Implement Unit Hazardous Materials Management
05-2-7503 / Version 1
Effective Date 07 Mar 2012

SECTION I. ADMINISTRATIVE DATA

All Courses Including This Lesson

Course Number	Version	Course Title
None		

Task(s) Taught(*) or Supported

Task Number	Task Title
Individual	
052-250-1005	Comply with Host Nation, Federal, State and Local Environmental Protection Laws and Regulations
101-20B-0029	Manage Hazardous Materials (HAZMAT)
551-882-2007	Train Unit Movement Personnel to Identify, Document, and Properly Load Hazardous Materials (HAZMAT) and Sensitive and Classified Cargo
551-88N-3121	Coordinate Hazardous Materials/Munitions Shipments
551-88M-4325	Establish Transportation Safety Program
091-89D-1229	Transport Hazardous Materials
091-89D-1231	Store Hazardous Materials
Collective	
05-2-7502	React to a Hazardous Spill
05-2-7503	Implement Unit Hazardous Materials Management

Reinforced Task(s)

Task Number	Task Title
None	

Knowledge

Knowledge Id	Title	Taught	Required
011-0190K	Safe handling of explosives	No	Yes
031-K-627-025	Knowledge of basic hazardous materials terms	Yes	Yes
031-K-627-052	Knowledge of interpreting Military FM's, TM's, Training Circulars (TC's) and Regulations	No	Yes
031-K-627-066	Knowledge of requirements for conducting hazards analysis	Yes	Yes
031-K-627-105	Knowledge of unit Standard Operating Procedures (SOP) and location	No	Yes
031-K-627-111	Knowledge of 29 Code of Federal Regulations (CFR) 1910.1200 (MSDS)	Yes	Yes
052-K-00071	Knowledge of Chemicals	Yes	Yes
052-K-00095	Knowledge of Environmental Threats	Yes	Yes
052-K-00097	Risk Management Planning	No	Yes
052-K-00123	Explosive Hazards Indicators	No	Yes
052-K-00205	Safety Regulations	No	Yes
052-K-00249	State Environmental Laws	No	Yes
052-K-00250	Local Environmental Laws	No	Yes
052-K-00251	Host-Nation Environmental Laws	No	Yes
052-K-00252	The Army Strategy for the Environment	No	Yes
052-K-00255	Know the Environmental Considerations	No	Yes
052-K-00256	Personal Ethics	No	Yes
101-K-0017	Knowledge of SOP/Operations Order Requirements for Handling/Disposal of Hazardous Materials	No	Yes
101-K-12	Knowledge of Material Safety Data Sheets (MSDS)	Yes	Yes
101-K-46	Knowledge of Material Safety Data Sheets (MSDS) format	Yes	Yes
191-PRS-0011	Identify Explosives	No	Yes
052-K-00144	Environmental Protection Regulations	No	Yes
052-K-00708	Know Local and Military Environmental Rules, Laws, and Regulations	No	Yes
052-K-00778	Know Hazardous Transportation and Handling Laws for Material You Use	Yes	Yes
052-K-00780	Know How to Enforce the Clean Water Act (CWA)	No	Yes
052-K-00788	Know How to Enforce the Clean Air Act (CAA)	No	Yes
052-K-00848	Know Your Responsibilities in the Handling of Environmental Issues	No	Yes
052-K-00931	Know Transportation Requirements for Explosives	Yes	Yes

Skill

Skill Id	Title	Taught	Required
052-S-00013	Ability to use FM's	No	Yes
052-S-00057	Ability to Use Chemicals Safely	No	Yes
052-S-00088	Conduct Risk Analysis	No	Yes
805C-S-0031	Interpret and apply SOP	No	Yes
805C-S-0620	Locate, interpret and apply source documents	No	Yes
052-S-00170	Work while Wearing Rubber Protective Equipment	No	Yes
S-551-G-0018	Ability to conduct a military briefing	No	Yes
052-S-00251	Identify Environmental Considerations	Yes	Yes
052-S-00293	Perform Risk Assessment and Mitigation	No	Yes
052-S-00440	Have the Ability to Identify Hazardous Practices and Materials on the Job Site	Yes	Yes
052-S-00449	Identify Environmental Concerns	Yes	Yes
052-S-00452	Identify Hazardous Material and MSDS Sheets as They are Used in the Army	Yes	Yes
052-S-00453	Identify Hazardous Waste and Hazardous Material Used in Your Operation Environment	No	Yes
052-S-00464	Identify the Clean Water Act (CWA) Issues Within Your AO	No	Yes
052-S-00465	Identify the Concerns of the Clean Air Act (CAA) Within Your AO	No	Yes
052-S-00466	Identify the Environmental Officers Role in Your Operation	No	Yes

Administrative/ Academic Hours

The administrative/academic hours required to teach this lesson are as follows:

Academic	Resident Hours / Methods		
Yes	0 hrs	20 mins	Demonstration/Performance
Yes	5 hrs	15 mins	Conference/Discussion
Yes	0 hrs	0 mins	Test Review
Yes	0 hrs	0 mins	Test
Total Hours:	5 hrs	35 mins	

Test Lesson Number

Hours	Lesson Number
None	

Prerequisite Lesson(s)

Lesson Number	Lesson Title
None	

Clearance Access

Security Level: Unclassified

Foreign Disclosure Restrictions

FD5. This product/publication has been reviewed by the training/educational developers in coordination with the Ft. Leonard Wood FD authority. This product is releasable to students from all requesting foreign countries without restrictions.

References

Number	Title	Date	Additional Information
29 CFR 1910.1200	Hazard Communication	01 Jul 2003	
AR 700-141	HAZARDOUS MATERIALS INFORMATION RESOURCE SYSTEM	13 Aug 2007	
AR 702-18	MATERIEL QUALITY STORAGE STANDARDS POLICY FOR SHELF-LIFE MATERIEL	03 Oct 2004	
CFR 49	Title 49-Transportation	11 Oct 2011	
DOD 4140.27-M	Shelf Life Item Management Manual	26 Sep 1997	
ERG2008	Department of Transportation Emergency Response Guidebook.		
FM 3-34.5	ENVIRONMENTAL CONSIDERATIONS	16 Feb 2010	
FM 3-35	ARMY DEPLOYMENT AND REDEPLOYMENT	21 Apr 2010	
NFPA	National Fire Protection Association, Fire Protection Guide on Hazardous Materials, Eighth Edition		
NIOSH 97-140	NIOSH Pocket Guide to Chemical Hazards (NPG)	01 Jan 2003	
TC 3-34.489	The Soldier and the Environment.	08 May 2001	
TG 217	Technical Guide 217, Hazardous Material/Hazardous Waste Management Guidance for Maneuver Units During Fieald and Deployment Operations	02 Oct 2000	
TM 38-250	PREPARING HAZARDOUS MATERIALS FOR MILITARY AIR SHIPMENTS {AFMAN 24-204(1); NAVSUP PUB 505; MCO P4030.19I; DLAI 4145.3 DCMAD1, CH3.4 (HM24)} (REPRINTED W/ BASIC INCL C1)	15 Apr 2007	
TM 38-410	STORAGE AND HANDLING OF HAZARDOUS MATERIALS {DLAM 4145.11; NAVSUP PUB 573; AFR 69-9; MCO 4450-12}	13 Jan 1999	
UFC 4-442-01N	Unified Facilities Criteria (UFC) Design: Covered Storage	16 Jan 2004	

Student Study Assignment

None.

Instructor Requirements

None.

Additional Support Personnel Requirements

Name	Student Ratio	Qty	Man Hours
None			

Equipment Required for Instruction

ID - Name	Student Ratio	Instructor Ratio	Spt	Qty	Exp
None					

Materials Required

Instructor Materials:

The instructor will need the lesson plan, supporting PowerPoint presentation and access to the required references. Reference material that is not provided by ADP should be available through the library or electronically via the internet. Those references that are non-military, i.e. the NIOSH Pocket Guide, NFPA guidance on hazardous materials, etc., are not required to complete the lesson plan. General awareness of their existence is sufficient. The Code of Federal Regulations (CFR) is available electronically.

Student Materials:

None.

Classroom, Training Area, and Range Requirements

ID - Name	Quantity	Student Ratio	Setup Mins	Cleanup Mins
17120-M-1200-30 Classroom, Multipurpose, 1200 Square Feet, 30 Students				

Ammunition Requirements

DODIC - Name	Exp	Student Ratio	Instruct Ratio	Spt Qty
None				

Instructional Guidance

NOTE: Before presenting this lesson, instructors must thoroughly prepare by studying this lesson and identified reference material.

The instructor must familiarize themselves with the leasson plan prior to teaching the class. Be prepared for questions and ensure enough time is allowed to fully respond to questions. Be familiar with all stated references.

Proponent Lesson Plan Approvals

Name	Rank	Position	Date
Al Vargesko	Not available	Approver	07 Mar 2012

SECTION II. INTRODUCTION

Method of Instruction: Conference/Discussion
Instr Type(I:S Ratio/Qty): Instructor Qualified SME(null:null/0)*
Time of Instruction: 10 mins
Instructional Strategy: Small Group Instruction, Lecture
Note: Marked as (*) is derived from the parent learning object

Motivator

Improper management of hazardous materials can lead to leaks, spills and the interaction of incompatible materials. Leaks and spills have the potential to contaminate the environment and get into surface and groundwater. The interaction of incompatible materials could lead to fire, explosions, the release or generation of toxic gasses. Preventing hazardous materials from being released into the environment will protect the health and well-being of Soldiers and civilians in the vicinity, as well as protecting the environment from damage.

Terminal Learning Objective

NOTE. Inform the students of the following Terminal Learning Objective requirements.
At the completion of this lesson, you [the student] will:

Action:	Implement unit hazardous materials management.
Conditions:	Given the presence of hazardous materials within the unit area, implement a hazardous materials management program. The necessary references are available. Hazardous materials management is also required during a deployment.
Standards:	Unit personnel will implement hazardous materials management techniques, the procedures for managing hazardous materials using the DLA Shelf-Life Program, the components of a Hazard Communication Program, and hazardous materials transportation requirements according to federal, state, local and Army regulations when hazardous materials are present, stored or being used in the unit area of responsibility.

Safety Requirements

Safety considerations are low in the classroom. Proper personal protective equipment will be used and appropriate safety precautions will be taken when using, handling and storing hazardous materials.

Risk Assessment Level

None

Environmental Considerations

NOTE: Instructor should conduct a Risk Assessment to include Environmental Considerations IAW FM 3-34.5, Environmental Considerations {MCRP 4-11B}, and ensure students are briefed on hazards and control measures.

No major environmental considerations.
NOTE: It is the responsibility of all Soldiers and DA civilians to protect the environment from damage.

Evaluation

Correctly answering 100% of the check on learning questions for each LSA within

the ELOs will suffice to demonstrate an understanding of the lesson. Additional check on learning questions may be added by the instructor if 100% accuracy is not obtained.

Instructional Lead-in

Implementing a unit hazardous materials management program, with the appropriate training for all Soldiers and civilians that use, handle or store these materials in the unit area, will promote awareness of the chemical hazards, provide the procedures necessary to protect health, prevent spills, reduce waste, save money and prevent damage to the environment.

SECTION III. PRESENTATION

NOTE: Inform the students of the Enabling Learning Objective requirements.

A. ENABLING LEARNING OBJECTIVE

ACTION:	Identify hazardous materials management techniques.
CONDITIONS:	Given the presence of hazardous materials within the unit area, identify hazardous materials management techniques. The necessary references are available.
STANDARDS:	Identify hazardous materials management techniques: Identify hazardous materials; identify hazardous materials storage requirements; identify deployment and redeployment requirements.

ELO A - LSA 1. Learning Step / Activity ELO A - LSA 1. Hazardous material indentification.

Method of Instruction: Conference/Discussion
Instr Type(I:S Ratio/Qty): Instructor Qualified SME(/0)*
Time of Instruction: 0 hrs 10 mins
Instructional Strategy: Small Group Instruction / Lecture
Media Type: PowerPoint Presentation / Conference
Security Classification: Unclassified
Note: Marked as (*) is derived from the parent learning object

Slide 4: Training Applicability

Implementing a unit hazardous materials management program is a collective task and requires key personnel to be trained and cohesively working together to accomplish effectively. The Supply Sergeant, Motor Sergeant, Safety Officer and/or NCO, CBRN Officer and/or NCO, any facility management personnel and all personnel who use or handle hazardous materials (HAZMAT) need to be involved in this task. The Commander, First Sergeant and Environmental Officer (EO) will need to be aware of the management system and its requirements for oversight purposes. The EO is the eyes and ears of the Commander regarding the unit environmental program and will be conducting unit self assessments that will encompass HAZMAT storage and usage areas. If there is no Safety Officer, the EO will likely be assuming many of the responsibilities of the Safety Officer as well.

Slide 5: Hazardous Material

Hazardous materials (HAZMAT), hazardous chemicals and hazardous substances are all used interchangeably, but are defined differently based on the regulation that supports them.

A HAZMAT is any item or agent (biological, chemical, or physical) which has the potential to cause harm to humans, animals, or the environment, either by itself or through interaction with other factors.

The Department of Transportation (DOT) defines a HAZMAT as any item or chemical which, when being transported or moved, is a risk to public safety or the environment. Title 49 of the Code of Federal Regulations (49 CFR) defines a HAZMAT as “a

material or substance which the Secretary of the Department of Transportation (DOT) has determined is capable of posing an unreasonable risk to health, safety, and property when transported in commerce and has been so designated (171.8)".
The Occupational Safety and Health Association's (OSHA) definition of a hazardous chemical includes any substance or chemical which is a "health hazard" or "physical hazard," including: chemicals which are carcinogens, toxic agents, irritants, corrosives, sensitizers; agents which act on the hematopoietic system; agents which damage the lungs, skin, eyes, or mucous membranes; chemicals which are combustible, explosive, flammable, oxidizers, pyrophorics, unstable-reactive or water-reactive; and chemicals which in the course of normal handling, use, or storage may produce or release dusts, gases, fumes, vapors, mists or smoke which may have any of the previously mentioned characteristics. (Full definitions can be found at 29 CFR 1910.1200.)
The US Environmental Protection Agency (USEPA) uses hazardous substances, incorporates the OSHA definition, and adds any item or chemical which can cause harm to people, plants or animals when released by spilling, leaking, pumping, pouring, emitting, emptying, discharging, injecting, escaping, leaching, dumping or disposing into the environment.

Slide 6: Common Hazardous Materials

This list outlines several of the common HAZMAT that you may encounter in the Army. The unit Environmental Officer should be aware of all HAZMAT that are stored or used by Soldiers within the area of operation. It is every individual's responsibility to be aware of the properties of the chemical they are using, follow unit Standard Operating Procedures (SOP) regarding handling and storage of HAZMAT and use all required personal protective equipment (PPE) to protect themselves.

Slide 7: Labels

Product labels contain important information to help with proper management of HAZMAT. Labels on products obtained through the DLA will include additional information that is not found on commercial labels, such as the national stock number (NSN), shelf-life information and contract number.

Slide 8: Replacement Labeling

Labels often become worn or damaged due to the climate or storage and environmental factors. Labels that are missing, illegible or damaged must be replaced.

Slide 9: Material Safety Data Sheets

All HAZMAT that are stored or used on site are required to have a MSDS. MSDSs should be delivered with the material when it is received. If it is not, it can be acquired through Supply, directly from the manufacturer or via their website, through the Defense Logistics Agency (DLA) Hazardous Material Information Resource System (HMIRS) at http://www.dlis.dla.mil/hmirs/, from the installation or MACOM environmental officer or safety officer.

Identify materials by proper hazard class using labeling and marking data on package, if available. If marking and labeling data are not readily available, or if individual processing material is not clear as to whether a material is classified as hazardous, research the National Stock Number (NSN) or common name through HMIRS.

Slide 10: Personal Protective and Safety Equipment

Check the MSDS or manufacturer's recommendations for appropriate PPE to be used with each hazardous material. Harsh climates can cause PPE and safety equipment to deteriorate quickly. Include PPE and safety equipment in your inspections. Make sure Soldiers are wearing or using their equipment properly.

Slide 11: Spill and Emergency Equipment

All HAZMAT storage areas should have spill kits, fire extinguishers and personnel safety equipment, such as an eye wash station and emergency shower readily available and accessible. Emergency communications should also be established; such as an alarm, bell or whistle; used to notify personnel in the vicinity of a spill or fire.

Slide 12: Managing HAZMAT Inventories

These are general rules for managing HAZMAT:

1. Use non-hazardous substitutes when possible.
2. Check with the HAZMART before placing an order for additional HAZMAT.
3. Have an up-to-date inventory of all HAZMAT used in your unit. Give a copy of the inventory to the local fire department or the base camp environmental or engineer officer if in a deployed environment.
4. Set high/low limits on HAZMAT to help keep enough on hand for normal operational requirements, but not so much that it can't be reasonably used up. Do not stockpile HAZMAT. Follow the rule: Reduce, Reuse, and Recycle. This will allow you to save time and money.
5. Follow the First In First out (FIFO) rule. Use the oldest materials first to avoid the possibility of them becoming unusable before they can be used up.
6. Manage HAZMAT using the shelf-life program. This program will be fully explored later in the training.

Check on Learning:

Question: What is a hazardous material?

Answer: Any material, including waste, that may pose an unreasonable risk to health, safety, property, or the environment.

Review Summary: Review the LSA as necessary.

ELO A - LSA 2. Learning Step / Activity ELO A - LSA 2. Hazardous material storage.

Method of Instruction: Conference/Discussion

Instr Type(I:S Ratio/Qty): Instructor Qualified SME(/0)*
Time of Instruction: 0 hrs 30 mins
Instructional Strategy: Small Group Instruction / Lecture
Media Type: PowerPoint Presentation / Conference
Security Classification: Unclassified
Note: Marked as (*) is derived from the parent learning object

Slide 13: General Rules for HAZMAT Storage

These are general rules for storing HAZMAT:

1. Consolidate the storage of HAZMAT; do not have it spread out across the work area. Also ensure HAZMAT are returned to the proper storage area or cabinet once they are no longer needed.
2. HAZMAT should be stored inside and protected from the weather. If this is not possible, overhead cover must be provided.
3. Coordinate with the safety officer for appropriate storage locations. If storing HAZMAT inside a building, the area will need to be checked for proper ventilation. If in a deployed environment, HAZMAT must be at least 100 meters downwind/gradient from billeting areas and dining facilities.
4. Ensure the placement of the storage area meets the minimum security requirements regarding proximity to the property line or, if deployed, the base camp perimeter. Flammable and reactive materials must be stored at least 50 feet from the property line or meet storage requirements for approved flammable storage. Quantities less than 500 gallons must be stored at least 25 feet from the property line, or 10 feet from any street, alley or public way.
5. Ensure proper labeling of all containers, especially if the material has been taken from a bulk container or is not in its original container.
6. Do everything you can to prevent spills. A spill plan must be written, trained and posted so all who operate in the area understand their responsibilities.
7. Check for compatibility of HAZMAT and make sure incompatible materials are properly segregated.
8. Establish secondary containment.
9. Cover or close floor drains or drains to sanitary sewers. If there is a waterway/ditch/wadi in the area, put in berms or dikes to prevent spilled material from entering the waterway.
10. Ensure that the proper personal protective equipment is available and serviceable. Also ensure Soldiers are properly trained on how to use it. Follow up to enforce its use by Soldiers when working with HAZMAT.
11. Post appropriate signage.

Slide 14: General Rules for HAZMAT Storage (cont'd)

AND:

12. HAZMAT storage areas need to be secured and access limited to those who have a need to be in the area.
13. Ensure the area is well-ventilated to prevent dangerous fumes from accumulating that can either be toxic to personnel or promote combustion. Weather and wind can

adversely affect HAZMAT containers. Precipitation can cause lids to rust or collected rainwater becomes contaminated due to residue around the container openings. Shade can help with temperature control and prevent excess vapor pressure and bulging during hot seasons.

14. Have an up-to-date inventory of all HAZMAT used in your unit. Give a copy of the inventory to the local fire department and, if deployed, to the base camp management team.

15. Inspect storage areas weekly. In harsh climates this becomes more important.

Slide 15: Storage Compatibility

Compatibility is important! If incompatible materials are combined the reaction can produce toxic fumes, spontaneous combustion and fire or even explosion. When you combine super tropical bleach with waste oil you get spontaneous combustion and fire. When you combine bleach and ammonia you get chlorine gas.

Most recent (last ten to fifteen years) MSDSs that are generated by HMIRS include a Hazardous Characteristic Code (HCC). It is often found under the Physical Properties section. The HCC can be used in conjunction with TM 38-410 to assist in segregating incompatible HAZMAT.

This system can also be used with DOT labeling on the container, precautionary labels, and placards.

Slide 16: Primary & Secondary Storage Segregation

There are many segregation charts available. There is a very basic one in the “You Spill, You Dig” publication and a more elaborate segregation system is based on TM 38-410, Appendix C. The basic system from “’You Spill, You Dig is based on 6 segregation areas. In the system from TM 38-410 there are 10 primary segregation units with designated letters.

In total there are 63 Hazardous Characteristic Codes that fall into the ten primary segregation areas. Within the primary segregation areas there is additional secondary segregation that should be accomplished. DLA recommends a minimum 4 foot aisle width between the areas of secondary segregation. For example, in the flammables storage area those HAZMAT with HCC of F1, F2, F3, F4 and V4 can be stored together but should be separated from the other HCCs that are shown in the diagram above.

Slide 17: Example of HCC Segregation

Using the HCC provided for the HAZMAT listed, discuss how each HAZMAT will be segregated into their appropriate primary segregation areas. Take the HCC from the chart to the table on the left. The HCC will appear in line with the appropriate storage area for that material.

Slide 18: Secondary Containment

All HAZMAT, including hazardous waste, must have appropriate secondary containment. The purpose is to contain the material in the case of a leak or spill and

prevent it from contaminating the ground or water. Adequate secondary containment will hold 10% of the total volume of stored HAZMAT or 110% of the largest single container being stored in the area.

Secondary containment will be seen in the form of overpack containers for 55-gallon drums, drum pallets, the use of berms, or for a small container an absorbent sock wrapped around the bottom of the container. Secondary containment may be engineered into the construction of a building using sloping of the concrete floor away from any entrance to the storage area and/or concrete berms.

In a deployed environment, secondary containment may be a depression dug into the ground that is lined with a plastic barrier or tarp and uses stacked sandbags to construct a berm.

Slide 19: Signage

Every HAZMAT storage area should have signage that identifies the site and the contact information for the individual responsible for the location with emergency numbers. It should also have a “No Smoking” sign and an NFPA fire diamond used to identify the hazards of the materials stored to emergency responders.

If in a deployed environment, the signage should include radio call numbers, if necessary. The NFPA fire diamond should be situated so that it does not “advertise” to insurgents or other hostile persons. The signs should be written in all languages of all personnel who will be using the site.

Slide 20: Storage Options

Storage lockers are designed to hold small quantities of HAZMAT that are used often. Although it is recommended that you have color-coded lockers, this is not always possible. However, it should be clearly marked as to what type of locker it is.

Storage buildings and warehouses are used for bulk quantities of HAZMAT and may have secondary containment engineered into their structure. If the building is manufactured for HAZMAT storage it will likely have secondary containment built in along with an alarm system. These buildings are also being built with solar panels to power internal lights or other electrical needs.

Storage racks are used for easy access to liquids in drums. Placing drums in these racks makes them more vulnerable to spilling or leaking than when they are upright. Practice spill prevention to reduce potential leaks and spills and ensure adequate secondary containment.

Slide 21: Empty Containers

Federal law, specifically the Resource Conservation and Recovery Act (RCRA), has specific guidelines for what “empty” means. Your best management practice is to reuse the container a HAZMAT came in to accumulate the waste generated from the use of that material. Whether a container is to be reused or not, ensure you remove or cover all old markings and labels so that others don’t think the container still has the original material in it.

Some containers (especially gas cylinders) have tracking numbers. Document tracking

numbers as required.

Slide 22: HAZMAT Inspections

When conducting inspections of HAZMAT areas there are specific issues that will need to be corrected if found. Here is a list of things to check:

1. Ensure labels are legible with HAZMAT name, hazard warning, and manufacturer information. If labels are fading, ink is running, or some other problem, copy information on a label and attach to container.
2. Containers need to be sealed tightly.
3. All HAZMAT must be properly labeled. Position the containers to ensure the identification of the contents is not obscured.
4. Containers are to be stored in a HAZMAT storage structure that is covered, curbed, and has secondary containment with impermeable surfaces.
5. Ensure containers are in good condition.
6. Check shelf life dates. Extend if MQCSS and/or QSL authorize it; or dispose of properly as hazardous waste.
7. Aisle space allows you to see containers and inspect them. In emergencies it allows response personnel to get equipment to the incident.
8. Fire extinguishers need to be placed near HAZMAT storage areas and be easily accessible in the case of a fire.
9. Secure containers, storage facilities and limit access, as determined by the unit.

Slide 23: HAZMART Participation

A HAZMART on a CONUS or OCONUS installation is a HAZMAT pharmacy program that tracks the issue and use of HAZMAT. The program is used to:

1. Reduce unit level on-site HAZMAT storage requirements,
2. Track HAZMAT quantities used, and
3. Allow for the turn-in of opened but still useable or unopened containers of HAZMAT that are no longer needed which may then be reissued to another activity, at no cost, that can use it for its intended purpose. This aspect may also be referred to as a free-issue pharmacy program.

If a HAZMART exists follow the SOP and participate. If one does not exist, encourage its development.

Check on Learning:

Question: Is it permitted to store MOGAS and Battery Acid in the same secondary containment?

Answer: No, MOGAS (flammable) and Battery Acid (acid) are incompatible materials and required individual secondary containment.

Question: What is the primary reference for storing and handling hazardous materials?

Answer: TM 38-410, Storage and Handling of Hazardous

Materials

Review Summary: Review the LSA as necessary.

ELO A - LSA 3. Learning Step / Activity ELO A - LSA 3. Deployment and redeployment

Method of Instruction: Conference/Discussion
Instr Type(I:S Ratio/Qty): Instructor Qualified SME(/0)*
Time of Instruction: 0 hrs 10 mins
Instructional Strategy: Small Group Instruction / Lecture
Media Type: PowerPoint Presentation / Conference
Security Classification: Unclassified
Note: Marked as (*) is derived from the parent learning object

Slide 24: Managing HAZMAT at a Base Camp

The procedures for managing HAZMAT at the base camp level mirror the unit level but on a larger scale. The base camp should have an environmental officer as part of the mayoral staff to oversee HAZMAT management base camp wide. The following are general rules for managing HAZMAT at base camps:

1. Encourage the use of non-hazardous substitutes when possible. Make this part of the base camp SOP.
2. Establish a base camp wide HAZMART where useable HAZMAT may be turned for reissue to other activities that need them.
3. Have all units submit an inventory of all HAZMAT stored/used by unit personnel. Update the Spill Plan to reflect the type and amount of HAZMAT in the inventory. Give a copy of the inventory to the fire department, medical staff, and the emergency response coordinator.
4. HAZMAT storage areas should be inspected weekly to ensure that containers are in good condition and management rules are being followed. The inspection reports should be maintained at the unit or in accordance with base camp SOP.
5. Have units submit inspection reports and assist with any support they need for corrective actions.
6. Ensure units have secondary containment and appropriate segregation.
7. Ensure appropriate signage is posted.

Slide 25: HAZMAT Considerations for Deployment

In a new Theater of Operations, supply chains may not be established and units may need to bring in 3-4 months worth of HAZMAT. Consideration will need to be given to the additional resource requirements necessary to accommodate this amount of supplies. Even when the supply chains are established, the storage capacity will be needed for potential expansion of the base camp.

Slide 26: HAZMAT Preparation for Redeployment/Closure

Prior to redeployment or closure of a base camp HAZMAT will need to be managed. Those materials that are no longer useable will be turned in and disposed of as hazardous waste. Useable HAZMAT should be:

1. Turned in to the HAZMART (if one is established) for redistribution;

2. Turned in to the DRMO for redistribution or resale; or

3. Packaged up and properly certified for transportation back to the unit's home station.

NOTE: Useable HAZMAT will NOT be turned in as hazardous waste simply because it is an expedient way of cleaning up a storage area or clearing out an inventory.

Slide 27: HAZMAT Management Summary

Promote the use of non-hazardous products where possible to protect the health and well-being of Soldiers as well as the environment. Participate in a HAZMART or free-issue pharmacy program where available. Ensure you have MSDSs for all HAZMAT you store or use on site. Make sure there is adequate secondary containment in storage areas and appropriate PPE is not only available but also used. Ensure the oldest materials are used up first so that they are used up before they reach the end of their shelf-life and must be disposed. Do not stock pile HAZMAT. Order and keep on hand a manageable amount that can be used up in a reasonable amount of time. Conduct routine inspections and correct deficiencies in a timely manner.

Check on Learning:

Question: How much hazardous materials should a unit plan to have on hand during the establishment of a new base camp?

Answer: In a new Theater of Operations, supply chains may not be established. Units might bring in 3-4 months worth of HM.

Review Summary: Review LSA as necessary.

CHECK ON LEARNING (ELO A): Conduct a check on learning that encompasses all of the LSAs for this ELO.

REVIEW SUMMARY(ELO A): Summarize the ELO.

B. ENABLING LEARNING OBJECTIVE

ACTION:	Identify the procedures for managing HAZMAT using the Shelf-Life Program
CONDITIONS:	Given the presence of hazardous materials within the unit area, implement a hazardous materials management program. The necessary references are available.
STANDARDS:	Identify the procedures for managing hazardous materials using the DLA Shelf-Life Program: demonstrate an understanding of the shelf-life program and complete a shelf-life extension example.

ELO B - LSA 1. Learning Step / Activity ELO B - LSA 1. Understanding the Shelf-Life Program.

Method of Instruction: Conference/Discussion
Instr Type(I:S Ratio/Qty): Instructor Qualified SME(/0)*
Time of Instruction: 0 hrs 10 mins

Instructional Strategy: Small Group Instruction / Lecture
Media Type: PowerPoint Presentation / Conference
Security Classification: Unclassified
Note: Marked as (*) is derived from the parent learning object

Slide 31: Managing Shelf-Life

Shelf-Life is the total period of time beginning with the date of manufacture, cure, assembly, or pack (subsistence only), that an item may remain in the combined wholesale (including manufacturer's) and retail storage systems, and still remain usable for issue and/or consumption by the end user.

Each item that meets the shelf-life criteria is assigned a National Stock Number (NSN) and a specific shelf-life code. Typical shelf-life items include food, medicines, batteries, paints, sealants, adhesives, film, tires, chemicals, packaged petroleum products, hoses/belts, mission-critical o-rings, and Nuclear/Biological/Chemical equipment and clothing.

The policies for optimizing shelf-life materiel are contained in DoD 4140.27-M, Shelf-Life Management Manual, as authorized by DoD Directive 4140.1, Materiel Management Policy. This policy provides for the supply chain (life-cycle management) of standard and hazardous shelf-life items contained in the federal supply system. Shelf life management helps to determine what hazardous materials can be kept and used passed their expiration date and what must be disposed of as hazardous waste.

Slide 32: Types of Shelf-Life Items

The Shelf-Life code identifies the shelf-life time period by which an item must be used, or subjected to inspection/test/restoration or disposal action. These codes are identified in Appendix A of the DoD 4140.27-M, and consist of two types, Type I and Type II. Type I is an individual item of supply which is determined through an evaluation of technical test data and/or actual experience, to be an item with a definite non-extendible period of Shelf-Life, and ends with the expiration date. Type I items have alphabetical codes. Type II is an individual item of supply having an assigned shelf-life time period that may be extended after completion of inspection, test, or restorative action, and is identified by an inspection/test/date. Type II items have numeric codes.

Shelf life codes and dates are specific to products ordered through the DLA and will generally not be found on commercial labels.

Slide 33: Typical DLA Product Label

This is a typical DLA product label. When researching the extension of a product's shelf-life it is important to note the NSN, the exact product name, the contract number and the lot or batch number.

Slide 34: Extension Requirements

The MQCSS and QSL are the databases containing shelf-life extension requirements and information. They used to be on separate websites but now are combined into one page. The MQCSS will delineate what types of inspections are required (visual,

laboratory, etc.). The QSL gives information on the testing that has been done on the HAZMAT.

Check on Learning:

Question: What is the purpose of the Shelf-Life Program?
Answer: To maintain high quality HAZMAT ready for use and to reduce waste generated from expired hazardous materials.

Question: What does a numeric shelf-life code designate?
Answer: A Type II shelf-life product that can be extended.

Review Summary: Review the LSA as necessary.

ELO B - LSA 2. Learning Step / Activity ELO B - LSA 2. A Shelf-Life extension example.

Method of Instruction:	Demonstration/Performance
Instr Type(I:S Ratio/Qty):	Instructor Qualified SME(/0)*
Time of Instruction:	0 hrs 20 mins
Instructional Strategy:	Small Group Instruction / Hands-On Instruction
Media Type:	Computer Assisted Instruction / Conference/Demonstration / PowerPoint Presentation
Security Classification:	Unclassified
Note: Marked as (*) is	derived from the parent learning object

Slide 35: Shelf-Life Example

A unit had a case of this hydraulic fluid used especially for tanks. Each can costs approximately $30. The next test date on the label is November 2006. Do not automatically assume that this material needs to be disposed of. Go to the MQCSS/QSL website and look it up.
Find it on the web at https://headquarters.dla.mil/j-3/shelflife/ you must have a .mil address to access the site or you will have to request a user ID and password.

Slide 36: Visual Inspection

First conduct a visual inspection of the container. Is it in good condition? You are looking for corrosion or rust, cracks, pits, leaks or other signs that the container has been compromised. The label on the container must also be legible. If the container is damaged or leaking the contents should be transferred to another container and the new container appropriately labeled.

Slide 37: DLA Shelf-Life Website

This is a screen shot of the opening page taken on 14DEC2011. At this time the link to the MQCSS/QSL search page is located both in the top center and in the bottom right corner of the page. This link periodically moves around on the page as updates or changes are made. Click on the link to enter the search page.

Slide 38: MQCSS/QSL Search

This is a screen shot of the next page you will see. Based on the product information you have, select from the drop down list and enter the national stock number (NSN),

Nato ID, National Item Identification Number (NIIN) or item name and click search. The database default is set to the MQCSS, but you may also select the QSL.

Slide 39: MQCSS/QSL Search (cont'd)

After you click search, this window will pop up. In this example only one item pops up under the NSN that was entered. It may have multiple entries. Ensure that the Item Name matches the product you are checking and click on it.

Slide 40: Search Results

The MQCSS and QSL pages will come up on the same screen. At the top of the page, the MQCSS provides a great deal of information about the product, such as the shelf-life code and type, the inspection type code, reinspection months, shelf-life months, and hazardous characteristic code. The website has rollover and help tools so you can move the cursor over any item shown in blue to get definitions of the items listed. For this product the inspection type code shows a V and an L which means the container must be visually inspected to ensure container integrity and tested by the laboratory to ensure the product is still good.

Since the container is in good condition, we must check for laboratory analysis results from the QSL which is at the bottom of the screen. Match the Contract Number and Lot/Batch number from the product label to the information listed in the QSL database. According to the information provided, this product was last tested in May of 2010. Since it has a shelf-life of 24 months according to the MQCSS it is good through May 2012. The QSL shows a test due date of May 2012 to coincide.

If the product appears in red at the top of the page with a code H, it is no longer extendible and will need to be disposed of.

Slide 41: Shelf-Life Extension Labels

The website home page will also assist in the creation of the Shelf-Life Extension Notices in Adobe (.pdf), Word (.doc Avery) or FormFlow (.frz) labels that can be downloaded, populated with the updated information and adhered to the container. In the bottom right corner of the home page there is a link to the label formats under the MCQSS/QSL search link.

Or you can fill out the information by hand and adhere it to the container. Be sure to note the Authority (QSL or MQCSS) and the name of the person who conducted the inspection.

Check on Learning:

Question: Where can you find shelf-life extension information?

Answer: The DLA Shelf-Life website.

Review Summary:

Review the LSA as necessary.

CHECK ON LEARNING (ELO B): Conduct a check on learning that encompasses all of the LSAs for this ELO.

REVIEW SUMMARY(ELO B): Summarize the ELO.

C. ENABLING LEARNING OBJECTIVE

ACTION:	Identify the components of Hazard Communication (HAZCOM)
CONDITIONS:	Given the presence of hazardous materials within the unit area, implement a hazardous materials management program. The necessary references are available.
STANDARDS:	Identify the components of HAZCOM: demonstrate an understanding of the HAZCOM Program and material safety data sheets.

ELO C - LSA 1. Learning Step / Activity ELO C - LSA 1. Introduction to the HAZCOM Program.

Method of Instruction: Conference/Discussion
Instr Type(I:S Ratio/Qty): Instructor Qualified SME(/0)*
Time of Instruction: 0 hrs 15 mins
Instructional Strategy: Small Group Instruction / Lecture
Media Type: PowerPoint Presentation / Conference
Security Classification: Unclassified
Note: Marked as (*) is derived from the parent learning object

Slide 44: Hazardous Chemicals

According to OSHA a hazardous chemical is any chemical which is a physical or health hazard. A chemical can be a single element or a mixture of elements and/or chemical compounds.

Slide 45: HAZCOM Program

Hazard Communication (HAZCOM) is an OSHA requirement (29 CFR 1910.1200) and technically a program managed for each installation by the Safety Office. A written HAZCOM program is required to be developed, implemented and maintained for each installation, and will likely be in the Safety Office. HAZCOM training should also be the responsibility of the Safety Office, but often they are short-staffed and don't look at the associated environmental issues.

HAZCOM regulations apply to any chemical which is known to be present in the workplace in such a manner that employees may be exposed under normal conditions of use or in a foreseeable emergency**.** Employers are responsible for ensuring that employees have full knowledge of any hazardous chemicals that they may be exposed to in their work or during an emergency. All personnel who work with or around hazardous chemicals must be informed of the location of the written HAZCOM program and it must be available to all on request.

The written HAZCOM program will contain:

1. A list of the hazardous chemicals known to be present using an identity that is referenced on the appropriate MSDS (the list may be compiled for the workplace as a whole or for individual work areas)
2. The methods the employer will use to inform employees of the hazards of non-routine tasks, and the hazards associated with chemicals contained in unlabeled pipes

or stationery equipment in their work areas
3. The methods used to provide employees of other employers who may be on site (i.e. contractors) access to MSDS for hazardous chemicals they may be exposed to while on site
4. The methods used to inform employees of the precautionary measures that are to be taken to protect them during normal operations and in emergencies (i.e. monitoring, methods of detection of a release, work practices, emergency procedures, PPE, etc.)
5. The methods used to inform employees of the components of the labeling system
6. The requirements for the maintenance of MSDS
NOTE: The HAZCOM program is required for all CONUS Army installations. It is a best management practice for OCONUS activities or contingency operations.

Slide 46: HAZCOM Program (cont'd)
This occupational safety and health standard is intended to address the issue of evaluating the potential hazards of chemicals, and communicating information concerning hazards and appropriate protective measures to employees. Evaluating the potential hazards of chemicals, and communicating information concerning hazards and appropriate protective measures to employees, may include, for example, but is not limited to, provisions for: developing and maintaining a written hazard communication program for the workplace, including lists of hazardous chemicals present; labeling of containers of chemicals in the workplace, as well as of containers of chemicals being shipped to other workplaces; preparation and distribution of material safety data sheets to employees and downstream employers; and development and implementation of employee training programs regarding hazards of chemicals and protective measures.

Slide 47: Labeling System
The original manufacturer's label on container will contain the OSHA required information and should not be purposely removed from the container. All labels must be legible, in the appropriate language of the users and prominently displayed on the container. If the label comes off it must be replaced and contain, at a minimum:
1. The identity of the chemical as it appears on the MSDS
2. Appropriate hazard warnings (words, pictures, symbols or a combination of these)
Individually stationary process containers (i.e. bulk overhead dispensers) may be marked with signs, placards, process sheets, batch tickets, operating procedures or other such written materials in lieu of labels as long as the alternative method identifies the contents.

Slide 48: Unit Level HAZCOM Responsibilities
HAZCOM is an OSHA requirement (29 CFR 1910.1200) and technically a program managed for each installation by the Safety Office. A written HAZCOM program is required to be maintained and will likely be in the Safety Office. HAZCOM training should also be the responsibility of the Safety Office, but often they are short-staffed and don't look at the associated environmental issues. For questions regarding the

required content of the written HAZCOM program refer to 29 CFR 1910.1200(a-h). HAZCOM regulations apply to any chemical which is known to be present in the workplace in such a manner that employees may be exposed under normal conditions of use or in a foreseeable emergency**.** Employers are responsible for ensuring that employees have full knowledge of any hazardous chemicals that they may be exposed to in their work or during an emergency.

Employers shall develop, implement, and maintain at each workplace, a written HAZCOM program which at least describes how the criteria specified for labeling, MSDS and employee information and training will be met and which also includes the following:

1. A list of the hazardous chemicals known to be present using an identity that is referenced on the appropriate material safety data sheet (the list may be compiled for the workplace as a whole or for individual work areas); and,
2. The methods the employer will use to inform employees of the hazards of non-routine tasks (for example, the cleaning of reactor vessels), and the hazards associated with chemicals contained in unlabeled pipes in their work areas.

Employers shall ensure that employees are provided with information and training in accordance with the HAZCOM program to the extent necessary to protect them in the event of an exposure.

HAZCOM Training needs to be documented and maintained within the unit training records.

Slide 49: HAZCOM Training

HAZCOM training should include:

1. A list of the materials on site
2. The physical and health hazards associated
3. Methods and observations that may be used to detect the presence or release of a hazardous chemical (i.e. monitoring that is being conducted, the visual appearance of a hazardous chemical or an odor to recognize)
4. Measures that Soldiers can take to protect themselves and procedures implemented (i.e. work practices, emergency procedures, PPE to be used)
5. How to get relevant information from the labeling system and MSDS
6. The components and details of the HAZCOM program.

This training must be documented and records maintained within the unit's train

Check on Learning:

Question: What must a written HAZCOM Program contain?

Answer:

1. A list of hazardous chemicals known to be present
2. Methods used to inform employees of the hazards
3. Methods used to inform employees of protective measures
4. Methods used to inform employees of the labeling system
5. Requirements for MSDS maintenance and necessary

training

Question: When should HAZCOM training be conducted?

Answer:

1. When new employees start
2. When a new chemical is introduced to the job site
3. Annually as a refresher

Review Summary: Reveiw the LSA as necessary.

ELO C - LSA 2. Learning Step / Activity ELO C - LSA 2. Introduction to Material Safety Data Sheets.

Method of Instruction: Conference/Discussion
Instr Type(I:S Ratio/Qty): Instructor Qualified SME(/0)*
Time of Instruction: 1 hr 45 mins
Instructional Strategy: Small Group Instruction / Lecture
Media Type: PowerPoint Presentation / Conference
Security Classification: Unclassified
Note: Marked as (*) is derived from the parent learning object

Slide 50: Material Safety Data Sheets

Hazardous chemicals should be labeled with warning labels to highlight the type of hazard the chemical presents. However, most relevant information may be obtained from the MSDS.

MSDS are required by OSHA to be maintained for all hazardous chemicals that are used or stored on site. They are required to be written in English but may also be maintained in other languages depending on the diversity of the work force. Soldiers need to understand how to obtain information from a MSDS for their protection and safety. If a MSDS does not come with the shipment of HAZMAT, it is the responsibility of unit personnel to obtain the appropriate MSDS from the manufacturer or through the Defense Logistics Agency (DLA). When using products with a National Stock Number (NSN) obtained through the defense supply system it is important to understand that several manufacturers may create these products using various chemical formulas that are specific to their company but that meet the military specifications for the NSN. This means you need to make sure the MSDS you have matches the NSN, product ID, manufacturer and date of manufacture.

MSDS must be readily available to all who request them. They may be maintained electronically, on microfiche or in other alternative manners as long as no barriers to immediate access exist. MSDS may be located with individual storage areas or lockers; or in a central location in the workplace as long as all know where to find them.

Slide 51: Obtaining an MSDS

MSDSs should be delivered with the material when it is received. If the MSDS does not come with the shipment, it is the responsibility of unit personnel to obtain it. It should be available through the supply chain, directly from the manufacturer or their

website, or through the Defense Logistics Agency (DLA) Hazardous Material Information Resource System (HMIRS) at http://www.dlis.dla.mil/hmirs/. Assistance in obtaining MSDSs may be received from the installation environmental office or, if deployed, from the MACOM environmental officer or safety officer. If marking and labeling data are not readily available, individual processing material is not clear as to whether a material is classified as hazardous, and the MSDS was not received with the material but you have a National Stock Number (NSN) or common name the material may be researched through the HMIRS to determine if a MSDS is necessary.

When using products with a NSN obtained through the defense supply system it is important to understand that several manufacturers may create these products, meeting the military specifications for the NSN, but using various chemical formulas specific to their company. This means you need to make sure the MSDS you have matches the NSN, product ID, manufacturer and date of manufacture specific to the product you have on hand.

Manufacturers may periodically change the formula for a chemical so it is important to make sure the MSDS you have is specific to the chemical you are using by verifying the name on the container is the same as that in the first section of the MSDS, and by comparing the date of manufacture to the date the form was created or last updated.

Slide 52: MSDS Sections

OSHA requires a MSDS to contain specific information, 29CFR 1910.1200 (g). The 16 sections listed here represent the format developed by American National Standards Institute (ANSI) and endorsed by OSHA. However, there is no required format, number of sections or section labels for these documents listed in the regulations. This means the information may be arranged differently from manufacturer to manufacturer. The section names may be different, not all of the sections listed above may be included, the information from sections may be combined for brevity, or the same information may be found in more than one section creating redundancy. The quantity of information provided in an MSDS will vary depending on the degree of hazard that the material presents. There should never be blanks in the information provided; NA, not applicable or not available may be used.

Where appropriate, MSDSs may be designed to cover groups of hazardous chemicals in a work place as long as all required information is provided for each chemical. We will cover each of these sections in detail. Information throughout the MSDS may be redundant because of the importance of being able to find the information you need quickly.

A commercial MSDS obtained from the manufacturer will appear differently from an MSDS that is obtained through HMIRS. Commercial MSDS have a much more polished and aesthetically pleasing appearance which can make them easier to read and find specific information. The MSDS obtained through HMIRS at first glance may appear confusing, as the various sections are not as boldly defined. It will also likely include information that is not available on a manufacturer's MSDS, such as the Hazard Characteristic Code (HCC) which can help with segregation of incompatible materials.

Slide 53: Product and Company Information

The Product and Company Information section names the material and links the MSDS to the label and shipping documents. It also identifies the name of the manufacturer, importer or other responsible party along with a mailing address and phone number for obtaining additional information. The name of the product and the name, address and emergency contact telephone number of the manufacturer must be provided. The manufacturer or distributor listed here should be able to provide detailed information on the hazards of the material covered by the MSDS. The emergency contact number listed may be for the Chemical Transportation Emergency Center (CHEMTREC) rather than for the manufacturer. CHEMTREC serves as a round-the-clock resource for obtaining immediate critical response information for incidents involving hazardous materials and dangerous goods.

There are many different names that may apply to a chemical:

1. A trade name – the brand name the manufacturer gives the product. It may also be referred to as the common name or manufacturer's name. This name does not tell you what chemicals are present.
2. The chemical or specific name - the name that describes the specific chemical. The chemical name is the easiest to use when researching the health effects of chemicals and how to protect yourself.
3. The generic name - describes a family or group of chemicals, for example chlorinated hydrocarbons describes thousand of different products.

The name in this section will correspond to the name on the product label and shipping documentation.

Slide 54: Hazard Identification

The Hazard Identification section describes the materials appearance and most significant immediate concerns. It is the most important section of the MSDS. It is divided into 4 subsections: emergency overview, OSHA regulatory status, potential health effects and potential environmental effects.

The physical state of the material and the health, physical and environmental hazards that require immediate attention in emergencies are listed in the emergency overview. The OSHA regulatory status subsection indicates if the material is hazardous or non-hazardous with respect to the HAZCOM standard. Potential adverse health effects and symptoms associated with exposure to the material are given in the potential health effects subsection. The potential environmental effects subsection provides information on the potential effects associated with release of the material into the environment.

Slide 55: Composition / Information on Ingredients

This section identifies the components, by-products and impurities that contribute to the materials hazards. The chemical name, common name or synonyms, along with the corresponding Chemical Abstract Service (CAS) registry number and percentages or ranges of percentages included.

The CAS number is a number given by the Chemical Abstract Service to each chemical. It is an important piece of information to have for a hazardous material (HAZMAT). The CAS number may also appear in the Product and Company Information section. While different chemicals may have the same name, they will all have their own CAS number. Regardless of what name is used, the CAS number for a chemical is specific to that chemical, does not change and can be used to immediately identify the hazardous characteristics of a material.

Listing only the trade name, only the CAS number or only the generic name on the MSDS is not compliant with OSHA requirements. The federal OSHA HAZCOM standard requires the evaluation of all chemicals and those found to be hazardous are covered by the law. State laws can differ regarding which chemicals are required to be listed on an MSDS. Some states require only the approximately 500 chemicals which have OSHA standards to be covered, others specifically list chemicals that are required to be listed and still others require all ingredients to be listed even those which are not hazardous.

This section may also list exposure limits that are recommended by OSHA, the American Conference of Governmental Industrial Hygienists (ACGIH) and the National Institute for Occupational Safety and Health (NIOSH). It is important to note that the ACGIH and NIOSH exposure limits are more updated and protective than OSHA's. Exposure limits will also be seen in the Exposure Controls and Personal Protection section if used.

Slide 56: First Aid Measures

The First Aid Measures section is divided into 2 subsections: first aid procedures and notes to physicians. The first aid procedures should be brief, easily understood emergency and first aid instructions for each potential route of exposure. They are intended for use by any untrained individual. The notes to physicians convey additional informatin on antidotes, specific treatments and diagnostic procedures and are intended for use by healthcare professionals.

1. Routes of entry/exposure
2. Lengths of exposure
3. Severity of the effect
4. Target organs
5. Type of effect
6. Signs and symptoms of exposure
7. The carcinogenicity status
8. Medical conditions known to be aggravated by the exposure to the material

Slide 57: Routes of Entry

There are four routes of entry/exposure:

1. Inhalation – by breathing in vapors or fumes.
2. Absorption – through contact with the skin or exterior of the body.
3. Injection – by puncturing the skin, such as a contaminated object poking through your hand.

4. Ingestion – through the mouth by swallowing, commonly by failing to wash hands before eating or smoking.

Inhalation and absorption are the most common routes of entry.

Slide 58: Fire-Fighting Measures

The Fire-fighting Measures section overview should be directed at protecting the lives of those in the area of a fire. Special environmental warnings such as toxicity of fire-water runoff should be made when appropriate. This section should describe:

1. The fire and explosive properties of the material
2. Appropriate extinguishing media
3. Basic fire-fighting guidance.
4. The flash point of the chemical
5. The upper and lower explosive limits (UEL and LEL).
6. Flammability classification
7. Flame propagation or burning rate of solid materials
8. Known or anticipated hazardous products of combustion

Slide 59: Flammability & Explosive Limits

When working with potential flammable gases or liquids, or in confined or poorly ventilated conditions, it is important to monitor flammable and explosive limits to minimize the potential for fires or explosions. Equipment is available to measure these concentrations and should be used, especially in confined space conditions.

Flammability limits give the proportion of combustible gases in a mixture with the ambient air between which the mixture is flammable. The lower flammable limit (LFL) is the concentration where a chemical becomes flammable and the upper flammable limit (UFL) corresponds to the concentration above which the chemical is no longer flammable. A good example for this is the use of a carburetor to get the appropriate mixture of air and gasoline to be ignited to run an engine. If the mixture is too rich or too lean, the engine won't run.

The upper and lower explosive limits (UEL/LEL) are generally used interchangeably with the LFL and UFL but represent the potential for explosion rather than flammability. Below the LEL the concentration is too lean and above the UEL the concentration is too rich for an explosion to occur. The wider the range between the LEL and UEL the more hazardous a chemical is.

Slide 60: Flashpoint & Auto-Ignition Temperature

Flashpoint is the temperature at (and above) which a liquid gives off enough flammable vapor to form a mixture with air that can be ignited by contact with an ignition source, such as a hot surface, spark or flame. The lower the flashpoint is, the greater the fire hazard. This is especially important in desert/hot climates. Ensure proper ventilation. Flammable liquids have a flashpoint less than or equal to 100 degrees. Combustible liquids have a flashpoint greater than or equal to 101 degrees.

Flashpoint should not be confused with the auto-ignition point temperature at which combustion occurs spontaneously and without an external ignition source. The auto-

ignition temperature is also referred to as the auto-ignition point or kindling point. The auto-ignition temperature is the lowest temperature at which a substance will spontaneously ignite in a normal atmosphere without an external source of ignition, such as a spark or flame. This temperature is necessary to supply the activation energy needed for combustion. The temperature at which a chemical will ignite decreases as the pressure or oxygen concentration increases.

Some examples of auto-ignition temperature are:

Acetone	347°F	Kerosene	563°F
Coke	1292°F	Methane	1076°F
Charcoal	660°F	Nitroglycerine	490°F
Diesel	410°F	Propane	842°F
Fuel Oil	410-505°F	Toluene	849°F
Gasoline	475-536°F	White Phosphorous	93°F
Hydrogen	932°F	Xylene	876°F

Slide 61: Spontaneous Combustion

Spontaneous combustion is what happens when a substance reaches its auto-ignition temperature. Spontaneous combustion is used to describe how something appears to have just ignited, but in fact it is more usually a slow process that can take several hours of decomposition/oxidation with heat buildup. A substance with a low auto-ignition temperature begins to release heat through oxidation or fermentation. If the heat is not able to escape, the temperature of the material rises. Once the appropriate temperature is reached the material will combust. Oxygen or an oxidizing agent must be present. An example would be gasoline contaminated rags that are accumulated in a closed container in a hot environment. Good ventilation can help to prevent spontaneous combustion.

Slide 62: Fire Extinguishers

Fire extinguishers are classified by which type of fuel is involved in the fire. They are divided into four categories based on different types of fires. Each fire extinguisher also has a numerical rating that serves as a guide for the amount of fire the extinguisher can handle; the higher the number, the more fire-fighting power. Some fires may involve a combination of materials that will cross between these classifications. Your fire extinguishers should have ABC ratings on them.

You want them to be accessible and work when needed so they should be routinely inspected by checking the following:

1. The extinguisher is not blocked by equipment, or objects that could interfere with access.
2. The pressure is at the recommended level. On extinguishers equipped with a gauge, the needle should be in the green.
3. The nozzle or other parts are not hindered in any way.
4. The pin and tamper seal (if it has one) are intact.
5. There are no dents, leaks, rust, chemical deposits and/or other signs of

abuse/wear.

6. Some manufacturers recommend shaking your dry chemical extinguishers once a month to prevent the powder from settling/packing. Be sure to check manufacturer's recommendations.

7. Fire extinguishers should be pressure tested (a process called hydrostatic testing) on a specific cycle. Consult your owner's manual, extinguisher label or the manufacturer.

8. If the extinguisher is damaged or needs recharging, replace it immediately!

Class A extinguishers are for ordinary combustible materials such as paper, wood, cardboard, and most plastics. The numerical rating on these types of extinguishers indicates the amount of water it holds and the amount of fire it can extinguish.

Class B fires involve flammable or combustible liquids such as gasoline, kerosene, grease and oil. The numerical rating for class B extinguishers indicates the approximate number of square feet of fire it can extinguish.

Class C fires involve electrical equipment; such as appliances, wiring, circuit breakers and outlets. Never use water to extinguish class C fires - the risk of electrical shock is far too great. Class C extinguishers do not have a numerical rating. The C classification means the extinguishing agent is non-conductive.

Class D fire extinguishers are commonly found in a chemical laboratory. They are for fires that involve combustible metals, such as magnesium, titanium, potassium and sodium. These types of extinguishers also have no numerical rating, nor are they given a multi-purpose rating - they are designed for class D fires only.

Slide 63: Other Extinguishers

Water or air-pressurized water extinguishers are suitable for class A fires only. Water extinguishers are filled with water and pressurized with oxygen. Never use a water extinguisher on grease fires, electrical fires or class D fires because the flames will only spread and make the fire bigger! Only fight the fire with a water or APW extinguisher if you're certain it is burning only ordinary combustible materials.

Dry chemical extinguishers come in a variety of types and are suitable for a combination of class A, B and C fires. They are filled with foam or powder and pressurized with nitrogen. The BC dry chemical extinguisher is filled with sodium bicarbonate or potassium bicarbonate. Be aware that it leaves a mildly corrosive residue which must be cleaned immediately to prevent any damage to materials. The ABC dry chemical extinguisher is the multipurpose dry chemical extinguisher. It is filled with monoammonium phosphate, a yellow powder that leaves a sticky residue that may be damaging to electrical appliances such as computers. Dry chemical extinguishers have an advantage over carbon dioxide extinguishers because they leave a non-flammable substance on the extinguished material, reducing the likelihood of re-ignition.

Carbon dioxide (CO_2) extinguishers are used for class B and C fires. These extinguishers hold carbon dioxide which is a non-flammable gas under a high amount of pressure. The pressure is so great that it is common for bits of dry ice to shoot out the nozzle. They don't work very well on class A fires because they may not be able to

displace enough oxygen to put the fire out, causing it to re-ignite. CO_2 extinguishers have an advantage over dry chemical extinguishers because they don't leave a harmful residue - a good choice for an electrical fire on a computer or other electronic device.

Slide 64: Accidental Release Measures

The Accidental Release Measures section contains information for responding to spills, leaks, or releases in order to eliminate or minimize the adverse effects on persons, property, and the environment.

The following types of information should be included:

1. Containment techniques (e.g. diking or capping procedures)
2. Cleanup procedures (e.g. neutralization and decontamination techniques, sorbent materials, sweeping or vacuuming techniques)
3. Equipment and other emergency advice relating to spills and releases.

Slide 65: Respirators

Respirators are used to prevent inhalation of hazardous chemicals. MOPP gear is not suitable for routine personal protective equipment. The type of respirator used must be appropriate to the situation and the chemical contaminants. Respirators may include filtering cartridges that must be selected for the chemical contaminants to be protected against. Respirator manufacturers will usually provide charts to indicate which filters are required for specific chemicals.

Those who will use a respirator must be tested for pulmonary fitness prior to use and on an annual basis thereafter. There are specific steps necessary to maintaining, putting on, using, cleaning and storing each respirator. Be sure to familiarize yourself with these procedures prior to using any type of respirator. Your Safety Officer will be able to assist you.

Slide 66: Emergency Response Levels

Level A suits provide the highest level of protection. They are vapor-tight, providing total encapsulation and a high level of protection against direct and airborne chemical contact. They are typically worn with a self-contained breathing apparatus (SCBA) enclosed within the suit. Level A equipment is required when the greatest potential for exposure to hazards exists, and when the greatest level of skin, respiratory and eye protection is required. These fully encapsulating suits afford protection against petroleum products and halogenated hydrocarbons, as well as against nerve and blister agents. The following constitute Level A equipment:

1. Positive pressure, full face piece self-contained breathing apparatus (SCBA), or positive pressure supplied air respirator with escape SCBA, approved by the National Institute for Occupational Safety and Health (NIOSH).
2. Totally-encapsulating chemical-protective suit
3. Coveralls (as needed)
4. Long underwear (as needed)
5. Gloves, outer, chemical-resistant

6. Gloves, inner, chemical-resistant
7. Boots, chemical-resistant, steel toe and shank
8. Hard hat (under suit) (as needed)
9. Disposable protective suit, gloves and boots (depending on suit construction, may be worn over totally-encapsulating suit)

Level B suits are not vapor-tight and thus provide a lesser level of protection. They are worn with an SCBA, which may be inside or outside of the suit, depending on the type of suit (encapsulating or non-encapsulating). Level B equipment is required when the highest level of respiratory protection, with a lesser level of skin protection, is needed.

Level C includes the use of coveralls or splash suits, providing a lesser level of protection than Level B and is typically worn with a respirator or gas mask only. Level C should be selected when the concentration(s) and type(s) of airborne substance(s) is (are) known and the criteria for using air purifying respirators are met. Do not use common latex gloves or untreated Tyvek suits for Level C protection.

Level D is not considered a 'HAZMAT suit'. It requires only specific work clothing and eye (splash) protection. Gloves, boots and other safety equipment may be required as determined by the situation and chemicals to be used.

Slide 67: Exposure Control / Personal Protection

The Exposure Controls and Personal Protection section of the MSDS will include information on the controls necessary to help reduce the risk of personnel exposure, including:

1. Guidance for the selection of PPE for each route of exposure, and for the use of special PPE (e.g. SCBAs) in the event of an emergency
2. Engineering controls (e.g. local exhaust system) to minimize potential airborne contaminants
3. Work practices to reduce the possibility of contact or exposure

Slide: 68: Exposure Limits & Terms

In jobs that require exposure to hazardous chemicals, the National Institute of Occupational Safety and Health (NIOSH) published limits to which workers or first responders can be exposed without a high potential for toxicity.

REL is the NIOSH recommended exposure limit to a HAZMAT.

PEL is the OSHA permissible exposure limit.

The TLV indicates a time-weighted average (TWA) concentration for up to a 10-hour workday during a 40-hour workweek set by the American Conference of Governmental Industrial Hygienists (ACGIH).

TWA concentrations for OSHA PELs must not be exceeded during any 8-hour work shift of a 40-hour workweek.

A STEL is designated by "ST" preceding the value and is measured over a 15-minute period unless noted otherwise.

OSHA ceiling concentrations (designated by "C" preceding the value) must not be exceeded during any part of the workday; if instantaneous monitoring is not feasible, the ceiling must be assessed as a 15-minute TWA exposure. In addition, there are a

number of substances (e.g., beryllium, ethylene dibromide) that have PEL ceiling values that must not be exceeded except for specified excursions. For example, a "5-minute maximum peak in any 2 hours" means that a 5-minute exposure above the ceiling value, but never above the maximum peak, is allowed in any 2 hours during an 8-hour workday.

The IDLH is considered a maximum concentration above which only a highly reliable breathing apparatus providing maximum worker protection should be permitted. In determining IDLH values, NIOSH considered the ability of a worker to escape without loss of life or irreversible health effects along with certain transient effects, such as severe eye or respiratory irritation, disorientation, and a lack of coordination, which could prevent escape. As a safety margin, IDLH values are based on effects that might occur as a consequence of a 30-minute exposure. However, the 30-minute period was NOT meant to imply that workers should stay in the work environment any longer than necessary; in fact, EVERY EFFORT SHOULD BE MADE TO EXIT IMMEDIATELY!

LD50 is the lethal dose that kills 50% of the test population.

LC50 is the lethal concentration that kills 50% of the test population.

Slide 69: Safety Glasses

Safety glasses are perhaps the most widely used type of eye protection. While they may look similar to regular glasses, they are much stronger and more resistant to impact and heat than regular glasses. In addition, most safety glasses are equipped with side shields that give you protection from hazards that may not be directly in front of you. Both prescription and nonprescription safety glasses are available. In addition, a wide variety of lens coatings are available for special work situations. Safety glasses should be Z-87 approved to meet OSHA requirements.

Goggles will give you more protection than safety glasses in situations where there are splashing liquids, fumes, vapors, powders, dusts and mists because they fit closer to your face. Goggles will be specific to the chemical contaminants which they will protect against.

As a safety precaution, contact lenses should not be worn during work activities where you could be exposed to dust, fumes, powders, vapors, chemical splashes, molten metals, other forms of chemical exposure or contamination, intense heat, light or glare. It is not recommended that contacts be worn while using a full face respirator. Respirators should be fitted with corrective lenses. Some chemicals can react with contacts and cause permanent injury.

Slide 70: Face Shields

Face shields offer you full face protection and are often used around operations which expose you to molten metal, chemical splashes, or flying particles. Many face shields can be used while wearing a hard hat. NOTE: You should always wear safety glasses or goggles when using a face shield for added protection. Face shields alone are not considered adequate eye protection.

Slide 71: Protective Gloves

It has been estimated that almost 20% of all disabling accidents on the job involve the hands. Be sure to wear appropriate gloves when handling HAZMAT and be careful to remove rings when involved in activities where they could create or exacerbate an injury.

1. Select and use the right kind of glove for the job you are going to be performing.
2. Select gloves that fit.
3. Some gloves may be chemical specific and have a life expectancy. Discard them after the recommended time has expired.
4. Remove any rings, watches, or bracelets that might cut or tear your gloves.
5. Wash your hands before and after wearing your gloves.
6. Inspect your gloves before you use them. Look for holes and cracks that might leak.
7. Replace gloves that are worn or torn
8. After working with chemicals, decontaminate your gloves as directed by the manufacturer. Dispose of rinsate (contaminated liquid) properly
9. Avoid borrowing gloves. Gloves are *personal* protective equipment
10. Store gloves right side out in a clean, cool, dry, ventilated area
11. Never wear gloves around powered rotating equipment - drills, lathes, etc.

Manufacturers provide guides for determining the appropriate gloves for the chemical being used. If using multiple chemicals use the gloves that provide the most protection.

Slide 72: Safety & Chemical Footwear

Appropriate footwear should also be chosen based on the activities and chemicals that will be undertaken. There is safety footwear, chemical protective footwear, electrostatic dissipating footwear (conducts static electricity to floors that are grounded), electrical hazard footwear (insulated with tough rubber to prevent shocks and burns from electricity) and disposable footwear (includes shower slippers, clear polyethylene and nonwoven booties used in dust free work areas).

Steel toe footwear protects your toes from falling objects and from being crushed. Metatarsal footwear has special guards that run from your ankle to your toes and protect your entire foot. Reinforced sole footwear has metal reinforcement that protects your foot from punctures. Latex/Rubber footwear resists chemicals and provides extra traction on slippery surfaces.

1. Select and use the right kind of footwear for the job you are going to be performing. Avoid footwear made of leather or cloth if you work around acids or caustics. These chemicals quickly eat through the leather or cloth, and can injure your feet.
2. Select footwear that fit.
3. Inspect your footwear before use. Look for holes and cracks that might leak. Replace footwear that are worn or torn.
4. After working with chemicals, hose your footwear with water to rinse away residual chemicals or dirt before removing your footwear. Dispose of rinsate (contaminated liquid) properly.
5. Avoid borrowing footwear. Footwear is *personal* protective equipment.

6. Store footwear in a clean, cool, dry, ventilated area.

Chemical protective footwear is different from safety footwear. PVC footwear protects your feet against moisture and improves traction. Butyl footwear protects against most ketones, aldehydes, alcohols, acids, salts, and alkalis. Vinyl footwear resists solvents, acids, alkalis, salts, water, grease, and blood. Nitrile footwear resists animal fats, oils, and chemicals. Consult references and manufacturers guides to select proper footwear. You can often base your chemical protective footwear selection on the type of gloves that your guidance recommends.

Slide 73: Hard Hats

Always wear your hard hat while you are working in areas where there are potential head hazards. It's important that you wear the right one for the job, as there are different kinds of hard hats. Adjust the suspension inside your hard hat so it sits comfortably but securely on your head.

Inspect the shell of your hard hat for cracks, gouges, and dents. Inspect the suspension system for frayed or broken straps. If the hard hat is defective, have it repaired immediately or get a new one.

Never paint, scratch or drill "air holes" in your hard hat. You may apply reflective plastic tape if you must work at night. Never use metal tape on your helmet because it can conduct electricity. Never carry personal belongings such as cigarettes, lighters, or pens in your hard hat.

Types of hard hats:

Class C hard hats are designed for comfort, these light-weight helmets offer limited protection. They protect personnel from bumping against fixed objects but do not protect against falling objects or electric shock.

Class G hard hats are for general service. They provide good impact protection but limited voltage protection. They are used mainly in mining, building construction, shipbuilding, lumbering, and manufacturing.

Class E hard hats are for personnel engaged in electrical work. They protect against falling objects and high-voltage shock and burns.

Slide 74: Hearing Protection

You should wear hearing protection whenever you are exposed to noise 85 decibels or greater for 8-hours. For every 3 dB over 85, permissible exposure time is cut in half. Here are some examples of recognizable activities and their decibel levels:

15-25 dB = whisper

45-55 dB = rainfall

65 dB = typical speech

75 dB = old washing machine

85 dB= busy city traffic / idling bulldozer

95 dB = gas mower / hair dryer

Approx 100 dB = walkman / tractor

115 dB = leaf blower / rock concert / chainsaw

Approx 120 dB = ambulance / jack hammer

Approx 130 dB = jet plane (from 100 feet)

140 dB = fireworks / gun shot

165 dB = 12 gauge shot gun

Slide 75: Engineering Controls

Engineering controls are equipment or systems designed to prevent or reduce exposure to hazardous chemicals.

Grounding could be considered both an engineering control and a best management practice (BMP). Static electricity can be enough to provide the ignition source necessary to ignite flammable gas or vapors once they reach the appropriate concentration. Grounding is a practical measure to prevent the accumulation or allow the discharge of static electricity before it can create a hazard. It is important to recognize activities that generate static electricity since it can provide sufficient energy to ignite flammable concentrations of gases and vapors. Practical measures to prevent accumulation or allow discharge of static electricity in field activities include the following:

1. Providing a bonding connection between metal containers when flammable gases or liquids are transferred or poured.
2. Wearing footwear with adequate conductivity for the conditions.
3. Grounding all probes used for stack sampling.

Slide 76: Physical and Chemical Properties

The Physical and Chemical Properties section includes a basic description; appearance, odor and physical state; along with the chemical properties specific to the material. The appearance will mention features like colors or texture. The odor for some chemicals is a good way to recognize that there is a leak or release; such as a smell of rotten eggs for sulfur-based chemicals, or cyanides have a burnt-almond smell, and some ketones and aldehydes have a sickly sweet smell. The physical state describes whether the form is solid, liquid, or gas and can also include an emulsion or crystalline structure.

Slide77: The pH Scale

A corrosive material may cause irreversible tissue damage or eat through other materials. The strength of corrosivity of a chemical in an aqueous solution is described by pH. Pure water is neutral and has a pH of 7, acids have a pH less than 7 and bases have a pH greater than 7. Strong acids have a pH that is closer to zero with many hydrogen ions in solution. Strong bases have a pH that is closer to 14 with few hydrogen and many hydroxide ions in solution. Below is a list of liquids and their respective pH:

Battery Acid	0.3	Milk	6.0-6.6
Stomach acid	0.7- 0.8	Blood	7.3 – 7.5
Lemon Juice	2.3	Sea water	8.0
Vinegar	2.8-3.0	Great Salt Lake	10
Cola	3.0	Household Ammonia	11.6-11.9
Beer	4.0-5.0	Bleach	12.6
Coffee (black)	5.0	Drain-O & Sodium Hydroxide	14.0

Slide 78: Vapor Pressure

Vapor pressure can put stress on the container in which a HAZMAT is stored. If the pressure is allowed to get high enough it can cause bulges, explosions and/or leaks to occur if the integrity of the container is compromised. Chemicals with high vapor pressure in a hot environmental will exert more pressure on the containers.

Slide 79: Outage (Ullage)

Outage, which is also called ullage or headspace, in this context is the amount of space between the contents of a container and the top of the container. Heat or release of pressure can cause a liquid to expand so the contents could overflow or make a container bulge. Headspace must be allowed inside containers during the accumulation or storage of HAZMAT to allow for the expansion of materials: for a 55-gallon drum allow approximately 4-5 inches, for a 5-gallon container allow approximately for 2-3 inches, and for a 1-gallon container allow approximately 1 inch. When operating in environments with extreme temperatures, double these headspace approximations.

Slide 80: Vapor Density

The density of a gas or vapor can be compared to the density of the ambient atmosphere. Vapor or gas that is greater in density than the ambient air tends to settle to the lowest point. Vapor density close to the density of air or lower tends to disperse into the atmosphere.

In settling, dense vapor (v.d. >1) creates many hazards. If the vapor displaces enough air to reduce the atmospheric concentration of oxygen below 16%, asphyxia may result. If the vapor is toxic, inhalation problems predominate even if the atmosphere is not oxygen deficient. If a substance is explosive and very dense, the fire/explosive hazard may be in the form of vapor trails which can spread far from the liquid. Flashback can occur if an ignition source is present.

For example, chlorine gas has a vapor density of 2.47 and is a highly toxic gas. Insurgents have been using chlorine gas with some of their explosive devices. Chlorine would be a heavy gas, so you should try to get above it (like on a hill) and upwind of it.

Slide 81: Boiling Point

A major consideration with toxic substances is how they enter the body. A material with a high boiling point will most commonly enter the body through physical contact (route of entry - skin absorption). A material with a low boiling point will most commonly be inhaled (route of entry – inhalation).

Slide 82: Solubility

Solubility is how fast a material can mix with another. It is usually measured using water or a specific solvent. Many chemicals are water-soluble; so in case of a spill or release of these chemicals you would want to block access to water by using drain covers, digging dams or berms, sandbagging around storm drains, etc. Chemicals that

are miscible with water will disperse faster and be harder to contain during clean up. Chemicals that are immiscible may be easier to contain and clean up when released into a water body. As a rule, heat can increase solubility and water temperature should be factored into spill response actions.

Slide 83: Specific Gravity

Chemicals with a specific gravity less than one will float in water. Those with a specific gravity greater than one will sink. A HAZMAT with a high specific gravity would sink, so you would want to ensure the booms, absorbent materials, or dams go below the surface. A HAZMAT with a low specific gravity will stay near the surface, so you would want to ensure booms or absorbent materials stay toward the surface.
An example of this would be oil and water.

Slide 84: Stability and Reactivity

The Stability and Reactivity Section contains the disclosure of potential reactivity hazards. This is often accomplished by describing the conditions that could result in a potentially hazardous chemical reaction. The formation of a substance with greater toxicity than the reactants is a possibility.

Slide 85: Chemical Reactions of Incompatibles

Here are examples of incompatible chemicals and the reactions that can occur.

Slide 86: Reactive Materials

A reactive material will undergo a chemical reaction when specific conditions are met, such as contact with another chemical with which it is not compatible.

Slide 87: Oxidants / Organic Peroxides / Pyrophoric Materials

Oxidants are compounds that give up oxygen easily, remove hydrogen from another compound, or attract negative electrons. Oxidants are extremely heat and flame sensitive and may provide oxygen to an existing fire causing a “hotter,” more intense burn. Examples would be paper, cardboard, hydrogen peroxide, or chlorites used as bleaching or stripping agents for textiles, etc.
Organic Peroxides are organic oxidizers that can be shock- and heat-sensitive, flammable, and potentially explosive. Use extreme caution with these chemicals!
Pyrophoric chemicals ignite spontaneously in air at a temperature of 130°F (54.4°C) or below. They are highly dangerous; avoid having in inventory if at all possible.
Example: White phosphorous is a pyrophoric material with an auto-ignition temperature of 93° F. If exposed to oxygen it can spontaneously combust.

Slide 88: Water Reactive Materials

Water reactive chemicals react with water and may release gases that are either flammable or present a health hazard. Usually flammable solids will react in varying degrees with water or humid air. If there are water reactive chemicals in your inventory, inspect containers frequently for damage or leaks. Provide water-tight or water-proof

containment if possible.

Slide 89: Toxicological Information

Toxicological Information section: Toxicity is the ability of a chemical to damage an organism. The toxicity of a substance to an individual will be affected by the dose, the route of entry, the length and level of exposure, the level of resistance of the individual exposed, synergistic relationships with other chemicals or substances in the area, age, a person's size, level of physical fitness and relative health of the individual. Toxins can affect the body in different ways. Toxins can focus on specific organ systems such as the central nervous system, or can affect you at the cellular level as seen with carcinogens. Carcinogens can cause cancer, mutagens can cause mutations in cells, and teratogens can cause deformities in a fetus.

Slide 90: Ecological Information

The Ecological Information section will provide information needed to understand the affects the chemical will have if released in to the environment; such as the level of toxicity to fish and other aquatic organisms, any potentially hazardous products generated by the chemical breaking down, the biochemcial oxygen demand (BOD) or the amount of dissolved oxygen consumed by bacteria that perform biological degradation of organic matter, and the chemical oxygen demand (COD) or the laboratory measurement of the amount of oxygen used in chemical reactions that occur in water as a result of the addition of wastes.

Slide 91: Disposal Considerations / Transport Information

The Disposal Considerations section of the MSDS should tell you how to manage waste generated through the use of the chemical or how to properly dispose of unused waste chemical once it is no longer needed or has passed its shelf-life. Due to the variety of environmental laws and regulations, manufacturers will generally provide a very generic statement that directs the user to dispose of waste in accordance with all federal, state and local regulations. This puts the responsibility on the user to understand these regulations and act appropriately.

The Transportation Information section of the MSDS should provide the basic shipping classification of the material:

1. Basic Department of Transportation (DOT) description (e.g. Hazardous Material Description/Proper Shipping Name, Hazard Class, and Identification Number)
2. Other DOT requirements (e.g. hazardous substance/reportable quantities, modal restrictions, packaging, labeling, or exemptions)
3. Classification and descriptions under international transportation regulations.

Slide 92: Regulatory and Other Information

This section may or may not be present in a MSDS. If the information is incorporated into other sections of the MSDS the manufacturer may opt to leave this section out. If it is present it may contain:

1. Information that is required by specific States, for example a material may only be

considered hazardous in California and the MSDS will need to provide this

2. There may be warning statements that are required only by specific States

3. The manufacturer may ship around the world and there may be classifications or regulations that are specific to a foreign nation

4. Hazardous Material Information System (HMIS) information regarding health, fire, reactivity and personal protection ratings

5. National Fire Protection Association (NFPA) information regarding health, flammability, reactivity and specific hazard ratings

6. The creation date for the MSDS or the date it was last updated

7. Applicable references

Slide 93: Fire Protection Guide on Hazardous Materials

The National Fire Protection Association developed a code you often see on signs posted on doors or entryways where hazardous materials are stored. Blue = health hazard; Red = fire hazard; Yellow = reactivity; White = specific hazard. 0 = stable; 1 = unstable if heated; 3 = shock or heat may detonate; 4 = may detonate.

Slide 94: NIOSH Pocket Guide to Chemical Hazards

The NIOSH Pocket Guide is available on line. It provides chemical and physical properties, exposure limits, respiratory and personal protective equipment recommendations (PPE) for 677 different chemicals commonly used in industry.

Slide 95: On-Line Training

The OSHA website offers free HAZCOM overview, PPE, and other safety related training that can be easily accessed.

Check on Learning:

Question: _____ is the minimum temperature at which a substance produces enough vapors to ignite in the presence of an ignition source.

Answer: Flashpoint

Question: A MSDS is required by _____ for _____ hazardous material stored or used on site.

Answer: OSHA, every

Review Summary: Review the LSA as necessary.

CHECK ON LEARNING (ELO C): Conduct a check on learning that encompasses all LSAs in this ELO.

REVIEW SUMMARY(ELO C): Summarize the ELO.

D. ENABLING LEARNING OBJECTIVE

ACTION:	Identify HAZMAT transportation requirements.
CONDITIONS:	Given the presence of hazardous materials within the unit area, implement a hazardous materials management program. The necessary references

	are available.
STANDARDS:	Identify hazardous materials transportation requirements: demonstrate an understanding of unit transportation responsibilities; demonstrate an understanding of hazardous materials regulations and the required training; prepare hazardous materials for shipping; and demonstrate an understanding of hazardous materials movement requirements.

ELO D - LSA 1. Learning Step / Activity ELO D - LSA 1. Unit transportation responsibility assignment.

Method of Instruction: Conference/Discussion
Instr Type(I:S Ratio/Qty): Instructor Qualified SME(/0)*
Time of Instruction: 0 hrs 10 mins
Instructional Strategy: Small Group Instruction / Lecture
Media Type: PowerPoint Presentation / Conference
Security Classification: Unclassified
Note: Marked as (*) is derived from the parent learning object

Slide 99: Unit Movement Officer

Units with deployment mission are required to have an appropriate number of personnel trained to perform special deployment duties. These duties include unit movement officer, unit loading teams, hazardous cargo certifying officials and air loading planners. Refer to FM 3-35 for more information.

The unit movement officer (UMO) is appointed by and represents the company commander in getting the unit ready for and maintaining movement readiness. Commanders appoint in writing an officer or NCO (E6 or above) as a UMO, with an alternate (E5 or above). The UMO is a movement technician who manages and controls the flow of Army Transportation during unit movement operations. They plan, organize, and supervise the movement of Army personnel and equipment. They coordinate movement operations issues with joint, Army, and commercial agencies, and provide technical interpretation and guidance on the implementation and use of transportation automation systems. They also coordinate training of unit personnel, and advise and assist commanders and staffs on the elements of unit movement operations.

The UMO is trained to perform the following duties:

1. Preparing and maintaining documentation for unit movement in TC-AIMS II. This includes maintaining the unit movement data, from which the OEL is generated, and creating and processing the UDL.
2. Preparing the unit movement plan.
3. Planning convoy movements.
4. Requesting commercial and military transportation.
5. Coordinating with higher headquarters and support activities for unit movements.
6. Coordinating logistical support for the move.
7. Coordinating with the A/DACG and CRE at the APOE and APOD.
8. Coordinating with SDDC representatives at the SPOE and SPOD.

9. Transporting of the units' organic equipment and cargo.
10. Establishing and training unit loading teams.
11. Obtaining 463L pallets, containers; and BBPCT materials.
12. Ensuring all cargo is properly labeled with MSLs and RF tags when directed.
13. Ensuring unit personnel are authorized to certify HAZMAT.
14. Ensuring packing lists are prepared for containers.
15. Maintaining movement binders or continuity books that include appointment orders, training certificates, recall rosters, OEL, transportation requests, and BBPCT requirements.

The UMO must be familiar with:

1. Transportability of the units' organic equipment and cargo.
2. Identifying, labeling, segregating, documenting, and moving HAZMAT.
3. HAZMAT certification process.
4. Procedures for requesting commercial and military transportation.
5. Unit requirements for 463L pallets, containers; BBPCT materials.
6. Unit radio frequency (RF) tag and military shipping label (MSL) requirements.

Units must have personnel trained in vehicle preparation and aircraft and rail loading/unloading techniques, referred to as unit loading teams. The type and quantity of equipment to be loaded and the time available for loading determines the composition of the team. Training is arranged through the installation unit movement coordinator (UMC) and once completed the load teams are put on unit orders.

Air load planners are appointed and trained to prepare, check, and sign unit aircraft load plans and in the planning and execution of airlift operations. The Air Mobility Command offers an Airlift Planners Course to those units aligned under the AMC Affiliation Program. The course is also taught at Fort Eustis, VA; Fort Bragg, NC; and Fort Campbell, KY.

Slide 100: Hazardous Cargo Certifying Official

Each unit (company or detachment) requires at least one individual trained to certify hazardous cargo. This individual should not be the UMO. Hazardous cargo certifiers must be trained on applicable regulations for all modes of transportation at a DOD approved school within the previous 24 months and receive refresher training every 2 years. Once trained and appointed by the commander in writing, these individuals can certify documentation for all commercial and military modes of shipment. The hazardous cargo certifying official is responsible for ensuring shipments are properly prepared, packaged, labeled, and segregated. The certifying official is also responsible for personally inspecting the item being certified and signing the HAZMAT documentation.

Check on Learning:

Question: What responsibilities does the UMO have regarding HAZMAT?

Answer: The UMO's duties regarding HAZMAT are:

Supervise development and execution of unit load plans

Coordinate training of unit personnel

Ensure authorized personnel available to handle/certify

HAZMAT
Prepare packing lists
Ensure cargo and vehicles are properly labeled/marked
Prepare/inspect cargo manifests

Question: Who signs the HAZMAT documentation for a unit and for what else is this Soldier responsible?
Answer: The Hazardous Cargo Certifying Official
Ensuring shipments are properly prepared, packaged, labeled and segregated
Personal inspection of shipments

Review Summary: Reveiw the LSA as necessary.

ELO D - LSA 2. Learning Step / Activity ELO D - LSA 2. HAZMAT regulations and required training.

Method of Instruction: Conference/Discussion
Instr Type(I:S Ratio/Qty): Instructor Qualified SME(/0)*
Time of Instruction: 0 hrs 15 mins
Instructional Strategy: Small Group Instruction / Lecture
Media Type: PowerPoint Presentation / Conference
Security Classification: Unclassified
Note: Marked as (*) is derived from the parent learning object

Slide 101: Hazardous Materials Regulations (HMR)

The Hazardous Materials Regulations (HMR), Title 49CFR, Parts 100-185, are issued by the U.S. Department of Transportation (USDOT), and govern the transportation of HAZMAT in commerce. The primary goal of the HMR is the safety of the public and those whose occupation involves transportation of, or contact with, HAZMAT. To minimize risks, the USDOT has issued specific requirements for shipments of HAZMAT in transportation. The HMR is divided into three general areas:

1. HAZMAT identification and hazard communication - Shipping papers, markings, labels, and placards are used to communicate hazards of the materials to emergency responders, as well as, to those who handle HAZMAT routinely.
2. Packaging requirements
3. Operational rules

According to 49CFR 171.2(a) of the HMR, anyone who offers or accepts a HAZMAT shipment must comply with the HMR. The shipper and carrier share in the responsibility to offer and or accept only HAZMAT shipments that comply.

Those materials that the Secretary of Transportation has determined to be hazardous are listed alphabetically, by proper shipping name, in the Hazardous Materials Table (HMT), 49CFR 172.101. To properly prepare, offer, or transport these materials in commerce, you must use this table!

The regulations also state that packaging and containers for shipping HAZMAT must

be prepared as required. It is a serious violation to misrepresent packages or containers as meeting USDOT's standards or requirements.

Slide 102: HAZMAT Transportation

Packaging, shipping, handling, and inspecting of HAZMAT is mandated by US and international laws. These laws also apply to the use of intermodal containers and container equipment.

HAZMAT must be properly prepared and documented according to TM 38-250 and other service or command regulations. Documentation must include the total HAZMAT quantity and a certification statement stating that the HAZMAT is properly classified, described, packaged, marked, and labeled. Only specially trained individuals have authority to certify HAZMAT for transportation. Contact the Installation Transportation Officer (ITO) or Movement Control Team (MCT) for assistance in determining what certification requirements apply to each HAZMAT item being prepared for shipment. Comply with all rules and regulations governing shipment of HAZMAT. When in doubt about shipping or classifying any hazardous or questionable materials, contact the ITO or MCT. Failure to follow these rules can incur fines, delay shipments, hamper cargo accountability, increase the port throughput workload and congestion and ultimately affect the mission.

Slide 103: HAZMAT Employer / Employee

The Federal Hazardous Materials Transportation Regulations in 49CFR, Part 172, Subpart H, Sections 172.700 through 172.704, require HAZMAT Employers to train, test, and certify their HAZMAT Employees. Additional training requirements for HAZMAT drivers are found in 177.816.

HAZMAT Employer: a person or business who uses one or more HAZMAT employees to transport HAZMAT in commerce; cause HAZMAT to be transported or shipped, or who manufactures, reconditions, tests, repairs, or certifies packaging, including cargo tanks, as qualified for use in the transportation of HAZMAT. This term includes any department or agency of the United States, a state, a political subdivision of a state, or Indian tribe engaged in offering or transporting HAZMAT in commerce.

HAZMAT Employee: a person who, in the course of their employment, directly affects HAZMAT transportation safety. This includes any individual who:

1. Loads, unloads, or handles HAZMAT;
2. Manufactures, tests, reconditions, repairs, modifies, marks, or otherwise represents packaging as qualified for use in transportation of HAZMAT;
3. Prepares HAZMAT for transportation, including hazard communications, packaging, or loading and securing HAZMAT in a vehicle;
4. Is responsible for safety of transporting HAZMAT; and or
5. Operates a vehicle used to transport HAZMAT.

Slide 104: DOT HAZMAT Training

DOT HAZMAT training requires a systematic program that ensures personnel are familiar with the regulations, are able to recognize and identify HAZMAT, have knowledge of specific requirements of the regulations that are applicable to their job functions, and have knowledge of emergency response procedures, self-protection measures, and accident prevention methods and procedures. Each HAZMAT employer must identify the HAZMAT functions that an employee performs, and provide instruction to ensure that the employee complies with all safety and regulatory requirements.

HAZMAT training must include:

1. General Awareness/Familiarization Training - to make employees familiar with the regulations and enable them to recognize/identify HAZMAT consistent with the OSHA hazard communication standards.
2. Function Specific Training - to thoroughly instruct employees in the applicability of the regulations to their specific job function(s).
3. Safety Training - concerning emergency response information and measures needed to protect them from the hazards associated with the HAZMAT they may be exposed to in the workplace, including specific measures implemented to protect them, and methods for avoiding accidents.
4. Security Awareness Training - includes awareness of security risks associated with HAZMAT transportation, methods designed to enhance security, and how to recognize and respond to security threats.

NOTE: If a HAZMAT Security Plan is required on site, personnel whose duties are related to the HAZMAT covered by the plan must be trained on the plan and its implementation. Training must include company security objectives, organizational security structure, specific security duties and responsibilities of each employee, and specific actions to be taken during a security breach. If the security plan is revised, personnel must be re-trained within 90 days.

HAZMAT drivers will require additional training as required by 49CFR 177.816.

HAZMAT Driver training will include:

1. Pre-trip safety inspection
2. Use of vehicle controls and equipment, including operation of emergency equipment;
3. Operation of vehicle, including turning, backing, braking, parking, handling, and vehicle characteristics including those that affect vehicle stability, such as effects of braking and curves, effects of speed on vehicle control, dangers associated with maneuvering through curves, dangers associated with weather or road conditions that a driver may experience (e.g., blizzards, mountainous terrain, high winds), and high center of gravity;
4. Procedures for maneuvering tunnels, bridges, and railroad crossings;
5. Requirements pertaining to attendance of vehicles, parking, smoking, routing, and incident reporting; and
6. Loading and unloading of materials, including—
   a. Compatibility and segregation of cargo in a mixed load;
   b. Package handling methods; and

c. Load securement.

In addition to the HAZMAT driver's training requirements, each person who operates a cargo tank or vehicle with a portable tank of 1,000 gallons or more capacity must have the appropriate State-issued commercial driver's license and specialized training which includes:

1. Operation of emergency control features of the cargo tank or portable tank;
2. Special vehicle handling characteristics, including: high center of gravity, fluid-load subject to surge, effects of fluid-load surge on braking, characteristic differences in stability among baffled, unbaffled, and multi-compartmented tanks; and effects of partial loads on vehicle stability;
3. Loading and unloading procedures;
4. The properties and hazards of the material transported; and
5. Retest and inspection requirements for cargo tanks.

These training requirements may be satisfied by compliance with the current requirements for a Commercial Driver's License (CDL) with a tank vehicle or HAZMAT endorsement. Frequency of training and recordkeeping requirements will conform to those previously stated for DOT HAZMAT training.

Slide 105: Training Documentation

Training will be conducted for new HAZMAT employees or those newly transferred to HAZMAT duties within 90 days of employment/transfer. The HAZMAT employee must be tested by appropriate means in the 5 subject areas noted above. A record of current training, including a written certification that the employee has been trained and tested, must be maintained. The training record must include the employee's name; the date of training; the training materials (a copy, description, or location); the name and address of the HAZMAT trainer; and the written certification. DOT HAZMAT transportation training must be provided at least once every 3 years. Training records will be maintained for 3 years during the period of employment and 90 days thereafter. NOTE: Training conducted to comply with the requirements of other government agencies (i.e. OSHA, EPA, etc), including security training, may be used to satisfy DOT HAZMAT training requirements to the extent that it addresses the DOT training components.

Check on Learning:

Question: What must DOT HAZMAT training include?

Answer: HAZMAT training must include:

General awareness
Function specific training
Safety
Security awareness
Driver training for those operating a HAZMAT vehicle

Review Summary: Review the LSA as necessary.

ELO D - LSA 3. Learning Step / Activity ELO D - LSA 3. Preparation for shipping HAZMAT.

Method of Instruction: Conference/Discussion

Instr Type(I:S Ratio/Qty): Instructor Qualified SME(/0)*
Time of Instruction: 0 hrs 30 mins
Instructional Strategy: Small Group Instruction / Lecture
Media Type: PowerPoint Presentation / Conference
Security Classification: Unclassified
Note: Marked as (*) is derived from the parent learning object

Slide 106: Hazard Classes 1-3

Class 1 Explosives: any substance or article which is designed to function by explosion or which, by chemical reaction within itself is able to function in a similar manner.

Division 1.1: explosives that have a mass explosion hazard (an explosion that affects almost the entire load instantaneously). Emergency Response Guidebook (ERG) number 112.

Division 1.2: explosives that have a projection hazard but not a mass explosion hazard. ERG number 112.

Division 1.3: explosives that have a fire hazard and either a minor blast hazard or a minor projection hazard, or both, but not a mass explosion hazard. ERG number 112.

Division 1.4: explosives that present a minor explosion hazard where the affects are largely confined to the package and no projection of fragments or appreciable size or range is expected. An external fire must not cause virtually instantaneous explosion of almost the entire contents of the package. ERG number 114.

Division 1.5: very insensitive explosives comprised of substances that have a mass explosion hazard but are so insensible that there is very little probability of initiation or of transition from burning to detonation under normal conditions of transport. ERG number 112.

Division 1.6: extremely insensitive articles which do not have a mass explosive hazard comprised of articles which contain only extremely insensitive detonating substances and which demonstrate a negligible probability of accidental initiation or propagation. ERG number 112.

Class 2 Compressed Gasses:

Division 2.1: 1001 pounds of any material which is a gas at 20 °C (68 °F) or less and 101.3kPa (14.7 psi) of pressure (a material that has a boiling point at the listed temperature and pressure) which is ignitable when in a mixture of 13% or less by volume with air; or has a flammable range with air or at least 12% regardless of the lower limit. (Except for aerosols, the limits specified are determined at 101.3kPa (14.7 psi) of pressure and a temperature of 20 °C (68 °F) according to ASTM Standards.) ERG number 118.

Division 2.2: non-flammable, non-poisonous gas – includes compressed gas, liquefied gas, pressurized cryogenic gas, compressed gas in solution, asphyxiant gas and oxidizing gas. Any material which exerts in the packaging an absolute pressure of 280 kPa (40.6 psi) or greater at 20°C (68 °F), and does not met the definition of Division 2.1 or 2.3. ERG number 121.

Division 2.2: oxygen. This is an optional placard for compressed oxygen in either gas or liquid state. Oxygen is considered a non-flammable gas because it does not burn in

and of itself. However, it is required for combustion to occur. High concentrations of oxygen greatly increase the rate and intensity of combustion. ERG number 122.

Division 2.3: poison gas – by inhalation means a material which has a boiling point of 20 °C (68 °F) or less at 101.3 kPa (14.7 psi) and which is known to be so toxic to humans it poses a hazard to health during transportation, or in the absence of adequate data on human toxicity, is presumed to be toxic because when tested on lab animals it has a lethal concentration value of not more that 5000 ml/m3. ERG number 123.

Class 3 Flammable Liquids: a liquid having a flashpoint of not more than 60.5 °C (141 °F) or any material in a liquid phase with a flashpoint at or above 37.8 °C (100 °F) that is intentionally heated and offered for transportation or transported at or above its flashpoint in a bulk packaging, except:

1. Any liquid meeting the definitions of Class 2 gasses.
2. Any mixture having 1 or more components with a flashpoint of 141 °F or higher, that make up at least 99% of the total volume of the mixture, if the mixture is not offered for transportation or transported at or above its flashpoint.
3. Any liquid with a flashpoint greater than 95°F which does not sustain combustion according to ASTM 4206.
4. Any liquid with a flashpoint greater than 95°F and with an ignition point greater than 212°F according to ISO 2592.
5. Any liquid with a flashpoint greater than 95°F which is in a water miscible solution with a water content of more than 90% by mass.

ERG number 127.

Class 3 Combustible Liquids:

1. Any liquid that does not meet the definition of any other hazard class and has a flashpoint above 60.5°C (141 °F) and below 93°C (200°F).
2. A flammable liquid with a flashpoint at or above 38°C (100°F) that does not meet the definition of any other hazard class may be reclassed as a combustible liquid. This provision does not apply to transportation by vessel or aircraft, except where other means of transportation is impracticable. An elevated temperature material that meets the definition of a Class 3 material because it is intentionally heated and offered for transportation or transported at or above its flashpoint may not be reclassed as a combustible liquid.
3. A combustible liquid which does not sustain combustion is not subject to the requirements of Class 3 materials. Tests must be conducted and documented to make this determination.

ERG number 127.

The Gasoline and Fuel Oil placards may be used as an alternative for these materials in non-bulk quantities.

Slide 107: Hazard Classes 4-9

Class 4 Flammable Solid, Spontaneously Combustible and Dangerous When Wet:

Division 4.1: Flammable Solid – any of the following 3 types of materials:

1. Desensitized explosives that are Class 1 Explosives when dry (other than those

which are wetted enough with water, alcohol or plasticizer to suppress explosive properties) and are specifically authorized by name in the HMT r have been assigned a shipping name and hazard class by the Associate Administrator for HAZMAT Safety.

2. Self-reactive - materials that are thermally unstable and can undergo a strongly exothermic decomposition even without oxygen. A material is excluded from this definition if it is classed as an explosive, is forbidden from being offered for transportation (49CFR 172.101 or 173.21), is classed as an oxidizer or organic peroxide, its heat decomposition is less than 300J/g, its self-accelerating decomposition temperature is greater that 75°C (167°F) for a 110 pound package, or the Associate Administrator for HAZMAT Safety has determined it does not present a hazard associated with a Division 4.1 material.

3. Readily combustible – materials that are solids which may cause a fire through friction (matches), show a burning rate faster than 2.2 mm per second when tested, or any metal powders that can be ignited and react over the whole length of a sample in 10 minutes or less.

ERG number 134.

Division 4.2: Spontaneously Combustible – pyrophoric and self-heating materials. A pyrophoric material is a liquid or solid that can ignite within 5 minutes of contact with air in small quantities without an external ignition source. A self-heating material will self-heat without an energy supply when in contact with air. ERG number 136.

Division 4.3: Dangerous When Wet – a material that is liable to become spontaneously flammable or give off flammable or toxic gas when it comes into contact with water. ERG number 139.

Class 5 Oxidizer and Organic Peroxide

Division 5.1: Oxidizers – any material that may cause or enhance the combustion of other materials by yielding oxygen. ERG number 143.

Division 5.2: Organic Peroxides – any organic compound containing oxygen in the bivalent structure and which may be considered a derivative of hydrogen peroxide, where one or more of the hydrogen atoms have been replaced by organic radicals, except where the material is classed as an explosive, is forbidden from being offered for transportation (49CFR 172.101 or 173.21), the Associate Administrator of HAZMAT Safety has determined it does not present a hazard associated with Division 5.2, it contains no more than 1% hydrogen peroxide and the available oxygen is not more than 1%, or it contains 1 to 7% hydrogen peroxide and the available oxygen is not more than .5%. ERG number 148.

Class 6 Poisons:

Division 6.1: a material, other than a gas, which is known to be so toxic to humans that it creates a health hazard during transportation, or, in the absence of adequate data on human toxicity, is presumed to be toxic to humans because it has been determined to be toxic to lab animals or is an irritating material which causes extreme irritation especially when in confined spaces (has properties similar to tear gas).

6.1 is subdivided to designate inhalation hazards, 1001 or more gross weight of poisonous materials that are not inhalation hazards (can use the POISON or TOXIC placards for this), and 1001 pounds or more gross weight of poisons that are

specifically packing group III. ERG number 153.

Class 7 Radioactive Materials: any material having a specific activity (referring to the activity of the radionuclide per unit mass of that nuclide) greater than 70 Bq per gram. Packages of radioactive material will bear the Radioactive Yellow III label unless they are “exclusive use” (meaning the transport vehicle is carrying only radioactive material from a sole consignor and all initial, intermediate and final loading and unloading are completed at the direction of the consignor or consignee) with low specific activity materials. But, even if not labeled, the Radioactive placard is required. ERG number 163.

Class 8 Corrosive: liquids or solids that cause full thickness destruction of human skin at the site of contact within a specified period of time and liquids that have a severe corrosion rate on steel or aluminum based on the criteria of 49CFR 173.137c2. The corrosives class includes both acids and bases. Care must be taken to ensure incompatible corrosive materials are segregated as many corrosive materials react violently if mixed. The HAZMAT Load & Segregation Chart (49CFR 177.848) does not make any reference to the separation of incompatible corrosive materials. ERG number 153.

Class 9 Miscellaneous: any material that presents a hazard during transportation but which does not meet the definition of any other hazard class including materials that have an anesthetic, noxious or other similar property which could impair a flight crew member and any elevated temperature material, hazardous waste or marine pollutant. ERG number 171.

Other Related Markings:

Dangerous: When non-bulk packagings of 2 or more categories of HAZMAT from Table 2 requiring different placards are being transported, the Dangerous placard may be used instead of all of the individual placards.

Marine Pollutant: these materials are listed in appendix B to 49CFR 172.101 (also 171.4). Placards are required when specific conditions are met.

Slide 108: Preparing & Documenting Shipments

The following steps are a guide to use when preparing HAZMAT for shipment:

1. Determine proper shipping name, hazard class, United Nations Identification (UN ID) number, and packing group from the Hazardous Materials Table (HMT) in Title 49CFR, or other governing regulation. Identify primary and any subsidiary hazard classes.

2. Determine the mode(s) of transport from origin to destination. The unit must ensure that the shipment complies with the various modal requirements. Mode of transport can affect the packaging, quantity per package, labeling, and segregation of HAZMAT. (Refer to Title 49CFR; for vessel shipments see International Maritime Dangerous Goods (IMDG) Code; for commercial air see International Air Transport Association (IATA); or for military air see TM 38-250.)

3. Determine and select the proper packaging according to the modal regulations. When selecting an authorized container, consider the quantity per package. Refer to the various modal regulations or use the DOD Performance Oriented Packaging PC III

database to determine appropriate and certified packaging. (Contact DLA, DOSO-DH, DSN 695-4788 or (804) 379-4788, FAX X3793, to obtain access to this program.)
4. Packaging shall be marked according to MIL-STD 129 and applicable modal regulations.
5. Select the proper labels and apply as required. Refer to the HMT. Labels are not needed for fuel that is in the tanks on individual vehicles being transported.
6. Prepare packing lists. List HAZMAT packed inside containers or vehicles first. Only authorized abbreviations are permitted for HAZMAT. Refer to Title 49CFR.
7. Determine segregation requirements for HAZMAT based on each mode of transport or combination thereof. Find segregation requirements that are specific to each mode of transportation in 49CFR, Parts 173 through 177.
8. Determine the proper placards according to 49CFR.
9. Load, block, and brace HAZMAT according to 49CFR and DOD-approved specifications. Container loading diagrams for ammunition and explosive items can be obtained by contacting the US Army Defense Ammunition Center, McAlester, Oklahoma.
10. Use water or air commodity and special handling codes on the OEL and UDL.
11. Prepare shipping documentation. Ensure the shipping papers (Commercial Bill of Lading (CBL), DD Form 836, and so forth) contain the required entries. Required entries are proper shipping name, hazard class and division, UN ID number, packing group, total HAZMAT metric measure with the English equivalents in parentheses, certification statement, and applicable emergency response information. See DOD 4500.9-R, Volume II for detailed documentation information.
Provide a dangerous goods declaration and certificate for each vehicle or freight item containing HAZMAT (See DOD 4500.9-R, Volume II).
NOTE: When operating OCONUS, HAZMAT laws and certification requirements differ from country to country. The local MCT has the information for all HAZMAT movement and certification requirements in the host country.

Slide 109: Shipping Papers

The term "shipping paper," as used by the transportation industry, means the paper or document used for billing, accountability and other day-to-day activities of transporting HAZMAT. In the HMR, "shipping paper" means the documentation or paper containing the HAZMAT information required by regulation. Federal regulation requires the retention of the shipping paper for one year by both the shipper and the carrier. Except for hazardous waste, there is no specific shipping paper "form" or "format" required for HAZMAT shipments. Shippers may use whatever format or design appropriate to their operation. All entries must be legible and printed in English. No unauthorized abbreviations are permitted. If there is more than one page, they must be numbered consecutively and the first page must specify the total number of pages. The shipping paper must contain the basic description plus any required additional descriptions or entries. The basic description includes the proper shipping name, the hazard class or division, the identification number and packing group (PG), if assigned. The shipping description may be shown before or after the basic description and will

include the total quantity with the unit of measure, except for empty packages, cylinders for Class 2 materials and bulk packages. An emergency response telephone number will be entered once if it covers all of the HAZMAT on the document or after each HAZMAT description. The type of packaging and destination marks will be included. After any additional required entries, the last shipping paper entry is the certification that the HAZMAT are properly offered for transportation according to the HMR. There are 3 different certification methods based on the mode of transportation. Ensure the proper one is used.

A HAZMAT and non-HAZMAT may be placed on the same shipping paper; however, the HAZMAT must be distinguished from the non-HAZMAT. There are 3 methods:

1. Enter the HAZMAT first,
2. Highlight the entry or enter it in a color that clearly contrasts with any description of non-HAZMAT
3. Put an “X” or “RQ” in the “HM” column

Additional entries required on shipping papers could include DOT-E followed by the exemption number for shipments made under a USDOT exemption; “Limited Quantity” or the authorized abbreviation for limited quantity shipments; “RQ” must be entered on the shipping paper for each hazardous substance that is shipped; there are specific entries that must be made if the material is radioactive; for packaging that contains a residue of a HAZMAT the shipping paper may include “Residue: Last contained ***” with the basic description of the material; for HAZMAT that is prohibited or forbidden aboard passenger carrying aircraft the words “Cargo Aircraft Only” must be entered; for rail shipments the reporting mark and number must be entered; there are specific entries required for anhydrous ammonia and noncorrosive liquefied petroleum gas shipped by highway; shipments of HAZMAT by water must identify the type, number and gross mass of each package and the name of the shipper; “Dangerous When Wet” must be entered for any material that meets that definition; for organic peroxides which qualify for more than one listing, the technical name must include the actual concentration or appropriate range; an entry describing a mixture or solution of 2 or more HAZMAT must include the technical names of at least the 2 predominant components; if not identified in the proper shipping name “Marine Pollutant” and the component making it such must be entered; add the technical name for poisonous or toxic constituents, if not added annotate “Poison” or “Toxic”; if a material is poisonous or toxic by inhalation add “Poison-Inhalation Hazard” or “Toxic-Inhalation Hazard” and the appropriate hazard zone.

Slide 110: Packaging

Anyone who has any responsibility for preparing HAZMAT for shipment must do so according to the HMR. This means, properly classifying, describing and packaging the material and correctly marking the package. Shippers must determine that packages are compatible with the lading.

The term “package” or “outside package” means the packaging plus its contents. The term “packaging” means a receptacle and any other components or materials necessary to perform its containment function in conformance with the minimum

packing requirements of the HMR. A package must meet or exceed minimum packaging requirements. Packaging includes fiberboard boxes, drums, jerricans, portable tanks, cargo tanks, tank cars, multi-unit tank car tanks and containers other than freight containers and overpacks. A shipment of HAZMAT that is not prepared according to the HMR may not be offered or accepted for transportation by any mode. Packaging requirements can be found in 49CFR 173.13.

Complying with 49CFR 173.13:

1. The HAZMAT must be placed in a tightly closed glass, plastic or metal inner packaging with a maximum capacity not exceeding 1.2 L for liquids and 2.85kg (6.25 pounds) for solids. Sufficient outage must be provided for liquids so the inner packaging will not become full at 55°C (130°F). The net quantity (measured at 20°C (68°F)) of liquid in any inner packaging may not exceed 1 L. For transportation by aircraft, the net quantity in one package may not exceed the quantity specified in the HMT.
2. The inner packaging must be placed in a hermetically sealed barrier bag which is impervious to the lading. For liquids it must then be wrapped in enough non-reactive absorbent material to completely absorb the contents. (Alternatively, the inner packaging may first be wrapped in a non-reactive absorbent material and then placed in the hermetically sealed barrier bag.)
3. For solids, the barrier bag and its contents must be placed in a fiberboard box which is then placed in another hermetically-sealed barrier bag. For liquids, the combination of inner packaging, absorbent material and bag must be placed in a snugly fitting metal container that must be securely closed. For Division 4.2 or 4.3 liquids, the metal container must be hermetically sealed. For Division 4.2 materials in Packing Group I, the metal container must be tested according to 49 CFR 178 at the Packing Group I performance level. Next, the metal container must be placed in a fiberboard box, which is finally placed in another hermetically sealed barrier bag.
4. The intermediate packaging must be placed inside a securely closed outer packaging which conforms to the appropriate requirements for the phase of the material.
5. Not more than four intermediate packagings are permitted in an outer packaging.

The HMT must be used to select the proper packaging for a HAZMAT. Identify the proper shipping name, hazard class and ID number in the HMT and follow the line across to the PG which will be designated by Roman numerals I, II or III reflecting the degree of danger within the hazard class (I is the greatest danger and III is the least). If specific conditions are met the HMT will list exceptions to the packaging requirements and authorized packaging for bulk and non-bulk material. General package requirements address package design, construction and content limitations. These general requirements preclude a significant release of HAZMAT, a substantial reduction in effectiveness of package, and mixing of gases or vapors which could reduce package effectiveness.

In selecting a packaging, you must also consider quantity and modal limitations that may restrict your choices. The HMT lists the quantity limitations for HAZMAT that can be transported by passenger railcars, passenger aircraft or cargo aircraft. HAZMAT

packaging for air shipment must be designed and constructed to prevent leakage caused by vibration, altitude and temperature changes; closures must be held securely in place by positive means to prevent leakage; combination packaging for certain hazardous liquids must contain non-reactive absorbent material to absorb leaks and where absorbent is required if the outer package is not leak-tight a leak-proof liner must be used. All cylinders with valves transported by air must have protection to prevent operation of or damage to valves. Equip cylinders with securely attached valve caps, protective headrings or place cylinders in a box or crate. Vented closures are used to reduce internal pressure and prevent an unintentional release of the product. Cargo tanks, tank cars or shipments of packages with vented closures may not be transported by aircraft.

Performance testing requirements for all packaging designs are contained in 49CFR, Part 178. Packagings tested to meet the performance requirements are called "UN Standard Packagings." Every UN standard packaging must be marked with the appropriate United Nations certification mark which contains the ID code letters and number(s) preceded by the UN symbol, e.g., UN1A1 or UN4G. In addition, the specification packaging must be marked with:

1. A letter to indicate the PG performance level, (i.e., X for PG I, II, and III; Y for PG II and III; or Z for PG III), and
2. A number designating the specific gravity or maximum gross mass (in kilograms) of the tested packaging design.

Example: The mark "4G/Y29" indicates a UN specification 4G fiberboard box tested to PG II performance requirements with a maximum gross mass of 29 kilograms (64 lbs).

UN standard packaging can be built and tested to a variety of performance levels and capacities. It is very important that the UN standard you select is authorized for the packing group of the material you want to ship. The package must be tested for the specific gravity or mass for the HAZMAT being shipped. Detailed explanations of the UN ID codes and package marking requirements are in 178.502 and 178.503. Always make sure that all markings required by the HMR are on the packaging. UN non-bulk packagings are also required to be marked to include:

1. The hydrostatic test pressure for single and composite packagings intended for liquids, or the letter "S" for packagings intended for solids or inner packagings;
2. The last two digits of the year of manufacture;
3. The state authorizing allocation of the mark;
4. The name and address or registered symbol of the manufacturer or approval agency certifying compliance with Part 178.

In addition to the packaging authorizations, a HAZMAT may be subject to the "Special Provisions" indicated by code letters and/or numbers in the HMT. If so, there may be additional packaging marking requirements or restrictions.

Slide 111: DOD Packaging

HAZMAT offered for transportation by, for or to the U.S. Department of Defense (DOD) must be packaged according to the HMR or in DOD-certified packagings of equal or greater strength and efficiency. This rule includes commercial shipments under

government contract. HAZMAT offered by DOD under these provisions may be reshipped by any shipper to any consignee as long as the packaging hasn't been altered or damaged.

HAZMAT sold by DOD in packaging not marked according to the HMR may be shipped from DOD installations. But, the DOD must certify in writing that the strength and efficiency of the packaging are equal to or greater than the packaging required by the HMR.

For each shipment, shippers must obtain the certification, in duplicate, from the DOD. Shippers must provide the originating carrier with a copy and retain the other copy for at least one year.

Slide 112: Marking & Labeling

The term "marking," as used in the HMR, means the required information on outer packagings of HAZMAT. This includes a descriptive name, ID number, specifications or UN marks plus any required instructions and/or cautions. Each person who offers a HAZMAT for transportation must mark each package, freight container and transport vehicle containing the HAZMAT as prescribed in the HMR. Additionally, when required, each carrier that transports a HAZMAT shall mark each package, freight container and transport vehicle, as prescribed. There are separate marking requirements for bulk packaging, cargo tanks, tank cars and portable tanks.

The term "label" as used in the HMR, means a prescribed hazard warning notice. Labels must be at least 100 mm (3.9 in.) on each side. Labels are applied to the outside of shipping containers of HAZMAT. Labels identify the primary and subsidiary hazards specific to materials and may give information about handling precautions and prohibitions, as well.

Slide 113: Markings

The requirements regarding the proper shipping name that apply to the completion of the shipping papers will apply when marking packages.

All markings must be durable, in English and printed on or affixed to the surface of the package or on a label, tag or sign. They must stand out. Place markings on a background of sharply contrasting color, not obscured by labels or other matter. Locate the required markings away from any other markings, such as advertising, that could reduce the effectiveness of the HMR markings.

Every non-bulk package of HAZMAT offered for transportation must be marked with the name and address of the consignee/consignor except when transported by highway and not transferred to another carrier; or when the entire contents of a carload, truckload, or freight container is shipped from one consignor to one consignee. Combination packages and overpacks with inside packaging of liquid HAZMAT must be packed with the closures in an upright position. Packages and overpacks must be marked with package orientation arrows on two opposite vertical sides to indicate the correct upright direction.

Slide 114: Labels

When labels are required, they must be:

1. On a background of contrasting color or have a dotted or solid line outer border
2. At least 3.9 inches on each side, durable and weather resistant
3. Unobscured by markings or attachments
4. Displayed next to each other when 2 or more labels are required.
5. On at least 2 sides or ends on each:
   a. Package or overpack with a volume of 64 cubic feet or more
   b. Non-bulk package of radioactive material
   c. Freight containers or aircraft unit load devices having a volume between 64 and 640 cubic feet (at least 1 must be near the closure for the freight container)

Slide 115: Labels (cont'd)

The HMT contains a listing of label codes for each HAZMAT. Once labeling codes are identified their meaning can be discerned using the Label Substitution Table in 49CFR 172.101(g). Unless excepted, no package of HAZMAT may be offered or transported unless properly and accurately labeled. The hazard warning labels must accurately represent the hazard of the material in the package.

The required labels must be printed on or affixed to the same surface of the package near the marked proper shipping name, if the package dimensions are adequate. The label may be printed on or affixed to a tag or by other suitable means when:

1. The package contains no radioactive material and the label is larger than the package;
2. The package surface is such that a label cannot be affixed; and/or
3. When the package is a cylinder.

A package containing a HAZMAT that meets the definition of more than one hazard class must be labeled for the additional hazard classes. Subsidiary hazard labels may not display the hazard class number. A package containing more than one HAZMAT must be labeled for each hazard class.

The labels required by the HMR are normally used for domestic shipments but may be used for international shipments. Several international organizations prescribe labeling requirements that may be used in addition to or in place of domestic labels. Shipments of HAZMAT being transported from Canada may display labels that conform with Canadian regulations for the Transportation of Dangerous Goods (TDG). The TDG labels may be used in place of or in addition to those required by the HMR. HAZMAT warning labels listed in the United Nations "Recommandations on the Transport of Dangerous Goods" document may also be used in place of the labels required by the HMR. Labels used in the United States, Canadian, IMO/IMDG and ICAO regulations are generally based on the UNR although Canada has some label designs that vary from the UNR.

If a shipment is being transported by water, the International Maritime Organization (IMO)/International Maritime Dangerous Goods (IMDG) Code labels may be used in place of or in addition to those required by the HMR.

If a shipment is being transported by air, the International Civil Aviation Organization (ICAO) Technical Instructions labels may be used in place of or in addition to those

required by the HMR. HAZMAT shipped by air and authorized for cargo aircraft only must have the “CARGO AIRCRAFT ONLY” label affixed to the package. The label warns those who handle the package that it may not be transported on a passenger carrying aircraft.

Check on Learning:

Question: What HAZMAT falls under Hazard Class 1?
Answer: Explosives

Question: What is the difference between marking and labeling?
Answer: Marking refers to the required information on outer packagings of HAZMAT. This includes a descriptive name, ID number, UN marks plus required instructions and/or cautions.
A label is a prescribed hazard warning notice applied to the outside of shipping containers of HAZMAT. Labels identify the primary and subsidiary hazards and may give information about handling precautions and prohibitions.

Review Summary: Review the LSA as necessary.

ELO D - LSA 4. Learning Step / Activity ELO D - LSA 4. HAZMAT transportation.

Method of Instruction:	Conference/Discussion
Instr Type(I:S Ratio/Qty):	Instructor Qualified SME(/0)*
Time of Instruction:	0 hrs 20 mins
Instructional Strategy:	Small Group Instruction / Lecture
Media Type:	PowerPoint Presentation / Conference
Security Classification:	Unclassified
Note: Marked as (*) is	derived from the parent learning object

Slide 116: Loading/Unloading Requirements

There are general loading and unloading requirements for motor carriers covering issues such as:

1. Attendance requirements - cargo tanks
2. Container safeguards
   a. Precautions in transit
   b. Securing against movement and leakage
3. Accident/fire prevention
   a. Fueling precautions
   b. Use of cargo heaters
   c. Smoking prohibitions and
   d. Keeping fire away from HAZMAT

There are specific loading and unloading requirements for hazard classes 1 through 8,

batteries containing electrolytes when loaded with other cargo, cargo tank vehicles that transport flammable liquids, cylinders containing compressed gas, poison-labeled packages, and radioactive material packages.

Some HAZMAT must be segregated to prevent the possibility of an accident or incident. Refer to 49CFR 177.848, the "Segregation Table for Hazardous Materials." This table shows the segregation requirements for hazard classes and divisions. A hazard class or division that is not shown is not restricted. A blank space in the table also indicates no restrictions apply. When using the segregation table, an X as an intersection of 2 chemicals means they can't be loaded, transported or stored together; an O means specific conditions must be met.

Slide 117: Placarding

Unless the regulations tell you differently, each person who offers or transports a regulated HAZMAT must comply with the placarding requirements. They are located in 49CFR 172, Subpart F, of the HMR. The HMR applies to freight containers and unit load devices. A freight container is a reusable container that has a volume greater than 1.8 cubic meters (64 cubic feet) and is designed to be lifted with its contents. It is intended primarily for containment of packages during transportation. A unit load device can be any type of freight container, including an aircraft pallet with a net or an aircraft pallet with a net over an igloo.

Placards may not be placed or displayed on a transport vehicle, portable tank or freight container unless the transported material is a HAZMAT, the placard represents a hazard of the material, and the placarding conforms to the regulations.

Placards must clearly communicate the hazard of the material being transported. This is crucial in an emergency situation. Therefore, do not use any sign or device that by its color, shape, content or design may be confused with a placard on a transport vehicle, portable tank or freight container.

These restrictions do not apply to the display of a UN/NA chemical identification number on a white square-on-point configuration prescribed by 172.336(b) (see the small graphic in the slide for an example); the display of a Biohazard marking, Hot marking, or a sour crude oil hazard marking. The UN/NA identification numbers, when required, will be displayed on either orange panels or on a plain white square-on-point panel with the same dimensions as a placard. They may also be included on the placard when specific circumstances are met.

These prohibitions do not apply if the placards used are in conformance with the TDG Regulations, the IMDG Code, or UN Recommendations.

Slide 118: Placarding Requirements

No placards are required for: Infectious substances, limited quantities, other regulated materials (ORM-D), combustible liquids in non-bulk packagings, and materials that are prepared according to 49CFR 173.13. The outside of the package must be marked, in association with the proper shipping name, with the statement: "This package conforms to 49CFR 173.13."

Placards must be displayed on each end and each side of a bulk packaging, freight

container, unit load device, transport vehicle and rail car containing HAZMAT, unless the HMR says otherwise. The placards must be readily visible from the direction it faces. If coupled to another motor vehicle or rail car, visibility is not required from the direction it faces. The placard on the front of a motor vehicle may be on the front of a truck tractor instead of, or in addition to, the placard on the attached cargo container. Freight containers or portable tanks may be placarded instead of the motor vehicle if visibility requirements are met, but if it is inside a transport vehicle, the van type trailer must be placarded.

When a shipper offers a HAZMAT to a carrier for highway transportation, the shipper must also offer the required placards, unless the carrier's vehicle is already properly placarded for the material. The motor carrier may not transport the HAZMAT unless the proper placards are affixed to the vehicle. For transportation by rail car, cargo tank or portable tank, the shipper of the HAZMAT must affix the required placards. (A portable tank of less than 1000 gallons needs to be placarded only on 2 sides). The placards for rail transportation may be displayed on the motor vehicle, transport container or portable tank instead of the rail car. Placards are not required when these same containers and devices are transported by air only, provided that they meet International Civil Aviation Organization (ICAO) Technical Instructions. Also, the container or device must be labeled or marked with a tag. Air shipments of freight containers and unit load devices with a capacity of less than 640 cubic feet require one placard or two labels.

Slide 119: Placarding Requirements (cont'd)

Each placard must be securely attached and maintained in good condition. Placards must be located clear of appurtenances and devices, away from dirt and water from wheels and at least three inches from any detracting markings. Placard words and/or numbers must be displayed horizontally.

There are some special placarding requirements that must be followed based on the HAZMAT being transported, i.e. when transporting poisonous material, a flammable liquid that is also a poison-inhalation hazard, etc.

Each bulk packaging, including a cargo tank, or portable tank, required to be placarded when it contained a HAZMAT must remain placarded when it is empty and has not been cleaned and purged, or reloaded with a non-regulated material or a HAZMAT requiring a different placard. The placard must be removed if the bulk packaging is reloaded with a non-regulated material or a HAZMAT that requires a different placard. The placard must be removed once the bulk packaging is cleaned and purged of all potentially hazardous vapors.

Slide 120: HMR Placarding Tables

There are two placarding tables in 49CFR 172.504(e). Do not confuse these tables with the HMT in 172.101. Table 1 requires placards for transporting any quantity of any HAZMAT listed. Table 2 is based on the aggregate gross weight of the HAZMAT listed. Placards are required if greater than 1001 pounds of a material listed is transported. Except for bulk packagings and HAZMAT subject to 49CFR 172.505, if

less than 1001 pounds of aggregate gross weight of a HAZMAT covered by Table 2 is transported by highway or rail, placards are not required.
If a transport vehicle or freight container carries non-bulk packages containing two or more hazard classes from Table 2 requiring different placards, the DANGEROUS placard may be used in place of the hazard class placards. The DANGEROUS placard may not be used on a cargo tank, portable tank or tank car. Instead, the specific placard for each HAZMAT must be applied. In addition, the DANGEROUS placard may not be used when placarding Table 1 materials. However, if 2205 pounds aggregate gross weight or more of one category of material is loaded at one loading facility, the placard specified in Table 2 must be applied for that specific HAZMAT.
Be familiar with additional placarding requirements and exceptions based on the HAZMAT transported and Tables 1 and 2.

Slide 121: Placard Modifications

Placards may be modified in certain instances. The word “GASOLINE” may be used in place of the word “FLAMMABLE” on the placard of a cargo or portable tank transporting gasoline by highway. As long as fuel oil is not classed as a Flammable liquid, the words “FUEL OIL” may be used in place of the word “COMBUSTIBLE” on the placard. However, the fuel oil must be in a cargo or portable tank transported by highway.

Slide 122: HAZMAT Movement

Be aware that there are different requirements for packaging, marking, labeling, and placards base on the mode of transportation; highway, rail, air, or water-borne vessel; for HAZMAT. There are restrictions that must be adhered to for different hazard classes and there are hazardous chemicals that are restricted or forbidden from certain modes of transportation. Unit personnel must rely on those Soldiers within its ranks that are trained for HAZMAT transportation tasks to conduct the proper planning, supervision, coordination, loading/unloading, and certification of HAZMAT for movement.

Check on Learning:

Question: What do the general loading and unloading requirements encompass?
Answer:
Attendance requirements
Container safeguards
Accident/fire prevention

Question: For highway shipments, who is responsible for supplying the placards?
Answer: The shipper.

Question: True or False. The requirements for transporting HAZMAT are the same regardless of the mode

of transportation.

Answer: False

Review Summary: Review the LSA as necessary.

CHECK ON LEARNING (ELO D): Conduct a check on learning that encompasses all the LSAs of this ELO.

REVIEW SUMMARY(ELO D): Summarize the ELO.

SECTION IV. SUMMARY

Method of Instruction:	Conference/Discussion
Instr Type(I:S Ratio/Qty):	Instructor Qualified SME (null:null/0)*
Time of Instruction:	10 mins
Instructional Strategy:	Small Group Instruction, Lecture

Note: Marked as (*) is derived from the parent learning object

Check on Learning

Answer questions and conduct a check on learning that encompasses all of the ELOs.

Review/ Summary

A great deal of planning must go into the management of hazardous materials: from ensuring personnel are aware of the hazards posed by the chemicals in their work area and use of the proper PPE; ensuring adequate storage and secondary containment is available for the segregation of incompatible materials; managing the materials in a manner that they are used up for their intended purpose prior to the expiration of their shelf-life and do not become a hazardous waste that must be disposed of; and ensuring they are properly packaged, marked, labeled, loaded/unloaded, segregated, the proper placards are offered and cared for during transportation. The improper management of hazardous materials can lead to leaks, spills and the interaction of incompatible materials. Preventing hazardous materials from being released into the environment will protect the health and well-being of Soldiers and civilians, as well as protecting the environment.

SECTION V. STUDENT EVALUATION

Testing Requirements	Correctly answering 100% of the check on learning questions for each LSA within the ELOs will suffice to demonstrate an understanding of the lesson. Additional check on learning questions may be added by the instructor if 100% accuracy is not obtained.
Feedback Requirements	Feedback is essential to effective learning. Schedule and provide feedback on the evaluation and any information to help answer students questions. Provide remedial training as needed.

Appendix A - Viewgraph Masters

Implement Unit Hazardous Materials Management
05-2-7503 / Version 1

Sequence	Media Name	Media Type
None		

Appendix B - Test(s) and Test Solution(s)

PRACTICAL EXERCISE(S)/SOLUTION(S) FOR LESSON 05-2-7503 Version 1

Appendix D - Student Handouts

Implement Unit Hazardous Materials Management
05-2-7503 / Version 1

Sequence	Media Name	Media Type
0	Implement Unit Hazardous Materials Managment	PPT
0	Implement Unit Hazardous Materials Management	PPT

Implement Unit Hazardous Materials Management

05-2-7503 / Version 1

Effective Date: 07 March 2012

1. The importance of this lesson: (Why)

Implement unit hazardous materials management.

2. What we want our Soldiers to Achieve: (Outcomes/Standard)

Implement unit hazardous materials management: identify hazardous materials management techniques; identify the procedures for managing hazardous materials using the DLA Shelf-Life Program; identify the components of hazard communication; and identify hazardous materials transportation requirements.

3. Tasks to be taught

Task Number	Task Title	Task Type
052-250-1005	Comply with Host Nation, Federal, State and Local Environmental Protection Laws and Regulations	Individual SUPPORTED
101-20B-0029	Manage Hazardous Materials (HAZMAT)	Individual SUPPORTED
551-882-2007	Train Unit Movement Personnel to Identify, Document, and Properly Load Hazardous Materials (HAZMAT) and Sensitive and Classified Cargo	Individual SUPPORTED
551-88N-3121	Coordinate Hazardous Materials/Munitions Shipments	Individual SUPPORTED
551-88M-4325	Establish Transportation Safety Program	Individual SUPPORTED
091-89D-1229	Transport Hazardous Materials	Individual SUPPORTED
091-89D-1231	Store Hazardous Materials	Individual SUPPORTED
05-2-7502	React to a Hazardous Spill	Collective SUPPORTED
05-2-7503	Implement Unit Hazardous Materials Management	Collective SUPPORTED

Additional Non-Standard Tasks

None

4. References:

Reference Number	Reference Title	Date
29 CFR 1910.1200	Hazard Communication	01 Jul 2003
AR 700-141	HAZARDOUS MATERIALS INFORMATION RESOURCE SYSTEM	13 Aug 2007
AR 702-18	MATERIEL QUALITY STORAGE STANDARDS POLICY FOR SHELF-LIFE MATERIEL	03 Oct 2004
CFR 49	Title 49-Transportation	11 Oct 2011
DOD 4140.27-M	Shelf Life Item Management Manual	26 Sep 1997
ERG2008	Department of Transportation Emergency Response Guidebook.	
FM 3-34.5	ENVIRONMENTAL CONSIDERATIONS	16 Feb 2010
FM 3-35	ARMY DEPLOYMENT AND REDEPLOYMENT	21 Apr 2010
NFPA	National Fire Protection Association, Fire Protection Guide on Hazardous Materials, Eighth Edition	
NIOSH 97-140	NIOSH Pocket Guide to Chemical Hazards (NPG)	01 Jan 2003
TC 3-34.489	The Soldier and the Environment.	08 May 2001
TG 217	Technical Guide 217, Hazardous Material/Hazardous Waste Management Guidance for Maneuver Units During Fieald and Deployment Operations	02 Oct 2000
TM 38-250	PREPARING HAZARDOUS MATERIALS FOR MILITARY AIR SHIPMENTS {AFMAN 24-204(1); NAVSUP PUB 505; MCO P4030.19I; DLAI 4145.3 DCMAD1, CH3.4 (HM24)} (REPRINTED W/ BASIC INCL C1)	15 Apr 2007
TM 38-410	STORAGE AND HANDLING OF HAZARDOUS MATERIALS {DLAM 4145.11; NAVSUP PUB 573; AFR 69-9; MCO 4450-12}	13 Jan 1999
UFC 4-442-01N	Unified Facilities Criteria (UFC) Design: Covered Storage	16 Jan 2004

Additional Non-Standard References

None

5. Resources

TIME: Time of Instruction (Time not specified)

LAND: Classroom, Training Area, and Range Requirements

Id	Name
17120-M-1200-30	Classroom, Multipurpose, 1200 Square Feet, 30 Students

AMMO: Ammunition Requirements

DODIC	Name
None	

MISC: Materiel Items and TADSS Requirements

Id	Name
None	

Additional Non-Standard Resources

None

6. A possible technique to achieve the outcome:

None

7. Conduct AAR with Soldier and Cadre.

None

NOTE: Before presenting this lesson, Instructors must be thoroughly prepared by studying the appropriate lesson plan and identified reference material.