Globally Harmonized System of Classification and Labelling of Chemicals
Heather Kubiak, CSP
What we will be covering...

Covering

- UN GHS Development
- GHS Implementation in the US
- Brief Recap of 1900.1200/1450
- State of Michigan Implementation
- Detailed Review of GHS parts
  - Labels
  - Pictograms & Hazard revisions
  - SDS sections
- Suggested Action Plan
- Ongoing Issues
WHERE ARE YOU IN THE PROCESS?
## Effective Dates and Requirements

<table>
<thead>
<tr>
<th>Effective Completion Date</th>
<th>Requirement(s)</th>
<th>Responsible Party</th>
</tr>
</thead>
<tbody>
<tr>
<td>December 1, 2013</td>
<td>Train employees on the new label elements and SDS format</td>
<td>Employers</td>
</tr>
<tr>
<td>June 1, 2015</td>
<td>Compliance with all modified provisions of the final rule except:</td>
<td>Chemical manufacturers, importers, distributors, and employers</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>December 1, 2015</td>
<td>The distributor shall not ship containers labeled by the chemical manufacturer or importer unless it is a GHS label</td>
<td>Distributor</td>
</tr>
<tr>
<td>June 1, 2016</td>
<td>Update alternative workplace labeling and hazard communication program as necessary, and provide additional employee training for newly identified hazards [and affected vertical standard specific signage]</td>
<td>Employer</td>
</tr>
</tbody>
</table>

Transition Period: 12/2012 to the effective completion dates noted above

May comply with either MIOSHA Part 42, 92 and 430 (final standard), or the current standard, or both

Chemical manufacturers, importers, distributors, and employers
1992 - Rio “Earth Summit” established 6 program areas on sound management of chemicals - including harmonization of classification and labeling of chemicals

1994 - IOMC (Interorganization Programmed for the Sound Management of Chemicals) The Coordinating Group for the Harmonization of Chemical Classification Systems led the effort. Technical Work:
- Physical Hazards
- Health/Environmental Hazards
- Hazard Communication

1994 - OHSA implements new HSC

UN Adopted Basic GHS components and published “Purple Book” in December 2002,
- Rev 5: 2013 [see toolkit]
OHSA - Hazard Communication Standard 2012

(a) Purpose.

(a)(1) The purpose of this section is to ensure that the hazards of all chemicals produced or imported are classified, and that information concerning the classified hazards is transmitted to employers and employees. The requirements of this section are intended to be consistent with the provisions of the United Nations Globally Harmonized System of Classification and Labeling of Chemicals (GHS). Revision 3. The transmittal of information is to be accomplished by means of comprehensive hazard communication programs, which are to include container labeling and other forms of warning, safety data sheets and employee training.

1. Ensure chemical hazards are classified
2. Transmit this info to employees via
   - Container labels - Pictograms!
   - Safety Data Sheets
   - Training
3. All info to be consistent with GHS

Lab specific Regs are 1910.1450
Under 1560.1450 the Lab
HazCom =

Pro-GHS
“Right to Know”
Hazard Determination
A Chemical Hygiene Officer
A Written Chemical Hygiene Plan
NPFA hazards
MSDS knowledge
Document Training
Label Chemicals in the Lab
Used the Manufacturers’
Retain and provide MSDS access

Post-GHS
‘Right to Understand”
Hazard Classification
A Chemical Hygiene Officer who is GHS Trained
A Chemical Hygiene Plan with GHS items added
Understanding Pictograms/new hazards
Understanding how to read an SDS
Document GHS Training
Label Chemicals: Decision on showing both GHS & Non-GHS
Retain MSDS, Replace with SDS as received, provide access

©2013 NW HELP Group; Permission to use granted provided attribution is shown
08/09/2013
GHS Parts

1. Labels
2. Pictograms and Hazard Classes
3. SDS
Labels

The Six Parts
Six elements of the new Globally Harmonized Standard (GHS) label format

1. **Signal Word:**
   Indicates relative level of hazard. "Danger" is used for most severe instances, while "Warning" is less severe.

2. **Symbols (Hazard Pictograms):**
   Convey health, physical and environmental hazard information with red diamond pictograms. May use a combination of one to five symbols.

3. **Product Name or Identifiers:**

4. **Hazard Statements:**
   Phrases that describe the nature of hazardous products and oftentimes the degree of hazard.

5. **Precautionary Statements:**
   Phrases associated with each hazard statement, that describe general preventative, response, storage or disposal precautions.

6. **Manufacturer Information:**
   Company name, address & telephone number.

---

**Example Label:**

**Danger**

Carbon Monoxide

H220: Extremely flammable gas.
H331: Toxic if inhaled.
H360D: May damage the unborn child.
H372: Causes damage to organs through prolonged or repeated exposure.

Keep container tightly closed. Avoid breathing vapours. If inhaled: Remove victim to fresh air and keep at rest in a position comfortable for breathing. Call a Poison Center or doctor. Store in a well-ventilated place.
New GHS Labels draw all statements from existing text, listed by hazard class – this table is an example of the process.
Our challenge is well illustrated by this table

- 1 is the new 4
- 4 is the new 1
- “Pink is the new black”
Pictograms

Goal: Understand the Change to Hazard Classification Represented by Each Pictogram
Chemicals will be classified using a harmonized system that provides standardized language for:

- Health Hazard Categories
- Physical Hazard Categories
- Environmental Hazard Categories*

*Not regulated by MIOSHA.
## Chemical Classifications:

### Health Hazards

<table>
<thead>
<tr>
<th>Hazard Class</th>
<th>Hazard Category</th>
</tr>
</thead>
<tbody>
<tr>
<td>Acute toxicity</td>
<td>1 2 3 4</td>
</tr>
<tr>
<td>Skin Corrosion/Irritation</td>
<td>1A 1B 1C 2</td>
</tr>
<tr>
<td>Serious Eye Damage/Eye Irritation</td>
<td>1 2A 2B</td>
</tr>
<tr>
<td>Respiratory or Skin Sensitization</td>
<td>1</td>
</tr>
<tr>
<td>Germ Cell Mutagenicity</td>
<td>1A 1B 2</td>
</tr>
<tr>
<td>Carcinogenicity</td>
<td>1A 1B 2</td>
</tr>
<tr>
<td>Reproductive Toxicity</td>
<td>1A 1B 2</td>
</tr>
<tr>
<td>Lactation</td>
<td></td>
</tr>
<tr>
<td>Specific Target Organ Toxicity – Single Exposure</td>
<td>1 2 3</td>
</tr>
<tr>
<td>Specific Target Organ Toxicity – Repeated Exposure</td>
<td>1 2</td>
</tr>
<tr>
<td>Aspiration</td>
<td>1</td>
</tr>
<tr>
<td>Simple Asphyxiants</td>
<td>Single</td>
</tr>
</tbody>
</table>
Chemical Classifications: Health Hazards

- Acute Toxicity
- Skin Corrosion/Irritation
- Respiratory or Skin Sensitization
- Germ Cell Mutagenicity
- Carcinogenicity
- Reproductive Toxicity
- Specific Target Organ Toxicity – Single Exposure
- Specific Target Organ Toxicity – Repeated Exposure
- Aspiration
- Simple Asphyxiants
Chemical Classifications: Physical Hazards

- Explosives
- Flammable Aerosols
- Oxidizing Gases
- Gases under Pressure
  - Compressed Gases
  - Liquefied Gases
  - Refrigerated Liquefied Gases
  - Dissolves Gases
Chemical Classifications: Physical Hazards (continued)

- Flammable Liquids
- Flammable Solids
- Self-Reactive Chemicals
- Pyrophoric Liquids
- Pyrophoric Solid
- Pyrophoric Gases
- Self-heating Chemicals
- Chemicals, which in contact with water, emit flammable gases
Chemical Classifications: Physical Hazards (continued)

- Oxidizing Liquids
- Oxidizing Solid
- Organic Peroxides
- Corrosive to Metals
- Combustible Dusts
## Physical Hazards

<table>
<thead>
<tr>
<th>Hazard Class</th>
<th>Hazard Category</th>
<th>Div 1.1</th>
<th>Div 1.2</th>
<th>Div 1.3</th>
<th>Div 1.4</th>
<th>Div 1.5</th>
<th>Div 1.6</th>
</tr>
</thead>
<tbody>
<tr>
<td>Explosives</td>
<td>Unstable</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Flammable Gases</td>
<td></td>
<td>1</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Flammable Aerosols</td>
<td></td>
<td>1</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Oxidizing Gases</td>
<td></td>
<td>1</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Gases under Pressure</td>
<td></td>
<td>1</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Compressed gases</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Liquefied gases</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Refrigerated liquefied gases</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Dissolved gases</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Flammable Liquids</td>
<td></td>
<td>1</td>
<td>2</td>
<td>3</td>
<td>4</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Flammable Solids</td>
<td></td>
<td>1</td>
<td>2</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Self-Reactive Chemicals</td>
<td>Type A</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Pyrophoric Liquids</td>
<td></td>
<td>1</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Pyrophoric Solids</td>
<td></td>
<td>1</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Pyrophoric Gases</td>
<td>Single Category</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Self-Heating Chemicals</td>
<td></td>
<td>1</td>
<td>2</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Chemicals in which contact with water emit flammable gases</td>
<td></td>
<td>1</td>
<td>2</td>
<td>3</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Oxidizing Liquids</td>
<td></td>
<td>1</td>
<td>2</td>
<td>3</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Oxidizing Solids</td>
<td></td>
<td>1</td>
<td>2</td>
<td>3</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Organic Peroxides</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>Type</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>
There are several new label elements:

- Symbols called “Pictograms”
- Signal Words
- Hazard Statements
- Precautionary Statements
- Product Identification
- Supplier/Manufacturer Identification

www.osha.gov/Publications/HazComm_QuickCard_Labels.html
There are 9 pictograms. Only 8 are regulated by MIOSHA
- Health Hazards
- Physical Hazards
- Environmental Hazards (Regulated by DEQ)
Labels: Pictograms – Physical Hazards

Explosives
Self reactives
Organic peroxides

Flammables
Self reactives
Pyrophorics
Self heating
Emits flammable gas
Organic peroxides
Exploding Bomb says it all!

Flame

- This is a complex set of hazards that includes high-use materials for labs
  - Gases, Aerosols, Liquids, and Solids
Labels: Pictograms – Physical Hazards (continued)

- Corrosive to Metals
- Oxidizer
- Gases under Pressure
Oxidizing materials

- Gas = O₂ and O₃
- Liquids = Nitric Acid, Chromic acid, Sodium Hypochlorite
- Solids = Chromate, Potassium Permanganate
Acute toxicity (Severe)

Acute toxicity (Less Severe):
- Irritant
- Dermal sensitizer
- Acute toxicity (harmful)
- Narcotic effects
- Respiratory tract irritation

Acute = short-term effect
### Skull and Crossbones
- Acute toxicity (oral, dermal, inhalation), hazard categories 1, 2, 3

### Exclamation Mark
- Acute toxicity (oral, dermal, inhalation), hazard category 4
- Skin irritation, hazard category 2
- Eye irritation, hazard category 2A
- Skin sensitisation, hazard category 1A, 1B
- Specific Target Organ Toxicity - Single exposure, hazard category 3
  - Respiratory tract irritation
  - Narcotic effects
- Hazardous to the ozone layer

---

Remember: Category 4 = least hazardous condition

---

©2013 NW HELP Group: Permission to use granted provided attribution is shown
Skin corrosion
Serious eye damage/
Eye irritation

Carcinogen
Respiratory sensitiser
Reproductive toxicity
Target organ toxicity
Mutagenic
Aspiration Hazard

Labels: Pictograms – Health Hazards (continued)
Will be used in by two different Risk Categories

- Chemical/Physical Risk = e.g. Corrosive Metals
- Health Risk = e.g. Eye Damage
Environment Pictogram: “Dead Tree Dead Fish”

- No current standard for non-aquatic species e.g. Bees
- If it is a category 3 or 4 Environment = no symbol no signal word

<table>
<thead>
<tr>
<th>Health hazard</th>
<th>Environment</th>
</tr>
</thead>
<tbody>
<tr>
<td>GHS03</td>
<td></td>
</tr>
<tr>
<td>Respiratory sensitization, hazard category 1A, 1B</td>
<td>Hazardous to the aquatic environment</td>
</tr>
<tr>
<td>Germ cell mutagenicity, hazard categories 1A, 1B, 2</td>
<td>– Acute hazard category 1</td>
</tr>
<tr>
<td>Carcinogenicity, hazard categories 1A, 1B, 2</td>
<td>– Chronic hazard categories 1, 2</td>
</tr>
<tr>
<td>Reproductive toxicity, hazard categories 1A, 1B, 2</td>
<td></td>
</tr>
<tr>
<td>Specific Target Organ Toxicity – Single exposure, hazard categories 1, 2</td>
<td></td>
</tr>
<tr>
<td>Specific Target Organ Toxicity – Repeated exposure, hazard categories 1, 2</td>
<td></td>
</tr>
<tr>
<td>Aspiration hazard, hazard category 1, 2</td>
<td></td>
</tr>
</tbody>
</table>
These are words used to indicate the severity of the hazard and alert employees to the potential hazard.

Only 2 signal words will appear:

- "DANGER" (more severe hazard)
- "WARNING" (less severe hazard)

Not all labels will have a signal word. Some chemicals are not hazardous enough to require that a signal word appear on the label.
There are specific hazard statements that must appear on the label based on the chemical hazard classification.

Examples:

- Flammable liquid and vapor
- Causes skin irritation
- May cause cancer
Labels and other forms of warning – Precautionary Statements

- Recommended measures related to:
  - Prevention
  - Response
  - Storage
  - Disposal

- Examples:
  - Wear respiratory protection
  - Wash with soap and water
  - Store in a well ventilated place

- Not a mandate for employers/employees to follow.
Label: Identification

- Product identification (i.e. name of product)
- Supplier identification:
  - Address
  - Telephone number
Safety Data Sheets
SAFETY DATA SHEET SECTIONS

Section 1. Identification
Section 2. Hazard(s) identification
Section 3. Composition/information on ingredients
Section 4. First-Aid measures
Section 5. Fire-fighting measures
Section 6. Accidental release measures
Section 7. Handling and storage
Section 8. Exposure controls/personal protection
Section 9. Physical and chemical properties
Section 10. Stability and reactivity
Section 11. Toxicological information
Section 12. Ecological information
Section 13. Disposal considerations
Section 14. Transport information
Section 15. Regulatory information
Section 16. Other information, including date of preparation or last revision
Revised Posters – MSDS to SDS
A revised 2012 OHSA Hazard Communication Standard incorporates a UN based Global Harmonization System for chemical labeling and handling – MIOSHA Adopts – review Parts 42, 92, 430

- New GHS Labels have 6 parts

- Pictograms represent 9 hazard classifications distributed among three hazard groups: one used in two different groups

- A 16 section Safety Data Sheet replaces the MSDS
Lab Chemical Mixtures
- SDS Conversion by Chemical vendors has a long way to go
- UN two year GHS Update process will cause additional changes
Action Plan

- If you have not done so already....
  - Review your written Hazard Communication Written Program. Align it with the newest standard. TRAIN YOUR EMPLOYEES ASAP.
  - You can’t train on subjects that you don’t understand so honestly spend a couple of hours reviewing the hazard classification changes
  - Determine how you will handle incoming new SDS’s within current system & retain copies of ‘old’ MSDS. MSDS must be kept for _____years!

- By June 1
  - Compliance with all aspects of GHS
Where to get more information

- LARA Website
  [http://www.michigan.gov/lara/0,4601,7-154-61256_11407-284831--,00.html](http://www.michigan.gov/lara/0,4601,7-154-61256_11407-284831--,00.html)
  [www.michigan.gov/ghs](http://www.michigan.gov/ghs)

- They have sample plans, video based training, lending library, etc.