

Demystifying GHS: Embracing the Largest HCS Change in History

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Introduction

Through the progression of the industrial age, the use of chemicals to produce thousands of products has reached to all corners of the globe. Along with this expanded use of chemical components is the ever-increasing concern about the hazards associated with production, transportation, storage, and use of these chemicals. Although international trade has many benefits, being able to effectively communicate chemical hazards to all affected individuals comes with challenges. Whether language, cultural or economic challenges exist, one thing is clear: Employee and environmental safety must be maintained in international trade.

Improper handling of hazardous materials can come with a high social and economic cost. As countries began to consider these costs, regulations were developed to promote the safe handling of hazardous chemicals. When given the task of regulating the handling of chemicals, countries around the world will respond in ways appropriate to their own habits and cultures. As a result, the inconsistencies in international regulations create an environment where doing business becomes more difficult, expensive and, potentially, more hazardous.

Fear of Change

The United States responded to the need for improved chemical hazard communication by implementing the OSHA Hazard Communication Standard (HCS) in the late 1980s. Since the HCS has been with us for about two decades, we have become accustomed to its features and limitations. Human beings resist change by nature so any change for the better or worse is often resisted if not introduced appropriately. Considering that Canada has the Workplace Hazardous Materials Information System (WHMIS), and the European Union has a different set of regulations covering hazardous material labeling and safety data sheets (SDS), changes are necessary and overdue to streamline international hazard communication and trade. The United Nations started the process in 1992 as an “action program” at the United Nations Conference on Environment and Development (UNCED). The goal of that conference was to produce a globally harmonized system by the year 2000. Systems from around the world were analyzed and a Globally Harmonized System for Classification and Labeling of Chemicals (GHS) was created

from the data gleaned from that research. GHS was adopted by the UN in 2002. The system is described in *A Guide to the Globally Harmonized System of Classification and Labeling of Chemicals (GHS)*, known as the “Purple Book.” Where this change will affect the United States is the modification of the existing Hazard Communication Standard (29 CFR 1910.1200). Based on questions from chemical producers, shippers, end-use employers, and employees, there seems to be some fear, uncertainty, and doubt about how the new standard will look and how it will affect them. There is no reason to fear the new standard and, therefore, no need for “fight or flight.”

There is no place to run and, actually, there is no *need* to run away from changes to the HCS. The new proposed HCS standard is not really all that complicated, just somewhat different. There are three basic strategies all should employ to embrace the new standard:

1. Understand the differences;
2. Embrace the benefits of an improved standard; and
3. Prepare for the changes.

Understand the Differences

What is the Globally Harmonized System of Classification and Labeling of Chemicals (GHS)? GHS is an internationally agreed-upon system set to replace the various classification and labeling standards used in different countries. The proposed changes to the HCS standard were published in the Federal Register on September 30, 2009. They can be reviewed at http://www.osha.gov/FedReg_osha_pdf/FED20090930.pdf. The proposed modifications to the current HCS standard include:

- Revised criteria for classification of chemical hazards;
- Requirements for use of standardized signal words, pictograms, hazard statements, and precautionary statements;
- A specified format for safety data sheets (SDSs);
- Related revisions to definitions of terms used in the standard; and
- Requirements for employee training on labels and SDSs.

OSHA is also proposing to modify provisions of a number of other standards, including standards for process safety management, flammable and combustible liquids, and most substance-specific, health standards to ensure consistency with the modified HCS requirements. Although GHS is not a regulation yet, that can change at any moment, as OSHA is getting closer to updating the HCS standard (29 CFR 1910.1200). As of this writing, the proposed standard has cleared the White House Office of Management and Budget (OMB) with some recommended changes.

Embrace the Benefits

What are some benefits of the change? The proposed modifications will improve the quality and consistency of information provided to employers and employees regarding chemical hazards and associated protective measures. Related and additional benefits include:

- Becoming a valuable tool for enabling global trade;
- Enhancing understanding of hazards from foreign products;
- Providing uniform employee training; and
- Helping countries with few EHS resources to compete globally.

As an example, Canada has established requirements for labels under its Workplace Hazardous Materials Information System (WHMIS) that require labels to include specified symbols within a

defined circle. U.S. chemical manufacturers must label chemicals accordingly for marketing in Canada. Considering that many U.S. corporations have Canadian facilities, this adds complexity and cost to doing business with our neighbors to the north.

Prepare for the Changes

The GHS is now available for worldwide implementation, and countries have been encouraged to implement the GHS as soon as possible, with the original goal of a fully operational system by 2008. OSHA published its HCS (“Right to Know”) on November 25, 1983 with an effective date of March 11, 1994. The original HCS was a good step forward. Prior to that time, only the most progressive companies embraced chemical labeling, employee training, and uniform chemical hazard communication of hazards.

The basic framework of the HCS will remain the same. The primary goal will now, as it always has been is to protect workers by informing them of hazards associated with products they are working with. As we begin to prepare for the coming changes consider that the basic requirements of the HCS have not changed, but what is different? Here are a few key elements:

- OSHA PELs (and other OELs) are required to be listed on SDS;
- Employee re-training is required within two years of publication of the final rule; and
- Full compliance is required within three years of the effective date.

OSHA is proposing that an employer’s new HCS program will include several features of the current standard (29 CFR1910.1200), plus some additional or modified information (shown in **bold** type below). A compliant HCS program should include the following sections:

- (a) Purpose
 - (b) Scope and Application
 - (c) Definitions
 - (d) **Hazard Classification**
 - (e) Written Hazard Communication Program
 - (f) **Labels and Other Forms of Warning**
 - (g) **Safety Data Sheets**
 - (h) **Employee Information and Training**
 - (i) Trade Secrets
 - (j) Effective Dates
- Appendices A-F**

Standard Objectives for GHS

The Globally Harmonized System for Classification and Labeling of Chemicals (GHS) is intended to:

1. Create an internationally recognizable hazard communication system;
2. Establish a framework for countries that do not have a hazard communication system; and
3. Support the trade of chemicals that have been properly assessed and identified for international exchange.

In order to meet these objectives, GHS comprises standards for:

1. Classifying chemicals;
2. Creates symbols (pictograms) for hazards;
3. Creates labeling requirements; and

4. Establishes a universal MSDS (SDS).

GHS-Specific Elements

The GHS provides specific criteria for classification of health and physical hazards, as well as classification of mixtures. GHS health hazard categories include nine key classes:

1. Acute toxicity (LD₅₀ and LC₅₀);
2. Skin corrosion/irritation;
3. Serious eye damage/eye irritation;
4. Respiratory and skin sensitization;
5. Germ cell mutagenicity;
6. Reproductive toxicity;
7. Carcinogenicity;
8. Specific target organ toxicity (STOT) classes, which include single- and repeated exposure; and
9. Aspiration hazard.

Pictograms

Pictograms used in GHS are similar to those that have been used in the European Union (EU) for years. There are three main hazard groups:

1. Health,
2. Physical, and
3. Environmental

An example of a pictogram for an environmental hazard is a “dead fish,” in a black and white color scheme with a red diamond shape around it, as shown in Exhibit 1.



Exhibit 1. Environmental Pictogram of “Dead Fish”

Exhibit 2 illustrates all nine standard pictograms:



Exhibit 2. All Nine Pictograms

Most of the hazard pictograms may look familiar, but two pictograms are completely new. The Health Hazard pictogram features an affected human bust. This pictogram indicates carcinogens, mutagens, reproductive toxicity (CMRs), aspiration hazards, respiratory sensitizers, and substances that have target organ toxicity. The Exclamation Mark pictogram replaces the European saltire depicted in Exhibit 3:



Exhibit 3. Saltire Pictogram

Harmful chemicals and irritants are marked with an exclamation mark (!). This change makes more sense, since a saltire would seem to indicate to an untrained individual that the material should not even be handled or used at all.

Container Labeling

The GHS does not specify an exact label format. However, it does require certain provisions. These must include:

- Product identification,
- Supplier identification,
- Symbols (hazard pictograms),
- Signal words,
- Hazard statements, and
- Precautionary information.

Currently, OSHA allows labeling format flexibility. Common practice in the U.S. is to follow the ANSI Z129.1-2006 Standard for precautionary labeling. Therefore, GHS labeling changes to OSHA only *currently* require:

1. Identity of the hazardous chemical,
2. Appropriate hazard warnings, and
3. Name and address of chemical manufacturer, importer or other responsible party.

The ANSI Z129.1-2006 standard includes 12 pieces of information, including the above three plus:

1. Identification of the chemical product,
2. Signal word(s),
3. Statement of hazards,
4. First aid instructions,
5. Instructions in case of fire,
6. Instructions in case of leak or spill,
7. Special handling,
8. References, and
9. Antidotes and notes to physician.

Signal Words

Typical signal words that will be used include, "Danger" or "Warning." These are used to emphasize associated hazards and indicate the severity of the hazard. Lower-level hazard categories do not use signal words. *Only one* signal word corresponding to the class of the hazard should be used on a label.

Hazard Statements

Hazard statements are presented in the form of risk phrases, which are assigned to a hazard class and category that describes the hazard. A statement should be included on the label for *each* GHS hazard when *multiple* hazards are associated with the product. Some risk phrase/hazard statement examples include:

- "Fatal if in contact with skin"
- "May cause cancer"
- "Extremely flammable aerosol"

Precautionary Statements

Precautionary statements are provided to minimize or prevent adverse effects. There are four types of precautionary statements covering: (1) prevention; (2) spill and exposure response; (3) storage, and (4) disposal.

Supplemental Information

Space for supplemental information is provided for any additional information that may be useful regarding the product. Supplemental information is a free-form narrative but must not contradict the standardized hazard information in other areas of the label.

Exhibit 4 shows what a label for acetone might look like under the new GHS system:



Exhibit 4. Example GHS Label for Acetone

This label is compliant with GHS standards because the following elements are present:

1. Pictograms for a flammable material and an exclamation mark for a harmful chemical or irritant is present;
2. Signal words are shown in all capital letters, “DANGER;”
3. The product is identified at the top of the label in bold font, “**Acetone;**”
4. The supplier identification is present at the bottom of the label, “Company Name;”
5. Two risk phrases are present including, “Highly flammable liquid and vapor” and “Causes severe eye irritation;” and
6. The label has eight precautionary statements including, “Keep away from heat, sparks and flame–No Smoking” and “Avoid contact with eyes, skin and clothing.”

The format of the label may differ as long as the required information is present. All of the same elements are present in the example for Chemical X shown in Exhibit 5:



Exhibit 5. Example GHS Label for Chemical X

Safety Data Sheets

Material Safety Data Sheets (MSDSs) will now be referred to as Safety Data Sheets (SDSs). The new SDSs have a 16-section format. However, this format is not new to the international scientific community. The International Organization for Standardization (ISO), the European Union (EU) and American National Standards Institute (ANSI) have used the 16-section format for some time. The ILO (International Labour Organization) has also used a 16-section SDS format, where sections 2 and 3 were reversed from the GHS format. The 16 required sections in the new SDS include:

1. Identification
2. Hazard(s) identification
3. Composition/information on ingredients
4. First-aid measures
5. Fire-fighting measures
6. Accidental release measures
7. Handling and storage
8. Exposure control/personal protection
9. Physical and chemical properties
10. Stability and reactivity
11. Toxicological information
12. Ecological information
13. Disposal considerations

14. Transport information
15. Regulatory information

Any component that has one or more of the following hazardous properties must be included on the SDS, provided that the component is present in a concentration greater than or equal to **1.0** percent:

1. Acute toxicity;
2. Skin corrosion;
3. Serious eye damage;
4. Germ cell mutagenicity (Category 2—chemicals which cause concern for man owing to the possibility that they may induce heritable mutations in the germ cells of humans);
5. Reproductive toxicity;
6. Specific target organ toxicity (with repeated exposure); and/or
7. Hazardous to the aquatic environment.

Any component that has one or more of the following hazardous properties must be included on the SDS, provided that the component is present in a concentration greater than or equal to **0.1** percent:

1. Respiratory or skin sensitization;
2. Germ cell mutagenicity (Category 1—chemicals known to induce heritable mutations or to be regarded as if they induce heritable mutations in the germ cells of humans); and/or
3. Carcinogenicity.

GHS Compliance in the United States

Chemical Manufacturers

Compared to when the first hazard communication standard was issued, the impact of compliance to the new GHS-guided HCS standard will likely be lower for U.S. chemical manufacturers, end-use organizations and their employees, since the changes amount to program improvements rather than implementation of an entirely new standard. There has been significant progress around the world in adopting GHS standards. Many countries in Asia, Europe, North and South America, and Australia have adopted the GHS standard.

Since the GHS provides specific criteria for classification of health and physical hazards, chemical manufacturers will need to revise all current MSDS to the SDS format and create new labels to meet requirements if OSHA makes all features of the proposed standard mandatory. The ANSI Z400.1-2004 MSDS Standard already reflects the 16-heading GHS format. Manufacturers will need a program to update their customers to the new SDS. These changes may be costly, but due to the harmonization of hazard information, manufacturers will hopefully have access to the work of others from around the globe that can be used, rather than starting from square one. A centralized chemical database, classified according to the GHS, is being considered for this purpose. The benefits of this improved and standardized information will enhance trade, especially internationally.

End-Use Employers

Employers will need to make sure the MSDSs they have on file for all chemicals in use in their plants have been replaced with SDSs. On-line MSDS services can make this task quite simple, since providers typically offer a service to update MSDSs when new ones become available for an existing product. Employers will also need to ensure that primary containers are properly

labeled prior to accepting shipments at the receiving dock. Secondary containers that are used in the plant for more than a single work shift must also be appropriately labeled. To meet these goals, enhanced employee and supervisor training will be required. OSHA has proposed a two-year window to provide the necessary training and three years for total program implementation.

The following time frames are proposed in the final rule:

- 2 years to train employees and supervisors;
- 3½ years for manufacturers and importers to complete chemical classification;
- 4 years for distributors to comply with changes to placarding and shipping document changes; and
- 4½ years for employers to review and update their Hazard Communication Standard program.

Currently, employers need to be aware of the GHS as chemicals enter the workplace. Employers importing chemicals from countries that are further along in implementing the GHS will need to address training sooner. Workers should understand GHS labels and be familiar with the 16-section SDS. Training should include not only basic information about chemical exposure, but how to read the new SDSs, labels, hazard statements, and pictograms.

Why Adopt GHS?

It will likely be required! More importantly, worker and consumer safety is improved with uniformity by limiting inconsistencies that exist between the varying nations' hazard communication systems. Companies that do not adopt GHS will be at a disadvantage when doing business internationally. So be aware of the benefits.

The government agencies primarily affected by GHS have been in favor of its implementation for nearly a decade. The Environmental Protection Agency (EPA) committed to GHS in 2004. The Department of Transportation (DOT) is also committed. The Consumer Product Safety Commission (CPSC) is still reviewing the standard. Industrial hygiene and safety personnel that have been tasked with performing risk assessments and especially those working for international corporations, will also welcome the harmonization of SDSs, labels, pictograms and hazard statements.

Benefits of GHS Compliance

The benefits of GHS implementation are many. A general improvement in the knowledge and recognition of acute and chronic health hazards of chemicals throughout the industry will likely lead to better hazard control. A framework can be established for movement towards the elimination of CMRs (carcinogenic, mutagenic, reprotoxic substances), and/or their replacement with less hazardous chemicals. The main goal is an international improvement in hazard communication between chemical manufacturers, end users, their employees and support personnel.

Summary

The Globally Harmonized System for Classification and Labeling of Chemicals (GHS) will affect virtually all manufacturers, shippers, employers and employees. The United Nations and countries around the world have recognized that regulations for hazardous chemicals differ between countries and between agencies within the same country. The need for a unified system

of classifying hazards, labeling containers and communicating those hazards to all those involved is becoming increasingly important to protect human and environmental health, and streamline commerce and associated costs. It is recommended that people potentially affected by upcoming GHS standards should:

1. Update the site chemical inventory;
2. Audit the MSDS (soon to be SDS) library;
3. Audit secondary labeling procedures;
4. Update HCS training for employees; and
5. Periodically check the web link shown for HCS updates from OSHA (<http://www.osha.gov/dsg/HCS/standards.html>).

Since OSHA has proposed modifications to other standards that it has determined will need to be consistent with the GHS, other long-awaited changes to some other outdated OSHA standards may also be forthcoming.

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