

DOT Hazardous Materials General Awareness



Regulated Materials Management Center

UW Environmental Health & Safety

MeHgOH
Pkg

What do you do when a driver asks you to sign for this package?



MeHgOH Can

Mashed can was thrice perforated. Foil pouch and glass vial intact





US Department of Transportation

- n The DOT regulates hazardous materials “in commerce”
 - Over the road
 - By rail
 - In the air
 - By vessel

ValuJet Crash Killed 109 People in 20 Minutes

- n "The National Transportation Safety Board determines the probable cause(s) of this accident as follows: ...
 - n actuation of one or more oxygen generators being improperly carried as cargo...
 - n the failure of SabreTech to properly prepare, package, and identify unexpended chemical oxygen generators before presenting them to ValuJet for carriage; ...
 - n ValuJet's failure to ensure that ... employees were aware of the **carrier's 'no-carry' hazardous materials policy** and had received appropriate hazardous materials training".
 - (NTSB Report AAR-97/06)
1. ValuJet tried to avoid dealing with hazmat regs by issuing a policy that they wouldn't transport hazmat. So personnel weren't trained to watch for it.
 2. SabreTech presented the oxygen generators as non-haz. If ValuJet staff had been properly trained, they would have connected "oxygen generator" with the definition of "Oxidizer" Hazard Class, and refused the shipment.
 3. Refusing the shipment would have saved 109 people's lives.

ValuJet Flight Path



ValuJet Witness



ValueJet Impact Site





FedEx DC-10 Destroyed by Fire

- n September 05, 1996 in NEWBURGH, NY
- n **DNA synthesizer** containing flammable liquids ignited in cargo hold.
- n The crew landed and escaped with only minor injuries.
- n The plane was completely destroyed.
- n "The presence of flammable chemicals in the DNA synthesizer was wholly unintended and unknown to the preparer of the package and shipper" - from NTSB report.

Fines - Most Schools Won't Talk

- n Some years ago, the football team for a northwestern state university took spray paint cans in carry-on luggage on a flight for a game. I gather they were going to repaint their helmets. They got off with a warning. They discovered later, that a warning counts as a prior incident.
- Some years later, a PI doing HIV research in Africa packaged up some materials for shipment to Nairobi. As the pallet passed through Heathrow, an odd package marking that indicated a non-hazardous unregulated material caught the eye of the inspector. They opened the packaging and discovered several undeclared items that qualified as hazmat under international regs. Since the university had a previous violation, and this new violation was considered multiple and gross, the PI's department was fined \$40K. They were not able to negotiate out of this fine. They did institute a training program.
- At some later date, a researcher from this same university packaged a sample in a dry shipper.
 - {A dry shipper, when properly prepared, is not regulated. It is a double-walled refrigeration device like a specialized thermos bottle. Between the walls, you pour in liquid N2. There is an absorbent that absorbs the liquid N2. Then you remove any free liquid that has not been absorbed. This keeps the sample, such as bull semen, at liquid N2 temp without the possibility of spilling liquid N2. Unless you fail to drain off all the free liquid}.
- n So this researcher's dry shipper is bouncing merrily down the cargo ramp in Arizona, when about a tablespoon of liquid N2 splashes out. This is how you go from 0 to 30,000 in one tablespoon. A cargo handler saw it fizzing, boiling, and vaporizing on the ramp. Phone calls, investigations, letters, interviews, and a \$30K fine followed. This time they were allowed to negotiate, because they had started a DOT hazmat training program. The settlement was a \$1K fine and \$15K in corrective actions. This package went from unregulated to fully-regulated hazmat in a single tablespoon. At that point, the university had multiple violations, including untrained shipper, improper packaging, improper markings, improper labels, improper documentation, etc. Each violation had to be addressed separately, and the DOT starting position is that, as specified in the regs, every day is a separate recurrence of each of the violations.
- That school now does a 4-hour mandatory training class, and charges \$25 fee for every hazmat shipment.

Dry Shippers



More Fines

- A famous medical training university was fined in 2002 for an improperly-marked package of an infectious substance.
- One of the universities that isn't talking got busted at a DOT check station when the inspector found improper paperwork for one of their packages on the truck.
- FedEx requires that shipping papers be typed, not handwritten. This is their requirement and not a federal reg. One of my professional colleagues at another university wrote: "A handwritten package containing 6.2 material was kicked backed to us. The lab tech gave it to an UNTRAINED departmental secretary to type up the form. The package contained Dry Ice, a Packing Group III material, which she recorded on the DG form as Packing Group 111. ... we were cited for EIGHT violations including improper marking, improper documentation, and having an untrained person package the shipment. Each violation theoretically could have cost us \$27.5K. Our lawyers talked with the FAA's lawyers and we paid \$7500".
- A central US university said that a PI shipped a 2-part epoxy paint - flammable liquid. The box was found to be leaking when unloading plane at destination. Instant airport hazmat response and Dangerous Goods inspection. Traced it back to the campus and PI. FAA followed up with an investigation. Negotiated out of a fine by implementing a training program. Now they have a "prior".



Hazardous Materials

Capable of posing unreasonable risk
when transported in commerce

- Health
- Safety
- Property



HazMat Employee

- n Load, unload, or handle hazmat
 - Prepare hazmat for transport
 - Responsible for the safe transport of hazmat
 - Operate a vehicle used to transport hazmat
 - Supervise hazmat employees

Required Training:

- n General Awareness
- n Function-specific



HazMat Regulations

- n Security Awareness
- n Identification/Classification
- n The Hazardous Materials Table
- n Shipping Papers
- n Packaging
- n Labeling/Marking
- n Placarding
- n Emergency Response



Security Awareness

- n Hazardous materials have potential for intentional and accidental damage.
- n Required packaging, labeling, marking, documentation, and training controls most accidents.
- n Prudent security awareness is needed to prevent intentional damage from hazmat.



UW Security Objectives

- n Make it inconvenient for hazmat to be obtained for unauthorized use, while maintaining convenient access for authorized use.
- n Maximize the probability that :
 - Unauthorized use will be discovered promptly,
 - And the identity of unauthorized users will be known promptly.



UW Security Procedures

n Preventing Security Breaches

- A security plan for hazmat during transport to and from the RMMC, or stored incident to transport.
- Details on a need-to-know basis.

n Response to Security Breaches

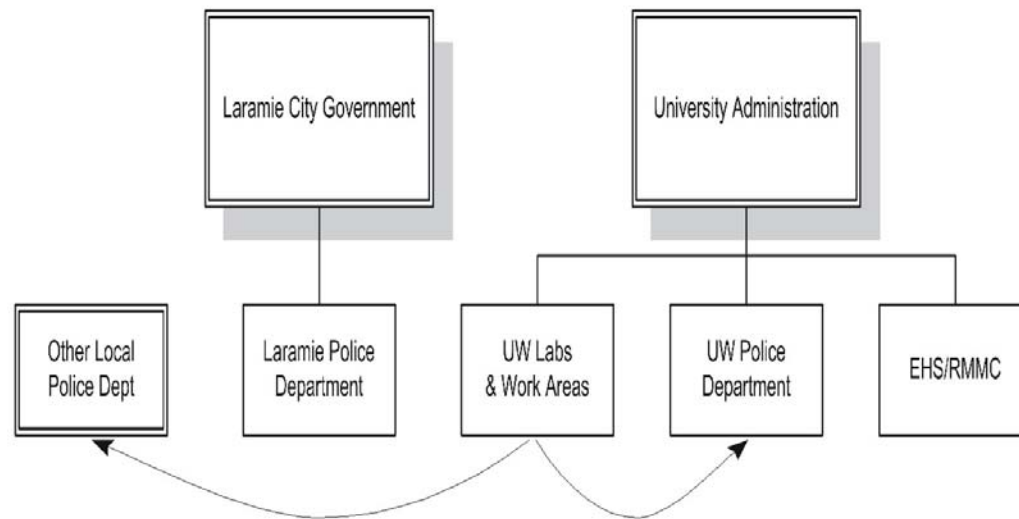
- Notify your manager.
- Your manager will contact appropriate police department.



HazMat Employee Responsibilities

- n Secure your hazmat with locked or supervised doors, restricted access, or sign-out sheets, as determined appropriate by your manager or PI.
- n Watch for unfamiliar persons or disgruntled personnel who seek or gain access to hazmat.
- n Promptly report concerns to UW Police.
 - For out-of-town security concerns related to UW hazmat, contact **local** police near the incident, not UW Police.

Organizational Security Structure



Contact UW PD for on-campus hazmat security concerns,
or Local Jurisdiction directly for hazmat in transport.



Classification

n **9 Hazard Classes**

- Based on type of hazard

n **Division**

- Subset of a hazard class (e.g. flammable, nonflammable, & toxic compressed gases).

n **Packing Groups**

- Based on degree of danger
- PG I, II, III with PG I being the worst
- Most Classes have PGs, but this training will focus on toxic PGs.

n **Zones**

- For Inhalation hazards
- A through D, with A most toxic



DOT Hazard Classes

- n **1** Explosives
- n **2** Gases
- n **3** Flammable Liquids
- n **4** Flammable Solids
- n **5** Oxidizers
- n **6** Toxics
- n **7** Radioactive
- n **8** Corrosive
- n **9** Misc. hazardous

Explosives: Hazard Class 1



- n Regulations are too complicated
- n Extreme hazard
- n Don't mess with them!
- n **Call the RMMC or EH&S Office**

Gases: Hazard Class 2

n 2.1 Flammable Gas

- Acetylene
- Propane



n 2.2 Non-flammable Gas

- Argon
- Carbon Dioxide



n 2.3 Poisonous Gas

- Chlorine
- Nitric Oxide



Flammable Liquids: Hazard Class 3

n Flammable Liquid

–Flashpoint

< 60.5°C (141°F)





What's a Flashpoint?

n The temperature of a liquid at which its vapor will ignite, but not necessarily continue to burn.

– motor oil 465°F

– acetone 0°F

– *Fast & Easy*

Floor Cleaner 111°F

– Gasoline -40°F

Flammable Solids: Hazard Class 4



- n 4.1 Flammable Solid
 - Self reactive materials or readily combustible solids
 - Matches, celluloid film



- n 4.2 Spontaneously Combustible
 - Pyrophoric or self-heating material
 - Charcoal, some metal powders



- n 4.3 Dangerous When Wet
 - Spontaneously ignites or evolves flammable or toxic gases when wet
 - Sodium, potassium

Oxidizers: Hazard Class 5



n 5.1 Oxidizers

- “a material that may, generally by yielding oxygen, cause or enhance the combustion of other materials”
 - Nitrates, chlorates, permanganates



n 5.2 Organic Peroxides

- Organic derivatives of Hydrogen Peroxide

Toxics: Hazard Class 6.1

- n 6.1 Packing Group I
 - Oral $LD_{50} < 5\text{mg/kg}$
 - Dermal $LD_{50} < 40\text{mg/kg}$
 - Inhalation $LD_{50} < 0.5\text{mg/kg}$ particulate
 - Cyanides, strychnine



- 6.1 Packing Group II
 - Oral $LD_{50} < 50\text{mg/kg}$
 - Dermal $LD_{50} < 200\text{mg/kg}$
 - Inhalation $LD_{50} < 2\text{mg/kg}$ particulate
 - Phenols, nicotine

- n 6.1 Packing Group III
 - Oral $LD_{50} < 200\text{mg/kg}$ solid, $< 500\text{mg/kg}$ liquids
 - Dermal $LD_{50} < 1000\text{mg/kg}$
 - Inhalation $LD_{50} < 10\text{mg/kg}$ particulate
 - Pesticides, disinfectants

Liquid Vapor Toxics: Hazard Class 6.1

n 6.1 Packing Group I

Zone A: $LC_{50} < 200\text{ppm}$

and saturation (max) concentration in air $> 500 * LC_{50}$

Zone B: $LC_{50} < 1000\text{ppm}$

and saturation (max) concentration in air $> 10 * LC_{50}$



n 6.1 Packing Group II

$LC_{50} < 3000\text{ppm}$ and

saturation (max) concentration in air $> LC_{50}$

n 6.1 Packing Group III

$LC_{50} < 5000\text{ppm}$

and saturation (max) concentration in air $> 0.2 * LC_{50}$

Toxics: Hazard Class 6



n 6.2 Biohazards

- Infectious Substances
 - Viruses, bacteria, prions
 - Not DNA
- Diagnostic Specimens
 - Body fluid or tissue samples
 - Animal carcasses
- Commercial Biological Product regulated by FDA
- Regulated Medical Waste
 - Potentially infectious
 - Used needles
- Not infectious = not regulated

Radioactive: Hazard Class 7

- n Any material with a specific activity >70 Bq/g
- n 3 types of labels
 - Radioactive I, II, III



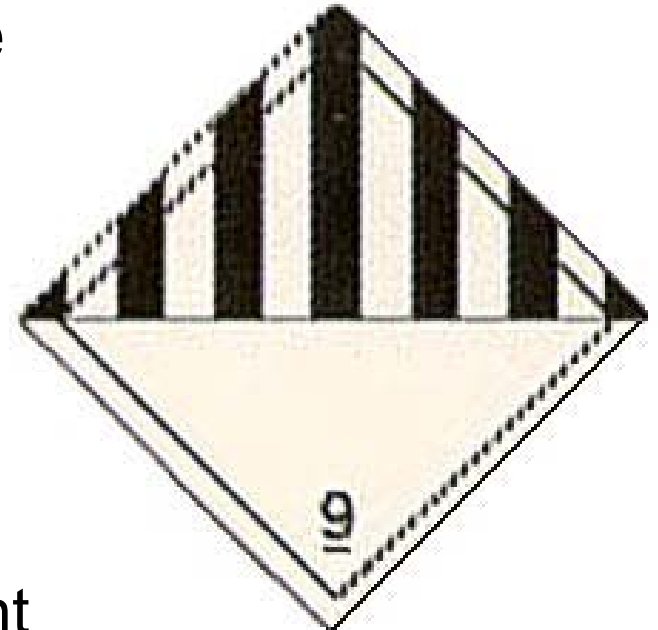
Corrosives: Hazard Class 8



- n Acids or Bases
 - Sulfuric Acid, sodium hydroxide

Miscellaneous Hazardous Material: Hazard Class 9

- n Any material not otherwise regulated that is:
 - Anesthetic
 - Noxious
 - Elevated temperature
 - “Irritant”
 - Properties that could cause extreme discomfort to a flight crew
 - Dry Ice





Other Regulated Materials: ORM-D

- n Hazardous material which presents a limited hazard during transportation due to its form, quantity and packaging.
- n Consumer commodities
 - Package intended or suitable for sale.
 - Packaged for use in the home.
 - Includes most medicines and cleaning supplies.
 - Hazmat Table identifies ORM-D material



DOT Hazards Review

- n 1 Explosives
- n 2 Gases
- n 3 Flammable Liquids
- n 4 Flammable Solids
- n 5 Oxidizers
- n 6 Toxics
- n 7 Radioactive
- n 8 Corrosive
- n 9 Misc. hazardous
- n ORM-D material



Review

- n How many Hazard Classes are there?
- n What kind of material is in Hazard Class 3?
- n What is a hazard division?
- n How many Packing Groups are there?



Review

- n Which Hazard Class and Packing Group is a cyanide solution likely to be in?
- n You carry a drum of cleaning solution in your truck. It's marked "corrosive." Which Hazard Class applies to it?
- n What type of hazard does Hazard Class 9 describe?



Review

- n Both chlorine and strychnine are poisons. Are they in the same Hazard Class?
- n Both gasoline and sodium are flammable. Are they in the same Hazard Class?

Hazardous Materials Table (HMT)

§ 172.101 HAZARDOUS MATERIALS TABLE—Continued

Sym- bols	Hazardous materials descrip- tions and proper shipping names	Hazard class or Di- vision	Identifica- tion Num- bers	PG	Label Codes	Special provisions	(8) Packaging (\$173.***)			(9) Quantity limitations		(10) Vessel stow- age	
							Excep- tions	Non- bulk	Bulk	Passenger aircraft/rail	Cargo air- craft only	Loca- tion	Other
(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8A)	(8B)	(8C)	(9A)	(9B)	(10A)	(10B)
G	Corrosive solids, toxic, n.o.s.	8	UN2923	I	8, 6.1		None	211	242	1 kg	25 kg	B	40
				II	8, 6.1		None	212	240	15 kg	50 kg	B	40
				III	8, 6.1		154	213	240	25 kg	100 kg	B	40, 95
G	Corrosive solids, water-reactive, n.o.s.	8	UN3096	I	8, 4.3	B105	None	211	243	1 kg	25 kg	D	
				II	8, 4.3	B105	None	212	242	15 kg	50 kg	D	
D, W A, W AIW	Cotton	9	NA1365	.....	9	137, W41	None	None	None	No limit	No limit	A	
				III	4.2		None	213	None	Forbidden	Forbidden	A	54
AIW	Cotton, wet	4.2	UN1365	III	4.2		None	204	241	Forbidden	Forbidden	A	
				I	3, 6.1		None	201	243	Forbidden	30 L	B	40
	Coumarin derivative pesticides, liquid, flammable, toxic, flashpoint less than 23 de- grees C.	3	UN3024	I	3, 6.1		None	201	243	Forbidden	30 L	B	40
				II	3, 6.1		None	202	243	1 L	60 L	B	40
	Coumarin derivative pesticides, liquid, toxic.	6.1	UN3026	I	6.1		None	201	243	1 L	30 L	B	40
				II	6.1		None	202	243	5 L	60 L	B	40
	Coumarin derivative pesticides, liquid, toxic, flammable flashpoint not less than 23 de- grees C.	6.1	UN3025	III	6.1		153	203	241	60 L	220 L	A	40
				I	6.1, 3		None	201	243	1 L	30 L	B	40
	Coumarin derivative pesticides, solid, toxic.	6.1	UN3027	II	6.1	B1	None	202	243	5 L	60 L	B	40
				III	6.1, 3		153	203	242	60 L	220 L	A	40
	Cresols	6.1	UN2076	I	6.1		None	211	242	5 kg	50 kg	A	40
				II	6.1		None	212	242	25 kg	100 kg	A	40
	Cresylic acid	6.1	UN2022	III	6.1		153	213	240	100 kg	200 kg	A	40
				I	6.1, 8		None	202	243	1 L	30 L	B	
	Crotonaldehyde, stabilized	6.1	UN1143	II	6.1, 8	B110, T8	None	202	243	1 L	30 L	B	
				I	6.1, 3	B110, T8	None	202	243	1 L	30 L	B	
	Crotonic acid liquid	8	UN2823	2, B9, B14, B32, B74, B77, T38, T43, T45	6.1, 3		None	227	244	Forbidden	30 L	B	40
				III	8		154	203	241	5 L	60 L	A	12
	Crotonic acid, solid	8	UN2823	.....	8		154	213	240	25 kg	100 kg	A	12
				I	3		150	201	243	1 L	30 L	E	
	Crotonylene	3	UN1144	.....	3		T20	201	243	1 L	30 L	E	
				II	8, 6.1		T8, T26	None	202	243	1 L	30 L	A
	Cupriethylenediamine solution ...	8	UN1761	.....	8, 6.1		T7	202	243	1 L	30 L	A	
				III	8, 6.1		154	203	242	5 L	60 L	A	95
	Cutters, cable, explosive	1.4S	UN0070	II	1.4S		None	62	None	25 kg	100 kg	A	



HMT

- n 1st Column: +,A,G,D,I,W
 - Rules about shipping name or transport mode
- n 2nd Column: Proper Shipping Name
- n 3rd Column: Hazard Class/Division
- n 4th Column: Identification Number
- n 5th Column: Packing Group



HMT

n 6th Column: Label Codes

n 7th Column: Special Provisions

n 8th Column: Packaging Authorizations

n 9th Column: Quantity Limitations by Air

n 10th Column: Vessel Stowage

HMT

235

+	Toluene diisocyanate	6.1	UN2078	II	6.1	B110, T14	None	202	243	5 L	60 L	D	25, 40
	<i>Toluene sulfonic acid, see Alkyl, or Aryl sulfonic acid etc.</i>												
+	Toluidines liquid	6.1	UN1708	II	6.1	T14	None	202	243	5 L	60 L	A	
+	Toluidines solid	6.1	UN1708	II	6.1		None	212	242	25 kg	100 kg	A	
	2,4-Toluylenediamine or 2,4-Toluenediamine.	6.1	UN1709	III	6.1	T7	153	213	240	100 kg	200 kg	A	
	Torpedoes, liquid fueled, with inert head.	1.3J	UN0450	II	1.3J			62	None	Forbidden	Forbidden	E	7E, 16E, 23E
	Torpedoes, liquid fueled, with or without bursting charge.	1.1J	UN0449	II	1.1J			62	None	Forbidden	Forbidden	E	7E, 16E, 23E
	Torpedoes with bursting charge	1.1E	UN0329	II	1.1E			62	None	Forbidden	Forbidden	B	
	Torpedoes with bursting charge	1.1F	UN0330	II	1.1F			62	None	Forbidden	Forbidden	B	
	Torpedoes with bursting charge	1.1D	UN0451	II	1.1D			62	None	Forbidden	Forbidden	B	
G	Toxic liquid, corrosive, inorganic, n.o.s.	6.1	UN3289	I	6.1, 8	T42	None	201	243	0.5 L	2.5 L	A	
G	Toxic liquid, corrosive, inorganic, n.o.s. <i>Inhalation Hazard, Packing Group I, Zone A.</i>	6.1	UN3289	II	6.1, 8	T14	None	202	243	1 L	30 L	A	
G	Toxic liquid, corrosive, inorganic, n.o.s. <i>Inhalation Hazard, Packing Group I, Zone B.</i>	6.1	UN3289	I	6.1, 8	1, B9, B14, B30, B72, T38, T43, T44	None	226	244	Forbidden	Forbidden	B	40
G	Toxic liquid, inorganic, n.o.s.	6.1	UN3287	I	6.1	2, B9, B14, B32, B74, T38, T43, T45	None	227	244	Forbidden	Forbidden	B	40
G	Toxic liquid, inorganic, n.o.s.	6.1	UN3287	I	6.1	T42	None	201	243	1 L	30 L	A	
G	Toxic liquid, inorganic, n.o.s.	6.1	UN3287	II	6.1	B110, T14	None	202	243	5 L	60 L	A	
G	Toxic liquid, inorganic, n.o.s. <i>Inhalation Hazard, Packing Group I, Zone A.</i>	6.1	UN3287	III	6.1	T7	153	203	241	60 L	220 L	A	
G	Toxic liquid, inorganic, n.o.s. <i>Inhalation Hazard, Packing Group I, Zone B.</i>	6.1	UN3287	I	6.1	1, B9, B14, B30, B72, T38, T43, T44	None	226	244	Forbidden	Forbidden	B	40
G	Toxic liquid, inorganic, n.o.s. <i>Inhalation Hazard, Packing Group I, Zone B.</i>	6.1	UN3287	I	6.1	2, B9, B14, B32, B74, T38, T43, T45	None	227	244	Forbidden	Forbidden	B	40
G	Toxic liquids, corrosive, organic, n.o.s.	6.1	UN2927	I	6.1, 8	T42	None	201	243	0.5 L	2.5 L	B	40
G	Toxic liquids, corrosive, organic, n.o.s.	6.1	UN2927	II	6.1, 8	T42	None	202	243	1 L	30 L	B	40
G	Toxic liquids, corrosive, organic, n.o.s., <i>inhalation hazard, Packing Group I, Zone A.</i>	6.1	UN2927	I	6.1, 8	1, B9, B14, B30, B72, T38, T43, T44	None	226	244	Forbidden	Forbidden	D	40
G	Toxic liquids, corrosive, organic, n.o.s., <i>inhalation hazard, Packing Group I, Zone B.</i>	6.1	UN2927	I	6.1, 8	2, B9, B14, B32, B74, T38, T43, T45	None	227	244	Forbidden	Forbidden	D	40
G	Toxic liquids, flammable, organic, n.o.s.	6.1	UN2929	I	6.1, 3	T42	None	201	243	1 L	30 L	B	40
G	Toxic liquids, flammable, organic, n.o.s.	6.1	UN2929	II	6.1, 3	T15	None	202	243	5 L	60 L	B	40
G	Toxic liquids, flammable, organic, n.o.s., <i>inhalation hazard, Packing Group I, Zone A.</i>	6.1	UN2929	I	6.1, 3	1, B9, B14, B30, B72, T38, T43, T44	None	226	244	Forbidden	Forbidden	D	40



Shipping Papers

- n Required for hazardous material shipments
- n Format is flexible
- n Keep for 1 year
- n Must be next to driver or in door pouch on top of anything else

Example AirBill and DGD

UNIVERSITY OF WYOMING
 6TH & GIBBON
 LARAMIE WY 82071
 77662304

SHIP DATE: 21MAY2003
 ACCOUNT #: 080222068
 ACTUAL WGT: 0.90 LBS



TO:

3078566944

KCWC-TV
 RUBY CALVERT
 2660 PECK AVENUE
 RIVERTON WY 82501
 REF: M JUNGUWTV



Delivery Address Barcode

FedEx **PRIORITY OVERNIGHT**

System # 2197454 21MAY2003
 TRK# 7902 9569 2880 Form 0201

THU

DELIVER BY:
22MAY2003
 AM

CPR

82501-WY-US

XH RIWA



05US v5.2.01 2197454 2844 04/02

Track: 790295692880
 Mode: FedEx Express Priority

Invoice: M JUNG	Date: 05/21/2003	Shipping:	13.12
Customer: RUBY CALVERT	Weight: 1.00	Special:	0.66
Dept: UWTV	COD: 0.00	Handling:	3.28
DV: 0.00	Total:		17.06



Dangerous Goods Regulations

FIGURE 8.2.E

Consignment Containing Dangerous Goods for Which a Shipper's Declaration is Not Required

Airport of Destination		Requested Flight/Date		Amount of Insurance		INSURANCE - If carrier offers insurance, and such insurance is requested in accordance with the conditions thereof, indicate amount to be insured in figures in box marked "Amount of Insurance".		
Handling Information								
							SCI	
No. of Pieces RCP	Gross Weight	kg lb	Rate Class		Chargeable Weight	Rate / Charge	Total	Nature and Quantity of Goods (incl. Dimensions of Volume)
			Commodity Item No.					
								Frozen Fish Carbon Dioxide, solid 9 UN1845 2 x 40 kg

FIGURE 8.2.F

Consignment Containing Dangerous Goods in Excepted Quantities

Airport of Destination		Requested Flight/Date		Amount of Insurance		INSURANCE - If carrier offers insurance, and such insurance is requested in accordance with the conditions thereof, indicate amount to be insured in figures in box marked "Amount of Insurance".		
Handling Information								
							SCI	
No. of Pieces RCP	Gross Weight	kg lb	Rate Class		Chargeable Weight	Rate / Charge	Total	Nature and Quantity of Goods (incl. Dimensions of Volume)
			Commodity Item No.					
								Dental Kit - Dangerous Goods in Excepted Quantities



Shipping Papers

n Must include:

- Proper shipping name
- Hazard class
- UN Identification Number
- Packing group
- Quantity and units of HM
- Additional info if needed
- Emergency Response Information (ERG)
- Emergency phone number
- Shipper's Certification (Signature)

FedEx DGD

SHIPPER'S DECLARATION FOR DANGEROUS GOODS

(Provide at least three copies to FedEx Express)

Shipper		Air Waybill No.					
		Page of Pages Shipper's Reference Number					
Consignee		FedEx Federal Express					
<i>Two completed and signed copies of this Declaration must be handed to the operator.</i>		WARNING					
TRANSPORT DETAILS This shipment is within the limitations prescribed for <i>(delete non-applicable)</i>		Failure to comply in all respects with the applicable Dangerous Goods Regulations may be in breach of the applicable law, subject to legal penalties. This Declaration must not, in any circumstances, be completed and/or signed by a consolidator, a forwarder or an IATA cargo agent.					
Airport of Departure <table border="1" style="width: 100%;"> <tr> <td style="width: 50%; text-align: center;">PASSENGER AND CARGO AIRCRAFT</td> <td style="width: 50%; text-align: center;">CARGO AIRCRAFT ONLY</td> </tr> </table>				PASSENGER AND CARGO AIRCRAFT	CARGO AIRCRAFT ONLY		
PASSENGER AND CARGO AIRCRAFT	CARGO AIRCRAFT ONLY						
Airport of Destination		Shipment type: <i>(delete non-applicable)</i> <input type="checkbox"/> NON-RADIOACTIVE <input type="checkbox"/> RADIOACTIVE					
NATURE AND QUANTITY OF DANGEROUS GOODS							
Dangerous Goods Identification							
Proper Shipping Name	Class or Division	UN of ID No.	Packing Group	Subsidiary Risk	Quantity and Type of packing	Packing Inst.	Authorization
Additional Handling Information							
Emergency Telephone Number							
I hereby declare that the contents of this consignment are fully and accurately described above by the proper shipping name, and are classified, packaged, marked, and labelled/placarded, and are in all respects in proper condition for transport according to applicable international and national governmental regulations.					Name/Title of Signatory		
					Place and Date		
IF ACCEPTABLE FOR PASSENGER AIRCRAFT, THIS SHIPMENT CONTAINS RADIOACTIVE MATERIAL INTENDED FOR USE IN, OR INCIDENT TO, RESEARCH, MEDICAL DIAGNOSIS, OR TREATMENT					Signature <i>(see warning above)</i>		

FedEx Bad Example

This DGD was returned to the shipper, along with the time-sensitive package.

FedEx Dangerous Goods **FedEx Billing Copy**
Airbill

8761461

1 From
Date: April 21, 03 Sender's Facility Account Number: 0802-2206-8
Sender's Name: Kurt Dolence Phone: (307) 766-2954
Company: UNIVERSITY OF WYOMING
Address: 16TH & GIBSON School of Pharmacy
City: LARAMIE State: WY ZIP: 82071

2 To
Recipient's Name: Dr. Ken Jackson Phone: (405) 271-3920
Company: Molecular Biology Resource Facility
Warren Medical Research Inst.
Address: 941 S.E. Young Blvd., BSEB 306
City: Oklahoma City State: OK ZIP: 73104

3 Your Internal Billing Reference Information

4a Express Package Service Packages under 150 lbs.
 FedEx Priority Overnight FedEx Standard Overnight
 FedEx 2Day FedEx Express Saver

4b Express Freight Service Packages over 150 lbs.
 FedEx Overnight Freight FedEx Day Freight FedEx Express Saver Freight

5 Packaging
 U.S. Mail Packaging
 International Packaging

6 Special Handling
 Fragile
 High Value
 Hazardous
 Live Animals
 Perishable
 Temperature Sensitive
 Other

7 Payment
Bill To: Shipper Receiver Third Party Credit Card Check
Total Packages: Total Weight: Total Declared Value: Total Charges:

810307670010 **0204**

Page 1 of 1 Pages

TRANSPORT DETAILS
This document is subject to the conditions prescribed for (6.04) use applicable to PASSENGER AND LARGE AIRCRAFT. Airport of origin: Keyport. Airport of destination:
Shipment type: (where applicable) NON-RADIOACTIVE | RADIOACTIVE

WARNING
Failure to comply in all respects with the applicable Dangerous Goods Regulations may be in breach of the applicable law, subject to legal penalties. This Declaration must not, in any circumstances, be completed and/or signed by a consolidator, a forwarder or an IATA cargo agent.

NATURE AND QUANTITY OF DANGEROUS GOODS

Proposed Shipping Name	Class or Division	UN or I.D. No.	Packing Group	Subsidiary Risk	Quantity and Type of Packaging	Packing Inst.	Authorization
Phosphonic acid, 2-piperidyl-, diphenyl ester, hydrochloride	6.1	2810	III	ERG #153	1 fibreboard box X 10.0 grams		Limited Quantity
Phosphonic acid, 2-piperidyl-diethyl ester	6.1	UN 2810	III	ERG #153	1 fibreboard box X 1.0 grams		

Additional Handling Information

Prepared for AIR TRANSPORT according to: (Customer MUST check one)
 49 CFR ICAO / IATA

I hereby declare that the contents of this consignment are fully and accurately described above by the proper shipping name and are classified, packaged, marked, and labelled (where applicable) and are in all respects in proper condition for transport according to applicable international and national governmental regulations.

Emergency Telephone Number (Required for US Origin or Destination Shipments): 307-742-5458

Signature of Shipper: Kurt Dolence, 4/21/03
University of Wyoming

IF ACCEPTABLE FOR PASSENGER AIRCRAFT, THIS SHIPMENT CONTAINS RADIOACTIVE MATERIAL, INTENDED FOR USE IN OR SUBJECT TO, RESEARCH, MEDICAL DIAGNOSIS, OR TREATMENT.

FedEx Good Example

FedEx Dangerous Goods Airbill

Sender's Copy
RETAIN FOR 1 YEAR
RETAIN THIS COPY FOR YOUR RECORDS

1 From (please print and press hard)
Date 4/23/2003 Sender's FedEx Account Number 0802-2206-8

Sender's Name Kurt Dolence Phone (307) 766 2954

Company UNIVERSITY OF WYOMING

Address 16TH & GIBBON School of Pharmacy Dept./Floor/Suite/Room

City LARAMIE State WY ZIP 82071

2 Your Internal Billing Reference Information (Optional) (Print 24 characters will appear on invoice)

3 To (please print and press hard)
Recipient's Name Dr. Ken Jackson Phone (405) 271 3920

Company Warren Medical Research Inst. Check here if residence (Else charge applies for FedEx Express Service)

Address 941 S.L. Young Blvd., BSEB 306

City Oklahoma City State OK Zip 73104

For HOLD at FedEx Location check here For WEEKEND Delivery check here
 Hold Weekday Hold Saturday (Not available at all locations) (Available for FedEx Priority Overnight and FedEx 2Day only)
 Saturday Delivery (Available for FedEx Priority Overnight and FedEx 2Day only) NEW Sunday Delivery (Available for FedEx Priority Overnight only)

4a Express Package Service Packages under 150 lbs.
 FedEx Priority Overnight (Next business morning) FedEx Standard Overnight (Next business afternoon) FedEx Express 2Day (Second business day) FedEx Express Saver (Third business day)

4b Express Freight Service Packages over 150 lbs.
 FedEx Overnight Freight (Next business day) FedEx 2Day Freight (Second business day) FedEx Express Saver Freight (Up to 3 business days)

The World On Time

Service Conditions, Declared Value, and Limit of Liability - By using this label, you agree to the service conditions in our current Service Guide or U.S. Government Service Guide. Both are available on request. SEE BACK OF SENDER'S COPY OF THIS AIRBILL FOR INFORMATION AND ADDITIONAL TERMS. We will not be responsible for any claim in excess of \$100 per package unless the recipient has declared a higher value. The maximum declared value for any one package is \$500. Federal Express may, at its discretion, refuse to accept a higher value, pay an additional charge, and document your actual loss in a timely manner. Your right to recover from us for any loss in excess of the declared value of the package, less of sales, taxes, duties, and other forms of damage, depends on the circumstances of the loss. The maximum declared value for any one package is \$500. Federal Express may, at its discretion, refuse to accept a higher value, pay an additional charge, and document your actual loss in a timely manner. See the FedEx Service Guide for further information.

Questions? Call 1-800-Go-FedEx® (800) 463-3339

5 Packaging
 Other Packaging
 Dangerous Goods cannot be shipped in FedEx packaging.

6 Special Handling
 Dangerous Goods as per attached Shipper's Declaration Cargo Only

7 Payment
 Bill to: Sender Recipient Third Party Credit Card (Name, Title, and Address) (Name, Title, and Address) (Name, Title, and Address) (Name, Title, and Address)

8 Signature Release Unavailable

9
 Total Packages Total Weight Total Declared Value
 \$ 00

Signature Release Unavailable

810307669943 0204

Page 1 of 1 Pages

Two completed and signed copies of this Declaration must be handed to the operator.

TRANSPORT DETAILS
 This shipment is within the limitations prescribed for:
 (delete non-applicable)
 PASSENGER AND CARGO AIRCRAFT ONLY
 AIRCRAFT ONLY

Airport of Departure: Cheyenne

WARNING
 Failure to comply in all respects with the applicable Dangerous Goods Regulations may breach of the applicable law, subject to legal penalties. This Declaration must not, in circumstances, be completed and/or signed by a consolidator, a forwarder or an IATA agent.
 Shipment type: (delete non-applicable)
 NON-RADIOACTIVE RADIOACTIVE

NATURE AND QUANTITY OF DANGEROUS GOODS					Quantity and Type of Packaging	Packing Inst.	Authorization
Dangerous Goods Identification							
Proper Shipping Name	Class or Division	UN or I.D. No.	Packing Group	Subsidiary Risk			
Toxic liquid, organic, n.o.s., (Phosphonic acid, 2-piperidinyl-, diphenyl ester, hydrochloride)	6.1	UN2810	III		10 ml	Y611	
Toxic solid, organic, n.o.s. (Phosphonic acid 2-piperidinyl-, diethyl ester, hydrochloride)	6.1	UN2811	III		10 gm	Y611	
Additional Handling Information					All packed in one fibreboard box		

Prepared for AIR TRANSPORT according to ICAO / IATA (Customer MUST check c 49 CFR / ICAO / IATA)

I hereby declare that the contents of this consignment are fully and accurately described above by the proper shipping name and are classified, packaged, marked, and labeled/placarded, and are in all respects in proper condition for transport according to applicable international and national governmental regulations.
 Emergency Telephone Number (Required for US Origin or Destination Shipments): 307-442-5458
 Name/Title of Signatory: J L STARR
 Place and Date: LARAMIE WY 4/23/03
 Signature: [Signature]

IF ACCEPTABLE FOR PASSENGER AIRCRAFT, THIS SHIPMENT CONTAINS RADIOACTIVE MATERIAL INTENDED FOR USE IN, OR INCIDENT TO, RESEARCH, MEDICAL DIAGNOSIS, OR TREATMENT.



Shipping Paper Myths

- n **Must reject a shipment missing a shipping paper.**
 - No need to reject.
 - Only need hazardous materials shipping paper if YOU plan to ship the package to the next destination,
 - Or if you can't identify the contents from the packing slip or item label(s).
- n **Must have a shipping paper for every chemical substance shipped.**
 - Only need shipping paper for REGULATED, non-exempt, hazardous materials.



Shipping Papers

- n Failure to provide proper shipping papers can result in fines.
- n If you think you need a shipping paper, call the RMMC.

766-3697



Review

True or False?

- n If a hazmat load arrives without a shipping paper, you must reject it.
- n If you put the wrong shipping name on a shipping paper, you can be fined personally.
- n Every hazardous material on the DOT Hazardous Material Table has an ID number.



Packaging

- n Package- packaging with its contents
- n Packaging- a receptacle and any other components or materials necessary to perform its containment function in conformance with the minimum packing requirements of the HMR.
- n Specification- packaging for which the regulations mandate detailed manufacturing specifications. (Cylinders, portable tanks, cargo tanks, tank cars)
- n Performance orientated- non-bulk packaging that have passed certain performance tests



Packaging

- n HazMat can only be transported in authorized packaging, i.e. Specification and performance-oriented packaging (49CFR 173)
- n Packaging requirements based on hazard class and packing group. Packaging authorizations are in column 8 of the HMT.
- n Exception, non-bulk, or bulk packaging may apply

Hazardous Materials Table (HMT)

§ 172.101 HAZARDOUS MATERIALS TABLE—Continued

Sym- bols	Hazardous materials descrip- tions and proper shipping names	Hazard class or Di- vision	Identifica- tion Num- bers	PG	Label Codes	Special provisions	(8) Packaging (\$173.***)			(9) Quantity limitations		(10) Vessel stow- age		
							Excep- tions	Non- bulk	Bulk	Passenger aircraft/rail	Cargo air- craft only	Loca- tion	Other	
(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8A)	(8B)	(8C)	(9A)	(9B)	(10A)	(10B)	
G	Corrosive solids, toxic, n.o.s	8	UN2923	I	8, 6.1		None	211	242	1 kg	25 kg	B	40	
				II	8, 6.1		None	212	240	15 kg	50 kg	B	40	
				III	8, 6.1		154	213	240	25 kg	100 kg	B	40, 95	
G	Corrosive solids, water-reactive, n.o.s.	8	UN3096	I	8, 4.3	B105	None	211	243	1 kg	25 kg	D		
				II	8, 4.3	B105	None	212	242	15 kg	50 kg	D		
D, W A, W AIW	Cotton	9	NA1365	.....	9	137, W41	None	None	None	No limit	No limit	A	
				III	4.2		None	213	None	Forbidden	Forbidden	A	54	
AIW	Cotton, wet	4.2	UN1365	III	4.2		None	204	241	Forbidden	Forbidden	A		
				I	3, 6.1		None	201	243	Forbidden	30 L	B	40	
	Coumarin derivative pesticides, liquid, flammable, toxic, flashpoint less than 23 de- grees C.	3	UN3024	I	3, 6.1		None	201	243	Forbidden	30 L	B	40	
							II	3, 6.1	None	202	243	1 L	60 L	B	40
	Coumarin derivative pesticides, liquid, toxic.	6.1	UN3026	I	6.1		None	201	243	1 L	30 L	B	40	
				II	6.1		None	202	243	5 L	60 L	B	40	
	Coumarin derivative pesticides, liquid, toxic, flammable flashpoint not less than 23 de- grees C.	6.1	UN3025	III	6.1		153	203	241	60 L	220 L	A	40	
				I	6.1, 3		None	201	243	1 L	30 L	B	40	
	Coumarin derivative pesticides, solid, toxic.	6.1	UN3027	II	6.1	B1	None	202	243	5 L	60 L	B	40	
				III	6.1, 3		153	203	242	60 L	220 L	A	40	
	Cresols	6.1	UN2076	I	6.1		None	211	242	5 kg	50 kg	A	40	
				II	6.1		None	212	242	25 kg	100 kg	A	40	
	Cresylic acid	6.1	UN2022	III	6.1		153	213	240	100 kg	200 kg	A	40	
				I	6.1, 8		None	202	243	1 L	30 L	B		
	Crotonaldehyde, stabilized	6.1	UN1143	II	6.1, 8	B110, T8	None	202	243	1 L	30 L	B		
				I	6.1, 3	B110, T8	None	202	243	1 L	30 L	B		
	Crotonic acid liquid	8	UN2823	2, B9, B14, B32, B74, B77, T38, T43, T45	6.1, 3		None	227	244	Forbidden	30 L	B	40	
				III	8		154	203	241	5 L	60 L	A	12	
	Crotonic acid, solid	8	UN2823	.....	8		154	213	240	25 kg	100 kg	A	12
				I	3		150	201	243	1 L	30 L	E		
	Crotonylene	3	UN1144	.....	3		T20	201	243	1 L	30 L	A	
				II	8, 6.1		T8, T26	None	202	243	1 L	30 L	A	
	Cupriethylenediamine solution ...	8	UN1761	8, 6.1		T7	154	203	242	5 L	60 L	A	95
				III	8, 6.1		None	62	None	25 kg	100 kg	A		
	Cutters, cable, explosive	1.4S	UN0070	II	1.4S		None							



Packaging

n Non-bulk packaging (<450L, 400kg)

- Cylinders
- Fiberboard boxes
- Drums
- Bags
- Jerricans

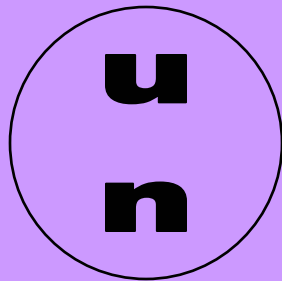
n Bulk packaging (>450L, 400kg)

- Rail cars
- Cargo containers
- Portable tanks



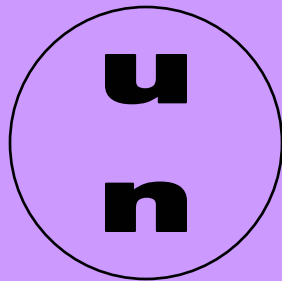
Packaging

UN specification marking



4G/X20/S/02

USA/R9307



1A1/Y1.4/150/02/USA/RU832



Markings

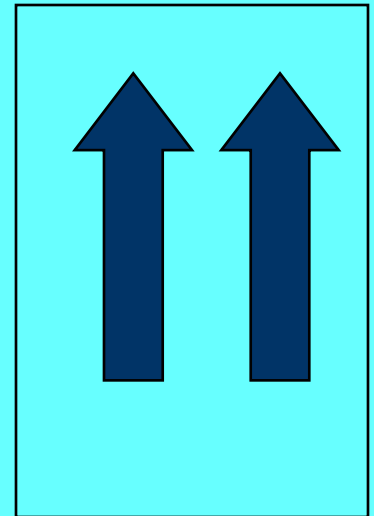
- n Durable and in English
- n Printed or affixed to package surface or tag
- n Contrasted to background
- n Unobscured
- n Located away from other markings

Markings

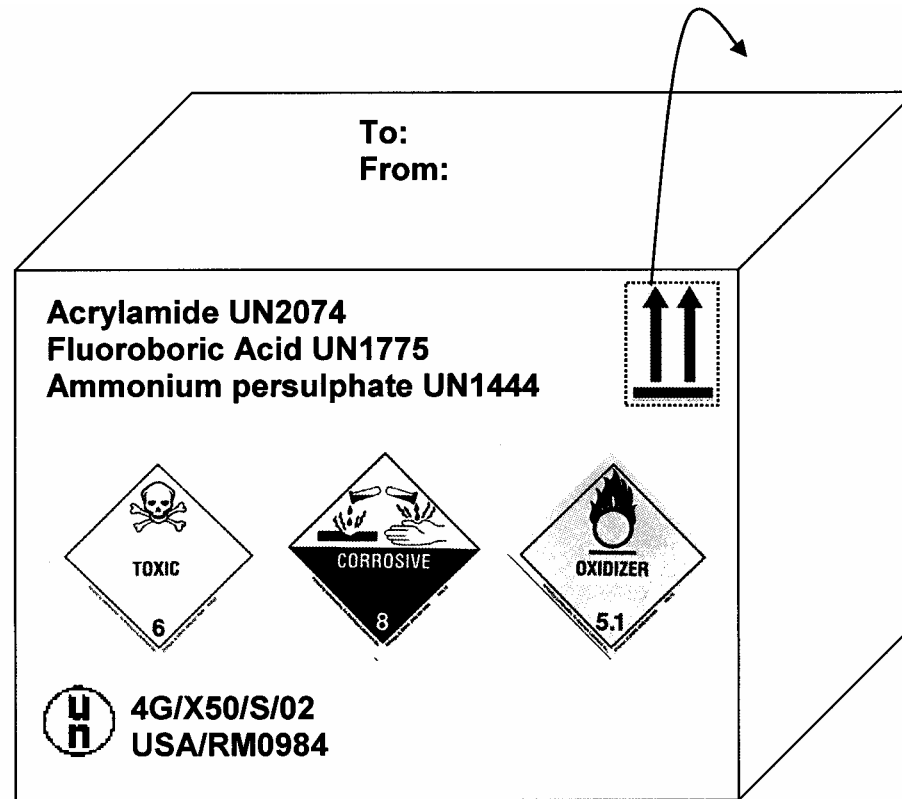
To: UW
From: Acme, Co.

Hexachloroacetone hydrate
UN2661

- n Addresses To/From
- n Proper shipping name
- n Identification number
- n Orientation arrows
- n Others, depending on specific materials and size of load



Example Package



The segregation table indicates that such a package would actually be illegal, because it contains both a corrosive and an oxidizer.



Labels

- n Labels must be used on packages containing a hazardous material in transport unless exempted.
- n Different DOT label for each Hazard Class/Division.
- n Labels for primary and subsidiary risks.

DOT Labels

- Hazard Class appears at the bottom of each label
- Other labels are prohibited if similar to these.

DOT Labels

Class 1 Explosives

Class 2 Gases (Flammable, Non-Flammable, Poison, & Toxic)

Class 3 Flammable Liquids

Class 4 Flammable Solids

Class 5 Oxidizers & Organic Peroxides

Class 6 Poisonous, Toxic & Infectious Substances

Class 7 Radioactives

Class 8 Corrosives

Class 9 Miscellaneous Dangerous Goods

EMPTY

Additional Labels

Labels shown include: EXPLOSIVE 1.1A, 1.2B, 1.3C, 1.4, 1.5, 1.6; FLAMMABLE GAS, NON-FLAMMABLE GAS, INHALATION HAZARD, POISON GAS, TOXIC GAS, OXYGEN; FLAMMABLE LIQUID, FLAMMABLE SOLID, SPONTANEOUSLY COMBUSTIBLE, DANGEROUS WHEN WET; OXIDIZER, ORGANIC PEROXIDE; INHALATION HAZARD, POISON, TOXIC, HARMFUL, INFECTIOUS SUBSTANCE; RADIOACTIVE I, II, III; CORROSIVE; and EMPTY.

Package containing hazardous materials must be labeled with the hazard class label specified by the Hazardous Materials Table (HMT) in 49CFR. Column 6 of the HMT lists the label code(s) for each proper shipping name. The label code can be cross referenced to the appropriate label by using the Label Substitution Table located in 172.101(g) of 49CFR. The label code listed first corresponds to the primary hazard of the material and requires a hazard class number in the lower corner of the label while the label code listed second corresponds to the subsidiary hazard(s) of the material. No hazard class number is to be displayed on subsidiary labels. Each diamond (square on point) must measure at least 100mm x 100mm and have a solid line inner border. Label designs are shown in 49CFR part 172.411 through 172.450. Hazard class labels must appear on the same surface of the package as the proper shipping name and may not be placed on the bottom of a package.

Labelmaster — 1-800-621-5808

Style No. TRAINCRD3 ©1997 Printed by Labelmaster, An American Labelmark Co., Chicago, IL 60646 (800) 621-5808 Rev.8/97

Review

- n Jim Bob forgets to put the ID number on the package so he writes it on the shipping paper. Is this OK?
- n What's wrong with this label?

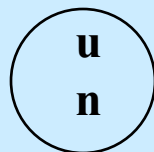
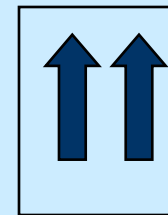


The Finished Package

**Hexachloroacetone
hydrate
UN2661**



**To: UW
From: Acme, Co.**



4G/X20/S/99/USA/T7402



Storage Incident to Transport

- n Hazardous materials may not be loaded, transported, or stored together except in accordance with the **DOT Segregation Table for Hazardous Materials**.
- n Acids cannot be stored or transported with cyanides.
- n In most cases, 2.3 and 6.1 Packing Group I Inhalation Hazards cannot be stored or transported with any other hazardous material.

Segregation Table for Hazardous Materials

Class or division	Notes	1.1 1.2	1.3	1.4	1.5	1.6	2.1	2.2	2.3 gas zone A	2.3 gas Zone B	3	4.1	4.2	4.3	5.1	5.2	6.1 liq- uids PG I zone A	7	8 liquids only
Explosives	1.1 A	*	*	*	*	*	X	X	X	X	X	X	X	X	X	X	X	X	X
Explosives	1.2 and 1.2																		
Explosives	1.3	*	*	*	*	*	X		X	X	X		X	X	X	X	X	X	X
Explosives	1.4	*	*	*	*	*	O		O	O	O		O	O	X	X	O	O	O
Very insensitive explosives	1.5 A	*	*	*	*	*	X	X	X	X	X	X	X	X	X	X	X	X	X
Extremely insensitive ex- plosives	1.6	*	*	*	*	*													
Flammable gases	2.1	X	X	O	X				X	O							O	O	
Non-toxic, non-flammable gases.	2.2	X			X														
Poisonous gas Zone A	2.3	X	X	O	X		X				X	X	X	X	X	X			X
Poisonous gas Zone B	2.3	X	X	O	X		O				O	O	O	O	O	O			O
Flammable liquids	3	X	X	O	X			X	O								X		
Flammable solids	4.1	X			X			X	O								X		O
Spontaneously combustible materials.	4.2	X	X	O	X			X	O								X		X
Dangerous when wet ma- terials.	4.3	X	X		X			X	O								X		O
Oxidizers	5.1 A	X	X		X			X	O		O						X		O
Organic peroxides	5.2	X	X		X			X	O								X		O
Poisonous liquids PG I Zone A.	6.1	X	X	O	X		O				X	X	X	X	X	X			X
Radioactive materials	7	X			X		O												
Corrosive liquids	8	X	X	O	X			X	O			O	X	O	O	O	X		

X= Cannot go in the truck at the same time.
O= Cannot go in the same labpack together.

Blank space = No Restriction



Vehicle Loading & Unloading

- n Do not unnecessarily delay shipments of hazardous materials
- n Handbrake must be set.
- n No Smoking
- n Keep packages dry
- n Cylinders must be lashed in upright position
- n Do not attempt to load, unload or transport explosives. Rules are very complicated.



Vehicle Loading & Unloading

These MUST BE BRACED!

- n Gases (Hazard Class 2)
- n Flammable Liquids (Hazard Class 3)
- n Flammable Solids (Hazard Class 4)
- n Oxidizers (Hazard Class 5)
- n Toxics (Division 6.1)
- n Radioactives (Hazard Class 7)
- n Corrosives (Hazard Class 8)



Placards

- n Similar to labels, but larger. Placed on all four sides of transport vehicle.
- n Amount of material and Hazard Class determine if placards are needed.
- n Any hazmat load heavier than 1000 pounds - automatically placard.
- n **Shipper must provide placard to carrier.**
- n Exceptions may apply- Call the RMMC.



Placarding Required in Any Amount

n DOT Placard Table 1

If you are shipping hazmat in the following class/divisions, you must placard regardless of quantity:

Class 1.1-1.3 Explosives

2.3 Poisonous Gas

4.3 Dangerous When Wet

5.2 Organic Peroxide

6.1 Poison Inhalation Hazard (Zones A&B)

Class 7 Radioactives requiring Yellow III label



Placards, CDLs, Endorsements

- n If your load requires a placard, you must have a CDL with a Hazmat Endorsement to transport it.
- n Call the RMMC to have it placarded and/or transported.



Review

- n Can you transport copper cyanide with acetic acid?
- n What do you check on the truck before you load hazardous materials on it?
- n Dr. Boom wants to ship 1 lb of organic peroxide. Does he need to supply placards to the carrier?
- n Can you drive a truck with placards on it?



Emergency Response Information

- n Must be printed legibly in English
- n Available for use away from the package
- n Presented on:
 - Shipping Paper
 - Document attached to Shipping Paper (i.e. MSDS)
 - North American Emergency Guidebook #



Emergency Response Information

n Emergency Response Information

- Basic description and technical name
- Immediate hazards to health
- Risks of fire or explosion
- Immediate precautions to be taken in the event of an accident
- Immediate methods for handling fires
- Immediate methods for handling spills or leaks
- Preliminary first aid measures

n Emergency Response Telephone Number

- Monitored at all times
- Have access to information about material



DOT Exceptions

- n Exceptions allow for an easement of regulatory requirements.
 - Limited or small quantities
 - Agricultural operations
 - Private Carriage
 - DOT Exempt Packaging
 - ORM-D/Consumer Commodity
 - Materials of Trade



Limited or small quantities

- n Column 8 in the Hazardous Materials Table will offer any alternatives and exceptions for limited quantities.
- n If your material is less than 30 ml or 30 g it may be an excepted quantity. Call the RMMC to find out.



Materials of Trade

n Material:

- protects health & safety of vehicle operator. (SCBA Tank)
- supports the maintenance and operation of the vehicle. (gasoline in your tank)
- used on the vehicle to support the business that owns the vehicle. (welding truck acetylene)
- Cannot exceed 440 pounds.

n Does not include all hazardous materials! **Check with RMMC.**



Review of Desirable Exceptions for Shippers

- n Consumer commodity
- n Material of Trade
- n Limited Quantity
- n Excepted Quantity
- n Unregulated



Thank You!

Call us when you get stuck.

University of Wyoming

Regulated Materials Management Center

766-3698