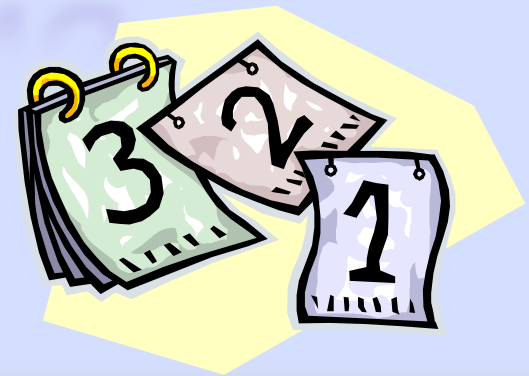


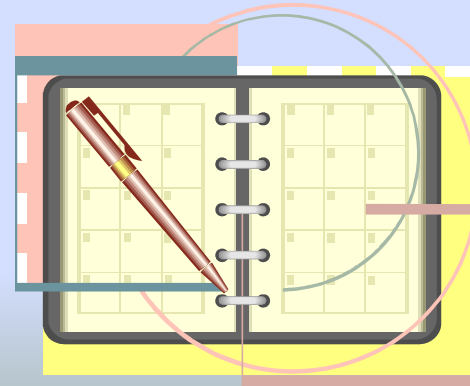
# OSHA's TRAINING DEADLINE IS APPROACHING

**HCS 2012**



# What's Today's Agenda?

- Review (once again) HCS 2012 with knowledgeable people.
- Present elements that trainers need to present to employees
- Anticipate questions from your employees
- Open discussion.





# HCS 2012

- **OSHA issues the long awaited update to the Hazard Communication Standard on March 21, 2012.**
  - So what happens first?**

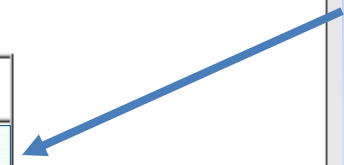


[« Hazard Communication](#)

## Effective Dates

The table below summarizes the phase-in dates required under the revised Hazard Communication Standard (HCS):

Effective Completion Date	Requirement(s)	Who
December 1, 2013	Train employees on the new label elements and safety data sheet (SDS) format.	Employers
June 1, 2015 December 1, 2015	Compliance with all modified provisions of this final rule, except: The Distributor shall not ship containers labeled by the chemical manufacturer or importer unless it is a GHS label	Chemical manufacturers, importers, distributors and employers
June 1, 2016	Update alternative workplace labeling and hazard communication program as necessary, and provide additional employee training for newly identified physical or health hazards.	Employers
Transition Period to the effective completion dates noted above	May comply with either 29 CFR 1910.1200 (the final standard), or the current standard, or both	Chemical manufacturers, importers, distributors, and employers



# Some things change...Others don't!

## HCS 1994

Hazard Determinations  
Labels (3 elements)  
MSDSs – any format  
Training required  
Written program  
Trade secrets allowed  
Formulators rely on  
supplier data sheets

## HCS 2012

Hazard **Classifications**  
Labels ( **6** elements)  
SDSs – **16 sections**  
Training required  
Written program  
Trade secrets allowed  
**Formulators responsible  
for data if substance known**

# Some things change a lot!

## HCS 1994

Performance standard

Floor of hazardous chemicals

One study rule

Standard mixture cut-offs (bright lines)

## HCS 2012

Specification standard

No floor of hazardous chemicals

Weight of evidence

Each property calculated based on ingredients

# What's Hazardous?

- **Physical Hazards (1994)**

- Fire
- Explosion
- Reactivity

- **Physical Hazards (2012)**

- Explosives
- Flammable Gases
- Oxidizing Gases
- Pressurized Gases
  - Compressed gases
  - Liquefied gases
  - Refrigerated liquefied gases
  - Dissolved gases

- Flammable Liquids
- Flammable Solids
- Self-Reactive Substances
- Pyrophoric Liquids
- Pyrophoric Solids
- Self-heating Substances
- Water Reactive->
  - Flammable gases
- Oxidizing Liquids
- Oxidizing Solids
- Organic Peroxides
- Corrosive to Metals
- Explosive Dusts

# All Physical Hazards Adopted by OSHA

## Physical Hazards

Hazard Class	Hazard Category						
Explosives	Unstable Explosives	Div 1.1	Div 1.2	Div 1.3	Div 1.4	Div 1.5	Div 1.6
Flammable Gases	1	2					
Flammable Aerosols	1	2					
Oxidizing Gases	1						
Gases under Pressure Compressed Gases Liquefied Gases Refrigerated Liquefied Gases Dissolved Gases	1						
Flammable Liquids	1	2	3	4			
Flammable Solids	1	2					
Self-Reactive Chemicals	Type A	Type B	Type C	Type D	Type E	Type F	Type G
Pyrophoric Liquids	1						
Pyrophoric Solid	1						
Pyrophoric Gases	Single category						
Self-heating Chemicals	1	2					
Chemicals, which in contact with water, emit flammable gases	1	2	3				
Oxidizing Liquids	1	2	3				
Oxidizing Solids	1	2	3				
Organic Peroxides	Type A	Type B	Type C	Type D	Type E	Type F	Type G
Corrosive to Metals	1						
Combustible Dusts	Single category						



# What's Hazardous?

- **Health Hazards (1994)**

- Irritants
- Corrosives
- Toxins
- Sensitizers
- Carcinogens
- Mutagens
- Teratogens
- Effects on target organs (i.e., liver, kidney, nervous system, blood, lungs, mucous membranes, reproductive system, skin, eyes, etc.).

- **Health Hazards (2012)**

- Acute Toxicity, Oral
- Acute Toxicity, Dermal

- Acute Toxicity, Inhalation
- Aspiration Hazard
- Skin Corrosion / Irritation
- Eye Corrosion / Irritation
- Respiratory Sensitization
- Skin Sensitization
- Germ Cell Mutagenicity
- Carcinogenicity
- Reproductive Toxicity, Fertility
- Reproductive Toxicity,
  - Development
- Specific Target Organ Toxicity
  - Single dose
  - Repeat dose

# Most (but not all) Health Hazards Adopted by OSHA

## Health Hazards

Hazard Class	Hazard Category			
Acute Toxicity	1	2	3	4
Skin Corrosion/ Irritation	1A	1B	1C	2
Serious Eye Damage/ Eye Irritation	1	2A	2B	
Respiratory or Skin Sensitization	1			
Germ Cell Mutagenicity	1A	1B	2	
Carcinogenicity	1A	1B	2	
Reproductive Toxicity	1A	1B	2	Lactation
STOT – Single Exposure	1	2	3	
STOT – Repeated Exposure	1	2		
Aspiration	1			
Simple Asphyxiants	Single Category			

# Health Hazards

- OSHA did not adopt the following health hazards...
  - Toxicity category 5 by any route of exposure: This would be relevant to consumer products and is of low toxicity.
  - Irritation category 3: Mild irritants to skin and
  - Eye irritation category 2b: Mild eye irritants
  - Asphyxiation category 2: GHS calls ‘aspiration hazards ‘

# What is considered for untested mixtures?

- HCS 1994:
  - Every health and physical hazard that is present at a concentration of 1% or greater.
  - Every carcinogen present at 0.1% or greater

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  - Hazardous materials at a concentration sufficient to present a hazard in the workplace.

# HCS 2012 - Untested Mixtures

	HCS 1994	OSHA HCS 2012
Acute toxicity	≥ 1%	ATE; ≥ 1 % Or < 1 % where relevant
Skin corrosion/ irritation	≥ 1%	Calculation, cutoffs; ≥ 1 % Or < 1 % where relevant
Eye Damage/Irritation	≥ 1%	Calculation, cutoffs; ≥ 1 % Or < 1 % where relevant
Skin sensitization		
Cat 1		≥ 0.1%
Cat 1A	≥ 1%	≥ 0.1%
Cat 1B		≥ 1.0%
Respiratory sensitization		
Cat 1		≥ 0.1%
Cat 1A	≥ 1%	≥ 0.1%
Cat 1B		≥ 1.0 % [≥ 0.2% for gases]
Mutagenicity: Cat 1		≥ 0.1% Cat 1 = SDS/label
Category 2	≥ 1%	≥ 1% Cat 2 = SDS/label
Carcinogenicity:		
Category 1		≥ 0.1% Cat 1 = SDS/label
	≥ 0.1%	≥ 0.1% < 1% Cat 2 = SDS (optional label)
Category 2		≥ 1% Cat 2 = SDS/label
Reproductive toxicity:		
Cat. 1 / Lactation	≥ 1%	≥ 0.1% Cat 1 = SDS/label
Category 2		≥ 0.1% Cat 2 = SDS/label
STOT:		
Category 1		≥ 1% Cat 1 = Cat 1 SDS/label
Category 2	≥ 1%	≥ 1% Cat 2 = Cat 2 SDS/label
Category 3		≥ 20% additive
Aspiration:		
Category 1	≥ 1%	≥ 10% of Cat 1's and kinematic viscosity ≤ 20.5 mm <sup>2</sup> /s @ 40°C

# Classification Criteria




## Flammable Liquids

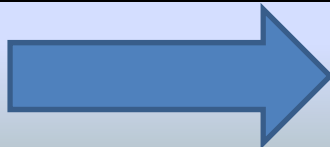
Existing HCS	2012 HCS	
<b>Flammable</b>  FP ≤ 100 °F	<b>Category 1</b>  FP > 73.4 °F & BP ≤ 95 °F	
	<b>Category 2</b>  FP > 73.4 °F & BP > 95 °F	
	<b>Category 3</b>  FP ≥ 73.4 °F and ≤ 140 °F	
<b>Combustible</b>  FP > 100 °F ≤ 200°F	<b>Category 4</b>  FP ≥ 140 °F and ≤ 200 °F	

# Classification Criteria

Acute Toxicity definition is broader.

## Oral Toxicity to Rat




Existing HCS	2012 Standard	
<b>Highly Toxic:</b> LD50 $\leq$ 50 mg/kg	<b>Category 1:</b> LD50 $\leq$ 5 mg/kg  <b>Category 2:</b> LD50 $>$ 5 mg/kg & $<$ 50 mg/kg	
<b>Toxic:</b> LD50 $>$ 50 mg/kg & $\leq$ 500 mg/kg	<b>Category 3:</b> LD50 $\geq$ 50 mg/kg & $<$ 300 mg/kg  <b>Category 4:</b> LD50 $\geq$ 300 mg/kg & $<$ 2000 mg/kg	  



# Classification Criteria

- Acute Toxicity definition is broader.




## Dermal Toxicity to Rabbit

Existing HCS	2012 Standard	
<b>Highly Toxic:</b> LD50 $\leq$ 200 mg/kg	<b>Category 1:</b> LD50 $\leq$ 50 mg/kg  <b>Category 2:</b> LD50 $>$ 50 mg/kg & $\leq$ 200 mg/kg	
<b>Toxic:</b> LD50 $>$ 200 mg/kg & $\leq$ 1000 mg/kg	<b>Category 3:</b> LD50 $>$ 200 mg/kg & $\leq$ 1000 mg/kg  <b>Category 4</b> LD50 $>$ 1000 mg/kg & $\leq$ 2000 mg/kg	  






# Classification Criteria

## Inhalation Toxicity to Rat (gases)

Existing HCS	Proposed Standard	
<b>Highly Toxic:</b> LC50 (1 hr) $\leq$ 200 ppm LC50 (4 hr) $\leq$ ~100 ppm	<b>Category 1:</b> LC50 (4 hr) $\leq$ 100 ppm  <b>Category 2:</b> LC50 (4 hr) $>$ 100 ppm & $\leq$ 500 PPM	
<b>Toxic:</b> LC50 (1 hr) $>$ 200 ppm & $\leq$ 2000 ppm LC50 (4 hr) $>$ 100 ppm & $\leq$ 1000 ppm	<b>Category 3:</b> LC50 (4 hr) $>$ 500 ppm & $\leq$ 2500 ppm  <b>Category 4</b> LC50 (4 hr) $>$ 2500 ppm & $\leq$ 20000 ppm	  
<b>The conversion factor from 1 hr to 4hr is to divide by 2 for gases</b>		




# Classification Criteria

## Inhalation Toxicity to Rat (dust/mist)

Existing HCS	Proposed Standard	
<p><b>Highly Toxic:</b>                      LC50 (1 hr) <math>\leq</math> 2 mg/l                      LC50 (4 hr) <math>\leq</math> ~0.5 mg/l</p>	<p><b>Category 1:</b> LC50 (4 hr) <math>\leq</math> 0.05 mg/l</p> <p><b>Category 2:</b> LC50 (4 hr) <math>&gt;</math> 0.05 mg/l &amp;  <math>\leq</math> 0.5 mg/l</p>	
<p><b>Toxic:</b>                      LC50 (1 hr) <math>&gt;</math> 2 mg/l &amp;  <math>\leq</math> 20 mg/l                      LC50 (4 hr) <math>&gt;</math> 0.5 mg/l &amp;  <math>\leq</math> ~5 mg/l</p>	<p><b>Category 3:</b>                      LC50 (4 hr) <math>&gt;</math> 0.5 mg/l &amp;  <math>\leq</math> 1.0 mg/l</p> <p><b>Category 4</b>                      LC50 (4 hr) <math>&gt;</math> 1.0 mg/l &amp;  <math>\leq</math> 5 mg/l</p>	 
<p><b>The conversion factor from 1 hr to 4hr is to divide by 4 for dust</b></p>		

# Classification Criteria

## Inhalation Toxicity to Rat (vapor)

Existing HCS	Proposed Standard	
<p><b>Highly Toxic:</b>                      LC50 (1 hr) <math>\leq</math> 200 ppm                      LC50 (4 hr) <math>\leq</math> ~100 ppm</p>	<p><b>Category 1:</b> LC50 (4 hr) <math>\leq</math> 0.5 mg/l</p> <p><b>Category 2:</b> LC50 (4 hr) <math>&gt;</math> 0.5 mg/l &amp; <math>\leq</math> 2 mg/l</p>	
<p><b>Toxic:</b>                      LC50 (1 hr) <math>&gt;</math> 200 ppm &amp; <math>\leq</math> 2000 ppm                      LC50 (4 hr) <math>&gt;</math> 100 ppm &amp; <math>\leq</math> ~1000 ppm</p> <p>A direct comparison is not possible.</p> <p>mg/l = (ppm) x (MW)/(24,450)</p>	<p><b>Category 3:</b>                      LC50 (4 hr) <math>&gt;</math> 2 mg/l &amp; <math>\leq</math> 10.0 mg/l</p> <p><b>Category 4</b>                      LC50 (4 hr) <math>&gt;</math> 10.0 mg/l &amp; <math>\leq</math> 20 mg/l</p>	 

# Classification Criteria

- List of IARC, NTP, OSHA carcinogens replaced by carcinogenicity criteria.

Criteria	Known to cause human cancers	Animal carcinogen & limited human evidence	Limited evidence in animals & humans
<b>IARC</b>	1 – Human Carcinogen	2a – Probable Carcinogen	2b – Suspect Carcinogen
<b>NTP</b>	Known Carcinogen	Suspect Carcinogen	
<b>OSHA carcinogens</b>	Cancer Agent	Suspect Cancer Agent	
<b>2012 Standard</b>	1A – Known Carcinogen	1B – Presumed Carcinogen	2 – Suspect Carcinogen

These translated categories are approximate. The study results should be reviewed to determine the actual classification under the 2012 standard.

# Classifying Mixtures (toxicity)

- Testing
- Bridging criteria such as
  - dilution,
  - interpolation of high, low data
- Calculation by formula

– Acute toxicity

$$\frac{100}{ATE_{mix}} = \frac{C_i}{ATE_i}$$

# Classifying Mixtures (toxicity)

More than 10% of mixture has unknown toxicity value....

$$\frac{100 - (\sum C_{\text{unknown}})}{ATE_{\text{mix}}} = \sum_{n=i} \frac{C_i}{ATE_i}$$

**Your mixture calculates to a more toxic value if data is not available.**

# Mixtures – Corrosivity / Irritation

Sum of ingredients classified as: (where effects are additive)	Concentrations triggering classification of a mixture as		
	Skin Corrosive	Skin Irritant	
	Category 1	Category 2	Category 3
Skin category 1	≥ 5%	≥ 1% but < 5%	
Skin category 2		≥ 10%	≥ 1% but < 10%
Skin category 3			≥ 10%
(10 x Skin category 1) + Skin category 2		≥ 10%	≥ 1% but < 10%
(10 x Skin category 1 Skin category 1) + Skin category 2 + Skin Category 3			≥ 10%



# Mixtures – Corrosivity/Irritation

<b>Ingredient:</b> (where effects are not additive)	<b>Concentration</b>	<b>Mixture Classified as: (Skin)</b>
<b>Acid with pH <math>\leq 2</math></b>	$\geq 1\%$	<b>Category 1</b>
<b>Base with pH <math>\geq 11.5</math></b>	$\geq 1\%$	<b>Category 1</b>
<b>Other corrosive (category 1) ingredients for which additivity does not apply</b>	$\geq 1\%$	<b>Category 1</b>
<b>Other corrosive (category 2/3) ingredients for which additivity does not apply, including acids and bases</b>	$\geq 3\%$	<b>Category 2</b>



# Materials to Train

- The following information is for employees and discusses what they are going to show and where to find information in SDSs and on Labels.

# HCS 2012

- Safety Data Sheets (SDSs)
  - HCS 1985 & HCS 1994 did not specify form of safety data sheet, only the information to be presented.
  - HCS 2012 specifies the 16 section format with data fields for each section. Now the same kind of information will be in the same section on each SDS.

# SDSs Requirements

## (Minimum Information Required)

- Section 1 *Product and Company*
  - Product identity (same as on label)
  - Other means of identity
  - **Product use and restriction on use**
  - Name, address and phone number of responsible party
  - **Emergency phone number**

# SDSs Requirements (Minimum Information Required)

- Section 2 *Hazard Identification*
  - Classification of chemical according to **new criteria**
  - **Signal word, hazard statements, precautionary statements, symbols** (either graphic or words)
  - **Unclassified hazards** (e.g. combustible dusts)
  - **Where an ingredient is present at 1% or more with unknown toxicity.....statement indicating percentage of unknown toxicity**

# SDSs Requirements

(Minimum Information Required)

- Section 3  
(*Composition / Information on Ingredients*)
  - For Substances
    - Chemical name and common name (synonyms)
    - **CAS Number or other unique identifier**
    - Any impurity that contributes to product hazard
  - For Mixtures
    - Chemical name and common name (synonyms)
    - **CAS Number or other unique identifier**
    - **Concentration for each hazardous ingredient**
      - **If the exact percentage is a trade secret, a range of concentration can be used.**

# SDSs Requirements

## Minimum Information Required

- Section 4 *First Aid Measures*

### First aid measures by route of entry

- Most important symptoms (immediate and delayed)
- Indication of immediate medical attention or other special steps to be taken

- Section 5 *Fire-Fighting Measures*

- Suitable (and unsuitable) extinguishing media
- Special hazards presented by the chemical or mixture
- Special protective equipment necessary for fire fighters

# SDSs Requirements

## Minimum Information Required

- *Section 6 Accidental Release Measures*  
PPE, other protective equipment and emergency procedures
  - Methods of cleanup and containment
- *Section 7 Handling and Storage*
  - Precautions for safe handling
  - Conditions for safe storage and incompatibilities

# SDSs Requirements

## Minimum Information Required

- *Section 8 Exposure Controls – Personal Protection*
  - OSHA PELs and any other exposure value developed or used by the responsible party
  - ACGIH TLVs
  - Engineering controls (e.g. ventilation)
  - Personal Protective Equipment



# SDSs Requirements

- Section 9 *Physical & Chemical Properties*  
Mandatory headings for .....

**appearance, odor, odor threshold, physical state, pH, melting/freezing point, initial boiling point and boiling range, flash point, evaporation rate, flammability (solid, gas), upper/lower flammability (explosive) limits, vapor pressure, vapor density, specific gravity, solubility, partition coefficient, (n-octanol/water), auto-ignition temperature and decomposition temperature, viscosity.**

# SDSs Requirements

## Minimum Information Required

- Section 10 *Stability and Reactivity*
  - Reactivity
  - Chemical stability
  - Possibility of hazardous reactions
  - Incompatible materials
  - Hazardous decomposition products

# SDSs Requirements

## Minimum Information Required

- Section 11 *Toxicological Information*
  - May contain technical language for health professionals
  - Information on likely routes of exposure
  - Symptoms related to exposure by route
  - Delayed and immediate effects of short term exposure
  - Chronic effects from long term exposure
  - Numerical measures of toxicity (e.g., LD50's)

# SDSs Requirements

## Minimum Information Required

- Section 12 *Ecological Information*
  - Ecotoxicity (aquatic, terrestrial when available)
  - Persistence and degradability
  - Bioaccumulative potential
  - Mobility in soil
  - Other adverse effects (e.g., effect on ozone layer)

# SDSs Requirements

- Section 13 *Disposal Considerations*
  - Description of waste residues and information on safe handling and methods of disposal (including packaging).
- Section 14 *Transport Information*
  - UN number
  - UN shipping name
  - Transport hazard class
  - Packing group
  - Marine pollutant and other environmental hazards
  - Transport of bulk quantities

# SDSs Requirements

## Minimum Information Required

- **Section 15 *Regulatory Information***
  - Safety, health and environmental regulations specific to the product
- **Section 16 *Other Information***
  - Date of preparation and/or last revision

# HCS 2012

- **Labels:**
  - HCS 1994 required identity, hazards, supplier name and address.
  - HCS 2012 requires identity, **signal word**, hazards, **precautions**, **hazard symbols**, supplier name, address and **phone number**.

Labels will look different..

## 1994 OSHA Label Requirements

### **Methyl Enigma**

**FLAMMABLE LIQUID AND VAPOR  
CAUSES SKIN AND EYE IRRITATION**

**Phantom Chemical- Kneecap, AL.**



# Labels will look different..

## Typical ANSI Label

<b>WARNING!</b> FLAMMABLE LIQUID AND VAPOR CAUSES SKIN AND EYE IRRITATION Avoid sources of ignition. Avoid contact with skin and eyes. Wash thoroughly after using. First Aid:..... In case of fire:..... In case of spill:..... <i>Environmental Hazards.....</i> Storage and Handling:..... <i>Disposal Considerations</i> <i>or prohibitions??</i> For additional information, see MSDS. Phantom Chemical- Kneecap, AL.	<b>Methyl Enigma</b>
--	----------------------

# Under HCS 2012

## Typical ANSI Label Modified for GHS

### Methyl Enigma

#### WARNING!

FLAMMABLE *LIQUID AND VAPOR*  
CAUSES SKIN AND EYE IRRITATION

Keep container tightly closed.

Avoid ignition sources.

Wear protective glove and eye protection.

Wash thoroughly after using.

First Aid:.....

In case of fire:.....

In case of spill:.....

Environmental Hazards.....

Storage and Handling:.....

*Disposal Considerations  
or prohibitions??*

For additional information, see MSDS.

**Phantom Chemical- Kneecap, AL. (999) 451-2398**



# HCS 2012 Symbols

## HCS Pictograms and Hazards

### Health Hazard



- Carcinogen
- Mutagenicity
- Reproductive Toxicity
- Respiratory Sensitizer
- Target Organ Toxicity
- Aspiration Toxicity

### Flame



- Flammables
- Pyrophorics
- Self-Heating
- Emits Flammable Gas
- Self-Reactives
- Organic Peroxides

### Exclamation Mark



- Irritant (skin and eye)
- Skin Sensitizer
- Acute Toxicity
- Narcotic Effects
- Respiratory Tract Irritant
- Hazardous to Ozone Layer (Non-Mandatory)

### Gas Cylinder



- Gases Under Pressure

### Corrosion



- Skin Corrosion/ Burns
- Eye Damage
- Corrosive to Metals

### Exploding Bomb



- Explosives
- Self-Reactives
- Organic Peroxides

### Flame Over Circle



- Oxidizers

### Environment (Non-Mandatory)



- Aquatic Toxicity

### Skull and Crossbones



- Acute Toxicity (fatal or toxic)

# Where to get help?

- OSHA GHS & GHS Training Resources found at:
- <http://www.osha.gov/hazcom>
  - Wallet cards, label & SDS training aids
- <http://www.schc.org>
  - Links to resources and to OSHA Alliance page which has resources as well.

WHAT ARE EMPLOYEES LIKELY TO ASK?



# Some Questions to Anticipate

- **Is this going to affect my job?**
- **I've already seen lots of 16 section MSDSs. Why?**
- **When do we start to see the new MSDSs?**
- **Why are they dropping the word Material from MSDSs? Why just SDS?**
- **When are labels going to change?**
- **Why don't our labels contain these symbols?**

# Some Questions to Anticipate

- **This stuff wasn't hazardous before but now it has a new symbol on it. Why?**
- **This stuff used to be called an irritant. Now its not. Why?**
- **Is this really going to make things safer for me?**
- **Why is there a big DOT Flammable symbol on the drum but not a small OSHA Flammable symbol?**

# Some Questions to Anticipate

- **Is this going to affect our labels?**
- **Is this going to change the way we get trained about hazards?**
- **Will I get something to help me remember what the symbols mean?**



# Discussion

