

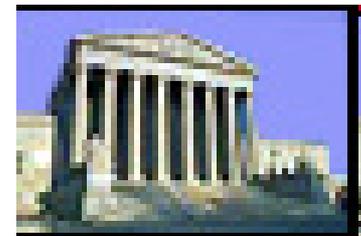
## Workshop

## Malaysians



SAND No. 2008-3832C?  
Sandia is a multiprogram laboratory operated by Sandia Corporation, a Lockheed Martin Company,  
for the United States Department of Energy's National Nuclear Security Administration  
under contract DE-AC04-94AL85000.





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# United States, Regulations, Recommendations, Standards and Guidelines

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# 1936 Walsh-Healy Act

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## The First US Safety Law



**Required companies providing goods to the US government to provide a safe and health workplace**

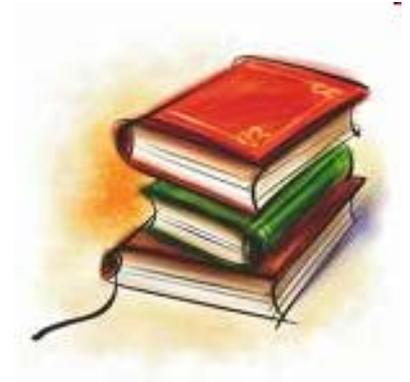


# 1970 Occupational Safety and Health Act

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established OSHA and NIOSH to:

- formulate work standards
- do safety research



**OSHA**

**NIOSH**



# US Safety Related Regulations and Standards

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- OSHA-Occupational Safety and Health Administration
- EPA-Environmental Protection Agency
- DOT-Department of Transportation
- FDA-Food and Drug Administration





# US Safety Research and Recommendations

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- NIOSH-National Institute of Occupational Safety and Health
- NIH-National Institutes of Health
- CDC-Centers for Disease Control and Prevention





# Voluntary Industry Standards

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- **ACGIH/TLV®-American Conference of Governmental Industrial Hygienists/Threshold Limit Values®**
- **NFPA-National Fire Protection Association**
- **ANSI-American National Standards Institute**



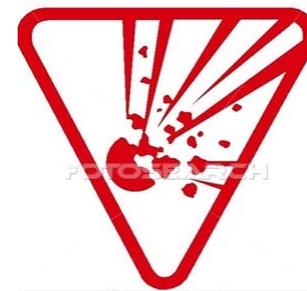
*Celebrating 60 years of outstanding service  
to occupational and environmental health and safety!*



# Voluntary Industry Standards: Continued

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- **CGA - Compressed Gas Association**
- **ASHRAE-American Society of Heating, Refrigeration, and Air Conditioning Engineers**
- **IME-Institute of Makers of Explosives**
- **ASME-American Society of Mechanical Engineers**



scm\_007c www.fotosearch.com



obi\_466 www.fotosearch.com



# Important OSHA Chemical Safety Regulations



OSHA General Industry Standard  
**29CFR1910**

**OSHA is part of DOL**

**29 = Department of Labor**

**CFR = Code of Federal Regulations**

**1910 = The General Industry Standard**

General Duty Clause 5(a)(1)

States that employers “shall furnish to each of his employees ... a place ... free of recognized hazards ... causing ... or likely to cause death or serious physical harm”





# OSHA Chemical Safety Regulations: Continued

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29CFR1910.1904

## Recording and Reporting of Occupational Injuries and Illnesses

- **requires and specifies what must be reported, when, how, by whom and to whom**
- **also establishes confidentiality**





# OSHA Chemical Safety Regulations: Continued

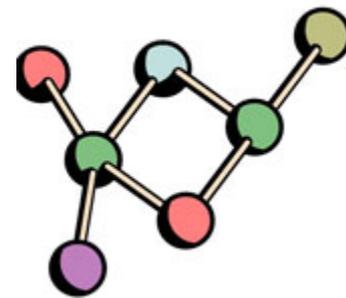
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29CFR1910.1001-1048

suffix, .1001 establishes a specific standard

Specific Substance Standards

- e.g., lead, asbestos, formaldehyde, specific carcinogens, benzene, arsenic, vinyl chloride, ethylene oxide





## OSHA Permissible Exposure Limits (PELs)

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- **asbestos**                      **0.1 fiber/cm<sup>3</sup>**
- **lead**                              **0.05 mg/m<sup>3</sup>**
- **formaldehyde**                **0.075 ppm**
- **benzene**                         **1.0 ppm**
- **vinyl chloride**                **1.0 ppm**
- **ethylene oxide**                **<0.1 ppm**
- **arsenic**                            **0.01 mg/m<sup>3</sup> (inorganic)**  
**0.5 mg/m<sup>3</sup> (organic)**



# OSHA Chemical Safety Regulations: Continued

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29CFR1910.1200

Hazard Communication Standard (1989)



- **evaluates hazards of chemicals and communicates information to workers by a hazard communication programs that includes labeling, material safety data sheets and training.**

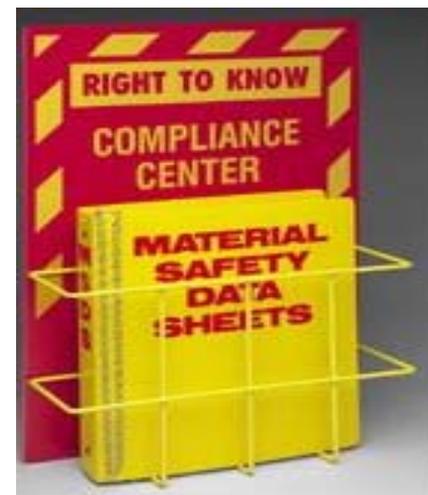




# OSHA MSDSs

MSDS is described in the Hazard Communication Standard

- Content is specified **but not** the format.
- **Therefore**, MSDS's may differ dramatically in appearance by manufacturer
- But they present the required data.





# ANSI (GHS/REACH\*) Standardized 16 Part MSDS Format

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- Identification
- Hazard(s) identification
- Composition/information on ingredients
- First-aid measures
- Fire-fighting measures
- Accidental release measures
- Handling and storage
- Exposure controls/personal protection
- Physical and chemical properties
- Stability and reactivity
- Toxicological information
- Ecological information
- Disposal considerations
- Transport information
- Regulatory information
- Other information

(\*More details in GHS/REACH presentation)



# OSHA Chemical Safety Regulations: Continued

29CFR1910.1450

Occupational Exposure to Toxic Substances in Laboratories  
(The Laboratory Standard, 1990)

- **specifies requirements needed to control exposure to chemicals in non-manufacturing and non-production laboratories**
- **establishes need for Chemical Hygiene Officer and Chemical Hygiene Plan**





# Definitions

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- **Laboratory** - a facility where small quantities of hazardous chemicals are used on a non-production basis
- **Use-** handling such chemicals as follows:
  - multiple chemical procedures or chemicals used
  - chemical manipulations can be performed by one person
  - procedures involved are not part of a production or manufacturing process
  - protective laboratory practices and equipment are available and used to minimize exposure



# Chemical Hygiene Officer

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- an employee designated by the employer
- qualified by training and experience
- to provide technical guidance in development and implementation of the Chemical Hygiene Plan





# Chemical Hygiene Plan

- **Procedures/methods to:**
  - protect employees
  - keep exposures below PEL/TLV
- **Control measures**
  - engineering control
    - selection, and use of lab hoods
  - PPE
- **Chemical procurement**
  - MSDS's
- **Training**
- **Specify operations requiring approval**
- **SOP's as required**
- **Medical surveillance**
- **Waste management**
- **OSHA regulation appendix A should be considered**
- **Available to each employee**
- **Annual review and update**





# OSHA Chemical Safety Regulations: Continued

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29CFR1910.1030

Occupational Exposure to Blood Borne Pathogens (1992)



- **controls exposure to potentially infectious material, can apply to biochemical and biomedical samples**





# OSHA Chemical Safety Regulations: Continued

29CFR1910.120

Hazardous Waste Operations and Emergency Response (HAZWOPER, 1987)

- **regulates/controls potentially exposure of workers during clean-up of hazardous substances and waste**
- **requires health and safety plan that includes methods of worker protection**





# Environmental Protection Agency (EPA) Chemical Safety Regulations

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40CFR100

**40 Pertains to the EPA**

Clear Air Act (1963)



- **establishes criteria for control, emission and exposure to hazardous substances in the air**



## EPA Chemical Safety Regulations: Continued

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40CFR50

Clean Water Act (1972)



- **controls releases to water of high amounts of toxic substances, regulates water pollution to ensure safe standards for human exposure**



# EPA Chemical Safety Regulations: Continued

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40CFR240

## Resource Conservation and Recovery Act (RCRA, 1976)

- regulates disposal of hazardous and non-hazardous waste from the *“cradle to the grave”*





# RCRA Regulates and Defines Waste

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- generation, transport, storage, treatment, disposal, tracking, record keeping and facilities
- conserving energy and natural resources, recycling, and reducing the amount of waste generated
- defines hazardous waste as:  
ignitable, corrosive, reactive, toxic





# RCRA Waste Characteristics

- **Ignitability** - can create fires that are spontaneously combustible, or have a flash point  $< 60\text{ }^{\circ}\text{C}$ , e.g., waste oils, used solvents
- **Corrosivity** - acids or bases ( $\text{pH} \leq 2$ , or  $\geq 12.5$ ) capable of corroding metal containers, e.g., storage tanks, drums, and barrels, (battery acid)
- **Reactivity** - unstable under "normal" conditions; can cause explosions, toxic fumes, vapors when heated, compressed, or mixed with water, e.g., lithium-sulfur batteries and explosives
- **Toxicity** - harmful or fatal when ingested or absorbed (e.g., contain mercury, lead) or when land disposed, contaminated liquid may leach out and pollute ground water





## EPA Chemical Safety Regulations: Continued

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40CFR240-271

Comprehensive Environmental Response Compensation and Liability Act (CERCLA, Superfund, 1980, Sara 1986)

- **established requirements for hazardous waste sites;**
- **provided for liability of persons responsible for releases of hazardous waste; and**
- **provided for cleanup when no responsible party could be identified.**



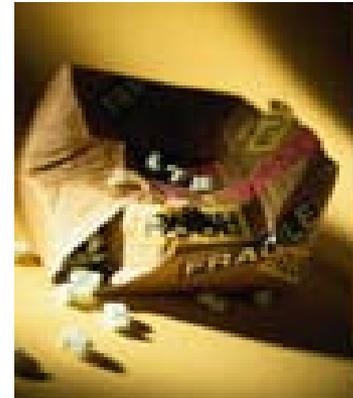


# Department of Transportation (DOT) Chemical Safety Regulations

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49CFR173

General Requirement for Shipping and Packaging\*



(\*More details in Safe Chemical Transport Presentation)



# DOT Chemical Safety Regulations: Continued

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49CFR172



## Hazardous Materials Table

- includes chemical specific communication requirements, emergency response information



# DOT Chemical Safety Regulations: Continued

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49CFR177

Requirements for Transport on Public Highways\*



(\*More details in Safe Chemical Transport Presentation)



# Other US Chemical Safety Regulations e.g., Food & Drug Administration (FDA)

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21CFR1300

## Requirements for Controlled Substances (restricted drugs)

- e.g., heroin, pentobarbital, anabolic steroids ,  
diazepam, chloral hydrate, hallucinogens, etc.
  - lock & key, strict inventory control





# Most Recent US Regulations

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## Department of Homeland Security (DHS):



### Chemical Facility Anti-Terrorism Standards (CFATS, 2007)



- allows the DHS to regulate chemical installations (re: handout/CD)





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# European Union/United Nation Chemical Safety Regulations



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# REACH



## Registration, Evaluation, Authorisation of Chemicals

2007 EU regulation; replaces 40 existing acts to create a single system for all chemicals

- requires authorization to use, manufacture and import
- to track and manage chemical risks and provide safety information
- proposes to integrate REACH with GHS
- creates European Chemical Agency (ECHA, Helsinki, Finland)



# REACH

## Life of the chemical from Cradle-to-the-Grave



Manufacturing

Importing

Marketing

Use

Waste stream





# REACH

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- **Comprehensive legislation to ensure European authorities know and condone what chemicals are used as they enter the EU supply train**
- **Objective is to protect human health and the environment by recognizing and classifying hazardous chemicals so they are handled safely**
- **REACH & GHS are not equivalent or optional but separate legislation with parallel requirements**



# REACH

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- **The responsibility for proving whether a chemical is hazardous or non-hazardous is on the manufacturer and supplier not the government**
- **The responsibility also includes documentation, tests, classification, risk exposure, labeling, safety data sheets**
- **ECHA will store the information in the International Uniform Chemical information Database (IUCLID)**



# REACH

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## Four Steps

1. Registration
2. Evaluation
3. Authorization
4. Restriction



**ECHA maintains database**



# REACH: Registration

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**Importers and manufacturers of substances in quantities over 1 ton/yr must register their substance with ECHA**

Registration began June 2007

**December 1, 2010**

**≥ 1000 tons per year**

- carcinogenic, mutagenic, or reproductive toxin ≥ 1 ton per year
- substances classified as dangerous for aquatic environment ≥ 100 tons per year

**June 1, 2013**

- manufactured or imported at 100-1000 tons per year

**June 1, 2018**

- manufactured or imported at 1-100 tons per year



# REACH: Evaluation

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**Authorities will review registration and request further information or testing to determine the impact of the substance on human health and the environment**

**Decides next steps:**

- action for authorization**
- align classification & label**
- other action**





# REACH: Authorization

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**Decisions on what substances require an authorization or restriction are carried out for substances that pose the most concern, such as carcinogens and mutagens**

**Three steps:**

- SVHC (Substances of Very High Concern)**
  - carcinogenic, mutagenic and reprotoxic substances, persistent, bio-accumulative and toxic**
- Prioritize**
- Authorization provided**



# REACH: Restriction

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- **Limit uses**
  - **Where no viable alternative exists, a research and development plan to derive a suitable alternative is developed**
- **Ban substance**
  - **where there is an unacceptable risk to human health and the environment.**



## REACH: Concern

**A potential concern may be creating country specific safety data sheets and labels that are compatible with the GHS proposal**





# REACH: Resources

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**About REACH:**

**[http://reach.jrc.it/about\\_reach\\_en.htm](http://reach.jrc.it/about_reach_en.htm)**

**REACH Help:**

**[http://echa.europa.eu/reach/helpdesk\\_en.htm](http://echa.europa.eu/reach/helpdesk_en.htm)**

**About ECHA: <http://ec.europa.eu/echa>**

**[http://ec.europa.eu/environment/chemicals/reach/reach\\_intro.htm](http://ec.europa.eu/environment/chemicals/reach/reach_intro.htm)**



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# Globally Harmonized System for Classification and Labeling of Chemicals (GHS)

International UN standardization for classification, safety data sheet format, and labeling of chemicals using pictograms, signal words, and hazard warnings

US OSHA is reviewing GHS for adoption



# GHS

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- **United Nations proposed system to internationally standardize chemical communication**
- **Countries will adopt on their own timeframe**
- **2008 - UN goal for world-wide implementation**



# GHS Implementation

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## **Intergovernmental Forum on Chemical Safety**

**(IFCS)**- adopted GHS implementation goal of 2008. The US participates and agreed to work toward this goal

**Japan, Korea, New Zealand** – various stages of adopting & implemented GHS

**European Union** – 2010 deadline for GHS substance classification

**Canada** – Assessing how to adopt and implement GHS

**United States** – Assessing impact of GHS, plans to adopt GHS by 2009. DOT expects to have changes in place by 2009

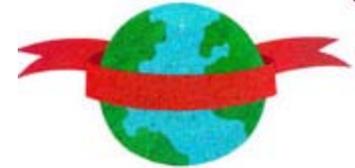


# GHS Benefits

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- Uniform Communication
  - Better Safety
- Improved International Trade
  - Lower cost





# GHS Changes

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MSDS now named: “SDS” (Safety Data Sheet)

Labels will be standardized with:



- signal words
- hazard statements
- precautionary statements
- pictograms
- elimination of US, Canadian and EU labels



# GHS Labeling

## Information required on a GHS label:

- Pictograms
- Signal words
- Hazard statements
- Precautionary statements and pictograms
- Product identifier
- Supplier information





# Changes to (M)SDS



## GHS name: Safety Data Sheet (SDS)

- Format:
  - 16 sections required in specified order (as per ANSI MSDS format in US Regulations presentation)
- Reclassification:
  - (MSDS) Health & Physical Hazards
  - (SDS) Environmental Hazards
- Building Block Approach
  - each country can select portions of GHS to adopt
  - Not every country will require all categories or all hazards



# Examples of GHS Pictograms

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# Differences between REACH and GHS

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- REACH and GHS have different scopes but there are many links between the two regulations
- REACH aims to produce information on hazards, risks, and risk management
- GHS aims to harmonize classification and labeling of materials
- GHS is a UN recommendation which applies across countries, including the EU





# Differences between REACH and GHS

- REACH intends to replace current EU classification criteria with GHS. REACH has provisions for safety data sheets based on GHS.
- GHS intends to apply classification and labeling beginning December 1, 2010, when the new GHS regulation will be available.
- Substances will be phased in the first 3.5 years. Mixtures will be given an additional 4.5 years for reclassification.





# Globally Harmonized System

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## Resources



[http://www.unece.org/trans/danger/publi/ghs/ghs\\_rev02/02files\\_e.html](http://www.unece.org/trans/danger/publi/ghs/ghs_rev02/02files_e.html)

[http://www.unece.org/trans/danger/publi/ghs/presentation\\_e.html](http://www.unece.org/trans/danger/publi/ghs/presentation_e.html)

<http://www.osha.gov/SLTC/hazardcommunications/global.html>