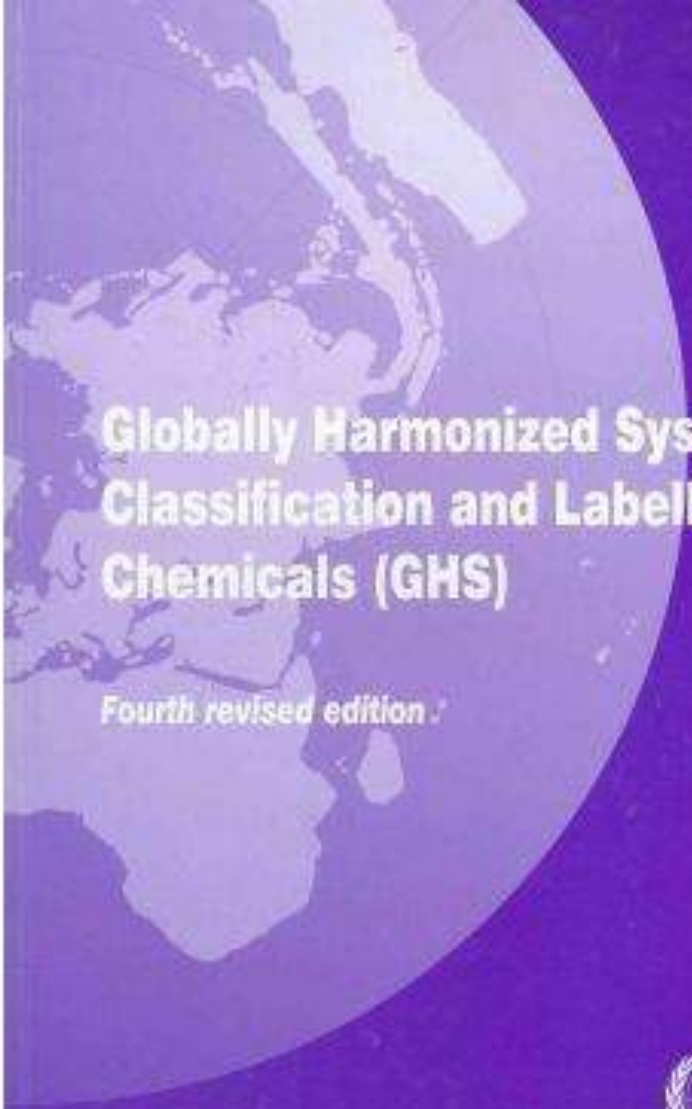


OSHA HAZCOM 2012 Update

GHS: The Globally Harmonized System for
Classification and
Labeling of Chemicals

AIHA-Deep South Section
24 May 2012

Charles D Leonard, CIH – charlie@cleonard.net



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

Fourth revised edition



UNITED NATIONS

Objective

- Basic overview
- What is GHS anyway?
- How does it affect me?
- Oversimplified examples
- Will not cover all 565+ pages!
- What to watch out for...
- New OSHA requirements
- Implementation schedule

Hazcom History

- 1983: OSHA Initial manufacturing hazcom standard
- 1987: OSHA Expanded to all industries
 - > Established requirements but not a format!
- 1990: ILO Recommendation 177
- 1991: EU SDS Directive 91/155/EEC (Pictograms, Risk & Safety phrases)
- 1992: UN Conference on the Environment and Development (UNCED)
- 1993: ANSI Z400.1 consensus standard format
- 2003: GHS v.1 published (GHS v4 published 6/2011)
- March 26, 2012: OSHA Final Rule on GHS

MATERIAL SAFETY DATA SHEET

SECTION I

PRODUCT NAME:	Kol-Seal	SIZE:	-6 Mesh
CHEMICAL NAME:	Ground Coal		
FORMULA:	N/A		
MANUFACTURER:	WelDril Products, Inc.		
ADDRESS:	Box 2673, Muskogee, OK 74402		
FOR INFORMATION ON HEALTH HAZARDS, CALL: 918-686-8585			
FOR OTHER INFORMATION, CALL:	918-686-8585	INFORMATION EFFECTIVE AS OF:	12/17/1997

SECTION II HAZARDOUS INGREDIENTS OF MIXTURES

PRINCIPAL HAZARDOUS COMPONENT(S)	%	TLV (Units)
N.A.		

SECTION III PHYSICAL DATA

BOILING POINT (°F.)	N.A.	SPECIFIC GRAVITY (H ₂ O - 1)	1.3
VAPOR PRESSURE (mm Hg.)	N.A.	PERCENT VOLATILE BY VOLUME (%)	N.A.
VAPOR DENSITY (AIR-1)	N.A.	EVAPORATION RATE	N.A.
SOLUBILITY IN WATER	Insoluble		
APPEARANCE AND ODOR	Black granular and powder		

What is GHS?

- Harmonized criteria for classification of substances and mixtures according to their health, environmental and physical hazards
- Harmonized hazard communication system, including labeling and safety data sheets
- Target audience: workers, employers, consumers, transportation, emergency responders

Why GHS?

- Different systems use different symbols and criteria, leading to confusion.



Different Criteria

Figure 1.2

Acute oral toxicity LD ₅₀ (mg/kg)						
Organization/Country/Regulation or Standard	High		Hazard			Low
	0	< 50	> 50 < 300	> 300 < 2,000	> 2,000 < 5,000	> 5,000
ANSI/ISO 1061	< 50 Highly Toxic	> 50 < 300 Toxic	> 300 < 2,000 Harmful			
OSHA/MSHA	< 50 Highly Toxic	> 50 < 300 Toxic				
EPA/USFRA	0 < 50 Toxicity Category I	> 50 < 300 Toxicity Category II	> 300 < 2,000 Toxicity Category III		> 2,000 < 5,000 Toxicity Category IV	
OSHA/MSHA	< 50 Highly Toxic	> 50 < 300 Toxic				
GHS	≤ 5	> 5 ≤ 50	> 50 ≤ 300	> 300 ≤ 2,000	> 2,000 ≤ 5,000	> 5,000
DOT/US	< 5 Poisoning Group I	> 5 < 50 Poisoning Group II	> 50 < 200 (solid) > 50 < 500 (liquid) Poisoning Group III			
NSFPA/US	≤ 5 Hazard Category 4	> 5 < 30 Hazard Category 3	> 30 < 300 Hazard Category 2	> 300 < 2,000 Hazard Category 1	> 2,000 < 5,000 Hazard Category 0	
NIH/NIH/HS	≤ 1 Toxicity Rating 4	> 1 < 50 Toxicity Rating 3	> 50 < 300 Toxicity Rating 2	> 300 < 2,000 Toxicity Rating 1	> 2,000 < 5,000 Toxicity Rating 0	
EU	< 25 Very Toxic	> 25 < 200 Toxic	> 200 < 2,000 Harmful			
WHO/WHO/WHO	< 50 Very Toxic WHO Class D, Division 1, Sub-division A	> 50 < 300 Toxic WHO Class D, Division 1, Sub-division B	> 300 < 2,000 Harmful			
Australia/NOHSC	< 25 Very Toxic	> 25 < 200 Toxic	> 200 < 2,000 Harmful			
Mexico	< 1 Extremely Toxic	> 1 < 50 Highly Toxic	> 50 < 300 Moderately Toxic	> 300 < 2,000 Mildly Toxic		
Malaysia	< 25 Very Toxic	> 25 < 200 Toxic	> 200 < 2,000 Harmful			
Japan	< 50 Poisonous	> 50 < 300 Toxic	> 300 < 2,000 Harmful			
Korea	< 25 Very Toxic	> 25 < 200 Toxic	> 200 < 2,000 Harmful			

Benefits of Harmonization

- Countries, international organizations, chemical producers and users of chemicals all benefit.
- Enhance protection of humans and environment.
- Facilitate international trade in chemicals.
- Reduce need for duplicate testing and evaluation.
- Assist countries and international organizations to ensure the sound management of chemicals.

GHS – Based on Existing Systems

- USA – OSHA, CPSC (consumer), EPA pesticides
- Canada – WHMIS, CCCR (consumer), pesticides
- EU classification and labelling
- UN Recommendations on Transport of Dangerous Goods

Technical Focal Points

- **Health & Environmental:** The Organization for Economic Cooperation and Development (OECD)
- **Physical Hazards:** The UN Committee of Experts for the Transport of Dangerous Goods (UNCETDG)
- **Hazard Communication:** The International Labor Organization (ILO)

GHS Elements

Classification Criteria

- Physical Hazards
- Health and Environmental Hazards
- Mixtures

Hazard Communication

- Safety Data Sheets
- Labels

Physical Hazards

Explosives

Flammable gases (including chemically unstable gases)

Aerosols

Oxidizing gases

Gases under pressure

Flammable liquids & solids

Self-reactive substances and mixtures

Pyrophoric liquids & solids

Self-heating substances and mixtures

Substances and mixtures which, in contact with water, emit flammable gases

Oxidizing liquids & solids

Organic peroxides

Corrosive to metals

Health & Environmental Hazards

Acute Toxicity

Skin Corrosion/Irritation

Serious Eye Damage/Eye Irritation

Respiratory or Skin Sensitization

Germ Cell Mutagenicity

Carcinogenicity

Reproductive Toxicity

Specific Target Organ Toxicity (STOT) – Acute

Specific Target Organ Toxicity (STOT) – Chronic

Aspiration Hazard

Hazardous to the Aquatic Environment – Acute & Chronic

Hazardous to the Ozone Layer

Pictograms and Hazards

Health Hazard 	Flame 	Exclamation Mark 
• Carcinogen • Mutagenicity • Reproductive Toxicity • Respiratory Sensitizer • Target Organ Toxicity • Aspiration Toxicity	• Flammables • Pyrophorics • Self-Heating • Emits Flammable Gas • Self-Reactives • Organic Peroxides	• Irritant (skin and eye) • Skin Sensitizer • Acute Toxicity (harmful) • Narcotic Effects • Respiratory Tract Irritant • Hazardous to Ozone Layer (Non Mandatory)
Gas Cylinder 	Corrosion 	Exploding Bomb 
• Gases under Pressure	• Skin Corrosion/ burns • Eye Damage • Corrosive to Metals	• Explosives • Self-Reactives • Organic Peroxides
Flame over Circle 	Environment (Non Mandatory) 	Skull and Crossbones 
• Oxidizers	• Aquatic Toxicity	• Acute Toxicity (fatal or toxic)

GHS Format

Table 1.5.2: Minimum information for a [Safety Data Sheet](#)

1. Identification of the substance or mixture and of the supplier

- (a) GHS product identifier;
- (b) Other means of identification;
- (c) Recommended use of the chemical and restrictions on use;
- (d) Supplier's details (including name, address, phone number etc.);
- (e) Emergency phone number.

2. Hazards identification [\(Formerly Section 3\)](#)

- (a) [GHS classification](#) of the substance/mixture and any national or regional information;
- (b) [GHS label elements](#), including precautionary statements. (Hazard symbols may be provided as a graphical reproduction of the symbols in black and white or the name of the symbol e.g. "flame", "skull and crossbones");
- (c) Other hazards which do not result in classification (e.g. "dust explosion hazard") or are not covered by the GHS.

GHS Format

3. Composition/ information on ingredients

Substance

- (a) Chemical identity;
- (b) Common name, synonyms, etc.;
- (c) CAS number and other unique identifiers;
- (d) Impurities and stabilizing additives which are themselves classified and which contribute to the classification of the substance.

Mixture

The chemical identity and concentration or concentration ranges of all ingredients which are hazardous within the meaning of the GHS and are present above their cut-off levels.

NOTE: For information on ingredients, the competent authority rules for CBI take priority over the rules for product identification.

GHS Format

4. First-aid measures

- (a) Description of necessary measures, subdivided according to the different routes of exposure, i.e. inhalation, skin and eye contact and ingestion;
- (b) Most important symptoms/effects, acute and delayed.
- (c) Indication of immediate medical attention and special treatment needed, if necessary.

5. Fire-fighting measures

- (a) Suitable (and unsuitable) extinguishing media.
- (b) Specific hazards arising from the chemical (e.g. nature of any hazardous combustion products).
- (c) Special protective equipment and precautions for firefighters.

GHS Format

6. Accidental release measures

- (a) Personal precautions, protective equipment and emergency procedures.
- (b) Environmental precautions.
- (c) Methods and materials for containment and cleaning up.

7. Handling and storage

- (a) Precautions for safe handling.
- (b) Conditions for safe storage, including any incompatibilities.

8. Exposure controls/personal protection

- (a) Control parameters e.g. occupational exposure limit values or biological limit values.
- (b) Appropriate engineering controls.
- (c) Individual protection measures, such as personal protective equipment.

GHS Format

9. Physical and chemical properties

- (a) Appearance (physical state, colour etc);
- (b) Odour;
- (c) Odour threshold;
- (d) pH;
- (e) Melting point/freezing point;
- (f) Initial boiling point and boiling range;
- (g) Flash point;
- (h) Evaporation rate;
- (i) Flammability (solid, gas);
- (j) Upper/lower flammability or explosive limits;
- (k) Vapour pressure;
- (l) Vapour density;
- (m) Relative density;
- (n) Solubility(ies);
- (o) Partition coefficient: n-octanol/water;
- (p) Auto-ignition temperature;
- (q) Decomposition temperature;
- (r) Viscosity.

GHS Format

10. Stability and reactivity

- (a) Reactivity
- (b) Chemical stability;
- (c) Possibility of hazardous reactions;
- (d) Conditions to avoid (e.g. static discharge, shock or vibration);
- (e) Incompatible materials;
- (f) Hazardous decomposition products.

11. Toxicological information

Concise but complete and comprehensible description of the various toxicological (health) effects and the available data used to identify those effects, including:

- (a) information on the likely routes of exposure (inhalation, ingestion, skin and eye contact);
- (b) Symptoms related to the physical, chemical and toxicological characteristics;
- (c) Delayed and immediate effects and also chronic effects from short and long term exposure;
- (d) Numerical measures of toxicity (such as acute toxicity estimates).

GHS Format

12. Ecological information

- (a) Ecotoxicity (aquatic and terrestrial, where available);
- (b) Persistence and degradability;
- (c) Bioaccumulative potential;
- (d) Mobility in soil;
- (e) Other adverse effects.

13. Disposal considerations

Description of waste residues and information on their safe handling and methods of disposal, including the disposal of any contaminated packaging.

GHS Format

14. Transport information

- (a) UN number;
- (b) UN proper shipping name;
- (c) Transport hazard class(es);
- (d) Packing group, if applicable;
- (e) **Environmental hazards** (e.g.: Marine pollutant (Yes/No));
- (f) Transport in bulk (according to Annex II of MARPOL 73/78 and the IBC Code);
- (g) Special precautions which a user needs to be aware of, or needs to comply with, in connection with transport or conveyance either within or outside their premises.

15. Regulatory information

Safety, health and environmental regulations specific for the product in question.

16. Other information including information on preparation and revision of the SDS

Hazard Classification

1. Use test data for the substance/ mixture, when available
2. Use bridging principles, if applicable
3. Estimate hazards based on known ingredient information:
 - a. calculation (acute toxicity/ environmental)
 - b. additivity (corrosion/ irritation)
 - c. Concentration limits (other endpoints)

Acute toxicity: decision logic (1)

Substance: Are there data and/or information to evaluate acute toxicity?

No

Classification
not possible

Yes

According to the criteria, does the substance have an:

- Oral $LD_{50} \leq 5$ mg/kg bodyweight, or
- Dermal $LD_{50} \leq 50$ mg/kg bodyweight, or
- Inhalation (gas) $LC_{50} \leq 100$ ppm, or
- Inhalation (vapour) $LC_{50} \leq 0.5$ mg/l, or
- Inhalation (dust/mist) $LC_{50} \leq 0.05$ mg/l?

Yes

Category 1



Danger

No

According to the criteria, does the substance have an:

- Oral $LD_{50} > 5$ but ≤ 50 mg/kg bodyweight, or
- Dermal $LD_{50} > 50$ but ≤ 200 mg/kg bodyweight, or
- Inhalation (gas) $LC_{50} > 100$ but ≤ 500 ppm, or
- Inhalation (vapour) $LC_{50} > 0.5$ but ≤ 2.0 mg/l, or
- Inhalation (dust/mist) $LC_{50} > 0.05$ but ≤ 0.5 mg/l?

Yes

Category 2



Danger

No

Cont'd

Acute toxicity: decision logic (2)

No

According to the criteria, does substance have an:

- Oral $LD_{50} > 50$ but ≤ 300 mg/kg bodyweight, or
- Dermal $LD_{50} > 200$ but ≤ 1000 mg/kg bodyweight, or
- Inhalation (gas) $LC_{50} > 500$ but ≤ 2500 ppm, or
- Inhalation (vapour) $LC_{50} > 2$ but ≤ 10.0 mg/l, or
- Inhalation (dust/mist) $LC_{50} > 0.5$ but ≤ 1.0 mg/l?

Yes

Category 3



Danger

No

According to the criteria, does the substance have an:

- Oral $LD_{50} > 300$ but ≤ 2000 mg/kg bodyweight, or
- Dermal $LD_{50} > 1000$ but ≤ 2000 mg/kg bodyweight, or
- Inhalation (gas) $LC_{50} > 2500$ but ≤ 20000 ppm, or
- Inhalation (vapour) $LC_{50} > 10$ but ≤ 20 mg/l, or
- Inhalation (dust/mist) $LC_{50} > 1$ but ≤ 5 mg/l?

Yes

Category 4

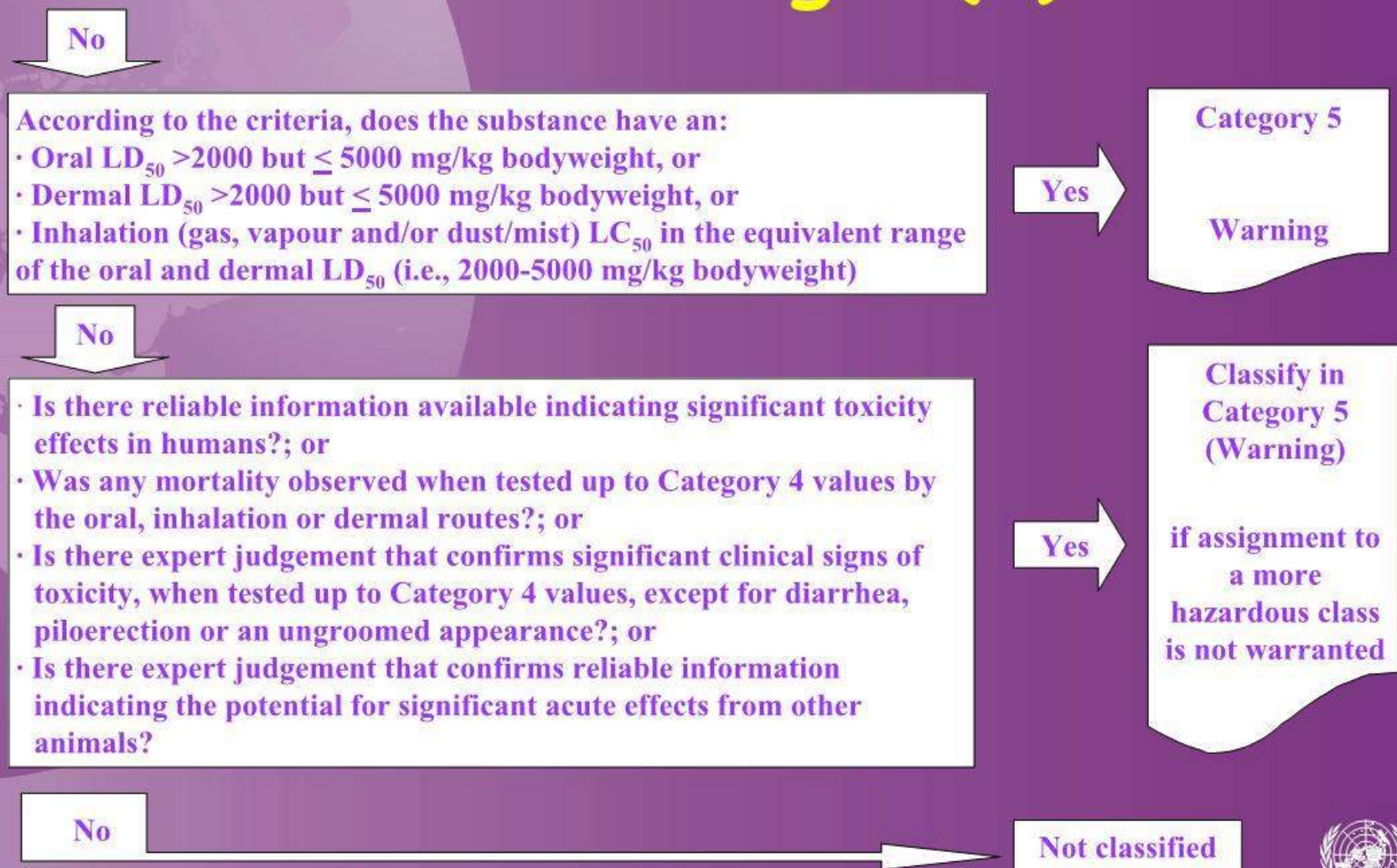


Warning

No

Cont'd

Acute toxicity: decision logic (3)



GHS Classification

ID3 Acrylonitrile

CAS 107-13-1

Date Classified: Feb. 15, 2006 Reference Manual: GHS Classification Manual (Feb. 10, 2006)

Health Hazards

Hazard class	Classification	Rational for the classification
1 Acute toxicity (oral)	Category 3	Based on the LD50 value of 87mg/kg calculated from the testing data of rat LD50 (oral route) of 93mg/kg, 101mg/kg, 128mg/kg, 82mg/kg, 86mg/kg, 84mg/kg, 72mg/kg, 78mg/kg and 186mg/kg" (EHC 28, 1983).
1 Acute toxicity (dermal)	Category 2	Based on the rat LD50 (dermal route) value of 148mg/kg representing the lower of the two testing data, 148mg/kg and 282 mg/kg (EHC 28, 1983).
1 Acute toxicity (inhalation: gas)	Not applicable	Due to the fact that the substance is "liquid" according to the GHS definition and inhalation of its gas is not expected.
1 Acute toxicity (inhalation: vapour)	Category 2	Based on the rat LC50 value of 0.54 mg/L (243ppm), calculated from the testing data of rat LC50 (inhalation of vapour) of 0.47mg/L (4 hours), 1.03mg/L (4 hours) and 1.21mg/L (4 hours) (EU-PAR No.32, 2004), was lower than 90% of the saturated vapor concentration (110,000ppm) under a saturated vapour pressure of 11 kPa (20°C) (IPCS, 2001), the substance was considered as "vapour containing substantially no mist" and was classified based on standard values expressed in ppm.
1 Acute toxicity (inhalation: dust, mist)	Classification not possible	No data available
2 Skin corrosion / irritation	Category 2	Based on the evidence of erythema and edema and an average Draize score of 3.6 obtained in rabbit skin primary irritation tests (EU-RAR No.32, 2004), although no data are available for applications of less than 4 hours.
3 Serious eye damage / eye irritation	Category 2A	Based on the following description by DuPont (1975) on serious eye damage/eye irritation among several testing data in EU-RAR No.32, 2004: "In unwashed eyes, moderate corneal opacity, moderate iritis, severe conjunctival irritation and corneal opacity associated with vascularization observed even after 21 days from exposure. In washed eyes, mild temporary corneal opacity, moderate iris congestion, moderate conjunctival irritation, recovery observed within 3 days from exposure."
4 Respiratory/skin sensitizer	Respiratory sensitizer: Classification not possible Skin sensitizer: Category 1	Respiratory sensitizer: No data available Skin sensitizer: Based on positive results in guinea pig maximization tests (CICAD, 39 2002).
5 Germ cell mutagenicity	Category 2	Based on negative data on heritable mutagenicity tests (dominant lethal tests) and germ cell genotoxicity tests in vivo (UDS tests on rat spermatocytes), the absence of data on germ cell mutagenicity tests in vivo and positive data on somatic cell mutagenicity tests in vivo (gene mutation tests on rat spleen T cells), described in CERI-NITE Hazard Assessment No.64 (2003), CICADS 39 (2002) and EU-RAR No.32 (2004).
6 Carcinogenicity	Category 2	Due to the fact that the substance is classified as Category R by NTP (2005) and Group 2B by IARC (1999).
7 Toxic to reproduction	Category 2	Based on the evidence of organ and skeletal malformations in offspring at dosing levels toxic to dams in rat teratogenicity tests, described in CERI-NITE Hazard Assessment No. 64 (2003).
8 Specific target organs/systemic toxicity following single exposure	Category 1 (nervous system, liver) Category 3 (respiratory tract irritation, narcotic effects)	Based on the human evidence including "mild jaundice and spasm" (CERI-NITE Hazard Assessment No. 64, 2003), "effects on the central nervous system and the liver" (CICAD 39, 2002) and "eye, nasal and respiratory irritation, spasm, loss of consciousness and asphyxia" (NICNAS, 2000), with some of the effects on the nervous systems being temporal and reversible (CERI-NITE Hazard Assessment No. 64, 2003).
9 Specific target organs/systemic toxicity following repeated exposure	Category 1 (nervous system, respiratory organs, blood system, testes, kidneys, liver)	Based on the human evidence including "central nervous system symptoms including anxiety, headache and nervous breakdown" (CERI Hazard Data 96-3, 1997), "pain in the eyes, nose, throat and respiratory tract" (CERI-NITE Hazard Assessment No. 64, 2003) and "decreases in hemoglobin levels and red and white blood cell counts, immunosuppression" (EU-RAR No.32, 2004) and the evidence from animal studies including "a decrease in sperm count, a decrease in physical capabilities, hyaline cast formation in renal collecting tubules, subacute bronchial pneumonia, focal necrosis in the liver, focal gliosis in the brain and cellular infiltration around the blood vessels" (CERI-NITE Hazard Assessment No. 64, 2003). The effects on experimental animals were observed at dosing levels within the guidance value ranges for Category 1.
10 Aspiration hazard	Classification not possible	No data available

Hazard Classification - Mixtures

- Prefer actual mixture data
- Bridging principles
 - a. Dilution
 - b. Batching
 - c. Similar substances
 - d. Interpolation
- Known ingredient information:
 - a. Calculation (acute toxicity/ environmental)
 - b. Additivity (corrosion/ irritation)
 - c. Concentration limits (other endpoints)

Hazard Classification - Mixtures

- Acute Toxicity Estimate (ATE):
 - Component A, 30%, LD50 oral rat = 50 mg/kg
 - Component B, 40%, LD50 oral rat = 500 mg/kg
 - Component C, 30%, LD50 oral rat = 100 mg/kg

$$\frac{100}{ATE_{mix}} = \sum_{n=i} \frac{C_i}{ATE_i}$$

- ATE_{mix} calculation:

$$\frac{100}{ATE_{mix}} = \frac{30}{50} + \frac{40}{500} + \frac{30}{100}$$

$$ATE_{mix} = 102 \text{ mg/kg}$$

- Classification = Acute Oral Toxicity, Category 3

Hazard Statements

- Physical Hazards, H2XX
- Health Hazards, H3XX
- Environmental hazards, H4XX

— Example: Flammable liquid

H224 =	Extremely flammable liquid and vapor	(Category 1)
H225 =	Highly flammable liquid and vapor	(Category 2)
H226 =	Flammable liquid and vapor	(Category 3)
H227 =	Combustible liquid	(Category 4)

— Example: acute toxicity, oral:

H300=	Fatal if swallowed	(Category 1 & 2)
H301=	Toxic if swallowed	(Category 3)
H302=	Harmful if swallowed	(Category 4)
H303=	May be harmful if swallowed	(Category 5)

Precautionary statements

- 5 types of precautionary statements:
- General (codes “P1xx”)
- Prevention (codes “P2xx”)
- Response (in case of spillage or exposure) (codes “P3xx”)
- Storage (codes “P4xx”)
- Disposal (codes “P5xx”)

Label Elements

ACUTE TOXICITY - ORAL (CHAPTER 3.1)

Symbol
Skull and crossbones



Hazard category

3

Signal word

Danger

Hazard statement

H301 Toxic if swallowed

Precautionary statements			
Prevention	Response	Storage	Disposal
P264 Wash ... thoroughly after handling. ... Manufacturer/supplier or the competent authority to specify parts of the body to be washed after handling. P270 Do not eat, drink or smoke when using this product.	P301 + P310 IF SWALLOWED: Immediately call a POISON CENTER/doctor/... ...Manufacturer/supplier or the competent authority to specify the appropriate source of emergency medical advice. P321 Specific treatment (see ... on this label) ... Reference to supplemental first aid instruction. - <i>if immediate administration of antidote is required.</i> P330 Rinse mouth.	P405 Store locked up.	P501 Dispose of contents/container to... ... in accordance with local/regional/national/international regulations (to be specified).

GHS Label Elements

- Product identification
- Supplier identification
- Symbols/ hazard pictograms *
- Signal Words: Danger or Warning *
- Hazard Statements *
- Precautionary information *

* Based on hazard classification

Label Examples

Outer
container
drum label

ToxiFlam Danger! Toxic If Swallowed Flammable Liquid and Vapor	Flammable liquids, toxic, n.o.s. (contains XYZ) UN 1992	 
Do not eat, drink or use tobacco when using this product. Wash hands thoroughly after handling. Keep container tightly closed. Keep away from heat/sparks/open flame. – No smoking. Wear protective gloves and eye/face protection. Ground container and receiving equipment. Use explosion-proof electrical equipment. Take precautionary measures against static discharge. Use only non-sparking tools. Store in cool/well-ventilated place. IF SWALLOWED: Immediately call a POISON CONTROL CENTER or doctor/physician. Rinse mouth. In case of fire, use water fog, dry chemical, CO₂ , or “alcohol” foam. See Material Safety Data Sheet for further details regarding safe use of this product MyCompany, MyStreet, MyTown NJ 00000, Tel: 444 999 9999		

Inner package:

	ToxiFlam (Contains: XYZ) Danger! Toxic If Swallowed, Flammable Liquid and Vapor	
Do not eat, drink or use tobacco when using this product. Wash hands thoroughly after handling. Keep container tightly closed. Keep away from heat/sparks/open flame. – No smoking. Wear protective gloves and eye/face protection. Ground container and receiving equipment. Use explosion-proof electrical equipment. Take precautionary measures against static discharge. Use only non-sparking tools. Store in cool/well-ventilated place. IF SWALLOWED: Immediately call a POISON CONTROL CENTER or doctor/physician. Rinse mouth. In case of fire, use water fog, dry chemical, CO₂ , or “alcohol” foam. See Material Safety Data Sheet for further details regarding safe use of this product MyCompany, MyStreet, MyTown, NJ 00000, Tel: 444 999 9999		

OSHA Additions

- **Hazards Not Otherwise Classified (HNOC):**
 1. **Pyrophoric gases:** Danger! Catches fire spontaneously if exposed to air
 2. **Simple asphyxiants:** Warning: May displace oxygen and cause rapid suffocation
 3. **Combustible dust:** Warning: May form combustible dust concentrations in the air

Trade Secrets

- Trade Secrets continue to be allowed, and continue to require additional regulatory burdens including written requests and responses. §1910.1200(i)
- “Chemical ingredients of public knowledge or of general knowledge in an industry that are disclosed by the goods one markets cannot be claimed as a trade secret. And, despite the claim that a hazardous chemical is a trade secret, the permissible exposure limit (PEL), threshold limit value (TLV), or other designated exposure limits, as well as properties and effects of the hazardous ingredients, must be included on the material safety data sheet (MSDS).
- “Trade secret status may be claimed for **exact percentage composition** but not for concentration ranges. Where a trade secret claim is made for exact percentage, the chemical manufacturer or importer may choose to provide a concentration range to assist downstream users in providing appropriate protections and, at the same time, potentially eliminating requests from users for disclosure of the trade secret in accordance with §1910.1200.”

OSHA Phase-In

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

ACGIH TLVs

- “The TLVs and BEIs represent conditions under which ACGIH believes that **nearly** all workers may be repeatedly exposed **without adverse health effects**”

European Union: REACH

REACH = Registration, Evaluation, Authorization and Restriction of Chemicals

REACH defines Extended Safety Data Sheets, (eSDS) applicable to dangerous materials produced at >10 tonnes/yr. (22,046 lbs/yr)

“A chemical safety assessment shall be performed and a chemical safety report completed for all substances subject to registration in accordance with this Chapter in quantities of 10 tonnes or more per year per registrant” (life-cycle analysis)

DNEL= Derived No-Effect Level, “levels of exposure to the substance **above which humans should not be exposed**”.

Potential for many different DNELs because of different Exposure Scenarios – worker & general population. We typically describe population responses using a LogNormal distribution. Resulting DNELs are generally significantly lower than existing OELs

Data Resources

- EU Classification: <http://esis.jrc.ec.europa.eu/> (4100 entries, IUCLID data sheets are comprehensive)
- <http://www.echa.europa.eu/web/guest/information-on-chemicals/registered-substances> Lists manufacturer classifications for registered substances.
- Japan CHRIP: <http://www.safe.nite.go.jp/english/db.html> & http://www.safe.nite.go.jp/english/ghs_index.html (1500 entries)
- New Zealand HSNO: <http://www.epa.govt.nz/search-databases/Pages/HSNO-CCID.aspx>
- NLM ChemIDplus: <http://chem2.sis.nlm.nih.gov/chemidplus/chemidlite.jsp>
- NLM ToxNet: <http://toxnet.nlm.nih.gov/cgi-bin/sis/htmlgen?HSDB>
- Also ACGIH, OSHA, EPA, DOT, etc. that you already know.
- NTP & IARC Carcinogen lists
- See also www.cleonard.net/MSDS