Globally Harmonized Hazard Communication (HAZCOM) for Advanced Users

Worker Trainer's Exchange

HAMMER Training, Richland WA

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Introduction

The United Nations (1992) proposed the Globally Harmonized System of Classification and Labeling of Chemicals (GHS) as a universal and comprehensive approach to:

- Defining health, physical, and environmental hazards of chemicals
- Creating classification processes that use available physical, toxicological and other relevant health and environmental data on chemicals for comparison with the defined hazard criteria
- Communicating hazard information and protective measures

NOTE: *The UN GHS standard was first published in 2003*

GHS and OSHA

- March 2012, OSHA revised the GHS standard to include most of the elements of the UN-GHS purple book.
- The revised OSHA standard excluded the environmental hazard classes and some physical and health hazard class-categories.
- Understand that GHS is an enhancement to the hazard communication standard – not a replacement.

OSHA Revised Standard

- The new GHS standard
  - Revised the chemical hazard classification & categorization criteria
  - Introduced signal words, pictograms, and manufacture's label elements
  - Assigned hazard and precautionary statements to Chemical Hazards
  - Standardized the format for Safety Data Sheets
- OSHA established an implementation timeline
- Hanford inter-contractor work group established
- DOE directed MSA to take the lead for Hanford implementation

GHS Implementation Timeline

3-25-2012 | 11-10-2012 | 12-1-2013 | 6-1-2015 | 12-1-2015 | 6-1-2016

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

Worker Training

Hanford General Employee Training (HGET)**:** Used to meet OSHA requirements for introducing the new elements of the GHS-HAZCOM Standard by December 1, 2013. This training started in November 2012 and has been completed. New employees are required to take the same training – optional for retraining.

Hazardous Waste Operations (HAZWOPER)**:** Initial and Refresher Training: Provides workers with additional training in the HAZCOM Section of the training. Training started in November 2012 and is continuing.

Work Area Facility Specific Training: The Hazard Communication Section of the training will be updated. The training will include the new elements the GHS to meet the Facility Requirements.

HGET Video

Video has been removed

GHS Workers Training

Topic	HGET	HAZWOPER	Work Area/Facility Specific
Training is attended by	All Workers	Selected Workers of Certain Jobs	Specific to Facility Workers Working with Chemical Products or with potential exposure.
Method Delivered	Computer Based (CBT)	Instructor Led	CBT or Instructor Led
Safety Data Sheet training	General	General	Facility may chose to reinforce present training or add other in-depth training
Manufacturer Label training	General	General	Facility may Chose to Reinforce present training or add other in-depth training
Elements of GHS Hazard Classification	General	General	Facility may Chose to Reinforce their present training or add other in-depth training

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GHS Workers Training (cont.)

Topic	HGET	HAZWOPER	Work Area/Facility Specific
Hanford Hazard Container Labeling Training	General	General	Training on how to Obtain and Understand Label Elements
Facility Hazard Communication Written Program	General	NA	Anticipated Changes to the Written Program.
SDS/MSDS's	General	General/NA	Location and Method of accessing SDS/MSDSs
Information about the Chemical Hazards to which the Worker may be Exposed	General	General	Facility Specific Hazards and How to use the GHS Elements in Safe Work.

Why Advanced Training Is Needed

- Provide more in-depth training to personnel providing the HAZCOM training.
  - Industrial Hygienists
  - Chemical Management Specialists and Leads
  - HAMMER HAZWOPER Trainers
  - Environmental Compliance Officers
  - Safety Professionals
  - Procedure Writers, Fire Protection Engineers, Emergency Preparedness Personnel, planners, others

NOTE: *Training started in March 2014. Twelve classes were offered with a total of 110 personnel attending these classes.*

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Course Terminal Objective

Identify and assess the relevant hazards and communicate those hazards to individuals performing work using the new elements of the Globally Harmonized System (GHS) HAZCOM standard.

Advanced Class Course Outline

- Introduction to the Globally Harmonized System (GHS) of classification and labeling of chemicals
- Overview of the Revised HAZCOM Standard
- Summarize Criteria for Health, Physical and Environmental Hazard Classifications
- Discuss Elements of the GHS label and Safety Data Sheet (SDS)
- Present Hanford Implementation of GHS:

  (Training, Labeling, Databases, Webpage, Document Revisions, Chemical Procurement Forms, Job Hazard Analysis)
- Discuss Changes Made or Anticipated by Other Organizations or Agencies

HCS 2012 Standard (29 CFR 1910.1200)

Section:	Appendix
(a) Purpose	A: Health Hazard Criteria (Mandatory)
(b) Scope and Application	B: Physical Hazard Criteria (Mandatory)
(c) Definitions	C: Allocation of Label Elements (Mandatory)
(d) Hazard Classification	D: Safety Data Sheets (Mandatory)
(e) Written HAZCOM Program	E: Definition of "Trade Secret" (Mandatory)
(f) Labels and Other Forms of Warning	F: Guidance for Hazard Classifications re: Carcinogenicity (Non-Mandatory)
(g) Safety Data Sheets	
(h) Employee Information and Training	
(i) Trade Secrets	
(j) Effective Dates	

Summary of Changes to HAZCOM

GHS Section	Change	HCS 2012 (GHS) and 1994 Standards
a. Purpose	Minor	Added a reference to the UN GHS, and included the word “Classification“ in many sentences.
b. Scope and application	Minor	Few editorial changes.
c. Definitions	Major	New definitions to health and physical hazards, hazard classes, hazard statements, precautionary statements, signal words and pictograms were added. Many definitions are listed and explained in this section and in Appendices.

Changes to HAZCOM (cont.)

GHS Section	Change	HCS 2012 (GHS) and 1994 Standards
d. Hazard Classifications	Major	Title changed from *Hazard Determination.* Section refers to Appendices A and B for guidelines on the hazard classifications of pure substances and mixtures.
e. Written Hazard Communication Program	Minor	Section is not part of the UN-GHS. Only terminology changes relative to the GHS terms.
f. Labels and other Forms of Warning	Major	Section was revised for GHS labeling requirements. Appendix C provides detailed information on this section.
g. Safety Data Sheet (SDS)	Major	Title changed from *Material Safety Data Sheet.* Appendix D describes in details the contents of the sixteen sections.

Changes to HAZCOM (cont.)

GHS Section	Change	HCS 2012 (GHS) and 1994 Standards
h. Employee Information and Training	Minor	Requires new label and SDS be discussed in training. Terminology revised to include the new elements of the standard.
i. Trade Secrets	Major	Requires disclosure of the constituents and **percent composition** for mixtures on the SDS.
j. Effective Dates	New Dates	Dates established for implementation of the new standard.

Changes to HAZCOM Appendices

GHS Standard Appendix :	Change	HCS 1994 Standard Appendix:
A: Health Hazard Criteria	Major	A: Health Hazard Definitions
B: Physical Hazard Criteria (**New**)	Major	B: Hazard Determination
C: Allocation of Label Elements (**New**)	Major	C: None-Reserved
D: Safety Data Sheets	Major	
E: Definition of "Trade Secret"	Same	D: Definition of "Trade Secret"
F: Guidance for Hazard Classification: Carcinogenicity (**New -** Non Mandatory)	Major	E: Guidance for Employer Compliance: • *Familiarity,* • *Responsibilities,* • *Identifying hazardous chemicals,* • *Implementation of HAZCOM program including: labels, MSDS (non mandatory format), training, other requirements*

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GHS- Hazard Identification:

Determine the Nature of the Hazard as being a

Health Hazard

1. Acute Toxicity
2. Skin Corrosion/ Irritation
3. Eye Damage / Irritation
4. Sensitization
5. Germ Cell Mutagenicity
6. Carcinogenicity
7. Toxic to Reproduction
8. Specific Target Organ Toxicity Single Exposure
9. Specific Target Organ Toxicity Repeated or prolong Exposure
10. Aspiration Hazard

Physical Hazard

1. Explosives
2. Flammable Gases
3. Flammable Aerosol
4. Oxidizing Gas
5. Gases Under Pressure
6. Flammable Liquid
7. Flammable Solids
8. Self-Reactive
9. Pyrophoric Liquids
10. Pyrophoric Solids
11. Self-Heating
12. Emits flammable gases
13. Oxidizing Liquid
14. Oxidizing Solids
15. Organic Peroxides
16. Corrosive to Metals

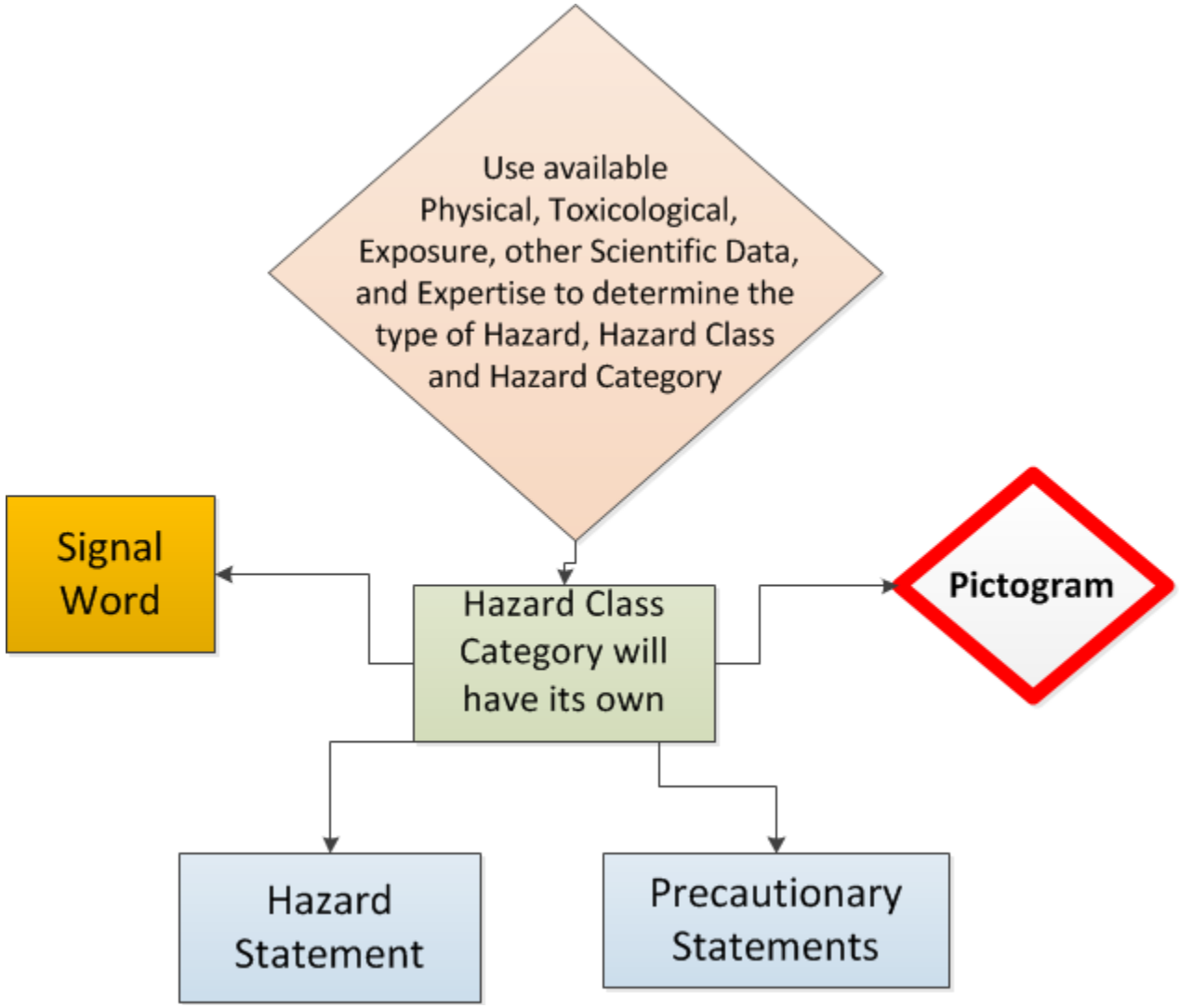
Environmental Hazard

1. Acute Aquatic Toxicity
2. Chronic Aquatic Toxicity
3. Hazardous to the Ozone Layer

OSHA Additional Hazard Classes

- Pyrophoric Gases
- Combustible Dusts
- Simple Asphyxiant
- Hazards Not Otherwise Classified

Globally Harmonized System (GHS) Relationship Between Terms



GHS Poster

GLOBALLY HARMONIZED SYSTEM (GHS) OF CLASSIFICATION AND LABELING OF SUBSTANCES AND MIXTURES

PHYSICAL HAZARDS

OSHA ADOPTED *Appendix B*

Hazard Class/ Category	Pictogram	Signal Word	Hazard Statement
B.1 EXPLOSIVES			
Unstable		DANGER	H200: Unstable explosive
1.1		DANGER	H201: Explosive; mass explosion hazard
1.2		DANGER	H202: Explosive; severe projection hazard
1.3		DANGER	H203: Explosive; fire, blast or projection hazard
1.4		WARNING	H204: Fire or projection hazard
1.5	No Pictogram	DANGER	H205: May mass explode in fire
1.6	No Pictogram	None	None
B.2 FLAMMABLE GASES			
1		DANGER	H220: Extremely flammable gas
2	No Pictogram	WARNING	H221: Flammable gas
B.3 FLAMMABLE AEROSOL			
1		DANGER	H222: Extremely flammable aerosol
2		WARNING	H223: Flammable aerosol
B.4 OXIDIZING GAS			
1		DANGER	H270: May cause or intensify fire; oxidizer
B.5 GASES UNDER PRESSURE			
Compressed gas Liquefied gas Dissolved gas		WARNING	H280: Contains gas under pressure; may explode if heat-ed
Refrigerated Liquefied gas		WARNING	H281: Contains refrigerated gas; may cause cryogenic burns or injury
B.6 FLAMMABLE LIQUIDS			
1		DANGER	H224: Extremely flammable liquid and vapor
2		DANGER	H225: Highly flammable liquid and vapor

HEALTH HAZARDS

OSHA ADOPTED *Appendix A*

Hazard Class/ Category	Pictogram	Signal Word	Hazard Statement
A.1 ACUTE TOXICITY- ORAL (Category 5 not adopted by OSHA)			
1 & 2		DANGER	H300: Fatal if swallowed
3		DANGER	H301: Toxic if swallowed
4		WARNING	H302:Harmful if swallowed
A.1 ACUTE TOXICITY- DERMAL (Category 5 not adopted by OSHA)			
1 & 2		DANGER	H310: Fatal in contact with skin
3		DANGER	H311: Toxic in contact with skin
4		WARNING	H312: Harmful in contact with skin
A.1 ACUTE TOXICITY- INHALATION (Category 5 not adopted by OSHA)			
1 & 2		DANGER	H330: Fatal if inhaled
3		DANGER	H331: Toxic if inhaled
4		WARNING	H332: Harmful if inhaled
A.2 SKIN CORROSION			
1A, 1B, 1C		DANGER	H314: Causes severe skin burns and eye damage
A.2 SKIN IRRITATION (Category 3 not adopted by OSHA)			
2		WARNING	H315: Causes skin irritation
A.3 SERIOUS EYE DAMAGE			
1		DANGER	H318: Causes serious eye damage
A.3 EYE IRRITATION			
2A		WARNING	H319: Causes serious eye irritation
2B	No Pictogram	WARNING	H320: Causes eye irritation
A.4 RESPIRATORY SENSITIZATION			
1A & 1B		DANGER	H334: May cause allergy or asthma symptoms or breathing difficulties if inhaled
A.4 SKIN SENSITIZATION			
1A & 1B		WARNING	H317: May cause an allergic skin reaction
A.5 GERM CELL MUTAGENICITY			
			H340: May cause genetic

ENVIRONMENTAL HAZARDS

NOT ADOPTED BY OSHA

Hazard Class/ Category	Pictogram	Signal Word	Hazard Statement
1. AQUATIC TOXICITY- ACUTE			
1		WARNING	H400: Very toxic to aquatic life
2	No Pictogram	None	H401: Toxic to aquatic life
3	No Pictogram	None	H402: Harmful to aquatic life
2. AQUATIC TOXICITY- CHRONIC			
1		WARNING	H410: Very toxic to aquatic life with long lasting effects
2		None	H411: Toxic to aquatic life with long lasting effects
3	No Pictogram	None	H412: Harmful to aquatic life with long lasting effects
4	No Pictogram	None	H413: May cause harmful effects to aquatic life
3. DANGEROUS TO THE OZONE LAYER			
1		WARNING	H420: Harms public health and the environment by destroying ozone in the upper atmosphere

PRIMARY CONTAINER LABEL EXAMPLE

Chemical Product Name

(Flammable Liquid Category 1 and Acute Toxic– Oral Category 1)

DANGER

Hazard Statements:

Physical-H224: Extremely flammable liquid and vapor.
Health-H300: Fatal if swallowed.

Precautionary Statements:

Prevention:

P264: Wash thoroughly after handling.
P242: Use only non-sparking tools.
P270: Do not eat, drink, or smoke while using this product.
P233: Keep container tightly closed
P243: Take precautionary measures against static discharge.

Response:

P301: If swallowed immediately call a poison center/doctor/ chemical manufacturer/importer/ or distributor to specify the appropriate source of emergency medical advice.

Hazard Classes and Categories Activity

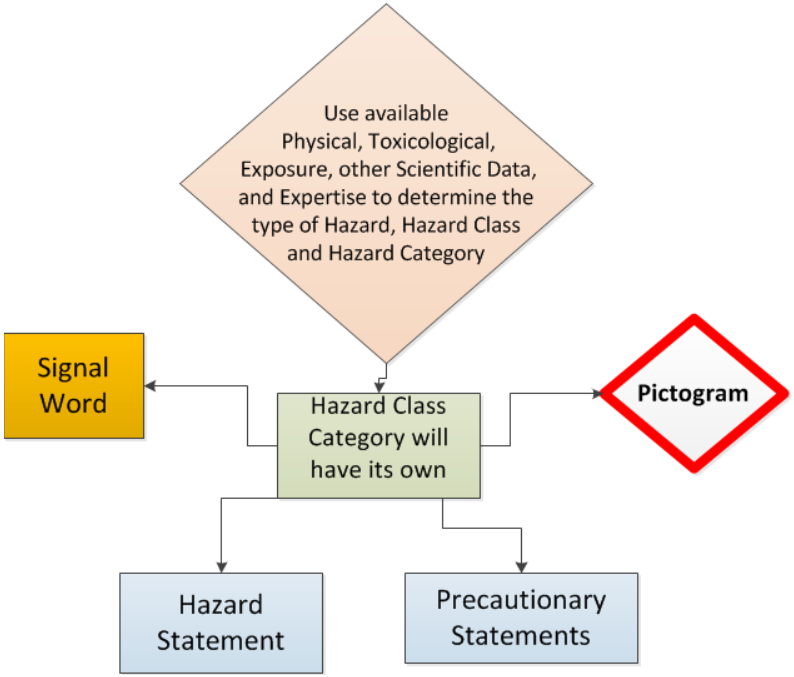
Hazard Class/ Category	Pictogram	Signal Word	Hazard Statement
Carcinogenicity			
1A & 1B		**DANGER**	H350: May Cause Cancer (*state route of exposure ...*)
2		**WARNING**	H351: Suspected of Causing Cancer (*state route of exposure*)
Flammable Aerosols			
1		**DANGER**	H222: Extremely Flammable Aerosol
2		**WARNING**	H223: Flammable Aerosol

Health Hazards

Classification criteria for Health Hazards – Developed by the Organization for Economic Cooperation and Development (OECD)

Health Hazard Criteria Guidelines

- Match the product's existing data with the hazard class and category criteria.
- GHS does not require manufacturer to conduct new testing on their products.
- Different approaches are acceptable for mixtures as long they are scientifically sound.



Appendix A: Health Hazard Criteria (Example)

Hazard Class	Categories	Criteria		
A.1 Acute Toxicity (Oral, Dermal, Inhalation) 	1, 2, 3, 4	• Oral and Dermal Lethal Doses (LD50): *exposures within 24 hours.* • Inhalation Lethal Concentrations (LC50): *exposure of 4 hours*.		
Exposure Route	**Category 1**	**Category 2**	**Category 3**	**Category 4**
LD50 – Oral (mg/kg)	≤ 5	> 5 and ≤ 50	> 50 and ≤ 300	> 300 and ≤ 2000
LD50 – Dermal (mg/kg)	≤ 50	> 50 and ≤ 200	> 200 and ≤ 1000	> 1000 and ≤ 2000
LC50 – Inhalation Gases (ppmV)	≤ 100	> 100 and ≤ 500	> 500 and ≤ 2500	> 2500 and ≤ 20,000

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Activity (Substances)

Determine the Acute Toxicity Hazard Categories of the following substances:

1. Methyl alcohol	
Oral rat LD-50	1200 mg/kg
Dermal rabbit LD-50	15,840 mg/kg
Inhalation rat LC-50	64,000 ppm(v) Four Hours
2. Toluene	
Oral rat LD-50 rat	5000 mg/kg
Dermal rabbit LD-50	12,124 mg/kg
Inhalation rat LC-50	8000 ppm(v) Four Hours

Acute Toxicity Criteria (Activity)

Exposure Route	Category 1	Category 2	Category 3	Category 4	Category 5 (GHS only)
LD50 – Oral (mg/kg)	≤ 5	> 5 and ≤ 50	> 50 and ≤ 300	> 300 and ≤ 2000	> 2000 and ≤ 5000
LD50 – Dermal (mg/kg)	≤ 50	> 50 and ≤ 200	> 200 and ≤ 1000	> 1000 and ≤ 2000	> 2000 and ≤ 5000
LC50 – Inhalation Gases (ppmV)	≤ 100	> 100 and ≤ 500	> 500 and ≤ 2500	> 2500 and ≤ 20,000	Not Included
LC50 – Inhalation Vapors (mg/L)	≤ 0.5	> 0.5 and ≤ 2.0	> 2.0 and ≤ 10.0	> 10.0 and ≤ 20.0	Not Included
LC50 – Inhalation Dusts/Mists (mg/L)	≤ 0.05	> 0.05 and ≤ 0.5	> 0.5 and ≤ 1.0	> 1.0 and ≤ 5.0	Not Included

NOTE: *Acute Toxicity Category 5 not adopted by OSHA*

Appendix A: Health Hazard Criteria (Example)

Hazard Class	Categories	Criteria
A.2. Skin Corrosion	1A, 1B, 1C	Observing irreversible damages to skin (necrosis, ulcers, bleedings) following 4 hours or less of exposure based on human epidemiological and clinical studies, and relevant animal data. • **Category 1A:** exposure ≤ 3 min, observed in ≤ 1 h *Example*: Sodium Hydroxide solution • **Category 1B:** exposure > 3 min ≤ 1 h, observed in ≤ 14 Days *Example*: Concentrated HCL • **Category 1C:** exposure > 1 h ≤ 4 h, observed in ≤ 14 Days *Example*: Tri-sodium Phosphate solution **NOTE:** *Substances are considered corrosive Category 1 when the pH of solution is ≤ 2 and ≥ 11.5*

Appendix A: Health Hazard Criteria (Example)

Hazard Class	Categories	Criteria
A.2. Skin Irritation	2	Reversible damage to skin following 4 hours or less of exposure. Criteria is based on tested animals showing signs of erythema or inflammation to skin. *Examples*: Silica, metal salts

NOTE: *Skin Irritation Category 3 not adopted by OSHA*

Summary of Changes to Health Hazards

HCS 2012 GHS	HCS 1994
1. Acute Toxicity **(Oral, Dermal, Inhalation)**	Toxic or Highly Toxic Agents
2. **Skin** Corrosion/Irritation	Corrosives/Irritants
3. Eye Damage /Irritation	Agents which Damage the Eyes/Irritants
4. Respiratory /Skin Sensitization	Sensitizers
5. Germ Cell Mutagenicity (new)	
6. Carcinogenicity	Carcinogens
7. Reproductive Toxicity	Reproductive Toxins
8. Specific Target Organ Toxicity, **Single Exposure**	Agents which Damage the Lungs, Skin, Eyes, or Mucous Membranes. Hepatotoxins, Nephrotoxins, Neurotoxins Agents
9. Specific Target Organ	Same as above
10. Aspiration Hazard (new)	

Health Hazard Mixture Guidelines

- Use available health data (Best Approach).
- When no data is available, but there is data on both the ingredients and/or similar tested mixtures, use:
  - Bridging Principles (six principles)
  - Cutoff concentration values of mixture ingredients
  - Additivity Formulas
  - Summation /Additivity

Use Competent Authority (CA) Judgment in final determination

Summary: Categorization of Mixtures

Hazard	Bridging Principles	Classification "Favorite " Approach
A.1 Acute toxicity	All Six	Acute Toxicity Estimate (ATE): Additivity formulas . No cutoff values
A.2 Serious Eye Damage & Eye Irritation	All Six	Mostly additivity approach, sometimes cutoffs
A.3 Skin corrosion & Skin Irritation	All Six	Mostly additivity approach, sometimes cutoffs
A.4 Skin Sensitization	Dilution, Batching, Substantially similar mixtures, Aerosols	Cutoffs with CA Options
A.4 Respiratory Sensitization	Dilution, Batching, Substantially similar mixtures, Aerosols	Cutoffs with CA options

NOTE: *This information from GHS purple book*

Summary: Categorization of Mixtures

Hazard	Bridging Principles	Classification "Favorite "Approach
A.5 Germ Cell Mutagenicity	Dilution, Batching, Substantially similar mixtures	Cutoffs
A.6 Carcinogenicity	Dilution, Batching, Substantially similar mixtures	Cutoffs with CA options
A.7 Reproductive Toxicity	Dilution, Batching, Substantially similar mixtures	Cutoffs with CA options
A.8 & A.9 Target Organs	All six	Cutoffs with CA options
A. 10 Aspiration Toxicity	Dilution, Batching, Concentration of highly toxic mixtures, Interpolation within one toxicity category, Substantially similar mixtures	Cutoffs

NOTE: *This information from GHS purple book*

Physical Hazards

Classification criteria for physical hazards – Developed by the United Nations Subcommittee of Experts on the Transport of Dangerous Goods (UNSCETDG) and the International Labor Organization (ILO) working group.

Appendix B: Physical Hazards Criteria (Example)

Hazard Class	Categories	Criteria
B.6 Flammable Liquids	1, 2, 3, 4	Based on flash and boiling points of the liquid as determined by ASTM test methods. • **Category 1**: Flash point < 73.4°F and initial boiling point ≤ 95°F *Example:* Dimethyl ether • **Category 2:** Flash point < 73.4°F and initial boiling point > 95°F *Examples*: Acetone, Methanol • **Category 3:** Flash point ≥ 73.4°F and ≤ 140°F . *Examples:* Purell hand sanitizer, Paint thinner • **Category 4:** Flash point > 140°F and ≤ 199.4°F. *Example*: Kerosene

Changes to HAZCOM Physical Hazards

HCS 2012 (GHS)	HCS 1994
B.1. Explosives	Explosives
B.2. Flammable **Gases**	Flammables
B.3. Flammable **Aerosols**	Flammables
B.4. Oxidizing Gases	Oxidizers
B.5. Gases Under Pressure	Compressed Gases
B.6. Flammable **Liquids**	Flammables
B.7. Flammable **Solids**	Flammables
B.**8. Self-Reactive Chemicals (new)**	**Unstable**
B.9. Pyrophoric **Liquids**	Pyrophoric
B.10. Pyrophoric **Solids**	Pyrophoric

Changes to HAZCOM Physical Hazards

HCS 2012 (GHS)	HCS 1994
B.11. Self-Heating Chemicals (new)	Unstable
B.12. Chemicals which, in contact with water, emit flammable gasses (New)	Water Reactive
B.13. Oxidizing **Liquids**	Oxidizers
B.14. Oxidizing **Solid**	Oxidizers
B.15. Organic Peroxides	Peroxides
B.16. **Corrosive to Metals (new)**	**None**
	Unstable (not on GHS list)
	Water Reactive (not on GHS list)
	Combustible Liquid (not on GHS list)

OSHA Defined/Listed Hazards (Label Elements)

Hazard Class/Category	Pictogram	Signal Word	Hazard Statement
Pyrophoric Gases			
None		DANGER	H250: Catches fire spontaneously if exposed to air
Combustible Dusts			
None	No Pictogram	WARNING	May form combustible concentrations in air
Simple Asphyxiant			
None	No Pictogram	WARNING	May displace oxygen and cause rapid suffocation

OSHA Defined/Listed Hazards
(HAZCOM Standard Section (c) Definitions)

- Pyrophoric Gas: A gas that will ignite spontaneously in air at a temperature below 130 F
- Simple Asphyxiant: A non-toxic substance or a mixture that displaces oxygen in the ambient atmosphere and can cause oxygen deprivation resulting in death

  Examples: Nitrogen, Helium, Argon gases
- Combustible Dusts: No OSHA definition in the HAZCOM standard

  Examples: sugar dust, aluminum dust

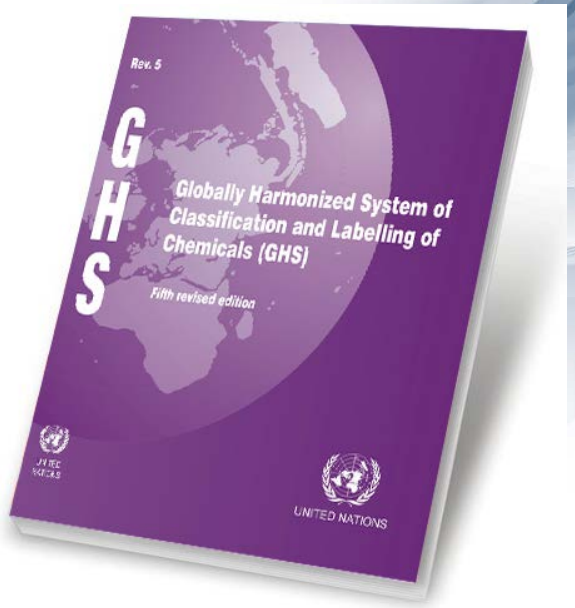
Hazard Not Otherwise Classified (HNOC)

- An Adverse physical or health effect identified through evaluation of scientific evidence during classification process and are not addressed in Appendices A or B of the standard.
- Hazard labeling elements not required on Label.

Examples: Diethyl ether, form peroxides, Sulfuric acid (conc.) violently react with water.

Environmental Hazards

Classification criteria for environmental hazards – Developed by the Organization for Economic Cooperation and Development (OECD)



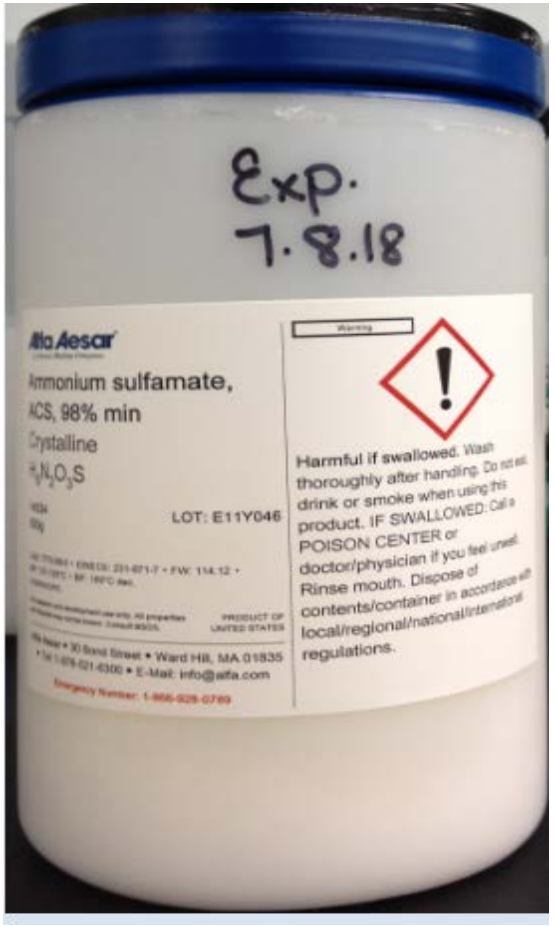
GHS Environmental Hazards

(Not in OSHA Standard- UN Purple book)

Hazard Class	Categories	Criteria
Acute Aquatic Toxicity	1, 2, 3	Causes injury to an aquatic organism in a **short-term exposure**.
Chronic Aquatic Toxicity	**1, 2, 3, 4**	Causes adverse effects to aquatic organisms during exposures that are determined in relation to the lifecycle of the organism.
Dangerous to the Ozone layer	**1**	Any of the controlled substances (Halocarbons) listed to Annexes to the Montreal Protocol.

Manufacturer's Label

- Product name/identifier
- Pictogram(s)
- Signal word
- Hazard statements
- Precautionary statements
- Supplementary information
- Manufacturer name and emergency contact



Manufacturer's Label Elements

Product Identifier

Chemical Product Name

(Flammable Liquid Category 1 and Acute Toxic– Oral Category 1)

Signal Word

DANGER

Hazard Statements:

Physical-H224: Extremely flammable liquid and vapor.
Health-H300: Fatal if swallowed.

Precautionary Statements:

Prevention:

P264: Wash thoroughly after handling.
P242: Use only non-sparking tools.
P270: Do not eat, drink, or smoke while using this product.
P233: Keep container tightly closed
P243: Take precautionary measures against static discharge.

Response:

P301: If swallowed immediately call a poison center/doctor/ chemical manufacturer/importer/ or distributor to specify the appropriate source of emergency medical advice.
P302: If on skin take off immediately all contaminated clothing. Rinse skin with water/shower.
P370: In case of fire: Use chemical manufacturer, importer, or distributor to specify appropriate media to extinguish.
P330: Rinse mouth.

Storage:

P405: Store locked up.
P403: Store in well ventilated place. Keep cool.

Disposal:

P501: Dispose of contents/container in accordance with local/ federal laws.

Manufacturer Name and Emergency Contact:
Hanford Chemical Distribution Inc. Hanford, WA
509.555.1234

Manufacturer Info

Pictograms

Label Elements

- **Signal Word**: **DANGER** or **WARNING**
- **Hazard Statement**: Standard phrases assigned to a hazard class and category that describe the nature of the hazard
- **Precautionary Statement**: A phrase that describes a recommended measure to minimize or prevent adverse effects resulting from exposure or improper storage or handling. (*Prevention, Response, Storage, and Disposal*)

OSHA HAZCOM Standard: Appendix D
GHS Safety Data Sheet

- Sections 1-11 and 16 must include the information listed in Appendix D1.
  - If no relevant information is found for any given section, the SDS shall clearly state that no applicable information is available.
- Sections 12-15 may be included, but are not required by OSHA.

GHS Safety Data Sheet (cont.)

Improvements/Advantages:

- Consistent format
- Items of primary interest to responders are listed first
- More information
- Internationally recognized
- Based on *ANSI Z400.1 Standard*

Sections of a GHS-SDS

Section	Title	Section	Title
1.	Product Identification	9.	Physical & Chemical Properties
2.	Hazard Identification	10.	Stability and Reactivity
3.	Composition Information	11.	Toxicological Information
4.	First-aid Measures	12.	Ecological Information
5.	Fire Fighting Measures	13.	Disposal Considerations
6.	Accidental Release Measures	14.	Transport Information
7.	Handling and Storage	15.	Regulatory Information
8.	Exposure Controls and Personal Protection	16.	Other Information

SDS/MSDS Database

Safety Data Sheet- Material Safety Data Sheet

- Used by all Hanford contractors for basic HAZCOM
- All current and past SDS-MSDS documents
- Assigns a Hanford unique SDS-MSDS document number
- Distinguishes between SDS and MSDS formats
- Product name, synonyms, manufacturer, and catalogue ID
- SDS-MSDS date

SDS/MSDS Database (cont.)

Keep using the existing SDS-MSDS database with the following modifications:

- Accept all of the GHS Safety Data Sheet documents
- Administrator evaluate document for the main elements of the GHS and if are present would stamp document with GHS-SDS # 0xxxx Instead of MSDS # 0xxxxx

- Ability to search specifically for GHS-SDS documents

SDS/MSDS Database (cont.)

Conventional Gasoline

Material Safety Data Sheet

Hanford MSDS#033543

1. PRODUCT AND COMPANY IDENTIFICATION

Product Name: Conventional Gasoline

MSDS Code: 251720

Synonyms: Gasoline, Unleaded, Conventional (All Grades); Gasoline, Low Sulfur Unleaded (All Grades)

Intended Use: Fuel

Responsible Party: ConocoPhillips
600 N. Dairy Ashford
Houston, Texas 77079-1175

Customer Service: 800-640-1956

Technical Information: 800-255-9556

MSDS Information: Phone: 800-762-0942
Email: MSDS@conocophillips.com
Internet: http://w3.conocophillips.com/NetMSDS/

Emergency Telephone Numbers: Chemtrec: 800-424-9300 (24 Hours)
California Poison Control System: 800-356-3219

2. HAZARDS IDENTIFICATION

Emergency Overview

DANGER!
Extremely Flammable Liquid and Vapor
Skin Irritant
Aspiration Hazard

NFPA

3 / 1 / 0

Appearance: Clear to amber
Physical Form: Liquid
Odor: Gasoline

Potential Health Effects
Eye: Contact may cause mild eye irritation including stinging, watering, and redness.

Skin: Skin irritant. Contact may cause redness, itching, a burning sensation, and skin damage. Prolonged or repeated contact can defat the skin, causing drying and cracking of the skin, and possibly dermatitis (inflammation). Not acutely toxic by skin absorption, but prolonged or repeated skin contact may be harmful (see Section 11).

Inhalation (Breathing): Low to moderate degree of toxicity by inhalation.

Ingestion (Swallowing): Low degree of toxicity by ingestion. ASPIRATION HAZARD - This material can enter lungs during swallowing or vomiting and cause lung inflammation and damage.

Signs and Symptoms: Effects of overexposure may include nausea, vomiting, flushing, blurred vision, tremors, respiratory failure, signs of nervous system depression (e.g., headache, drowsiness, dizziness, loss of coordination, disorientation and fatigue), unconsciousness, convulsions, death.

Safety Data Sheet
According to OSHA HCS 2012 (29 CFR 1910.1200)

HANFORD GHS-SDS# 033543B

Section 1: Identification

Product Identifier: Conventional Gasoline
Other means of identification: Gasoline, Unleaded, Conventional (All Grades); Gasoline, Low Sulfur Unleaded (All Grades)
SDS Number: 251720
MARPOL Annex I Category: Gasoline and Spirits
Intended Use: Fuel
Uses Advised Against: All others

Manufacturer:
Phillips 66 Company
P.O. Box 4428
Houston, Texas 77210

SDS Information:
Phone: 800-762-0942
Email: SDS@P66.com
URL: www.Phillips66.com

Emergency Health and Safety Number:
Chemtrec: 800-424-9300 (24 Hours)

Customer Service:
800-527-5476 *Technical Information:*
800-527-5476

Section 2: Hazards Identification

Classified Hazards
H224 -- Flammable liquids -- Category 1
H315 -- Skin corrosion/irritation -- Category 2
H304 -- Aspiration Hazard -- Category 1
H336 -- Specific target organ toxicity (single exposure) -- Category 3
H350 -- Carcinogenicity -- Category 1B
H411 -- Hazardous to the aquatic environment, chronic toxicity -- Category 2

Other Hazards
Electrostatic charges may be generated during handling.

Label Elements

DANGER
Extremely flammable liquid and vapor
Causes skin irritation
May be fatal if swallowed and enters airways
May cause drowsiness or dizziness
May cause cancer
Toxic to aquatic life with long lasting effects

Obtain special instructions before use; Do not handle until all safety precautions have been read and understood; Keep away from heat/sparks/open flames/hot surfaces. - No smoking; Keep container tightly closed; Ground/bond container and receiving equipment; Use explosion-proof electrical/ventilating/lighting equipment; Use only non-sparking tools; Take precautionary measures against static discharge; Avoid breathing dust/fume/gas/mist/vapours/spray; Wash thoroughly after handling; Use only outdoors or in a well-ventilated area; Avoid release to the environment; Wear protective gloves / protective clothing / eye protection / face protection; Call a POISON CENTER or doctor/physician if you feel unwell; IF ON SKIN: Remove/Take off immediately all contaminated clothing. Rinse skin with water/shower; If skin irritation occurs:; Get medical advice/attention; IF SWALLOWED: Immediately call a POISON CENTER or doctor/physician; Do NOT induce vomiting; IF INHALED: Remove victim to fresh air and keep at rest in a position comfortable for breathing; Take off contaminated clothing and wash before reuse; In case of fire: Use dry chemical, carbon dioxide, or foam for extinction; Collect spillage; Dispose of contents/container to approved disposal facility

SDS/MSDS Database (cont.)

Safety Data Sheets - Material Safety Data Sheets (SDS-MSDS) System

Search | History | Links | Help FAQ

SDS-MSDS Search

Find | Clear Form

Available Fields

Accession
*SDS-MSDS Date
Prefix
Known As Name
CAS Number
Hazard Rating Date
NFPA Health
NFPA Flammability
NFPA Reactivity
Specific Hazard
Target Organ(s)
Previous SDS-MSDS
Previous MFR
Previous Product Name
Distributor

<< >>

Add All Fields

Fields appearing in Results List

*Format
*SDS-MSDS No.
*Suffix
*Product Name
*Manufacturer
*Product Code

Up

Down

* These fields may not be removed

Enter Data for Select

SDS-MSDS Format:
SDS-MSDS No.: Suffix:
Manufacturer:
Distributor:
Accession:
Product Name:
Product Code:
Synonyms/Known As Name:
CAS Number:
SDS-MSDS From Date: SDS-MSDS To Date:
Input From Date: Input To Date:

Use % for a wildcard in your searches.

Sort By: SDS-MSDS No. & Suffix

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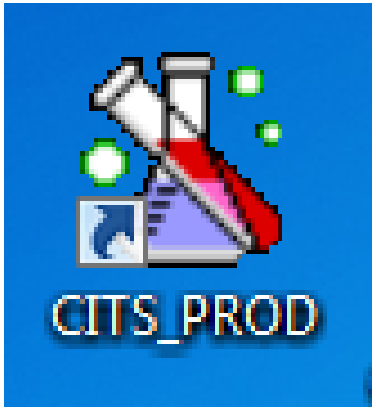
Chemical Inventory Tracking System

Chemical Inventory Tracking System (CITS)

- Used by all Hanford contractors for inventory tracking/reporting
- Product by manufacturer
- Identifies constituents
- NFPA hazard ratings
- GHS hazard class, category, and statements



CITS Database:

Included a GHS Hazard Information Report

CITS Product ID	84294				
Product Name	3-OCTANONE				
Manufacturer	SIGMA-ALDRICH				
SDS - MSDS	067507	**Date**	12/19/2012	**Format**	
Signal Word	WARNING				

HEALTH		
Hazard Statement(s)		**Pictogram(s)**
H319	Causes serious eye irritation	
H315	Causes skin irritation	
H335	May cause respiratory irritation	

PHYSICAL		
Hazard Statement(s)		**Pictogram(s)**
H226	Flammable liquid and vapour	

Primary and Secondary GHS Labeling

- **Container Labels**
  - Defines the label elements manufacturer's primary label
  - Only general guidelines established for secondary labels

  – *"Product identifier and words, pictures, symbols, or combination thereof, which provide at least general information regarding the hazards…"* 29CFR1910.1200 (f)(6)(ii)

GHS Compliant Hanford Hazard (Secondary) Container Labels

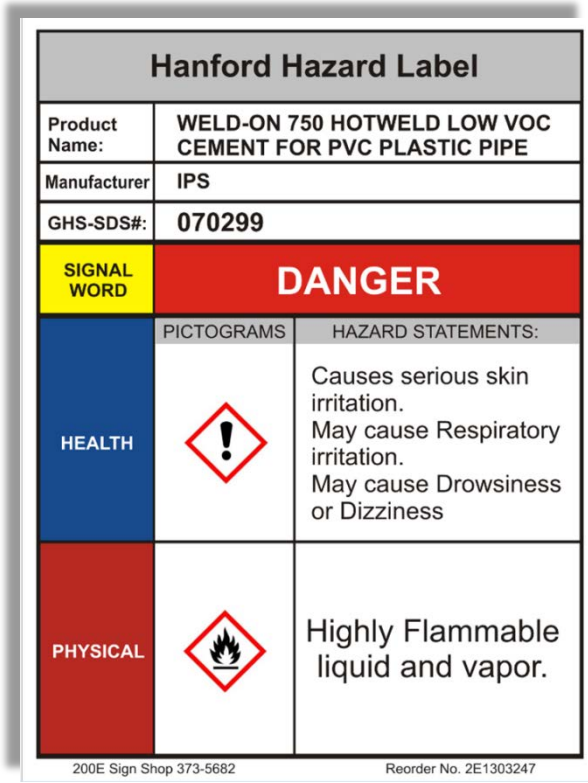
- Product Name/Identifier
- Pictogram
- Signal Word
- Hazard Statements
- Manufacturer Name
- <u>Added Hanford GHS-SDS Number</u>
- <u>Removed Precautionary Statements</u>
- <u>Removed Manufacturer's Emergency Contacts</u>

GHS Compliant Hanford Hazard (Secondary) Container Labels

Hanford Workplace labeling

- Product & manufacturer
- Hanford unique SDS number
- Color coding
- Signal words and pictograms
- Hazard statements
- No precautionary statements
- No NFPA 704 hazard ratings
- The value of standardization
- Possible harsh environments

- EFCOG best practice



Hanford Hazard Label		
Product Name:	WELD-ON 750 HOTWELD LOW VOC CEMENT FOR PVC PLASTIC PIPE	
Manufacturer	IPS	
GHS-SDS#:	070299	
SIGNAL WORD	DANGER	
	PICTOGRAMS	HAZARD STATEMENTS:
HEALTH		Causes serious skin irritation. May cause Respiratory irritation. May cause Drowsiness or Dizziness
PHYSICAL		Highly Flammable liquid and vapor.

200E Sign Shop 373-5682 Reorder No. 2E1303247

Energy Facility Contractors Group

Dedicated to Promoting Excellence in DOE Operations

EFCOG Best Practice #168

08/05/14

PDF Version

Best Practice Title: Best Practice for GHS Secondary Container Hazard Labeling

Facility: Hanford Site, Richland Washington

Points of Contact: Raja Atallah, 509-373-2249, raja_h_atallah@rl.gov, Mark Hermanson, 509-376-2257, mark_l_hermanson@rl.gov, Jeff Hieb, 509-373-9881, Jeffery_M_Hieb@rl.gov, Mikhail Alnajjar, 509-375-2321, ms.alnajjar@pnnl.gov

Brief Description of Best Practice: The United Nations proposed the Globally Harmonized System of Classification and Labeling of Chemicals (GHS) in 1992. In March 2012, OSHA revised the Hazard Communication Standard (HCS) 29CFR-1910-1200 to align with the new GHS system. The U.S. Department of Energy's "Worker Safety and Health Program" in section 10 CFR 851.23 incorporates the OSHA general industry standards by reference, making the revised HCS a requirement for DOE contractors.

GHS Compliant Hanford Hazard (Secondary) Container Labels

Hanford Hazard Label		
Product Name:		
Manufacturer		
GHS-SDS#:		
SIGNAL WORD	WARNING	
	PICTOGRAMS	HAZARD STATEMENTS:
HEALTH		
PHYSICAL		

200E Sign Shop 373-5682 Reorder No. 2E1303245.7

Hanford Hazard Label		
Product Name:		
Manufacturer		
GHS-SDS#:		
SIGNAL WORD	DANGER	
	PICTOGRAMS	HAZARD STATEMENTS:
HEALTH		
PHYSICAL		

200E Sign Shop 373-5682 Reorder No. 2E1303247.1

Hanford Hazard Label		
Product Name:		
Manufacturer		
GHS-SDS#:		
SIGNAL WORD	NONE	
	PICTOGRAMS	HAZARD STATEMENTS:
HEALTH	NONE	NONE
PHYSICAL	NONE	NONE

200E Sign Shop 373-5682 Reorder No. 2E1303250-4X6

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Weld-On Physical and Health Secondary Label Info.

Hazard Class	Category	Pictogram	Signal Word	Statement
A.3 Eyes Irritation	2A		WARNING	Causes serious eye Irritation (H319)
A. 8 (STOSE)	3		WARNING	May cause respiratory Irritation (H335) May cause drowsiness or dizziness (H336)
B.6 Flammable Liquid	2		DANGER	Highly flammable liquid and vapor (H225)

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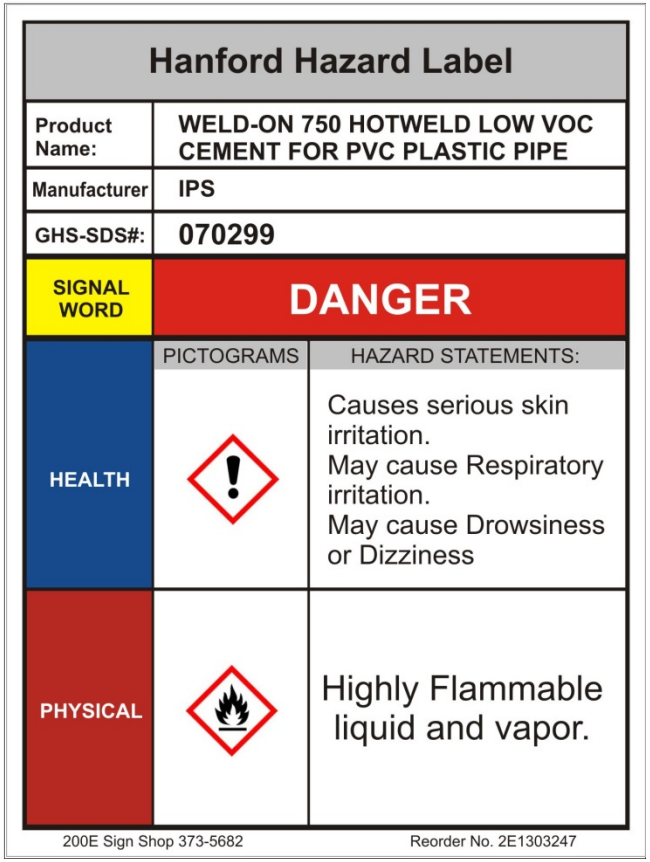
GHS Compliant Hanford Hazard (Secondary) Container Labels

OLD

NEW



Hanford GHS Website

Occupational Safety & Health

NAVIGATION

- OSH Home
- Safety & Health Information Systems
- Safety Topics/Awareness
  - Poster Section
  - Sample MSDS Documents with Watermark
  - Globally Harmonized System (GHS) of Classification and Labeling of Chemicals
- Safety & Health Performance Posters
- Safety Meeting Outlines
- Product Alerts/Recalls
- OS&H Programs
- MSA Hazardous Energy Control Board
- Other Site Programs
- Safety & Health Org, HAMTC Reps and General Documents
- Safety Links
- Chemical Managment Home
- What's New
- Search
- Site Map
- OSH Flash Home
- Print Preview

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

Please make completing your annual HGET refresher before Dec

On March 25, 2012, the Occupational Safety and Health Administration (OSHA) published a final rule updating the Hazard Communication Standard (HAZCOM), Title 29 Code of Federal Regulation (CFR), part 1910.1200. OSHA has established a timeline for companies to train workers, revise their policies and procedures, and re-label existing/remaining secondary containers. The Department of Energy has directed the Hanford Site contractors to implement the new GHS program according to this timeline.

- GHS Communications
  - DOE Direction to MSA
  - Globally Harmonized System (GHS) Pictograms
  - Globally Harmonized System (GHS) Training

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Implementation Plan (Excerpt)

Planned Action	Implementation Process (Requirement)	Implementation Date and Status
Establishing Hanford GHS Working Group	Hanford contractors meet to coordinate actions and share ideas on the how to implement the revised standard. Members are made of training managers, HAZCOM subject matter experts, chemical management program personnel, industrial hygienists, CITS and SDS administrator. (Best Practice) DOE Letter of Direction to MSA, G. H. Branch/RL J. F. to Armijo/MSA Correspondence #1204857 A dated 11/05/2012.	Group meetings started in April 2012 and keep meeting per need at HAMMER Facility. See the GHS Web Page for meeting schedule, dates and minutes.
HAZCOM section part of Hanford General Employee Training (HGET)	Training material was revised by training managers and HAZCOM subject matter experts. The revised material included a GHS video and new slide on the new GHS elements. This training meets the OSHA requirements of providing workers initial GHS-HAZCOM training on the GHS elements by December 2013. (29CFR1910.1200 (j)(1) Effective Dates)	HGET is required annually for all Hanford employees. The new GHS HAZCOM part of HGET training was began November 2012 and completed by all Hanford employees by the OSHA deadline of December 2013. Training for new workers requires watching the five minutes GHS HAMMER video. Video is optional when retaking the training.

Required Changes to Procedures, Forms, Databases

HCS 1992	HCS -GHS
MSDS	GHS-SDS or SDS
Flammable Liquids	New criteria for flash points and boiling points
Combustible liquid	Removed
Health Hazard Definitions (e.g. Sensitizer, Irritant , highly toxic)	Changed
Physical Hazard Definitions (e.g. Gases,)	Changed
Chemical Definition	Changed to Substance

Examples of Procedures, Forms, Databases

Document	Examples
Procedures/Required Documentation/Plans/Guides	• Hazard Communication • Chemical Management • Occupational Carcinogen • Chemical Hygiene Plans • Hazard Analysis Documents
Databases	• CITS • SDS/MSDS
Forms	• MSA-Chemical Procurement Screening (CPS) • MSA-Chemical Inventory Work Sheet (CIW) for subcontractors

Chemical Procurement Screening (CPS) Forms

- Information Required For the Approval of:
  - New Chemical Products Used by Craft
  - Adding Product to Facility Pre-approved List

<u>Anticipated Advantages:</u>

Complete and comprehensive information to be utilized by personnel completing the form.

Job Hazard Analysis

- Hazard and Precautionary Statements on the GHS-SDS are helpful to complete the Job Hazard Analysis.

<u>Anticipated Advantages:</u>

Complete and comprehensive information to be utilized by personnel completing the form.

Organizations/Agencies Responses to the Adoption of the OSHA-GHS Standard

Organization/Agency	Current Changes
Department of Energy (DOE)	Adopted the GHS-OSHA Standard. Directed MSA to take the Hanford Site Lead in Implementing the Standard. Letter Sent on 11-5-2012
DOE-Energy Facilities Contractors Group (EFCOG)	Accepted the use of Hanford GHS secondary hazard label. Published the EFCOG best practice document # 168 " ***Best Practice Title:*** *Best Practice for GHS Secondary Container Hazard Labeling* *http://www.efcog.org/bp/p/168.htm*

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Organizations/Agencies Responses to the Adoption of the OSHA-GHS Standard

Organization/Agency	Current Changes
EPA Office of Pesticides Program: Regulates the labeling of pesticides under the Federal Insecticide, Fungicide, and Rodenticide Act (FIFRA)	Preparing and soliciting public comments on a White Paper outlining its initial thinking on how the GHS might be applied to pesticide labels. 2004? Pesticides: Final Guidance on Material Safety Data Sheets as Pesticide Labeling; Request for Comment on Paperwork Burden. Comment period closed on June 19, 2012 (rule pending)

Responses to the Adoption of the OSHA Standard for GHS

Organization/Agency	
Consumer Product Safety Commission (CPSC)	CPSC staff is completing a comparison of agency regulations and guidelines under the Federal Hazardous Substances Act to the GHS. This review will determine which sections of the GHS might be considered for implementation, as well as whether statutory or regulatory changes would be necessary for eventual implementation.
Inter-agency Coordination: (EPA, OSHA, DOT and CPSC)	Formed an Inter-agency Working Group on Harmonization to Coordinate U.S. Government participation in GHS Activities and Negotiations.

DOT Responses to the Adoption of the OSHA standard for GHS

- Department of Transportation (DOT) has modified its regulations to incorporate most elements of the GHS that affect its programs, including physical hazards and the most severe categories of acute toxicity.

However, OSHA does not recommend adding GHS labels with DOT labels for the same hazard to eliminate confusion.

OSHA standards Affected by GHS

Standard Section	Title/Changes
1926.59	Hazard Communication for Construction/ Definition Changes
1910.106	Flammable Liquids / Definition Changes
1910.109	Explosives and Blasting Agents /Definition Changes
1910.120	Hazardous Waste Operations and Emergency Response/ Definition Changes

Changes by Other Agencies/Organizations

- National Fire Protection Association (NFPA): **None to date**

- American National Standards Institute (ANSI): **None to date**

Acknowledgement

- Hanford GHS Implementation Committee
  - Training Managers
  - Chemical management staff
  - Industrial Hygienists
- MSA Sign Shop
- DOE-EFCOG
- Computer Programmers

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Comments / Open Discussion

Raja Atallah or Pete Wells may be reached at HAMMER 509-372-3143