chessie Floor Plates in 40-foot Trailer

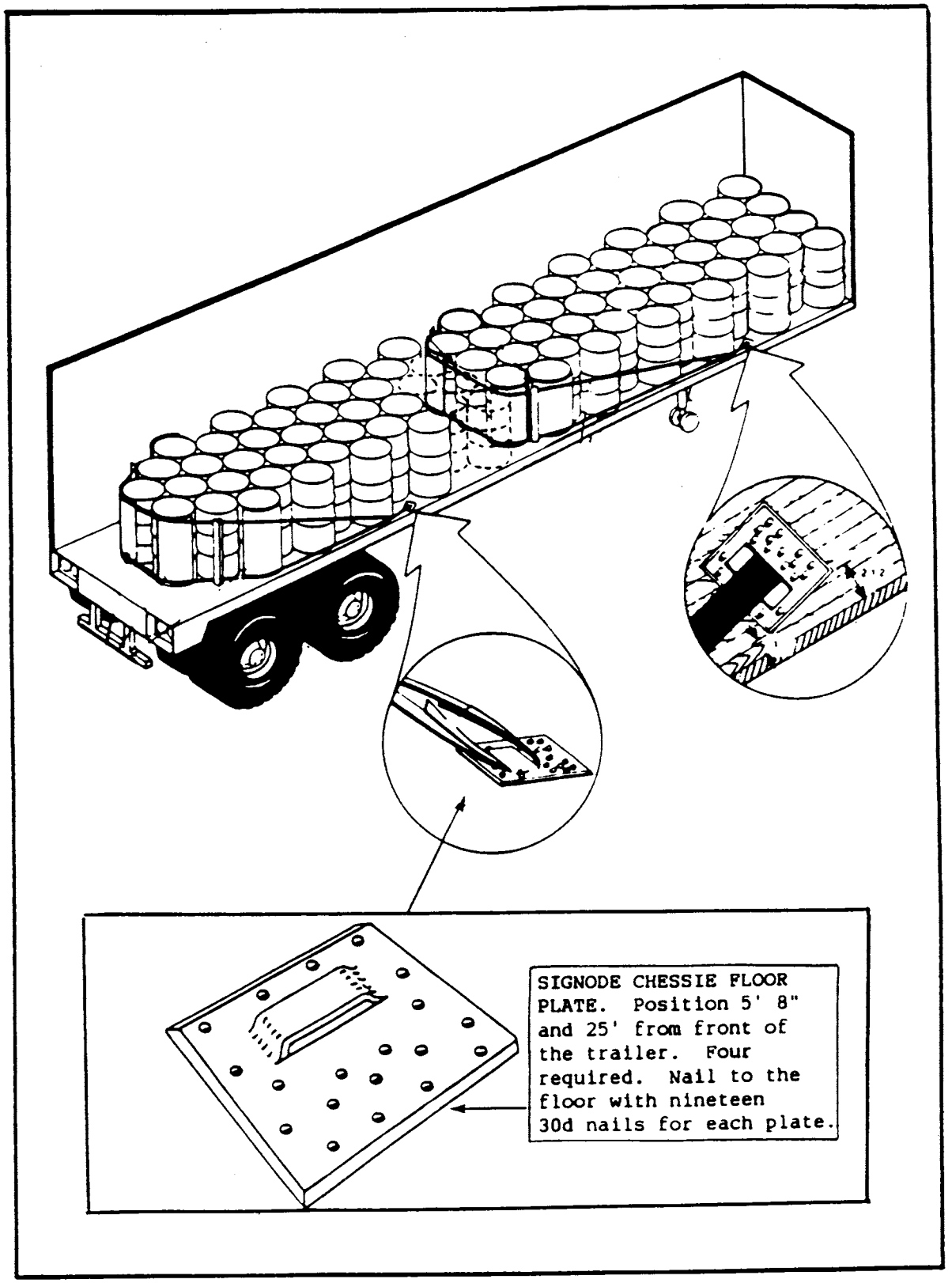


Figure F-15. Signode Chessie Floor Plate with Wall Anchor

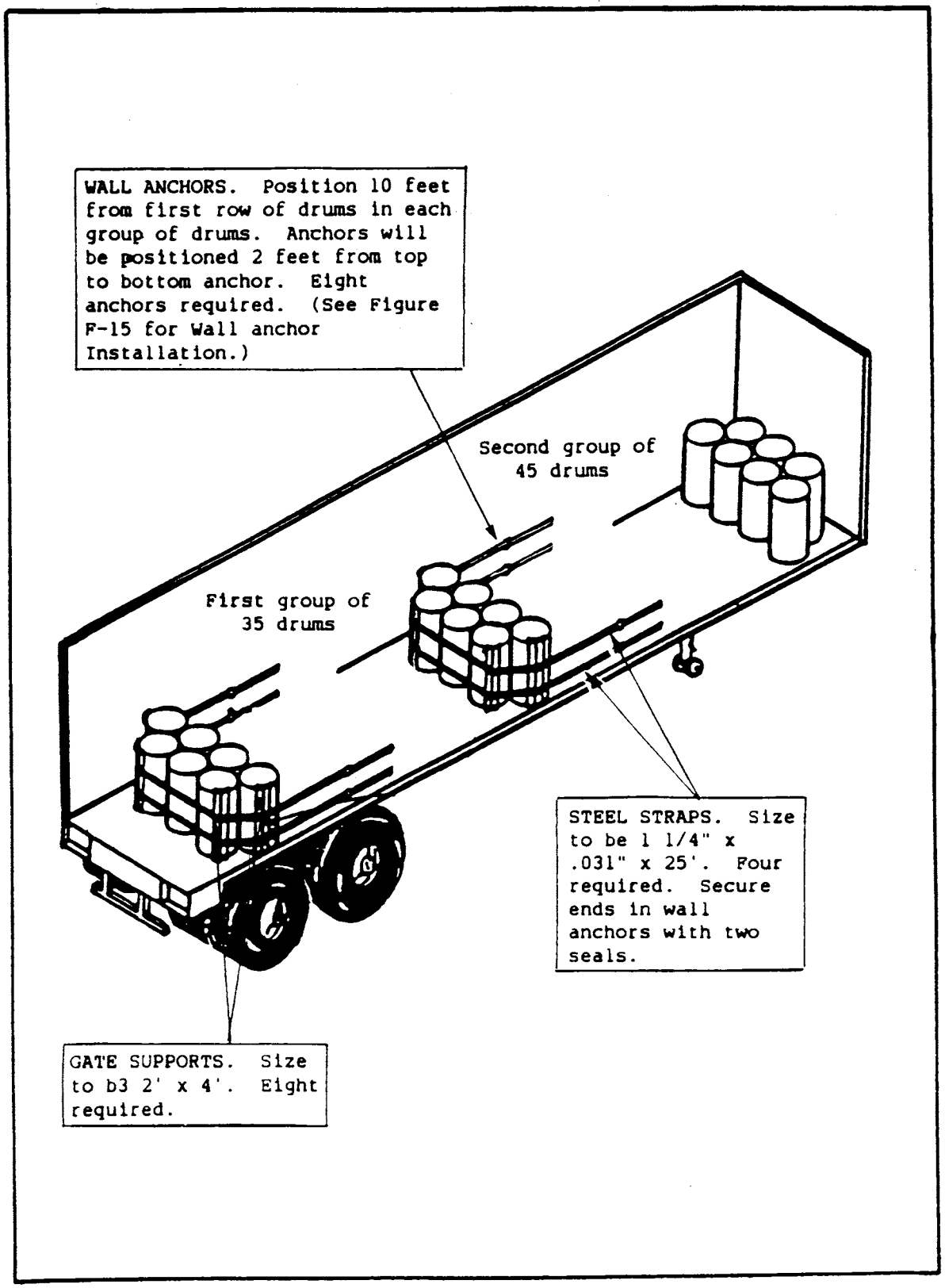


Figure F-16. Steel Strap Method with Wall Anchors in 40-foot Trailer

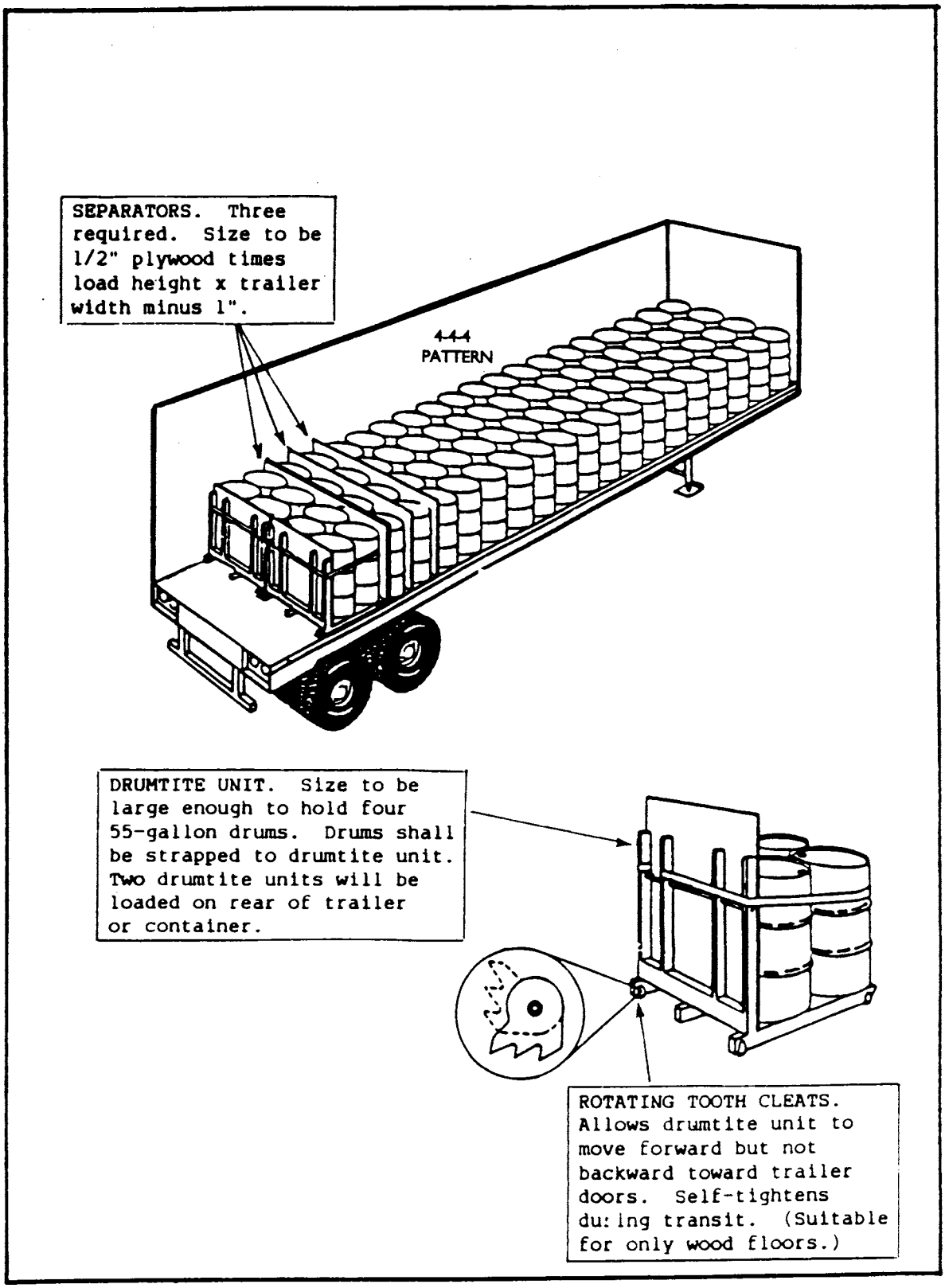
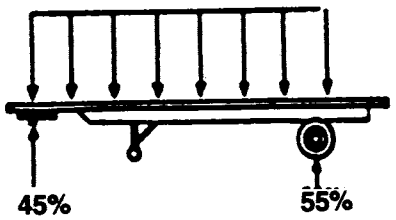
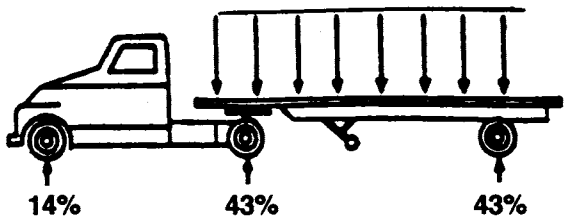


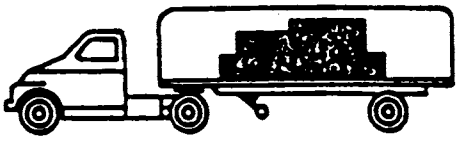
Figure F-17. Self-locking Skid Method Using Drumtite Units in 40-foot Trailer





Trailers are also designed for uniform load distribution, as shown by the above sketches. The fundamental difference between loading trailers and trucks is: in the case of trucks, the average design provides for about 90% of the payload on the rear tires and 10% on the front tires. In the case of trailers, the payload should be distributed equally between the rear tires and the fifth wheel which transfers its load to the truck-tractor.

WRONG



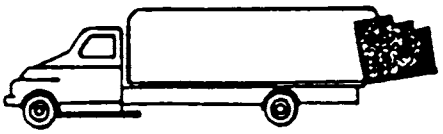
RIGHT

With a part load or a very heavy load having little bulk, it is common practice to put it at the front end of the trailer to get traction on truck-tractor rear tires. This overloads the truck tires and shortens their milage life, to say nothing of bending the truck rear axel housing. Applications of trailer brakes may lock wheels, cause tire flat spots, or skidding, or both.

The load should be distributed over the full length of the trailer floor or platform.

WRONG

These examples are obviously wrong. In the case of the first trailer, the heavy load at the rear is overloading the rear trailer tires. There is practically no load on the fifth wheel, and the truck-tractor rear tires would certainly slip and wear away rubber. Braking distribution would also be very uneven.



Tail gate loading, of course, should never be practiced, even in the interest of speed, as it puts a severe strain on the equipment, and frequently results in serious accidents.

WRONG

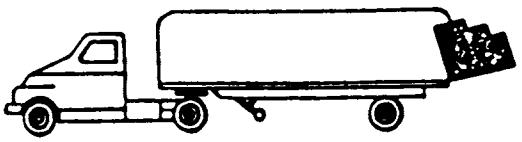


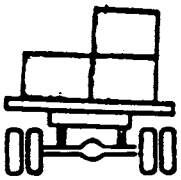
Figure F-18. Load Distribution

WRONG

A heavy load, like a big piece of machinery or a safe, should not be loaded against the cab. This loading will bend the frame, perhaps permanently. It will also overload the front tires, may even cause a blowout on a worn tire. Hard steering will also result, and the load may be top-heavy.

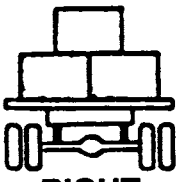
RIGHT

A heavy concentrated load should be placed near the rear and on its long side if at all possible. Most of the load should be over the rear axle to get proper tire loading and eliminate bending of the frame.



WRONG

A very heavy load should not be loaded at one side. This overloads one spring and the tires at that side. This loading could be bad enough to allow the brakes to leak on the wheels at the light side and cause flat spots on the tires , or a skid on a wet surface.



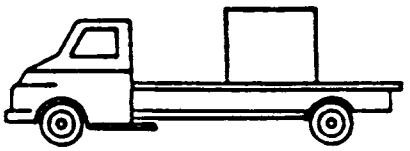
RIGHT

This loading has equal loads on the rear tires and eliminates twisting of the frame, which might loosen rivets of cross frame members or frame brackets. Uniform loading crosswise prevents axle housing and wheel bearing overloading, too.

This above example applies to trucks and trailers alike.

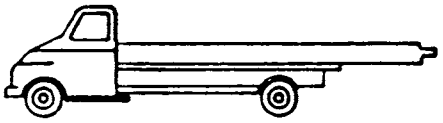
WRONG

This loading should never be permitted. The frame bends, the rear tires are very much overloaded, and enough weight is taken from the front tires to make steering almost impossible.



RIGHT

Again, the proper place for a concentrated lode like this is just ahead of the rear axel, with the longest side on the floor.



WRONG

This type of loading results from the use of the wrong vehicle for the job. Such loading can result, on rough roads, in an actual pivoting of the truck on its rear wheel, and taking the front wheels entirely off the road.

RIGHT

A tractor-trailer combination is the proper vehicle for use in service like this. By using the proper vehicle, damage to the truck and tires, and even seriuos accidents, may be avoided.

Figure F-18. Load Distribution, (Continued)

APPENDIX G

TRAINING REQUIREMENTS FOR HAZARDOUS MATERIALS MANAGEMENT SAMPLE TRAINING PLAN

Hazardous materials employees are assigned **SKILL AREA CODES**. A skill area code represents an assigned set of duties and responsibilities and defines **minimum** training requirements. An employee may be assigned multiple skill area codes. An employee must complete all training required under assigned skill area codes. When an employee has more than one skill area code, additional training is required for only those courses not contained in the first skill area code. Training must be completed within regulatory timeframes. The training specified addresses functional areas of responsibility. They are not intended to infer that separate training courses are required for each series. Training designed to meet one requirement may also meet other functional area requirements. Trainers should plan training to encompass related areas of responsibility.

Table G-1 of this appendix provides a summarization of a recommended approach for training typical depot personnel.
Table G-2 of this appendix provides a detailed listing of skill codes by depot employee titles and lists recommended training.
Tables G-3 through G-5 of this appendix provide a listing of the various initial, refresher, and implied training recommended.

When regulatory training timeframes are mandated, they are indicated under the appropriate course.

Training courses in this appendix are assigned a number series, i.e. R500, R600, or R700. Courses listed in the R500 series are mandatory and require periodic retraining in order to meet regulatory requirements. Courses listed in the R600 series are for refresher training requirements. Courses listed in the R700 series represent training which is implied by the regulation. Implied training is not explicitly stated in the regulation, however training is required so that the employee can gain the knowledge to complete their jobs in compliance with the regulations. For certain skill codes implied training is recommended in addition to other specified courses and those codes include an “I”.

Course numbers are to be matched as follows in order to identify the employee's complete training requirement.

MANDATORY TRAINING	REFRESHER TRAINING	IMPLIED TRAINING
R502	R602	R702

Refresher/Implied training is not a requirement when there is no corresponding R600/R700 course given, i.e.

MANDATORY TRAINING	REFRESHER TRAINING	IMPLIED TRAINING
R501	**NO REQUIREMENT**	R701

Table G-1. Summarization of Selected Depot Personnel Function Specific Training (Recommended Approach)

	SKILL CODE	501	502 602	503 603	504 604	507 607	508 608	510 610	511 611	513 613	516 616	518 618	519 619	520 620	521/522 621/622	523 623	529 629	530 630	531 631
RECEIVING	E06	X	A						T									T	
WAREHOUSEMAN	E07	X	A						T										
MHE OPERATOR	E08	X	A						T										
LABORER	E09	X	A																T
PACKERS	E10	X	A						T									T	
CERTIFIERS	E11	X	A						T	B								T	
DOCUMENTS PREPARATION	E12	X	A														T		
MOTOR VEHICLE OPERATOR	E13	X	A														T		
RECOUPMENT	E14	X		A		A	A										T	T	
STOCK MAINTENANCE	E15	X	A			A	A										T	T	
INVENTORY INTEGRITY	E16	X	A																
SURVEILANCE INSPECTORS	E17	X	A						T									T	
QUALITY ASSURANCE	E18	X	A						T									T	
CYLINDER EMPLOYEES	E19	X	A						T					A					
ASBESTOS	E20	X	A			A						A							
RADIATION PERSONNEL	E23	X	A								A								T
STRATOSPHEREIC OZONE	E24	X	A												A				T
SECURITY (GATE GUARD)	E29	X	A																T
EMERGENCY RESPONSE	E52	X			A			T											

501 - HAZARD COMMUNICATION
502 - FIRST RESPONDER: AWARENESS LEVEL
503 - FIRST RESPONDER: OPERATION LEVEL (INCLUDES 502)
504 - EMERGENCY RESPONSE (TECHNICIAN LEVEL) (INCLUDES 502, 503)
507 - SAFETY & HEALTH FOR HANDLERS OF HM/HW (INCLUDES 503)
508 - RCRA FOR GENERATORS OF HW
510 - TRANSPORTATION OF HM/HW FOR DoD
511 - STORAGE AND HANDLING OF HAZARDOUS MATERIAL
513 - PACKAGING OF HAZARDOUS MATERIALS FOR TRANSPORTATION (ALL COURSES LISTED IN ATTACHMENT 28 OF AFJMAN 24-204 ARE ACCEPTABLE)
516 - RADIATION TRAINING
518 - ASBESTOS TRAINING
519 - RESPIRATOR TRAINING
520 - COMPRESSED GAS CYLINDERS
521 - EPA STRATOSPHERIC OZONE CERTIFICATION TRAINING (MVAC) (FOR EMPLOYEES SERVICING VEHICLE AIR CONDITIONERS)
522 - EPA STRATOSPHERIC OZONE CERTIFICATION (FOR EMPLOYEES SERVICING APPLIANCES)
523 - LEAD EXPOSURE TRAINING
529 - HAZARDOUS MATERIAL TRANSPORTATION TRAINING
530 - PERFORMANCE ORIENTED PACKAGING (POP) TRAINING
531 - OVERVIEW OF HAZARDOUS MATERIALS TRANSPORTATION

A = ANNUAL TRAINING, B = BIENNIAL TRAINING, T = TRIENNIAL TRAINING, X = ONE TIME TRAINING
INITIAL TRAINING IS 500 LEVEL COURSE. RECURRENT TRAINING IS 600 LEVEL.

Table G-2. Detailed Description of HAZMAT Training Courses		
Who Needs Training	Skill Code	Courses
Base Commanders, deputies, senior managers and lawyers	E01I	R703 - Executive Environmental
Environmental officers/ specialists/engineers who are not physically involved with hazardous property/hazardous material but are responsible for determining and/or implementing policy and/or providing technical guidance	E02I	R704 - Environmental Coordinators Depending upon assigned duties, additional training will be customized to ensure training compliance. Courses may be selected from those listed in Table G-3. If required, additional skill area codes will be assigned
Environmental specialists/engineers and those who perform environmentalist duties who are physically involved with hazardous property/hazardous material (including occasional contact) and affect transportation, but do not work in a TSD facility	E03	R501 - Hazard Communication R503 - First Responder: Operation Level R507 - Safety and Health for Handlers of HM/HW **(Includes R501 and R503)** R508 - RCRA for Generators of HW R510 - Transportation of HM/HW R603 - Annual first Responder: Operation Level Refresher R608 - Annual RCRA for Generators of HW Refresher R610 - Triennial Transportation of HM/HW Refresher Depending upon assigned duties, additional training will be customized to ensure training compliance. Courses may be selected from those listed at the end of this table. If needed, additional codes can be assigned
Environmental specialists/engineers and those who perform environmentalist duties, who are physically involved with hazardous property/hazardous materials (including occasional contact), affect transportation and work in a TSD facility	E04	R501 - Hazard Communication R503 - First Responder: Operation Level R507 - Safety and Health for Handlers of HM/HW **(Includes R501 and R503)** R509 - RCRA Facility Compliance R510 - Transportation of HM/HW R603 - Annual First Responder: Operation Level R609 - Annual RCRA Facility Compliance Refresher R610 - Triennial Transportation of HM/HW Refresher Depending upon assigned duties, additional training will be customized to ensure training compliance. Courses may be selected from those listed at the end of this table. If needed, additional codes can be assigned.

Table G-2. Detailed Description of HAZMAT Training Courses-Continued		
Who Needs Training	Skill Code	Courses
Environmental officers/ specialists/engineers and those who perform environmentalist duties who are physically involved with hazardous material/hazardous waste and do not affect transportation	E05	R501 - Hazard Communication R503 - First Responder: Operation Level R507 - Safety and Health for Handlers of HM/HW **(Includes R501 and R503)** R508 - RCRA for Generators of HW R603 - Annual First Responder: Operation Level Refresher R608 - Annual RCRA for Generators of HW Refresher Depending upon assigned duties, additional training will be customized to ensure training compliance. Courses may be selected from those listed at the end of this table. If needed, additional codes can be assigned
Receiving (Employees, including supervisors, involved in the handling and/or management of hazardous materials receiving operations. This includes, but is not limited to: Planners, Materials Handlers, and inspectors)	E06	R501 - Hazard Communication R502 - First Responder: Awareness Level R511 - Storage and Handling of Hazardous Material R530 - Performance Oriented Packaging R602 - Annual First Responder: Awareness Level Refresher R611 - Triennial Storage and Handling of Hazardous Material Refresher R630 - Triennial Performance Oriented Packaging (POP) Recurrent
Warehouseman (Employees, including supervisors, involved in handling and/or management of warehousing hazardous materials)	E07	R501 - Hazard Communication R502 - First Responder: Awareness Level R511 - Storage and Handling of Hazardous Material R602 - Annual First Responder: Awareness Level Refresher R611 - Triennial Storage and Handling of Hazardous Material Recurrent

Table G-2. Detailed Description of HAZMAT Training Courses-Continued		
Who Needs Training	Skill Code	Courses
Material Handling Equipment (MHE) Operator (Employees, including supervisors, operating MHE in the handling and/or storage and selection of hazardous materials)	E08	R501 - Hazard Communication R502 - First Responder: Awareness Level R511 - Storage and Handling of Hazardous Material R602 - Annual First Responder: Awareness Level Refresher R611 - Triennial Storage and Handling of Hazardous Material Recurrent
Laborer (Employees, including supervisors, whose duties are performed in a work area containing hazardous materials)(does not affect transportation)	E09	R501 - Hazard Communication R502 - First Responder: Awareness Level R602 - Annual First Responder: Awareness Level Refresher
Packers (Employees, including supervisors, involved in packaging of hazardous material)	E10	R501 - Hazard Communication R502 - First Responder: Awareness Level R511 - Storage and Handling of Hazardous Material R530 - Performance Oriented Packaging (POP) R602 - Annual First Responder: Awareness Level Refresher R611 - Biennial Storage and Handling of Hazardous Material Recurrent R630 - Triennial POP Refresher
Packaging Certifiers (Employees, including supervisors, involved in the certification of hazardous material)	E11	R501 - Hazard Communication R502 - First Responder: Awareness Level R511 - Storage and Handling of Hazardous Material R513 - Defense Packaging of HM for Transportation (or equivalent) R530 - Performance Oriented Packaging (POP) R602 - Annual First Responder: Awareness Level Refresher R611 - Triennial Storage and Handling of Hazardous Material Refresher R613 - Biennial Defense (Refresher) Packaging R630 - Triennial POP Refresher

Table G-2. Detailed Description of HAZMAT Training Courses-Continued		
Who Needs Training	Skill Code	Courses
Documents Preparation (Employees, including supervisors, involved in preparing the documentation for hazardous materials shipments)	E12	R501 - Hazard Communication R502 - First Responder: Awareness Level R529 - Hazardous Material Transportation Training R602 - Annual First Responder: Awareness Level Refresher R629 - Triennial Hazardous Material Transportation Recurrent
Motor Vehicle Operators (Drivers must comply with Federal Motor Carrier Safety Regulations, as appropriate. This includes the requirement for a commercial driver's license (CDL) and a hazardous material (HM) endorsement)	E13	R501 - Hazard Communication R502 - First Responder: Awareness Level R529 - Hazardous Material Transportation Training R602 - Annual First Responder: Awareness Level Refresher R629 - Triennial Hazardous Material Transportation Recurrent Depending upon assigned duties, may also require skill area code E25.
Recoupment (Employees, including supervisors, involved in the physical recoupment of HM or in the decision-making process of recoupment operations)	E14	R501 - Hazard Communication R503 - First Responder: Operation Level R507 - Safety and Health for Handlers of HM/HW **(Includes R501 and R503)** R508 - RCRA for Generators of HW R529 - Hazardous Materials Transportation Training R530 - Performance Oriented Packaging (POP) R603 - Annual First Responder: Operation Level Refresher R608 - Annual RCRA for Generators of HW Refresher R629 - Triennial Hazardous Material Transportation Recurrent R630 - Triennial POP Recurrent Depending upon assigned duties, may also require skill area codes E25 and E26.

Table G-2. Detailed Description of HAZMAT Training Courses-Continued		
Who Needs Training	Skill Code	Courses
Stock Maintenance (Employees, including supervisors, involved in the repackaging, marking, and labeling of HM)	E15	R501 - Hazard Communication R502 - First Responder: Awareness Level R507 - Safety and Health for Handlers of HM/HW **(Includes R501 and R503)** R508 - RCRA for Generators of HW R529 - Hazardous Material Transportation Training R530 - Performance Oriented Packaging (POP) R602 - Annual First Responder: Awareness Level Refresher R608 - Annual RCRA for Generators of HW Refresher R629 - Triennial Hazardous Material Transportation Recurrent R630 - Triennial POP Recurrent Depending upon assigned duties, may also require skill area codes E25 and E26.
Inventory Integrity (Employees, including supervisors, who perform all aspects of physical inventory, location surveys, and denial research)	E16	R501 - Hazard Communication R502 - First Responder: Awareness Level R602 - Annual First Responder: Awareness Level Refresher
Surveillance Inspectors	E17	R501 - Hazard Communication R502 - First Responder: Awareness Level R511 - Storage and Handling of Hazardous Material R530 - Performance Oriented Packaging (POP) R602 - Annual First Responder: Awareness Level Refresher R611 - Triennial Storage and Handling of Hazardous Material Recurrent R630 - Triennial POP Recurrent

Table G-2. Detailed Description of HAZMAT Training Courses-Continued		
Who Needs Training	Skill Code	Courses
Quality Assurance	E18	R501 - Hazard Communication R502 - First Responder: Awareness Level R511 - Storage and Handling of Hazardous Material R530 - Performance Oriented Packaging (POP) R602 - Annual First Responder: Awareness Level Refresher R611 - Triennial Storage and Handling of Hazardous Material Recurrent**)** R630 - Triennial POP Recurrent
Cylinder Employees (Employees, including supervisors, who handle, refurbish, and store compressed gas cylinders)	E19	R501 - Hazard Communication R502 - First Responder: Awareness Level R511 - Storage and Handling of Hazardous Material R520 - Compresses Gas Cylinders R602 - Annual First Responder: Awareness Level Refresher R611 - Triennial Storage and Handling of Hazardous Material Recurrent R620 - Annual Compressed Gas Cylinders Refresher
Employees exposed to airborne concentrations of asbestos at or above the action level and/or excursion limit as defined in 29 CFR 1910.1001 at the workplace	E20	R501 - Hazard Communication R502 - First Responder: Awareness Level R507 - Safety and health for Handlers of HM **(Includes R501 and R502)** R518 - Asbestos Training R602 - Annual First Responder: Awareness Level Refresher R618 - Annual Asbestos Training Refresher Depending upon assigned duties, may also require skill area code E25.
Asbestos abatement inspector (Note: Does not include activities that involve non-building materials, such as asbestos brake linings, that may be either stored or used inside a building) (40 CFR 763, Appendix C to Subpart E)	E21	R501 - Hazard Communication R502 - First Responder: Awareness Level R517 - EPA Asbestos Certification R602 - Annual First Responder: Awareness Level Refresher R617 - Annual EPA Asbestos Certification Refresher Depending upon assigned duties, may also require skill area code E25.

Table G-2. Detailed Description of HAZMAT Training Courses-Continued		
Who Needs Training	Skill Code	Courses
Radiation Safety Officers (primary and alternates). Training is required under 10 CFR 19.12 and NRC license	E22	R501 - Hazard Communication R502 - First Responder: Awareness Level R515 - Radiation Protection Training R531 - Overview of Hazardous Material Transportation R602 - Annual First Responder: Awareness Level Refresher R615 - Annual Radiation Protection Refresher R631 - Triennial Overview of Hazardous Material Transportation Recurrent Depending upon assigned duties, may also require skill area code E25.
Radiation Personnel (Employees working in or frequenting any portion of a restricted radiation area and are NOT assigned skill area code E22)(10 CFR 19.12)	E23	R501 - Hazard Communication R502 - First Responder: Awareness Level R516 - Radiation Training R531 - Overview of Hazardous Material Transportation R602 - Annual First Responder: Awareness Level Refresher R616 - Annual Radiation Training Refresher R631 - Triennial Overview of Hazardous Material Transportation Recurrent Depending upon assigned duties, may also require skill area code E25.
Stratospheric Ozone (Employees who require EPA technician certification as defined in 40 CFR 82.40 and 82.161 and/or anyone who might release CFCs and/or HCFCs into the atmosphere)	E24	R501 - Hazard Communication R502 - First Responder: Awareness Level R521 - EPA Stratospheric Ozone Certification Training (MVAC) R522 - EPA Stratospheric Ozone Certification R531 - Overview of Hazardous Material Transportation R602 - Annual First Responder: Awareness Level Refresher R621 - Annual EPA Stratospheric Ozone Certification Training (MVAC) Refresher R622 Annual EPA Stratospheric Ozone Certification Refresher R631 - Triennial Overview of Hazardous Material Transportation Recurrent Depending on assigned duties, may also require skill area code E25

Table G-2. Detailed Description of HAZMAT Training Courses-Continued		
Who Needs Training	Skill Code	Courses
Employees required to wear respirators to protect against atmospheric contamination. This decision will be made by the facility safety office by evaluating the occupational health hazards associated with the employees duties (29 CFR 1910.134)	E25	R501 - Hazard Communication R502 - First Responder: Awareness Level R519 - Respirator Training R602 - Annual First Responder: Awareness Level Refresher R619 - Annual Respirator Refresher
Employees involved in lead-based paint activities, including maintenance, renovation, removal, or disposal (40 CFR)	E26	R501 - Hazard Communication R502 - First Responder: Awareness Level R524 - EPA Lead Exposure Certification R602 - Annual First Responder: Awareness Level Refresher R624 - Annual EPA Lead Exposure Refresher Depending upon assigned duties, may also require skill area code E25.
Employees who handle, mix, use or apply pesticides (40 CFR 171.4(c)) (DoD 4150.7-M, Annex 2)	E27

Table G-2. Detailed Description of HAZMAT Training Courses-Continued		
Who Needs Training	Skill Code	Courses
Security (Gate Guard) (Employees who in the course of their duties may be involved with hazardous materials and/or affect transportation (e.g., verifying that motor vehicles are properly placarded upon their arrival and departure from the facility))	E29	R501 - Hazard Communication R502 - First Responder: Awareness Level R531 - Overview of Hazardous Materials Transportation R602 - Annual Emergency Response Refresher (Awareness) R631 - Triennial Overview of Hazardous Materials Transportation Recurrent
Facility operations (carpenters)	E30	R501 - Hazard Communication R502 - First Responder: Awareness Level R602 - Annual First Responder: Awareness Level Refresher
Facility Operations (painter)	E31	R501 - Hazard Communication R502 - First Responder: Awareness Level R602 - Annual First Responder: Awareness Level Refresher Depending upon assigned duties, may also require skill area code E25.
Facility Operations (roofer)	E32 E32I	R501 - Hazard Communication R502 - First Responder: Awareness Level R602 - Annual First Responder: Awareness Level Refresher R740 - General Awareness**,** Asbestos
Facility Operations: Masonry	E33 E33I	R501 - Hazard Communication R502 - First Responder: Awareness Level R602 - Annual First Responder: Awareness Level Refresher R740 - General Awareness**, A**sbestos
Facility Operations: Plumber, Steamfitter, Boiler Room, Heating, Electrician, Installers	E34 E34I	R501 - Hazard Communication R502 - First Responder: Awareness Level R602 - Annual First Responder: Awareness Level Refresher R740 - General Awareness**,** Asbestos R741 - General Awareness, Oil Pollution/Recycling

Table G-2. Detailed Description of HAZMAT Training Courses-Continued		
Who Needs Training	Skill Code	Courses
Facility Operations: Welder	E35 E35I	R501 - Hazard Communication R502 - First Responder: Awareness Level R602 - Annual First Responder: Awareness Level Refresher R740 - General Awareness**,** Asbestos Depending upon assigned duties, may also require skill area codes E19 and E25.
Facility Operations: Air Conditioner/ Refrigerator	E36 E36I	R501 - Hazard Communication R502 - First Responder: Awareness Level R602 - Annual First Responder: Awareness Level Refresher R740 - General Awareness**,** Asbestos R741 - General Awareness, Oil Pollution/Recycling R744 - General Awareness, Ozone Depleting Substances Depending upon assigned duties, may also require skill area code E25.
Facility Operations: Maintenance Workers	E37 E37I	R501 - Hazard Communication R502 - First Responder: Awareness Level R602 - Annual First Responder: Awareness Level Refresher R740 - General Awareness**,** Asbestos R741 - General Awareness, Oil Pollution/Recycling Depending upon assigned duties, may also require skill area code E25.

Table G-2. Detailed Description of HAZMAT Training Courses-Continued		
Who Needs Training	Skill Code	Courses
Facility Operations: Sheet Metal Worker	E39 E39I	R501 - Hazard Communication R502 - First Responder: Awareness Level R602 - Annual First Responder: Awareness Level Refresher R741 - General Awareness, Oil Pollution/Recycling R742 - General awareness, Lead Exposure Depending upon assigned duties, may also require skill area code E25.
Vehicle/Equipment Maintenance: Motor Pool, Auto/MHE Mechanic	E40 E40I	R501 - Hazard Communication R502 - First Responder: Awareness Level R602 - Annual First Responder: Awareness Level Refresher R740 - General Awareness**,** Asbestos R741 - General Awareness, Oil Pollution Act/Oil Recycling R744 - General awareness, Ozone Depleting Substances Depending upon assigned duties, may also require skill area code E25.
Utilities: Sewage treatment, Heat Plant, Boiler Room)	E42 E42I	R501 - Hazard Communication R502 - First Responder: Awareness Level R602 - Annual First Responder: Awareness Level Refresher R740 - General Awareness**,** Asbestos R741 - General Awareness, Oil Pollution/Recycling R742 - General awareness, Lead Exposure R743 - General awareness, Compressed Gas Cylinders Depending upon assigned duties, may also require skill area code E25.
Roads and Grounds: Maintenance	E43	R501 - Hazard Communication R502 - First Responder: Awareness Level R602 - Annual First Responder: Awareness Level Refresher Depending upon assigned duties, may also require skill area code E19 and E25.

Table G-2. Detailed Description of HAZMAT Training Courses-Continued		
Who Needs Training	Skill Code	Courses
Roads and Grounds: Gardener	E45	R501 - Hazard Communication R502 - First Responder: Awareness Level R602 - Annual First Responder: Awareness Level Refresher Depending upon assigned duties, may also require skill area code E27.
Roads and Grounds: Waste Management/Recycling)	E46 E46I	R501 - Hazard Communication R502 - First Responder: Awareness Level R602 - Annual First Responder: Awareness Level Refresher R740 - General Awareness, Asbestos R741 - General Awareness, Oil Pollution/Recycling R742 - General Awareness, Lead Exposure R743 - General Awareness, Compressed Gas Cylinders
Audio Visual	E47 E47I	R501 - Hazard Communication R502 - First Responder: Awareness Level R602 - Annual First Responder: Awareness Level Refresher R741 - General Awareness, Oil Pollution/Recycling
Master Planner Examiners	E48 E48I	R501 - Hazard Communication R716 - Natural and Cultural Awareness

Table G-2. Detailed Description of HAZMAT Training Courses-Continued		
Who Needs Training	Skill Code	Courses
Fire Department	E49

Table G-2. Detailed Description of HAZMAT Training Courses-Continued		
Who Needs Training	Skill Code	Courses
Member of Emergency Response Team (Technician level is defined in 29 CFR 1910.120(q)).	E52 E52I	R501 - Hazard Communication R504 - Emergency Response (Technician) R510 - Transportation of HM/HW for DoD R604 - Annual Emergency Response Refresher (Technician) R610 - Biennial Transportation to HM/HW for DoD Recurrent R745 - General Awareness, Emergency Planning and Community Right-to-Know (EPCRA) R749 - General Awareness for RCRA Depending upon assigned duties, may also require skill area code E25.
Member of Emergency Response Team (Specialist level is defined in 29 CFR 1910.120(q)).	E53	R501 - Hazard Communication R505 - Emergency Response (Specialist) R510 - Transportation of HM/HW for DoD R605 - Annual Emergency Response (Specialist) Refresher R610 - Triennial Transportation to HM/HW for DoD Recurrent R745 - General Awareness, Emergency Planning and Community Right-to-Know (EPCRA) R749 - General Awareness for RCRA Depending upon assigned duties, may also require skill area code E25.

Table G-2. Detailed Description of HAZMAT Training Courses-Continued		
Who Needs Training	Skill Code	Courses
Member of Emergency Response Team (On Scene Incident Commander level is defined in 29 CFR 1910.120(q)).	E54	R501 - Hazard Communication R506 - Emergency Response (On Scene Incident Commander) R510 - Transportation of HM/HW for DoD R606 - Annual Emergency Response (On Scene Incident Commander) Refresher R610 - Biennial Transportation to HM/HW for DoD Recurrent R745 - General Awareness, Emergency Planning and Community Right-to-Know (EPCRA) R749 - General Awareness for RCRA Depending upon assigned duties, may also require skill area code E25.
Employees working at clean-up operations required by a governmental body that are conducted at uncontrolled hazardous waste sites; corrective actions involving clean-up operations at RCRA sites; voluntary clean-up operations at sites recognized by governmental bodies at uncontrolled HW sites as defined in 29 CFR 1910.120(e).	E59	R501 - Hazard Communication R510 - Transportation of HM/HW for DoD R534 - Emergency Response for Hazardous Waste (HW) Clean-up Sites R610 - Triennial Transportation of HM/HW for DoD Recurrent R634 - Annual Emergency Response for Hazardous Waste (HW) Clean-Up Sites Refresher Depending upon assigned duties, may also require skill area code E25.
Environmental Compliance Auditors	E60 E60I	R501 - Hazard Communication R502 - First Responder: Awareness Level R602 - Annual First Responder: Awareness Level Refresher R711 - Environmental Audit Depending upon assigned duties, additional courses should be assigned as appropriate.

Table G-2. Detailed Description of HAZMAT Training Courses-Continued		
Who Needs Training	Skill Code	Courses
Environmental Monitors	E68 E68I	R501 - Hazard Communication R502 - First Responder Awareness Level R511 - Storage and Handling of Hazardous Material R602 - Annual First Responder Awareness Level Refresher R611 - Triennial Storage and Handling of Hazardous Material Recurrent R740 - General Awareness, Asbestos R741 - General Awareness, Oil Pollution/Recycling R742 - General Awareness, Lead Exposure R743 - General Awareness, Compressed Gas Cylinders R744 - General Awareness, Ozone Depleting Substances Depending upon assigned duties, may also require skill area code E25.
Employees who require State and/or local training	E69I	Depending upon assigned duties, courses will be selected from R700 series courses.
Employees who are not professional instructors and are appointed to provide classroom training to others	E70I	R733 - Train-the-Trainer
Safety officers, Specialists, or Industrial Hygienists	E72 E72I	R501 - Hazard Communication R502 - First Responder Awareness Level R602 - Annual First Responder Awareness Level Refresher R705 - Overview of Environmental Regulations
Employees responsible for determining training requirements and/or implementing the training plans, e.g., training administrators, supervisors, training point-of-contact	E73I	Courses providing instruction in the implementation of training plans
Custodian (Employees, including supervisors, whose duties are performed in a work area containing hazardous materials)	E74	R501 - Hazard Communication R502 - First Responder: Awareness Level R602 - Annual First Responder: Awareness Level Refresher

Table G-2. Detailed Description of HAZMAT Training Courses-Continued		
Who Needs Training	Skill Code	Courses
Administrative personnel who provide support to employees who are involved with hazardous material	E78	R501 - Hazard Communication R502 - First Responder Awareness Level R602 - Annual First Responder Awareness Level Refresher Depending upon assigned duties, courses will be selected from Appendix D.
Employees in a workplace in which there is a potential exposure to airborne lead at any level	E79 E79I	R501 - Hazard Communication R502 - First Responder: Awareness Level R602 - Annual First Responder: Awareness Level R742 - General Awareness Lead Exposure
Woodworking (includes employees in box shop)	E87	R501 - Hazard Communication R502 - First Responder Awareness Level R/530 - Performance Oriented Packaging (POP) R531 - Overview of Hazardous Materials Transportation R602 - Annual First Responder Awareness Level Refresher R630 - Triennial Performance Oriented Packaging Recurrent R631 - Triennial Overview of Hazardous Material Transportation Recurrent
Tractor Operation	E88	R501 - Hazard Communication R502 - First Responder Awareness Level R511 - Storage and Handling of Hazardous Material R602 - Annual First Responder Awareness Level Refresher R611 - Triennial Storage and Handling of Hazardous Material Recurrent
Terminal Operation	E89	R501 - Hazard Communication R502 - First Responder Awareness Level R511 - Storage and Handling of Hazardous Material R602 - Annual First Responder Awareness Level Refresher R611 - Triennial Storage and Handling of Hazardous Material Recurrent

Table G-2. Detailed Description of HAZMAT Training Courses-Continued		
Who Needs Training	Skill Code	Courses
Truck Control	E90	R501 - Hazard Communication R502 - First Responder Awareness Level R529 - Hazardous Material Transportation Training R602 - Annual First Responder Awareness Level Refresher R629 - Triennial Hazardous Material Transportation Training Recurrent
Storage Management (Distribution Facilities Specialist)	E91	R501 - Hazard Communication R502 - First Responder Awareness Level R511 - Storage and Handling of Hazardous Material R602 - Annual First Responder Awareness Level Refresher R611 - Triennial Storage and Handling of Hazardous Material Recurrent
Packaging Improvement (Packaging Specialist)	E92	R501 - Hazard Communication R502 - First Responder Awareness Level R511 - Storage and Handling of Hazardous Material R513 - Packaging of Hazardous Materials for Transportation R530 - Performance Oriented Packaging R602 - Annual First Responder Awareness Level Refresher R611 - Triennial Storage and Handling of Hazardous Material Recurrent R613 - Biennial Defense (Refresher) Packaging Recurrent R630 - Triennial Performance Oriented Packaging (POP) Recurrent
Traffic Management Specialist	E103	R501 - Hazard Communication R502 - First Responder Awareness Level R513 - Packaging of Hazardous Materials (HM) for Transportation R602 - Annual First Responder Awareness Level Refresher R613 - Biennial defense (Refresher) Packaging Recurrent

Table G-3. Summary of HAZMAT Training Courses COMPLIANCE TRAINING: Initial Courses		
COURSE ID	COURSE TITLE	HOURS
R501	Hazard Communication	4-6
R502	First Responder: Awareness Level	8
R503	First Responder: Operation Level	8-12
R504	Emergency response (Technician)	24-40
R505	Emergency Response (Specialist)	24-40
R506	Emergency Response (On Scene Incident Commander)	24-40
R507	Safety and Health for Handlers of HM/HW	40
R508	RCRA for Generators of HW	24-32
R509	RCRA Facility Compliance	40
R510	Transportation of HM/HW for DoD	40
R511	Storage and Handling of Hazardous Material	24
R512	HM Shipment Release for DRMS Distribution Personnel	40
R513	Packaging of Hazardous Material (HM) for Transportation	76
R514	RESERVED	
R515	Radiation Protection Training	120
R516	Radiation Training	24
R517	EPA Asbestos Certification	40
R518	Asbestos Training	24
R519	Respirator Training	8
R520	Compressed Gas Cylinders	24
R521	EPA Stratospheric Ozone Certification Training (MVAC)	40
R522	EPA Stratospheric Certification	24
R523	Lead Exposure Training	8
R524	EPA Lead Exposure Certification	24
R525	Pesticide Applicator Certification (DoD)	120
R526	Pesticide Applicator Certification (State)	
R527	RESERVED	
R528	RESERVED	
R529	Hazardous Material Transportation Training	16
R530	Performance Oriented Packaging (POP)	24
R531	Overview of Hazardous Material Transportation	8
R532	RESERVED	
R533	Oil Pollution Training	24
R534	Emergency Response for Hazardous Waste (HW) Clean-UP Sites	40-72
R535	EPA Asbestos Certification for Management Planners	40
R536	EPA Asbestos Certification for Abatement Project Designers	40
R537	EPA Asbestos Certification for Asbestos	40
R538	EPA Asbestos Certification for asbestos Abatement Workers	40
R539	EPA Asbestos Certification for Project Monitors	40
R540	Overseas Hazardous Waste Operations	
R541	Overseas Hazardous Waste Management	
R542	European Agreement Considering the International Carriage of Dangerous Goods by Road (ADR) Training	
R543	International Maritime Dangerous Goods (IMDG) for Shipment by Water	
R544	International Hazardous Materials Transportation Standards	
* All course hours are estimates		

Table G-4. Summary of HAZMAT Training Courses COMPLIANCE TRAINING: Refresher Courses		
COURSE ID	COURSE TITLE	HOURS
R602	Annual First Responder: Awareness Level Refresher	8
R603	Annual First Responder: Operation Level Refresher	8
R604	Annual Emergency Response (Technician) Refresher	8-24
R605	Annual Emergency Response (Specialist) Refresher	8-24
R606	Annual Emergency Response (On Scene Incident Commander) Refresher	8-24
R607	RESERVED	
R608	Annual RCRA for Generators of HW Refresher	8
R609	Annual RCRA Facility Compliance Refresher	8
R610	Triennial Transportation of HM/HW for DoD Recurrent	24
R611	Triennial Storage and Handling of Hazardous Material Recurrent	16
R612	Triennial HM Shipment Release for DRMS Distribution Personnel Recurrent	24
R613	Triennial Defense (Refresher) Packaging	36
R614	RESERVED	
R615	Annual Radiation Protection Refresher	24
R616	Annual Radiation Training Refresher	8
R617	Annual EPA Asbestos Certification Refresher	24
R618	Annual Asbestos Training Refresher	4
R619	Annual Respirator Refresher	4
R620	Annual Compressed Gas Cylinders Refresher	4
R621	Annual EPA Stratospheric Ozone Certification Training (MVAC) Refresher	24
R622	Annual EPA Stratospheric Ozone Certification Refresher	8
R623	Annual Lead Exposure Refresher	4
R624	Annual EPA Lead Exposure Refresher	8
R625	DoD Pesticide Applicator Recertification Refresher	40
R626	State Pesticide Applicator	
R627	RESERVED	
R628	RESERVED	
R629	Triennial Hazardous Material Transportation Training Recurrent	
R630	Triennial Performance Oriented Packaging (POP) Recurrent	24
R631	Triennial Overview of Hazardous Material Transportation Recurrent	
R632	RESERVED	
R633	Annual Oil Pollution Training Refresher	4
R634	Annual Emergency Response for Hazardous Waste (HW) Clean-Up Sites Refresher	8
R635	Annual EPA Asbestos Certification for Management Planners Refresher	24
R636	Annual EPA Asbestos Certification for Abatement Project Designers Refresher	24
R637	Annual EPA Asbestos Certification for Asbestos Abatement Contractors and Supervisors Refresher	24
R638	Annual EPA Asbestos Certification for Asbestos Abatement Workers Refresher	24
R639	Annual EPA Asbestos Certification for Project Monitors Refresher	24
* All course hours are estimates		

Table G-5. Summary of HAZMAT Training Courses COMPLIANCE TRAINING: Implied Training Courses	
COURSE ID	COURSE TITLE
R701	Hazard Communication Standard
R702	Comprehensive Environmental Response, Compensation, and Liability Act (CERCLA) and the Superfund Amendments Reauthorization Act (SARA)
R703	Executive Environmental
R704	Environmental Coordinators
R705	Overview of Environmental Regulations
R706	National Environmental Policy Act (NEPA)
R707	Clean Air Act (CAA)
R708	Resource Conservation and Recovery Act
R709	Oil Pollution Act (OPA)
R710	Hazardous Materials Transportation Uniform Safety Act (HMUTSA)
R711	Environmental Audit
R712	Clean Water Act (CWA)
R713	Toxic Substances Control Act (TSCA)
R714	RESERVED
R715	Department of Energy
R716	RESERVED
R717	Asbestos Hazard Emergency Response (AHERA) and amended by Asbestos School Hazard Abatement Reauthorization Act (ASHARA)
R718	Natural and Cultural Resource Management
R719	Natural Resource Protection Laws
R720	Cultural Resource Protection Laws
R721	Stratospheric Ozone, Clean Air Amendment
R722	RESERVED
R723	RESERVED
R724	EPA Lead Exposure Training
R725	Federal Insecticide, Fungicide, and Rodenticide Act (FIFRA)
R726	Contractor Line Item Number
R727	RESERVED
R728	RESERVED
R729	Emergency Planning and Community Right-to-Know Act (EPCRA)
R730	Buying Green: A Multi-Functional Approach to Pollution Prevention
R731	Safe Drinking Water Act (SDWA)
R732	Environmental Considerations in the Management of DoD Contracts
R733	Train-the-Trainer
R734	Inland Oil Spill Control
R735	Geotech Drilling and Sampling

Table G-5. Summary of HAZMAT Training Courses COMPLIANCE TRAINING: Implied Training Courses - Continued	
COURSE ID	COURSE TITLE
R736	Sampling and Monitoring
R738	RESERVED
R739	Implementing the DLA Environmental Training Plan
R740	General Awareness, Asbestos
R741	General Awareness, Oil Pollution Act/Oil Recycling
R742	General Awareness, Lead Exposure
R743	General Awareness, Compressed Gas Cylinder
R744	General Awareness, Ozone Depleting Substances
R745	General Awareness, Emergency Planning and Community Right-to-Know Act (EPCRA)
R746	General Awareness, Cultural Resource Preservation Laws
R747	General Awareness, Pollution Prevention
R748	General Awareness, Environmental
R749	General Awareness for Resource Conservation Recovery Act (RCRA)
R750	Buying Green: A Multi-Functional Approach to Pollution Prevention
R751	Pollution Prevention Facility
R752	Environmental Monitors
R753	Pollution Prevention Program Operations and Management
R754	Pollution Prevention Tools, Techniques, and Technologies
R755	Environmental Negotiations Workshop
R756	Environmental Planning, Programming and Budgeting
R757	Environmental Risk Communication and Public Dialog Workshop

APPENDIX H
EXPLANATION OF ACRONYMS, TERMS, AND DEFINITIONS

Section I. Abbreviations

AAPCO	Association of American Pest Control Office
AAR	Association of American Railroads
ACGIH	American Conference of Governmental Industrial Hygienists
ACM	asbestos containing material
ADP	automated data processing
AFFF	aqueous film foaming foam
AFJM	Air Force Joint manual
AFR	Air Force regulation
AIS	automated information system
ALARA	as low as reasonably achievable
AHERA	Asbestos Hazard Emergency Response Act
ALMC	Army Logistics Management College
ANSI	American National Standards Institute
AR	Army regulation
ASHARA	Asbestos School Hazard Abatement Reauthorization Act
ASTM	American Society of Testing and Materials
AUTODIN	automatic digital network
BOE	Bureau of Explosives
C.	degrees celsius

CAA	Clean Air Act

CAA	competent authority approval
CAC	competent authority certificate
CAS	Contract Administration Service
CAS	Chemical Abstracts Service
CD-ROM	compact disc - read only memory
CDL	commercial driver's license
CEPP	Community Emergency Preparedness Program
CERCLA	Comprehensive Environmental Response, Cleanup and Liability Act
CFC	chlorofluorocarbons
CFR	Code of Federal Regulations
CGA	Compressed Gas Association
CHLOREP	Chlorine Emergency Plan

Operated 24 hours a day, 7 days a week by the Chlorine Institute for any emergency involving chlorine. In the event of a chlorine emergency call CHEMTREC.

COE	certificate of equivalency
COFC	container on flat car
CONUS	Continental United States
COSIS	care of supplies in storage
CPO	civilian personnel office
CSO	Command Security Officer
CWA	Clean Water Act
DA	Department of the Army

DBMS	Defense Business Management System

DCMC	Defense Contract Management Command
DCMD	Defense Contract Management District
DFSC	Defense Fuel Supply Center, Fort Belvoir, VA
DFSP	Defense Fuel Support Point
DLA	Defense Logistics Agency, Fort Belvoir, VA
DLAH	Defense Logistics Agency handbook
DLAM	Defense Logistics Agency manual
DLAR	Defense Logistics Agency regulation
DLIS	Defense Logistics Information Service, Battle Creek, MI
DLSC	Defense Logistics Support Command, Ft. Belvoir, VA
DMET	Defense Management Education Training
DoD	Department of Defense
DoDAC	Department of Defense ammunition code
DoDI	Department of Defense instruction
DOT	Department of Transportation
DPSC	Defense Personnel Support Center, Philadelphia, PA
DRMO	Defense Reutilization and Marketing Office
DRMS	Defense Reutilization and Marketing Service
DRO	disposal release order
DTR	Defense Transportation regulation
DTS	Defense Transportation System
DSC	Defense Supply Center

DSCR	Defense Supply Center Richmond, Richmond, VA
DSS	Distribution Standard System
DVD	direct vendor delivery
EHS	extremely hazardous substance
EIS	environmental impact statement
EO	Executive Order
EPCRA	Emergency Planning and Community-Right-to-Know Act
EPO	environmental protection officer
F.	degrees fahrenheit
FCP	Facility Contingency Plan
FEMA	Federal Emergency Management Agency
FIFO	first-in/first-out
FIFRA	Federal Insecticide, Fungicide, and Rodenticide Act
FOB	free on board (Origin or Destination)
FT^3	cubic feet
GBL	Government Bill of Lading
GOCO	Government-Owned/Contractor-Operated
GPO	Government Printing Office
GSA	General Services Administration
HAZMAT	hazardous materials
HAZMIN	hazardous minimization
HAZWOPER	hazardous waste operations and emergency response
HCC	Hazard Characteristic Code

HCS	Hazard Communication Standard
HE	high explosives
HM	hazardous materials
HMIS	Hazardous Materials Information System (DoD 6050.5)
HMR	hazardous materials regulation
HMTA	Hazardous Materials Transportation Act
HP	hazardous property
HSAC	Hazardous Storage Area Code
HTIS	Hazardous Technical Information Service
HW	hazardous waste
HS	hazardous substance
IATA	International Air Transport Association
IAW	in accordance with
ICAO	International Civil Aviation Organization
ICC	Interstate Commerce Commission
ICP	inventory control point
IMDG	international maritime dangerous goods
IMDGC	international maritime dangerous goods codes
IMO	International Maritime Organization
IPG	Issue Priority Group
IPY	inches per year (as corrosion rate reference in 49 CFR 173.240(a)(2) and 173.500 (b)(2)(i))
ISCP	Installation Spill Contingency Plan

ISO	International Standards Organization
JSM	joint service manual
KG	kilogram
kPa	kilopascal
LCL	less than carload
LEPC	Local Emergency Planning Committee
LTL	less than truckload
MCO	Marine Corps order
MEKP	Methyl Ethyl Ketone Peroxide
MG	milligram
MHE	materials handling equipment
MILSPEC	military specification
MILSTAMP	Military Standard Transportation and Movement Procedures
MMC	Material Management Center
MMD	material movement document
MQCSS	material quality control storage standards
MRO	material release order
MSDS	material safety data sheet
MTMC	Military Traffic Management Command
NA	North American
NAVFACENGCOM	Navy Facilities Engineering Command
NCP	National Contingency Plan

NCTAMSLANT	Naval Computer and Telecommunications Area Master Station Atlantic
NEC	National Electric Codes
NIIN	national item identification number
NIOSH	National Institute for Occupational Safety and Health
NOS or n.o.s.	not otherwise specified
NPTN	National Pesticide Telecommunications Network
NRC	National Response Center
NRC	Nuclear Regulatory Commission
NRC	non-reusable container
NRFI	not ready for issue
NRT	national response team
NSN	national stock number
OASD	Office of the Assistant Secretary of Defense
ODS	ozone depleting substance
OJT	on-the-job training
ORM	other regulated materials
OSC	on-scene Coordinator in emergency response
OSHA	Occupational Safety and Health Administration
PPPP&M	preservation, packaging, packing, palletization and marking
PEL	permissible exposure limits (OSHA)
PG	packing group
PLFA	Primary Level Field Activity
PMRD	Prepositioned Materiel Receipt Document

POC	Point of Contact
POP	Performance Oriented Packaging
PPA	Pollution Prevention Act of 1990
ppb	parts per billion
PPE	personal protective equipment
ppm	parts per million
psf	pounds per square foot
psi	pounds per square inch
psia	pounds per square inch absolute
psig	pounds per square inch gauge
PSN	proper shipping name
QAR	quality assurance representative
QDR	quality deficiency report
RAM	radioactive material
RCRA	Resource Conservation and Recovery Act
RO	requisitioning objective
ROD	Report of Discrepancy (SF 364) (same as SDR)
RO/RO or RORO	roll-on/roll-off service ocean shipping
RPO	radiation protection officer
RQ	reportable quantity
RSPA	Research and Special Programs Administration
RTECS	registry of toxic effects of chemical substances
SARA	Superfund Amendments and Reauthorization Act

SCBA	self-contained breathing apparatus
SDR	Supply Discrepancy Report (same as ROD)
SDWA	Safe Drinking Water Act
SERC	Stare Emergency Response Commission
SF	standard Form
SHM	safety health manager/monitor
SOP	standard operating procedure
SPCC	Spill Prevention Control and Countermeasure Plan
SPM	spill prevention management
SRP	Spill Response Plan
SRT	spill response team
SSA	system safety analysis
SSP	System Safety Program
SU(s)	shipment unit(s)
TCLP	toxicity characteristic leaching procedure (EPA Test Method 1311)
TCMD	transportation control and movement document
TDG	transport of dangerous goods
TDR	Transportation Discrepancy Report (SF 361)
TIs	technical instructions (ICAO)
TLV	threshold limit value
TM	technical manual
TNT	Trinitrotoluene
TCN	transportation control number

TOFC	trailer on flat car (piggy back)
TPQ	threshold planning quantity
TRI	toxic release inventory
TSCA	Toxic Substance Control Act (Public Law 99-519)
TSDF	treatment, storage, and disposal facility
TU(s)	transportation unit(s)
UEL	upper explosive limit
UFL	upper flammable limit
UI	unit of issue
UL	Underwriters Laboratories, Inc.
UMMIPS	Uniform Materiel Movement and Issue Priority System
UN	United Nations
USACOE	United States Army Corps of Engineers
USAEHA	United States Army Environmental Hygiene Agency
USC	United States Code
USCG	United States Coast Guard

Section II. Terms and Definitions

Acid - One of a large class of chemical substances whose water solutions have one or more of the following properties; sour taste, ability to make blue litmus paper turn red and to cause other indicator dyes to change characteristic colors, ability to react with and dissolve certain metals to form salts and ability to react with bases or alkalis to form salts. All acids contain hydrogen and in water, ionization or splitting of the molecule occurs so that hydrogen ions are formed. The pH of these solutions is less than 7.0.

ADN - The European provision concerning the international carriage of dangerous goods by inland waterway.

ADNR - The regulations for the carriage of dangerous goods on the Rhine River.

ADR - The European agreement concerning the international carriage of dangerous goods by road.

Alkali - Any substance that in water solution is bitter, more or less irritating or caustic to the skin and mucous membranes; turns red litmus paper blue, and has a pH value greater than 7.0.

Atmospheric Pressure - Atmospheric Pressure is 101.3 kPa (14.7 psi).

Bag - A flexible packaging made of paper, plastic film textiles, woven material or other similar materials.

Bottle - An inner packaging having a neck of relatively smaller cross section than the body and an opening capable of holding a closure for retention of the contents.

Box - A packaging with complete rectangular or polygonal faces made of metal, wood, plywood, reconstituted wood, fiberboard, plastic, or other suitable material.

Bulk Packaging - A packaging, with no intermediate form of containment, that has a maximum capacity greater than 400 kg (882 lb.) or 450 L (119 gallons).

CAGE - Commercial and Government Entity. The five-position code assigned to any contractor who does business with the Government.

Certificate of Equivalency (COE) - Approval that the proposed packaging for shipment of hazardous materials either equals or exceeds the requirements of Title 49 CFR.

Closed Transport Vehicle - A transport vehicle equipped with an attached exterior enclosure that restricts the access of unauthorized persons to the cargo space containing the radioactive materials during normal transport. The enclosure may be either temporary or permanent. In the case of packaged materials, the enclosure may be of the "see-through" type and must limit access from top, sides, and ends.

Combination Packaging - A combination of packaging, for transport purposes, consisting of one or more inner containers secured in a nonbulk outer packaging. It does not include a composite packaging.

Combustible Liquid - A combustible liquid is any liquid that does not meet the definition of any other classification specified in this manual and has a flash point above 60.5^{o} C (141° F) and below 93° C (200° F). Any mixture having one or more components with a flash point of 93° C (200° F) or higher, that makes up at least 99 percent of the total volume of the mixture is not a combustible liquid.

Competent Authority Approval (CAA) - Written approval granted by the DOT Competent Authority to use a design-type package without POP testing it. DoD activities cannot waive POP requirements.

Competent Authority - A national agency responsible under its national law for the control or regulation of a particular aspect of the transportation of hazardous materials. The Associate Director, Office of Hazardous Materials Transportation, Research and Special Programs Administration, US Department of Transportation, is the United States Competent Authority.

Composite Packaging - Packaging consisting of an outer packaging and inner receptacle, so constructed that the inner receptacle and the outer packaging form an integral packaging. Once assembled it remains thereafter an integrated single unit; it is filled, stored, shipped, and emptied as such.

Compressed Gas In Solution - A nonliquified compressed gas dissolved in a solvent.

CONEX - A military-controlled and owned reusable serially numbered, steel shipping container in either of two sizes.

Container - Any portable device in which a material is stored, transported, disposed of, or otherwise handled.

Containerization - The use of containers to unitize cargo for transportation, supply, and storage. Containerization incorporates supply, transportation, packaging, storage, and security together with visibility of container and its contents into a distribution system from source to user.

Contingency - An emergency involving military forces caused by natural disasters, terrorists, subversives, or by required military operations. Due to the uncertainty of the situation, contingencies require plans, rapid response, and special procedures to ensure the safety and readiness of personnel, installations, and equipment.

Dangerous When Wet - A hazard classification and label requirement for water-reactive materials being shipped by DOT and international modes of transportation.

Design - The description of a special form material, a package, or a packaging, that enables those items to be fully identified. The description may include specifications, engineering drawings, reports meeting regulatory requirements, and other relevant documentation.

Division - A subdivision of a hazard class.

DOT Exemption - Administrative relief granted on the basis of new technology of equivalent levels of safety or levels of safety consistent with the public interest and the policy of the Hazardous Materials Transportation Act.

Drum - A flat-ended or convex-ended cylindrical packaging made of metal, fiberboard, plastic, plywood, or other suitable materials.

Egress - Exit.

Expiration Date - (As relates to Shelf-life) The date by which nonextendible items should be discarded as no longer suitable for issue or use.

Flash Point - The minimum temperature at which a liquid within a test vessel gives off vapor in sufficient concentration to form an ignitable mixture with air near the surface of the liquid. Flash points are determined by the testing prescribed in 49 CFR 173.120.

FSC - Federal supply class. The four-digit number preceding the NIIN that signifies the special group to which an item belongs (e.g. 6810, Chemicals; 8040, Adhesives)

FSCM/FSCNM - Federal Supply Code for Manufacturers/Federal Supply Code for Nonmanufacturers. The five-position code assigned to any contractor who does business with the Government. For purposes of this document, when FSCM is written, it can be assumed that FSCNM is also included. (now retitled CAGE).

Handlers - Personnel who handle hazardous materials or hazardous materials documentation.

Hazard Class - The category of hazard assigned to a hazardous material based on defining criteria. Hazard classes are: explosives (Class 1), compressed gases (Class 2), flammable liquids (Class 3), flammable solids (Class 4), oxidizers and organic peroxides (Class 5), poisons and infectious substances (etiologic agents) (Class 6), radioactive materials (Class 7), corrosive materials (Class 8), and miscellaneous dangerous goods (Class 9).

Hazard Zone - One of four levels of hazard (hazard zones A through D) assigned to gases and one of two levels of hazard (hazard zones A and B) assigned to liquids that are poisonous by inhalation. A hazard zone is based on the LC50 value for acute inhalation toxicity of gases and vapors.

Hazardous Cargo Inspectors - DoD personnel whose duties require them to review the integrity of the packaging and accuracy of documentation for all hazardous materials being transported within the Defense Transportation System (DTS) or by commercial carriers.

Hazardous Cargo Preparers - DoD personnel whose duties require them to sign legally binding documentation certifying that hazardous materials are properly classified, packaged, marked and labeled, and in all respects meet the legal requirements for transportation within the DTS or by commercial carriers.

Hazardous Chemicals - Hazardous materials used in the workplace that are regulated under OSHA "right-to-know" regulations in Title 29 CFR 1910.1200.

Hazardous Materials - A substance or material, which has been determined by the Secretary of Transportation to be capable of posing an unreasonable risk to health, safety, and property when transported in commerce, and which has been so designated. The term includes hazardous substances, hazardous wastes, marine pollutants, and elevated temperature materials. Materials designated as hazardous under the provisions of CFR 49, sections 172.101, 172.102, and materials that meet the defining criteria for hazard classes and divisions in Part 173.

Hazardous Substance (DOT) - A material, including its mixtures and solutions, that is capable of posing an unreasonable risk to health, safety, and property when transported in a quantity (in one package) which equals or exceeds the reportable quantity (RQ) listed in the appendix to 49 CFR 172.101.

Hazardous Waste - Any solid waste that meets the definition in 40 CFR 261.3 and/or identified as a specific state hazardous waste..

HAZMAT Employee - A person who is employed by a HAZMAT employer and who in the course of employment directly affects hazardous materials transportation safety. This term includes an owner-operator of a motor vehicle which transports hazardous materials in commerce. This term includes an individual, including a self-employed individual, employed by a HAZMAT employer who, during the course of employment:
(1) Loads, unloads, or handles hazardous materials;
(2) Tests, reconditions, repairs, modifies, marks, or otherwise represents containers, drums, or packagings as qualified for use in the transportation of hazardous materials;
(3) Prepares hazardous materials for transportation;
(4) Is responsible for safety of transporting hazardous materials; or
(5) Operates a vehicle used to transport hazardous materials.

HAZMAT Employer - A person who uses one or more of its employees in connection with: transporting hazardous materials in commerce; causing hazardous materials to be transported or shipped in commerce; or representing, marking, certifying, selling, offering, reconditioning, testing, repairing, or modifying containers, drums, or packagings as qualified for use in the transportation of hazardous materials. This term includes an owner-operator of a motor vehicle which transports hazardous materials in commerce. This term also includes any department, agency, or instrumentality of the United States, a State, a political subdivision of a State, or an Indian tribe engaged in an activity described in the first sentence of this definition.

Inner Packaging - A packaging for which an outer packaging is required for transport. It does not include the inner receptacle of a composite packaging.

Inner Receptacle - A receptacle which requires an outer packaging in order to perform its containment function. The inner receptacle may be an inner packaging of a combination packaging or the inner receptacle of a composite packaging.

Intermodal Container - A freight container designed and constructed to permit it to be used interchangeably in two or more modes of transport.

Intermodal Portable Tank Or IM Portable Tank - A specific class of portable tanks designed primarily for international intermodal use.

Jerrican - A metal or plastic packaging of rectangular or polygonal cross-section.

Label - Any diamond, square, or rectangular-shaped attachment to a package that identifies the hazardous nature of a material.

Limited Quantity - when specified as such in a section applicable to a particular material, means the maximum amount of a hazardous material for which there is a specific labeling or packaging exception.

Liquid - A material that has a vertical flow of over 2 inches (50mm) within a three minute period, or a material having one gram or more liquid separation, when determined in accordance with the procedures specified in ASTM D 4359-84, Standard Test Method for Determining whether a Material is a Liquid or Solid.

Magazine Vessel - A vessel used for the receiving, storing, or dispensing of explosives.

Magnetic Material - Any packaged material that has a magnetic field strength of 0.002 gauss or more measured at 2.1 m (7ft) from any surface of the package.

Mode - Any of the following transportation methods: rail, highway, air, or water.

Non-Bulk Packaging - A packaging which has: (1) A maximum capacity of 450 L (119 gallons) or less as a receptacle for a liquid. (2) A maximum net mass of 400 kg (882 pounds) or less and a maximum capacity of 450 L (119 Gallons) or less as a receptacle for a solid. (3) A water capacity of 454 kg (1000 pounds) or less as a receptacle for a gas as defined in 49 CFR, 173.115.

Non-Reusable Container - A packaging (container) whose reuse is restricted in accordance with the provisions of 49 CFR, 173.28.

Operator - A person who controls the use of an aircraft, vessel, or vehicle.

Outage or Ullage - The amount by which a packaging falls short of being liquid full, usually expressed in percent by volume.

Outer Packaging - The outermost enclosure of a composite or combination packaging together with any absorbent materials, cushioning and any other components necessary to contain and protect inner receptacles or inner packagings.

Overpack - An enclosure used by a single consignor to provide protection or convenience in handling of a package or to consolidate two or more packages. Overpack does not include a freight container.

Package or Outside Package - A packaging plus its contents.

Packaging - A receptacle and any other components or materials necessary for the receptacle to perform its containment function.

Packers - Personnel who package hazardous materials, but do not sign legally binding documents.

Packing Group - A grouping according to the degree of danger presented by hazardous materials. Packing Group I, indicates great danger; Packing Group II, medium danger; Packing Group III, minor danger.

PCB(s) - Polychlorinated Biphenyls. A series of compounds used for a number of industrial purposes which are now found throughout the natural environment. PCBs are toxic to some marine life at concentrations of a few parts per billion (ppb) and are known to cause skin diseases, digestive disturbances, and even death in humans at higher concentrations. PCBs are persistent in the environment and do not easily decompose, and biomagnify up the food chain.

pH - A value taken which represents the acidity or alkalinity of an aqueous solution. It is defined as the logarithm of the reciprocal of the hydrogen ion concentration of a solution.

Primary Hazard - The hazard class of a material as assigned in the Title 49 CFR 172.101.

Proper Shipping Name - The name of the hazardous material shown in Roman print (not italics) in Title 49 CFR 172.101.

Receptacle - A containment vessel for receiving and holding materials, including any means of closing.

Reportable Quantity - (RQ) The quantity specified in column 3 of the table in Title 49 CFR 172.101, Appendix A for any material identified in column 1.

Residue - The hazardous material remaining in a packaging, including a tank car, after its contents have been unloaded to the maximum extent practicable and before the packaging is either refilled or cleaned of hazardous material and purged to remove any hazardous vapors.

RID - European regulatory body that regulates rail shipments of dangerous goods in Europe.

Salvage Drum - A drum with a removable metal head that is compatible with the material and is used to transport damaged or leaking hazardous materials or hazardous waste for repackaging or disposal.

SEAVAN - Commercial or Government-owned (or leased) shipping container.

Shipping Paper - A shipping order, bill of lading, manifest or other shipping document serving a similar purpose and containing the information required by Title 49 CFR 172.202, 172.203, and 172.204.

Single Packaging - A non-bulk packaging other than a combination packaging.

Solid - A material which has a vertical flow of two inches (50mm) or less within a three-minute period, or a separation of less than one gram of liquid when determined in accordance with the procedures specified in ASTMD 4359, "Standard Test Method for Determining Whether a Material is a Liquid or Solid."

State - A State of the United States, the District of Columbia, the Commonwealth of Puerto Rico, the Commonwealth of the Northern Mariana Islands, the Virgin Islands, American Samoa, Guam, or any other territory or possession of the United States designated by the Secretary.

Stowage - The act of placing hazardous materials on board a vessel.

Subsidiary Hazard - A hazard of a material other than the primary hazard.

Tactical - A tactical operation is the movement of personnel, equipment and supplies of an organization so they can accomplish their immediate military combat objective.

Technical Name - A recognized chemical name or microbiological name currently used in scientific and technical handbooks, journals, and texts. Generic descriptions are authorized provided they readily identify the general chemical or microbiological group.

Threshold Limit Value (TLV) - A registered trademark of the American Conference of Governmental Industrial Hygienists (ACGIH). ACGIH presents the most recent TLVs for commonly used industrial chemical compounds. The Threshold Limit Value-Time Weighted Average (TLV-TWA) is the time weighted average concentration for a normal 8-hour workday and 40-hour workweek to which nearly all workers may be repeatedly exposed, day after day, without adverse effect. Threshold Limit Value-Short Term Exposure Limit (TLV-STEL, 15 minutes) is the concentration to which workers can be exposed continuously for a short period of time without suffering from (1) irritation; (2) chronic or irreversible tissue damage; or (3) narcosis of sufficient degree to increase the likelihood of accidental injury, impair self-rescue, or materially reduce work efficiency, provided that the daily TLV-TWA is not exceeded. This is not a separate independent exposure limit but, rather, supplements the time recognized acute effects from a substance whose toxic effects are primarily of a chronic nature. STELs are recommended only where toxic effects have been reported from high short-term exposures in either humans or animals.

Transport Vehicle - A cargo-carrying vehicle such as an automobile, van, tractor, truck, semitrailer, tank car or rail car used for the transportation of cargo by any mode.

UN - United Nations.

UN Number - The four-digit number assigned by the United Nations Committee of Experts on the Transport of Dangerous Goods to identify a substance or a particular group of substances. (The prefix "UN" must always be used in conjunction with these numbers.)

UN Standard Packaging - A specification packaging conforming to the requirements in Title 49 CFR, subparts L and M of part 178.

Unit Load Device - Any type of freight container, aircraft pallet with a net, or aircraft pallet with a net over an igloo.

Vessel - Includes every description of watercraft, used or capable of being used as a means of transportation on the water.

Water Resistant - Having a degree of resistance to permeability by and damage caused by water in liquid form.

Wooden Barrel - A packaging made of natural wood, of round cross-section, having convex walls, consisting of staves and heads and fitted with hoops.

APPENDIX I
HMIS FOCAL POINTS

	FOCAL POINT	CD-ROM DISTRIBUTION
DLA	DGSC-VBA Defense Supply Center Richmond 8000 Jefferson Davis Hwy Richmond, VA 23297 DSN 695-3104 804-279-3104 FAX 804-279-4149	DGSC-VBB Defense Supply Center Richmond 8000 Jefferson Davis Hwy Richmond, VA 23297 DSN 695-5735 804-279-5735
AIR FORCE	Armstrong Lab Attn: AL/OEMB Brooks AFB, TX 78235 DSN 240-3214 210-536-3214 FAX 210-536-2315	Same
NAVY	Navy Environmental Health Center Attn: HMIS 2510 Walmer Ave. Norfolk, VA 23513 DSN 564-4657, ext. 272 804-444-4657 ext 272 FAX 804-444-3672	Naval Computer & Telecommunications Area Master Station, Atlantic (NCTAMSLANT) Code 911.3 Norfolk, VA 23511 DSN 565-9192 804-445-9192
MARINE CORPS	Same as Navy	Same as Navy
COAST GUARD	US Coast Guard Attn: G-CSP Washington, DC 20593 202-267-2961	US Coast Guard Attn: G-ELM, Logistics Management Div. 2100 2nd St. SW Washington, DC 20593 202-267-0640

GSA	GSA-FSS Paints & Chemicals Center ATTN: HMIS (10FTE) . 400 15th St. S.W. Auburn, WA 98001-6599 206-931-7881 FAX 206-931-7778	Contact Navy CD-ROM distribution POC directly
AAFES	Headquarters, AAFES Attn: FS-P/S 2727 LBJ Freeway Dallas, TX 75247 DSN 967-2720 214-277-7094	Same
ARMY	US Army Logistics Support Activity Packaging Storage and Containerization Center ATTN: AMXLS-TP-T 11 Hap Arnold Blvd Tobyhanna, PA 18466-5097 DSN 795-6622 717-895-6622	Apply to appropriate MACOM as listed below: National Guard Bureau Attn: NGB-ARL-L Arlington, VA 22204-1382 DSN 286-7740 USAREUR 7th Army, DCSLOG APO AE 09403 DSN 370-8669/6889 US Forces Command Attn: AFPI-SO Ft. McPherson, GA 30330 DSN 367-5556 Army Materiel Command Attn: AMCSF-S 5001 Eisenhower Ave Alexandria, VA 22333-0001 DSN 284-9475 TRADOC Attn: ATBO-HS Ft. Monroe, VA 23651-5000 DSN 680-5164

Eighth U.S. Army
Attn: FKJ4-MS-S, Unit 5236
APO AP 96205-0009
DSN 315-723-4443

US Army Pacific
Attn: APLG-MMS
Ft. Shafter, HI 96858-5100
DSN 438-8626

Information Systems
Command
Attn: ASLO-O-SA
Ft. Huachuca, AZ
85613-5000
DSN 879-6114

Army Corps of Engineers
Attn: CESO-I
20 Massachusetts Ave, NW
Washington, DC 20314-1000
202-272-0091

Military Traffic Mgt Cmd
Attn: MTOPS
5611 Columbia Pike
Falls Church, VA
22041-5050
DSN 289-1951

Criminal Investigation Cmd
Attn: CIPL-LO-MM
5611 Columbia Pike
Falls Church, VA
22041-5015

Health Services Command
Attn: HSLO-MS
Ft. Sam Houston, TX 78234
DSN 471-6448/6449

Intelligence & Security
Command
Attn: IAPER-HS
Ft. Belvoir, VA 22060-5370
DSN 235-2497

Military District of Washington
DCSLOG
Attn: ANLG-LS, Bldg 18
Washington, DC 20319-5050
DSN 335-7335

US Army South
Attn: SOLG, Unit 7108
APO AA 34004-5000
DSN 287-5047

Special Operations Command
Attn: AOEN
Ft. Bragg, NC 28307
DSN 236-2554

US Army Military Academy
Attn: MALO-D
West Point, NY 10996-5000
DSN 688-3211

US Army Reserve Command
ATTN: AFRC-SA
3800 North Camp Creek
Parkway S.W.
Atlanta, GA 30331-5099

APPENDIX J

Miscellaneous Addresses

CDC	Centers for Disease Control 1600 Clifton Road NE Atlanta, GA 30333 (404) 633-5313, 24 hours
CGNRC	Coast Guard National Response Center US Coast Guard Headquarters 2100 Second St. SW Room 2611 Washington, DC 20593 (800) 424-8802
CHEMTREC	Chemical Transportation Emergency Center Chemical Manufacturers Association 2501 M St. NW Washington, DC 20037 (800) 424-9300 or (202) 483-7616, 24 hours

A 24-our emergency contact point that can be used to obtain guidance and advice relating to chemical spills that occur on public highways and railroads.

DDC	Defense Distribution Center 2001 Mission Drive DDC-TO New Cumberland, PA 17070 DSN 977-8238, (717) 770-8238
EPA	Environmental Protection Agency

Regional Administrators:

Region I
J.F. Kennedy Federal Building
Boston, MA 02203
(617) 223-7120

Region II
26 Federal Plaza
New York, NY 10278
(212) 264-2525

Region III
6th and Walnut Streets
Philadelphia, PA 19106
(215) 597-9800

Region IV
345 Courtland St. NE
Atlanta, GA 30365
(404) 881-4727

Region V
230 S. Dearborn St.
Chicago, IL 60604
(312) 353-2000

Region VI
1201 Elm St.
Dallas, TX 75270
(214) 767-2600

Region VII
716 Minnesota Ave
Kansas City, MO 66101
(913) 263-2800

Region VIII
1860 Lincoln St.
Denver, CO 80295
(303) 837-3895

Region IX
215 Freemont St.
San Francisco, CA 94105
(415) 974-8153

Region X
1200 Sixth Ave
Seattle, WA 98101
(206) 442-5810

RECOMMENDED CHANGES TO EQUIPMENT TECHNICAL PUBLICATIONS

SOMETHING WRONG WITH PUBLICATION

FROM: (PRINT YOUR UNIT'S COMPLETE ADDRESS)

DATE SENT

PUBLICATION NUMBER	PUBLICATION DATE	PUBLICATION TITLE

BE EXACT PIN-POINT WHERE IT IS

PAGE NO.	PARA-GRAPH	FIGURE NO.	TABLE NO.

IN THIS SPACE, TELL WHAT IS WRONG AND WHAT SHOULD BE DONE ABOUT IT.

PRINTED NAME, GRADE OR TITLE AND TELEPHONE NUMBER	SIGN HERE

TEAR ALONG PERFORATED LINE

DA FORM 1 JUL 79 2028-2

PREVIOUS EDITIONS ARE OBSOLETE.

P.S.--IF YOUR OUTFIT WANTS TO KNOW ABOUT YOUR RECOMMENDATION MAKE A CARBON COPY OF THIS AND GIVE IT TO YOUR HEADQUARTERS.

The Metric System and Equivalents

Linear Measure

1 centimeter = 10 millimeters = .39 inch
1 decimeter = 10 centimeters = 3.94 inches
1 meter = 10 decimeters = 39.37 inches
1 dekameter = 10 meters = 32.8 feet
1 hectometer = 10 dekameters = 328.08 feet
1 kilometer = 10 hectometers = 3,280.8 feet

Weights

1 centigram = 10 milligrams = .15 grain
1 decigram = 10 centigrams = 1.54 grains
1 gram = 10 decigram = .035 ounce
1 dekagram = 10 grams = .35 ounce
1 hectogram = 10 dekagrams = 3.52 ounces
1 kilogram = 10 hectograms = 2.2 pounds
1 quintal = 100 kilograms = 220.46 pounds
1 metric ton = 10 quintals = 1.1 short tons

Liquid Measure

1 centiliter = 10 milliters = .34 fl. ounce
1 deciliter = 10 centiliters = 3.38 fl. ounces
1 liter = 10 deciliters = 33.81 fl. ounces
1 dekaliter = 10 liters = 2.64 gallons
1 hectoliter = 10 dekaliters = 26.42 gallons
1 kiloliter = 10 hectoliters = 264.18 gallons

Square Measure

1 sq. centimeter = 100 sq. millimeters = .155 sq. inch
1 sq. decimeter = 100 sq. centimeters = 15.5 sq. inches
1 sq. meter (centare) = 100 sq. decimeters = 10.76 sq. feet
1 sq. dekameter (are) = 100 sq. meters = 1,076.4 sq. feet
1 sq. hectometer (hectare) = 100 sq. dekameters = 2.47 acres
1 sq. kilometer = 100 sq. hectometers = .386 sq. mile

Cubic Measure

1 cu. centimeter = 1000 cu. millimeters = .06 cu. inch
1 cu. decimeter = 1000 cu. centimeters = 61.02 cu. inches
1 cu. meter = 1000 cu. decimeters = 35.31 cu. feet

Approximate Conversion Factors

To change	*To*	*Multiply by*	*To change*	*To*	*Multiply by*
inches	centimeters	2.540	ounce-inches	newton-meters	.007062
feet	meters	.305	centimeters	inches	.394
yards	meters	.914	meters	feet	3.280
miles	kilometers	1.609	meters	yards	1.094
square inches	square centimeters	6.451	kilometers	miles	.621
square feet	square meters	.093	square centimeters	square inches	.155
square yards	square meters	.836	square meters	square feet	10.764
square miles	square kilometers	2.590	square meters	square yards	1.196
acres	square hectometers	.405	square kilometers	square miles	.386
cubic feet	cubic meters	.028	square hectometers	acres	2.471
cubic yards	cubic meters	.765	cubic meters	cubic feet	35.315
fluid ounces	milliliters	29,573	cubic meters	cubic yards	1.308
pints	liters	.473	milliliters	fluid ounces	.034
quarts	liters	.946	liters	pints	2.113
gallons	liters	3.785	liters	quarts	1.057
ounces	grams	28.349	liters	gallons	.264
pounds	kilograms	.454	grams	ounces	.035
short tons	metric tons	.907	kilograms	pounds	2.205
pound-feet	newton-meters	1.356	metric tons	short tons	1.102
pound-inches	newton-meters	.11296			

Temperature (Exact)

°F	Fahrenheit temperature	5/9 (after subtracting 32)	Celsius temperature	°C

PIN: 069251-000