



COMMONWEALTH of VIRGINIA

DEPARTMENT OF LABOR AND INDUSTRY

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AGENDA

SAFETY AND HEALTH CODES BOARD

State Corporation Commission
1300 East Main Street, Court Room A
Second Floor
Richmond, Virginia

Wednesday, September 12, 2012

10:00 a.m.

1. Call to Order
2. Approval of Agenda
3. Approval of Minutes for Board Meeting of May 24, 2012
4. Election of Officers
5. Opportunity for the Public to Address the Board on this issues pending before the Board today or on any other topic that may be of concern to the Board or within the scope of authority of the Board.

This will be the only opportunity for public comment at this meeting. Please limit remarks to 5 minutes in consideration of others wishing to address the Board.

6. Old Business

Report on Periodic Review of Certain Regulations:

- a) Public Participation Guidelines, 16VAC25-11

Presenter – Reba O’Connor

- b) Regulation Concerning Licensed Asbestos Contractor Notification, Asbestos Project Permits, and Permit Fees, 16VAC25-20

Presenter – Reba O’Connor

7. New Business

- a) Federal-Identical Standards:

- 1) Bloodborne Pathogens Standard, §1910.1030; Corrections and Technical Amendment

Presenter – Ron Graham

- 2) Rigging Equipment for Material Handling Construction Standard, §1926.251; Correction and Technical Amendment

Presenter – Jim Garrett

- 3) Corrections and Technical Amendments to Multiple Standards

Presenter – Jim Garrett

- 4) Updating OSHA Standards Based on National Consensus Standards for Head Protection; Direct Final Rule (DFR) for Multiple Standards; and Correction to DFR

Presenter – Jim Garrett

- 5) Cranes and Derricks in Construction; Demolition and Underground Construction; Direct Final Rule

Presenter – Jim Garrett

- 6) Hazard Communication Standard, §1910.1200; Final Rule; and Other Related Standards in Parts 1910, 1915 and 1926

Presenter – Ron Graham

8. Items of Interest from the Department of Labor and Industry
9. Items of Interest from Members of the Board
10. Meeting Adjournment

DRAFT

**SAFETY AND HEALTH CODES BOARD
MEETING MINUTES
THURSDAY, MAY 24, 2012**

BOARD MEMBERS PRESENT: Mr. Satish Korpe, Secretary, Presiding Officer
Mr. Charles Bird
Mr. Jerome Brooks
Mr. Gregory Hart
Ms. Rebecca LePrell
Dr. James Mundy
Mr. Marc Olmsted
Mr. Mike Pischke
Mr. Danny Sutton
Mr. Chuck Stiff

BOARD MEMBERS ABSENT: Ms. Anna Jolly
Ms. Eloisa Rea
Ms. Milly Rodriguez, Chair
Mr. Tommy Thurston, Vice Chair

STAFF PRESENT: Courtney M. Malveaux, Esq., Commissioner, Dept. of
Labor and Industry
Mr. Bill Burge, Assistant Commissioner – VOSH
Mr. Jim Garrett, Director of VOSH Programs
Mr. Ron Graham, Director, Occupational Health
Compliance
Mr. John Crisanti, Manager, Office of Planning and
Evaluation
Ms. Reba O'Connor, Regulatory Coordinator
Ms. Jennifer Wester, Director, Cooperative Programs
Division
Ms. Regina Cobb, Senior Management Analyst
Ms. Sharon Sykes, Policy and Planning Specialist
Ms. Kendall Hamilton, Legal Intern

OTHERS PRESENT: Ms. Debroah Carter, CMRS, CCR, Commonwealth
Reporters, LLC
Ms. Beverly Crandell, Federal OSHA
Joshua N. Lief, Esq., Office of the Attorney General
Mr. C. Ray Davenport, VA AFL-CIO
Mr. Ed Boulanger, Safety Resource Associates, LLC

ORDERING OF AGENDA

Mr. Satish Korpe, Secretary/Presiding Officer, called the meeting to order at 10:01 a.m., and noted that there was a quorum. Mr. Korpe asked for a motion to approve the Agenda. Dr. James Mundy moved to accept the Agenda, and Mr. Jerome Brooks properly seconded the motion. The Agenda was approved, as submitted, and the motion was carried by unanimous voice vote.

APPROVAL OF MINUTES

Mr. Korpe asked the Board for a motion to approve the Minutes for the October 13, 2011, Board meeting. On proper motion by Mr. Marc Olmsted and seconded by Mr. Gregory Hart, the Minutes were approved, as submitted, by unanimous voice vote.

PUBLIC COMMENTS

Mr. Korpe opened the floor to comments from the public, however, there were no comments.

OLD BUSINESS

There was no Old Business.

NEW BUSINESS

Corrections and Technical Amendments to Multiple Standards

Mr. John Crisanti, Manager of the Office of Planning and Evaluation, requested, on behalf of the VOSH Program, that the Board consider for adoption federal OSHA's Corrections and Technical Amendments to Multiple Standards, as published in 76 FR 80735 on December 27, 2011.

Mr. Crisanti summarized the corrections and technical amendments by stating that federal OSHA has made non-substantive technical amendments to, and has corrected typographical errors in, 16 different general industry, construction and shipyard employment standards. He stated that the technical amendments include updating or revising cross-references and updating OSHA recordkeeping log numbers. He added that the technical amendments and corrections do not modify or revoke existing rights and obligations. He then listed the 16 standards revised as follows: A) Process Safety Management of Highly Hazardous Chemicals, §1910.119; B) Hazardous Waste Operations and Emergency Response, §1910.120; C) Permit-Required Confined Spaces, §1910.146; D) Medical Services and First Aid, §§1910.151 and 1926.50; E) Servicing Multi-piece and Single-Piece Rim Wheels, §1910.177; F) Mechanical Power Presses, §1910.217; G) Pulp, Paper, and Paperboard Mills, §1910.261; H) Sawmills, §1910.265; I) Grain Handling Facilities, §1910.272; J) Commercial Diving Operations, §1910.440; K) 13 Carcinogens (4-Nitrobiphenyl, etc.), §1910.1003; L) Lead, §§1910.1025 and 1926.62; M) Bloodborne Pathogens, §1910.1030; and N) Air Contaminants, §1915.1000.

With respect to the Basis of the Corrections and Technical Amendments, Mr. Crisanti informed the Board that these non-substantive technical amendments in 16 existing standards were made

to reflect various updated references, consolidations, correction of typographical errors, as well as to address continuity and consistency issues.

He continued by stating that no impact on employers, employees or the Department is anticipated from the adoption of these technical amendments.

In conclusion, Mr. Crisanti recommended that the Board adopt federal OSHA's Corrections and Technical Amendments to Multiple Standards, as authorized by Virginia Code §§40.1-22(5) and 2.2-4006.A.4(c), with an effective date of September 15, 2012.

Dr. Mundy moved to accept Mr. Crisanti's recommendation. Mr. Chuck Stiff properly seconded the motion which was unanimously approved by voice vote.

Acetylene Standard, §1910.102, Revising Other Standards Referenced Therein; Direct Final Rule

Mr. Ron Graham, Director of Occupational Health Compliance, requested that the Board consider for adoption federal OSHA's Direct Final Rule for the Acetylene Standard, §1910.102, Revising Other Standards Referenced Therein, as published in 76 FR 75782, on December 5, 2011.

He explained that this Direct Final Rule (DFR) updates the standards-developing organization ("SDO") standards, referenced in paragraph (a) of §1910.102 (Cylinders), by deleting the reference to the 2003 Edition of the Compressed Gas Association ("CGA") Pamphlet G-1 ("Acetylene") and replacing it with CGA Pamphlet G-1-2009 ("Acetylene"), which is the most recent edition of that pamphlet.

He informed the Board that the DFR is a legislative process that OSHA and other federal government agencies institute in situations wherein they feel that the changes to a standard are not controversial, provide equivalent or equal protection to the employees; and do not impose on employers significant compliance costs. He added that with this DFR, there were no adverse comments.

Mr. Graham explained that the purpose of this DFR is to update references to recognize the latest edition of the Compressed Gas Association Standard, CGA G-1-2003, in the Acetylene Standard.

With respect to the impact of this DFR, Mr. Graham stated that the DFR should enhance compliance with the standard since employers will be utilizing the most recent version of the Compressed Gas Standard for Acetylene. He added that the adoption of the DFR will cause no adverse impact on employers, employees or the Department. He stated that with the adoption of the DFR, VOSH will be "as effective as" federal OSHA. He added that since employers should have already been complying with the 2003 version of CGA Pamphlet, and there were only technical changes to the 2009 version, there are no additional costs in complying with the standard.

In conclusion, Mr. Graham recommended, on behalf of the Department, that the Board adopt federal OSHA's Direct Final Rule for the Acetylene Standard, §1910.102, revising other standards referenced therein, as authorized by Virginia Code §40.1-22(5) and 2.2-4006A.4(c), with an effective date of September 15, 2012.

Mr. Stiff moved to accept Mr. Graham's recommendation. Mr. Hart seconded the motion which was unanimously approved by voice vote.

Correcting Amendments for: Construction Industry Standard for Sanitation, 16VAC25-160, and Field Sanitation Standard, 16VAC25-180

Mr. Graham informed the Board that these two standards are Virginia unique standards that do not have comparable OSHA standards. He began by requesting the Board to authorize the Department's Correcting Amendments to the Construction Industry Standard for Sanitation; in General, 16VAC25-160-10, and the Field Sanitation Standard, 16VAC25-180-10, with an effective date of September 15, 2012.

He stated that the VOSH Program seeks to correct a reference in the definition of "Potable water" which appears in both of the Virginia unique Construction Industry Standard for Sanitation; in General, 16VAC25-160-10 (b)(i)(2) and the Field Sanitation Standard, 16VAC25-180. The correction would delete the single word "Interim" from the reference "U.S. Environmental Protection Agency's Interim Primary Drinking Water Regulations", published in 40 CFR Part 141. Also in 16VAC25-160-10 (b)(i)(2), VOSH seeks to insert the word "National" before "Primary" to more accurately reflect the title of the referenced regulations. VOSH wants to change the text in both standards to reflect the current EPA terminology which basically requires that worksites have water that is fit for human consumption.

He stated that these correcting amendments will clean up the standards and make them consistent with the federal OSHA standards as well. He added the U.S. Environmental Protection Agency (EPA) actually sets the standards for potable drinking water and has made these national standards.

He informed the Board that adoption of these minor correcting amendments are not expected to impact Virginia employers, employees or the Department.

In conclusion, Mr. Graham recommended that the Board adopt correcting amendments to the final rules for the Construction Industry Standard for Sanitation; in General, 16VAC25-160-10, and for Field Sanitation Standard, 16VAC25-180-10, as authorized by Virginia Code §§40.1-22(5) and 2.2-4006.A.3, with an effective date of September 15, 2012.

Mr. Danny Sutton moved to accept Mr. Graham's recommendation. Mr. Charles Bird seconded the motion which was unanimously approved by voice vote.

Regulation Concerning Certified Lead Contractor Notification, Lead Project Permits, and Permit Fees, 16VAC25-35

On behalf of the Department of Labor and Industry, Mr. Graham requested the Board to amend the Regulation Concerning Certified Lead Contractors Notification, Lead Project Permits, and Permit Fees, 16VAC25-35, with an effective date of September 15, 2012.

Mr. Graham informed the Board that when contractors are performing asbestos and lead abatement projects they must provide the Department with written notification. He began by giving an overview of how lead abatement works in Virginia. He explained that the State receives a grant or funding from the U.S. Environmental Protection Agency (EPA) to administer requirements under regulations which govern lead abatement projects – basically child-occupied facilities and target housing. He stated that the goal is to reduce lead poisoning in children in these units. He added that there are three major agencies involved in this process: the Department of Health, the Department of Professional and Occupational Regulation (“DPOR”), and the Department of Labor and Industry (“DOLI”).

He explained that the purpose of these amendments is to correct regulatory oversight errors, and to address and conform to a series of changes to the related DPOR regulations, as well as to eliminate confusion on the part of lead contractors who must be licensed by DPOR and who also must file lead project permits with DOLI. These changes clarify terminology and provide consistency in the lead contract regulations enforced by DPOR and DOLI. DPOR does not use the designation “certified” for lead contractors performing lead-based paint activities. Instead, he continued to explain, DPOR uses the term “licensed lead contractor” or to a “licensed lead abatement contractor”. In compliance with DPOR’s terminology, DOLI seeks to delete the term “certified” wherever it is referenced in its lead abatement notification regulations and replace that term with “licensed”. He referred the Board to page 3 of the briefing package for the proposed changes to the existing regulatory text.

He discussed other proposed changes which include: replacing DOLI’s term “residential building” for DPOR’s term “residential dwelling”; replacing the “Virginia Board for Asbestos and Lead’s Virginia Lead-Based Paint Activities Regulation” for DPOR’s “Virginia Board for Asbestos, Lead, and Home Inspector’s Lead-Based Paint Activities Regulation”. Mr. Graham mentioned that, although the licensing board with DPOR is actually the Virginia Board for Asbestos, Lead, Mold and Home Inspectors, the mold regulations will be deregulated as of July 1 of this year.

Mr. Graham stated that adoption of these amendments should not present any impact on employers because employers will still be required to notify DOLI of lead abatement projects in the same manner as before, and there should be no impact on employees as their work processes or workloads within the DOLI substantially will remain unchanged.

Mr. Korpe asked Mr. Graham if there would be similar changes in the language for Asbestos Licensing as it is for Lead. Mr. Graham responded that the asbestos notification regulations were written somewhat differently, and are based upon the NESHAP regulations which were developed by the EPA. He assured Mr. Korpe that DOLI will be looking at the asbestos

notification regulations which have been included in the Periodic Review of Existing Regulations that will be presented during today's meeting.

Mr. Stiff inquired about whether the reporting requirements would be the same for public and private work. Mr. Graham responded that he would address that issue with the next item on the Agenda – Notice of Intended Regulatory Action (NOIRA): Amendments to Certified Lead Contractors Notification, Lead Project Permits and Permit Fees. He added that just as DOLI is required to be “as effective as” with the OSHA regulations, the EPA requires the same level of enforcement activity in the adoption of standards. He stated that so far as the requirement for notifying lead abatement projects goes, it either has to be a child-occupied facility or target housing. Target housing is housing built prior to 1978. After 1978, the Consumer Products Safety Commission basically banned the use of lead-based paint.

Mr. Stiff asked whether one must also be certified to be licensed or is there some sort of a process for verifying the contractors' qualification. Mr. Graham responded that the terms are used somewhat synonymously which is one of the reasons why DOLI would not be impacted by the changes. DOLI has interpreted licensure and certification to mean the same thing. DPOR is the authorizing agency through their board. DPOR uses the terminology “license”; and to get that license, one must complete the EPA-approved course. Since DPOR grants the license, DOLI wants to be consistent with DPOR. Ms. Rebecca LePrell added that she believes that in the Department of Health's care manual for children with elevated blood lead levels, the term “licensed contractor,” not “licensed lead abatement contractor” or “lead contractor” is used.

In conclusion, Mr. Graham recommended that the Board adopt the correcting amendments to the final rule for the Regulation Concerning Licensed Asbestos Contractor Notification, Asbestos Project Permits, and Permit Fees, 16VAC25-20, as authorized by Virginia Code §§40.1-22(5) and 2.2-4006.A.3., with an effective date of September 15, 2012.

Dr. Mundy moved to accept Mr. Graham's recommendation. Mr. Stiff properly seconded the motion which was unanimously approved by voice vote.

Notice of Intended Regulatory Action (NOIRA): Amendments to Certified Lead Contractors Notification, Lead Project Permits and Permit Fees, 16VAC25-35

Mr. Graham requested the Board to authorize the Department to initiate the full Virginia Administrative Process Act (APA) regulatory process to amend the Regulation Concerning Certified Lead Contractors Notification, Lead Project Permits and Permit Fees, 16VAC25-35, by filing a Notice of Intended Regulatory Action (NOIRA), pursuant to §2.2-4007.01.

Mr. Graham explained that the Department of Labor and Industry (DOLI) is seeking to remove the \$2,000 minimum contract price provision for lead contractors to be required to file a lead project notification with the Department, as provided in Paragraph A. of 16VAC25-35-30. This change would require that licensed lead contractors submit written notifications for *all* lead projects, as defined in 16VAC25-35-10, regardless of the contract price for the lead project. He added that the Environmental Protection Agency (EPA) has no price amount stipulated when the notification is required and DOLI wants to be in compliance with the EPA's requirements.

He informed the Board that the purpose of this intended regulatory action is to provide both increased protection to employees and employers performing lead-based paint abatement projects.

Mr. Graham stated that this proposed revision will not have a significant impact on Virginia employers since the lead abatement projects are being performed in residential dwellings, and DOLI does not charge a fee for lead projects in residential dwellings. At most, there may be additional paperwork on the employer's behalf. He added that DOLI has modified its forms to make the process easier. He stated that he did not believe that Virginia employees would be substantially impacted by the proposed regulatory changes. He added that employee protections could be enhanced in that DOLI would have perhaps more facilities that it would actually inspect to insure employee protection as well as the protection for the general public. Other than changes made to Department forms, no significant impact on the Department is anticipated.

In conclusion, Mr. Graham recommended that the Board direct the Department to initiate the full Virginia Administrative Process (APA) by filing a Notice of Intended Regulatory Action (NOIRA) to amend the Regulation Concerning Certified Lead Contactors Notification, Lead Project Permits and Permit Fees, 16VAC25-35, pursuant §2.3-4007.01.

Mr. Stiff moved to accept Mr. Graham's recommendation. Mr. Michael Pischke properly seconded the motion which was unanimously approved by voice vote.

Administrative Regulation for the Virginia Occupational Safety and Health (VOSH) Program, 16VAC25-60, et seq.

Mr. Crisanti requested the Board to authorize the Department to amend Paragraph B.2. of §190, General Provisions, of the Administrative Regulation for the VOSH Program, 16VAC25-60, *et seq.*, to delete the old address of the Virginia Department of Labor and Industry and to insert the new address.

Mr. Crisanti informed the Board that on April 2, 2012, the Virginia Department of Labor and Industry moved its headquarters from 13 South Thirteenth Street, Richmond, Virginia to Main Street Centre, 600 East Main Street, Suite 207, Richmond, Virginia 23219-2430. The reference to the old address is being replaced with the new address. He stated that the Department wanted to take a formal action since the old address actually appears in the regulation.

Mr. Crisanti concluded by recommending that the Board adopt this correcting amendment to Paragraph B.2. of §190, General Provisions, of the Administrative Regulation for the Virginia Occupational Safety and Health (VOSH) Program, 16VAC25-60, *et seq.*, as authorized by §§40.1-22(5) and 2.2-4006.A.3, with an effective date of September 15, 2012.

Mr. Stiff moved to accept Mr. Crisanti's recommendation. Dr. Mundy properly seconded the motion which was unanimously approved by voice vote.

Notice of Periodic Review of Certain Existing Regulations

Ms. Reba O'Connor, Regulatory Coordinator for the Department of Labor and Industry, requested the Board's permission to proceed with the periodic review process of two of the Board's regulations: Public Participation Guidelines, 16VAC25-11, and the Regulation Concerning Licensed Asbestos Contractor Notification, Asbestos Project Permits, and Permit Fees, 16VAC25-20.

Ms. O'Connor explained that Gov. McDonnell's Executive Order 14 (2010) requires that existing regulations undergo a periodic review every four years, and the Department has identified two regulations for review in 2012: Public Participation Guidelines, 16VAC25-11, and the Regulation Concerning Licensed Asbestos Contractor Notification, Asbestos Project Permits, and Permit Fees, 16VAC25-20. She informed the Board that, with the its approval, a notice of periodic review will be posted on the Regulatory Town Hall and published in the Virginia Register, which opens a 21-day public comment period. The Department staff will then review these regulations and make recommendations to the Board at the next meeting.

She concluded by requesting the Board's permission to proceed with the periodic review of these two regulations.

Dr. Mundy moved to accept Ms. O'Connor's recommendation. Mr. Stiff properly seconded the motion which was unanimously approved by voice vote.

Items of Interest from the Department of Labor and Industry

Courtney M. Malveaux, Esq., Commissioner of the Department of Labor and Industry, thanked the Board for volunteering their time for our efforts. He also thanked his staff for their dedication.

Commissioner Malveaux spoke about the new headquarters. He informed the Board that the Department is on the second floor (upper lobby) and on the 17th floor. He then invited the Board members to visit headquarters.

He stated that the Department is continuing to undergo restructuring which will boost the efficiency of the Department, and especially VOSH in terms of workplace office safety. He continued by stating that one direction the Department is moving in is the expansion of the Voluntary Protection Program (VPP). Commissioner Malveaux stated that he, Bill Burge, and Jennifer Wester have been working on the expansion of VPP which has increased from one position to eight. He informed the Board that much more attention will be paid to employers or places of employment, expanding to places where the Department previously may not have been a presence. Commissioner Malveaux speculated about how to use the new VPP resources, and expressed his excitement about the opportunity provided by the new VPP resources.

Commissioner Malveaux stated that Virginia is the only state where the appeals process on Occupational Safety and Health is strictly within the judicial system. He explained that the

Department is seeking input on how Virginia Occupational Safety and Health can get an administrative judge-type legal process.

Mr. Stiff mentioned the importance of senior leadership in the Department in making sure that inspectors in the regions have the necessary technical backgrounds to have a beneficial impact on employers and employees.

Commissioner Malveaux stated that the Department is open to ideas, and we're always trying to "fine tune" how we do business. He explained that he has sought and will continue to seek input from organizations, such as the American Society of Safety Engineers (ASSE) and the Association of General Contractors (AGC). Additionally, the Department has invited various groups to speak at our internal bi-regional meetings or internal trainings.

Commissioner Malveaux then mentioned the VOSH conference which will be held in Roanoke this year.

Mr. Korpe asked that information on violations be shared throughout the state. Commissioner Malveaux responded that the Department would not be able to single-handedly make any changes in that regard because there is a statutory prohibition to prevent the Department from sharing that information. He stated that such information is generally releasable under the Freedom of Information Act (FOIA) once the citations have been issued and sent to the employer. Commissioner Malveaux added that, if there are ways to address that concern with the General Assembly, the Department can take a look at that with anyone who is interested in taking a look at that issue.

Mr. Crisanti added that, although individual cases may not be looked at, it would be possible to look at trends over time. Mr. Crisanti added that information about trends also can be obtained from organizations, such as NIOSH, OSHA, and the National Safety Council. Commissioner Malveaux added that these organizations mentioned have the resources to keep up with the changes in technology that impact everything from general industry to agriculture to construction.

Items of Interest from Members from the Board

There Board members had no items of interest to share.

Adjournment

There being no further business, Mr. Stiff made the motion to adjourn the meeting. Mr. Brooks properly seconded the motion which was carried unanimously by voice vote. The meeting adjourned at 11:04 a.m.



COMMONWEALTH of VIRGINIA

DEPARTMENT OF LABOR AND INDUSTRY

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VIRGINIA SAFETY AND HEALTH CODES BOARD

BRIEFING PACKAGE

FOR SEPTEMBER 12, 2012

PERIODIC REVIEW OF EXISTING REGULATIONS

I. Background and Process

Governor McDonnell's Executive Order 14 (2010), "Development and Review of Regulations Proposed by State Agencies," governs the Periodic Review or re-evaluation of existing regulations and the regulatory process to promulgate new regulations or amend current regulations.

At its meeting on May 24, 2012, the Department notified the Board that two regulations had been identified for Periodic Review. The review was to include a determination as to whether the regulations are necessary for the protection of public health, safety, and welfare, and whether they are clearly written and easily understandable. The Board approved the Department's request to publish a notice of periodic review in the VA Register.

The Virginia Regulatory Town Hall web site contains the citations for the federal/state authority for these regulations and a contact person for each regulation.

II. Current Status

The following regulations have been reviewed.

1. 16 VAC 25-11, Public Participation Guidelines

2. 16 VAC 25-20, Regulation Concerning Licensed Asbestos Contractor Notification, Asbestos Project Permits, and Permit Fees

Public Comment for these regulations began on August 13, 2012 and ended on September 3, 2012.

III. Review and Analysis

Pursuant to § 2.2-4007.1 E and F of the Code of Virginia, the Department is obligated to evaluate the economic impact of this regulation on small business. The following factors must be considered:

- (1) the continued need for the regulation;
- (2) the complexity of the regulation;
- (3) the extent to which the regulation overlaps, duplicates, or conflicts with federal or state law or regulation; and
- (4) the length of time since the regulation has been evaluated or the degree to which technology, economic conditions, or other factors have changed in the area affected by the regulation.

The discussion must also include the agency's determination as to whether the regulation should be amended, repealed, or retained consistent with the stated objectives of applicable law, to minimize the economic impact of regulations on small businesses.

16 VAC 25-11, Public Participation Guidelines

This regulation sets out procedures to be followed by the Board and the Department to ensure that the public and all parties interested in regulations adopted by the Board have a full and fair opportunity to participate at every stage. The required procedures are designed to involve the public in the formation of regulations, and to solicit public comments and suggestions. There is a continuing need for this regulation because it is mandated by the Administrative Process Act, Code of Virginia, §2.2-4007.02, which states that the Board will have Public Participation Guidelines and defines the policies that are to be included.

This regulation is not overly complex. It has no negative impact on the regulated community and does not overlap, duplicate, or conflict with federal or state law or regulation.

16 VAC 25-20 Regulation Concerning Licensed Asbestos Contractor Notification, Asbestos Project Permits, and Permit Fees

The purpose of this regulation is to establish the notification requirements for certain asbestos projects and provide for the payment of permit fees based on the size of the asbestos project. There is a continuing need for this regulation because it protects and promotes the safety and health of employees in places of employment.

This regulation is not overly complex. It has no negative impact on the regulated community and does not overlap, duplicate, or conflict with federal or state law or regulation.

IV. Recommendations

16 VAC 25-11, Public Participation Guidelines

This Periodic Review is the first evaluation of this regulation since it became effective in December of 2008. During that time, technology, economic conditions, and other factors have not changed significantly in the area affected by the regulation. Therefore, as a result of this Periodic Review, the Department recommends retention of the existing regulation in its current form. The Department also recommends that the Board state in any motion it may make in regard to this regulatory action that it will receive, consider and respond to petitions by any interested person at any time with respect to reconsideration or revision of these regulations or any other regulation which has been adopted in accordance with the applicable subsection of the Administrative Process Act.

16 VAC 25-20 Regulation Concerning Licensed Asbestos Contractor Notification, Asbestos Project Permits, and Permit Fees

This Periodic Review is the first evaluation of this regulation since it was amended in December of 2008. As a result of this Periodic Review, the Department recommends retention of the above existing regulation in its current form. The Department also recommends that the Board state in any motion it may make in regard to this regulatory action that it will receive, consider and respond to petitions by any interested person at any time with respect to reconsideration or revision of these regulations or any other regulation which has been adopted in accordance with the applicable subsection of the Administrative Process Act.

Contact Person:

Ms. Reba O'Connor
Regulatory Coordinator
804.371.2631
Reba.OConnor@doli.virginia.gov



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DEPARTMENT OF LABOR AND INDUSTRY

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VIRGINIA SAFETY AND HEALTH CODES BOARD

BRIEFING PACKAGE

FOR SEPTEMBER 12, 2012

Bloodborne Pathogens Standard, §1910.1030; Corrections and Technical Amendment

I. Action Requested.

The Virginia Occupational Safety and Health (VOSH) Program requests the Safety and Health Codes Board to consider for adoption federal OSHA's corrections and technical amendment to the final rule for the Bloodborne Pathogens Standard, as published in 77 FR 19933 on April 3, 2012.

The proposed effective date is January 1, 2013.

II. Summary of the Amendment.

Federal OSHA made a technical amendment to its Bloodborne Pathogens Standard by moving the paragraph on sharps injury log requirements from paragraph (i), entitled "Dates," to paragraph (h), entitled "Recordkeeping."

III. Basis, Purpose and Impact of the Amendment.

A. Basis.

On January 18, 2001, federal OSHA revised the Bloodborne Pathogens Standard, §1910.1030, to include requirements of the Needlestick Safety and Prevention Act, November 6, 2000 (Pub.L. 106-430). These revisions included adding a fifth subparagraph, entitled "Sharps injury log," to paragraph (h) of §1910.1030 (66 FR 5325). However, in the July 1, 2001, publication of the Code of Federal Regulations (CFR), subparagraph (5) was placed under paragraph (i) ("Date").

On June 11, 2001, the Safety and Health Codes Board adopted federal OSHA's revised final rule for Bloodborne Pathogens, §1910.1030, as it related to needlesticks and other sharps injuries, with an effective date of September 15, 2001.

B. Purpose.

These corrections and technical amendment have removed subparagraph (5) from paragraph (i) and relocated it to paragraph (h) ("Recordkeeping").

C. Impact on Employers.

No impact on employers is anticipated from the adoption of these corrections and technical amendments.

D. Impact on Employees.

No impact on employees is anticipated from the adoption of these corrections and technical amendments.

E. Impact on the Department of Labor and Industry.

No impact on the Department is anticipated from the adoption of these corrections and technical amendments.

Federal regulations 29 CFR 1953.23(a) and (b) require that Virginia, within six months of the occurrence of a federal program change, to adopt identical changes or promulgate equivalent changes which are at least as effective as the federal change. The Virginia Code reiterates this requirement in § 40.1-22(5). Adopting these revisions will allow Virginia to conform to the federal program change.

Contact Person:

Mr. Ron Graham
Director, Health Compliance
(804) 786-0574
Ron.Graham@doli.virginia.gov

**Bloodborne Pathogens Standard, §1910.1030;
Corrections and Technical Amendment**

As Adopted by the
Safety and Health Codes Board

Date: _____



VIRGINIA OCCUPATIONAL SAFETY AND HEALTH PROGRAM

VIRGINIA DEPARTMENT OF LABOR AND INDUSTRY

Effective Date: _____

16VAC25-90-1910.1030, Bloodborne Pathogens Standard, §1910.1030;

When the regulations, as set forth in the Corrections and Technical Amendment to the Final Rule for Bloodborne Pathogens, §1910.1030, are applied to the Commissioner of the Department of Labor and Industry and/or to Virginia employers, the following federal terms shall be considered to read as below:

Federal Terms

VOSH Equivalent

29 CFR

VOSH Standard

Assistant Secretary

Commissioner of Labor and
Industry

Agency

Department

April 3, 2012

January 1, 2013

(A) The type and brand of device involved in the incident,

(B) The department or work area where the exposure incident occurred, and

(C) An explanation of how the incident occurred.

(ii) The requirement to establish and maintain a sharps injury log shall apply to any employer who is required to maintain a log of occupational injuries and illnesses under 29 CFR part 1904.

(iii) The sharps injury log shall be maintained for the period required by 29 CFR 1904.33.

(i) *Dates*—(1) *Effective Date*. The standard shall become effective on March 6, 1992.

(2) The Exposure Control Plan required by paragraph (c) of this section shall be completed on or before May 5, 1992.

(3) Paragraphs (g)(2) Information and Training and (h) Recordkeeping of this section shall take effect on or before June 4, 1992.

(4) Paragraphs (d)(2) Engineering and Work Practice Controls, (d)(3) Personal Protective Equipment, (d)(4) Housekeeping, (e) HIV and HBV Research Laboratories and Production Facilities, (f) Hepatitis B Vaccination and Post-Exposure Evaluation and Follow-up, and (g)(1) Labels and Signs of this section, shall take effect July 6, 1992.

* * * * *

[FR Doc. 2012-7715 Filed 4-2-12; 8:45 am]

BILLING CODE 4510-26-P

PART 1910—OCCUPATIONAL SAFETY AND HEALTH STANDARDS

■ 2. In § 1910.1030, add paragraph (h)(5) and revise paragraph (i) to read as follows:

§ 1910.1030 Bloodborne pathogens.

* * * * *

(h) * * *

(5) *Sharps injury log*. (i) The employer shall establish and maintain a sharps injury log for the recording of percutaneous injuries from contaminated sharps. The information in the sharps injury log shall be recorded and maintained in such manner as to protect the confidentiality of the injured employee. The sharps injury log shall contain, at a minimum:



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DEPARTMENT OF LABOR AND INDUSTRY

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VIRGINIA SAFETY AND HEALTH CODES BOARD

BRIEFING PACKAGE

FOR SEPTEMBER 12, 2012

Rigging Equipment for Material Handling Construction Standard, §1926.251; Correction and Technical Amendment

I. Action Requested.

The Virginia Occupational Safety and Health (VOSH) Program requests the Safety and Health Codes Board to consider for adoption federal OSHA's Correction and Technical Amendment to the final rule for the Rigging Equipment for Material Handling Construction Standard, §1926.251, as published in 77 FR 23117 on April 18, 2012.

The proposed effective date is January 1, 2013.

II. Summary of the Revision.

Federal OSHA corrected its sling standard for construction titled "Rigging Equipment for Material Handling" by removing the rated capacity tables and making minor, non-substantive revisions to the regulatory text.

III. Basis, Purpose and Impact of the Revision.

A. Basis.

In the final rule for OSHA's Standards Improvement Project—Phase III (June 8, 2011), OSHA stated that it was amending its standards regulating slings for general industry, shipyard employment, and construction by removing outdated tables that specify safe working loads, and revising other provisions that referenced the outdated tables. In replacing these tables, OSHA added requirements that prohibit employers from loading slings in excess of the recommended safe working load prescribed on identification markings located on, or attached to, each sling; these requirements also prohibit the use of slings that do not have such markings.

Although OSHA removed the load-capacity tables for slings from §1910.184 (General Industry; tables N-184-1, and N-184-3 through N-184-22) and §1915.118 (Shipyard Employment; tables G-1 through G-5 G-7 through G-8, and G-10), including references to these tables in §1915.112 and §1915.113, OSHA failed to include in the regulatory text provisions to remove the tables in §1926.251 (Construction; tables H-1, and H-3 through H-19), and redesignate Table H-2 to H-1 and Table H-20 to H-2. In this action, OSHA amends §1926.251 by removing most of the existing tables (H-1, and H-3 through H-19), redesignating Table H-2 as Table H-1 and Table H-20 as Table H-2, and revising paragraphs (b)(5) and (c)(5) to indicate the new table number.

B. Purpose.

The purpose of this revision is to remove outdated tables that specify safe working loads and to revise other provisions that referenced the outdated tables.

C. Impact on Employers.

No impact on employers is anticipated from the adoption of these corrections and technical amendments.

D. Impact on Employees.

No impact on employees is anticipated from the adoption of these corrections and technical amendments.

E. Impact on the Department of Labor and Industry.

No impact on the Department is anticipated from the adoption of these corrections and technical amendments.

Federal regulations 29 CFR 1953.23(a) and (b) require that Virginia, within six months of the occurrence of a federal program change, to adopt identical changes or promulgate equivalent changes which are at least as effective as the federal change. The Virginia Code reiterates this requirement in § 40.1-22(5). Adopting these revisions will allow Virginia to conform to the federal program change.

Contact Person

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RECOMMENDED ACTION

Staff of the Department of Labor and Industry recommends that the Safety and Health Codes Board adopt the correction and technical amendment to the final rule for Rigging Equipment for Material Handling Construction Standard, § 1926.251, as authorized by Virginia Code §§ 40.1-22(5) and 2.2-4006.A.4(c), with an effective date of January 1, 2013.

The Department also recommends that the Board state in any motion it may make to amend this regulation that it will receive, consider and respond to petitions by any interested person at any time with respect to reconsideration or revision of this or any other regulation which has been adopted in accordance with the above-cited subsection A.4(c) of the Administrative Process Act.

**Rigging Equipment for Material Handling Construction Standard, §1926.251;
Correction and Technical Amendment**

As Adopted by the
Safety and Health Codes Board

Date: _____



VIRGINIA OCCUPATIONAL SAFETY AND HEALTH PROGRAM

VIRGINIA DEPARTMENT OF LABOR AND INDUSTRY

Effective Date: _____

16VAC25-175-1926.251, Rigging Equipment for Material Handling

When the regulations, as set forth in the correction and technical amendment to the Final Rule for Rigging Equipment for Material Handling Construction Standard, §1926.251, are applied to the Commissioner of the Department of Labor and Industry and/or to Virginia employers, the following federal terms shall be considered to read as below:

<u>Federal Terms</u>	<u>VOSH Equivalent</u>
29 CFR	VOSH Standard
Assistant Secretary	Commissioner of Labor and Industry
Agency	Department
April 18, 2012	January 1, 2013

- c. Remove Tables H-1 and H-3 through H-19; and
- d. Redesignate Table H-2 as Table H-1 and Table H-20 as Table H-2.

The revisions read as follows:

§ 1926.251 Rigging equipment for material handling.

* * * * *

(b) * * *

(5) Whenever wear at any point of any chain link exceeds that shown in Table H-1, the assembly shall be removed from service.

* * * * *

(c) * * *

(5) When U-bolt wire rope clips are used to form eyes, Table H-2 shall be used to determine the number and spacing of clips.

* * * * *

[FR Doc. 2012-8881 Filed 4-17-12; 8:45 am]

BILLING CODE 4510-26-P

Accordingly, OSHA is amending 29 CFR part 1926 by making the following corrections and technical amendments:

**PART 1926—SAFETY AND HEALTH
REGULATIONS FOR CONSTRUCTION**

**Subpart H—Materials Handling,
Storage, Use, and Disposal**

- 2. Amend § 1926.251 as follows:
 - a. Revise paragraph (b)(5) and (c)(5) introductory text;
 - b. Add a reserved paragraph (c)(5)(ii);



COMMONWEALTH of VIRGINIA

DEPARTMENT OF LABOR AND INDUSTRY

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VIRGINIA SAFETY AND HEALTH CODES BOARD

BRIEFING PACKAGE

For September 12, 2012

Corrections and Technical Amendments to Multiple Standards

I. Action Requested.

The Virginia Occupational Safety and Health (VOSH) Program requests the Safety and Health Codes Board to consider for adoption federal OSHA's Corrections and Technical Amendments, as published in 77 FR 42988 on July 23, 2012 to the final rules:

- Respiratory Protection, §1910.134;
- Mechanical Power Presses, 1910.217; and
- (Non-Mandatory) Appendix A to Subpart L of Part 1926, Scaffold Specifications

The proposed effective date is January 1, 2013.

II. Summary of the Revisions.

Federal OSHA has corrected the medical evaluation questionnaire in Appendix C of its Respiratory Protection Standard, §1910.134, by removing the term "fits" in a question. Also, it has corrected its Mechanical Power Presses Standard for General Industry, §1910.217, by restoring requirements that were removed inadvertently from the regulatory text. The third revision is to Subpart L of its Scaffold Standards for Construction, Part 1926 to correct a cross reference made in two paragraphs in Appendix A.

III. Basis, Purpose and Impact of the Revisions.

A. Basis.

1. ***Appendix C (Mandatory) to §1910.134 (Respiratory Protection)***

In the Standards Improvement Project—Phase III (SIP III) final rule, published on June 8, 2011 (76 FR 33590), federal OSHA revised Question 2.a in the OSHA Respirator Medical Evaluation Questionnaire, Appendix C, Part A, Section 2, of its Respiratory Protection Standard, §1910.134, by deleting the word “fits,” leaving only the word “seizures” to describe the applicable medical condition. Subsequent to the publication of the SIP-III final rule, OSHA found an additional use of the term “fits” in Appendix C of §1910.134: namely, question 7.d. On October 13, 2011, the Safety and Health Codes Board adopted federal OSHA’s final rule for the Standards Improvement Project – Phase III (SIP-III), with an effective date of January 15, 2012. In this current action, federal OSHA removed the term “fits” from Question 7.d.

Additionally, when federal OSHA promulgated the revised Respiratory Protection Standard on January 8, 1998 (63 FR 1152), the introductory language of Appendix C included the following question to the employee: “Can you read (circle one): Yes/No.” Because this question is illogical (i.e., employees who cannot read cannot respond validly to the question), federal OSHA removed this question from Appendix C of §1910.134 in this current action.

On February 9, 1998, the Safety and Health Codes Board adopted the Respiratory Protection Standard, §1910.134, and other related standards in Parts 1910 and 1926, with an effective date of June 1, 1998.

2. ***Mechanical Power Presses (§1910.217)***

On December 27, 2011, federal OSHA published a *Federal Register* notice making corrections and technical amendments to 16 OSHA standards. On May 24, 2012, the Safety and Health Codes Board adopted federal OSHA’s technical amendments and corrections to these 16 different General Industry, Construction and Shipyard Employment Standards, with an effective date of September 1, 2012. Included were changes to the Mechanical Power Presses Standard for General Industry (76 FR 80735). Paragraph (g)(1) requires that employers submit reports of employees injured while operating power presses to OSHA or, for state-plan states, the state agency administering the plan.

The requirements in paragraph (g)(1), specifying what information to include in the report, however, were missing from the subsequent Code of Federal Regulations generated by the Office of the Federal Register. This action would restore these missing requirements.

3. ***Appendix A (Non-mandatory) to 29 CFR 1926, Subpart L (Scaffolds)***

On August 30, 1996, federal OSHA published the Scaffold standard for construction at 29 CFR 1926, subpart L (61 FR 46026). Paragraphs (z)(3) and (z)(5) in Appendix A of that standard, which address tank builders’ scaffolds, incorrectly refer to the guardrail requirements §1926.451(e)(4). The requirements at §1926.451(e)(4) contain provisions for stair towers, which

are not applicable to tank building scaffolds. The reference cited in paragraphs (z)(3) and (z)(5) should be to paragraph §1926.451(g)(4), which addresses guardrail systems for tank building scaffolds. Federal OSHA has revised paragraphs (z)(3) and (z)(5) of Appendix A to refer to §1926.451(g)(4) instead of §1926.451(e)(4).

B. Purpose.

Federal OSHA is making revisions to correct both errors and publishing oversights by the *Federal Register* in its standards.

C. Impact on Employers.

No impact on employers is anticipated from the adoption of these corrections and technical amendments.

D. Impact on Employees.

No impact on employees is anticipated from the adoption of these corrections and technical amendments.

E. Impact on the Department of Labor and Industry.

No impact on the Department is anticipated from the adoption of these corrections and technical amendments.

Federal regulations 29 CFR 1953.23(a) and (b) require that Virginia, within six months of the occurrence of a federal program change, to adopt identical changes or promulgate equivalent changes which are at least as effective as the federal change. The Virginia Code reiterates this requirement in § 40.1-22(5). Adopting these revisions will allow Virginia to conform to the federal program change.

RECOMMENDED ACTION

Staff of the Department of Labor and Industry recommends that the Safety and Health Codes Board adopt the Corrections and Technical Amendments to the following final rules: Respiratory Protection, §1910.134; Mechanical Power Presses, §1910.217; and (Non-Mandatory) Appendix A to Subpart L of Part 1926, Scaffold Specifications, as authorized by Virginia Code §§ 40.1-22(5) and 2.2-4006.A.4(c), with an effective date of January 1, 2013.

The Department also recommends that the Board state in any motion it may make to amend this regulation that it will receive, consider and respond to petitions by any interested person at any time with respect to reconsideration or revision of this or any other regulation which has been adopted in accordance with the above-cited subsection A.4(c) of the Administrative Process Act.

**Corrections and Technical Amendments
to Multiple Standards**

As Adopted by the
Safety and Health Codes Board

Date: _____



VIRGINIA OCCUPATIONAL SAFETY AND HEALTH PROGRAM

VIRGINIA DEPARTMENT OF LABOR AND INDUSTRY

Effective Date: _____

16VAC25-90-1910.134, Respiratory Protection, §1910.134;
16VAC25-90-1910.217, Mechanical Power Presses, §1910.217; and
16VAC25-175-1926 (Non-Mandatory) Appendix A to Subpart L of Part 1926—Scaffold Specifications

When the regulations, as set forth in the Corrections and Technical Amendments to the final rules for: Respiratory Protection, §1910.134; Mechanical Power Presses, §1910.217; and (Non-Mandatory) Appendix A to Subpart L of Part 1926—Scaffold Specifications, are applied to the Commissioner of the Department of Labor and Industry and/or to Virginia employers, the following federal terms shall be considered to read as below:

Federal Terms

VOSH Equivalent

29 CFR

VOSH Standard

Assistant Secretary

Commissioner of Labor and
Industry

Agency

Department

August 7, 2012

January 1, 2013

d. Seizures: Yes/No

* * * * *

Subpart O—[AMENDED]

- 4. Amend § 1910.217 by revising paragraph (g) to read as follows:

§ 1910.217 Mechanical power presses.

* * * * *

(g) *Reports of injuries to employees operating mechanical power presses.* (1) The employer shall report, within 30 days of the occurrence, all point-of-operation injuries to operators or other employees to either the Director of the Directorate of Standards and Guidance at OSHA, U.S. Department of Labor, Washington, DC 20210 or electronically at <http://www.osha.gov/pls/oshaweb/mechanical.html>; or to the State Agency administering a plan approved by the Assistant Secretary of Labor for Occupational Safety and Health.

(2) The report shall include the following information:

(i) Employer's name, address and location of the workplace (establishment).

(ii) Employee's name, injury sustained, and the task being performed (operation, set-up, maintenance, or other).

(iii) Type of clutch used on the press (full revolution, part revolution, or direct drive).

(iv) Type of safeguard(s) being used (two hand control, two hand trip, pullouts, sweeps, or other). If the safeguard is not described in this section, give a complete description.

(v) Cause of the accident (repeat of press, safeguard failure, removing stuck part or scrap, no safeguard provided, no safeguard in use, or other).

(vi) Type of feeding (manual with hands in dies or with hands out of dies, semiautomatic, automatic, or other).

(vii) Means used to actuate press stroke (foot trip, foot control, hand trip, hand control, or other).

(viii) Number of operators required for the operation and the number of operators provided with controls and safeguards.

* * * * *

PART 1910—OCCUPATIONAL SAFETY AND HEALTH STANDARDS**Subpart I—[Amended]**

- 2. In § 1910.134:

■ a. In the introductory text of Appendix C to § 1910.134, remove "Can you read (circle one): Yes/No".

■ b. Revise question 7.d. in Part A, Section 2 (Mandatory) of Appendix C, to read as follows:

§ 1910.134 Respiratory protection.

* * * * *

Appendix C to § 1910.134: * * *

* * * * *

Part A. Section 2. * * *

7. * * *

**PART 1926—SAFETY AND HEALTH
REGULATIONS FOR CONSTRUCTION****Subpart L—[AMENDED]**

■ 6. Revise paragraphs (z)(3) and (z)(5) of Appendix A to subpart L to read as follows:

* * * * *

**(Non-Mandatory) Appendix A to
Subpart L of Part 1926—Scaffold
Specifications.**

* * * * *

(z) * * *

(3) A taut wire or synthetic rope supported on the scaffold brackets shall be installed at the scaffold plank level between the innermost edge of the scaffold platform and the curved plate structure of the tank shell to serve as a safety line in lieu of an inner guardrail assembly where the space between the scaffold platform and the tank exceeds 12 inches (30.48 cm). In the event the open space on either side of the rope exceeds 12 inches (30.48 cm), a second wire or synthetic rope appropriately placed, or guardrails in accordance with § 1926.451(g)(4), shall be installed in order to reduce that open space to less than 12 inches (30.48 cm).

* * * * *

(5) Guardrails shall be constructed of a taut wire or synthetic rope, and shall be supported by angle irons attached to brackets welded to the steel plates. These guardrails shall comply with § 1926.451(g)(4). Guardrail supports shall be located at no greater than 10 feet 6 inch intervals.

* * * * *

[FR Doc. 2012-19077 Filed 8-6-12; 8:45 am]

BILLING CODE 4510-26-P



COMMONWEALTH of VIRGINIA

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VIRGINIA SAFETY AND HEALTH CODES BOARD

BRIEFING PACKAGE

FOR SEPTEMBER 12, 2012

Updating OSHA Standards Based on National Consensus Standards for Head Protection; Direct Final Rule for Multiple Standards; and Correction to Direct Final Rule

I. Action Requested.

The Virginia Occupational Safety and Health (VOSH) Program requests the Safety and Health Codes Board to consider for adoption federal OSHA's Updating OSHA Standards Based on the National Consensus Standards for Head Protection affecting Multiple Standards, as published on June 22, 2012 in 77 FR 37587; and the Correction to the Direct Final Rule, as published in 77 FR 42988 on July 23, 2012. The following standards on head protection are affected by this Direct Final Rule:

- General Industry, §1910.135;
- Shipyard Employment, §1915.155;
- Longshoring, §1917.93;
- Marine Terminals, §1918.103; and
- Construction, §1926.100

The proposed effective date is January 1, 2013.

II. Summary of the Direct Final Rule.

On June 22, 2012, federal OSHA issued this Direct Final Rule to revise the personal protective equipment (PPE) sections of its General Industry, Shipyard Employment, Longshoring, and Marine Terminals standards regarding requirements for head protection, along with an identical proposed rule [77 FR 37617]. OSHA updated the references in §§1910.135(b)(1), 1915.155(b)(1), 1917.93(b)(1), 1918.103(b)(1) to recognize the 2009 edition of the American National Standard for Industrial Head Protection (ANSI Z89.1). The provisions in the 2009 edition permit optional testing for helmet worn in the backwards position (“reverse wearing”), optional testing for helmets at colder temperatures than provided in previous editions, and optional testing for the high-visibility coloring of helmets.

Additionally, changes in the 2009 edition include: (1) removing the definition of “cap” and “hat” and inserts the definitions of “manufacturer” and “test plaque” in the 2009 edition; (2) permitting the testing facility to determine an appropriate size of the headform if the manufacturer did not specify the size; (3) requiring orientation of test samples in the normal wearing position when conducting various test procedures; and (4) removing vertical guard rails from the lists of necessary components for specified test equipment.

The 2009 revision to the General Industry and Maritime Industry personal protective equipment standards, however, did not address the construction standards requiring personal protective equipment. Therefore, the construction standards at §1926.100 (b) and (c) still required compliance with the older ANSI Z89.1-1969 and ANSI Z89.2-1971, respectively.

To bring the construction standard up-to-date and to ensure consistency across all of its standards, federal OSHA amended §1926.100 to permit compliance with ANSI Z89.1-1969 and ANSI Z89.2-1971, which set forth requirements regarding different types of helmets now addressed in Z89.1, and replaced these outdated head protection references with the same three most recent editions of ANSI Z89.1, referenced in the general industry and maritime industry standards: ANSI Z89.1-1997, ANSI Z89.1-2003, or ANSI Z89.1-2009.

The 2009 edition defines Type I and Type II helmets by the area of the head to which the helmets afford protection, rather than by whether the helmets have a brim. It also renames the classes of helmets tested for protection against electrical hazards (i.e., classes G, E, and C instead of A, B, and C), although it still bases helmet classification on the capacity of the helmet to protect employees from electrical hazards. In addition, the 2009 edition of ANSI Z89.1 eliminates a fourth class of helmets used in fire fighting. Many requirements included in the 1969 and 1971 editions, such as requirements specifying the type of material manufacturers must use when making different components and specifications regarding helmet accessories, have been eliminated in the 2009 edition. Most importantly, ANSI revised the performance requirements and test methods. The 2009 edition includes fundamental updates such as more and different types of test methods, and the use of different equipment for performing these test methods.

Additionally, federal OSHA corrected instruction number 16 of the Direct Final Rule (77 FR 37600) with respect to the Construction Industry head protection standards to eliminate

confusion resulting from a drafting error in §1926.100. The original instruction number 16 stated that §1926.100 was amended by adding paragraph (b)(1) through (b)(3) and removed paragraph (c). The corrected instruction number 16 states that §1926.100 was amended by removing paragraph (c) and revising paragraph (b).

III. Use of Direct Final Rulemaking.

In using direct final rulemaking, OSHA, like other federal agencies, will publish a direct final rule (DFR) in the Federal Register with a statement that the rule will go into effect unless significant adverse comment is received within a specified period of time. An identical proposed rule is often published at the same time.

If a significant adverse comment is received, the federal agency withdraws the direct final rule and treats such comment as a response to the proposed rule. Direct final rulemaking is typically used where OSHA anticipates that a rule will not be controversial, e.g., minor substantive changes to regulations, direct incorporations of mandates from new legislation, and in this case, minor changes to regulations resulting from a judicial remand.

Since federal OSHA received no significant adverse comments to the Direct Final Rule by the July 23, 2012 deadline, this revision becomes effective in federal OSHA jurisdictions on September 20, 2012.

IV. Basis, Purpose and History.

A. Basis.

Over the last several years, federal OSHA has undertaken a series of projects to update its standards to incorporate the latest versions of national consensus and industry standards. These projects include updating or removing national consensus and industry standards referenced in existing federal OSHA standards, updating regulatory text of standards adopted directly by OSHA from the language of outdated consensus standards and, when appropriate, replacing specific references to outdated national consensus and industry standards with performance-oriented requirements.

B. History.

Subpart I of OSHA's general industry standards contains design requirements for head protection. OSHA has similar requirements in Subpart I of Part 1915 (Shipyard Employment), Subpart E of Part 1917 (Marine Terminals), Subpart J of part 1918 (Longshoring), and Subpart E of Part 1926 (Construction Standards). The General Industry and Maritime rules require that the specified head protection comply with national consensus standards incorporated by reference into the OSHA standards unless the employer demonstrates that non-specified head-protection equipment is at least as effective in protecting workers as equipment that complies with the incorporated

national consensus standard. These design provisions are part of comprehensive requirements to ensure that employees use personal protective equipment that will protect them from hazards in the workplace.

On September 9, 2009, OSHA published the final rule, which became effective on October 9, 2009 (74 FR 46350). These revised standards permitted compliance with ANSI Z89.1-2003, ANSI Z89.1-1997, or ANSI Z89.1-1986. On January 14, 2010, the Safety and Health Codes Board adopted this revised final rule, with an effective date of April 15, 2010.

Subsequent to this action by OSHA and the Board, the latest version of ANSI Z89.1-2009 then became available. This rulemaking updates the references to head protection to recognize the most recent edition, ANSI Z89.1-2009.

C. Purpose.

This Direct Final Rule (DFR) updates the references in OSHA's standards to recognize the 2009 edition of the American National Standard for Industrial (ANSI) Z89.1, Head Protection, and deletes the outdated 1986 edition of that national consensus standard.

V. Impact of the Proposed Changes.

A. Impact on Employers.

Under the DFR, OSHA believes that employers will be able to continue to use the same equipment they are using currently to meet their compliance obligation under the existing standards' design-criteria requirements. The DFR will eliminate confusion and clarify employer obligations, while providing up-to-date protection for workers exposed to falling objects. This DFR does not require an employer to update or replace its head protection solely as a result of this rule if the head protection currently in use meets the revised standards. This DFR also provides employers with additional options for meeting the design-criteria requirements for head protection – options most employers are already using.

B. Impact on Employees.

OSHA believes that these revisions will make the requirements of its Head Protection Standards consistent with current industry practices and will enhance employee protection.

C. Impact on the Department of Labor and Industry.

If the DFR is adopted, there is no impact anticipated on the Department. The DFR will make the requirements of OSHA's head protection standards consistent with the OSHA's other standards and with current industry practices, thereby eliminating confusion and

clarifying employer obligations.

Federal regulations 29 CFR 1953.23(a) and (b) require that Virginia, within six months of the occurrence of a federal program change, to adopt identical changes or promulgate equivalent changes which are at least as effective as the federal change. The Virginia Code reiterates this requirement in § 40.1-22(5). Adopting these revisions will allow Virginia to conform to the federal program change.

D. Benefit/Cost.

This Direct Final Rule eliminates references to outdated National Consensus Standards and replaces them with the latest available standards. It does not impose any additional costs on any private or public sector entity.

Contact Person:

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RECOMMENDED ACTION

Staff of the Department of Labor and Industry recommends that the Safety and Health Codes Board adopt the Direct Final Rule Updating OSHA Standards Based on National Consensus Standards for Head Protection affecting Multiple Standards; and the Correction to the Direct Final Rule, as authorized by Virginia Code §§ 40.1-22(5) and 2.2-4006.A.4(c), with an effective date of January 1, 2013.

The Department also recommends that the Board state in any motion it may make to amend this regulation that it will receive, consider and respond to petitions by any interested person at any time with respect to reconsideration or revision of this or any other regulation which has been adopted in accordance with the above-cited subsection A.4(c) of the Administrative Process Act.

**Updating OSHA Standards Based on National Consensus Standards for Head Protection;
Direct Final Rule for Multiple Standards; and
Correction to Direct Final Rule**

As Adopted by the
Safety and Health Codes Board

Date: _____



VIRGINIA OCCUPATIONAL SAFETY AND HEALTH PROGRAM

VIRGINIA DEPARTMENT OF LABOR AND INDUSTRY

Effective Date: _____

16VAC25-90-1910.135, Head Protection, §1910.135 (General Industry);
16VAC25-100-1915.155, Head Protection, §1915.155 (Shipyard Employment);
16VAC25-120-1917.93, Head Protection, §1917.93 (Marine Terminals);
16VAC25-130-1918.103, Head Protection, §1918.103 (Longshoring); and
16VAC25-175-1926.100, Head Protection, §1926.100 (Construction)

When the regulations, as set forth in the Update of OSHA Standards Based on the National Consensus Standards for Head Protection; Direct Final Rule for Multiple Standards; and Correction to Direct Final Rule, are applied to the Commissioner of the Department of Labor and Industry and/or to Virginia employers, the following federal terms shall be considered to read as below:

Federal Terms

VOSH Equivalent

29 CFR

VOSH Standard

Assistant Secretary

Commissioner of Labor and
Industry

Agency

Department

September 20, 2012

January 1, 2013

Amendments to Standards

For the reasons stated above in the preamble, the Occupational Safety and Health Administration is amending 29 CFR parts 1910, 1915, 1917, 1918, and 1926 as follows:

PART 1910—[AMENDED]**Subpart A—[Amended]**

- 3. Amend § 1910.135 by revising paragraph (b)(1) to read as follows:

§ 1910.135 Head protection.

* * * * *

(b) *Criteria for head protection.* (1) Head protection must comply with any of the following consensus standards:

(i) American National Standards Institute (ANSI) Z89.1–2009, “American National Standard for Industrial Head Protection,” incorporated by reference in § 1910.6;

(ii) American National Standards Institute (ANSI) Z89.1–2003, “American National Standard for Industrial Head Protection,” incorporated by reference in § 1910.6; or

(iii) American National Standards Institute (ANSI) Z89.1–1997, “American National Standard for Personnel Protection—Protective Headwear for Industrial Workers—Requirements,” incorporated by reference in § 1910.6.

* * * * *

PART 1915—[AMENDED]

(iii) American National Standards Institute (ANSI) Z89.1–1997, “American National Standard for Personnel Protection—Protective Headwear for Industrial Workers—Requirements,” incorporated by reference in § 1917.3.

* * * * *

PART 1918—[AMENDED]

■ 6. Amend § 1915.155 by revising paragraph (b)(1) to read as follows:

§ 1915.155 Head protection.

* * * * *

(b) *Criteria for protective helmets.* (1) Head protection must comply with any of the following consensus standards:

(i) American National Standards Institute (ANSI) Z89.1–2009, “American National Standard for Industrial Head Protection,” incorporated by reference in § 1915.5;

(ii) American National Standards Institute (ANSI) Z89.1–2003, “American National Standard for Industrial Head Protection,” incorporated by reference in § 1915.5; or

(iii) American National Standards Institute (ANSI) Z89.1–1997, “American National Standard for Personnel Protection—Protective Headwear for Industrial Workers—Requirements,” incorporated by reference in § 1915.5.

* * * * *

PART 1917—[AMENDED]

Subpart E—[Amended]

■ 9. Amend § 1917.93 by revising paragraph (b)(1) to read as follows:

§ 1917.93 Head protection.

* * * * *

(b)(1) The employer must ensure that head protection complies with any of the following consensus standards:

(i) American National Standards Institute (ANSI) Z89.1–2009, “American National Standard for Industrial Head Protection,” incorporated by reference in § 1917.3;

(ii) American National Standards Institute (ANSI) Z89.1–2003, “American National Standard for Industrial Head Protection,” incorporated by reference in § 1917.3; or

703-525-1695; fax: 703-528-2148; Web
site: www.safetysupply.com.

* * * * *

Subpart J—[Amended]

■ 12. Amend § 1918.103 by revising paragraph (b)(1) to read as follows:

§ 1918.103 Head protection.

* * * * *

(b)(1) The employer must ensure that head protection complies with any of the following consensus standards:

(i) American National Standards Institute (ANSI) Z89.1-2009, "American National Standard for Industrial Head Protection," incorporated by reference in § 1918.3;

(ii) American National Standards Institute (ANSI) Z89.1-2003, "American National Standard for Industrial Head Protection," incorporated by reference in § 1918.3; or

(iii) American National Standards Institute (ANSI) Z89.1-1997, "American National Standard for Personnel Protection—Protective Headwear for Industrial Workers—Requirements," incorporated by reference in § 1918.3.

* * * * *

PART 1926—[AMENDED]

Subpart E—[Amended]

■ 16. Amend § 1926.100 as follows:

■ a. Add paragraphs (b)(1) through (b)(3).

■ b. Remove paragraph (c).

§ 1926.100 Head protection.

* * * * *

(b) * * *
(1) The employer must provide each employee with head protection that meets the specifications contained in any of the following consensus standards:

(i) American National Standards Institute (ANSI) Z89.1-2009, "American National Standard for Industrial Head Protection," incorporated by reference in § 1926.6;

(ii) American National Standards Institute (ANSI) Z89.1-2003, "American National Standard for Industrial Head Protection," incorporated by reference in § 1926.6; or

(iii) American National Standards Institute (ANSI) Z89.1-1997, "American National Standard for Personnel Protection—Protective Headwear for Industrial Workers—Requirements," incorporated by reference in § 1926.6.

(2) The employer must ensure that the head protection provided for each employee exposed to high-voltage electric shock and burns also meets the specifications contained in Section 9.7

("Electrical Insulation") of any of the consensus standards identified in paragraph (b)(1) of this section.

(3) OSHA will deem any head protection device that the employer demonstrates is at least as effective as a head protection device constructed in accordance with one of the consensus standards identified in paragraph (b)(1) of this section to be in compliance with the requirements of this section.

[FR Doc. 2012-15030 Filed 6-21-12; 8:45 am]

BILLING CODE 4510-26-P

DEPARTMENT OF LABOR

Occupational Safety and Health
Administration

29 CFR Part 1926

[Docket No. OSHA-2011-0184]

RIN 1218-AC65

Updating OSHA Construction
Standards Based on National
Consensus Standards; Head
Protection; Correction of Direct Final
Rule

AGENCY: Occupational Safety and Health
Administration (OSHA), Department of
Labor.

ACTION: Direct final rule; correction.

§ 1926.100 [Corrected]

On page 37600, correct instruction
number 16, to read as follows:

- 16. Amend § 1926.100 as follows:
- a. Remove paragraph (c).
- b. Revise paragraph (b) to read as
follows:

1926.100 Head protection.

* * * * *

(b) *Criteria for head protection.* (1)
The employer must provide each
employee with head protection that
meets the specifications contained in
any of the following consensus
standards:

(i) American National Standards
Institute (ANSI) Z89.1-2009, "American
National Standard for Industrial Head
Protection," incorporated by reference
in § 1926.6;

(ii) American National Standards
Institute (ANSI) Z89.1-2003, "American
National Standard for Industrial Head

Protection," incorporated by reference in § 1926.6; or

(iii) American National Standards Institute (ANSI) Z89.1-1997, "American National Standard for Personnel Protection—Protective Headwear for Industrial Workers—Requirements," incorporated by reference in § 1926.6.

(2) The employer must ensure that the head protection provided for each employee exposed to high-voltage electric shock and burns also meets the specifications contained in Section 9.7 ("Electrical Insulation") of any of the consensus standards identified in paragraph (b)(1) of this section.

(3) OSHA will deem any head protection device that the employer demonstrates is at least as effective as a head protection device constructed in accordance with one of the consensus standards identified in paragraph (b)(1) of this section to be in compliance with the requirements of this section.

Signed at Washington, DC, on July 17, 2012.

David Michaels,

Assistant Secretary of Labor for Occupational Safety and Health.

[FR Doc. 2012-17872 Filed 7-20-12; 8:45 am]

BILLING CODE P



COMMONWEALTH of VIRGINIA

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VIRGINIA SAFETY AND HEALTH CODES BOARD

BRIEFING PACKAGE

For September 12, 2012

Cranes and Derricks in Construction; Demolition and Underground Construction; Direct Final Rule

I. Action Requested.

The Virginia Occupational Safety and Health (VOSH) Program requests the Safety and Health Codes Board to consider for adoption federal OSHA's Direct Final Rule for Cranes and Derricks in Construction; Demolition and Underground Construction, as published in 77 FR 49722 on August 17, 2012.

The proposed effective date is for January 1, 2013.

II. Summary of the Direct Final Rule.

On August 17, 2012, federal OSHA issued a Direct Final Rule, along with a companion notice of proposed rulemaking [77 FR 49741], that applies the requirements of the August 2010 Final Rule for Cranes and Derricks in Construction to demolition work and underground construction.

This Direct Final Rule has applied the same crane rules to underground construction and demolition that were already being used by other construction sectors, and has streamlined

federal OSHA's standards by eliminating the separate Cranes and Derricks Standard currently used for underground and demolition work.

The Direct Final Rule also corrected several errors introduced in the 2010 rulemaking. To cover all construction work under Subpart CC, and to correct errors, federal OSHA has amended §§1926.856(c) and 1926.858(b) by replacing the requirements to comply with Subpart DD with requirements to comply with Subpart CC, and has amended §1926.858(b) by reinstating the requirement to comply with Subpart N as well.

Also, federal OSHA has amended §1926.800(t) to extend Subpart CC to underground construction, and to resolve the technical errors set forth in that section. Federal OSHA has amended the introductory paragraph of §1926.800(t) to restore the provision allowing employers to use cranes to hoist personnel for routine access to the underground worksites via a shaft without the need to show that conventional means of access are more hazardous or impossible for this purpose. This amendment excepts routine access of employees to an underground worksite via a shaft from the requirements of §1926.1431(a), requirements that are virtually identical to the requirements of §1926.550(g)(2). Federal OSHA has also restored §1926.800(t)(1) through (4). Also, OSHA has corrected three minor grammatical errors that appeared in the text of paragraphs §1926.800(t)(3)(vi), (t)(4)(iii), and (t)(4)(iv), as previously published in the Code of Federal Regulations.

III. Use of Direct Final Rulemaking.

In direct final rulemaking, OSHA, like other federal agencies, will publish a direct final rule (DFR) in the Federal Register with a statement that the rule will go into effect unless significant adverse comment is received within a specified period of time. An identical proposed rule was published at the same time [77 FR 49741].

If a significant adverse comment is received by September 17, 2012, then federal OSHA will withdraw the direct final rule and treat such comment as a response to the proposed rule. Direct final rulemaking is typically used where OSHA anticipates that a rule will not be controversial, e.g., minor substantive changes to regulations, direct incorporations of mandates from new legislation, and in this case, minor changes to regulations resulting from a judicial remand.

IV. Basis, Purpose and Impact of the Direct Final Rule.

A. Basis.

On August 9, 2010, federal OSHA issued new requirements for Cranes and Derricks in Construction under Subpart CC. For most construction work, the new Cranes and Derricks in Construction Standard replaced the prior cranes and derricks standard, §1926.550, which had been in place for over 40 years. For demolition and underground construction work, however, the protective requirements of §1926.550 were no longer

covered in federal OSHA's construction regulations. As a result, federal OSHA had to reestablish the substance of the demolition and underground construction provisions in a new Subpart DD, which was in the updated Cranes and Derricks in Construction Standard.

A second error was made, however. In the rulemaking process for the final rule for Cranes and Derricks in Construction, federal OSHA inadvertently deleted the requirements addressing material, personnel, overhead hoists, and elevators in demolition and underground construction work by requiring employers to follow the requirements of Subpart DD for demolition and underground construction work.

At its meeting on January 20, 2011, the Safety and Health Codes Board adopted the revised Final Rule for Cranes and Derricks in Construction, and other Related Standards, with an effective date of April 15, 2011.

B. Purpose.

The Direct Final Rule has accomplished two goals: (1) brought all crane and derrick use in construction work under new Subpart CC and (2) corrected errors in the final rule that substantively altered the demolition and underground construction provisions, and replace subparagraphs §1926.800(t)(1) through (4).

The Direct Final Rule applied the same crane rules to underground construction and demolition that already were being used by other construction sectors. Also, it streamlined federal OSHA's standards by eliminating the separate cranes and derricks standard currently used for underground and demolition work.

C. Impact on Employers.

The revisions clarify employer obligations by avoiding the confusion that would result if Subpart CC covers part of a project and existing Subpart DD covers another part of the project. As a result of the Direct Final Rule, employer compliance is anticipated to increase because all construction operations involving cranes and derricks are subject to a single rule rather than by having a few operations subject to a different rule.

This direct final rule also facilitates employer compliance because demolition and underground construction contractors will no longer be subject to the outdated requirements in prior §1926.550, which relied heavily on pre-1970 consensus standards.

D. Impact on Employees.

The direct final rule does not reduce the employee protections. Instead, it enhances employee safety by ensuring that the construction workers involved in demolition and underground construction receive the same safety protections from recently published Subpart CC as other construction workers.

Applying Subpart CC to demolition and underground construction will ensure that construction workers in those sectors receive the same safety protections from new Subpart CC as other construction workers.

E. Impact on the Department of Labor and Industry.

This Direct Final Rule corrects inadvertent errors made to the standards for Underground Construction and Demolition when OSHA issued the Final Rule for Cranes and Derricks, therefore, no additional impact on the Department is anticipated.

Federal regulations 29 CFR 1953.23(a) and (b) require that Virginia, within six months of the occurrence of a federal program change, to adopt identical changes or promulgate equivalent changes which are at least as effective as the federal change. The Virginia Code reiterates this requirement in § 40.1-22(5). Adopting these revisions will allow Virginia to conform to the federal program change.

F. Technological and Economic Feasibility

Federal OSHA determined that compliance with the requirements of the final standard is technologically feasible for all affected industries and that there are no technological constraints in complying with any of the requirements. Compliance with requirements, i.e., employers performing crane inspections, utilizing qualified or certified crane operators, etc., can be achieved with readily and widely available technologies. Some businesses in the affected industries already implement the requirements of the standard to varying degrees.

Federal OSHA has determined that the conclusions in the Final Economic Analysis (FEA) from the 2010 Cranes and Derricks Final Rule are valid for this Direct Final Rule. [77 FR 49725] The FEA for the final cranes standard, which included all cranes, crane operations, and industry sectors subject to this Direct Final Rule, found that the requirements of the rule were technologically and economically feasible.

Federal OSHA stated that this Direct Final Rule does not impose any costs on private-sector employers beyond those costs already taken into account in the 2010 Final Rule for Cranes and Derricks in Construction [75 FR 47906]. Federal OSHA reviewed the total costs of the final rule with the promulgation of the standard in 2010, therefore, no further review of those costs was deemed necessary. [77 FR 49728]

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RECOMMENDED ACTION

Staff of the Department of Labor and Industry recommends that the Safety and Health Codes Board adopt the Direct Final Rule for Cranes and Derricks in Construction: Demolition and Underground Construction, §§1926.856 and 1926.858, and 1926.800, respectively, as authorized by Virginia Code §§ 40.1-22(5) and 2.2-4006.A.4(c), with an effective date of January 1, 2013.

The Department also recommends that the Board state in any motion it may make to amend this regulation that it will receive, consider and respond to petitions by any interested person at any time with respect to reconsideration or revision of this or any other regulation which has been adopted in accordance with the above-cited subsection A.4(c) of the Administrative Process Act.

**Cranes and Derricks in Construction: Demolition and Underground Construction
§§1926.856, 1926.858, and 1926.800, respectively;
Direct Final Rule**

As Adopted by the
Safety and Health Codes Board

Date: _____



VIRGINIA OCCUPATIONAL SAFETY AND HEALTH PROGRAM

VIRGINIA DEPARTMENT OF LABOR AND INDUSTRY

Effective Date: _____

16VAC25-175-1926.856, Removal of Walls, Floors and Material with Equipment, §1926.856
16VAC25-175-1926.858, Removal of Steel Construction, §1926.858
16VAC25-175-1926.800, Underground Construction, §1926.800

When the regulations, as set forth in the Direct Final Rule for Cranes and Derricks in Construction: Demolition and Underground Construction, §§1926.856, 1926.858 and 1926.800, respectively, are applied to the Commissioner of the Department of Labor and Industry and/or to Virginia employers, the following federal terms shall be considered to read as below:

<u>Federal Terms</u>	<u>VOSH Equivalent</u>
29 CFR	VOSH Standard
Assistant Secretary	Commissioner of Labor and Industry
Agency	Department
November 15, 2012, unless federal OSHA receives a significant adverse comment to this direct final rule or the companion proposal by September 17, 2012	January 1, 2013

Amendments to Standards

For the reasons stated in the preamble of this direct final rule, OSHA is amending 29 CFR part 1926 as follows:

PART 1926—[AMENDED]

Subpart S—Underground Construction, Caissons, Cofferdams, and Compressed Air

- 1. Revise the authority citation for subpart S of 29 CFR part 1926 to read as follows:

Authority: 40 U.S.C. 3701; 29 U.S.C. 653, 655, 657; and Secretary of Labor's Orders 12-71 (36 FR 8754), 8-76 (41 FR 25059), 9-83 (48 FR 35736), 1-90 (55 FR 9033), 6-96 (62 FR 111), 5-2007 (72 FR 31159), or 1-2012 (77 FR 3912), as applicable.

- 2. Amend § 1926.800 by revising paragraph (t) to read as follows:

§ 1926.800 Underground construction.

* * * * *

(t) *Hoisting unique to underground construction.* Except as modified by this paragraph (t), employers must: Comply with the requirements of subpart CC of

this part, except that the limitation in § 1926.1431(a) does not apply to the routine access of employees to an underground worksite via a shaft; ensure that material hoists comply with § 1926.552(a) and (b) of this part; and ensure that personnel hoists comply with the personnel-hoists requirements of § 1926.552(a) and (c) of this part and the elevator requirements of § 1926.552(a) and (d) of this part.

(1) *General requirements for cranes and hoists.* (i) Materials, tools, and supplies being raised or lowered, whether within a cage or otherwise, shall be secured or stacked in a manner to prevent the load from shifting, snagging or falling into the shaft.

(ii) A warning light suitably located to warn employees at the shaft bottom and subsurface shaft entrances shall flash whenever a load is above the shaft bottom or subsurface entrances, or the load is being moved in the shaft. This paragraph does not apply to fully enclosed hoistways.

(iii) Whenever a hoistway is not fully enclosed and employees are at the shaft bottom, conveyances or equipment shall be stopped at least 15 feet (4.57 m) above the bottom of the shaft and held there until the signalman at the bottom of the shaft directs the operator to continue lowering the load, except that the load may be lowered without stopping if the load or conveyance is within full view of a bottom signalman who is in constant voice communication with the operator.

(iv)(A) Before maintenance, repairs, or other work is commenced in the shaft served by a cage, skip, or bucket, the operator and other employees in the area shall be informed and given suitable instructions.

(B) A sign warning that work is being done in the shaft shall be installed at the shaft collar, at the operator's station, and at each underground landing.

(v) Any connection between the hoisting rope and the cage or skip shall be compatible with the type of wire rope used for hoisting.

(vi) Spin-type connections, where used, shall be maintained in a clean condition and protected from foreign matter that could affect their operation.

(vii) Cage, skip, and load connections to the hoist rope shall be made so that the force of the hoist pull, vibration, misalignment, release of lift force, or impact will not disengage the connection. Moused or latched open-throat hooks do not meet this requirement.

(viii) When using wire rope wedge sockets, means shall be provided to prevent wedge escapement and to

ensure that the wedge is properly seated.

(2) *Additional requirements for cranes.* Cranes shall be equipped with a limit switch to prevent overtravel at the boom tip. Limit switches are to be used only to limit travel of loads when operational controls malfunction and shall not be used as a substitute for other operational controls.

(3) *Additional requirements for hoists.* (i) Hoists shall be designed so that the load hoist drum is powered in both directions of rotation, and so that brakes are automatically applied upon power release or failure.

(ii) Control levers shall be of the "deadman type" which return automatically to their center (neutral) position upon release.

(iii) When a hoist is used for both personnel hoisting and material hoisting, load and speed ratings for personnel and for materials shall be assigned to the equipment.

(iv) Material hoisting may be performed at speeds higher than the rated speed for personnel hoisting if the hoist and components have been designed for such higher speeds and if shaft conditions permit.

(v) Employees shall not ride on top of any cage, skip or bucket except when necessary to perform inspection or maintenance of the hoisting system, in which case they shall be protected by a body belt/harness system to prevent falling.

(vi) Personnel and materials (other than small tools and supplies secured in a manner that will not create a hazard to employees) shall not be hoisted together in the same conveyance. However, if the operator is protected from the shifting of materials, then the operator may ride with materials in cages or skips which are designed to be controlled by an operator within the cage or skip.

(vii) Line speed shall not exceed the design limitations of the systems.

(viii) Hoists shall be equipped with landing level indicators at the operator's station. Marking the hoist rope does not satisfy this requirement.

(ix) Whenever glazing is used in the hoist house, it shall be safety glass, or its equivalent, and be free of distortions and obstructions.

(x) A fire extinguisher that is rated at least 2A:10B:C (multi-purpose, dry chemical) shall be mounted in each hoist house.

(xi) Hoist controls shall be arranged so that the operator can perform all operating cycle functions and reach the emergency power cutoff without having to reach beyond the operator's normal operating position.

(xii) Hoists shall be equipped with limit switches to prevent overtravel at the top and bottom of the hoistway.

(xiii) Limit switches are to be used only to limit travel of loads when operational controls malfunction and shall not be used as a substitute for other operational controls.

(xiv) Hoist operators shall be provided with a closed-circuit voice communication system to each landing station, with speaker microphones so located that the operator can communicate with individual landing stations during hoist use.

(xv) When sinking shafts 75 feet (22.86 m) or less in depth, cages, skips, and buckets that may swing, bump, or snag against shaft sides or other structural protrusions shall be guided by fenders, rails, ropes, or a combination of those means.

(xvi) When sinking shafts more than 75 feet (22.86 m) in depth, all cages, skips, and buckets shall be rope or rail guided to within a rail length from the sinking operation.

(xvii) Cages, skips, and buckets in all completed shafts, or in all shafts being used as completed shafts, shall be rope or rail-guided for the full length of their travel.

(xviii) Wire rope used in load lines of material hoists shall be capable of supporting, without failure, at least five times the maximum intended load or the factor recommended by the rope manufacturer, whichever is greater. Refer to § 1926.552(c)(14)(iii) of this part for design factors for wire rope used in personnel hoists. The design factor shall be calculated by dividing the breaking strength of wire rope, as reported in the manufacturer's rating tables, by the total static load, including the weight of the wire rope in the shaft when fully extended.

(xix) A competent person shall visually check all hoisting machinery, equipment, anchorages, and hoisting rope at the beginning of each shift and during hoist use, as necessary.

(xx) Each safety device shall be checked by a competent person at least weekly during hoist use to ensure suitable operation and safe condition.

(xxi) In order to ensure suitable operation and safe condition of all functions and safety devices, each hoist assembly shall be inspected and load-tested to 100 percent of its rated capacity: at the time of installation; after any repairs or alterations affecting its structural integrity; after the operation of any safety device; and annually when in use. The employer shall prepare a certification record which includes the date each inspection and load-test was performed; the signature of the person

who performed the inspection and test; and a serial number or other identifier for the hoist that was inspected and tested. The most recent certification record shall be maintained on file until completion of the project.

(xxii) Before hoisting personnel or material, the operator shall perform a test run of any cage or skip whenever it has been out of service for one complete shift, and whenever the assembly or components have been repaired or adjusted.

(xxiii) Unsafe conditions shall be corrected before using the equipment.

(4) *Additional requirements for personnel hoists.* (i) Hoist drum systems shall be equipped with at least two means of stopping the load, each of which shall be capable of stopping and holding 150 percent of the hoist's rated line pull. A broken-rope safety, safety catch, or arrestment device is not a permissible means of stopping under this paragraph.

(ii) The operator shall remain within sight and sound of the signals at the operator's station.

(iii) All sides of personnel cages shall be enclosed by one-half inch (12.70 mm) wire mesh (not less than No. 14 gauge or equivalent) to a height of not less than 6 feet (1.83 m). However, when the cage or skip is being used as a work platform, its sides may be reduced in height to 42 inches (1.07 m) when the conveyance is not in motion.

(iv) All personnel cages shall be provided with a positive locking door that does not open outward.

(v) All personnel cages shall be provided with a protective canopy. The canopy shall be made of steel plate, at least 3/16-inch (4.763 mm) in thickness, or material of equivalent strength and impact resistance. The canopy shall be sloped to the outside, and so designed that a section may be readily pushed upward to afford emergency egress. The canopy shall cover the top in such a manner as to protect those inside from objects falling in the shaft.

(vi) Personnel platforms operating on guide rails or guide ropes shall be equipped with broken-rope safety devices, safety catches or arrestment devices that will stop and hold 150 percent of the weight of the personnel platform and its maximum rated load.

(vii) During sinking operations in shafts where guides and safeties are not yet used, the travel speed of the personnel platform shall not exceed 200 feet (60.96 m) per minute. Governor controls set for 200 feet (60.96 m) per minute shall be installed in the control system and shall be used during personnel hoisting.

(viii) The personnel platform may travel over the controlled length of the hoistway at rated speeds up to 600 feet (182.88 m) per minute during sinking operations in shafts where guides and safeties are used.

(ix) The personnel platform may travel at rated speeds greater than 600 feet (182.88 m) per minute in completed shafts.

* * * * *

Subpart T—Demolition.

■ 3. Revise the authority citation for subpart T of 29 CFR part 1926 to read as follows:

Authority: 40 U.S.C. 3701; 29 U.S.C. 653, 655, 657; and Secretary of Labor's Orders 12-71 (36 FR 8754), 8-76 (41 FR 25059), 9-83 (48 FR 35736), 1-90 (55 FR 9033), 6-96 (62 FR 111), 5-2007 (72 FR 31159), or 1-2012 (77 FR 3912), as applicable.

■ 4. Amend § 1926.856 by revising paragraph (c) to read as follows:

§ 1926.856 Removal of walls, floors, and material with equipment.

* * * * *

(c) Cranes, derricks, and other mechanical equipment used must meet the requirements specified in subparts N, O, and CC of this part.

■ 5. Amend § 1926.858 by revising paragraph (b) to read as follows:

§ 1926.858 Removal of steel construction.

* * * * *

(b) Cranes, derricks, and other hoisting equipment used must meet the requirements specified in subparts N and CC of this part.

* * * * *

Subpart DD—[Removed]

■ 6. Remove subpart DD.

[FR Doc. 2012-20171 Filed 8-16-12; 8:45 am]

BILLING CODE 4510-26-P



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VIRGINIA SAFETY AND HEALTH CODES BOARD

BRIEFING PACKAGE

FOR SEPTEMBER 12, 2012

Hazard Communication Standard, §1910.1200; Final Rule; and Other Related Standards In Parts 1910, 1915 and 1926

I. Action Requested.

The Virginia Occupational Safety and Health (VOSH) Program requests the Safety and Health Codes Board to consider for adoption federal OSHA's revised final rule for the Hazard Communication Standard and Other Related Standards in Parts 1910, 1915 and 1926, as published in 77 FR 17573 on March 26, 2012.

The proposed effective date is January 1, 2013.

II. Summary of the Standard.

Hazard communication in the workplace is currently addressed by many different international, national, and state authorities. These existing requirements are not always consistent and often contain different definitions of hazards and varying provisions for what information is required on labels and safety data sheets (SDSs), formerly known as Material Safety Data Sheets (MSDSs).

In this final rule, federal OSHA has modified its Hazard Communication Standard (HAZCOM) in General Industry, Part 1910; Construction, Part 1926; and Shipyard Employment, Part 1915, that contain hazard classification and communication provisions so that they will be internally consistent and aligned with the United Nations' Globally Harmonized System of Classification and Labelling of Chemicals (GHS) and, as a result, would enhance worker safety and facilitate international trade. The modifications to the standard include:

- revised criteria for classification of chemical hazards;
- revised labeling provisions that include requirements for use of standardized signal words, pictograms,

- hazard statements, and precautionary statements;
- a specified format for safety data sheets; and
- related revisions to definitions of terms used in the standard, and requirements for employee training on labels and safety data sheets. [77 FR 17683]

Federal OSHA has also modified provisions of other standards, including standards for flammable and combustible liquids for both General Industry and Construction, §§1910.106 and 1926.152, respectively, to align the requirements of the standards with the GHS hazard categories for flammable liquids. Modifications to the Process Safety Management of Highly Hazardous Chemicals standard, §1910.119, will ensure that the scope of the standard is not changed by the revisions to the HAZCOM. In addition, modifications have been made to most of OSHA's substance-specific health standards, to ensuring that requirements for signs and labels and safety data sheets (SDSs) are consistent with the modified HAZCOM. [77 FR 17582]

There are three information communication components in this system – labels, SDSs, and employee training, all of which are essential to the effective functioning of the program. Labels provide a brief, but immediate and conspicuous, summary of hazard information at the site where the chemical is use. SDSs provide detailed technical information and serve as a reference source for exposed employees, industrial hygienists, safety professionals, emergency responders, health care professionals, and other interested parties. Training is designed to ensure that employees understand the chemical hazards in their workplace and are aware of protective measures to follow. Labels, SDSs, and training are complementary parts of a comprehensive hazard communication program—each element reinforces the knowledge necessary for effective protection of employees. [77 FR 17676]

Like Federal OSHA, VOSH is seeking to use the extended the phase-in period for this final rule with the same federal date schedule for implementation so that the additional time granted to manufacturers, distributors, and users of chemicals will serve to reduce the transitional costs associated with this rule. [77 FR 17679]

III. Basis, Purpose and Impact of the Standard.

A. Basis.

The current HAZCOM Standard in which federal OSHA established the need for disclosure of chemical hazardous information, was initially promulgated in two parts. First, a final rule covering the manufacturing industry was published in the Federal Register in 1983 (48 FR 53280, Nov. 25, 1983); a second final rule covering other general industries, maritime industries, construction industries, and agricultural industries was published in the Federal Register in 1987 (53 FR 31852, Aug. 24, 1987). Federal OSHA's current HAZCOM standard includes the following sections: 29 CFR 1910.1200; 1915.1200; 1917.28 1918.90; and 1926.59.

To protect employees and members of the public who are potentially exposed to hazardous chemicals during their production, transportation, use and disposal, a number of countries have developed laws that require information about those chemicals to be prepared and transmitted to affected parties. The laws vary in the scope of chemicals covered, definitions of hazards, the specification of requirements, e.g., specification of a format for safety data sheets, and the use of symbols and pictograms. The inconsistencies among the various national laws are substantial enough that different labels and safety data sheets must often be developed for the same product when it is marketed in different countries.

For example, within the United States, several regulatory authorities exercise jurisdiction over chemical hazard communication. In addition to federal OSHA's oversight of private sector workplaces, the Department of Transportation (DOT) regulates chemicals in transport; the Consumer Product Safety Commission (CPSC) regulates consumer products; and the Environmental Protection Agency (EPA) regulates pesticides, as well as exercising other authority over the labeling of chemicals under the Toxic Substances Control Act. Each of these regulatory authorities operates under different statutory mandates, and all have adopted distinct hazard communication requirements. [77 FR 17577]

Tracking and complying with the hazard communications requirements of different regulatory authorities is a burden for manufacturers, importers, distributors, and transporters engaged in commerce in the domestic arena. This burden is magnified by the need to develop multiple sets of labels and safety data sheets for each product in international trade.

The problems associated with differing national and international requirements were recognized and discussed when the HAZCOM was first promulgated in 1983. At that time, federal OSHA committed to periodically reviewing its standard in recognition of an interagency trade policy that supported the U.S. pursuing international harmonization of requirements for chemical classification and labeling. Federal OSHA has actively participated in many such efforts in the years since that commitment was made, including trades-related discussions on the need for harmonization with major U.S. trading partners. In January 1990, federal OSHA issued a Request for Information (RFI) in the Federal Register to obtain input regarding international harmonization efforts and on work being done at that time by the International Labour Organization (ILO). The majority of the nearly 600 comments received expressed support for a standard safety data sheet format and an opinion favoring a standardized format for labels as well.

In June 1992, the United Nations Conference on Environment and Development issued a mandate supported by the United States calling for the development of a globally harmonized chemical classification and labeling system. This international mandate initiated a substantial effort to develop the GHS, involving numerous international organizations, many countries and extensive stakeholder representation. [77 FR 17577]

On September 12, 2006, federal OSHA published an Advance Notice of Proposed Rulemaking (ANPR) on the GHS [71 FR 53617], which provided information about the GHS and its potential impact on the HAZCOM and sought input from the public on issues related to GHS implementation. On September 30, 2009, federal OSHA published a Notice of Proposed Rulemaking (NPRM) [74 FR 50279]. This final rule is based on Revision 3 of the GHS.

B. Purpose.

Employees in work environments covered by the HAZCOM standard are exposed to a variety of significant hazards that can and do cause serious injury and death. The HAZCOM standard serves to ensure that both employers and employees are provided needed information about chemical hazards that was not provided by markets in the absence of such a standard.

Adoption of the GHS will improve federal OSHA's current HAZCOM standard by providing consistent, standardized hazard communication to downstream users and improve worker understanding of the hazardous chemicals they encounter every day. The changes to the HAZCOM standard will create a

uniformity standard for the presentation of hazard information and, as such, will serve to improve the efficiency and effectiveness of the existing hazard communication system in the U.S., and to reduce unnecessary barriers to trade. [77 FR 17605]

C. Impact on Employers.

Federal OSHA believes that adopting the GHS will result in a clearer, more effective methodology for conveying information on hazardous chemicals to employers and employees. Such harmonization will also reduce costs for employers. There is widespread agreement that aligning the HAZCOM standard with the GHS would establish a valuable, systematic approach for employers to evaluate workplace hazards, and provide employees with consistent information regarding the hazards they encounter. [77 FR 17579]

For establishments producing hazardous chemicals, which are generally part of the chemical manufacturing industry, the revisions to the standard would involve reclassifying chemicals in accordance with the new classification system and revising safety data sheets (SDS) and labels associated with hazardous chemicals. [77 FR 17605]

Federal OSHA estimates that over five million workplaces nationally will be affected by the revised HAZCOM Standard. From this, it is estimated that in Virginia, approximately 136,000 workplaces will be affected by the HAZCOM standard. Included among these five million workplaces nation-wide are an estimated 90,000 establishments that create hazardous chemicals across the U.S. In Virginia, of the approximately 136,000 such workplaces creating hazardous chemicals, and therefore affected by the HAZCOM standard, there are an estimated 2,400 establishments.

This federal final rule is anticipated to potentially affect approximately 4,094,000 small entities nationally [77 FR 17678] of which over 110,000 are estimated to be in Virginia. The rule has its greatest impacts on the approximately 72,000 small firms nation-wide that produce chemicals that require SDSs and labels. [77 FR 17678] In Virginia, approximately 1,950 small entities are estimated to produce chemicals which require SDSs and labels.

D. Impact on Employees.

Federal OSHA estimates that approximately 880,000 hazardous chemicals are currently used in the United States. Every workplace covered under the OSH Act where employees are exposed to hazardous chemicals is covered by the HAZCOM Standard and is required to have a hazard communication program. [77 FR 17612]

The revisions to the HAZCOM Standard will impact employees by making employers' HAZCOM programs more worker-protective, efficient, and effective. In addition, the revisions will have the effect of harmonizing the HAZCOM standard with the GHS and will improve worker understanding of the hazardous chemicals they encounter every day. Employees provided with information and training on chemical hazards are more able to fully participate in the protective measures instituted in their workplaces. Knowledgeable employees can take the steps required to work safely with chemicals, and are able to determine what actions are necessary if an emergency occurs.

For establishments with employees whose only exposures to hazardous chemicals result from their use of the chemical products, the revisions to the HAZCOM standard would generally involve minor effects, such as familiarization with new warning labels.

Federal OSHA estimates that the new standard will cover over an estimated 43 million workers who could be exposed to hazardous chemical across this country [77 FR 17611]. From this, it is estimated that in Virginia, the new standard will cover an estimated 1.2 million such workers who could be exposed to hazardous chemicals. Almost three million employees across the U.S. work in establishments that create hazardous chemicals; and in Virginia, it is estimated that more than 81,000 employees work in establishments that create hazardous chemicals, and therefore impacted by the HAZCOM standard.

E. Impact on the Department of Labor and Industry.

Apart from expenses incurred for training staff on the final rule, there is no anticipated impact on the Department.

Federal regulations 29 CFR 1953.23(a) and (b) require that Virginia, within six months of the occurrence of a federal program change, to adopt identical changes or promulgate equivalent changes which are at least as effective as the federal change. The Virginia Code reiterates this requirement in § 40.1-22(5). Adopting these revisions will allow Virginia to conform to the federal program change.

F. Technology Feasibility

Federal OSHA has determined that compliance with the requirements of the rule is technologically feasible for all affected industries. [77 FR 17604] While the GHS modifications to the HAZCOM standard impose more specific requirements for hazard classification, labeling, and safety data sheets, employers may use the same expertise and methods to meet these requirements as they are already utilizing to comply with the requirements of HAZCOM. The most important resource employers will need in order to comply with the GHS modifications to HAZCOM is technical expertise in hazard classification and the communication of those hazards. Federal OSHA found that such expertise was already available in promulgating the initial HAZCOM rule in 1983. Federal OSHA believes that the availability of professionals with this expertise has only increased in the intervening time. The GHS has already been implemented, in whole or in part, by a number of major U.S. trading partners, including Japan and the European Union (EU). American-based companies that export to these jurisdictions should already have developed expertise in the GHS, and there are a number of GHS training resources developed on the international level. [77 FR 17604]

Through federal OSHA's Alliance with the Society for Chemical Hazard Communication, training to small businesses in the requirements of hazard communication and information about the GHS modifications has been made available.

The revisions to federal OSHA's HAZCOM standard would require employers that produce chemicals to reclassify chemicals in accordance with the new classification criteria and revise safety data sheets and labels associated with hazardous chemicals. Compliance with these requirements is not expected to involve any technological obstacles. Industry was required to notify the classification and labeling of all chemical substances that are hazardous or subject to registration under the Registration, Evaluation and Authorization of Chemicals (REACH) regulation and placed on the EU market in accordance with the GHS criteria. NIOSH is also currently working to update its International Chemical Safety Cards and Pocket

Guide to incorporate the GHS classifications, which will further reduce the technological burdens of reclassification borne by manufacturers. The rule would also require employers whose workplaces involve potential exposure to hazardous chemicals to train employees on the relevant aspects of the revised approach to hazard communication. Affected employees would need additional training to explain the new labels and safety data sheets. Compliance with these requirements is not expected to involve any technological obstacles.

The revisions to the HAZCOM standard will require establishments that package or label hazardous chemicals to affix labels that include hazard warning pictograms enclosed in a red bordered diamond. While some establishments may not currently be printing labels in colors other than black and white, color printing technology is widely available and printing labels with a red bordered diamond or purchasing preprinted labels with a red bordered diamond is not expected to involve any technological obstacles. Research conducted for federal OSHA found that printer technology is rapidly evolving—resulting in lower costs for printers and printing supplies and making better technology available to a wider range of buyers. Combined with currently available printing technology, this clearly demonstrates that printing product labels in color is technologically feasible.

Businesses in the affected industries have long been required to be in compliance with the existing HAZCOM standard, which includes similar requirements. The revised HAZCOM standard would simply require modifying the labels and SDSs for hazardous chemicals, adding some training to ensure employees are familiar with these changes and upgrading printing technology with widely available color printers or purchasing preprinted color labels. No new technologies are required for compliance with the modifications to the HAZCOM standard. Many U.S. businesses in the affected industries have already begun implementing many of the requirements of the GHS in order to meet the new foreign requirements for exported products. Therefore, federal OSHA believes that there are no technological constraints associated with compliance with any of the requirements of the revisions to the HAZCOM standard. [77 FR 17604]

G. Summary of Benefits and Costs

1. **Benefits.** Once fully implemented, federal OSHA anticipates that the revisions to the HAZCOM standard will result in a positive benefit/cost with the benefits including:
 - a. **Safety and Health**
 - Improvement in the quality and consistency of hazard information in the workplace thus making it safer for workers to do their jobs and easier for employers to stay competitive;
 - Providing workers with quicker and more efficient access to information on the safety data sheets (SDS) by the introduction of a standardized format, thereby facilitating worker comprehension of hazards, especially for low and limited-literacy workers,
 - This will facilitate safety training and a reduction in confusion over data and specific procedures and instructions in the workplace, and result in safer handling and use of chemicals;

- Federal OSHA estimates that nationally the final rule will prevent approximately 43 deaths, 585 injuries and illnesses, in Virginia, it is estimated that the final rule will prevent approximately 1.2 deaths, 16 injuries and illnesses,

b. Productivity

Federal OSHA anticipates that, in addition to safety and health benefits, the revised HAZCOM standard will result in the following types of productivity benefits:

- Chemical manufacturers, will need to produce fewer different SDSs and labels to meet multiple data, information and other labeling requirements for each chemical in future years ;
- Employers will be able to provide simpler and streamlined training due to the improved consistency of the labels and SDSs resulting in providing training to new employees as compared with the requirements of the HAZCOM standard;
- Reduction of trade barriers by having a compatible system used globally for firms engaging in, or considering engaging in, multi-national trade.

2. Costs – according to federal OSHA estimates

The estimated compliance costs for the revisions to the HAZCOM standard represent the additional costs necessary for employers to achieve full compliance with the new requirements of the final rule. They do not include costs associated with current compliance that has already been achieved nor do they include costs necessary to achieve compliance with existing requirements, to the extent that some employers may currently not be fully complying with applicable regulatory requirements. [77 FR 17606]

The majority of the costs associated with compliance with the revisions to the HAZCOM standard would generally be incurred by the affected industries as one-time transitional costs over the phase-in period of four years. The costs of compliance with the revisions to the HAZCOM standard consist of four main categories:

- The cost of reclassification and revision of SDSs and labels,
- the cost of management familiarization and other management costs associated with the administration of hazard communication programs,
- the cost of training employees, and
- the cost of printing labels for hazardous chemicals in color.

The first three categories are considered to be one-time transitional costs. The estimated compliance cost are based on a determination made by federal OSHA that the revisions would not significantly change the number of chemicals or products for which an SDS will be required. This also means that there will be no change in the number of establishments that are required to implement a hazard communication program. [77 FR 17625]

There will be additional ongoing annual compliance costs associated with the revisions to the HAZCOM standard due to the cost to purchase and maintain color printing ink or cartridges or to

purchase pre-printed color labels in order to comply with the requirement that the GHS hazard warning pictogram be presented with a red border. Federal OSHA's analysis has found that these costs will not be substantial relative to the other costs of the rule. [77 FR 17607]

- a. For all businesses nationally these changes result in:
 - Total annualized cost savings of approximately: \$ 475 M
 - total annualized cost of compliance estimated: \$ 201 M
 - Net savings \$ 274 M

- b. For all Virginia businesses these changes result in:
 - Total annualized cost savings of approximately: \$ 12.9 M
 - total annualized cost of compliance estimated: \$ 5.5 M
 - Net savings \$ 7.4 M

- c. Approximate major cost elements associated with the revisions to the standard:
 - Classification of chemical hazards in accordance with the GHS criteria and the corresponding revision of safety data sheets and labels to meet new format and content requirements:

Nationally	\$22.5 M
Virginia	\$ 0.6 M

 - Training for employees to become familiar with new warning symbols and the revised safety data sheet format:

Nationally	\$95.4 M
Virginia	\$ 2.5 M

 - Management familiarization and other management-related costs as may be necessary:

Nationally	\$59.0 M
Virginia	\$ 1.6 M

 - Costs to purchase upgraded label printing equipment and supplies or to purchase pre-printed color labels in order to include the hazard warning pictogram enclosed in a red-bordered diamond on the product label:

Nationally	\$24.1 M
Virginia	\$ 0.7 M

 - The total annualized cost of compliance with the final rule for small entities:

Nationally	\$119.0 M
Virginia	\$ 3.2 M

IV. Highlights of the Standard

- **Hazard classification:** Chemical manufacturers and importers are required to determine the hazards of the chemicals they produce or import. Hazard classification under the new, updated standard provides specific

criteria to address health and physical hazards as well as classification of chemical mixtures.

- **Labels:** Chemical manufacturers and importers must provide a label that includes a signal word, pictogram, hazard statement, and precautionary statement for each hazard class and category.
- **Safety Data Sheets:** The new format requires 16 specific sections, ensuring consistency in presentation of important protection information.
- **Information and training:** To facilitate understanding of the new system, the new standard requires that workers be trained by December 1, 2013 on the new label elements and safety data sheet format, in addition to the current training requirements.

V. Implementation Schedule for federal OSHA and VOSH

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*	Compliance with all modified provisions of this final rule, except:	Chemical manufacturers, importers, distributors and employers
December 1, 2015	The Distributor shall not ship containers labeled by the chemical manufacturer or importer unless it is a GHS label.	
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

*This date coincides with the EU implementation date for classification of mixtures

RECOMMENDED ACTION

Staff of the Department of Labor and Industry recommends that the Safety and Health Codes Board adopt the Final Rule for the Hazard Communication Standard, §1910.1200, and Other Related Standards in Parts 1910, 1915, and 1926, as authorized by Virginia Code §§ 40.1-22(5) and 2.2-4006.A.4(c), with an effective date of January 1, 2013.

The Department also recommends that the Board state in any motion it may make to amend this regulation that it will receive, consider and respond to petitions by any interested person at any time with respect to reconsideration or revision of this or any other regulation which has been adopted in accordance with the above-cited subsection A.4(c) of the Administrative Process Act.

**Hazard Communication Standard, §1910.1200; Final Rule
and Other Related Standards in Parts 1910, 1915, and 1926**

As Adopted by the
Safety and Health Codes Board

Date: _____



VIRGINIA OCCUPATIONAL SAFETY AND HEALTH PROGRAM

VIRGINIA DEPARTMENT OF LABOR AND INDUSTRY

Effective Date: _____

16VAC25-90-1910
16VAC25-100-1915
16VAC25-175-1926

Hazard Communication Standard and Other Related Standards in Parts 1910 - General Industry, 1915- Shipyard Employment, and 1926 – Construction

Part 1910-GENERAL INDUSTRY- 16VAC25-90-	PART 1910- CONT'D	Part 1926-CONSTRUCTION 16VAC25-175-
Subpart H-Hazardous Materials	1910.1029, Coke Oven Emissions	Subpart D-Occupational Health and Environmental Controls
1910.106, Flammable Liquids	1910.1043, Cotton Dust	1926.60, Methylenedianiline
1910.107, Spray Finishing using Flammable and Combustible Materials	1910.1044, 1,2-dibromo-3-chloropropane	1926.62, Lead
1910.119, Process Safety Management of Highly Hazardous Chemicals	1910.1045, Acrylonitrile	Appendix B to 1926.62 – Employee Standard Summary
1910.120, Hazardous Waste Operations and Emergency Response	1910.1047, Ethylene Oxide	1926.64, Process safety management of highly hazardous chemicals
1910.123, Dipping and Coating Operations: Coverage and Definitions	1910.1048, Formaldehyde	1926.65, Hazardous waste operations and emergency response
1910.124, General Requirements for Dipping and Coating Operations	1910.1050, Methylenedianiline	Subpart F –Fire Protection and Prevention
1910.125, Additional Requirements for Dipping and Coating Operations that the Flammable Liquids or Liquids with Flashpoints Greater than 199.4°F (93°C)	1910.1051, 1,3-Butadiene	1926.152, Flammable and Combustible Liquids
Subpart Q-Welding, Cutting and Brazing	1910.1052, Methylene Chloride	1926.155, Definitions applicable to this subpart
1910.252, General Requirements	1910.1200, Hazard Communication	Subpart Z –Toxic and Hazardous Substances
Subpart Z-Toxic and Hazardous Substances	Appendix A to 1910.1200 –Health Hazard Criteria (Mandatory)	1926.1101, Asbestos
1910.1001, Asbestos	Appendix B to 1910.1200-Physical Criteria (Mandatory)	1926.1126, Chromium (VI)
1910.1003, Lead	Appendix C to 1910.1200 –Allocation of Label Elements (Mandatory)	1926.1127, Cadmium
1910.1017, Vinyl Chloride	Appendix D to 1910.1200 – Safety Data Sheets (Mandatory)	
1910.1018, Inorganic Arsenic	Appendix F to 1910.1200 – Guidance for Hazard Classifications Re: Carcinogenicity (Non-Mandatory)	
1910.1025, Lead	1910.1450, Occupational Exposure to Hazardous Chemicals in Laboratories	
Appendix B to 1910.1025		
1910.1026, Chromium (VI)	PART 1915-SHIPYARD EMPLOYMENT – 16VAC25-100-	
1910.1027, Cadmium	Subpart Z-Toxic and Hazardous Substances	
1910.1028, Benzene	1915.1001, Asbestos	
	1915.1026, Chromium (VI)	

When the regulations, as set forth in the Final Rule for the Hazard Communication Standard, §1910.1200, and Other Related Standards in Parts 1910, 1915, and 1926, are applied to the Commissioner of the Department of Labor and Industry and/or to Virginia employers, the following federal terms shall be considered to read as below:

Federal Terms

VOSH Equivalent

29 CFR

VOSH Standard

Assistant Secretary

Commissioner of Labor and Industry

Agency

Department

May 25, 2012

January 1, 2013

See Implementation Schedule in Section V, above.

NOTE: *The Safety and Health Codes Board will consider adopting the entire HAZCOM Standard, §1200, and Other Related Standards in Parts 1910, 1915 and 1926, with the exception of the following: §1910.6, Incorporation by Reference."*

To view the regulatory text and various Appendices of the Hazard Communication Standard, §1200; Final Rule; and Other Related Standards in Parts 1910, 1915 and 1926, please click on the links below:

<http://www.osha.gov/dsg/hazcom/HCSFinalRegTxt.html>

http://www.osha.gov/dsg/hazcom/appendix_a.pdf

http://www.osha.gov/dsg/hazcom/appendix_b.pdf

http://www.osha.gov/dsg/hazcom/appendix_c.pdf

http://www.osha.gov/dsg/hazcom/appendix_d.pdf

http://www.osha.gov/dsg/hazcom/appendix_e.pdf

http://www.osha.gov/dsg/hazcom/appendix_f.pdf

Subpart H—[Amended]

- 4. Amend § 1910.106 as follows:
- A. Revise the section heading;
- B. Revise paragraphs (a)(13), (a)(14)(i) through (a)(14)(iii), and (a)(19);
- C. Remove the last sentence of paragraph (a)(17);
- D. Remove and reserve paragraph (a)(18);
- E. Remove the words “or combustible” wherever they appear in § 1910.106.
- F. Remove the words “and combustible” in paragraphs (d)(5)(vi) introductory text, (e)(2) introductory text, (j)(1) and (j)(3);
- G. Revise paragraphs (b)(2)(iv)(f) and (g), (b)(2)(vi)(b), (b)(2)(viii)(e), (b)(3)(i), (b)(3)(iv)(a), (b)(3)(iv)(c), (b)(3)(v)(d), and (b)(4)(iv)(e);
- H. Revise paragraphs (d)(1)(ii)(b), (d)(2)(iii) introductory text and (d)(2)(iii)(a)(2), Table H-12, paragraphs (d)(3)(i), (d)(4)(iii), (d)(4)(iv), Tables H-14 through H-17, and paragraph (d)(7)(i)(b);
- I. Revise paragraphs (e)(2)(ii)(b)(1), (e)(2)(ii)(b)(2), (e)(2)(ii)(b)(3), (e)(2)(iv)(a), (e)(2)(iv)(c), (e)(3)(v)(a), (e)(3)(v)(b), (e)(4)(i), (e)(6)(ii), and (e)(7)(i)(c);
- J. Revise paragraphs (f)(1)(i), (f)(1)(ii), (f)(2)(ii), (f)(2)(iii)(a), (f)(2)(iii)(b), (f)(2)(iii)(c), (f)(3)(i), (f)(3)(ii), (f)(3)(iv)(a)(1), (f)(3)(iv)(a)(2), (f)(3)(iv)(d)(2), (f)(3)(v), (f)(3)(vi), (f)(4)(viii)(e), (f)(5)(i), (f)(6), and (f)(8);
- K. Revise paragraphs (g)(1)(i)(c), (g)(1)(i)(e) introductory text, (g)(1)(i)(f), (g)(1)(iii)(a), (g)(1)(iii)(b), (g)(1)(iii)(c), (g)(1)(v), (g)(3)(iv)(a), (g)(3)(iv)(b),

(g)(3)(iv)(c), (g)(3)(v)(a), (g)(3)(vi)(a), Table H-19, and paragraphs (g)(4)(iii)(d), (g)(5)(i), (g)(6)(iv), and (g)(7); and

■ L. Revise paragraphs (h)(3)(i)(a), (h)(3)(iii)(b), (h)(3)(iv), (h)(5), (h)(7)(i)(b), (h)(7)(iii)(c), and (j).

The revisions read as follows:

§ 1910.106 Flammable liquids.

* * * * *

(a) * * *

(13) Flammable aerosol shall mean a flammable aerosol as defined by Appendix B to § 1910.1200—Physical Hazard Criteria. For the purposes of paragraph (d) of this section, such aerosols are considered Category 1 flammable liquids.

(14) * * *

(i) For a liquid which has a viscosity of less than 45 SUS at 100 °F (37.8 °C), does not contain suspended solids, and does not have a tendency to form a surface film while under test, the procedure specified in the Standard Method of Test for Flashpoint by Tag Closed Tester (ASTM D-56-70), which is incorporated by reference as specified in § 1910.6, or an equivalent test method as defined in Appendix B to § 1910.1200—Physical Hazard Criteria, shall be used.

(ii) For a liquid which has a viscosity of 45 SUS or more at 100 °F (37.8 °C), or contains suspended solids, or has a tendency to form a surface film while under test, the Standard Method of Test for Flashpoint by Pensky-Martens Closed Tester (ASTM D-93-71) or an equivalent method as defined by Appendix B to § 1910.1200—Physical Hazard Criteria, shall be used except that the methods specified in Note 1 to section 1.1 of ASTM D-93-71 may be used for the respective materials specified in the Note. The preceding ASTM standard is incorporated by reference as specified in § 1910.6.

(iii) For a liquid that is a mixture of compounds that have different volatilities and flashpoints, its flashpoint shall be determined by using the procedure specified in paragraph (a)(14)(i) or (ii) of this section on the liquid in the form it is shipped.

* * * * *

(18) [Reserved]

(19) *Flammable liquid* means any liquid having a flashpoint at or below 199.4 °F (93 °C). Flammable liquids are divided into four categories as follows:

(i) Category 1 shall include liquids having flashpoints below 73.4 °F (23 °C) and having a boiling point at or below 95 °F (35 °C).

(ii) Category 2 shall include liquids having flashpoints below 73.4 °F (23 °C)

and having a boiling point above 95 °F (35 °C).

(iii) Category 3 shall include liquids having flashpoints at or above 73.4 °F (23 °C) and at or below 140 °F (60 °C). When a Category 3 liquid with a flashpoint at or above 100 °F (37.8 °C) is heated for use to within 30 °F (16.7 °C) of its flashpoint, it shall be handled in accordance with the requirements for a Category 3 liquid with a flashpoint below 100 °F (37.8 °C).

(iv) Category 4 shall include liquids having flashpoints above 140 °F (60 °C) and at or below 199.4 °F (93 °C). When a Category 4 flammable liquid is heated for use to within 30 °F (16.7 °C) of its flashpoint, it shall be handled in accordance with the requirements for a Category 3 liquid with a flashpoint at or above 100 °F (37.8 °C).

(v) When liquid with a flashpoint greater than 199.4 °F (93 °C) is heated for use to within 30 °F (16.7 °C) of its flashpoint, it shall be handled in accordance with the requirements for a Category 4 flammable liquid.

* * * * *

(b) * * *

(2) * * *

(iv) * * *

(f)(1) Tanks and pressure vessels storing Category 1 flammable liquids shall be equipped with venting devices which shall be normally closed except when venting to pressure or vacuum conditions. Tanks and pressure vessels storing Category 2 flammable liquids and Category 3 flammable liquids with a flashpoint below 100 °F (37.8 °C) shall be equipped with venting devices which shall be normally closed except when venting under pressure or vacuum conditions, or with approved flame arresters.

(2) Exemption: Tanks of 3,000 bbls (barrels), capacity or less containing crude petroleum in crude-producing areas and outside aboveground atmospheric tanks under 1,000 gallons capacity containing other than Category 1 flammable liquids may have open vents. (See paragraph (b)(2)(vi)(b) of this section.)

(g) Flame arresters or venting devices required in paragraph (b)(2)(iv)(f) of this section may be omitted for Category 2 flammable liquids and Category 3 flammable liquids with a flashpoint below 100 °F (37.8 °C) where conditions are such that their use may, in case of obstruction, result in tank damage.

* * * * *

(vi) * * *

(b) Where vent pipe outlets for tanks storing Category 1 or 2 flammable liquids, or Category 3 flammable liquids with a flashpoint below 100 °F (37.8 °C),

are adjacent to buildings or public ways, they shall be located so that the vapors are released at a safe point outside of buildings and not less than 12 feet above the adjacent ground level. In order to aid their dispersion, vapors shall be discharged upward or horizontally away from closely adjacent walls. Vent outlets shall be located so that flammable vapors will not be trapped by eaves or other obstructions and shall be at least five feet from building openings.

* * * * *

(viii) * * *

(e) For Category 2 flammable liquids and Category 3 flammable liquids with a flashpoint below 100 °F (37.8 °C), other than crude oils, gasolines, and asphalts, the fill pipe shall be so designed and installed as to minimize the possibility of generating static electricity. A fill pipe entering the top of a tank shall terminate within 6 inches of the bottom of the tank and shall be installed to avoid excessive vibration.

* * * * *

(3) * * *

(i) *Location.* Excavation for underground storage tanks shall be made with due care to avoid undermining of foundations of existing structures. Underground tanks or tanks under buildings shall be so located with respect to existing building foundations and supports that the loads carried by the latter cannot be transmitted to the tank. The distance from any part of a tank storing Category 1 or 2 flammable liquids, or Category 3 flammable liquids with a flashpoint below 100 °F (37.8 °C), to the nearest wall of any basement or pit shall be not less than 1 foot, and to any property line that may be built upon, not less than 3 feet. The distance from any part of a tank storing Category 3 flammable liquids with a flashpoint at or above 100 °F (37.8 °C) or Category 4 flammable liquids to the nearest wall of any basement, pit or property line shall be not less than 1 foot.

* * * * *

(iv) * * *

(a) *Location and arrangement of vents* for Category 1 or 2 flammable liquids, or Category 3 flammable liquids with a flashpoint below 100 °F (37.8 °C). Vent pipes from tanks storing Category 1 or 2 flammable liquids, or Category 3 flammable liquids with a flashpoint below 100 °F (37.8 °C), shall be so located that the discharge point is outside of buildings, higher than the fill pipe opening, and not less than 12 feet above the adjacent ground level. Vent pipes shall discharge only upward in order to disperse vapors. Vent pipes 2 inches or less in nominal inside

diameter shall not be obstructed by devices that will cause excessive back pressure. Vent pipe outlets shall be so located that flammable vapors will not enter building openings, or be trapped under eaves or other obstructions. If the vent pipe is less than 10 feet in length, or greater than 2 inches in nominal inside diameter, the outlet shall be provided with a vacuum and pressure relief device or there shall be an approved flame arrester located in the vent line at the outlet or within the approved distance from the outlet.

* * * * *

(c) Location and arrangement of vents for Category 3 flammable liquids with a flashpoint at or above 100 °F (37.8 °C) or Category 4 flammable liquids. Vent pipes from tanks storing Category 3 flammable liquids with a flashpoint at or above 100 °F (37.8 °C) or Category 4 flammable liquids shall terminate outside of the building and higher than the fill pipe opening. Vent outlets shall be above normal snow level. They may be fitted with return bends, coarse

screens or other devices to minimize ingress of foreign material.

* * * * *

(v) * * *

(d) For Category 2 flammable liquids and Category 3 flammable liquids with a flashpoint below 100 °F (37.8 °C), other than crude oils, gasolines, and asphalts, the fill pipe shall be so designed and installed as to minimize the possibility of generating static electricity by terminating within 6 inches of the bottom of the tank.

* * * * *

(4) * * *

(iv) * * *

(e) For Category 2 flammable liquids and Category 3 flammable liquids with a flashpoint below 100 °F (37.8 °C), other than crude oils, gasoline, and asphalts, the fill pipe shall be so designed and installed as to minimize the possibility of generating static electricity by terminating within 6 inches of the bottom of the tank.

* * * * *

(d) * * *

(1) * * *

(ii) * * *

(b) Category 1, 2, or 3 flammable liquids in the fuel tanks of a motor vehicle, aircraft, boat, or portable or stationary engine;

* * * * *

(2) * * *

(iii) Size. Flammable liquid containers shall be in accordance with Table H-12, except that glass or plastic containers of no more than 1-gallon capacity may be used for a Category 1 or 2 flammable liquid if:

(a) * * *

(2) The user's process either would require more than 1 pint of a Category 1 flammable liquid or more than 1 quart of a Category 2 flammable liquid of a single assay lot to be used at one time, or would require the maintenance of an analytical standard liquid of a quality which is not met by the specified standards of liquids available, and the quantity of the analytical standard liquid required to be used in any one control process exceeds one-sixteenth the capacity of the container allowed under Table H-12 for the category of liquid; or

* * * * *

TABLE H-12—MAXIMUM ALLOWABLE SIZE OF CONTAINERS AND PORTABLE TANKS FOR FLAMMABLE LIQUIDS

Container type	Category 1	Category 2	Category 3	Category 4
Glass or approved plastic	1 pt	1 qt	1 gal	1 gal.
Metal (other than DOT drums)	1 gal	5 gal	5 gal	5 gal.
Safety cans	2 gal	5 gal	5 gal	5 gal.
Metal drums (DOT specifications)	60 gal	60 gal	60 gal	60 gal.
Approved portable tanks	660 gal	660 gal	660 gal	660 gal.

Note: Container exemptions: (a) Medicines, beverages, foodstuffs, cosmetics, and other common consumer items, when packaged according to commonly accepted practices, shall be exempt from the requirements of 1910.106(d)(2)(i) and (ii).

(3) * * *

(i) *Maximum capacity.* Not more than 60 gallons of Category 1, 2, or 3 flammable liquids, nor more than 120 gallons of Category 4 flammable liquids may be stored in a storage cabinet.

* * * * *

(4) * * *

(iii) *Wiring.* Electrical wiring and equipment located in inside storage rooms used for Category 1 or 2 flammable liquids, or Category 3 flammable liquids with a flashpoint below 100 °F (37.8 °C), shall be approved under subpart S of this part

for Class I, Division 2 Hazardous Locations; for Category 3 flammable liquids with a flashpoint at or above 100 °F (37.8 °C) and Category 4 flammable liquids, shall be approved for general use.

(iv) *Ventilation.* Every inside storage room shall be provided with either a gravity or a mechanical exhaust ventilation system. Such system shall be designed to provide for a complete change of air within the room at least six times per hour. If a mechanical exhaust system is used, it shall be controlled by a switch located outside of

the door. The ventilating equipment and any lighting fixtures shall be operated by the same switch. A pilot light shall be installed adjacent to the switch if Category 1 or 2 flammable liquids, or Category 3 flammable liquids with a flashpoint below 100 °F (37.8 °C), are dispensed within the room. Where gravity ventilation is provided, the fresh air intake, as well as the exhaust outlet from the room, shall be on the exterior of the building in which the room is located.

* * * * *

BILLING CODE 4510-26-P

TABLE H-14 - INDOOR CONTAINER STORAGE

Category liquid	Storage level	Gallons	
		Protected storage maximum per pile	Unprotected storage maximum per pile
1	Ground and upper floors.....	2,750 (50)	660 (12)
	Basement.....	Not permitted	Not permitted
2	Ground and upper floors.....	5,500 (100)	1,375 (25)
	Basement.....	Not permitted	Not permitted
3 FP<100F	Ground and upper floors.....	16,500 (300)	4,125 (75)
	Basement.....	Not permitted	Not permitted
3 FP≥100F	Ground and upper floors.....	16,500 (300)	4,125 (75)
	Basement.....	5,500 (100)	Not permitted
4 ...	Ground and upper floors.....	55,000 (1,000)	13,750 (250)
	Basement.....	8,250 (450)	Not permitted

NOTE 1: When 2 or more categories of materials are stored in a single pile, the maximum gallonage permitted in that pile shall be the smallest of the 2 or more separate maximum gallonages.

NOTE 2: Aisles shall be provided so that no container is more than 12 ft. from an aisle. Main aisles shall be at least 3 ft. wide and side aisles at least 4 ft. wide.

NOTE 3: Each pile shall be separated from each other by at least 4 ft.

NOTE 4: FP means Flashpoint.

(Number in parenthesis indicate corresponding number of 55-gal. drums.)

TABLE H-15 - INDOOR PORTABLE TANK STORAGE

Category	Storage level	Gallons	
		Protected storage maximum per pile	Unprotected storage maximum per pile
1	Ground and upper floors.....	Not permitted	Not permitted
	Basement.....	Not permitted	Not permitted
2	Ground and upper floors.....	20,000	2,000
	Basement.....	Not permitted	Not permitted
3	Ground and upper floors.....	40,000	5,500
FP<100F	Basement.....	Not permitted	Not permitted
3	Ground and upper floors.....	40,000	5,500
FP≥100F	Basement.....	20,000	Not permitted
4	Ground and upper floors.....	60,000	22,000
	Basement.....	20,000	Not permitted

NOTE 1: When 1 or more categories of materials are stored in a single pile, the maximum gallonage permitted in that pile shall be the smallest of the 2 or more separate maximum gallonages.

NOTE 2: Aisles shall be provided so that no portable tank is more than 12 ft. from an aisle. Main aisles shall be at least 8 ft. wide and side aisles at least 4 ft. wide.

NOTE 3: Each pile shall be separated from each other by at least 4 ft.

NOTE 4: FP means Flashpoint.

TABLE H-16 - OUTDOOR CONTAINER STORAGE

1-Category	2-Maximum per pile	3-Distance between piles	4-Distance to property line that can be built upon	5-Distance to street, alley, public way
	gallons	feet	feet	feet
1	1,100	5	20	10
2	2,200	5	20	10
3 FP<100F.	4,400	5	20	10
3 FP>100F.	8,800	5	10	5
4	22,000	5	10	5

NOTE 1: When 2 or more categories of materials are stored in a single pile, the maximum gallonage in that pile shall be the smallest of the 2 or more separate gallonages.

NOTE 2: Within 200 ft. of each container, there shall be a 12 ft. wide access way to permit approach of fire control apparatus.

NOTE 3: The distances listed apply to properties that have protection for exposures as defined. If there are exposures, and such protection for exposures does not exist, the distances in column 4 shall be doubled.

NOTE 4: When total quantity stored does not exceed 50 percent of maximum per pile, the distances in columns 4 and 5 may be reduced 50 percent, but not less than 3 ft.

NOTE 5: FP means flashpoint.

TABLE H-17 - OUTDOOR PORTABLE TANK STORAGE

1-Category	2-Maximum per pile	3-Distance between piles	4-Distance to property line that can be built upon	5-Distance to street, alley, public way
	gallons	feet	feet	feet
1	2,200	5	20	10
2	4,400	5	20	10
3 FP<100F.	8,800	5	20	10
3 FP>100F.	17,600	5	10	5
4	44,000	5	10	5

NOTE 1: When 2 or more categories of materials are stored in a single pile, the maximum gallonage in that pile shall be the smallest of the 2 or more separate gallonages.

NOTE 2: Within 200 ft. of each portable tank, there shall be a 12 ft. wide access way to permit approach of fire control apparatus.

NOTE 3: The distances listed apply to properties that have protection for exposures as defined. If there are exposures, and such protection for exposures does not exist, the distances in column 4 shall be doubled.

NOTE 4: When total quantity stored does not exceed 50 percent of maximum per pile, the distances in columns 4 and 5 may be reduced 50 percent, but not less than 3 ft.

NOTE 5: FP means flashpoint.

BILLING CODE 4510-26-C

(7) * * *

(i) * * *

(b) At least one portable fire extinguisher having a rating of not less than 12-B units must be located not less than 10 feet, nor more than 25 feet, from any Category 1, 2, or 3 flammable liquid storage area located outside of a storage room but inside a building.

* * * * *

(e) * * *

(2) * * *

(ii) * * *

(b) * * *

(1) 25 gallons of Category 1 flammable liquids in containers

(2) 120 gallons of Category 2, 3, or 4 flammable liquids in containers

(3) 660 gallons of Category 2, 3, or 4 flammable liquids in a single portable tank.

* * * * *

(iv) * * *

(a) Category 1 or 2 flammable liquids, or Category 3 flammable liquids with a flashpoint below 100 °F (37.8 °C), shall

be kept in covered containers when not actually in use.

* * * * *

(c) Category 1 or 2 flammable liquids, or Category 3 flammable liquids with a flashpoint below 100 °F (37.8 °C), may be used only where there are no open flames or other sources of ignition within the possible path of vapor travel.

* * * * *

(3) * * *

(v) * * *

(a) Areas as defined in paragraph (e)(3)(i) of this section using Category 1 or 2 flammable liquids, or Category 3 flammable liquids with a flashpoint below 100 °F (37.8 °C), shall be ventilated at a rate of not less than 1 cubic foot per minute per square foot of solid floor area. This shall be accomplished by natural or mechanical ventilation with discharge or exhaust to a safe location outside of the building. Provision shall be made for introduction of makeup air in such a manner as not to short circuit the ventilation. Ventilation shall be arranged to include all floor areas or pits where flammable vapors may collect.

(b) Equipment used in a building and the ventilation of the building shall be designed so as to limit flammable vapor-air mixtures under normal operating conditions to the interior of equipment, and to not more than 5 feet from equipment which exposes Category 1 or 2 flammable liquids, or Category 3 flammable liquids with a flashpoint below 100 °F (37.8 °C), to the air. Examples of such equipment are dispensing stations, open centrifuges, plate and frame filters, open vacuum filters, and surfaces of open equipment.

* * * * *

(4) * * *

(i) Tank vehicle and tank car loading or unloading facilities shall be separated from aboveground tanks, warehouses, other plant buildings or nearest line of adjoining property which may be built upon by a distance of 25 feet for Category 1 or 2 flammable liquids, or Category 3 flammable liquids with a flashpoint below 100 °F (37.8 °C), and 15 feet for Category 3 flammable liquids with a flashpoint at or above 100 °F (37.8 °C) and Category 4 flammable liquids, measured from the nearest

position of any fill stem. Buildings for pumps or shelters for personnel may be a part of the facility. Operations of the facility shall comply with the appropriate portions of paragraph (f)(3) of this section.

* * * * *

(6) * * *

(ii) *Grounding.* Category 1 or 2 flammable liquids, or Category 3 flammable liquids with a flashpoint below 100 °F (37.8 °C), shall not be dispensed into containers unless the nozzle and container are electrically interconnected. Where the metallic floorplate on which the container stands while filling is electrically connected to the fill stem or where the fill stem is bonded to the container during filling operations by means of a bond wire, the provisions of this section shall be deemed to have been complied with.

(7) * * *

(i) * * *

(c) Locations where flammable vapor-air mixtures may exist under abnormal conditions and for a distance beyond Division 1 locations shall be classified Division 2 according to the requirements of subpart S of this part. These locations include an area within 20 feet horizontally, 3 feet vertically beyond a Division 1 area, and up to 3 feet above floor or grade level within 25 feet, if indoors, or 10 feet if outdoors, from any pump, bleeder, withdrawal fitting, meter, or similar device handling Category 1 or 2 flammable liquids, or Category 3 flammable liquids with a flashpoint below 100 °F (37.8 °C). Pits provided with adequate mechanical ventilation within a Division 1 or 2 area shall be classified Division 2. If only Category 3 flammable liquids with a flashpoint at or above 100 °F (37.8 °C) or Category 4 flammable liquids are handled, then ordinary electrical equipment is satisfactory though care shall be used in locating electrical apparatus to prevent hot metal from falling into open equipment.

* * * * *

(f) * * *

(1) * * *

(i) *Category 1 or 2 flammable liquids, or Category 3 flammable liquids with a flashpoint below 100 °F (37.8 °C).*

Category 1 or 2 flammable liquids, or Category 3 flammable liquids with a flashpoint below 100 °F (37.8 °C), shall be stored in closed containers, or in storage tanks above ground outside of buildings, or underground in accordance with paragraph (b) of this section.

(ii) *Category 3 flammable liquids with a flashpoint at or above 100 °F (37.8 °C) and Category 4 flammable liquids.*

Category 3 flammable liquids with a flashpoint at or above 100 °F (37.8 °C) and Category 4 flammable liquids shall be stored in containers, or in tanks within buildings or above ground outside of buildings, or underground in accordance with paragraph (b) of this section.

* * * * *

(2) * * *

(ii) *Heating.* Rooms in which Category 1 or 2 flammable liquids, or Category 3 flammable liquids with a flashpoint below 100 °F (37.8 °C), are stored or handled shall be heated only by means not constituting a source of ignition, such as steam or hot water. Rooms containing heating appliances involving sources of ignition shall be located and arranged to prevent entry of flammable vapors.

(iii) * * *

(a) Ventilation shall be provided for all rooms, buildings, or enclosures in which Category 1 or 2 flammable liquids, or Category 3 flammable liquids with a flashpoint below 100 °F (37.8 °C), are pumped or dispensed. Design of ventilation systems shall take into account the relatively high specific gravity of the vapors. Ventilation may be provided by adequate openings in outside walls at floor level unobstructed except by louvers or coarse screens. Where natural ventilation is inadequate, mechanical ventilation shall be provided.

(b) Category 1 or 2 flammable liquids, or Category 3 flammable liquids with a flashpoint below 100 °F (37.8 °C), shall not be stored or handled within a building having a basement or pit into which flammable vapors may travel, unless such area is provided with ventilation designed to prevent the accumulation of flammable vapors therein.

(c) Containers of Category 1 or 2 flammable liquids, or Category 3 flammable liquids with a flashpoint below 100 °F (37.8 °C), shall not be drawn from or filled within buildings unless provision is made to prevent the accumulation of flammable vapors in hazardous concentrations. Where mechanical ventilation is required, it shall be kept in operation while flammable liquids with a flashpoint below 100 °F (37.8 °C) are being handled.

(3) * * *

(i) *Separation.* Tank vehicle and tank car loading or unloading facilities shall be separated from aboveground tanks, warehouses, other plant buildings or nearest line of adjoining property that may be built upon by a distance of 25 feet for Category 1 or 2 flammable

liquids, or Category 3 flammable liquids with a flashpoint below 100 °F (37.8 °C), and 15 feet for Category 3 flammable liquids with a flashpoint at or above 100 °F (37.8 °C) and Category 4 flammable liquids measured from the nearest position of any fill spout. Buildings for pumps or shelters for personnel may be a part of the facility.

(ii) *Category restriction.* Equipment such as piping, pumps, and meters used for the transfer of Category 1 or 2 flammable liquids, or Category 3 flammable liquids with a flashpoint below 100 °F (37.8 °C), between storage tanks and the fill stem of the loading rack shall not be used for the transfer of Category 3 flammable liquids with a flashpoint at or above 100 °F (37.8 °C) or Category 4 flammable liquids.

* * * * *

(iv) * * *

(a) * * *

(1) Where Category 1 or 2 flammable liquids, or Category 3 flammable liquids with a flashpoint below 100 °F (37.8 °C), are loaded, or

(2) Where Category 3 flammable liquids with a flashpoint at or above 100 °F (37.8 °C) or Category 4 flammable liquids are loaded into vehicles which may contain vapors from previous cargoes of Category 1 or 2 flammable liquids, or Category 3 flammable liquids with a flashpoint below 100 °F (37.8 °C).

* * * * *

(d) * * *

(2) Where no Category 1 or 2 flammable liquids, or Category 3 flammable liquids with a flashpoint below 100 °F (37.8 °C), are handled at the loading facility and the tank vehicles loaded are used exclusively for Category 3 flammable liquids with a flashpoint at or above 100 °F (37.8 °C) and Category 4 flammable liquids; and

* * * * *

(v) *Stray currents.* Tank car loading facilities where Category 1 or 2 flammable liquids, or Category 3 flammable liquids with a flashpoint below 100 °F (37.8 °C), are loaded through open domes shall be protected against stray currents by bonding the pipe to at least one rail and to the rack structure if of metal. Multiple lines entering the rack area shall be electrically bonded together. In addition, in areas where excessive stray currents are known to exist, all pipe entering the rack area shall be provided with insulating sections to electrically isolate the rack piping from the pipelines. No bonding between the tank car and the rack or piping is required during either loading or unloading of Category 3 flammable liquids with a

flashpoint at or above 100 °F (37.8 °C) or Category 4 flammable liquids.

(vi) *Container filling facilities.* Category 1 or 2 flammable liquids, or Category 3 flammable liquids with a flashpoint below 100 °F (37.8 °C), shall not be dispensed into containers unless the nozzle and container are electrically interconnected. Where the metallic floorplate on which the container stands while filling is electrically connected to the fill stem or where the fill stem is bonded to the container during filling operations by means of a bond wire, the provisions of this section shall be deemed to have been complied with.

(4) * * *

(viii) * * *

(e) In addition to the requirements of paragraph (f)(4)(viii)(d) of this section, each line conveying Category 1 or 2 flammable liquids, or Category 3 flammable liquids with a flashpoint below 100 °F (37.8 °C), leading to a wharf shall be provided with a readily accessible block valve located on shore near the approach to the wharf and outside of any diked area. Where more than one line is involved, the valves shall be grouped in one location.

* * * * *

(5) * * *

(i) *Application.* This paragraph (f)(5)(i) shall apply to areas where Category 1 or 2 flammable liquids, or Category 3 flammable liquids with a flashpoint below 100 °F (37.8 °C), are stored or handled. For areas where only Category 3 flammable liquids with a flashpoint at or above 100 °F (37.8 °C) or Category 4 flammable liquids are stored or handled, the electrical equipment may be installed in accordance with the provisions of Subpart S of this part, for ordinary locations.

* * * * *

(6) *Sources of ignition.* Category 1 or 2 flammable liquids, or Category 3 flammable liquids with a flashpoint below 100 °F (37.8 °C), shall not be handled, drawn, or dispensed where flammable vapors may reach a source of ignition. Smoking shall be prohibited except in designated localities. "No Smoking" signs shall be conspicuously posted where hazard from flammable liquid vapors is normally present.

* * * * *

(8) *Fire control.* Suitable fire-control devices, such as small hose or portable fire extinguishers, shall be available to locations where fires are likely to occur. Additional fire-control equipment may be required where a tank of more than 50,000 gallons individual capacity contains Category 1 or 2 flammable liquids, or Category 3 flammable liquids

with a flashpoint below 100 °F (37.8 °C), and where an unusual exposure hazard exists from surrounding property. Such additional fire-control equipment shall be sufficient to extinguish a fire in the largest tank. The design and amount of such equipment shall be in accordance with approved engineering standards.

* * * * *

(g) * * *

(1) * * *

(i) * * *

(c) Apparatus dispensing Category 1 or 2 flammable liquids, or Category 3 flammable liquids with a flashpoint below 100 °F (37.8 °C), into the fuel tanks of motor vehicles of the public shall not be located at a bulk plant unless separated by a fence or similar barrier from the area in which bulk operations are conducted.

* * * * *

(e) The provisions of paragraph (g)(1)(i)(a) of this section shall not prohibit the dispensing of flammable liquids with a flashpoint below 100 °F (37.8 °C) in the open from a tank vehicle to a motor vehicle. Such dispensing shall be permitted provided:

* * * * *

(f) Category 1 or 2 flammable liquids, or Category 3 flammable liquids with a flashpoint below 100 °F (37.8 °C), shall not be stored or handled within a building having a basement or pit into which flammable vapors may travel, unless such area is provided with ventilation designed to prevent the accumulation of flammable vapors therein.

* * * * *

(iii) * * *

(a) Except where stored in tanks as provided in paragraph (g)(1)(ii) of this section, no Category 1 or 2 flammable liquids, or Category 3 flammable liquids with a flashpoint below 100 °F (37.8 °C), shall be stored within any service station building except in closed containers of aggregate capacity not exceeding 60 gallons. One container not exceeding 60 gallons capacity equipped with an approved pump is permitted.

(b) Category 1 or 2 flammable liquids, or Category 3 flammable liquids with a flashpoint below 100 °F (37.8 °C), may be transferred from one container to another in lubrication or service rooms of a service station building provided the electrical installation complies with Table H-19 and provided that any heating equipment complies with paragraph (g)(6) of this section.

(c) Category 3 flammable liquids with a flashpoint at or above 100 °F (37.8 °C) and Category 4 flammable liquids may be stored and dispensed inside service

station buildings from tanks of not more than 120 gallons capacity each.

* * * * *

(v) *Dispensing into portable containers.* No delivery of any Category 1 or 2 flammable liquids, or Category 3 flammable liquids with a flashpoint below 100 °F (37.8 °C), shall be made into portable containers unless the container is constructed of metal, has a tight closure with screwed or spring cover, and is fitted with a spout or so designed so the contents can be poured without spilling.

* * * * *

(3) * * *

(iv) * * *

(a) Category 1 or 2 flammable liquids, or Category 3 flammable liquids with a flashpoint below 100 °F (37.8 °C), shall be transferred from tanks by means of fixed pumps so designed and equipped as to allow control of the flow and to prevent leakage or accidental discharge.

(b)(1) Only listed devices may be used for dispensing Category 1 or 2 flammable liquids, or Category 3 flammable liquids with a flashpoint below 100 °F (37.8 °C). No such device may be used if it shows evidence of having been dismantled.

(2) Every dispensing device for Category 1 or 2 flammable liquids, or Category 3 flammable liquids with a flashpoint below 100 °F (37.8 °C), installed after December 31, 1978, shall contain evidence of listing so placed that any attempt to dismantle the device will result in damage to such evidence, visible without disassembly or dismounting of the nozzle.

(c) Category 1 or 2 flammable liquids, or Category 3 flammable liquids with a flashpoint below 100 °F (37.8 °C), shall not be dispensed by pressure from drums, barrels, and similar containers. Approved pumps taking suction through the top of the container or approved self-closing faucets shall be used.

* * * * *

(v) * * *

(a) This paragraph (g)(3)(v) shall apply to systems for dispensing Category 1 or 2 flammable liquids, or Category 3 flammable liquids with a flashpoint below 100 °F (37.8 °C), where such liquids are transferred from storage to individual or multiple dispensing units by pumps located elsewhere than at the dispensing units.

* * * * *

(vi) * * *

(a) A listed manual or automatic-closing type hose nozzle valve shall be provided on dispensers used for the dispensing of Category 1 or 2 flammable

liquids, or Category 3 flammable liquids
with a flashpoint below 100 °F (37.8 °C).

(4) * * *

(iii) * * *

* * * * *

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TABLE H-19 - ELECTRICAL EQUIPMENT HAZARDOUS AREAS
- SERVICE STATIONS

Location	Class I Group D division	Extent of classified area
Underground tank: Fill opening.....	1	Any pit, box or space below grade level, any part of which is within the Division 1 or 2 classified area.
	2	Up to 18 inches above grade level within a horizontal radius of 10 feet from a loose fill connection and within a horizontal radius of 5 feet from a tight fill connection.
Vent-Discharging Upward.	1	Within 3 feet of open end of vent, extending in all directions.
	2	Area between 3 feet and 5 feet of open end of vent, extending in all directions.
Dispenser: Pits	1	Any pit, box or space below grade level, any part of which is within the Division 1 or 2 classified area.
Dispenser enclosure ..	1	The area 4 feet vertically above base within the enclosure and 18 inches horizontally in all directions.
Outdoor	2	Up to 18 inches above grade level within 20 feet horizontally of any edge of enclosure.
Indoor: With mechanical ventilation	2	Up to 18 inches above grade or floor level within 20 feet horizontally of any edge of enclosure.
With gravity ventilation	2	Up to 18 inches above grade or floor level within 25 feet horizontally of any edge of enclosure.

Remote pump - Outdoor.	1	Any pit, box or space below grade level if any part is within a horizontal distance of 10 feet from any edge of the pump.
	2	Within 3 feet of any edge of the pump, extending in all directions. Also up to 18 inches above grade level within 10 feet horizontally from any edge of the pump.
Remote pump - Indoor..	1	Entire area within any pit.
	2	Within 5 feet of any edge of pump, extending in all directions. Also up to 3 feet above floor or grade level within 25 feet horizontally from any edge of pump.
Lubrication or service room	1	Entire area within any pit.
	2	Area up to 18 inches above floor or grade level within entire lubrication room.
Dispenser for Liquids with a flashpoint below 100 °F (37.8 °C) (1)	2	Within 3 feet of any fill or dispensing point, extending in all directions.
Special enclosure inside building per 1910.106(f) (1) (ii). Sales, storage and rest rooms.....	1	Entire enclosure.
	(2)	If there is any opening to these rooms within the extent of a Division 1 area, the entire room shall be classified as Division 1.

Footnote (1) Category 1 or 2 flammable liquids, or for Category 3 flammable liquids with a flashpoint below 100 °F (37.8 °C).

Footnote (2) Ordinary

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(d) Piping handling Category 1 or 2 flammable liquids, or Category 3 flammable liquids with a flashpoint below 100 °F (37.8 °C), shall be grounded to control stray currents.

(5) * * *

(i) *Application.* This paragraph (g)(5) shall apply to areas where Category 1 or 2 flammable liquids, or Category 3 flammable liquids with a flashpoint below 100 °F (37.8 °C), are stored or handled. For areas where Category 3 flammable liquids with a flashpoint at or above 100 °F (37.8 °C) or Category 4 flammable liquids are stored or handled the electrical equipment may be installed in accordance with the

provisions of subpart S of this part, for ordinary locations.

* * * * *

(6) * * *

(iv) *Work areas.* Heating equipment using gas or oil fuel may be installed in the lubrication, sales, or service room where there is no dispensing or transferring of Category 1 or 2 flammable liquids or 3 flammable liquids with a flashpoint below 100 °F (37.8 °C), provided the bottom of the combustion chamber is at least 18 inches above the floor and the heating equipment is protected from physical damage by vehicles. Heating equipment using gas or oil fuel listed for use in garages may be installed in the lubrication or service room where Category 1 or 2 flammable liquids, or

Category 3 flammable liquids with a flashpoint below 100 °F (37.8 °C), are dispensed provided the equipment is installed at least 8 feet above the floor.

* * * * *

(7) *Drainage and waste disposal.* Provision shall be made in the area where Category 1 or 2 flammable liquids, or Category 3 flammable liquids with a flashpoint below 100 °F (37.8 °C), are dispensed to prevent spilled liquids from flowing into the interior of service station buildings. Such provision may be by grading driveways, raising door sills, or other equally effective means. Crankcase drainings and flammable liquids shall not be dumped into sewers but shall be stored in tanks or drums

outside of any building until removed from the premises.

* * * * *

(h) * * *

(3) * * *

(i) * * *

(a) Processing buildings shall be of fire-resistance or noncombustible construction, except heavy timber construction with load-bearing walls may be permitted for plants utilizing only stable Category 3 flammable liquids with a flashpoint at or above 100 °F (37.8 °C) or Category 4 flammable liquids. Except as provided in paragraph (h)(2)(ii) of this section or in the case of explosion resistant walls used in conjunction with explosion relieving facilities, see paragraph (h)(3)(iv) of this section, load-bearing walls are prohibited. Buildings shall be without basements or covered pits.

* * * * *

(iii) * * *

(b) Equipment used in a building and the ventilation of the building shall be designed so as to limit flammable vapor-air mixtures under normal operating conditions to the interior of equipment, and to not more than 5 feet from equipment which exposes Category 1 or 2 flammable liquids, or Category 3 flammable liquids with a flashpoint below 100 °F (37.8 °C), to the air. Examples of such equipment are dispensing stations, open centrifuges, plate and frame filters, open vacuum filters, and surfaces of open equipment.

(iv) *Explosion relief.* Areas where Category 1 or unstable liquids are processed shall have explosion venting through one or more of the following methods:

* * * * *

(5) *Tank vehicle and tank car loading and unloading.* Tank vehicle and tank car loading or unloading facilities shall be separated from aboveground tanks, warehouses, other plant buildings, or nearest line of adjoining property which may be built upon by a distance of 25 feet for Category 1 or 2 flammable liquids, or Category 3 flammable liquids with a flashpoint below 100 °F (37.8 °C), and 15 feet for Category 3 flammable liquids with a flashpoint at or above 100 °F (37.8 °C) and Category 4 flammable liquids measured from the nearest position of any fill stem. Buildings for pumps or shelters for personnel may be a part of the facility. Operations of the facility shall comply with the appropriate portions of paragraph (f)(3) of this section.

* * * * *

(7) * * *

(i) * * *

(b) Category 1 or 2 flammable liquids, or Category 3 flammable liquids with a flashpoint below 100 °F (37.8 °C), shall not be dispensed into containers unless the nozzle and container are electrically interconnected. Where the metallic floorplate on which the container stands while filling is electrically connected to the fill stem or where the fill stem is bonded to the container during filling operations by means of a bond wire, the provisions of this section shall be deemed to have been complied with.

* * * * *

(iii) * * *

(c) Locations where flammable vapor-air mixtures may exist under abnormal conditions and for a distance beyond Division 1 locations shall be classified Division 2 according to the requirements of subpart S of this part. These locations include an area within 20 feet horizontally, 3 feet vertically beyond a Division 1 area, and up to 3 feet above floor or grade level within 25 feet, if indoors, or 10 feet if outdoors, from any pump, bleeder, withdrawal fitting, meter, or similar device handling Category 1 or 2 flammable liquids, or Category 3 flammable liquids with a flashpoint below 100 °F (37.8 °C). Pits provided with adequate mechanical ventilation within a Division 1 or 2 area shall be classified Division 2. If Category 3 flammable liquids with a flashpoint at or above 100 °F (37.8 °C) or Category 4 flammable liquids only are handled, then ordinary electrical equipment is satisfactory though care shall be used in locating electrical apparatus to prevent hot metal from falling into open equipment.

* * * * *

(j) *Scope.* This section applies to the handling, storage, and use of flammable liquids with a flashpoint at or below 199.4 °F (93 °C) unless otherwise noted. This section does not apply to:

* * * * *

■ 5. Amend § 1910.107 as follows:

■ A. Amend paragraphs (c)(9)(i), (e)(1), (e)(2), (e)(3), (e)(6)(iv), (e)(8), and (e)(9) by removing the terms "flammable or combustible liquids" wherever it appears and adding in its place the phrase "flammable liquids or liquids with a flashpoint greater than 199.4 °F (93 °C)"; and

■ B. Revise the heading of paragraph (e), and (e)(4) to read as follows:

§ 1910.107 Spray finishing using flammable and combustible materials.

* * * * *

(e) *Flammable liquids and liquids with a flashpoint greater than 199.4 °F (93 °C)*

* * * * *

(4) *Transferring liquids.* Except as provided in paragraph (e)(5) of this section the withdrawal of flammable liquids and liquids with a flashpoint greater than 199.4 °F (93 °C) from containers having a capacity of greater than 60 gallons shall be by approved pumps. The withdrawal of flammable liquids or liquids with a flashpoint greater than 199.4 °F (93 °C) from containers and the filling of containers, including portable mixing tanks, shall be done only in a suitable mixing room or in a spraying area when the ventilating system is in operation. Adequate precautions shall be taken to protect against liquid spillage and sources of ignition.

* * * * *

■ 6. Amend § 1910.119 to revise paragraphs (a)(1)(ii) introductory text, (a)(1)(ii)(B) and the definition of "Trade secret" in paragraph (b) to read as follows:

§ 1910.119 Process safety management of highly hazardous chemicals.

* * * * *

(a) * * *

(1) * * *

(ii) A process which involves a Category 1 flammable gas (as defined in 1910.1200(c)) or a flammable liquid with a flashpoint below 100 °F (37.8 °C) on site in one location, in a quantity of 10,000 pounds (4535.9 kg) or more except for:

* * * * *

(B) Flammable liquids with a flashpoint below 100 °F (37.8 °C) stored in atmospheric tanks or transferred which are kept below their normal boiling point without benefit of chilling or refrigeration.

* * * * *

(b) * * *

Trade secret means any confidential formula, pattern, process, device, information or compilation of information that is used in an employer's business, and that gives the employer an opportunity to obtain an advantage over competitors who do not know or use it. See Appendix E to § 1910.1200—Definition of a Trade Secret (which sets out the criteria to be used in evaluating trade secrets).

* * * * *

■ 7. In § 1910.120, revise the definition of the term *Health hazard* in paragraph (a)(3) to read as follows:

§ 1910.120 Hazardous waste operations and emergency response.

(a) * * *

(3) * * *

Health hazard means a chemical or a pathogen where acute or chronic health

effects may occur in exposed employees. It also includes stress due to temperature extremes. The term *health hazard* includes chemicals that are classified in accordance with the Hazard Communication Standard, 29 CFR 1910.1200, as posing one of the following hazardous effects: Acute toxicity (any route of exposure); skin corrosion or irritation; serious eye damage or eye irritation; respiratory or skin sensitization; germ cell mutagenicity; carcinogenicity; reproductive toxicity; specific target organ toxicity (single or repeated exposure); aspiration toxicity or simple asphyxiant. (See Appendix A to § 1910.1200—Health Hazard Criteria (Mandatory) for the criteria for determining whether a chemical is classified as a health hazard.)

* * * * *

■ 8. Amend paragraph (d) of § 1910.123 by removing the definition of “Combustible liquid” and revising the definitions of the terms “Flammable liquid” and “Flashpoint” to read as follows:

§ 1910.123 Dipping and coating operations: Coverage and definitions.

* * * * *

(d) * * *

Flammable liquid means any liquid having a flashpoint at or below 199.4 °F (93 °C).

Flashpoint means the minimum temperature at which a liquid gives off a vapor in sufficient concentration to ignite if tested in accordance with the test methods in Appendix B to § 1910.1200—Physical Hazard Criteria.

* * * * *

■ 9. In § 1910.124, revise paragraph (c)(2) introductory text to read as follows:

§ 1910.124 General requirements for dipping and coating operations.

* * * * *

(c) * * *

(2) You must ensure that any exhaust air re-circulated from a dipping or coating operation using flammable liquids or liquids with flashpoints greater than 199.4 °F (93 °C) is:

* * * * *

■ 10. Amend § 1910.125 by revising the section heading and the introductory text (including the table) to read as follows:

§ 1910.125 Additional requirements for dipping and coating operations that use flammable liquids or liquids with flashpoints greater than 199.4 °F (93 °C).

If you use flammable liquids, you must comply with the requirements of this section as well as the requirements of §§ 1910.123, 1910.124, and 1910.126, as applicable.

You must also comply with this section if:

And:

- The flashpoint of the liquid is 199.4 °F (93 °C) or above

- The liquid is heated as part of the operation; or
- A heated object is placed in the liquid.

■ 11. Amend the introductory text of paragraph (c) of § 1910.126 by removing the words “or combustible”.

Subpart Q—[Amended]

- 13. Amend § 1910.252 as follows;
- A. Revise paragraph (c)(1)(iv);
- B. Add new paragraphs (c)(1)(v) and (c)(1)(vi).

§ 1910.252 General requirements.

* * * * *

(c) * * *

(1) * * *

(iv) *Hazard communication.* The employer shall include the potentially hazardous materials employed in fluxes, coatings, coverings, and filler metals, all of which are potentially used in welding and cutting, or are released to the atmosphere during welding and cutting, in the program established to comply with the Hazard Communication Standard (HCS) (§ 1910.1200). The employer shall ensure that each employee has access to labels on

containers of such materials and safety data sheets, and is trained in accordance with the provisions of § 1910.1200. Potentially hazardous materials shall include but not be limited to the materials itemized in paragraphs (c)(5) through (c)(12) of this section.

(v) *Additional considerations for hazard communication in welding, cutting, and brazing.* (A) The suppliers shall determine and shall label in accordance with § 1910.1200 any hazards associated with the use of their materials in welding, cutting, and brazing.

(B) In addition to any requirements imposed by § 1910.1200, all filler metals and fusible granular materials shall carry the following notice, as a minimum, on tags, boxes, or other containers:

Do not use in areas without adequate ventilation. See ANSI Z49.1–1967 Safety in Welding, Cutting, and Allied Processes published by the American Welding Society.

(C) Where brazing (welding) filler metals contain cadmium in significant amounts, the labels shall indicate the hazards associated with cadmium including cancer, lung and kidney effects, and acute toxicity effects.

(D) Where brazing and gas welding fluxes contain fluorine compounds, the labels shall indicate the hazards associated with fluorine compounds including eye and respiratory tract effects.

(vi) Prior to June 1, 2015, employers may include the following information on labels in lieu of the labeling requirements in paragraph (c)(1)(v) of this section:

(A) All filler metals and fusible granular materials shall carry the following notice, as a minimum, on tags, boxes, or other containers:

CAUTION

Welding may produce fumes and gases hazardous to health. Avoid breathing these fumes and gases. Use adequate ventilation. See ANSI Z49.1–1967 Safety in Welding and Cutting published by the American Welding Society.

(B) Brazing (welding) filler metals containing cadmium in significant amounts shall carry the following notice on tags, boxes, or other containers:

WARNING

CONTAINS CADMIUM—POISONOUS
FUMES MAY BE FORMED ON HEATING

Do not breathe fumes. Use only with adequate ventilation such as fume collectors, exhaust ventilators, or air-supplied respirators. See ANSI Z49.1–1967. If chest pain, cough, or fever develops after use call physician immediately.

(C) Brazing and gas welding fluxes containing fluorine compounds shall have a cautionary wording to indicate that they contain fluorine compounds. One such cautionary wording recommended by the American Welding

Society for brazing and gas welding fluxes reads as follows:

**CAUTION
CONTAINS FLUORIDES**

This flux when heated gives off fumes that may irritate eyes, nose and throat.

1. Avoid fumes—use only in well-ventilated spaces.
2. Avoid contact of flux with eyes or skin.
3. Do not take internally.

* * * * *

Subpart Z—[Amended]

(h) * * *
(2) * * *

(iv) The employer shall ensure that containers of contaminated protective devices or work clothing, which are to be taken out of change rooms or the workplace for cleaning, maintenance or disposal, bear labels in accordance with paragraph (j) of this section.

(3) * * *

(vi) The employer shall ensure that contaminated clothing is transported in sealed impermeable bags, or other closed, impermeable containers, and labeled in accordance with paragraph (j) of this section.

* * * * *

(j) * * *

(1) *Hazard communication—general.*

(i) Chemical manufacturers, importers, distributors and employers shall comply with all requirements of the Hazard Communication Standard (HCS) (§ 1910.1200) for asbestos.

(ii) In classifying the hazards of asbestos at least the following hazards are to be addressed: Cancer and lung effects.

(iii) Employers shall include asbestos in the hazard communication program established to comply with the HCS (§ 1910.1200). Employers shall ensure that each employee has access to labels on containers of asbestos and to safety data sheets, and is trained in accordance with the requirements of HCS and paragraph (j)(7) of this section.

* * * * *

(4) *Warning signs—(i) Posting.*

Warning signs shall be provided and displayed at each regulated area. In addition, warning signs shall be posted at all approaches to regulated areas so that an employee may read the signs and take necessary protective steps before entering the area.

(ii) *Sign specifications:*

(A) The warning signs required by paragraph (j)(4)(i) of this section shall bear the following legend:

DANGER
ASBESTOS
MAY CAUSE CANCER
CAUSES DAMAGE TO LUNGS
AUTHORIZED PERSONNEL ONLY

(B) In addition, where the use of respirators and protective clothing is required in the regulated area under this section, the warning signs shall include the following:

WEAR RESPIRATORY PROTECTION AND
PROTECTIVE CLOTHING IN THIS AREA

(C) Prior to June 1, 2016, employers may use the following legend in lieu of that specified in paragraph (j)(4)(ii)(A) of this section:

DANGER

ASBESTOS
CANCER AND LUNG DISEASE
HAZARD
AUTHORIZED PERSONNEL ONLY

(D) Prior to June 1, 2016, employers may use the following legend in lieu of that specified in paragraph (j)(4)(ii)(B) of this section:

RESPIRATORS AND PROTECTIVE
CLOTHING ARE REQUIRED IN THIS
AREA

(iii) The employer shall ensure that employees working in and contiguous to regulated areas comprehend the warning signs required to be posted by paragraph (j)(4)(i) of this section. Means to ensure employee comprehension may include the use of foreign languages, pictographs and graphics.

(iv) At the entrance to mechanical rooms/areas in which employees reasonably can be expected to enter and which contain ACM and/or PACM, the building owner shall post signs which identify the material which is present, its location, and appropriate work practices which, if followed, will ensure that ACM and/or PACM will not be disturbed. The employer shall ensure, to the extent feasible, that employees who come in contact with these signs can comprehend them. Means to ensure employee comprehension may include the use of foreign languages, pictographs, graphics, and awareness training.

(5) *Warning labels—(i) Labeling.* Labels shall be affixed to all raw materials, mixtures, scrap, waste, debris, and other products containing asbestos fibers, or to their containers. When a building owner or employer identifies previously installed ACM and/or PACM, labels or signs shall be affixed or posted so that employees will be notified of what materials contain ACM and/or PACM. The employer shall attach such labels in areas where they will clearly be noticed by employees who are likely to be exposed, such as at the entrance to mechanical room/areas. Signs required by paragraph (j) of this section may be posted in lieu of labels so long as they contain the information required for labeling.

(ii) *Label specifications.* In addition to the requirements of paragraph (j)(1), the employer shall ensure that labels of bags or containers of protective clothing and equipment, scrap, waste, and debris containing asbestos fibers include the following information:

DANGER
CONTAINS ASBESTOS FIBERS
MAY CAUSE CANCER
CAUSES DAMAGE TO LUNGS
DO NOT BREATHE DUST
AVOID CREATING DUST

■ 15. Amend § 1910.1001 as follows:

■ A. Remove paragraph (j)(5);

■ B. Redesignate paragraphs (j)(1) through (j)(4) as paragraphs (j)(2) through (j)(5);

■ C. Revise paragraphs (h)(2)(iv), (h)(3)(vi), the newly redesignated paragraphs (j)(4), (j)(5), and the introductory text of paragraph (j)(6);

■ D. Add new paragraph (j)(1);

■ E. Amend Appendix F, to § 1910.1001, Paragraph [A] (6) by removing “(j)(4)” and adding in its place “(j)(5)”.

The revisions and additions read as follows:

§ 1910.1001 Asbestos.

* * * * *

Society for brazing and gas welding fluxes reads as follows:

**CAUTION
CONTAINS FLUORIDES**

This flux when heated gives off fumes that may irritate eyes, nose and throat.

1. Avoid fumes—use only in well-ventilated spaces.
2. Avoid contact of flux with eyes or skin.
3. Do not take internally.

* * * * *

Subpart Z—[Amended]

(h) * * *

(2) * * *

(iv) The employer shall ensure that containers of contaminated protective devices or work clothing, which are to be taken out of change rooms or the workplace for cleaning, maintenance or disposal, bear labels in accordance with paragraph (j) of this section.

(3) * * *

(vi) The employer shall ensure that contaminated clothing is transported in sealed impermeable bags, or other closed, impermeable containers, and labeled in accordance with paragraph (j) of this section.

* * * * *

(j) * * *

(1) *Hazard communication—general.*
(i) Chemical manufacturers, importers, distributors and employers shall comply with all requirements of the Hazard Communication Standard (HCS) (§ 1910.1200) for asbestos.

(ii) In classifying the hazards of asbestos at least the following hazards are to be addressed: Cancer and lung effects.

(iii) Employers shall include asbestos in the hazard communication program established to comply with the HCS (§ 1910.1200). Employers shall ensure that each employee has access to labels on containers of asbestos and to safety data sheets, and is trained in accordance with the requirements of HCS and paragraph (j)(7) of this section.

* * * * *

(4) *Warning signs—(i) Posting.*

Warning signs shall be provided and displayed at each regulated area. In addition, warning signs shall be posted at all approaches to regulated areas so that an employee may read the signs and take necessary protective steps before entering the area.

(ii) *Sign specifications:*

(A) The warning signs required by paragraph (j)(4)(i) of this section shall bear the following legend:

**DANGER
ASBESTOS
MAY CAUSE CANCER
CAUSES DAMAGE TO LUNGS
AUTHORIZED PERSONNEL ONLY**

(B) In addition, where the use of respirators and protective clothing is required in the regulated area under this section, the warning signs shall include the following:

**WEAR RESPIRATORY PROTECTION AND
PROTECTIVE CLOTHING IN THIS AREA**

(C) Prior to June 1, 2016, employers may use the following legend in lieu of that specified in paragraph (j)(4)(ii)(A) of this section:

DANGER

**ASBESTOS
CANCER AND LUNG DISEASE
HAZARD
AUTHORIZED PERSONNEL ONLY**

(D) Prior to June 1, 2016, employers may use the following legend in lieu of that specified in paragraph (j)(4)(ii)(B) of this section:

**RESPIRATORS AND PROTECTIVE
CLOTHING ARE REQUIRED IN THIS
AREA**

(iii) The employer shall ensure that employees working in and contiguous to regulated areas comprehend the warning signs required to be posted by paragraph (j)(4)(i) of this section. Means to ensure employee comprehension may include the use of foreign languages, pictographs and graphics.

(iv) At the entrance to mechanical rooms/areas in which employees reasonably can be expected to enter and which contain ACM and/or PACM, the building owner shall post signs which identify the material which is present, its location, and appropriate work practices which, if followed, will ensure that ACM and/or PACM will not be disturbed. The employer shall ensure, to the extent feasible, that employees who come in contact with these signs can comprehend them. Means to ensure employee comprehension may include the use of foreign languages, pictographs, graphics, and awareness training.

(5) *Warning labels—(i) Labeling.*
Labels shall be affixed to all raw materials, mixtures, scrap, waste, debris, and other products containing asbestos fibers, or to their containers. When a building owner or employer identifies previously installed ACM and/or PACM, labels or signs shall be affixed or posted so that employees will be notified of what materials contain ACM and/or PACM. The employer shall attach such labels in areas where they will clearly be noticed by employees who are likely to be exposed, such as at the entrance to mechanical room/areas. Signs required by paragraph (j) of this section may be posted in lieu of labels so long as they contain the information required for labeling.

(ii) *Label specifications.* In addition to the requirements of paragraph (j)(1), the employer shall ensure that labels of bags or containers of protective clothing and equipment, scrap, waste, and debris containing asbestos fibers include the following information:

**DANGER
CONTAINS ASBESTOS FIBERS
MAY CAUSE CANCER
CAUSES DAMAGE TO LUNGS
DO NOT BREATHE DUST
AVOID CREATING DUST**

■ 15. Amend § 1910.1001 as follows:

■ A. Remove paragraph (j)(5);

■ B. Redesignate paragraphs (j)(1) through (j)(4) as paragraphs (j)(2) through (j)(5);

■ C. Revise paragraphs (h)(2)(iv), (h)(3)(vi), the newly redesignated paragraphs (j)(4), (j)(5), and the introductory text of paragraph (j)(6);

■ D. Add new paragraph (j)(1);

■ E. Amend Appendix F, to § 1910.1001, Paragraph [A] (6) by removing “(j)(4)” and adding in its place “(j)(5)”.

The revisions and additions read as follows:

§ 1910.1001 Asbestos.

* * * * *

effects may occur in exposed employees. It also includes stress due to temperature extremes. The term *health hazard* includes chemicals that are classified in accordance with the Hazard Communication Standard, 29 CFR 1910.1200, as posing one of the following hazardous effects: Acute toxicity (any route of exposure); skin corrosion or irritation; serious eye damage or eye irritation; respiratory or skin sensitization; germ cell mutagenicity; carcinogenicity; reproductive toxicity; specific target organ toxicity (single or repeated exposure); aspiration toxicity or simple asphyxiant. (See Appendix A to § 1910.1200—Health Hazard Criteria (Mandatory) for the criteria for determining whether a chemical is classified as a health hazard.)

* * * * *

■ 8. Amend paragraph (d) of § 1910.123 by removing the definition of “Combustible liquid” and revising the definitions of the terms “Flammable liquid” and “Flashpoint” to read as follows:

§ 1910.123 Dipping and coating operations: Coverage and definitions.

* * * * *

(d) * * *

Flammable liquid means any liquid having a flashpoint at or below 199.4 °F (93 °C).

Flashpoint means the minimum temperature at which a liquid gives off a vapor in sufficient concentration to ignite if tested in accordance with the test methods in Appendix B to § 1910.1200—Physical Hazard Criteria.

* * * * *

■ 9. In § 1910.124, revise paragraph (c)(2) introductory text to read as follows:

§ 1910.124 General requirements for dipping and coating operations.

* * * * *

(c) * * *

(2) You must ensure that any exhaust air re-circulated from a dipping or coating operation using flammable liquids or liquids with flashpoints greater than 199.4 °F (93 °C) is:

* * * * *

■ 10. Amend § 1910.125 by revising the section heading and the introductory text (including the table) to read as follows:

§ 1910.125 Additional requirements for dipping and coating operations that use flammable liquids or liquids with flashpoints greater than 199.4 °F (93 °C).

If you use flammable liquids, you must comply with the requirements of this section as well as the requirements of §§ 1910.123, 1910.124, and 1910.126, as applicable.

You must also comply with this section if:

And:

• The flashpoint of the liquid is 199.4 °F (93 °C) or above

• The liquid is heated as part of the operation; or
• A heated object is placed in the liquid.

■ 11. Amend the introductory text of paragraph (c) of § 1910.126 by removing the words “or combustible”.

Subpart Q—[Amended]

containers of such materials and safety data sheets, and is trained in accordance with the provisions of § 1910.1200. Potentially hazardous materials shall include but not be limited to the materials itemized in paragraphs (c)(5) through (c)(12) of this section.

(v) *Additional considerations for hazard communication in welding, cutting, and brazing.* (A) The suppliers shall determine and shall label in accordance with § 1910.1200 any hazards associated with the use of their materials in welding, cutting, and brazing.

(B) In addition to any requirements imposed by § 1910.1200, all filler metals and fusible granular materials shall carry the following notice, as a minimum, on tags, boxes, or other containers:

Do not use in areas without adequate ventilation. See ANSI Z49.1–1967 Safety in Welding, Cutting, and Allied Processes published by the American Welding Society.

(C) Where brazing (welding) filler metals contain cadmium in significant amounts, the labels shall indicate the hazards associated with cadmium including cancer, lung and kidney effects, and acute toxicity effects.

(D) Where brazing and gas welding fluxes contain fluorine compounds, the labels shall indicate the hazards associated with fluorine compounds including eye and respiratory tract effects.

(vi) Prior to June 1, 2015, employers may include the following information on labels in lieu of the labeling requirements in paragraph (c)(1)(v) of this section:

(A) All filler metals and fusible granular materials shall carry the following notice, as a minimum, on tags, boxes, or other containers:

CAUTION

Welding may produce fumes and gases hazardous to health. Avoid breathing these fumes and gases. Use adequate ventilation. See ANSI Z49.1–1967 Safety in Welding and Cutting published by the American Welding Society.

(B) Brazing (welding) filler metals containing cadmium in significant amounts shall carry the following notice on tags, boxes, or other containers:

WARNING

CONTAINS CADMIUM—POISONOUS
FUMES MAY BE FORMED ON HEATING

Do not breathe fumes. Use only with adequate ventilation such as fume collectors, exhaust ventilators, or air-supplied respirators. See ANSI Z49.1–1967. If chest pain, cough, or fever develops after use call physician immediately.

(C) Brazing and gas welding fluxes containing fluorine compounds shall have a cautionary wording to indicate that they contain fluorine compounds. One such cautionary wording recommended by the American Welding

■ 13. Amend § 1910.252 as follows;

■ A. Revise paragraph (c)(1)(iv);

■ B. Add new paragraphs (c)(1)(v) and (c)(1)(vi).

§ 1910.252 General requirements.

* * * * *

(c) * * *

(1) * * *

(iv) *Hazard communication.* The employer shall include the potentially hazardous materials employed in fluxes, coatings, coverings, and filler metals, all of which are potentially used in welding and cutting, or are released to the atmosphere during welding and cutting, in the program established to comply with the Hazard Communication Standard (HCS) (§ 1910.1200). The employer shall ensure that each employee has access to labels on

(iii) Prior to June 1, 2015, employers may include the following information on raw materials, mixtures or labels of bags or containers of protective clothing and equipment, scrap, waste, and debris containing asbestos fibers in lieu of the labeling requirements in paragraphs (j)(1)(i) and (j)(5)(ii) of this section:

DANGER
CONTAINS ASBESTOS FIBERS
AVOID CREATING DUST
CANCER AND LUNG DISEASE HAZARD

(6) The provisions for labels and for safety data sheets required by paragraph (j) of this section do not apply where:

* * * * *

■ 16. Amend § 1910.1003 as follows:

■ A. In the last sentence in paragraph (c)(4)(v) remove the words "paragraphs (e)(2), (3), and (4)" and add the words "paragraph (e)" in their place;

■ B. Revise the heading of paragraph (e);

■ C. Revise paragraphs (e)(1) and (e)(2).

■ D. Remove paragraph (e)(3); and

■ E. Redesignate paragraphs (e)(4) and (e)(5) as (e)(3) and (e)(4).

The revisions read as follows:

§ 1910.1003 13 Carcinogens (4-nitrobiphenyl, etc.).

* * * * *

(e) *Communication of hazards*—(1)

Hazard communication. (i) Chemical manufacturers, importers, distributors and employers shall comply with all requirements of the Hazard Communication Standard (HCS) (§ 1910.1200) for each carcinogen listed in paragraph (e)(1)(iv) of this section.

(ii) In classifying the hazards of carcinogens listed in paragraph (e)(1)(iv) of this section, at least the hazards listed in paragraph (e)(1)(iv) are to be addressed.

(iii) Employers shall include the carcinogens listed in paragraph (e)(1)(iv) of this section in the hazard communication program established to comply with the HCS (§ 1910.1200). Employers shall ensure that each employee has access to labels on containers of the carcinogens listed in paragraph (e)(1)(iv) and to safety data sheets, and is trained in accordance with the requirements of HCS and paragraph (e)(4) of this section.

(iv) List of Carcinogens:

(A) 4-Nitrobiphenyl: Cancer.

(B) alpha-Naphthylamine: Cancer; skin irritation; and acute toxicity effects.

(C) Methyl chloromethyl ether: Cancer; skin, eye and respiratory effects; acute toxicity effects; and flammability.

(D) 3,3'-Dichlorobenzidine (and its salts): Cancer and skin sensitization.

(E) bis-Chloromethyl ether: Cancer; skin, eye, and respiratory tract effects; acute toxicity effects; and flammability.

(F) beta-Naphthylamine: Cancer and acute toxicity effects.

(G) Benzidine: Cancer and acute toxicity effects.

(H) 4-Aminodiphenyl: Cancer.

(I) Ethyleneimine: Cancer; mutagenicity; skin and eye effects; liver effects; kidney effects; acute toxicity effects; and flammability.

(J) beta-Propiolactone: Cancer; skin irritation; eye effects; and acute toxicity effects.

(K) 2-Acetylaminofluorene: Cancer.

(L) 4-Dimethylaminoazo-benzene: Cancer; skin effects; and respiratory tract irritation.

(M) N-Nitrosodimethylamine: Cancer; liver effects; and acute toxicity effects.

(2) *Signs.* (i) The employer shall post entrances to regulated areas with signs bearing the legend:

DANGER
(CHEMICAL IDENTIFICATION)
MAY CAUSE CANCER
AUTHORIZED PERSONNEL ONLY

(ii) The employer shall post signs at entrances to regulated areas containing operations covered in paragraph (c)(5) of this section. The signs shall bear the legend:

DANGER
(CHEMICAL IDENTIFICATION)
MAY CAUSE CANCER
WEAR AIR-SUPPLIED HOODS,
IMPERVIOUS SUITS, AND PROTECTIVE
EQUIPMENT IN THIS AREA
AUTHORIZED PERSONNEL ONLY

(iii) Prior to June 1, 2016, employers may use the following legend in lieu of that specified in paragraph (e)(2)(i) of this section:

CANCER-SUSPECT AGENT
AUTHORIZED PERSONNEL ONLY

(iv) Prior to June 1, 2016, employers may use the following legend in lieu of that specified in paragraph (e)(2)(ii) of this section:

CANCER-SUSPECT AGENT EXPOSED IN
THIS AREA
IMPERVIOUS SUIT INCLUDING GLOVES,
BOOTS, AND AIR-SUPPLIED HOOD
REQUIRED AT ALL TIMES
AUTHORIZED PERSONNEL ONLY

(v) Appropriate signs and instructions shall be posted at the entrance to, and exit from, regulated areas, informing employees of the procedures that must be followed in entering and leaving a regulated area.

* * * * *

■ 17. Revise § 1910.1017 paragraph (l) to read as follows:

§ 1910.1017 Vinyl chloride.

* * * * *

(l) *Communication of hazards*—(1) *Hazard communication—general.* (i)

Chemical manufacturers, importers, distributors and employers shall comply with all requirements of the Hazard Communication Standard (HCS) (§ 1910.1200) for vinyl chloride and polyvinyl chloride.

(ii) In classifying the hazards of vinyl chloride at least the following hazards are to be addressed: Cancer; central nervous system effects; liver effects; blood effects; and flammability.

(iii) Employers shall include vinyl chloride in the hazard communication program established to comply with the HCS (§ 1910.1200). Employers shall ensure that each employee has access to labels on containers of vinyl chloride and to safety data sheets, and is trained in accordance with the requirements of HCS and paragraph (j) of this section.

(2) *Signs.* (i) The employer shall post entrances to regulated areas with legible signs bearing the legend:

DANGER
VINYL CHLORIDE
MAY CAUSE CANCER
AUTHORIZED PERSONNEL ONLY

(ii) The employer shall post signs at areas containing hazardous operations or where emergencies currently exist. The signs shall be legible and bear the legend:

DANGER
VINYL CHLORIDE
MAY CAUSE CANCER
WEAR RESPIRATORY PROTECTION AND
PROTECTIVE CLOTHING IN THIS AREA
AUTHORIZED PERSONNEL ONLY

(iii) Prior to June 1, 2016, employers may use the following legend in lieu of that specified in paragraph (l)(2)(i) of this section:

CANCER-SUSPECT AGENT AREA
AUTHORIZED PERSONNEL ONLY

(iv) Prior to June 1, 2016, employers may use the following legend in lieu of that specified in paragraph (l)(2)(ii) of this section:

CANCER-SUSPECT AGENT IN THIS AREA
PROTECTIVE EQUIPMENT REQUIRED
AUTHORIZED PERSONNEL ONLY

(3) *Labels.* (i) In addition to the other requirements in this paragraph (l), the employer shall ensure that labels for containers of polyvinyl chloride resin waste from reactors or other waste contaminated with vinyl chloride are legible and include the following information:

CONTAMINATED WITH VINYL CHLORIDE
MAY CAUSE CANCER

(ii) Prior to June 1, 2015, employers may include the following information on labels of containers of polyvinyl chloride resin waste from reactors or other waste contaminated with vinyl

chloride in lieu of the labeling requirements in paragraphs (l)(3)(i) of this section:

CONTAMINATED WITH VINYL CHLORIDE
CANCER-SUSPECT AGENT

(4) Prior to June 1, 2015, employers may include the following information for containers of polyvinyl chloride in lieu of the labeling requirements in paragraphs (l)(1)(i) of this section:

POLYVINYL CHLORIDE (OR TRADE NAME)
Contains
VINYL CHLORIDE
VINYL CHLORIDE IS A CANCER-SUSPECT AGENT

(5)(i) Prior to June 1, 2015, employers may include either the following information in either paragraph (l)(5)(i) or (l)(5)(ii) of this section on containers of vinyl chloride in lieu of the labeling requirements in paragraph (l)(1)(i) of this section:

VINYL CHLORIDE
EXTREMELY FLAMMABLE GAS UNDER PRESSURE
CANCER-SUSPECT AGENT

(ii) In accordance with 49 CFR Parts 170–189, with the additional legend applied near the label or placard:

CANCER-SUSPECT AGENT

(6) No statement shall appear on or near any required sign, label, or instruction which contradicts or detracts from the effect of any required warning, information, or instruction.

* * * * *

■ 18. Revise § 1910.1018 paragraphs (j)(2)(vii) and (p) to read as follows:

§ 1910.1018 Inorganic arsenic.

* * * * *

(j) * * *

(2) * * *

(vii) Labels on contaminated protective clothing and equipment.

(A) The employer shall ensure that the containers of contaminated protective clothing and equipment in the workplace or which are to be removed from the workplace are labeled and that the labels include the following information:

DANGER: CONTAMINATED WITH INORGANIC ARSENIC. MAY CAUSE CANCER. DO NOT REMOVE DUST BY BLOWING OR SHAKING. DISPOSE OF INORGANIC ARSENIC CONTAMINATED WASH WATER IN ACCORDANCE WITH APPLICABLE LOCAL, STATE OR FEDERAL REGULATIONS.

(B) Prior to June 1, 2015, employers may include the following information on containers of protective clothing and equipment in lieu of the labeling requirements in paragraphs (j)(2)(vii) of this section:

CAUTION: Clothing contaminated with inorganic arsenic; do not remove dust by blowing or shaking. Dispose of inorganic arsenic contaminated wash water in accordance with applicable local, State or Federal regulations.

* * * * *

(p) *Communication of hazards*—(1) *Hazard communication—General.* (i) Chemical manufacturers, importers, distributors and employers shall comply with all requirements of the Hazard Communication Standard (HCS) (§ 1910.1200) for inorganic arsenic.

(ii) In classifying the hazards of inorganic arsenic at least the following hazards are to be addressed: Cancer; liver effects; skin effects; respiratory irritation; nervous system effects; and acute toxicity effects.

(iii) Employers shall include inorganic arsenic in the hazard communication program established to comply with the HCS (§ 1910.1200). Employers shall ensure that each employee has access to labels on containers of inorganic arsenic and to safety data sheets, and is trained in accordance with the requirements of HCS and paragraph (o) of this section.

(iv) The employer shall ensure that no statement appears on or near any sign or label required by this paragraph (p) which contradicts or detracts from the meaning of the required sign or label.

(2) *Signs.* (i) The employer shall post signs demarcating regulated areas bearing the legend:

DANGER
INORGANIC ARSENIC
MAY CAUSE CANCER
DO NOT EAT, DRINK OR SMOKE
WEAR RESPIRATORY PROTECTION IN THIS AREA
AUTHORIZED PERSONNEL ONLY

(ii) Prior to June 1, 2016, employers may use the following legend in lieu of that specified in paragraph (p)(2)(i) of this section:

DANGER
INORGANIC ARSENIC
CANCER HAZARD
AUTHORIZED PERSONNEL ONLY
NO SMOKING OR EATING
RESPIRATOR REQUIRED

(iii) The employer shall ensure that signs required by this paragraph (p) are illuminated and cleaned as necessary so that the legend is readily visible.

(3)(i) Prior to June 1, 2015, in lieu of the labeling requirements in paragraphs (p)(1)(i) of this section, employers may apply precautionary labels to all shipping and storage containers of inorganic arsenic, and to all products containing inorganic arsenic, bearing the following legend:

DANGER

CONTAINS INORGANIC ARSENIC
CANCER HAZARD
HARMFUL IF INHALED OR SWALLOWED
USE ONLY WITH ADEQUATE VENTILATION OR RESPIRATORY PROTECTION

(ii) Labels are not required when the inorganic arsenic in the product is bound in such a manner so as to make unlikely the possibility of airborne exposure to inorganic arsenic. (Possible examples of products not requiring labels are semiconductors, light emitting diodes and glass.)

* * * * *

■ 19. Amend § 1910.1025 as follows:

■ A. Revise paragraph (g)(2)(vii) and paragraph (m);

■ B. Revise Appendix B to § 1910.1025, paragraph xi.

The revisions read as follows:

§ 1910.1025 Lead.

* * * * *

(g) * * *

(2) * * *

(vii) Labeling of contaminated protective clothing and equipment.

(A) The employer shall ensure that labels of bags or containers of contaminated protective clothing and equipment include the following information:

DANGER: CLOTHING AND EQUIPMENT CONTAMINATED WITH LEAD. MAY DAMAGE FERTILITY OR THE UNBORN CHILD. CAUSES DAMAGE TO THE CENTRAL NERVOUS SYSTEM. DO NOT EAT, DRINK OR SMOKE WHEN HANDLING. DO NOT REMOVE DUST BY BLOWING OR SHAKING. DISPOSE OF LEAD CONTAMINATED WASH WATER IN ACCORDANCE WITH APPLICABLE LOCAL, STATE, OR FEDERAL REGULATIONS.

(B) Prior to June 1, 2015, employers may include the following information on bags or containers of contaminated protective clothing and equipment in lieu of the labeling requirements in paragraphs (g)(2)(vii)(A) of this section:

CAUTION: CLOTHING CONTAMINATED WITH LEAD. DO NOT REMOVE DUST BY BLOWING OR SHAKING. DISPOSE OF LEAD CONTAMINATED WASH WATER IN ACCORDANCE WITH APPLICABLE LOCAL, STATE, OR FEDERAL REGULATIONS.

* * * * *

(m) *Communication of hazards*—(1) *Hazard communication—general.* (i) Chemical manufacturers, importers, distributors and employers shall comply with all requirements of the Hazard Communication Standard (HCS) (§ 1910.1200) for lead.

(ii) In classifying the hazards of lead at least the following hazards are to be addressed: Reproductive/developmental

toxicity; central nervous system effects; kidney effects; blood effects; and acute toxicity effects.

(iii) Employers shall include lead in the hazard communication program established to comply with the HCS (§ 1910.1200). Employers shall ensure that each employee has access to labels on containers of lead and to safety data sheets, and is trained in accordance with the requirements of HCS and paragraph (l) of this section.

(2) *Signs.* (i) The employer shall post the following warning signs in each work area where the PEL is exceeded:

DANGER
LEAD
MAY DAMAGE FERTILITY OR THE
UNBORN CHILD
CAUSES DAMAGE TO THE CENTRAL
NERVOUS SYSTEM
DO NOT EAT, DRINK OR SMOKE IN THIS
AREA

(ii) The employer shall ensure that no statement appears on or near any sign required by this paragraph (m)(2) which contradicts or detracts from the meaning of the required sign.

(iii) The employer shall ensure that signs required by this paragraph (m)(2) are illuminated and cleaned as necessary so that the legend is readily visible.

(iv) The employer may use signs required by other statutes, regulations, or ordinances in addition to, or in combination with, signs required by this paragraph (m)(2).

(v) Prior to June 1, 2016, employers may use the following legend in lieu of that specified in paragraph (m)(2)(ii) of this section:

WARNING
LEAD WORK AREA
POISON
NO SMOKING OR EATING
* * * * *

Appendix B to § 1910.1025—Employee Standard Summary

* * * * *

xi. SIGNS—PARAGRAPH (m)

The standard requires that the following warning sign be posted in the work areas when the exposure to lead exceeds the PEL:

DANGER
LEAD
MAY DAMAGE FERTILITY OR THE
UNBORN CHILD
CAUSES DAMAGE TO THE CENTRAL
NERVOUS SYSTEM
DO NOT EAT, DRINK OR SMOKE IN THIS
AREA

However, prior to June 1, 2016, employers may use the following legend in lieu of that specified above:

WARNING

LEAD WORK AREA
POISON
NO SMOKING OR EATING
* * * * *

■ 20. Revise § 1910.1026, paragraphs (h)(2)(iv) and (l)(1) to read as follows:

§ 1910.1026 Chromium (VI).

* * * * *
(h) * * *
(2) * * *

(iv) The employer shall ensure that bags or containers of contaminated protective clothing or equipment that are removed from change rooms for laundering, cleaning, maintenance, or disposal are labeled in accordance with the requirements of the Hazard Communication Standard, § 1910.1200.

* * * * *

(l) * * *

(1) *Hazard communication—general*
(i) Chemical manufacturers, importers, distributors and employers shall comply with all requirements of the Hazard Communication Standard (HCS) (§ 1910.1200) for chromium (VI).

(ii) In classifying the hazards of chromium (VI) at least the following hazards are to be addressed: Cancer, eye irritation, and skin sensitization.

(iii) Employers shall include chromium (VI) in the hazard communication program established to comply with the HCS (§ 1910.1200). Employers shall ensure that each employee has access to labels on containers of chromium (VI) and to safety data sheets, and is trained in accordance with the requirements of HCS and paragraph (l)(2) of this section.

* * * * *

■ 21. Revise § 1910.1027 paragraphs (k)(7), (m)(1), (m)(2), and (m)(3) to read as follows:

§ 1910.1027 Cadmium.

* * * * *

(k) * * *

(7) Waste, scrap, debris, bags, containers, personal protective equipment, and clothing contaminated with cadmium and consigned for disposal shall be collected and disposed of in sealed impermeable bags or other closed, impermeable containers. These bags and containers shall be labeled in accordance with paragraph (m) of this section.

* * * * *

(m) * * *

(1) *Hazard communication—general.*

(i) Chemical manufacturers, importers, distributors and employers shall comply with all requirements of the Hazard Communication Standard (HCS) (§ 1910.1200) for cadmium.

(ii) In classifying the hazards of cadmium at least the following hazards

are to be addressed: Cancer; lung effects; kidney effects; and acute toxicity effects.

(iii) Employers shall include cadmium in the hazard communication program established to comply with the HCS (§ 1910.1200). Employers shall ensure that each employee has access to labels on containers of cadmium and to safety data sheets, and is trained in accordance with the requirements of HCS and paragraph (m)(4) of this section.

(2) *Warning signs.* (i) Warning signs shall be provided and displayed in regulated areas. In addition, warning signs shall be posted at all approaches to regulated areas so that an employee may read the signs and take necessary protective steps before entering the area.

(ii) Warning signs required by paragraph (m)(2)(i) of this section shall bear the following legend:

DANGER
CADMIUM
MAY CAUSE CANCER
CAUSES DAMAGE TO LUNGS AND
KIDNEYS
WEAR RESPIRATORY PROTECTION IN
THIS AREA
AUTHORIZED PERSONNEL ONLY

(iii) The employer shall ensure that signs required by this paragraph (m)(2) are illuminated, cleaned, and maintained as necessary so that the legend is readily visible.

(iv) Prior to June 1, 2016, employers may use the following legend in lieu of that specified in paragraph (m)(2)(ii) of this section:

DANGER
CADMIUM
CANCER HAZARD
CAN CAUSE LUNG AND KIDNEY DISEASE
AUTHORIZED PERSONNEL ONLY
RESPIRATORS REQUIRED IN THIS AREA

(3) *Warning labels.* (i) Shipping and storage containers containing cadmium or cadmium compounds shall bear appropriate warning labels, as specified in paragraph (m)(1) of this section.

(ii) The warning labels for containers of contaminated protective clothing, equipment, waste, scrap, or debris shall include at least the following information:

DANGER
CONTAINS CADMIUM
MAY CAUSE CANCER
CAUSES DAMAGE TO LUNGS AND
KIDNEYS
AVOID CREATING DUST

(iii) Prior to June 1, 2015, employers may include the following information on shipping and storage containers containing cadmium, cadmium compounds, or cadmium contaminated clothing, equipment, waste, scrap, or debris in lieu of the labeling

requirements specified in paragraphs (m)(1)(i) and (m)(3)(ii) of this section:

DANGER
CONTAINS CADMIUM
CANCER HAZARD
AVOID CREATING DUST
CAN CAUSE LUNG AND KIDNEY DISEASE

(iv) Where feasible, installed cadmium products shall have a visible label or other indication that cadmium is present.

* * * * *

■ 22. Revise § 1910.1028, paragraph (j) heading, and paragraphs (j)(1) and (j)(2) to read as follows:

§ 1910.1028 Benzene.

* * * * *

(j) *Communication of hazards*—(1) *Hazard communication—general.* (i) Chemical manufacturers, importers, distributors and employers shall comply with all requirements of the Hazard Communication Standard (HCS) (§ 1910.1200) for benzene.

(ii) In classifying the hazards of benzene at least the following hazards are to be addressed: Cancer; central nervous system effects; blood effects; aspiration; skin, eye, and respiratory tract irritation; and flammability.

(iii) Employers shall include benzene in the hazard communication program established to comply with the HCS (§ 1910.1200). Employers shall ensure that each employee has access to labels on containers of benzene and to safety data sheets, and is trained in accordance with the requirements of HCS and paragraph (j)(3) of this section.

(2) *Warning signs and labels.* (i) The employer shall post signs at entrances to regulated areas. The signs shall bear the following legend:

DANGER
BENZENE
MAY CAUSE CANCER
HIGHLY FLAMMABLE LIQUID AND VAPOR
DO NOT SMOKE
WEAR RESPIRATORY PROTECTION IN
THIS AREA
AUTHORIZED PERSONNEL ONLY

(ii) Prior to June 1, 2016, employers may use the following legend in lieu of that specified in paragraph (j)(2)(i) of this section:

DANGER
BENZENE
CANCER HAZARD
FLAMMABLE—NO SMOKING
AUTHORIZED PERSONNEL ONLY
RESPIRATOR REQUIRED

(iii) The employer shall ensure that labels or other appropriate forms of warning are provided for containers of benzene within the workplace. There is no requirement to label pipes. The labels shall comply with the

requirements of paragraph (j)(1) of this section and § 1910.1200(f).

(iv) Prior to June 1, 2015, employers shall include the following legend or similar language on the labels or other appropriate forms of warning:

DANGER
CONTAINS BENZENE
CANCER HAZARD

* * * * *

■ 23. Revise § 1910.1029 paragraph (l) heading, and paragraphs (l)(1) through (l)(3) to read as follows:

§ 1910.1029 Coke oven emissions.

* * * * *

(l) *Communication of hazards*—(1) *Hazard communication—general.* The employer shall include coke oven emissions in the program established to comply with the Hazard Communication Standard (HCS) (§ 1910.1200). The employer shall ensure that each employee has access to labels on containers of chemicals and substances associated with coke oven processes and to safety data sheets, and is trained in accordance with the provisions of HCS and paragraph (k) of this section. The employer shall ensure that at least the following hazard is addressed: Cancer.

(2) *Signs.* (i) The employer shall post signs in the regulated area bearing the legend:

DANGER
COKE OVEN EMISSIONS
MAY CAUSE CANCER
DO NOT EAT, DRINK OR SMOKE
WEAR RESPIRATORY PROTECTION IN
THIS AREA
AUTHORIZED PERSONNEL ONLY

(ii) In addition, the employer shall post signs in the areas where the permissible exposure limit is exceeded bearing the legend:

WEAR RESPIRATORY PROTECTION IN
THIS AREA

(iii) The employer shall ensure that no statement appears on or near any sign required by this paragraph (l) which contradicts or detracts from the effects of the required sign.

(iv) The employer shall ensure that signs required by this paragraph (l)(2) are illuminated and cleaned as necessary so that the legend is readily visible.

(v) Prior to June 1, 2016, employers may use the following legend in lieu of that specified in paragraph (l)(2)(i) of this section:

DANGER
CANCER HAZARD
AUTHORIZED PERSONNEL ONLY
NO SMOKING OR EATING

(vi) Prior to June 1, 2016, employers may use the following legend in lieu of that specified in paragraph (l)(2)(ii) of this section:

DANGER
RESPIRATOR REQUIRED

(3) *Labels.* (i) The employer shall ensure that labels of containers of contaminated protective clothing and equipment include the following information:

CONTAMINATED WITH COKE EMISSIONS
MAY CAUSE CANCER
DO NOT REMOVE DUST BY BLOWING OR
SHAKING

(ii) Prior to June 1, 2015, employers may include the following information on contaminated protective clothing and equipment in lieu of the labeling requirements in paragraph (l)(3)(i) of this section:

CAUTION
CLOTHING CONTAMINATED WITH COKE
EMISSIONS
DO NOT REMOVE DUST BY BLOWING OR
SHAKING

* * * * *

■ 24. Revise § 1910.1043 paragraph (j) to read as follows:

§ 1910.1043 Cotton dust.

* * * * *

(j) *Signs.* (1) The employer shall post the following warning sign in each work area where the permissible exposure limit for cotton dust is exceeded:

DANGER
COTTON DUST
CAUSES DAMAGE TO LUNGS
(BYSSINOSIS)
WEAR RESPIRATORY PROTECTION IN
THIS AREA

(2) Prior to June 1, 2016, employers may use the following legend in lieu of that specified in paragraph (j)(1) of this section:

WARNING
COTTON DUST WORK AREA
MAY CAUSE ACUTE OR DELAYED
LUNG INJURY
(BYSSINOSIS)
RESPIRATORS
REQUIRED IN THIS AREA

* * * * *

■ 25. Revise § 1910.1044 paragraphs (j)(2)(v), (k)(1)(iii)(b), and paragraph (o) to read as follows:

§ 1910.1044 1,2-dibromo-3-chloropropane.

* * * * *

(j) * * *
(2) * * *

(v) Containers of DBCP-contaminated protective devices or work clothing which are to be taken out of change rooms or the workplace for cleaning, maintenance or disposal shall bear

labels with the following information:
CONTAMINATED WITH 1,2-Dibromo-
3-chloropropane (DBCP), MAY CAUSE
CANCER.

* * * * *

(k) * * *

(1) * * *

(iii) * * *

(b) Portable vacuum units used to collect DBCP may not be used for other cleaning purposes and shall be labeled as prescribed by paragraph (j)(2)(v) of this section.

* * * * *

(o) *Communication of hazards*—(1) *Hazard communication—general.* (i) Chemical manufacturers, importers, distributors and employers shall comply with all requirements of the Hazard Communication Standard (HCS) (§ 1910.1200) for DBCP.

(ii) In classifying the hazards of DBCP at least the following hazards are to be addressed: Cancer; reproductive effects; liver effects; kidney effects; central nervous system effects; skin, eye and respiratory tract irritation; and acute toxicity effects.

(iii) Employers shall include DBCP in the hazard communication program established to comply with the HCS (§ 1910.1200). Employers shall ensure that each employee has access to labels on containers of DBCP and to safety data sheets, and is trained in accordance with the requirements of HCS and paragraph (n) of this section.

(iv) The employer shall ensure that no statement appears on or near any sign or label required by this paragraph (o) which contradicts or detracts from the meaning of the required sign or label.

(2) *Signs.* (i) The employer shall post signs to clearly indicate all regulated areas. These signs shall bear the legend:

DANGER
1,2-Dibromo-3-chloropropane
MAY CAUSE CANCER
WEAR RESPIRATORY PROTECTION IN
THIS AREA
AUTHORIZED PERSONNEL ONLY

(ii) Prior to June 1, 2016, employers may use the following legend in lieu of that specified in paragraph (o)(2) of this section:

DANGER
1,2-Dibromo-3-chloropropane
(Insert appropriate trade or common names)
CANCER HAZARD
AUTHORIZED PERSONNEL ONLY
RESPIRATOR REQUIRED

(3) *Labels.* (i) Where DBCP or products containing DBCP are sold, distributed or otherwise leave the employer's workplace bearing appropriate labels required by EPA under the regulations in 40 CFR Part

162, the labels required by this paragraph (o)(3) need not be affixed.

(ii) The employer shall ensure that the precautionary labels required by this paragraph (o)(3) are readily visible and legible.

(iii) Prior to June 1, 2015, employers may include the following information on containers of DBCP or products containing DBCP, DBCP-contaminated protective devices or work clothing or DBCP-contaminated portable vacuums in lieu of the labeling requirements in paragraphs (j)(2)(v), (k)(1)(iii)(b) and (o)(1)(i) of this section:

DANGER
1,2-Dibromo-3-chloropropane
CANCER HAZARD

* * * * *

■ 26. Revise § 1910.1045 paragraph (p) to read as follows:

§ 1910.1045 Acrylonitrile.

* * * * *

(p) *Communication of hazards*—(1) *Hazard communication—general.* (i) Chemical manufacturers, importers, distributors and employers shall comply with all requirements of the Hazard Communication Standard (HCS) (§ 1910.1200) for AN and AN-based materials not exempted under paragraph (a)(2) of this section.

(ii) In classifying the hazards of AN and AN-based materials at least the following hazards are to be addressed: Cancer; central nervous system effects; liver effects; skin sensitization; skin, respiratory, and eye irritation; acute toxicity effects; and flammability.

(iii) Employers shall include AN and AN-based materials in the hazard communication program established to comply with the HCS (§ 1910.1200). Employers shall ensure that each employee has access to labels on containers of AN and AN-based materials and to safety data sheets, and is trained in accordance with the requirements of HCS and paragraph (o) of this section.

(iv) The employer shall ensure that no statement appears on or near any sign or label required by this paragraph (p) that contradicts or detracts from the required sign or label.

(2) *Signs.* (i) The employer shall post signs to clearly indicate all workplaces where AN concentrations exceed the permissible exposure limits. The signs shall bear the following legend:

DANGER
ACRYLONITRILE (AN)
MAY CAUSE CANCER
RESPIRATORY PROTECTION MAY BE
REQUIRED IN THIS AREA
AUTHORIZED PERSONNEL ONLY

(ii) The employer shall ensure that signs required by this paragraph (p)(2) are illuminated and cleaned as necessary so that the legend is readily visible.

(iii) Prior to June 1, 2016, employers may use the following legend in lieu of that specified in paragraph (p)(2)(i) of this section:

DANGER
ACRYLONITRILE (AN)
CANCER HAZARD
AUTHORIZED PERSONNEL ONLY
RESPIRATORS MAY BE REQUIRED

(3) *Labels.* (i) The employer shall ensure that precautionary labels are in compliance with paragraph (p)(1)(i) of this section and are affixed to all containers of liquid AN and AN-based materials not exempted under paragraph (a)(2) of this section. The employer shall ensure that the labels remain affixed when the materials are sold, distributed, or otherwise leave the employer's workplace.

(ii) Prior to June 1, 2015, employers may include the following information on precautionary labels required by this paragraph (p)(3) in lieu of the labeling requirements in paragraph (p)(1) of this section:

DANGER
CONTAINS ACRYLONITRILE (AN)
CANCER HAZARD

(iii) The employer shall ensure that the precautionary labels required by this paragraph (p)(3) are readily visible and legible.

* * * * *

■ 27. Revise § 1910.1047 paragraph (j) heading, and paragraphs (j)(1) and (j)(2) to read as follows:

§ 1910.1047 Ethylene oxide.

* * * * *

(j) *Communication of hazards*—(1) *Hazard communication—general.* (i) Chemical manufacturers, importers, distributors and employers shall comply with all requirements of the Hazard Communication Standard (HCS) (§ 1910.1200) for EtO.

(ii) In classifying the hazards of EtO at least the following hazards are to be addressed: Cancer; reproductive effects; mutagenicity; central nervous system; skin sensitization; skin, eye and respiratory tract irritation; acute toxicity effects; and flammability.

(iii) Employers shall include EtO in the hazard communication program established to comply with the HCS (§ 1910.1200). Employers shall ensure that each employee has access to labels on containers of EtO and to safety data sheets, and is trained in accordance with the requirements of HCS and paragraph (j)(3) of this section.

(2) *Signs and labels*—(i) *Signs*. (A) The employer shall post and maintain legible signs demarcating regulated areas and entrances or access ways to regulated areas that bear the following legend:

DANGER
ETHYLENE OXIDE
MAY CAUSE CANCER
MAY DAMAGE FERTILITY OR THE
UNBORN CHILD
RESPIRATORY PROTECTION AND
PROTECTIVE CLOTHING MAY BE
REQUIRED IN THIS AREA
AUTHORIZED PERSONNEL ONLY

(B) Prior to June 1, 2016, employers may use the following legend in lieu of that specified in paragraph (j)(2)(i)(A) of this section:

DANGER
ETHYLENE OXIDE
CANCER HAZARD AND REPRODUCTIVE
HAZARD
AUTHORIZED PERSONNEL ONLY
RESPIRATORS AND PROTECTIVE
CLOTHING MAY BE REQUIRED TO BE
WORN IN THIS AREA

(ii) *Labels*. (A) The employer shall ensure that labels are affixed to all containers of EtO whose contents are capable of causing employee exposure at or above the action level or whose contents may reasonably be foreseen to cause employee exposure above the excursion limit, and that the labels remain affixed when the containers of EtO leave the workplace. For the purposes of this paragraph (j)(2)(ii), reaction vessels, storage tanks, and pipes or piping systems are not considered to be containers.

(B) Prior to June 1, 2015, employers may include the following information on containers of EtO in lieu of the labeling requirements in paragraph (j)(1)(i) of this section:

(1) DANGER
CONTAINS ETHYLENE OXIDE
CANCER HAZARD AND REPRODUCTIVE
HAZARD;

(2) A warning statement against breathing airborne concentrations of EtO.

(C) The labeling requirements under this section do not apply where EtO is used as a pesticide, as such term is defined in the Federal Insecticide, Fungicide, and Rodenticide Act (7 U.S.C. 136 et seq.), when it is labeled pursuant to that Act and regulations issued under that Act by the Environmental Protection Agency.

* * * * *

■ 28. Revise § 1910.1048 paragraphs (e)(1), (h)(2)(ii), (j)(4) and (m) to read as follows:

§ 1910.1048 Formaldehyde.

* * * * *

(e) * * *

(1) *Signs*. (i) The employer shall establish regulated areas where the concentration of airborne formaldehyde exceeds either the TWA or the STEL and post all entrances and access ways with signs bearing the following legend:

DANGER
FORMALDEHYDE
MAY CAUSE CANCER
CAUSES SKIN, EYE, AND RESPIRATORY
IRRITATION
AUTHORIZED PERSONNEL ONLY

(ii) Prior to June 1, 2016, employers may use the following legend in lieu of that specified in paragraph (e)(1)(i) of this section:

DANGER
FORMALDEHYDE
IRRITANT AND POTENTIAL CANCER
HAZARD
AUTHORIZED PERSONNEL ONLY

* * * * *

(h) * * *

(2) * * *

(ii) When formaldehyde-contaminated clothing and equipment is ventilated, the employer shall establish storage areas so that employee exposure is minimized.

(A) *Signs*. Storage areas for contaminated clothing and equipment shall have signs bearing the following legend:

DANGER
FORMALDEHYDE-CONTAMINATED
[CLOTHING] EQUIPMENT
MAY CAUSE CANCER
CAUSES SKIN, EYE AND RESPIRATORY
IRRITATION
DO NOT BREATHE VAPOR
DO NOT GET ON SKIN

(B) *Labels*. The employer shall ensure containers for contaminated clothing and equipment are labeled consistent with the Hazard Communication Standard, § 1910.1200, and shall, as a minimum, include the following:

DANGER
FORMALDEHYDE-CONTAMINATED
[CLOTHING] EQUIPMENT
MAY CAUSE CANCER
CAUSES SKIN, EYE, AND RESPIRATORY
IRRITATION
DO NOT BREATHE VAPOR
DO NOT GET ON SKIN

(C) Prior to June 1, 2016, employers may use the following legend in lieu of that specified in paragraph (h)(2)(ii)(A) of this section:

DANGER
FORMALDEHYDE-CONTAMINATED
[CLOTHING] EQUIPMENT
AVOID INHALATION AND SKIN CONTACT

(D) Prior to June 1, 2015, employers may include the following information on containers of protective clothing and equipment in lieu of the labeling

requirements in paragraphs (h)(2)(ii)(B) of this section:

DANGER
FORMALDEHYDE-CONTAMINATED
[CLOTHING] EQUIPMENT
AVOID INHALATION AND SKIN CONTACT

* * * * *

(j) * * *

(4) Formaldehyde-contaminated waste and debris resulting from leaks or spills shall be placed for disposal in sealed containers bearing a label warning of formaldehyde's presence and of the hazards associated with formaldehyde. The employer shall ensure that the labels are in accordance with paragraph (m) of this section.

* * * * *

(m) *Communication of hazards*. (1) *Hazard communication—General*. (i) Chemical manufacturers, importers, distributors and employers shall comply with all requirements of the Hazard Communication Standard (HCS) (§ 1910.1200) for formaldehyde.

(ii) In classifying the hazards of formaldehyde at least the following hazards are to be addressed: Cancer; skin and respiratory sensitization; eye, skin and respiratory tract irritation; acute toxicity effects; and flammability.

(iii) Employers shall include formaldehyde in the hazard communication program established to comply with the HCS (§ 1910.1200). Employers shall ensure that each employee has access to labels on containers of formaldehyde and to safety data sheets, and is trained in accordance with the requirements of HCS and paragraph (n) of this section.

(iv) Paragraphs (m)(1)(i), (m)(1)(ii), and (m)(1)(iii) of this section apply to chemicals associated with formaldehyde gas, all mixtures or solutions composed of greater than 0.1 percent formaldehyde, and materials capable of releasing formaldehyde into the air at concentrations reaching or exceeding 0.1 ppm.

(v) In making the determinations of anticipated levels of formaldehyde release, the employer may rely on objective data indicating the extent of potential formaldehyde release under reasonably foreseeable conditions of use.

(2)(i) In addition to the requirements in paragraphs (m)(1) through (m)(1)(iv) of this section, for materials listed in paragraph (m)(1)(iv) capable of releasing formaldehyde at levels above 0.5 ppm, labels shall appropriately address all hazards as defined in paragraph (d) of § 1910.1200 and Appendices A and B to § 1910.1200, including cancer and respiratory sensitization, and shall

contain the hazard statement "May Cause Cancer."

(ii) As a minimum, for all materials listed in paragraph (m)(1)(i) and (iv) of this section capable of releasing formaldehyde at levels of 0.1 ppm to 0.5 ppm, labels shall identify that the product contains formaldehyde; list the name and address of the responsible party; and state that physical and health hazard information is readily available from the employer and from safety data sheets.

(iii) Prior to June 1, 2015, employers may include the phrase "Potential Cancer Hazard" in lieu of "May Cause Cancer" as specified in paragraph (m)(2)(i) of this section.

* * * * *

■ 29. Amend § 1910.1050 as follows:

- A. Revise the heading of paragraph (k);
- B. Revise paragraphs (k)(1) and (k)(2);
- C. Redesignate paragraphs (k)(3) and (k)(4) as (k)(4) and (k)(5);
- D. Add new paragraph (k)(3).

The revisions and additions read as follows:

§ 1910.1050 Methylene dianiline.

* * * * *

(k) *Communication of hazards*—(1) *Hazard communication—general.*

(i) Chemical manufacturers, importers, distributors and employers shall comply with all requirements of the Hazard Communication Standard (HCS) (§ 1910.1200) for MDA.

(ii) In classifying the hazards of MDA at least the following hazards are to be addressed: Cancer; liver effects; and skin sensitization.

(iii) Employers shall include MDA in the hazard communication program established to comply with the HCS (§ 1910.1200). Employers shall ensure that each employee has access to labels on containers of MDA and to safety data sheets, and is trained in accordance with the requirements of HCS and paragraph (k)(4) of this section.

(2) *Signs and labels*—(i) *Signs.* (A) The employer shall post and maintain legible signs demarcating regulated areas and entrances or access ways to regulated areas that bear the following legend:

DANGER
MDA
MAY CAUSE CANCER
CAUSES DAMAGE TO THE LIVER
RESPIRATORY PROTECTION AND
PROTECTIVE CLOTHING MAY BE
REQUIRED IN THIS AREA
AUTHORIZED PERSONNEL ONLY

(B) Prior to June 1, 2016, employers may use the following legend in lieu of that specified in paragraph (k)(2)(i)(A) of this section:

DANGER
MDA
MAY CAUSE CANCER
LIVER TOXIN
AUTHORIZED PERSONNEL ONLY
RESPIRATORS AND PROTECTIVE
CLOTHING MAY BE REQUIRED TO BE
WORN IN THIS AREA

(ii) *Labels.* Prior to June 1, 2015, employers may include the following information workplace labels in lieu of the labeling requirements in paragraph (k)(1) of this section:

(A) For pure MDA:

DANGER
CONTAINS MDA
MAY CAUSE CANCER
LIVER TOXIN

(B) For mixtures containing MDA:

DANGER
CONTAINS MDA
CONTAINS MATERIALS WHICH MAY
CAUSE CANCER
LIVER TOXIN

(3) *Safety data sheets (SDS).* In meeting the obligation to provide safety data sheets, employers shall make appropriate use of the information found in Appendices A and B to § 1910.1050.

* * * * *

■ 30. Revise § 1910.1051 paragraph (l)(1) to read as follows:

§ 1910.1051 1,3-Butadiene.

* * * * *

(l) * * *

(1) *Hazard communication—general.*

(i) Chemical manufacturers, importers, distributors and employers shall comply with all requirements of the Hazard Communication Standard (HCS) (§ 1910.1200) for BD.

(ii) In classifying the hazards of BD at least the following hazards are to be addressed: Cancer; eye and respiratory tract irritation; center nervous system effects; and flammability.

(iii) Employers shall include BD in the hazard communication program established to comply with the HCS (§ 1910.1200). Employers shall ensure that each employee has access to labels on containers of BD and to safety data sheets, and is trained in accordance with the requirements of HCS and paragraph (l)(2) of this section.

* * * * *

■ 31. Amend § 1910.1052 as follows:

- A. Revise paragraph (k);
- B. Remove the phrase "material safety data sheets (MSDS)" and add in its place the phrase "safety data sheets (SDS)" where it appears in Appendix A, Paragraph X.E.

The revisions read as follows:

§ 1910.1052 Methylene chloride.

* * * * *

(k) *Hazard communication.*—(1) *Hazard communication—general.* (i) Chemical manufacturers, importers, distributors and employers shall comply with all requirements of the Hazard Communication Standard (HCS) (§ 1910.1200) for MC.

(ii) In classifying the hazards of MC at least the following hazards are to be addressed: Cancer, cardiac effects (including elevation of carboxyhemoglobin), central nervous system effects, liver effects, and skin and eye irritation.

(iii) Employers shall include MC in the hazard communication program established to comply with the HCS (§ 1910.1200). Employers shall ensure that each employee has access to labels on containers of MC and to safety data sheets, and is trained in accordance with the requirements of HCS and paragraph (l) of this section.

(2) [Reserved]

* * * * *

■ 32. Amend § 1910.1200 as follows:

■ A. Remove the word "material" before the word "safety" in the phrase "material safety data sheet" or "material safety data sheets" wherever they appear in paragraphs (b)(3)(ii), (b)(4)(ii), (e)(1) introductory text, (e)(2)(i), (g)(4), (g)(6)(i) through (iv), (g)(7)(i) through (vii), (g)(9), (g)(11), (h)(1), (h)(2)(iii), and (i)(1)(ii);

■ B. Remove the word "Material" before the word "safety" in the phrase "Material safety data sheets" wherever they appear in paragraphs (g)(10) and (g)(11). In paragraphs (g)(10) and (g)(11) in the first sentence, capitalize the first letter of the word "safety".

■ C. Remove the following definitions in paragraph (c) *Combustible liquid, Compressed gas, Explosive, Flammable, Flashpoint, Hazard warning, Identity, Material safety data sheet (MSDS), Organic peroxide, Oxidizer, Pyrophoric, Unstable (reactive), and Water-reactive;*

■ D. Revise the following definitions in paragraph (c) *Chemical, Chemical name, Health hazard, Label, Mixture, Physical hazard, and Trade secret;*

■ E. Redesignate the definition of the term *Hazardous chemical* in alphabetical order in paragraph (c) and revise the definition;

■ F. Add the following definitions in alphabetical order in paragraph (c) *Classification, Hazard category, Hazard class, Hazard not otherwise classified, Hazard statement, Label elements, Pictogram, Precautionary statement, Product identifier, Pyrophoric gas, Safety Data Sheet (SDS), Signal word, Simple asphyxiant, and Substance;*

■ G. Remove the following phrases: "in" before the phrase "in their work area(s)"

in paragraph (g)(10); "specific chemical identity" in paragraph (i)(10)(ii); and "or percentage of mixture" in paragraph (i)(13);

■ H. Revise paragraphs (a), (b)(1), (b)(3)(iv), (b)(5)(iv), (b)(6)(ii), paragraph (d) (heading), paragraphs (d)(1) through (d)(3), (e)(1)(i), (f), paragraph (g) (heading), paragraphs (g)(1), (g)(2), (g)(3), (g)(5), (g)(8), (g)(11), (h)(1), (h)(3)(ii), (h)(3)(iv), (i)(1) introductory text, (i)(1)(iii) and (iv), (i)(2), (i)(3) introductory text, (i)(3)(iii), (i)(7) introductory text, (i)(7)(iii), (i)(7)(v), (i)(9)(i), (i)(10), (i)(11), and (j).

■ I. Remove Appendices A, B, and E to § 1910.1200.

■ J. Redesignate Appendix D to § 1910.1200 as Appendix E to § 1910.1200.

■ K. Add new Appendices A, B, C, D and F to § 1910.1200.

The revisions and additions read as follows:

§ 1910.1200 Hazard communication.

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

(2) This occupational safety and health standard is intended to address comprehensively the issue of classifying the potential hazards of chemicals, and communicating information concerning hazards and appropriate protective measures to employees, and to preempt any legislative or regulatory enactments of a state, or political subdivision of a state, pertaining to this subject. Classifying the potential hazards of chemicals and communicating information concerning hazards and appropriate protective measures to employees, may include, for example, but is not limited to, provisions for: developing and maintaining a written hazard communication program for the workplace, including lists of hazardous chemicals present; labeling of containers of chemicals in the workplace, as well as of containers of chemicals being shipped to other workplaces; preparation and

distribution of safety data sheets to employees and downstream employers; and development and implementation of employee training programs regarding hazards of chemicals and protective measures. Under section 18 of the Act, no state or political subdivision of a state may adopt or enforce any requirement relating to the issue addressed by this Federal standard, except pursuant to a Federally-approved state plan.

(b) * * *

(1) This section requires chemical manufacturers or importers to classify the hazards of chemicals which they produce or import, and all employers to provide information to their employees about the hazardous chemicals to which they are exposed, by means of a hazard communication program, labels and other forms of warning, safety data sheets, and information and training. In addition, this section requires distributors to transmit the required information to employers. (Employers who do not produce or import chemicals need only focus on those parts of this rule that deal with establishing a workplace program and communicating information to their workers.)

* * * * *

(3) * * *

(iv) Laboratory employers that ship hazardous chemicals are considered to be either a chemical manufacturer or a distributor under this rule, and thus must ensure that any containers of hazardous chemicals leaving the laboratory are labeled in accordance with paragraph (f) of this section, and that a safety data sheet is provided to distributors and other employers in accordance with paragraphs (g)(6) and (g)(7) of this section.

* * * * *

(5) * * *

(iv) Any distilled spirits (beverage alcohols), wine, or malt beverage intended for nonindustrial use, as such terms are defined in the Federal Alcohol Administration Act (27 U.S.C. 201 et seq.) and regulations issued under that Act, when subject to the labeling requirements of that Act and labeling regulations issued under that Act by the Bureau of Alcohol, Tobacco, Firearms and Explosives;

* * * * *

(6) * * *

(ii) Any hazardous substance as such term is defined by the Comprehensive Environmental Response, Compensation and Liability Act (CERCLA) (42 U.S.C. 9601 et seq.) when the hazardous substance is the focus of remedial or removal action being conducted under

CERCLA in accordance with Environmental Protection Agency regulations.

* * * * *

(c) * * *

Chemical means any substance, or mixture of substances.

* * * * *

Chemical name means the scientific designation of a chemical in accordance with the nomenclature system developed by the International Union of Pure and Applied Chemistry (IUPAC) or the Chemical Abstracts Service (CAS) rules of nomenclature, or a name that will clearly identify the chemical for the purpose of conducting a hazard classification.

Classification means to identify the relevant data regarding the hazards of a chemical; review those data to ascertain the hazards associated with the chemical; and decide whether the chemical will be classified as hazardous according to the definition of hazardous chemical in this section. In addition, classification for health and physical hazards includes the determination of the degree of hazard, where appropriate, by comparing the data with the criteria for health and physical hazards.

* * * * *

Hazard category means the division of criteria within each hazard class, e.g., oral acute toxicity and flammable liquids include four hazard categories. These categories compare hazard severity within a hazard class and should not be taken as a comparison of hazard categories more generally.

Hazard class means the nature of the physical or health hazards, e.g., flammable solid, carcinogen, oral acute toxicity.

Hazard not otherwise classified (HNOC) means an adverse physical or health effect identified through evaluation of scientific evidence during the classification process that does not meet the specified criteria for the physical and health hazard classes addressed in this section. This does not extend coverage to adverse physical and health effects for which there is a hazard class addressed in this section, but the effect either falls below the cut-off value/concentration limit of the hazard class or is under a GHS hazard category that has not been adopted by OSHA (e.g., acute toxicity Category 5).

Hazard statement means a statement assigned to a hazard class and category that describes the nature of the hazard(s) of a chemical, including, where appropriate, the degree of hazard.

Hazardous chemical means any chemical which is classified as a physical hazard or a health hazard, a

simple asphyxiant, combustible dust, pyrophoric gas, or hazard not otherwise classified.

Health hazard means a chemical which is classified as posing one of the following hazardous effects: acute toxicity (any route of exposure); skin corrosion or irritation; serious eye damage or eye irritation; respiratory or skin sensitization; germ cell mutagenicity; carcinogenicity; reproductive toxicity; specific target organ toxicity (single or repeated exposure); or aspiration hazard. The criteria for determining whether a chemical is classified as a health hazard are detailed in Appendix A to § 1910.1200—Health Hazard Criteria.

* * * * *

Label means an appropriate group of written, printed or graphic information elements concerning a hazardous chemical that is affixed to, printed on, or attached to the immediate container of a hazardous chemical, or to the outside packaging.

Label elements means the specified pictogram, hazard statement, signal word and precautionary statement for each hazard class and category.

Mixture means a combination or a solution composed of two or more substances in which they do not react.

Physical hazard means a chemical that is classified as posing one of the following hazardous effects: explosive; flammable (gases, aerosols, liquids, or solids); oxidizer (liquid, solid or gas); self-reactive; pyrophoric (liquid or solid); self-heating; organic peroxide; corrosive to metal; gas under pressure; or in contact with water emits flammable gas. See Appendix B to § 1910.1200—Physical Hazard Criteria.

Pictogram means a composition that may include a symbol plus other graphic elements, such as a border, background pattern, or color, that is intended to convey specific information about the hazards of a chemical. Eight pictograms are designated under this standard for application to a hazard category.

Precautionary statement means a phrase that describes recommended measures that should be taken to minimize or prevent adverse effects resulting from exposure to a hazardous chemical, or improper storage or handling.

Product identifier means the name or number used for a hazardous chemical on a label or in the SDS. It provides a unique means by which the user can identify the chemical. The product identifier used shall permit cross-references to be made among the list of hazardous chemicals required in the

written hazard communication program, the label and the SDS.

* * * * *

Pyrophoric gas means a chemical in a gaseous state that will ignite spontaneously in air at a temperature of 130 degrees F (54.4 degrees C) or below.

* * * * *

Safety data sheet (SDS) means written or printed material concerning a hazardous chemical that is prepared in accordance with paragraph (g) of this section.

Signal word means a word used to indicate the relative level of severity of hazard and alert the reader to a potential hazard on the label. The signal words used in this section are "danger" and "warning." "Danger" is used for the more severe hazards, while "warning" is used for the less severe.

Simple asphyxiant means a substance or mixture that displaces oxygen in the ambient atmosphere, and can thus cause oxygen deprivation in those who are exposed, leading to unconsciousness and death.

* * * * *

Substance means chemical elements and their compounds in the natural state or obtained by any production process, including any additive necessary to preserve the stability of the product and any impurities deriving from the process used, but excluding any solvent which may be separated without affecting the stability of the substance or changing its composition.

Trade secret means any confidential formula, pattern, process, device, information or compilation of information that is used in an employer's business, and that gives the employer an opportunity to obtain an advantage over competitors who do not know or use it. Appendix E to § 1910.1200—Definition of Trade Secret, sets out the criteria to be used in evaluating trade secrets.

* * * * *

(d) **Hazard classification.** (1) Chemical manufacturers and importers shall evaluate chemicals produced in their workplaces or imported by them to classify the chemicals in accordance with this section. For each chemical, the chemical manufacturer or importer shall determine the hazard classes, and, where appropriate, the category of each class that apply to the chemical being classified. Employers are not required to classify chemicals unless they choose not to rely on the classification performed by the chemical manufacturer or importer for the chemical to satisfy this requirement.

(2) Chemical manufacturers, importers or employers classifying

chemicals shall identify and consider the full range of available scientific literature and other evidence concerning the potential hazards. There is no requirement to test the chemical to determine how to classify its hazards. Appendix A to § 1910.1200 shall be consulted for classification of health hazards, and Appendix B to § 1910.1200 shall be consulted for the classification of physical hazards.

(3) **Mixtures.** (i) Chemical manufacturers, importers, or employers evaluating chemicals shall follow the procedures described in Appendices A and B to § 1910.1200 to classify the hazards of the chemicals, including determinations regarding when mixtures of the classified chemicals are covered by this section.

(ii) When classifying mixtures they produce or import, chemical manufacturers and importers of mixtures may rely on the information provided on the current safety data sheets of the individual ingredients, except where the chemical manufacturer or importer knows, or in the exercise of reasonable diligence should know, that the safety data sheet misstates or omits information required by this section.

* * * * *

(e) * * *

(1) * * *

(i) A list of the hazardous chemicals known to be present using a product identifier that is referenced on the appropriate safety data sheet (the list may be compiled for the workplace as a whole or for individual work areas); and,

* * * * *

(f) **Labels and other forms of warning—**(1) **Labels on shipped containers.** The chemical manufacturer, importer, or distributor shall ensure that each container of hazardous chemicals leaving the workplace is labeled, tagged, or marked. Hazards not otherwise classified do not have to be addressed on the container. Where the chemical manufacturer or importer is required to label, tag or mark the following information shall be provided:

(i) Product identifier;
(ii) Signal word;
(iii) Hazard statement(s);
(iv) Pictogram(s);
(v) Precautionary statement(s); and,
(vi) Name, address, and telephone number of the chemical manufacturer, importer, or other responsible party.

(2) The chemical manufacturer, importer, or distributor shall ensure that the information provided under paragraphs (f)(1)(i) through (v) of this section is in accordance with Appendix

C to § 1910.1200, for each hazard class and associated hazard category for the hazardous chemical, prominently displayed, and in English (other languages may also be included if appropriate).

(3) The chemical manufacturer, importer, or distributor shall ensure that the information provided under paragraphs (f)(1)(ii) through (iv) of this section is located together on the label, tag, or mark.

(4) *Solid materials.* (i) For solid metal (such as a steel beam or a metal casting), solid wood, or plastic items that are not exempted as articles due to their downstream use, or shipments of whole grain, the required label may be transmitted to the customer at the time of the initial shipment, and need not be included with subsequent shipments to the same employer unless the information on the label changes;

(ii) The label may be transmitted with the initial shipment itself, or with the safety data sheet that is to be provided prior to or at the time of the first shipment; and,

(iii) This exception to requiring labels on every container of hazardous chemicals is only for the solid material itself, and does not apply to hazardous chemicals used in conjunction with, or known to be present with, the material and to which employees handling the items in transit may be exposed (for example, cutting fluids or pesticides in grains).

(5) Chemical manufacturers, importers, or distributors shall ensure that each container of hazardous chemicals leaving the workplace is labeled, tagged, or marked in accordance with this section in a manner which does not conflict with the requirements of the Hazardous Materials Transportation Act (49 U.S.C. 1801 *et seq.*) and regulations issued under that Act by the Department of Transportation.

(6) *Workplace labeling.* Except as provided in paragraphs (f)(7) and (f)(8) of this section, the employer shall ensure that each container of hazardous chemicals in the workplace is labeled, tagged or marked with either:

(i) The information specified under paragraphs (f)(1)(i) through (v) of this section for labels on shipped containers; or,

(ii) Product identifier and words, pictures, symbols, or combination thereof, which provide at least general information regarding the hazards of the chemicals, and which, in conjunction with the other information immediately available to employees under the hazard communication program, will provide employees with the specific information

regarding the physical and health hazards of the hazardous chemical.

(7) The employer may use signs, placards, process sheets, batch tickets, operating procedures, or other such written materials in lieu of affixing labels to individual stationary process containers, as long as the alternative method identifies the containers to which it is applicable and conveys the information required by paragraph (f)(6) of this section to be on a label. The employer shall ensure the written materials are readily accessible to the employees in their work area throughout each work shift.

(8) The employer is not required to label portable containers into which hazardous chemicals are transferred from labeled containers, and which are intended only for the immediate use of the employee who performs the transfer. For purposes of this section, drugs which are dispensed by a pharmacy to a health care provider for direct administration to a patient are exempted from labeling.

(9) The employer shall not remove or deface existing labels on incoming containers of hazardous chemicals, unless the container is immediately marked with the required information.

(10) The employer shall ensure that workplace labels or other forms of warning are legible, in English, and prominently displayed on the container, or readily available in the work area throughout each work shift. Employers having employees who speak other languages may add the information in their language to the material presented, as long as the information is presented in English as well.

(11) Chemical manufacturers, importers, distributors, or employers who become newly aware of any significant information regarding the hazards of a chemical shall revise the labels for the chemical within six months of becoming aware of the new information, and shall ensure that labels on containers of hazardous chemicals shipped after that time contain the new information. If the chemical is not currently produced or imported, the chemical manufacturer, importer, distributor, or employer shall add the information to the label before the chemical is shipped or introduced into the workplace again.

(g) *Safety data sheets.* (1) Chemical manufacturers and importers shall obtain or develop a safety data sheet for each hazardous chemical they produce or import. Employers shall have a safety data sheet in the workplace for each hazardous chemical which they use.

(2) The chemical manufacturer or importer preparing the safety data sheet

shall ensure that it is in English (although the employer may maintain copies in other languages as well), and includes at least the following section numbers and headings, and associated information under each heading, in the order listed (See Appendix D to § 1910.1200—Safety Data Sheets, for the specific content of each section of the safety data sheet):

- (i) Section 1, Identification;
- (ii) Section 2, Hazard(s) identification;
- (iii) Section 3, Composition/ information on ingredients;
- (iv) Section 4, First-aid measures;
- (v) Section 5, Fire-fighting measures;
- (vi) Section 6, Accidental release measures;
- (vii) Section 7, Handling and storage;
- (viii) Section 8, Exposure controls/ personal protection;
- (ix) Section 9, Physical and chemical properties;
- (x) Section 10, Stability and reactivity;
- (xi) Section 11, Toxicological information;
- (xii) Section 12, Ecological information;
- (xiii) Section 13, Disposal considerations;
- (xiv) Section 14, Transport information;
- (xv) Section 15, Regulatory information; and
- (xvi) Section 16, Other information, including date of preparation or last revision.

Note 1 to paragraph (g)(2): To be consistent with the GHS, an SDS must also include the headings in paragraphs (g)(2)(xii) through (g)(2)(xv) in order.

Note 2 to paragraph (g)(2): OSHA will not be enforcing information requirements in sections 12 through 15, as these areas are not under its jurisdiction.

(3) If no relevant information is found for any sub-heading within a section on the safety data sheet, the chemical manufacturer, importer or employer preparing the safety data sheet shall mark it to indicate that no applicable information was found.

* * * * *

(5) The chemical manufacturer, importer or employer preparing the safety data sheet shall ensure that the information provided accurately reflects the scientific evidence used in making the hazard classification. If the chemical manufacturer, importer or employer preparing the safety data sheet becomes newly aware of any significant information regarding the hazards of a chemical, or ways to protect against the hazards, this new information shall be added to the safety data sheet within three months. If the chemical is not

currently being produced or imported, the chemical manufacturer or importer shall add the information to the safety data sheet before the chemical is introduced into the workplace again.

* * * * *

(8) The employer shall maintain in the workplace copies of the required safety data sheets for each hazardous chemical, and shall ensure that they are readily accessible during each work shift to employees when they are in their work area(s). (Electronic access and other alternatives to maintaining paper copies of the safety data sheets are permitted as long as no barriers to immediate employee access in each workplace are created by such options.)

* * * * *

(11) Safety data sheets shall also be made readily available, upon request, to designated representatives, the Assistant Secretary, and the Director, in accordance with the requirements of § 1910.1020(e).

(h) * * *

(1) Employers shall provide employees with effective information and training on hazardous chemicals in their work area at the time of their initial assignment, and whenever a new chemical hazard the employees have not previously been trained about is introduced into their work area. Information and training may be designed to cover categories of hazards (e.g., flammability, carcinogenicity) or specific chemicals. Chemical-specific information must always be available through labels and safety data sheets.

* * * * *

(3) * * *

(ii) The physical, health, simple asphyxiation, combustible dust, and pyrophoric gas hazards, as well as hazards not otherwise classified, of the chemicals in the work area;

* * * * *

(iv) The details of the hazard communication program developed by the employer, including an explanation of the labels received on shipped containers and the workplace labeling system used by their employer; the safety data sheet, including the order of information and how employees can obtain and use the appropriate hazard information.

(i) * * *

(1) The chemical manufacturer, importer, or employer may withhold the specific chemical identity, including the chemical name, other specific identification of a hazardous chemical, or the exact percentage (concentration) of the substance in a mixture, from the safety data sheet, provided that:

* * * * *

(iii) The safety data sheet indicates that the specific chemical identity and/or percentage of composition is being withheld as a trade secret; and,

(iv) The specific chemical identity and percentage is made available to health professionals, employees, and designated representatives in accordance with the applicable provisions of this paragraph (i).

(2) Where a treating physician or nurse determines that a medical emergency exists and the specific chemical identity and/or specific percentage of composition of a hazardous chemical is necessary for emergency or first-aid treatment, the chemical manufacturer, importer, or employer shall immediately disclose the specific chemical identity or percentage composition of a trade secret chemical to that treating physician or nurse, regardless of the existence of a written statement of need or a confidentiality agreement. The chemical manufacturer, importer, or employer may require a written statement of need and confidentiality agreement, in accordance with the provisions of paragraphs (i)(3) and (4) of this section, as soon as circumstances permit.

(3) In non-emergency situations, a chemical manufacturer, importer, or employer shall, upon request, disclose a specific chemical identity or percentage composition, otherwise permitted to be withheld under paragraph (i)(1) of this section, to a health professional (i.e. physician, industrial hygienist, toxicologist, epidemiologist, or occupational health nurse) providing medical or other occupational health services to exposed employee(s), and to employees or designated representatives, if:

* * * * *

(iii) The request explains in detail why the disclosure of the specific chemical identity or percentage composition is essential and that, in lieu thereof, the disclosure of the following information to the health professional, employee, or designated representative, would not satisfy the purposes described in paragraph (i)(3)(ii) of this section:

* * * * *

(7) If the chemical manufacturer, importer, or employer denies a written request for disclosure of a specific chemical identity or percentage composition, the denial must:

* * * * *

(iii) Include evidence to support the claim that the specific chemical identity or percent of composition is a trade secret;

* * * * *

(v) Explain in detail how alternative information may satisfy the specific medical or occupational health need without revealing the trade secret.

* * * * *

(9) * * *

(i) The chemical manufacturer, importer, or employer has supported the claim that the specific chemical identity or percentage composition is a trade secret;

* * * * *

(10) * * *

(i) If OSHA determines that the specific chemical identity or percentage composition requested under paragraph (i)(3) of this section is not a "bona fide" trade secret, or that it is a trade secret, but the requesting health professional, employee, or designated representative has a legitimate medical or occupational health need for the information, has executed a written confidentiality agreement, and has shown adequate means to protect the confidentiality of the information, the chemical manufacturer, importer, or employer will be subject to citation by OSHA.

(ii) If a chemical manufacturer, importer, or employer demonstrates to OSHA that the execution of a confidentiality agreement would not provide sufficient protection against the potential harm from the unauthorized disclosure of a trade secret, the Assistant Secretary may issue such orders or impose such additional limitations or conditions upon the disclosure of the requested chemical information as may be appropriate to assure that the occupational health services are provided without an undue risk of harm to the chemical manufacturer, importer, or employer.

(11) If a citation for a failure to release trade secret information is contested by the chemical manufacturer, importer, or employer, the matter will be adjudicated before the Occupational Safety and Health Review Commission in accordance with the Act's enforcement scheme and the applicable Commission rules of procedure. In accordance with the Commission rules, when a chemical manufacturer, importer, or employer continues to withhold the information during the contest, the Administrative Law Judge may review the citation and supporting documentation "in camera" or issue appropriate orders to protect the confidentiality of such matters.

* * * * *

(j) *Effective dates.* (1) Employers shall train employees regarding the new label elements and safety data sheets format by December 1, 2013.

(2) Chemical manufacturers, importers, distributors, and employers

shall be in compliance with all modified provisions of this section no later than June 1, 2015, except:

(i) After December 1, 2015, the distributor shall not ship containers labeled by the chemical manufacturer or importer unless the label has been modified to comply with paragraph (f)(1) of this section.

(ii) All employers shall, as necessary, update any alternative workplace labeling used under paragraph (f)(6) of this section, update the hazard communication program required by paragraph (h)(1), and provide any additional employee training in accordance with paragraph (h)(3) for newly identified physical or health hazards no later than June 1, 2016.

(3) Chemical manufacturers, importers, distributors, and employers may comply with either § 1910.1200 revised as of October 1, 2011, or the current version of this standard, or both during the transition period.

Appendix A to § 1910.1200—Health Hazard Criteria (Mandatory)

A.0 GENERAL CLASSIFICATION CONSIDERATIONS

A.0.1 Classification

A.0.1.1 The term “hazard classification” is used to indicate that only the intrinsic hazardous properties of chemicals are considered. Hazard classification incorporates three steps:

(a) Identification of relevant data regarding the hazards of a chemical;

(b) Subsequent review of those data to ascertain the hazards associated with the chemical;

(c) Determination of whether the chemical will be classified as hazardous and the degree of hazard.

A.0.1.2 For many hazard classes, the criteria are semi-quantitative or qualitative and expert judgment is required to interpret the data for classification purposes.

A.0.2 Available Data, Test Methods and Test Data Quality

A.0.2.1 There is no requirement for testing chemicals.

A.0.2.2 The criteria for determining health hazards are test method neutral, i.e., they do not specify particular test methods, as long as the methods are scientifically validated.

A.0.2.3 The term “scientifically validated” refers to the process by which the reliability and the relevance of a procedure are established for a particular purpose. Any test that determines hazardous properties, which is conducted according to recognized scientific principles, can be used for purposes of a hazard determination for health hazards. Test conditions need to be standardized so that the results are reproducible with a given substance, and the standardized test yields “valid” data for defining the hazard class of concern.

A.0.2.4 Existing test data are acceptable for classifying chemicals, although expert

judgment also may be needed for classification purposes.

A.0.2.5 The effect of a chemical on biological systems is influenced, by the physico-chemical properties of the substance and/or ingredients of the mixture and the way in which ingredient substances are biologically available. A chemical need not be classified when it can be shown by conclusive experimental data from scientifically validated test methods that the chemical is not biologically available.

A.0.2.6 For classification purposes, epidemiological data and experience on the effects of chemicals on humans (e.g., occupational data, data from accident databases) shall be taken into account in the evaluation of human health hazards of a chemical.

A.0.3 Classification Based on Weight of Evidence

A.0.3.1 For some hazard classes, classification results directly when the data satisfy the criteria. For others, classification of a chemical shall be determined on the basis of the total weight of evidence using expert judgment. This means that all available information bearing on the classification of hazard shall be considered together, including the results of valid *in vitro* tests, relevant animal data, and human experience such as epidemiological and clinical studies and well-documented case reports and observations.

A.0.3.2 The quality and consistency of the data shall be considered. Information on chemicals related to the material being classified shall be considered as appropriate, as well as site of action and mechanism or mode of action study results. Both positive and negative results shall be considered together in a single weight-of-evidence determination.

A.0.3.3 Positive effects which are consistent with the criteria for classification, whether seen in humans or animals, shall normally justify classification. Where evidence is available from both humans and animals and there is a conflict between the findings, the quality and reliability of the evidence from both sources shall be evaluated in order to resolve the question of classification. Reliable, good quality human data shall generally have precedence over other data. However, even well-designed and conducted epidemiological studies may lack a sufficient number of subjects to detect relatively rare but still significant effects, or to assess potentially confounding factors. Therefore, positive results from well-conducted animal studies are not necessarily negated by the lack of positive human experience but require an assessment of the robustness, quality and statistical power of both the human and animal data.

A.0.3.4 Route of exposure, mechanistic information, and metabolism studies are pertinent to determining the relevance of an effect in humans. When such information raises doubt about relevance in humans, a lower classification may be warranted. When there is scientific evidence demonstrating that the mechanism or mode of action is not relevant to humans, the chemical should not be classified.

A.0.3.5 Both positive and negative results are considered together in the weight of evidence determination. However, a single positive study performed according to good scientific principles and with statistically and biologically significant positive results may justify classification.

A.0.4 Considerations for the Classification of Mixtures

A.0.4.1 For most hazard classes, the recommended process of classification of mixtures is based on the following sequence:

(a) Where test data are available for the complete mixture, the classification of the mixture will always be based on those data;

(b) Where test data are not available for the mixture itself, the bridging principles designated in each health hazard chapter of this appendix shall be considered for classification of the mixture;

(c) If test data are not available for the mixture itself, and the available information is not sufficient to allow application of the above-mentioned bridging principles, then the method(s) described in each chapter for estimating the hazards based on the information known will be applied to classify the mixture (e.g., application of cut-off values/concentration limits).

A.0.4.2 An exception to the above order or precedence is made for Carcinogenicity, Germ Cell Mutagenicity, and Reproductive Toxicity. For these three hazard classes, mixtures shall be classified based upon information on the ingredient substances, unless on a case-by-case basis, justification can be provided for classifying based upon the mixture as a whole. See chapters A.5, A.6, and A.7 for further information on case-by-case bases.

A.0.4.3 Use of cut-off values/concentration limits.

A.0.4.3.1 When classifying an untested mixture based on the hazards of its ingredients, cut-off values/concentration limits for the classified ingredients of the mixture are used for several hazard classes. While the adopted cut-off values/concentration limits adequately identify the hazard for most mixtures, there may be some that contain hazardous ingredients at lower concentrations than the specified cut-off values/concentration limits that still pose an identifiable hazard. There may also be cases where the cut-off value/concentration limit is considerably lower than the established non-hazardous level for an ingredient.

A.0.4.3.2 If the classifier has information that the hazard of an ingredient will be evident (i.e., it presents a health risk) below the specified cut-off value/concentration limit, the mixture containing that ingredient shall be classified accordingly.

A.0.4.3.3 In exceptional cases, conclusive data may demonstrate that the hazard of an ingredient will not be evident (i.e., it does not present a health risk) when present at a level above the specified cut-off value/concentration limit(s). In these cases the mixture may be classified according to those data. The data must exclude the possibility that the ingredient will behave in the mixture in a manner that would increase the hazard over that of the pure substance. Furthermore, the mixture must not contain ingredients that would affect that determination.

A.0.4.4 Synergistic or antagonistic effects.

When performing an assessment in accordance with these requirements, the evaluator must take into account all available information about the potential occurrence of synergistic effects among the ingredients of the mixture. Lowering classification of a mixture to a less hazardous category on the basis of antagonistic effects may be done only if the determination is supported by sufficient data.

A.0.5 Bridging Principles for the Classification of Mixtures Where Test Data Are Not Available for the Complete Mixture

A.0.5.1 Where the mixture itself has not been tested to determine its toxicity, but there are sufficient data on both the individual ingredients and similar tested mixtures to adequately characterize the hazards of the mixture, these data shall be used in accordance with the following bridging principles, subject to any specific provisions for mixtures for each hazard class. These principles ensure that the classification process uses the available data to the greatest extent possible in characterizing the hazards of the mixture.

A.0.5.1.1 Dilution.

For mixtures classified in accordance with A.1 through A.10 of this Appendix, if a tested mixture is diluted with a diluent that has an equivalent or lower toxicity classification than the least toxic original ingredient, and which is not expected to affect the toxicity of other ingredients, then:

(a) The new diluted mixture shall be classified as equivalent to the original tested mixture; or

(b) For classification of acute toxicity in accordance with A.1 of this Appendix, paragraph A.1.3.6 (the additivity formula) shall be applied.

A.0.5.1.2 Batching.

For mixtures classified in accordance with A.1 through A.10 of this Appendix, the toxicity of a tested production batch of a mixture can be assumed to be substantially equivalent to that of another untested production batch of the same mixture, when produced by or under the control of the same chemical manufacturer, unless there is reason to believe there is significant variation such that the toxicity of the untested batch has changed. If the latter occurs, a new classification is necessary.

A.0.5.1.3 Concentration of mixtures.

For mixtures classified in accordance with A.1, A.2, A.3, A.8, A.9, or A.10 of this Appendix, if a tested mixture is classified in Category 1, and the concentration of the ingredients of the tested mixture that are in Category 1 is increased, the resulting untested mixture shall be classified in Category 1.

A.0.5.1.4 Interpolation within one toxicity category.

For mixtures classified in accordance with A.1, A.2, A.3, A.8, A.9, or A.10 of this Appendix, for three mixtures (A, B and C) with identical ingredients, where mixtures A and B have been tested and are in the same toxicity category, and where untested mixture C has the same toxicologically active ingredients as mixtures A and B but has concentrations of toxicologically active ingredients intermediate to the concentrations in mixtures A and B, then mixture C is assumed to be in the same toxicity category as A and B.

A.0.5.1.5 Substantially similar mixtures.

For mixtures classified in accordance with A.1 through A.10 of this Appendix, given the following set of conditions:

(a) Where there are two mixtures:

(i) A + B;

(ii) C + B;

(b) The concentration of ingredient B is essentially the same in both mixtures;

(c) The concentration of ingredient A in mixture (i) equals that of ingredient C in mixture (ii);

(d) And data on toxicity for A and C are available and substantially equivalent; i.e., they are in the same hazard category and are not expected to affect the toxicity of B; then

If mixture (i) or (ii) is already classified based on test data, the other mixture can be assigned the same hazard category.

A.0.5.1.6 Aerosols.

For mixtures classified in accordance with A.1, A.2, A.3, A.4, A.8, or A.9 of this Appendix, an aerosol form of a mixture shall be classified in the same hazard category as the tested, non-aerosolized form of the mixture, provided the added propellant does not affect the toxicity of the mixture when spraying.

A.1 ACUTE TOXICITY**A.1.1 Definition**

Acute toxicity refers to those adverse effects occurring following oral or dermal administration of a single dose of a substance, or multiple doses given within 24 hours, or an inhalation exposure of 4 hours.

A.1.2 Classification Criteria for Substances

A.1.2.1 Substances can be allocated to one of four toxicity categories based on acute toxicity by the oral, dermal or inhalation route according to the numeric cut-off criteria as shown in Table A.1.1. Acute toxicity values are expressed as (approximate) LD50 (oral, dermal) or LC50 (inhalation) values or as acute toxicity estimates (ATE). See the footnotes following Table A.1.1 for further explanation on the application of these values.

TABLE A.1.1—ACUTE TOXICITY HAZARD CATEGORIES AND ACUTE TOXICITY ESTIMATE (ATE) VALUES DEFINING THE RESPECTIVE CATEGORIES

Exposure route	Category 1	Category 2	Category 3	Category 4
Oral (mg/kg bodyweight) see: Note (a), Note (b)	≤5	>5 and ≤50	>50 and ≤300	>300 and ≤2000.
Dermal (mg/kg bodyweight) see: Note (a), Note (b)	≤5	>50 and ≤200	>200 and ≤1000	>1000 and ≤2000.
Inhalation—Gases (ppmV) see: Note (a), Note (b), Note (c)	≤100	>100 and ≤500	>500 and ≤2500	>2500 and ≤20000.
Inhalation—Vapors (mg/l) see: Note (a), Note (b), Note (c), Note (d).	≤0.5	>0.5 and ≤2.0	>2.0 and ≤10.0	>10.0 and ≤20.0.
Inhalation—Dusts and Mists (mg/l) see: Note (a), Note (b), Note (c)	≤0.05	>0.05 and ≤0.5	>0.5 and ≤1.0	>1.0 and ≤5.0.

Note: Gas concentrations are expressed in parts per million per volume (ppmV).

Notes to Table A.1.1:

(a) The acute toxicity estimate (ATE) for the classification of a substance is derived using the LD₅₀/LC₅₀ Steward where available;

(b) The acute toxicity estimate (ATE) for the classification of a substance or ingredient in a mixture is derived using:

(i) the LD₅₀/LC₅₀ where available. Otherwise,

(ii) the appropriate conversion value from Table 1.2 that relates to the results of a range test, or

(iii) the appropriate conversion value from Table 1.2 that relates to a classification category;

(c) Inhalation cut-off values in the table are based on 4 hour testing exposures. Conversion of existing inhalation toxicity data which has been generated according to 1 hour exposure is achieved by dividing by a factor of 2 for gases and vapors and 4 for dusts and mists;

(d) For some substances the test atmosphere will be a vapor which consists of a combination of liquid and gaseous phases. For other substances the test atmosphere may consist of a vapor which is nearly all the gaseous phase. In these latter cases, classification is based on ppmV as follows: Category 1 (100 ppmV), Category 2 (500 ppmV), Category 3 (2500 ppmV), Category 4 (20000 ppmV).

The terms "dust", "mist" and "vapor" are defined as follows:

(i) Dust: solid particles of a substance or mixture suspended in a gas (usually air);

(ii) Mist: liquid droplets of a substance or mixture suspended in a gas (usually air);

(iii) Vapor: the gaseous form of a substance or mixture released from its liquid or solid state.

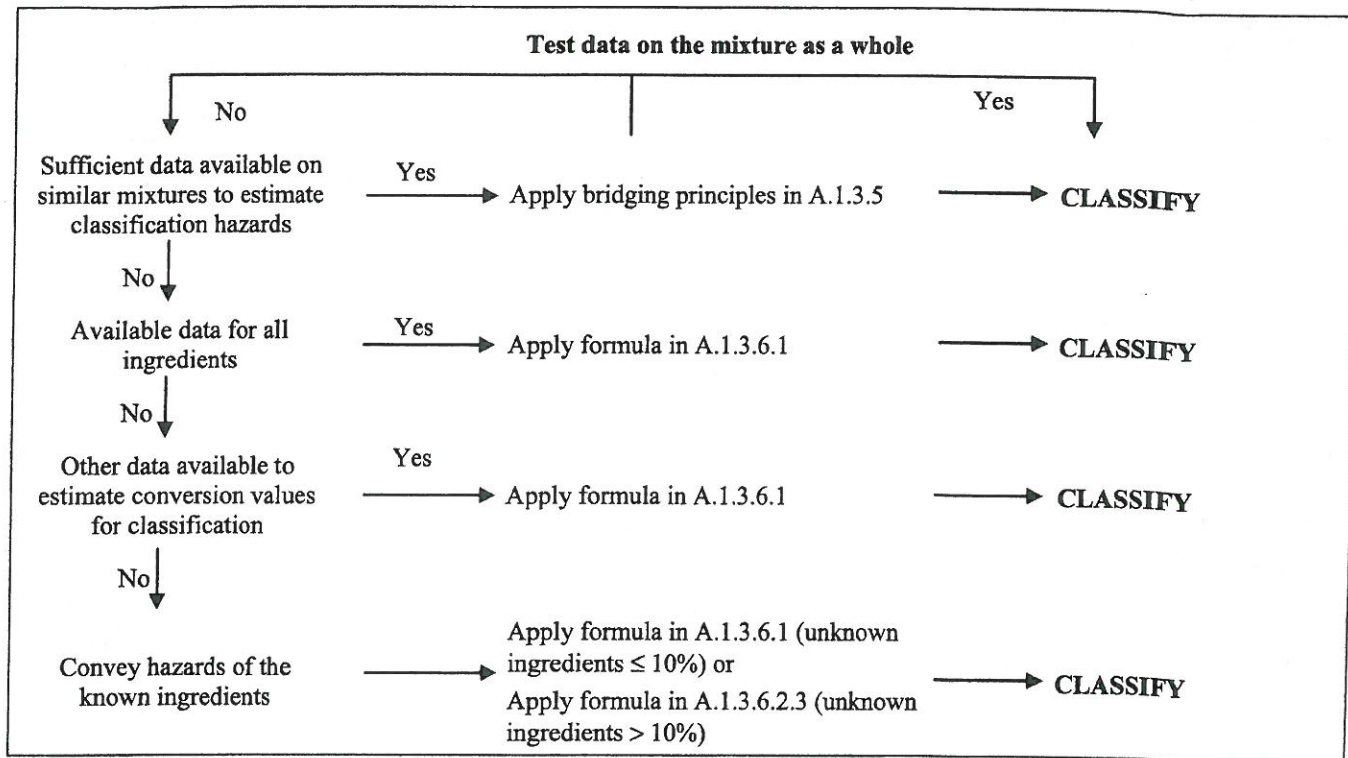
A.1.2.3 The preferred test species for evaluation of acute toxicity by the oral and inhalation routes is the rat, while the rat or rabbit are preferred for evaluation of acute dermal toxicity. Test data already generated for the classification of chemicals under existing systems should be accepted when

reclassifying these chemicals under the harmonized system. When experimental data for acute toxicity are available in several animal species, scientific judgment should be used in selecting the most appropriate LD₅₀ value from among scientifically validated tests.

A.1.3 Classification Criteria for Mixtures

A.1.3.1 The approach to classification of mixtures for acute toxicity is tiered, and is dependent upon the amount of information available for the mixture itself and for its ingredients. The flow chart of Figure A.1.1 indicates the process that must be followed:

Figure A.1.1: Tiered approach to classification of mixtures for acute toxicity



A.1.3.2 Classification of mixtures for acute toxicity may be carried out for each route of exposure, but is only required for one route of exposure as long as this route is followed (estimated or tested) for all ingredients and there is no relevant evidence to suggest acute toxicity by multiple routes. When there is relevant evidence of acute toxicity by multiple routes of exposure, classification is to be conducted for all appropriate routes of exposure. All available information shall be considered. The pictogram and signal word used shall reflect the most severe hazard category; and all relevant hazard statements shall be used.

A.1.3.3 For purposes of classifying the hazards of mixtures in the tiered approach:

(a) The "relevant ingredients" of a mixture are those which are present in concentrations $\geq 1\%$ (weight/weight for solids, liquids, dusts, mists and vapors and volume/volume for gases). If there is reason to suspect that an ingredient present at a concentration $< 1\%$ will affect classification of the mixture for acute toxicity, that ingredient shall also be considered relevant. Consideration of ingredients present at a concentration $< 1\%$ is particularly important when classifying untested mixtures which contain ingredients that are classified in Category 1 and Category 2;

(b) Where a classified mixture is used as an ingredient of another mixture, the actual or derived acute toxicity estimate (ATE) for that mixture is used when calculating the classification of the new mixture using the formulas in A.1.3.6.1 and A.1.3.6.2.4.

(c) If the converted acute toxicity point estimates for all ingredients of a mixture are within the same category, then the mixture should be classified in that category.

(d) When only range data (or acute toxicity hazard category information) are available for ingredients in a mixture, they may be converted to point estimates in accordance with Table A.1.2 when calculating the classification of the new mixture using the formulas in A.1.3.6.1 and A.1.3.6.2.4.

A.1.3.4 Classification of Mixtures Where Acute Toxicity Test Data Are Available for the Complete Mixture

Where the mixture itself has been tested to determine its acute toxicity, it is classified according to the same criteria as those used for substances, presented in Table A.1.1. If test data for the mixture are not available, the procedures presented below must be followed.

A.1.3.5 Classification of Mixtures Where Acute Toxicity Test Data Are Not Available for the Complete Mixture: Bridging Principles

A.1.3.5.1 Where the mixture itself has not been tested to determine its acute toxicity, but there are sufficient data on both the individual ingredients and similar tested mixtures to adequately characterize the hazards of the mixture, these data will be used in accordance with the following bridging principles as found in paragraph A.0.5 of this Appendix: Dilution, Batching, Concentration of mixtures, Interpolation within one toxicity category, Substantially similar mixtures, and Aerosols.

A.1.3.6 Classification of Mixtures Based on Ingredients of the Mixture (Additivity Formula)

A.1.3.6.1 Data available for all ingredients.

The acute toxicity estimate (ATE) of ingredients is considered as follows:

(a) Include ingredients with a known acute toxicity, which fall into any of the acute toxicity categories, or have an oral or dermal LD₅₀ greater than 2000 but less than or equal to 5000 mg/kg body weight (or the equivalent dose for inhalation);

(b) Ignore ingredients that are presumed not acutely toxic (e.g., water, sugar);

(c) Ignore ingredients if the data available are from a limit dose test (at the upper threshold for Category 4 for the appropriate route of exposure as provided in Table A.1.1) and do not show acute toxicity.

Ingredients that fall within the scope of this paragraph are considered to be ingredients with a known acute toxicity estimate (ATE). See note (b) to Table A.1.1 and paragraph A.1.3.3 for appropriate application of available data to the equation below, and paragraph A.1.3.6.2.4.

The ATE of the mixture is determined by calculation from the ATE values for all relevant ingredients according to the following formula below for oral, dermal or inhalation toxicity:

$$\frac{100}{ATE_{mix}} = \sum_n \frac{Ci}{ATE_i}$$

Where:

Ci = concentration of ingredient i

n ingredients and i is running from 1 to n

ATEi = acute toxicity estimate of ingredient i.

A.1.3.6.2 Data are not available for one or more ingredients of the mixture.

A.1.3.6.2.1 Where an ATE is not available for an individual ingredient of the mixture, but available information provides a derived conversion value, the formula in A.1.3.6.1 may be applied. This information may include evaluation of:

(a) Extrapolation between oral, dermal and inhalation acute toxicity estimates. Such an evaluation requires appropriate pharmacodynamic and pharmacokinetic data;

(b) Evidence from human exposure that indicates toxic effects but does not provide lethal dose data;

(c) Evidence from any other toxicity tests/assays available on the substance that indicates toxic acute effects but does not necessarily provide lethal dose data; or

(d) Data from closely analogous substances using structure/activity relationships.

A.1.3.6.2.2 This approach requires substantial supplemental technical information, and a highly trained and experienced expert, to reliably estimate acute toxicity. If sufficient information is not available to reliably estimate acute toxicity, proceed to the provisions of A.1.3.6.2.3.

A.1.3.6.2.3 In the event that an ingredient with unknown acute toxicity is used in a mixture at a concentration $\geq 1\%$, and the mixture has not been classified based on

testing of the mixture as a whole, the mixture cannot be attributed a definitive acute toxicity estimate. In this situation the mixture is classified based on the known ingredients only. (Note: A statement that x percent of the mixture consists of ingredient(s) of unknown toxicity is required on the label and safety data sheet in such cases; see Appendix C to this section, Allocation of Label Elements and Appendix D to this section, Safety Data Sheets.)

Where an ingredient with unknown acute toxicity is used in a mixture at a concentration $\geq 1\%$, and the mixture is not classified based on testing of the mixture as a whole, a statement that X% of the mixture consists of ingredient(s) of unknown acute toxicity is required on the label and safety data sheet in such cases; see Appendix C to this section, Allocation of Label Elements and Appendix D to this section, Safety Data Sheets.)

A.1.3.6.2.4 If the total concentration of the relevant ingredient(s) with unknown acute toxicity is $\leq 10\%$ then the formula presented in A.1.3.6.1 must be used. If the total concentration of the relevant ingredient(s) with unknown acute toxicity is $> 10\%$, the formula presented in A.1.3.6.1 is corrected to adjust for the percentage of the unknown ingredient(s) as follows:

$$\frac{100 - (\sum C_{unknown} \text{ if } > 10\%)}{ATE_{mix}} = \sum_n \frac{Ci}{ATE_i}$$

TABLE A.1.2—CONVERSION FROM EXPERIMENTALLY OBTAINED ACUTE TOXICITY RANGE VALUES (OR ACUTE TOXICITY HAZARD CATEGORIES) TO ACUTE TOXICITY POINT ESTIMATES FOR USE IN THE FORMULAS FOR THE CLASSIFICATION OF MIXTURES

Exposure routes	Classification category or experimentally obtained acute toxicity range estimate	Converted acute toxicity point estimate
Oral (mg/kg bodyweight)	0 <Category 1 ≤ 5	0.5
	5 <Category 2 ≤ 50	5
	50 <Category 3 ≤ 300	100
	300 <Category 4 ≤ 2000	500
Dermal (mg/kg bodyweight)	0 <Category 1 ≤ 50	5
	50 <Category 2 ≤ 200	50
	200 <Category 3 ≤ 1000	300
	1000 <Category 4 ≤ 2000	1100
Gases (ppmV)	0 <Category 1 ≤ 100	10
	100 <Category 2 ≤ 500	100
	500 <Category 3 ≤ 2500	700
	2500 <Category 4 ≤ 20000	4500
Vapors (mg/l)	0 <Category 1 ≤ 0.5	0.05
	0.5 <Category 2 ≤ 2.0	0.5
	2.0 <Category 3 ≤ 10.0	3
	10.0 <Category 4 ≤ 20.0	11
Dust/mist (mg/l)	0 <Category 1 ≤ 0.05	0.005
	0.05 <Category 2 ≤ 0.5	0.05
	0.5 <Category 3 ≤ 1.0	0.5
	1.0 <Category 4 ≤ 5.0	1.5

Note: Gas concentrations are expressed in parts per million per volume (ppmV).

A.2 SKIN CORROSION/IRRITATION

A.2.1 Definitions and General Considerations

A.2.1.1 *Skin corrosion* is the production of irreversible damage to the skin; namely, visible necrosis through the epidermis and into the dermis, following the application of a test substance for up to 4 hours. Corrosive reactions are typified by ulcers, bleeding, bloody scabs, and, by the end of observation at 14 days, by discoloration due to blanching of the skin, complete areas of alopecia, and scars. Histopathology should be considered to evaluate questionable lesions.

Skin irritation is the production of reversible damage to the skin following the application of a test substance for up to 4 hours.

A.2.1.2 Skin corrosion/irritation shall be classified using a tiered approach as detailed in figure A.2.1. Emphasis shall be placed upon existing human data (See A.0.2.6), followed by other sources of information. Classification results directly when the data satisfy the criteria in this section. In case the criteria cannot be directly applied, classification of a substance or a mixture is made on the basis of the total weight of evidence (See A.0.3.1). This means that all available information bearing on the determination of skin corrosion/irritation is considered together, including the results of appropriate scientifically validated in-vitro tests, relevant animal data, and human data such as epidemiological and clinical studies and well-documented case reports and observations.

A.2.2 Classification Criteria for Substances Using Animal Test Data

A.2.2.1 Corrosion

A.2.2.1.1 A corrosive substance is a chemical that produces destruction of skin tissue, namely, visible necrosis through the epidermis and into the dermis, in at least 1 of 3 tested animals after exposure up to a 4-hour duration. Corrosive reactions are typified by ulcers, bleeding, bloody scabs and, by the end of observation at 14 days, by discoloration due to blanching of the skin, complete areas of alopecia and scars. Histopathology should be considered to discern questionable lesions.

A.2.2.1.2 Three sub-categories of Category 1 are provided in Table A.2.1, all of which shall be regulated as Category 1.

TABLE A.2.1—SKIN CORROSION CATEGORY AND SUB-CATEGORIES

Category 1: corrosive	Corrosive sub-categories	Corrosive in ≥ 1 of 3 animals	
		Exposure	Observation
	1A	≤ 3 min	≤ 1 h.
	1B	> 3 min ≤ 1 h	≤ 14 days.
	1C	> 1 h ≤ 4 h	≤ 14 days.

A.2.2.2 Irritation

A.2.2.2.1 A single irritant category (Category 2) is presented in the Table A.2.2.

The major criterion for the irritant category is that at least 2 tested animals have a mean score of $\geq 2.3 \leq 4.0$.

TABLE A.2.2—SKIN IRRITATION CATEGORY

	Criteria
Irritant (Category 2)	(1) Mean value of $\geq 2.3 \leq 4.0$ for erythema/eschar or for edema in at least 2 of 3 tested animals from gradings at 24, 48 and 72 hours after patch removal or, if reactions are delayed, from grades on 3 consecutive days after the onset of skin reactions; or (2) Inflammation that persists to the end of the observation period normally 14 days in at least 2 animals, particularly taking into account alopecia (limited area), hyperkeratosis, hyperplasia, and scaling; or (3) In some cases where there is pronounced variability of response among animals, with very definite positive effects related to chemical exposure in a single animal but less than the criteria above.

A.2.2.2.2 Animal irritant responses within a test can be quite variable, as they are with corrosion. A separate irritant criterion accommodates cases when there is a significant irritant response but less than the mean score criterion for a positive test. For example, a substance might be designated as an irritant if at least 1 of 3 tested animals shows a very elevated mean score throughout the study, including lesions persisting at the end of an observation period of normally 14 days. Other responses could also fulfil this criterion. However, it should be ascertained that the responses are the result of chemical exposure. Addition of this criterion increases the sensitivity of the classification system.

A.2.2.2.3 Reversibility of skin lesions is another consideration in evaluating irritant responses. When inflammation persists to the end of the observation period in 2 or more test animals, taking into consideration alopecia (limited area), hyperkeratosis, hyperplasia and scaling, then a chemical should be considered to be an irritant.

A.2.3 Classification Criteria for Substances Using Other Data Elements

A.2.3.1 Existing human and animal data including information from single or repeated exposure should be the first line of analysis, as they give information directly relevant to effects on the skin. If a substance is highly toxic by the dermal route, a skin corrosion/irritation study may not be practicable since the amount of test substance to be applied would considerably exceed the toxic dose and, consequently, would result in the death of the animals. When observations are made of skin corrosion/irritation in acute toxicity studies and are observed up through the limit dose, these data may be used for classification provided that the dilutions used and species tested are equivalent. *In vitro* alternatives that have been scientifically validated shall be used to make classification decisions. Solid substances (powders) may become corrosive or irritant when moistened or in contact with moist skin or mucous membranes. Likewise, pH extremes like ≤ 2 and ≥ 11.5 may indicate skin effects,

especially when associated with significant buffering capacity. Generally, such substances are expected to produce significant effects on the skin. In the absence of any other information, a substance is considered corrosive (Skin Category 1) if it has a pH ≤ 2 or a pH ≥ 11.5 . However, if consideration of alkali/acid reserve suggests the substance or mixture may not be corrosive despite the low or high pH value, then further evaluation may be necessary. In some cases enough information may be available from structurally related compounds to make classification decisions.

A.2.3.2 A tiered approach to the evaluation of initial information shall be used (Figure A.2.1) recognizing that all elements may not be relevant in certain cases.

A.2.3.3 The tiered approach explains how to organize information on a substance and to make a weight-of-evidence decision about hazard assessment and hazard classification.

A.2.3.4 All the above information that is available on a substance shall be evaluated. Although information might be gained from the evaluation of single parameters within a

tier, there is merit in considering the totality of existing information and making an overall weight of evidence determination. This is especially true when there is information

available on some but not all parameters. Emphasis shall be placed upon existing human experience and data, followed by animal experience and testing data, followed

by other sources of information, but case-by-case determinations are necessary.

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Figure A.2.1: Tiered evaluation of skin corrosion and irritation potential

Step	Parameter	Finding	Conclusion
1a	Existing human or animal data ¹ ↓ Not corrosive or no data	→ Skin corrosive →	→ Category 1 ²
1b	Existing human or animal data ¹ ↓ Not an irritant or no data	→ Skin irritant →	→ Category 2 ²
1c	Existing human or animal data ¹ ↓ No/Insufficient data	→ Not a skin corrosive or skin irritant →	→ Not classified
2:	Other, existing skin data in animals ³ ↓ No/Insufficient data	→ Skin corrosive → Skin irritant →	→ Category 1 ² → Category 2 ²
3:	Existing skin corrosive <i>ex vivo</i> / <i>in vitro</i> data ⁴ ↓ Not corrosive or no data ↓ Existing skin irritation <i>ex vivo</i> / <i>in vitro</i> data ⁴ ↓ No/Insufficient data	→ Positive: Skin corrosive → → Positive: Skin irritant → Negative: Not a skin irritant ⁵ →	→ Category 1 ² → → Category 2 ² → Not classified
4:	pH-Based assessment (with consideration of buffering capacity of the chemical, or no buffering capacity data) ⁵ ↓ Not a pH extreme, No pH data or extreme pH with low/no buffering capacity	→ pH ≤ 2 or ≥ 11.5 →	→ Category 1 ²
5:	Validated Structure/Activity Relationship (SAR) models ↓ No/Insufficient data	→ Skin corrosive → Skin irritant →	→ Category 1 ² → Category 2 ²
6:	Consideration of the total Weight of Evidence ⁶ ↓ No concern based on consideration of the sum of available data ↓	→ Skin corrosive → Skin irritant →	→ Category 1 ² → Category 2 ²
7:	Not Classified	→	→ Not classified

Notes to Figure A.2.1:

¹ Evidence of existing human or animal data may be derived from single or repeated exposure(s) in occupational, consumer, transportation, or emergency response scenarios; from ethically-conducted human clinical studies; or from purposely-generated data from animal studies conducted according to scientifically validated test methods (at present, there is no internationally accepted test method for human skin irritation testing).

² Classify in the appropriate harmonized category, as shown in Tables A.2.1 and A.2.2.

- ³ Pre-existing animal data (e.g. from an acute dermal toxicity test or a sensitisation test) should be carefully reviewed to determine if sufficient skin corrosion/irritation evidence is available through other, similar information. For example, classification/categorization may be done on the basis of whether a chemical has or has not produced any skin irritation in an acute dermal toxicity test in animals at the limit dose, or produces very toxic effects in an acute dermal toxicity test in animals. In the latter case, the chemical would be classified as being very hazardous by the dermal route for acute toxicity, and it would be moot whether the chemical is also irritating or corrosive on the skin. It should be kept in mind in evaluating acute dermal toxicity information that the reporting of dermal lesions may be incomplete, testing and observations may be made on a species other than the rabbit, and species may differ in sensitivity in their responses.
- ⁴ Evidence from studies using scientifically validated protocols with isolated human/animal tissues or other, non-tissue-based, though scientifically validated, protocols should be assessed. Examples of scientifically validated test methods for skin corrosion include OECD TG 430 (Transcutaneous Electrical Resistance Test (TER)), 431 (Human Skin Model Test), and 435 (Membrane Barrier Test Method). OECD TG 439 (Reconstructed Human Epidermis Test Method) is a scientifically validated in vitro test method for skin irritation.
- ⁵ Measurement of pH alone may be adequate, but assessment of acid or alkali reserve (buffering capacity) would be preferable. Presently, there is no scientifically validated and internationally accepted method for assessing this parameter.
- ⁶ All information that is available on a chemical should be considered and an overall determination made on the total weight of evidence. This is especially true when there is conflict in information available on some parameters. Professional judgment should be exercised in making such a determination.

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A.2.4 Classification Criteria for Mixtures**A.2.4.1 Classification of Mixtures When Data Are Available for the Complete Mixture**

A.2.4.1.1 The mixture shall be classified using the criteria for substances (See A.2.3).

A.2.4.2 Classification of Mixtures When Data Are Not Available for the Complete Mixture: Bridging Principles

A.2.4.2.1 Where the mixture itself has not been tested to determine its skin corrosion/irritation, but there are sufficient data on both the individual ingredients and similar tested mixtures to adequately characterize the hazards of the mixture, these data will be used in accordance with the following bridging principles, as found in paragraph A.0.5 of this Appendix: Dilution, Batching, Concentration of mixtures, Interpolation within one toxicity category, Substantially similar mixtures, and Aerosols.

A.2.4.3 Classification of Mixtures When Data Are Available for All Ingredients or Only for Some Ingredients of the Mixture

A.2.4.3.1 For purposes of classifying the skin corrosion/irritation hazards of mixtures in the tiered approach:

The "relevant ingredients" of a mixture are those which are present in concentrations >1% (weight/weight for solids, liquids, dusts, mists and vapors and volume/volume for

gases.) If the classifier has reason to suspect that an ingredient present at a concentration <1% will affect classification of the mixture for skin corrosion/irritation, that ingredient shall also be considered relevant.

A.2.4.3.2 In general, the approach to classification of mixtures as irritant or corrosive to skin when data are available on the ingredients, but not on the mixture as a whole, is based on the theory of additivity, such that each corrosive or irritant ingredient contributes to the overall irritant or corrosive properties of the mixture in proportion to its potency and concentration. A weighting factor of 10 is used for corrosive ingredients when they are present at a concentration below the concentration limit for classification with Category 1, but are at a concentration that will contribute to the classification of the mixture as an irritant. The mixture is classified as corrosive or irritant when the sum of the concentrations of such ingredients exceeds a cut-off value/concentration limit.

A.2.4.3.3 Table A.2.3 below provides the cut-off value/concentration limits to be used to determine if the mixture is considered to be an irritant or a corrosive to the skin.

A.2.4.3.4 Particular care shall be taken when classifying certain types of chemicals such as acids and bases, inorganic salts, aldehydes, phenols, and surfactants. The approach explained in A.2.4.3.1 and A.2.4.3.2 might not work given that many of

such substances are corrosive or irritant at concentrations <1%. For mixtures containing strong acids or bases the pH should be used as classification criteria since pH will be a better indicator of corrosion than the concentration limits of Table A.2.3. A mixture containing corrosive or irritant ingredients that cannot be classified based on the additivity approach shown in Table A.2.3, due to chemical characteristics that make this approach unworkable, should be classified as Skin Category 1 if it contains ≥1% of a corrosive ingredient and as Skin Category 2 when it contains ≥3% of an irritant ingredient. Classification of mixtures with ingredients for which the approach in Table A.2.3 does not apply is summarized in Table A.2.4 below.

A.2.4.3.5 On occasion, reliable data may show that the skin corrosion/irritation of an ingredient will not be evident when present at a level above the generic concentration cut-off values mentioned in Tables A.2.3 and A.2.4. In these cases the mixture could be classified according to those data (See *Use of cut-off values/concentration limits*, paragraph A.0.4.3 of this Appendix).

A.2.4.3.6 If there are data showing that (an) ingredient(s) may be corrosive or irritant at a concentration of <1% (corrosive) or <3% (irritant), the mixture shall be classified accordingly (See *Use of cut-off values/concentration limits*, paragraph A.0.4.3 of this Appendix).

TABLE A.2.3—CONCENTRATION OF INGREDIENTS OF A MIXTURE CLASSIFIED AS SKIN CATEGORY 1 OR 2 THAT WOULD TRIGGER

[Category 1 or 2]

Sum of ingredients classified as:	Concentration triggering classification of a mixture as:	
	Skin corrosive	Skin irritant
	Category 1	Category 2
Skin Category 1	≥5%	≥1% but <5%.
Skin Category 2 .....	.....	≥10%.
(10 × Skin Category 1) + Skin Category 2 .....	.....	≥10%.

TABLE A.2.4—CONCENTRATION OF INGREDIENTS OF A MIXTURE FOR WHICH THE ADDITIVITY APPROACH DOES NOT APPLY, THAT WOULD TRIGGER CLASSIFICATION OF THE MIXTURE AS HAZARDOUS TO SKIN

Ingredient:	Concentration:	Mixture classified as: Skin
Acid with pH ≤2	≥1%	Category 1.
Base with pH ≥11.5	≥1%	Category 1.
Other corrosive (Category 1) ingredients for which additivity does not apply	≥1%	Category 1.
Other irritant (Category 2) ingredients for which additivity does not apply, including acids and bases	≥3%	Category 2.

A.3 SERIOUS EYE DAMAGE/EYE IRRITATION

A.3.1 Definitions and General Considerations

A.3.1.1 *Serious eye damage* is the production of tissue damage in the eye, or serious physical decay of vision, following application of a test substance to the anterior surface of the eye, which is not fully reversible within 21 days of application.

Eye irritation is the production of changes in the eye following the application of test substance to the anterior surface of the eye, which are fully reversible within 21 days of application.

A.3.1.2 Serious eye damage/eye irritation shall be classified using a tiered approach as detailed in Figure A.3.1. Emphasis shall be placed upon existing human data (See A.0.2.6), followed by animal data, followed

by other sources of information. Classification results directly when the data satisfy the criteria in this section. In case the criteria cannot be directly applied, classification of a substance or a mixture is made on the basis of the total weight of evidence (See A.0.3.1). This means that all available information bearing on the determination of serious eye damage/eye irritation is considered together, including the results of appropriate scientifically validated *in vitro* tests, relevant animal data, and human data such as epidemiological and clinical studies and well-documented case reports and observations.

A.3.2 Classification Criteria for Substances Using Animal Test Data

A.3.2.1 Irreversible effects on the eye/serious damage to eyes (Category 1).

A single hazard category is provided in Table A.3.1, for substances that have the potential to seriously damage the eyes. Category 1, irreversible effects on the eye, includes the criteria listed below. These observations include animals with grade 4 cornea lesions and other severe reactions (e.g. destruction of cornea) observed at any time during the test, as well as persistent corneal opacity, discoloration of the cornea by a dye substance, adhesion, pannus, and interference with the function of the iris or other effects that impair sight. In this context, persistent lesions are considered those which are not fully reversible within an observation period of normally 21 days. Category 1 also contains substances fulfilling the criteria of corneal opacity ≥3 and/or iritis >1.5 detected in a Draize eye test with rabbits, because severe lesions like these usually do not reverse within a 21-day observation period.

TABLE A.3.1—IRREVERSIBLE EYE EFFECTS

A substance is classified as Serious Eye Damage Category 1 (irreversible effects on the eye) when it produces:

- at least in one tested animal, effects on the cornea, iris or conjunctiva that are not expected to reverse or have not fully reversed within an observation period of normally 21 days; and/or
- at least in 2 of 3 tested animals, a positive response of:
 - corneal opacity ≥3; and/or
 - iritis >1.5; calculated as the mean scores following grading at 24, 48 and 72 hours after instillation of the substance.

A.3.2.2 Reversible effects on the eye (Category 2).

A single category is provided in Table A.3.2 for substances that have the potential to induce reversible eye irritation.

TABLE A.3.2—REVERSIBLE EYE EFFECTS

A substance is classified as Eye irritant Category 2A (irritating to eyes) when it produces in at least in 2 of 3 tested animals a positive response of:

- corneal opacity ≥1; and/or
- iritis ≥1; and/or
- conjunctival redness ≥2; and/or
- conjunctival edema (chemosis) ≥2

TABLE A.3.2—REVERSIBLE EYE EFFECTS—Continued

calculated as the mean scores following grading at 24, 48 and 72 hours after instillation of the substance, and which fully reverses within an observation period of normally 21 days.
An eye irritant is considered mildly irritating to eyes (Category 2B) when the effects listed above are fully reversible within 7 days of observation.

A.3.2.3 For those chemicals where there is pronounced variability among animal responses, this information may be taken into account in determining the classification.

A.3.3 Classification Criteria for Substances Using Other Data Elements

A.3.3.1 Existing human and animal data should be the first line of analysis, as they give information directly relevant to effects on the eye. Possible skin corrosion shall be evaluated prior to consideration of serious eye damage/eye irritation in order to avoid testing for local effects on eyes with skin corrosive substances. *In vitro* alternatives that have been scientifically validated and accepted shall be used to make classification decisions. Likewise, pH extremes like ≤ 2 and

≥ 11.5 , may indicate serious eye damage, especially when associated with significant buffering capacity. Generally, such substances are expected to produce significant effects on the eyes. In the absence of any other information, a mixture/substance is considered to cause serious eye damage (Eye Category 1) if it has a pH ≤ 2 or ≥ 11.5 . However, if consideration of acid/alkaline reserve suggests the substance may not have the potential to cause serious eye damage despite the low or high pH value, then further evaluation may be necessary. In some cases enough information may be available from structurally related compounds to make classification decisions.

A.3.3.2 A tiered approach to the evaluation of initial information shall be

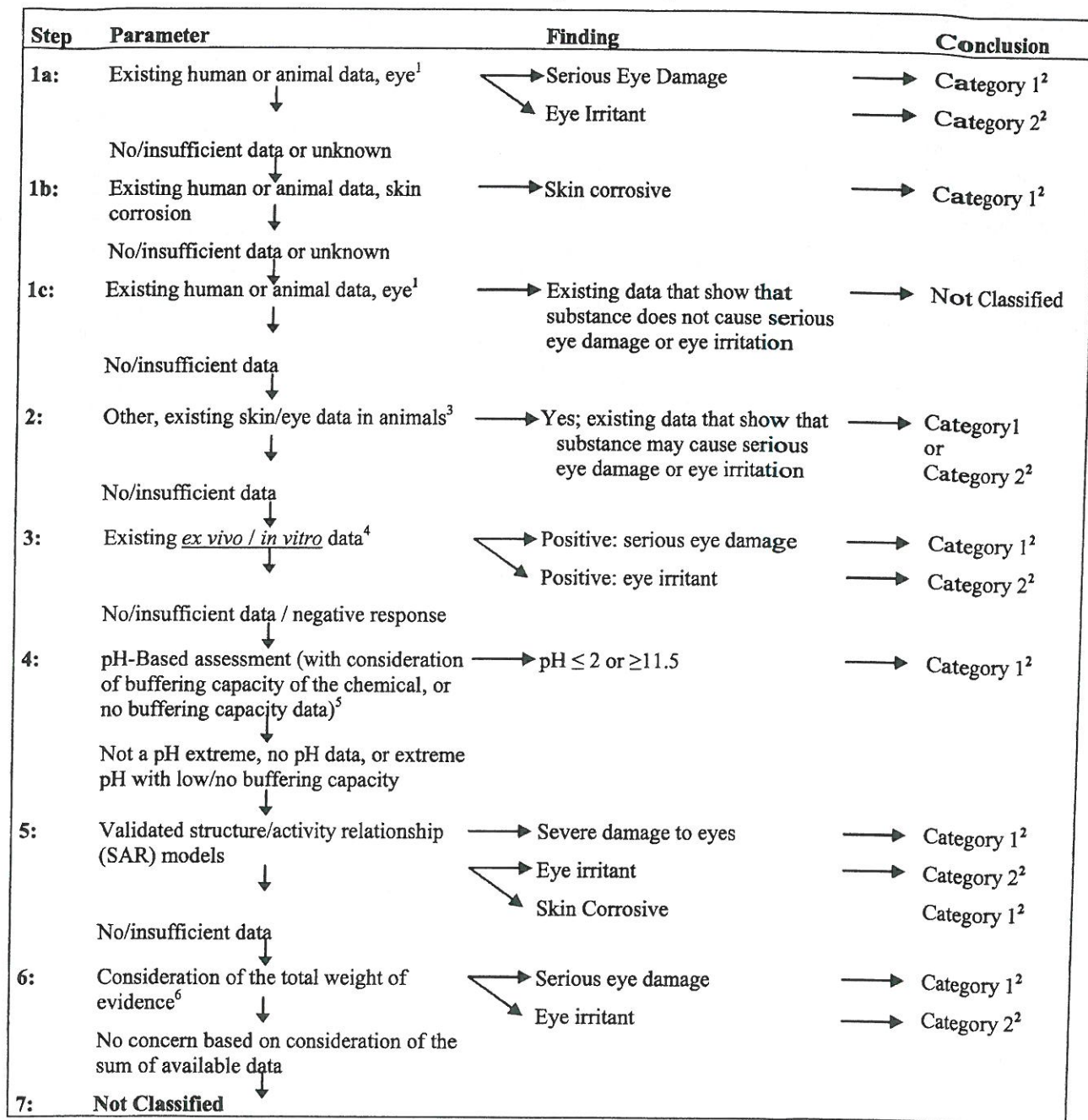
used where applicable, recognizing that all elements may not be relevant in certain cases (Figure A.3.1).

A.3.3.3 The tiered approach explains how to organize existing information on a substance and to make a weight-of-evidence decision, where appropriate, about hazard assessment and hazard classification.

A.3.3.4 All the above information that is available on a substance shall be evaluated. Although information might be gained from the evaluation of single parameters within a tier, consideration should be given to the totality of existing information and making an overall weight-of-evidence determination. This is especially true when there is conflict in information available on some parameters.

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Figure A.3.1 Evaluation strategy for serious eye damage and eye irritation
(See also Figure A.2.1)



Notes to Figure A.3.1:

¹ Evidence of existing human or animal data may be derived from single or repeated exposure(s) in occupational, consumer, transportation, or emergency response scenarios; from ethically-conducted human clinical studies; or from purposely-generated data from animal studies conducted according to scientifically validated test methods. At present, there are no internationally accepted test methods for human skin or eye irritation testing.

² Classify in the appropriate harmonized category, as shown in Tables A.3.1 and A.3.2.

² *Pre-existing animal data should be carefully reviewed to determine if sufficient skin or eye corrosion/irritation evidence is available through other, similar information.*

⁴ *Evidence from studies using scientifically validated protocols with isolated human/animal tissues or other, non-tissue-based, though scientifically validated, protocols should be assessed. Examples of scientifically validated test methods for identifying eye corrosives and severe irritants (i.e., Serious Eye Damage) include OECD TG 437 (Bovine Corneal Opacity and Permeability (BCOP)) and TG 438 (Isolated Chicken Eye). Positive test results from a scientifically validated in vitro test for skin corrosion would likely also lead to a conclusion to classify as causing Serious Eye Damage.*

⁵ *Measurement of pH alone may be adequate, but assessment of acid or alkali reserve (buffering capacity) would be preferable.*

⁶ *All information that is available on a chemical should be considered and an overall determination made on the total weight of evidence. This is especially true when there is conflict in information available on some parameters. The weight of evidence including information on skin irritation could lead to classification of eye irritation. It is recognized that not all skin irritants are eye irritants as well. Professional judgment should be exercised in making such a determination.*

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A.3.4 Classification Criteria for Mixtures

A.3.4.1 Classification of Mixtures When Data Are Available for the Complete Mixture

A.3.4.1.1 The mixture will be classified using the criteria for substances.

A.3.4.1.2 Unlike other hazard classes, there are alternative tests available for skin corrosivity of certain types of chemicals that can give an accurate result for classification purposes, as well as being simple and relatively inexpensive to perform. When considering testing of the mixture, chemical manufacturers are encouraged to use a tiered weight of evidence strategy as included in the criteria for classification of substances for skin corrosion and serious eye damage and eye irritation to help ensure an accurate classification, as well as avoid unnecessary animal testing. In the absence of any other information, a mixture is considered to cause serious eye damage (Eye Category 1) if it has a pH ≤ 2 or ≥ 11.5 . However, if consideration of acid/alkaline reserve suggests the substance or mixture may not have the potential to cause serious eye damage despite the low or high pH value, then further evaluation may be necessary.

A.3.4.2 Classification of Mixtures When Data Are Not Available for the Complete Mixture: Bridging Principles

A.3.4.2.1 Where the mixture itself has not been tested to determine its skin corrosivity or potential to cause serious eye damage or eye irritation, but there are sufficient data on both the individual ingredients and similar tested mixtures to adequately characterize the hazards of the mixture, these data will be used in accordance with the following bridging principles, as found in paragraph A.0.5 of this Appendix: Dilution, Batching, Concentration of mixtures, Interpolation within one toxicity category, Substantially similar mixtures, and Aerosols.

A.3.4.3 Classification of Mixtures When Data Are Available for All Ingredients or Only for Some Ingredients of the Mixture

A.3.4.3.1 For purposes of classifying the eye corrosion/irritation hazards of mixtures in the tiered approach:

The "relevant ingredients" of a mixture are those which are present in concentrations $>1\%$ (weight/weight for solids, liquids, dusts, mists and vapors and volume/volume for gases). If the classifier has reason to suspect that an ingredient present at a concentration $<1\%$ will affect classification of the mixture for eye corrosion/irritation, that ingredient shall also be considered relevant.

A.3.4.3.2 In general, the approach to classification of mixtures as seriously damaging to the eye or eye irritant when data are available on the ingredients, but not on the mixture as a whole, is based on the theory of additivity, such that each corrosive or irritant ingredient contributes to the overall irritant or corrosive properties of the mixture in proportion to its potency and concentration. A weighting factor of 10 is used for corrosive ingredients when they are present at a concentration below the concentration limit for classification with Category 1, but are at a concentration that will contribute to the classification of the mixture as an irritant. The mixture is classified as seriously damaging to the eye or eye irritant when the sum of the concentrations of such ingredients exceeds a threshold cut-off value/concentration limit.

A.3.4.3.3 Table A.3.3 provides the cut-off value/concentration limits to be used to determine if the mixture should be classified as seriously damaging to the eye or an eye irritant.

A.3.4.3.4 Particular care must be taken when classifying certain types of chemicals such as acids and bases, inorganic salts, aldehydes, phenols, and surfactants. The approach explained in A.3.4.3.1 and

A.3.4.3.2 might not work given that many of such substances are corrosive or irritant at concentrations $<1\%$. For mixtures containing strong acids or bases, the pH should be used as classification criteria (See A.3.4.1) since pH will be a better indicator of serious eye damage than the concentration limits of Table A.3.3. A mixture containing corrosive or irritant ingredients that cannot be classified based on the additivity approach applied in Table A.3.3 due to chemical characteristics that make this approach unworkable, should be classified as Eye Category 1 if it contains $\geq 1\%$ of a corrosive ingredient and as Eye Category 2 when it contains $\geq 3\%$ of an irritant ingredient. Classification of mixtures with ingredients for which the approach in Table A.3.3 does not apply is summarized in Table A.3.4.

A.3.4.3.5 On occasion, reliable data may show that the reversible/irreversible eye effects of an ingredient will not be evident when present at a level above the generic cut-off values/concentration limits mentioned in Tables A.3.3 and A.3.4. In these cases the mixture could be classified according to those data (See also A.0.4.3 *Use of cut-off values/concentration limits*). On occasion, when it is expected that the skin corrosion/irritation or the reversible/irreversible eye effects of an ingredient will not be evident when present at a level above the generic concentration/cut-off levels mentioned in Tables A.3.3 and A.3.4, testing of the mixture may be considered. In those cases, the tiered weight of evidence strategy should be applied as referred to in section A.3.3, Figure A.3.1 and explained in detail in this chapter.

A.3.4.3.6 If there are data showing that (an) ingredient(s) may be corrosive or irritant at a concentration of $<1\%$ (corrosive) or $<3\%$ (irritant), the mixture should be classified accordingly (See also paragraph A.0.4.3, *Use of cut-off values/concentration limits*).

TABLE A.3.3—CONCENTRATION OF INGREDIENTS OF A MIXTURE CLASSIFIED AS SKIN CATEGORY 1 AND/OR EYE CATEGORY 1 OR 2 THAT WOULD TRIGGER CLASSIFICATION OF THE MIXTURES AS HAZARDOUS TO THE EYE

Sum of ingredients classified as:	Concentration triggering classification of a mixture as:	
	Irreversible eye effects	Reversible eye effects
	Category 1	Category 2
Eye or Skin Category 1	$\geq 3\%$	$\geq 1\%$ but $< 3\%$.

TABLE A.3.3—CONCENTRATION OF INGREDIENTS OF A MIXTURE CLASSIFIED AS SKIN CATEGORY 1 AND/OR EYE CATEGORY 1 OR 2 THAT WOULD TRIGGER CLASSIFICATION OF THE MIXTURES AS HAZARDOUS TO THE EYE—Continued

Sum of ingredients classified as:	Concentration triggering classification of a mixture as:	
	Irreversible eye effects	Reversible eye effects
	Category 1	Category 2
Eye Category 2		≥10%.
(10 × Eye Category 1) + Eye Category 2		≥10%.
Skin Category 1 + Eye Category 1	≥3%	≥1% but <3%.
10 × (Skin Category 1 + Eye Category 1) + Eye Category 2		≥10%.

Note: A mixture may be classified as Eye Category 2B in cases when all relevant ingredients are classified as Eye Category 2B.

TABLE A.3.4—CONCENTRATION OF INGREDIENTS OF A MIXTURE FOR WHICH THE ADDITIVITY APPROACH DOES NOT APPLY, THAT WOULD TRIGGER CLASSIFICATION OF THE MIXTURE AS HAZARDOUS TO THE EYE

Ingredient	Concentration	Mixture classified as: Eye
Acid with pH ≤2	≥1%	Category 1.
Base with pH ≥11.5	≥1%	Category 1.
Other corrosive (Category 1) ingredients for which additivity does not apply	≥1%	Category 1.
Other irritant (Category 2) ingredients for which additivity does not apply, including acids and bases	≥3%	Category 2.

A.4 RESPIRATORY OR SKIN SENSITIZATION

A.4.1 Definitions and General Considerations

A.4.1.1 *Respiratory sensitizer* means a chemical that will lead to hypersensitivity of the airways following inhalation of the chemical.

Skin sensitizer means a chemical that will lead to an allergic response following skin contact.

A.4.1.2 For the purpose of this chapter, sensitization includes two phases: the first phase is induction of specialized immunological memory in an individual by exposure to an allergen. The second phase is elicitation, i.e., production of a cell-mediated or antibody-mediated allergic response by exposure of a sensitized individual to an allergen.

A.4.1.3 For respiratory sensitization, the pattern of induction followed by elicitation

phases is shared in common with skin sensitization. For skin sensitization, an induction phase is required in which the immune system learns to react; clinical symptoms can then arise when subsequent exposure is sufficient to elicit a visible skin reaction (elicitation phase). As a consequence, predictive tests usually follow this pattern in which there is an induction phase, the response to which is measured by a standardized elicitation phase, typically involving a patch test. The local lymph node assay is the exception, directly measuring the induction response. Evidence of skin sensitization in humans normally is assessed by a diagnostic patch test.

A.4.1.4 Usually, for both skin and respiratory sensitization, lower levels are necessary for elicitation than are required for induction.

A.4.1.5 The hazard class “respiratory or skin sensitization” is differentiated into:

(a) Respiratory sensitization; and

(b) Skin sensitization.

A.4.2 Classification Criteria for Substances

A.4.2.1 Respiratory Sensitizers

A.4.2.1.1 Hazard Categories.

A.4.2.1.1.1 Effects seen in either humans or animals will normally justify classification in a weight of evidence approach for respiratory sensitizers. Substances may be allocated to one of the two sub-categories 1A or 1B using a weight of evidence approach in accordance with the criteria given in Table A.4.1 and on the basis of reliable and good quality evidence from human cases or epidemiological studies and/or observations from appropriate studies in experimental animals.

A.4.2.1.1.2 Where data are not sufficient for sub-categorization, respiratory sensitizers shall be classified in Category 1.

TABLE A.4.1—HAZARD CATEGORY AND SUB-CATEGORIES FOR RESPIRATORY SENSITIZERS

Category 1	Respiratory sensitizer
	A substance is classified as a respiratory sensitizer.
	(a) if there is evidence in humans that the substance can lead to specific respiratory hypersensitivity and/or
	(b) if there are positive results from an appropriate animal test. ¹
Sub-category 1A	Substances showing a high frequency of occurrence in humans; or a probability of occurrence of a high sensitization rate in humans based on animal or other tests. ¹ Severity of reaction may also be considered.
Sub-category 1B	Substances showing a low to moderate frequency of occurrence in humans; or a probability of occurrence of a low to moderate sensitization rate in humans based on animal or other tests. ¹ Severity of reaction may also be considered.

A.4.2.1.2 Human evidence.

A.4.2.1.2.1 Evidence that a substance can lead to specific respiratory hypersensitivity will normally be based on human experience. In this context, hypersensitivity is normally seen as asthma, but other hypersensitivity reactions such as rhinitis/conjunctivitis and

alveolitis are also considered. The condition will have the clinical character of an allergic reaction. However, immunological mechanisms do not have to be demonstrated.

A.4.2.1.2.2 When considering the human evidence, it is necessary that in addition to

¹ At this writing, recognized and validated animal models for the testing of respiratory hypersensitivity are not available. Under certain circumstances, data from animal studies may provide valuable information in a weight of evidence assessment.

the evidence from the cases, the following be taken into account:

- (a) The size of the population exposed;
- (b) The extent of exposure.

A.4.2.1.2.3 The evidence referred to above could be:

- (a) Clinical history and data from appropriate lung function tests related to exposure to the substance, confirmed by other supportive evidence which may include:
 - (i) *In vivo* immunological test (e.g., skin prick test);
 - (ii) *In vitro* immunological test (e.g., serological analysis);
 - (iii) Studies that may indicate other specific hypersensitivity reactions where immunological mechanisms of action have not been proven, e.g., repeated low-level irritation, pharmacologically mediated effects;
 - (iv) A chemical structure related to substances known to cause respiratory hypersensitivity;
- (b) Data from positive bronchial challenge tests with the substance conducted according

to accepted guidelines for the determination of a specific hypersensitivity reaction.

A.4.2.1.2.4 Clinical history should include both medical and occupational history to determine a relationship between exposure to a specific substance and development of respiratory hypersensitivity. Relevant information includes aggravating factors both in the home and workplace, the onset and progress of the disease, family history and medical history of the patient in question. The medical history should also include a note of other allergic or airway disorders from childhood and smoking history.

A.4.2.1.2.5 The results of positive bronchial challenge tests are considered to provide sufficient evidence for classification on their own. It is, however, recognized that in practice many of the examinations listed above will already have been carried out.

A.4.2.1.3 Animal studies.

A.4.2.1.3.1 Data from appropriate animal studies² which may be indicative of the potential of a substance to cause sensitization by inhalation in humans³ may include:

(a) Measurements of Immunoglobulin E (IgE) and other specific immunological parameters, for example in mice

(b) Specific pulmonary responses in guinea pigs.

A.4.2.2 Skin Sensitizers

A.4.2.2.1 Hazard categories.

A.4.2.2.1.1 Effects seen in either humans or animals will normally justify classification in a weight of evidence approach for skin sensitizers. Substances may be allocated to one of the two sub-categories 1A or 1B using a weight of evidence approach in accordance with the criteria given in Table A.4.2 and on the basis of reliable and good quality evidence from human cases or epidemiological studies and/or observations from appropriate studies in experimental animals according to the guidance values provided in A.4.2.2.2.1 and A.4.2.2.3.2 for sub-category 1A and in A.4.2.2.2.2 and A.4.2.2.3.3 for sub-category 1B.

A.4.2.2.1.2 Where data are not sufficient for sub-categorization, skin sensitizers shall be classified in Category 1.

TABLE A.4.2—HAZARD CATEGORY AND SUB-CATEGORIES FOR SKIN SENSITIZERS

Category 1	Skin sensitizer
	A substance is classified as a skin sensitizer.
	(a) if there is evidence in humans that the substance can lead to sensitization by skin contact in a substantial number of persons, or
	(b) if there are positive results from an appropriate animal test.
Sub-category 1A	Substances showing a high frequency of occurrence in humans and/or a high potency in animals can be presumed to have the potential to produce significant sensitization in humans. Severity of reaction may also be considered.
Sub-category 1B	Substances showing a low to moderate frequency of occurrence in humans and/or a low to moderate potency in animals can be presumed to have the potential to produce sensitization in humans. Severity of reaction may also be considered.

A.4.2.2.2 Human evidence.

A.4.2.2.2.1 Human evidence for sub-category 1A may include:

- (a) Positive responses at $\leq 500 \mu\text{g}/\text{cm}^2$ (Human Repeat Insult Patch Test (HRIPT), Human Maximization Test (HMT)—induction threshold);
- (b) Diagnostic patch test data where there is a relatively high and substantial incidence of reactions in a defined population in relation to relatively low exposure;
- (c) Other epidemiological evidence where there is a relatively high and substantial

incidence of allergic contact dermatitis in relation to relatively low exposure.

A.4.2.2.2.2 Human evidence for sub-category 1B may include:

- (a) Positive responses at $> 500 \mu\text{g}/\text{cm}^2$ (HRIPT, HMT—induction threshold);
- (b) Diagnostic patch test data where there is a relatively low but substantial incidence of reactions in a defined population in relation to relatively high exposure;
- (c) Other epidemiological evidence where there is a relatively low but substantial incidence of allergic contact dermatitis in relation to relatively high exposure.

A.4.2.2.3 Animal studies

A.4.2.2.3.1 For Category 1, when an adjuvant type test method for skin sensitization is used, a response of at least 30% of the animals is considered as positive. For a non-adjuvant Guinea pig test method a response of at least 15% of the animals is considered positive. For Category 1, a stimulation index of three or more is considered a positive response in the local lymph node assay.⁴

A.4.2.2.3.2 Animal test results for sub-category 1A can include data with values indicated in Table A.4.3 below:

TABLE A.4.3—ANIMAL TEST RESULTS FOR SUB-CATEGORY 1A

Assay	Criteria
Local lymph node assay	EC3 value $\leq 2\%$.
Guinea pig maximization test	$\geq 30\%$ responding at $\leq 0.1\%$ intradermal induction dose or
	$\geq 60\%$ responding at $> 0.1\%$ to $\leq 1\%$ intradermal induction dose.
Buehler assay	$\geq 15\%$ responding at $\leq 0.2\%$ topical induction dose or

² At this writing, recognized and validated animal models for the testing of respiratory hypersensitivity are not available. Under certain circumstances, data from animal studies may provide valuable information in a weight of evidence assessment.

³ The mechanisms by which substances induce symptoms of asthma are not yet fully known. For preventive measures, these substances are considered respiratory sensitizers. However, if on

the basis of the evidence, it can be demonstrated that these substances induce symptoms of asthma by irritation only in people with bronchial hyperactivity, they should not be considered as respiratory sensitizers.

⁴ Test methods for skin sensitization are described in OECD Guideline 406 (the Guinea Pig Maximization test and the Buehler guinea pig test) and Guideline 429 (Local Lymph Node Assay).

Other methods may be used provided that they are scientifically validated. The Mouse Ear Swelling Test (MEST), appears to be a reliable screening test to detect moderate to strong sensitizers, and can be used, in accordance with professional judgment, as a first stage in the assessment of skin sensitization potential.

TABLE A.4.3—ANIMAL TEST RESULTS FOR SUB-CATEGORY 1A—Continued

Assay	Criteria
	≥60% responding at >0.2% to ≤20% topical induction dose.

Note: EC3 refers to the estimated concentration of test chemical required to induce a stimulation index of 3 in the local lymph node assay.

A.4.2.2.3.3 Animal test results for sub-category 1B can include data with values indicated in Table A.4.4 below:

TABLE A.4.4—ANIMAL TEST RESULTS FOR SUB-CATEGORY 1B

Assay	Criteria
Local lymph node assay	EC3 value >2%.
Guinea pig maximization test	≥30% to <60% responding at >0.1% to ≤1% intradermal induction dose or ≥30% responding at >1% intradermal induction dose.
Buehler assay	≥15% to <60% responding at >0.2% to ≤20% topical induction dose or ≥15% responding at >20% topical induction dose.

Note: EC3 refers to the estimated concentration of test chemical required to induce a stimulation index of 3 in the local lymph node assay.

A.4.2.2.4 Specific considerations.

A.4.2.2.4.1 For classification of a substance, evidence shall include one or more of the following using a weight of evidence approach:

(a) Positive data from patch testing, normally obtained in more than one dermatology clinic;

(b) Epidemiological studies showing allergic contact dermatitis caused by the substance. Situations in which a high proportion of those exposed exhibit characteristic symptoms are to be looked at with special concern, even if the number of cases is small;

(c) Positive data from appropriate animal studies;

(d) Positive data from experimental studies in man (See paragraph A.0.2.6 of this Appendix);

(e) Well documented episodes of allergic contact dermatitis, normally obtained in more than one dermatology clinic;

(f) Severity of reaction.

A.4.2.2.4.2 Evidence from animal studies is usually much more reliable than evidence from human exposure. However, in cases where evidence is available from both sources, and there is conflict between the results, the quality and reliability of the evidence from both sources must be assessed in order to resolve the question of classification on a case-by-case basis. Normally, human data are not generated in controlled experiments with volunteers for the purpose of hazard classification but rather as part of risk assessment to confirm lack of effects seen in animal tests. Consequently, positive human data on skin sensitization are usually derived from case-control or other, less defined studies. Evaluation of human data must, therefore, be carried out with caution as the frequency of cases reflect, in addition to the inherent properties of the substances, factors such as

the exposure situation, bioavailability, individual predisposition and preventive measures taken. Negative human data should not normally be used to negate positive results from animal studies. For both animal and human data, consideration should be given to the impact of vehicle.

A.4.2.2.4.3 If none of the above-mentioned conditions are met, the substance need not be classified as a skin sensitizer. However, a combination of two or more indicators of skin sensitization, as listed below, may alter the decision. This shall be considered on a case-by-case basis.

(a) Isolated episodes of allergic contact dermatitis;

(b) Epidemiological studies of limited power, e.g., where chance, bias or confounders have not been ruled out fully with reasonable confidence;

(c) Data from animal tests, performed according to existing guidelines, which do not meet the criteria for a positive result described in A.4.2.2.3, but which are sufficiently close to the limit to be considered significant;

(d) Positive data from non-standard methods;

(e) Positive results from close structural analogues.

A.4.2.2.4.4 Immunological contact urticaria.

A.4.2.2.4.4.1 Substances meeting the criteria for classification as respiratory sensitizers may, in addition, cause immunological contact urticaria. Consideration shall be given to classifying these substances as skin sensitizers.

A.4.2.2.4.4.2 Substances which cause immunological contact urticaria without meeting the criteria for respiratory sensitizers shall be considered for classification as skin sensitizers.

A.4.2.2.4.4.3 There is no recognized animal model available to identify substances

which cause immunological contact urticaria. Therefore, classification will normally be based on human evidence, similar to that for skin sensitization.

A.4.3 Classification Criteria for Mixtures

A.4.3.1 Classification of Mixtures When Data Are Available for the Complete Mixture

When reliable and good quality evidence, as described in the criteria for substances, from human experience or appropriate studies in experimental animals, is available for the mixture, then the mixture shall be classified by weight of evidence evaluation of these data. Care must be exercised in evaluating data on mixtures that the dose used does not render the results inconclusive.

A.4.3.2 Classification of Mixtures When Data Are Not Available for the Complete Mixture: Bridging Principles

A.4.3.2.1 Where the mixture itself has not been tested to determine its sensitizing properties, but there are sufficient data on both the individual ingredients and similar tested mixtures to adequately characterize the hazards of the mixture, these data will be used in accordance with the following agreed bridging principles as found in paragraph A.0.5 of this Appendix: Dilution, Batching, Concentration of mixtures, Interpolation, Substantially similar mixtures, and Aerosols.

A.4.3.3 Classification of Mixtures When Data Are Available for All Ingredients or Only for Some Ingredients of the Mixture

The mixture shall be classified as a respiratory or skin sensitizer when at least one ingredient has been classified as a respiratory or skin sensitizer and is present at or above the appropriate cut-off value/concentration limit for the specific endpoint as shown in Table A.4.5.

TABLE A.4.5—CUT-OFF VALUES/CONCENTRATION LIMITS OF INGREDIENTS OF A MIXTURE CLASSIFIED AS EITHER RESPIRATORY SENSITIZERS OR SKIN SENSITIZERS THAT WOULD TRIGGER CLASSIFICATION OF THE MIXTURE

Ingredient classified as:	Cut-off values/concentration limits triggering classification of a mixture as:		
	Respiratory Sensitizer Category 1		Skin Sensitizer Category 1
	Solid/liquid	Gas	All physical states
Respiratory Sensitizer, Category 1	≥0.1%	≥0.1%	.....
Respiratory Sensitizer, Sub-category 1A	≥0.1%	≥0.1%	.....
Respiratory Sensitizer, Sub-category 1B	≥1.0%	≥0.2%	.....
Skin Sensitizer, Category 1 .....	.....	.....	≥0.1%
Skin Sensitizer, Sub-category 1A .....	.....	.....	≥0.1%
Skin Sensitizer, Sub-category 1B .....	.....	.....	≥1.0%

A.5 GERM CELL MUTAGENICITY

A.5.1 Definitions and General Considerations

A.5.1.1 A *mutation* is defined as a permanent change in the amount or structure of the genetic material in a cell. The term *mutation* applies both to heritable genetic changes that may be manifested at the phenotypic level and to the underlying DNA modifications when known (including, for example, specific base pair changes and chromosomal translocations). The term *mutagenic* and *mutagen* will be used for agents giving rise to an increased occurrence

of mutations in populations of cells and/or organisms.

A.5.1.2 The more general terms *genotoxic* and *genotoxicity* apply to agents or processes which alter the structure, information content, or segregation of DNA, including those which cause DNA damage by interfering with normal replication processes, or which in a non-physiological manner (temporarily) alter its replication. Genotoxicity test results are usually taken as indicators for mutagenic effects.

A.5.1.3 This hazard class is primarily concerned with chemicals that may cause

mutations in the germ cells of humans that can be transmitted to the progeny. However, mutagenicity/genotoxicity tests *in vitro* and in mammalian somatic cells *in vivo* are also considered in classifying substances and mixtures within this hazard class.

A.5.2 Classification Criteria for Substances

A.5.2.1 The classification system provides for two different categories of germ cell mutagens to accommodate the weight of evidence available. The two-category system is described in the Figure A.5.1.

FIGURE A.5.1—HAZARD CATEGORIES FOR GERM CELL MUTAGENS

CATEGORY 1: Substances known to induce heritable mutations or to be regarded as if they induce heritable mutations in the germ cells of humans.

Category 1A: Substances known to induce heritable mutations in germ cells of humans.

Positive evidence from human epidemiological studies.

Category 1B: Substances which should be regarded as if they induce heritable mutations in the germ cells of humans.

(a) Positive result(s) from *in vivo* heritable germ cell mutagenicity tests in mammals; or

(b) Positive result(s) from *in vivo* somatic cell mutagenicity tests in mammals, in combination with some evidence that the substance has potential to cause mutations to germ cells. This supporting evidence may, for example, be derived from mutagenicity/genotoxicity tests in germ cells *in vivo*, or by demonstrating the ability of the substance or its metabolite(s) to interact with the genetic material of germ cells; or

(c) Positive results from tests showing mutagenic effects in the germ cells of humans, without demonstration of transmission to progeny; for example, an increase in the frequency of aneuploidy in sperm cells of exposed people.

CATEGORY 2: Substances which cause concern for humans owing to the possibility that they may induce heritable mutations in the germ cells of humans.

Positive evidence obtained from experiments in mammals and/or in some cases from *in vitro* experiments, obtained from:

(a) Somatic cell mutagenicity tests *in vivo*, in mammals; or

(b) Other *in vivo* somatic cell genotoxicity tests which are supported by positive results from *in vitro* mutagenicity assays.

Note: Substances which are positive in *in vitro* mammalian mutagenicity assays, and which also show chemical structure activity relationship to known germ cell mutagens, should be considered for classification as Category 2 mutagens.

A.5.2.2 Specific considerations for classification of substances as germ cell mutagens:

A.5.2.2.1 To arrive at a classification, test results are considered from experiments determining mutagenic and/or genotoxic effects in germ and/or somatic cells of exposed animals. Mutagenic and/or genotoxic effects determined in *in vitro* tests shall also be considered.

A.5.2.2.2 The system is hazard based, classifying chemicals on the basis of their intrinsic ability to induce mutations in germ cells. The scheme is, therefore, not meant for the (quantitative) risk assessment of chemical substances.

A.5.2.2.3 Classification for heritable effects in human germ cells is made on the

basis of scientifically validated tests.

Evaluation of the test results shall be done using expert judgment and all the available evidence shall be weighed for classification.

A.5.2.2.4 The classification of substances shall be based on the total weight of evidence available, using expert judgment. In those instances where a single well-conducted test is used for classification, it shall provide clear and unambiguously positive results. The relevance of the route of exposure used in the study of the substance compared to the route of human exposure should also be taken into account.

A.5.3 Classification Criteria for Mixtures⁵

A.5.3.1 Classification of Mixtures When Data Are Available for All Ingredients or Only for Some Ingredients of the Mixture

A.5.3.1.1 Classification of mixtures shall be based on the available test data for the

⁵ It should be noted that the classification criteria for health hazards usually include a tiered scheme in which test data available on the complete mixture are considered as the first tier in the evaluation, followed by the applicable bridging principles, and lastly, cut-off values/concentration limits or additivity. However, this approach is not used for Germ Cell Mutagenicity. These criteria for Germ Cell Mutagenicity consider the cut-off values/concentration limits as the primary tier and allow

Continued

individual ingredients of the mixture using cut-off values/concentration limits for the ingredients classified as germ cell mutagens.

A.5.3.1.2 The mixture will be classified as a mutagen when at least one ingredient has been classified as a Category 1A, Category 1B or Category 2 mutagen and is

present at or above the appropriate cut-off value/concentration limit as shown in Table A.5.1 below for Category 1 and 2 respectively.

TABLE A.5.1—CUT-OFF VALUES/CONCENTRATION LIMITS OF INGREDIENTS OF A MIXTURE CLASSIFIED AS GERM CELL MUTAGENS THAT WOULD TRIGGER CLASSIFICATION OF THE MIXTURE

Ingredient classified as:	Cut-off/concentration limits triggering classification of a mixture as:	
	Category 1 mutagen	Category 2 mutagen
Category 1A/B mutagen	≥0.1%	.....
Category 2 mutagen .....	.....	≥1.0%

Note: The cut-off values/concentration limits in the table above apply to solids and liquids (w/w units) as well as gases (v/v units).

A.5.3.2 Classification of Mixtures When Data Are Available for the Mixture Itself

The classification may be modified on a case-by-case basis based on the available test data for the mixture as a whole. In such cases, the test results for the mixture as a whole must be shown to be conclusive taking into account dose and other factors such as duration, observations and analysis (e.g. statistical analysis, test sensitivity) of germ cell mutagenicity test systems.

A.5.3.3 Classification of Mixtures When Data Are Not Available for the Complete Mixture: Bridging Principles

A.5.3.3.1 Where the mixture itself has not been tested to determine its germ cell mutagenicity hazard, but there are sufficient data on both the individual ingredients and similar tested mixtures to adequately characterize the hazards of the mixture, these data will be used in accordance with the following bridging principles as found in paragraph A.0.5 of this Appendix: Dilution, Batching, and Substantially similar mixtures.

A.5.4 Examples of Scientifically Validated Test Methods

A.5.4.1 Examples of *in vivo* heritable germ cell mutagenicity tests are:
 (a) Rodent dominant lethal mutation test (OECD 478)
 (b) Mouse heritable translocation assay (OECD 485)

(c) Mouse specific locus test
 A.5.4.2 Examples of *in vivo* somatic cell mutagenicity tests are:
 (a) Mammalian bone marrow chromosome aberration test (OECD 475)
 (b) Mouse spot test (OECD 484)
 (c) Mammalian erythrocyte micronucleus test (OECD 474)

A.5.4.3 Examples of mutagenicity/genotoxicity tests in germ cells are:
 (a) Mutagenicity tests:
 (i) Mammalian spermatogonial chromosome aberration test (OECD 483)
 (ii) Spermatid micronucleus assay
 (b) Genotoxicity tests:
 (i) Sister chromatid exchange analysis in spermatogonia
 (ii) Unscheduled DNA synthesis test (UDS) in testicular cells

A.5.4.4 Examples of genotoxicity tests in somatic cells are:
 (a) Liver Unscheduled DNA Synthesis (UDS) *in vivo* (OECD 486)
 (b) Mammalian bone marrow Sister Chromatid Exchanges (SCE)

A.5.4.5 Examples of *in vitro* mutagenicity tests are:
 (a) *In vitro* mammalian chromosome aberration test (OECD 473)
 (b) *In vitro* mammalian cell gene mutation test (OECD 476)
 (c) Bacterial reverse mutation tests (OECD 471)

A.5.4.6 As new, scientifically validated tests arise, these may also be used in the total weight of evidence to be considered.

A.6 CARCINOGENICITY

A.6.1 Definitions

Carcinogen means a substance or a mixture of substances which induce cancer or increase its incidence. Substances and mixtures which have induced benign and malignant tumors in well-performed experimental studies on animals are considered also to be presumed or suspected human carcinogens unless there is strong evidence that the mechanism of tumor formation is not relevant for humans.

Classification of a substance or mixture as posing a carcinogenic hazard is based on its inherent properties and does not provide information on the level of the human cancer risk which the use of the substance or mixture may represent.

A.6.2 Classification Criteria for Substances⁶

A.6.2.1 For the purpose of classification for carcinogenicity, substances are allocated to one of two categories based on strength of evidence and additional weight of evidence considerations. In certain instances, route-specific classification may be warranted.

FIGURE A.6.1—HAZARD CATEGORIES FOR CARCINOGENS

CATEGORY 1: Known or presumed human carcinogens.

The classification of a substance as a Category 1 carcinogen is done on the basis of epidemiological and/or animal data. This classification is further distinguished on the basis of whether the evidence for classification is largely from human data (Category 1A) or from animal data (Category 1B):

Category 1A: Known to have carcinogenic potential for humans. Classification in this category is largely based on human evidence.

Category 1B: Presumed to have carcinogenic potential for humans. Classification in this category is largely based on animal evidence.

The classification of a substance in Category 1A and 1B is based on strength of evidence together with weight of evidence considerations (See paragraph A.6.2.5). Such evidence may be derived from:

- human studies that establish a causal relationship between human exposure to a substance and the development of cancer (known human carcinogen); or
- animal experiments for which there is sufficient evidence to demonstrate animal carcinogenicity (presumed human carcinogen).

In addition, on a case by case basis, scientific judgment may warrant a decision of presumed human carcinogenicity derived from studies showing limited evidence of carcinogenicity in humans together with limited evidence of carcinogenicity in experimental animals.

CATEGORY 2: Suspected human carcinogens.

the classification to be modified only on a case-by-case evaluation based on available test data for the mixture as a whole.

⁶ See Non-mandatory Appendix F Part A for further guidance regarding hazard classification for carcinogenicity. This appendix is consistent with the GHS and is provided as guidance excerpted

from the International Agency for Research on Cancer (IARC) "Monographs on the Evaluation of Carcinogenic Risks to Humans" (2006).

FIGURE A.6.1—HAZARD CATEGORIES FOR CARCINOGENS—Continued

The classification of a substance in Category 2 is done on the basis of evidence obtained from human and/or animal studies, but which is not sufficiently convincing to place the substance in Category 1A or B. This classification is based on strength of evidence together with weight of evidence considerations (See paragraph A.6.2.5). Such evidence may be from either limited evidence of carcinogenicity in human studies or from limited evidence of carcinogenicity in animal studies.

Other considerations: Where the weight of evidence for the carcinogenicity of a substance does not meet the above criteria, any positive study conducted in accordance with established scientific principles, and which reports statistically significant findings regarding the carcinogenic potential of the substance, must be noted on the safety data sheet.

A.6.2.2 Classification as a carcinogen is made on the basis of evidence from reliable and acceptable methods, and is intended to be used for substances which have an intrinsic property to produce such toxic effects. The evaluations are to be based on all existing data, peer-reviewed published studies and additional data accepted by regulatory agencies.

A.6.2.3 Carcinogen classification is a one-step, criterion-based process that involves two interrelated determinations: evaluations of strength of evidence and consideration of all other relevant information to place substances with human cancer potential into hazard categories.

A.6.2.4 Strength of evidence involves the enumeration of tumors in human and animal studies and determination of their level of statistical significance. Sufficient human evidence demonstrates causality between human exposure and the development of cancer, whereas sufficient evidence in animals shows a causal relationship between the agent and an increased incidence of tumors. Limited evidence in humans is demonstrated by a positive association between exposure and cancer, but a causal relationship cannot be stated. Limited evidence in animals is provided when data suggest a carcinogenic effect, but are less than sufficient. (Guidance on consideration of important factors in the classification of carcinogenicity and a more detailed description of the terms "limited" and "sufficient" have been developed by the International Agency for Research on Cancer (IARC) and are provided in non-mandatory Appendix F).

A.6.2.5 Weight of evidence: Beyond the determination of the strength of evidence for carcinogenicity, a number of other factors

should be considered that influence the overall likelihood that an agent may pose a carcinogenic hazard in humans. The full list of factors that influence this determination is very lengthy, but some of the important ones are considered here.

A.6.2.5.1 These factors can be viewed as either increasing or decreasing the level of concern for human carcinogenicity. The relative emphasis accorded to each factor depends upon the amount and coherence of evidence bearing on each. Generally there is a requirement for more complete information to decrease than to increase the level of concern. Additional considerations should be used in evaluating the tumor findings and the other factors in a case-by-case manner.

A.6.2.5.2 Some important factors which may be taken into consideration, when assessing the overall level of concern are:

- (a) Tumor type and background incidence;
- (b) Multisite responses;
- (c) Progression of lesions to malignancy;
- (d) Reduced tumor latency;

Additional factors which may increase or decrease the level of concern include:

- (e) Whether responses are in single or both sexes;
- (f) Whether responses are in a single species or several species;
- (g) Structural similarity or not to a substance(s) for which there is good evidence of carcinogenicity;
- (h) Routes of exposure;
- (i) Comparison of absorption, distribution, metabolism and excretion between test animals and humans;
- (j) The possibility of a confounding effect of excessive toxicity at test doses; and,
- (k) Mode of action and its relevance for humans, such as mutagenicity, cytotoxicity

with growth stimulation, mitogenesis, immunosuppression.

Mutagenicity: It is recognized that genetic events are central in the overall process of cancer development. Therefore evidence of mutagenic activity *in vivo* may indicate that a substance has a potential for carcinogenic effects.

A.6.2.5.3 A substance that has not been tested for carcinogenicity may in certain instances be classified in Category 1A, Category 1B, or Category 2 based on tumor data from a structural analogue together with substantial support from consideration of other important factors such as formation of common significant metabolites, e.g., for benzidine congener dyes.

A.6.2.5.4 The classification should also take into consideration whether or not the substance is absorbed by a given route(s); or whether there are only local tumors at the site of administration for the tested route(s), and adequate testing by other major route(s) show lack of carcinogenicity.

A.6.2.5.5 It is important that whatever is known of the physico-chemical, toxicokinetic and toxicodynamic properties of the substances, as well as any available relevant information on chemical analogues, i.e., structure activity relationship, is taken into consideration when undertaking classification.

A.6.3 Classification Criteria for Mixtures⁷

A.6.3.1 The mixture shall be classified as a carcinogen when at least one ingredient has been classified as a Category 1 or Category 2 carcinogen and is present at or above the appropriate cut-off value/concentration limit as shown in Table A.6.1.

TABLE A.6.1—CUT-OFF VALUES/CONCENTRATION LIMITS OF INGREDIENTS OF A MIXTURE CLASSIFIED AS CARCINOGEN THAT WOULD TRIGGER CLASSIFICATION OF THE MIXTURE

Ingredient classified as:	Category 1 carcinogen	Category 2 carcinogen
Category 1 carcinogen	≥0.1%	
Category 2 carcinogen		≥0.1% (note 1).

Note: If a Category 2 carcinogen ingredient is present in the mixture at a concentration between 0.1% and 1%, information is required on the SDS for a product. However, a label warning is optional. If a Category 2 carcinogen ingredient is present in the mixture at a concentration of ≥1%, both an SDS and a label is required and the information must be included on each.

⁷ It should be noted that the classification criteria for health hazards usually include a tiered scheme in which test data available on the complete mixture are considered as the first tier in the evaluation, followed by the applicable bridging

principles, and lastly, cut-off values/concentration limit or additivity. However, this approach is not used for Carcinogenicity. These criteria for Carcinogenicity consider the cut-off values/concentration limits as the primary tier and allow

the classification to be modified only on a case-by-case evaluation based on available test data for the mixture as a whole.

A.6.3.2 Classification of Mixtures When Data Are Available for the Complete Mixture

A mixture may be classified based on the available test data for the mixture as a whole. In such cases, the test results for the mixture as a whole must be shown to be conclusive taking into account dose and other factors such as duration, observations and analysis (e.g., statistical analysis, test sensitivity) of carcinogenicity test systems.

A.6.3.3 Classification of Mixtures When Data Are Not Available for the Complete Mixture: Bridging Principles

Where the mixture itself has not been tested to determine its carcinogenic hazard, but there are sufficient data on both the individual ingredients and similar tested mixtures to adequately characterize the hazards of the mixture, these data will be used in accordance with the following bridging principles as found in paragraph A.0.5 of this Appendix: Dilution; Batching; and Substantially similar mixtures.

A.6.4 Classification of Carcinogenicity⁸

A.6.4.1 Chemical manufacturers, importers and employers evaluating chemicals may treat the following sources as establishing that a substance is a carcinogen or potential carcinogen for hazard communication purposes in lieu of applying the criteria described herein:

A.6.4.1.1 National Toxicology Program (NTP), "Report on Carcinogens" (latest edition);

A.6.4.1.2 International Agency for Research on Cancer (IARC) "Monographs on the Evaluation of Carcinogenic Risks to Humans" (latest editions)

A.6.4.2 Where OSHA has included cancer as a health hazard to be considered by classifiers for a chemical covered by 29 CFR part 1910, Subpart Z, Toxic and Hazardous Substances, chemical manufacturers, importers, and employers shall classify the chemical as a carcinogen.

A.7 REPRODUCTIVE TOXICITY

A.7.1 Definitions and General Considerations

A.7.1.1 *Reproductive toxicity* includes *adverse effects on sexual function and fertility* in adult males and females, as well as *adverse effects on development of the offspring*. Some reproductive toxic effects cannot be clearly assigned to either impairment of sexual function and fertility or to developmental toxicity. Nonetheless, chemicals with these effects shall be classified as reproductive toxicants.

For classification purposes, the known induction of genetically based inheritable effects in the offspring is addressed in *Germ cell mutagenicity* (See A.5).

A.7.1.2 *Adverse effects on sexual function and fertility* means any effect of chemicals that interferes with reproductive ability or sexual capacity. This includes, but is not limited to, alterations to the female and male reproductive system, adverse effects on

onset of puberty, gamete production and transport, reproductive cycle normality, sexual behaviour, fertility, parturition, pregnancy outcomes, premature reproductive senescence, or modifications in other functions that are dependent on the integrity of the reproductive systems.

A.7.1.3 *Adverse effects on development of the offspring* means any effect of chemicals which interferes with normal development of the conceptus either before or after birth, which is induced during pregnancy or results from parental exposure. These effects can be manifested at any point in the life span of the organism. The major manifestations of developmental toxicity include death of the developing organism, structural abnormality, altered growth and functional deficiency.

A.7.1.4 Adverse effects on or via lactation are also included in reproductive toxicity, but for classification purposes, such effects are treated separately (See A.7.2.1).

A.7.2 Classification Criteria for Substances

A.7.2.1 For the purpose of classification for reproductive toxicity, substances shall be classified in one of two categories in accordance with Figure A.7.1(a). Effects on sexual function and fertility, and on development, shall be considered. In addition, effects on or via lactation shall be classified in a separate hazard category in accordance with Figure A.7.1(b).

FIGURE A.7.1(a)—HAZARD CATEGORIES FOR REPRODUCTIVE TOXICANTS

CATEGORY 1: Known or presumed human reproductive toxicant.

Substance shall be classified in Category 1 for reproductive toxicity when they are known to have produced an adverse effect on sexual function and fertility or on development in humans or when there is evidence from animal studies, possibly supplemented with other information, to provide a strong presumption that the substance has the capacity to interfere with reproduction in humans. The classification of a substance is further distinguished on the basis of whether the evidence for classification is primarily from human data (Category 1A) or from animal data (Category 1B).

Category 1A: Known human reproductive toxicant.

The classification of a substance in this category is largely based on evidence from humans.

Category 1B: Presumed human reproductive toxicant.

The classification of a substance in this category is largely based on evidence from experimental animals. Data from animal studies shall provide sufficient evidence of an adverse effect on sexual function and fertility or on development in the absence of other toxic effects, or if occurring together with other toxic effects the adverse effect on reproduction is considered not to be a secondary non-specific consequence of other toxic effects. However, when there is mechanistic information that raises doubt about the relevance of the effect for humans, classification in Category 2 may be more appropriate.

CATEGORY 2: Suspected human reproductive toxicant.

Substances shall be classified in Category 2 for reproductive toxicity when there is some evidence from humans or experimental animals, possibly supplemented with other information, of an adverse effect on sexual function and fertility, or on development, in the absence of other toxic effects, or if occurring together with other toxic effects the adverse effect on reproduction is considered not to be a secondary non-specific consequence of the other toxic effects, and where the evidence is not sufficiently convincing to place the substance in Category 1. For instance, deficiencies in the study may make the quality of evidence less convincing, and in view of this, Category 2 would be the more appropriate classification.

FIGURE A.7.1(b)—HAZARD CATEGORY FOR EFFECTS ON OR VIA LACTATION

EFFECTS ON OR VIA LACTATION

Effects on or via lactation shall be classified in a separate single category. Chemicals that are absorbed by women and have been shown to interfere with lactation or that may be present (including metabolites) in breast milk in amounts sufficient to cause concern for the health of a breastfed child, shall be classified to indicate this property hazardous to breastfed babies. This classification shall be assigned on the basis of:

- (a) absorption, metabolism, distribution and excretion studies that indicate the likelihood the substance would be present in potentially toxic levels in breast milk; and/or

⁸ See Non-mandatory Appendix F for further guidance regarding hazard classification for

carcinogenicity and how to relate carcinogenicity

classification information from IARC and NTP to GHS.

FIGURE A.7.1(b)—HAZARD CATEGORY FOR EFFECTS ON OR VIA LACTATION—Continued

- (b) results of one or two generation studies in animals which provide clear evidence of adverse effect in the offspring due to transfer in the milk or adverse effect on the quality of the milk; and/or
- (c) human evidence indicating a hazard to babies during the lactation period.

A.7.2.2 Basis of Classification

A.7.2.2.1 Classification is made on the basis of the criteria, outlined above, an assessment of the total weight of evidence, and the use of expert judgment. Classification as a reproductive toxicant is intended to be used for substances which have an intrinsic, specific property to produce an adverse effect on reproduction and substances should not be so classified if such an effect is produced solely as a non-specific secondary consequence of other toxic effects.

A.7.2.2.2 In the evaluation of toxic effects on the developing offspring, it is important to consider the possible influence of maternal toxicity.

A.7.2.2.3 For human evidence to provide the primary basis for a Category 1A classification there must be reliable evidence of an adverse effect on reproduction in humans. Evidence used for classification shall be from well conducted epidemiological studies, if available, which include the use of appropriate controls, balanced assessment, and due consideration of bias or confounding factors. Less rigorous data from studies in humans may be sufficient for a Category 1A classification if supplemented with adequate data from studies in experimental animals, but classification in Category 1B may also be considered.

A.7.2.3 Weight of Evidence

A.7.2.3.1 Classification as a reproductive toxicant is made on the basis of an assessment of the total weight of evidence using expert judgment. This means that all available information that bears on the determination of reproductive toxicity is considered together. Included is information such as epidemiological studies and case reports in humans and specific reproduction studies along with sub-chronic, chronic and special study results in animals that provide relevant information regarding toxicity to reproductive and related endocrine organs. Evaluation of substances chemically related to the material under study may also be included, particularly when information on the material is scarce. The weight given to the available evidence will be influenced by factors such as the quality of the studies, consistency of results, nature and severity of effects, level of statistical significance for intergroup differences, number of endpoints affected, relevance of route of administration to humans and freedom from bias. Both positive and negative results are considered together in a weight of evidence determination. However, a single, positive study performed according to good scientific principles and with statistically or biologically significant positive results may justify classification (See also A.7.2.2.3).

A.7.2.3.2 Toxicokinetic studies in animals and humans, site of action and mechanism or mode of action study results

may provide relevant information, which could reduce or increase concerns about the hazard to human health. If it is conclusively demonstrated that the clearly identified mechanism or mode of action has no relevance for humans or when the toxicokinetic differences are so marked that it is certain that the hazardous property will not be expressed in humans then a chemical which produces an adverse effect on reproduction in experimental animals should not be classified.

A.7.2.3.3 In some reproductive toxicity studies in experimental animals the only effects recorded may be considered of low or minimal toxicological significance and classification may not necessarily be the outcome. These effects include, for example, small changes in semen parameters or in the incidence of spontaneous defects in the fetus, small changes in the proportions of common fetal variants such as are observed in skeletal examinations, or in fetal weights, or small differences in postnatal developmental assessments.

A.7.2.3.4 Data from animal studies shall provide sufficient evidence of specific reproductive toxicity in the absence of other systemic toxic effects. However, if developmental toxicity occurs together with other toxic effects in the dam (mother), the potential influence of the generalized adverse effects should be assessed to the extent possible. The preferred approach is to consider adverse effects in the embryo/fetus first, and then evaluate maternal toxicity, along with any other factors which are likely to have influenced these effects, as part of the weight of evidence. In general, developmental effects that are observed at maternally toxic doses should not be automatically discounted. Discounting developmental effects that are observed at maternally toxic doses can only be done on a case-by-case basis when a causal relationship is established or refuted.

A.7.2.3.5 If appropriate information is available it is important to try to determine whether developmental toxicity is due to a specific maternally mediated mechanism or to a non-specific secondary mechanism, like maternal stress and the disruption of homeostasis. Generally, the presence of maternal toxicity should not be used to negate findings of embryo/fetal effects, unless it can be clearly demonstrated that the effects are secondary non-specific effects. This is especially the case when the effects in the offspring are significant, e.g., irreversible effects such as structural malformations. In some situations it is reasonable to assume that reproductive toxicity is due to a secondary consequence of maternal toxicity and discount the effects, for example if the chemical is so toxic that dams fail to thrive and there is severe inanition; they are incapable of nursing pups; or they are prostrate or dying.

A.7.2.4 Maternal Toxicity

A.7.2.4.1 Development of the offspring throughout gestation and during the early postnatal stages can be influenced by toxic effects in the mother either through non-specific mechanisms related to stress and the disruption of maternal homeostasis, or by specific maternally-mediated mechanisms. So, in the interpretation of the developmental outcome to decide classification for developmental effects it is important to consider the possible influence of maternal toxicity. This is a complex issue because of uncertainties surrounding the relationship between maternal toxicity and developmental outcome. Expert judgment and a weight of evidence approach, using all available studies, shall be used to determine the degree of influence to be attributed to maternal toxicity when interpreting the criteria for classification for developmental effects. The adverse effects in the embryo/fetus shall be first considered, and then maternal toxicity, along with any other factors which are likely to have influenced these effects, as weight of evidence, to help reach a conclusion about classification.

A.7.2.4.2 Based on pragmatic observation, it is believed that maternal toxicity may, depending on severity, influence development via non-specific secondary mechanisms, producing effects such as depressed fetal weight, retarded ossification, and possibly resorptions and certain malformations in some strains of certain species. However, the limited numbers of studies which have investigated the relationship between developmental effects and general maternal toxicity have failed to demonstrate a consistent, reproducible relationship across species. Developmental effects which occur even in the presence of maternal toxicity are considered to be evidence of developmental toxicity, unless it can be unequivocally demonstrated on a case by case basis that the developmental effects are secondary to maternal toxicity. Moreover, classification shall be considered where there is a significant toxic effect in the offspring, e.g., irreversible effects such as structural malformations, embryo/fetal lethality, or significant post-natal functional deficiencies.

A.7.2.4.3 Classification shall not automatically be discounted for chemicals that produce developmental toxicity only in association with maternal toxicity, even if a specific maternally-mediated mechanism has been demonstrated. In such a case, classification in Category 2 may be considered more appropriate than Category 1. However, when a chemical is so toxic that maternal death or severe inanition results, or the dams (mothers) are prostrate and incapable of nursing the pups, it is reasonable to assume that developmental toxicity is produced solely as a secondary consequence of maternal toxicity and discount the developmental effects.

Classification is not necessarily the outcome in the case of minor developmental changes, e.g., a small reduction in fetal/pup body weight or retardation of ossification when seen in association with maternal toxicity.

A.7.2.4.4 Some of the endpoints used to assess maternal toxicity are provided below. Data on these endpoints, if available, shall be evaluated in light of their statistical or biological significance and dose-response relationship.

(a) Maternal mortality: An increased incidence of mortality among the treated dams over the controls shall be considered evidence of maternal toxicity if the increase occurs in a dose-related manner and can be attributed to the systemic toxicity of the test material. Maternal mortality greater than 10% is considered excessive and the data for that dose level shall not normally be considered to need further evaluation.

(b) Mating index (Number of animals with seminal plugs or sperm/Number of mated $\times$ 100)

(c) Fertility index (Number of animals with implants/Number of matings $\times$ 100)

(d) Gestation length (If allowed to deliver)

(e) Body weight and body weight change: Consideration of the maternal body weight change and/or adjusted (corrected) maternal body weight shall be included in the evaluation of maternal toxicity whenever such data are available. The calculation of an adjusted (corrected) mean maternal body weight change, which is the difference between the initial and terminal body weight minus the gravid uterine weight (or alternatively, the sum of the weights of the fetuses), may indicate whether the effect is maternal or intrauterine. In rabbits, the body weight gain may not be a useful indicator of maternal toxicity because of normal fluctuations in body weight during pregnancy.

(f) Food and water consumption (if relevant): The observation of a significant decrease in the average food or water consumption in treated dams (mothers) compared to the control group may be useful in evaluating maternal toxicity, particularly when the test material is administered in the diet or drinking water. Changes in food or water consumption must be evaluated in conjunction with maternal body weights when determining if the effects noted are reflective of maternal toxicity or more simply, unpalatability of the test material in feed or water.

(g) Clinical evaluations (including clinical signs, markers, and hematology and clinical chemistry studies): The observation of increased incidence of significant clinical signs of toxicity in treated dams (mothers) relative to the control group is useful in evaluating maternal toxicity. If this is to be used as the basis for the assessment of maternal toxicity, the types, incidence, degree and duration of clinical signs shall be reported in the study. Clinical signs of maternal intoxication include, but are not limited to: coma, prostration, hyperactivity, loss of righting reflex, ataxia, or labored breathing.

(h) Post-mortem data: Increased incidence and/or severity of post-mortem findings may be indicative of maternal toxicity. This can include gross or microscopic pathological findings or organ weight data, including absolute organ weight, organ-to-body weight ratio, or organ-to-brain weight ratio. When supported by findings of adverse histopathological effects in the affected organ(s), the observation of a significant change in the average weight of suspected target organ(s) of treated dams (mothers), compared to those in the control group, may be considered evidence of maternal toxicity.

A.7.2.5 Animal and Experimental Data

A.7.2.5.1 A number of scientifically validated test methods are available, including methods for developmental toxicity testing (e.g., OECD Test Guideline 414, ICH Guideline S5A, 1993), methods for peri- and post-natal toxicity testing (e.g., ICH S5B, 1995), and methods for one or two-generation toxicity testing (e.g., OECD Test Guidelines 415, 416)

A.7.2.5.2 Results obtained from screening tests (e.g., OECD Guidelines 421—Reproduction/Developmental Toxicity Screening Test, and 422—Combined Repeated Dose Toxicity Study with Reproduction/Development Toxicity Screening Test) can also be used to justify classification, although the quality of this evidence is less reliable than that obtained through full studies.

A.7.2.5.3 Adverse effects or changes, seen in short- or long-term repeated dose toxicity studies, which are judged likely to impair reproductive function and which occur in the absence of significant generalized toxicity, may be used as a basis for classification, e.g., histopathological changes in the gonads.

A.7.2.5.4 Evidence from *in vitro* assays, or non-mammalian tests, and from analogous substances using structure-activity relationship (SAR), can contribute to the procedure for classification. In all cases of this nature, expert judgment must be used to assess the adequacy of the data. Inadequate data shall not be used as a primary support for classification.

A.7.2.5.5 It is preferable that animal studies are conducted using appropriate routes of administration which relate to the potential route of human exposure. However, in practice, reproductive toxicity studies are commonly conducted using the oral route, and such studies will normally be suitable for evaluating the hazardous properties of the substance with respect to reproductive toxicity. However, if it can be conclusively demonstrated that the clearly identified mechanism or mode of action has no relevance for humans or when the toxicokinetic differences are so marked that it is certain that the hazardous property will not be expressed in humans then a substance which produces an adverse effect on reproduction in experimental animals should not be classified.

A.7.2.5.6 Studies involving routes of administration such as intravenous or intraperitoneal injection, which may result in

exposure of the reproductive organs to unrealistically high levels of the test substance, or elicit local damage to the reproductive organs, e.g., by irritation, must be interpreted with extreme caution and on their own are not normally the basis for classification.

A.7.2.5.7 There is general agreement about the concept of a limit dose, above which the production of an adverse effect may be considered to be outside the criteria which lead to classification. Some test guidelines specify a limit dose, other test guidelines qualify the limit dose with a statement that higher doses may be necessary if anticipated human exposure is sufficiently high that an adequate margin of exposure would not be achieved. Also, due to species differences in toxicokinetics, establishing a specific limit dose may not be adequate for situations where humans are more sensitive than the animal model.

A.7.2.5.8 In principle, adverse effects on reproduction seen only at very high dose levels in animal studies (for example doses that induce prostration, severe inappetence, excessive mortality) do not normally lead to classification, unless other information is available, for example, toxicokinetics information indicating that humans may be more susceptible than animals, to suggest that classification is appropriate.

A.7.2.5.9 However, specification of the actual "limit dose" will depend upon the test method that has been employed to provide the test results.

A.7.3 Classification Criteria for Mixtures⁹

A.7.3.1 Classification of Mixtures When Data Are Available for All Ingredients or Only for Some Ingredients of the Mixture

A.7.3.1.1 The mixture shall be classified as a reproductive toxicant when at least one ingredient has been classified as a Category 1 or Category 2 reproductive toxicant and is present at or above the appropriate cut-off value/concentration limit specified in Table A.7.1 for Category 1 and 2, respectively.

A.7.3.1.2 The mixture shall be classified for effects on or via lactation when at least one ingredient has been classified for effects on or via lactation and is present at or above the appropriate cut-off value/concentration limit specified in Table A.7.1 for the additional category for effects on or via lactation.

⁹It should be noted that the classification criteria for health hazards usually include a tiered scheme in which test data available on the complete mixture are considered as the first tier in the evaluation, followed by the applicable bridging principles, and lastly, cut-off values/concentration limits or additivity. However, this approach is not used for Reproductive Toxicity. These criteria for Reproductive Toxicity consider the cut-off values/concentration limits as the primary tier and allow the classification to be modified only on a case-by-case evaluation based on available test data for the mixture as a whole.

TABLE A.7.1—CUT-OFF VALUES/CONCENTRATION LIMITS OF INGREDIENTS OF A MIXTURE CLASSIFIED AS REPRODUCTIVE TOXICANTS OR FOR EFFECTS ON OR VIA LACTATION THAT TRIGGER CLASSIFICATION OF THE MIXTURE

Ingredients classified as:	Cut-off values/concentration limits triggering classification of a mixture as:		
	Category 1 reproductive toxicant	Category 2 reproductive toxicant	Additional category for effects on or via lactation
Category 1 reproductive toxicant	≥0.1%		
Category 2 reproductive toxicant		≥0.1%	
Additional category for effects on or via lactation			≥0.1%

A.7.3.2 Classification of Mixtures When Data Are Available for the Complete Mixture

Available test data for the mixture as a whole may be used for classification on a case-by-case basis. In such cases, the test results for the mixture as a whole must be shown to be conclusive taking into account dose and other factors such as duration, observations and analysis (e.g., statistical analysis, test sensitivity) of reproduction test systems.

A.7.3.3 Classification of Mixtures When Data Are Not Available for the Complete Mixture: Bridging Principles

A.7.3.3.1 Where the mixture itself has not been tested to determine its reproductive toxicity, but there are sufficient data on both the individual ingredients and similar tested mixtures to adequately characterize the hazards of the mixture, these data shall be used in accordance with the following bridging principles as found in paragraph A.0.5 of this Appendix: Dilution, Batching, and Substantially similar mixtures.

A.8 SPECIFIC TARGET ORGAN TOXICITY SINGLE EXPOSURE**A.8.1 Definitions and General Considerations**

A.8.1.1 *Specific target organ toxicity—single exposure, (STOT–SE)* means specific,

non-lethal target organ toxicity arising from a single exposure to a chemical. All significant health effects that can impair function, both reversible and irreversible, immediate and/or delayed and not specifically addressed in A.1 to A.7 and A.10 of this Appendix are included. Specific target organ toxicity following repeated exposure is classified in accordance with *SPECIFIC TARGET ORGAN TOXICITY—REPEATED EXPOSURE* (A.9 of this Appendix) and is therefore not included here.

A.8.1.2 Classification identifies the chemical as being a specific target organ toxicant and, as such, it presents a potential for adverse health effects in people who are exposed to it.

A.8.1.3 The adverse health effects produced by a single exposure include consistent and identifiable toxic effects in humans; or, in experimental animals, toxicologically significant changes which have affected the function or morphology of a tissue/organ, or have produced serious changes to the biochemistry or hematology of the organism, and these changes are relevant for human health. Human data is the primary source of evidence for this hazard class.

A.8.1.4 Assessment shall take into consideration not only significant changes in a single organ or biological system but also

generalized changes of a less severe nature involving several organs.

A.8.1.5 Specific target organ toxicity can occur by any route that is relevant for humans, i.e., principally oral, dermal or inhalation.

A.8.1.6 The classification criteria for specific organ systemic toxicity single exposure are organized as criteria for substances Categories 1 and 2 (See A.8.2.1), criteria for substances Category 3 (See A.8.2.2) and criteria for mixtures (See A.8.3). See also Figure A.8.1.

A.8.2 Classification Criteria for Substances**A.8.2.1 Substances of Category 1 and Category 2**

A.8.2.1.1 Substances shall be classified for immediate or delayed effects separately, by the use of expert judgment on the basis of the weight of all evidence available, including the use of recommended guidance values (See A.8.2.1.9). Substances shall then be classified in Category 1 or 2, depending upon the nature and severity of the effect(s) observed, in accordance with Figure A.8.1.

FIGURE A.8.1—HAZARD CATEGORIES FOR SPECIFIC TARGET ORGAN TOXICITY FOLLOWING SINGLE EXPOSURE

CATEGORY 1: Substances that have produced significant toxicity in humans, or that, on the basis of evidence from studies in experimental animals can be presumed to have the potential to produce significant toxicity in humans following single exposure

Substances are classified in Category 1 for STOT–SE on the basis of:

- (a) reliable and good quality evidence from human cases or epidemiological studies; or
- (b) observations from appropriate studies in experimental animals in which significant and/or severe toxic effects of relevance to human health were produced at generally low exposure concentrations. Guidance dose/concentration values are provided below (See A.8.2.1.9) to be used as part of weight-of-evidence evaluation.

CATEGORY 2: Substances that, on the basis of evidence from studies in experimental animals, can be presumed to have the potential to be harmful to human health following single exposure

Substances are classified in Category 2 for STOT–SE on the basis of observations from appropriate studies in experimental animals in which significant toxic effects, of relevance to human health, were produced at generally moderate exposure concentrations. Guidance dose/concentration values are provided below (See A.8.2.1.9) in order to help in classification.

In exceptional cases, human evidence can also be used to place a substance in Category 2 (See A.8.2.1.6).

CATEGORY 3: Transient target organ effects

There are target organ effects for which a substance does not meet the criteria to be classified in Categories 1 or 2 indicated above. These are effects which adversely alter human function for a short duration after exposure and from which humans may recover in a reasonable period without leaving significant alteration of structure or function. This category only includes narcotic effects and respiratory tract irritation. Substances are classified specifically for these effects as discussed in A.8.2.2.

Note: The primary target organ/system shall be identified where possible, and where this is not possible, the substance shall be identified as a general toxicant. The data shall be evaluated and, where possible, shall not include secondary effects (e.g., a hepatotoxicant can produce secondary effects in the nervous or gastro-intestinal systems).

A.8.2.1.2 The relevant route(s) of exposure by which the classified substance produces damage shall be identified.

A.8.2.1.3 Classification is determined by expert judgment, on the basis of the weight

of all evidence available including the guidance presented below.

A.8.2.1.4 Weight of evidence of all available data, including human incidents, epidemiology, and studies conducted in experimental animals is used to substantiate specific target organ toxic effects that merit classification.

A.8.2.1.5 The information required to evaluate specific target organ toxicity comes either from single exposure in humans (e.g., exposure at home, in the workplace or environmentally), or from studies conducted in experimental animals. The standard animal studies in rats or mice that provide this information are acute toxicity studies which can include clinical observations and detailed macroscopic and microscopic examination to enable the toxic effects on target tissues/organs to be identified. Results of acute toxicity studies conducted in other species may also provide relevant information.

A.8.2.1.6 In exceptional cases, based on expert judgment, it may be appropriate to place certain substances with human evidence of target organ toxicity in Category 2: (a) when the weight of human evidence is not sufficiently convincing to warrant Category 1 classification, and/or (b) based on the nature and severity of effects. Dose/concentration levels in humans shall not be considered in the classification and any available evidence from animal studies shall be consistent with the Category 2 classification. In other words, if there are also animal data available on the substance that warrant Category 1 classification, the chemical shall be classified as Category 1.

A.8.2.1.7 Effects considered to support classification for Category 1 and 2

A.8.2.1.7.1 Classification is supported by evidence associating single exposure to the substance with a consistent and identifiable toxic effect.

A.8.2.1.7.2 Evidence from human experience/incidents is usually restricted to reports of adverse health consequences, often with uncertainty about exposure conditions, and may not provide the scientific detail that

can be obtained from well-conducted studies in experimental animals.

A.8.2.1.7.3 Evidence from appropriate studies in experimental animals can furnish much more detail, in the form of clinical observations, and macroscopic and microscopic pathological examination and this can often reveal hazards that may not be life-threatening but could indicate functional impairment. Consequently all available evidence, and evidence relevance to human health, must be taken into consideration in the classification process. Relevant toxic effects in humans and/or animals include, but are not limited to:

(a) Morbidity resulting from single exposure;

(b) Significant functional changes, more than transient in nature, in the respiratory system, central or peripheral nervous systems, other organs or other organ systems, including signs of central nervous system depression and effects on special senses (e.g., sight, hearing and sense of smell);

(c) Any consistent and significant adverse change in clinical biochemistry, hematology, or urinalysis parameters;

(d) Significant organ damage that may be noted at necropsy and/or subsequently seen or confirmed at microscopic examination;

(e) Multi-focal or diffuse necrosis, fibrosis or granuloma formation in vital organs with regenerative capacity;

(f) Morphological changes that are potentially reversible but provide clear evidence of marked organ dysfunction; and,

(g) Evidence of appreciable cell death (including cell degeneration and reduced cell number) in vital organs incapable of regeneration.

A.8.2.1.8 Effects considered not to support classification for Category 1 and 2

Effects may be seen in humans and/or animals that do not justify classification. Such effects include, but are not limited to:

(a) Clinical observations or small changes in bodyweight gain, food consumption or water intake that may have some

toxicological importance but that do not, by themselves, indicate "significant" toxicity;

(b) Small changes in clinical biochemistry, hematology or urinalysis parameters and/or transient effects, when such changes or effects are of doubtful or of minimal toxicological importance;

(c) Changes in organ weights with no evidence of organ dysfunction;

(d) Adaptive responses that are not considered toxicologically relevant; and,

(e) Substance-induced species-specific mechanisms of toxicity, i.e., demonstrated with reasonable certainty to be not relevant for human health, shall not justify classification.

A.8.2.1.9 Guidance values to assist with classification based on the results obtained from studies conducted in experimental animals for Category 1 and 2

A.8.2.1.9.1 In order to help reach a decision about whether a substance shall be classified or not, and to what degree it shall be classified (Category 1 vs. Category 2), dose/concentration "guidance values" are provided for consideration of the dose/concentration which has been shown to produce significant health effects. The principal argument for proposing such guidance values is that all chemicals are potentially toxic and there has to be a reasonable dose/concentration above which a degree of toxic effect is acknowledged.

A.8.2.1.9.2 Thus, in animal studies, when significant toxic effects are observed that indicate classification, consideration of the dose/concentration at which these effects were seen, in relation to the suggested guidance values, provides useful information to help assess the need to classify (since the toxic effects are a consequence of the hazardous property(ies) and also the dose/concentration).

A.8.2.1.9.3 The guidance value (C) ranges for single-dose exposure which has produced a significant non-lethal toxic effect are those applicable to acute toxicity testing, as indicated in Table A.8.1.

TABLE A.8.1—GUIDANCE VALUE RANGES FOR SINGLE-DOSE EXPOSURES

Route of exposure	Units	Guidance value ranges for:		
		Category 1	Category 2	Category 3
Oral (rat)	mg/kg body weight	C ≤300	2000 ≥C >300	Guidance values do not apply.
Dermal (rat or rabbit)	mg/kg body weight	C ≤1,000	2000 ≥C >1,000.	
Inhalation (rat) gas	ppmV/4h	C ≤2,500	20,000 ≥C >2,500.	
Inhalation (rat) vapor	mg/l/4h	C ≤10	20 ≥C >10.	
Inhalation (rat) dust/mist/fume.	mg/l/4h	C ≤1.0	5.0 ≥C >1.0.	

A.8.2.1.9.4 The guidance values and ranges mentioned in Table A.8.1 are intended only for guidance purposes, i.e., to be used as part of the weight of evidence approach, and to assist with decisions about classification. They are not intended as strict demarcation values. Guidance values are not provided for Category 3 since this classification is primarily based on human data; animal data may be included in the weight of evidence evaluation.

A.8.2.1.9.5 Thus, it is feasible that a specific profile of toxicity occurs at a dose/concentration below the guidance value, e.g., <2000 mg/kg body weight by the oral route, however the nature of the effect may result in the decision not to classify. Conversely, a specific profile of toxicity may be seen in animal studies occurring at above a guidance value, e.g., ≥2000 mg/kg body weight by the oral route, and in addition there is supplementary information from other

sources, e.g., other single dose studies, or human case experience, which supports a conclusion that, in view of the weight of evidence, classification is the prudent action to take.

A.8.2.1.10 Other considerations

A.8.2.1.10.1 When a substance is characterized only by use of animal data the classification process includes reference to dose/concentration guidance values as one of

the elements that contribute to the weight of evidence approach.

A.8.2.1.10.2 When well-substantiated human data are available showing a specific target organ toxic effect that can be reliably attributed to single exposure to a substance, the substance shall be classified. Positive human data, regardless of probable dose, predominates over animal data. Thus, if a substance is unclassified because specific target organ toxicity observed was considered not relevant or significant to humans, if subsequent human incident data become available showing a specific target organ toxic effect, the substance shall be classified.

A.8.2.1.10.3 A substance that has not been tested for specific target organ toxicity shall, where appropriate, be classified on the basis of data from a scientifically validated structure activity relationship and expert judgment-based extrapolation from a structural analogue that has previously been classified together with substantial support from consideration of other important factors such as formation of common significant metabolites.

A.8.2.2 Substances of Category 3

A.8.2.2.1 Criteria for respiratory tract irritation

The criteria for classifying substances as Category 3 for respiratory tract irritation are:

(a) Respiratory irritant effects (characterized by localized redness, edema, pruritis and/or pain) that impair function with symptoms such as cough, pain, choking, and breathing difficulties are included. It is recognized that this evaluation is based primarily on human data;

(b) Subjective human observations supported by objective measurements of clear respiratory tract irritation (RTI) (e.g., electrophysiological responses, biomarkers of inflammation in nasal or bronchoalveolar lavage fluids);

(c) The symptoms observed in humans shall also be typical of those that would be produced in the exposed population rather than being an isolated idiosyncratic reaction or response triggered only in individuals with hypersensitive airways. Ambiguous reports simply of "irritation" should be

excluded as this term is commonly used to describe a wide range of sensations including those such as smell, unpleasant taste, a tickling sensation, and dryness, which are outside the scope of classification for respiratory tract irritation;

(d) There are currently no scientifically validated animal tests that deal specifically with RTI; however, useful information may be obtained from the single and repeated inhalation toxicity tests. For example, animal studies may provide useful information in terms of clinical signs of toxicity (dyspnoea, rhinitis etc) and histopathology (e.g., hyperemia, edema, minimal inflammation, thickened mucous layer) which are reversible and may be reflective of the characteristic clinical symptoms described above. Such animal studies can be used as part of weight of evidence evaluation; and,

(e) This special classification will occur only when more severe organ effects including the respiratory system are not observed as those effects would require a higher classification.

A.8.2.2.2 Criteria for narcotic effects

The criteria for classifying substances in Category 3 for narcotic effects are:

(a) Central nervous system depression including narcotic effects in humans such as drowsiness, narcosis, reduced alertness, loss of reflexes, lack of coordination, and vertigo are included. These effects can also be manifested as severe headache or nausea, and can lead to reduced judgment, dizziness, irritability, fatigue, impaired memory function, deficits in perception and coordination, reaction time, or sleepiness; and,

(b) Narcotic effects observed in animal studies may include lethargy, lack of coordination righting reflex, narcosis, and ataxia. If these effects are not transient in nature, then they shall be considered for classification as Category 1 or 2.

A.8.3 Classification Criteria for Mixtures

A.8.3.1 Mixtures are classified using the same criteria as for substances, or alternatively as described below. As with substances, mixtures may be classified for

specific target organ toxicity following single exposure, repeated exposure, or both.

A.8.3.2 Classification of Mixtures When Data Are Available for the Complete Mixture

When reliable and good quality evidence from human experience or appropriate studies in experimental animals, as described in the criteria for substances, is available for the mixture, then the mixture shall be classified by weight of evidence evaluation of this data. Care shall be exercised in evaluating data on mixtures, that the dose, duration, observation or analysis, do not render the results inconclusive.

A.8.3.3 Classification of Mixtures When Data Are Not Available for the Complete Mixture: Bridging Principles

A.8.3.3.1 Where the mixture itself has not been tested to determine its specific target organ toxicity, but there are sufficient data on both the individual ingredients and similar tested mixtures to adequately characterize the hazards of the mixture, these data shall be used in accordance with the following bridging principles as found in paragraph A.0.5 of this Appendix: Dilution, Batching, Concentration of mixtures, Interpolation within one toxicity category, Substantially similar mixtures, or Aerosols.

A.8.3.4 Classification of Mixtures When Data Are Available for All Ingredients or Only for Some Ingredients of the Mixture

A.8.3.4.1 Where there is no reliable evidence or test data for the specific mixture itself, and the bridging principles cannot be used to enable classification, then classification of the mixture is based on the classification of the ingredient substances. In this case, the mixture shall be classified as a specific target organ toxicant (specific organ specified), following single exposure, repeated exposure, or both when at least one ingredient has been classified as a Category 1 or Category 2 specific target organ toxicant and is present at or above the appropriate cut-off value/concentration limit specified in Table A.8.2 for Categories 1 and 2, respectively.

TABLE A.8.2—CUT-OFF VALUES/CONCENTRATION LIMITS OF INGREDIENTS OF A MIXTURE CLASSIFIED AS A SPECIFIC TARGET ORGAN TOXICANT THAT WOULD TRIGGER CLASSIFICATION OF THE MIXTURE AS CATEGORY 1 OR 2

Ingredient classified as:		Cut-off values/concentration limits triggering classification of a mixture as:	
		Category 1	Category 2
Category 1	Target organ toxicant	≥1.0%	.....
Category 2	Target organ toxicant .....	.....	≥1.0%

A.8.3.4.2 These cut-off values and consequent classifications shall be applied equally and appropriately to both single- and repeated-dose target organ toxicants.

A.8.3.4.3 Mixtures shall be classified for either or both single and repeated dose toxicity independently.

A.8.3.4.4 Care shall be exercised when toxicants affecting more than one organ system are combined that the potentiation or

synergistic interactions are considered, because certain substances can cause target organ toxicity at <1% concentration when other ingredients in the mixture are known to potentiate its toxic effect.

A.8.3.4.5 Care shall be exercised when extrapolating the toxicity of a mixture that contains Category 3 ingredient(s). A cut-off value/concentration limit of 20%, considered as an additive of all Category 3 ingredients

for each hazard endpoint, is appropriate; however, this cut-off value/concentration limit may be higher or lower depending on the Category 3 ingredient(s) involved and the fact that some effects such as respiratory tract irritation may not occur below a certain concentration while other effects such as narcotic effects may occur below this 20% value. Expert judgment shall be exercised. Respiratory tract irritation and narcotic

effects are to be evaluated separately in accordance with the criteria given in A.8.2.2. When conducting classifications for these hazards, the contribution of each ingredient should be considered additive, unless there is evidence that the effects are not additive.

A.9 SPECIFIC TARGET ORGAN TOXICITY REPEATED OR PROLONGED EXPOSURE

A.9.1 Definitions and general considerations

A.9.1.1 *Specific target organ toxicity—repeated exposure (STOT-RE)* means specific target organ toxicity arising from repeated exposure to a substance or mixture. All significant health effects that can impair function, both reversible and irreversible, immediate and/or delayed and not specifically addressed in A.1 to A.7 and A.10 of this Appendix are included. Specific target

organ toxicity following a single-event exposure is classified in accordance with *SPECIFIC TARGET ORGAN TOXICITY—SINGLE EXPOSURE* (A.8 of this Appendix) and is therefore not included here.

A.9.1.2 Classification identifies the substance or mixture as being a specific target organ toxicant and, as such, it may present a potential for adverse health effects in people who are exposed to it.

A.9.1.3 These adverse health effects produced by repeated exposure include consistent and identifiable toxic effects in humans, or, in experimental animals, toxicologically significant changes which have affected the function or morphology of a tissue/organ, or have produced serious changes to the biochemistry or hematology of the organism and these changes are relevant for human health. Human data will be the primary source of evidence for this hazard class.

A.9.1.4 Assessment shall take into consideration not only significant changes in a single organ or biological system but also generalized changes of a less severe nature involving several organs.

A.9.1.5 Specific target organ toxicity can occur by any route that is relevant for humans, e.g., principally oral, dermal or inhalation.

A.9.2 Classification Criteria for Substances

A.9.2.1 Substances shall be classified as STOT-RE by expert judgment on the basis of the weight of all evidence available, including the use of recommended guidance values which take into account the duration of exposure and the dose/concentration which produced the effect(s). (See A.9.2.9). Substances shall be placed in one of two categories, depending upon the nature and severity of the effect(s) observed, in accordance with Figure A.9.1.

FIGURE A.9.1—HAZARD CATEGORIES FOR SPECIFIC TARGET ORGAN TOXICITY FOLLOWING REPEATED EXPOSURE

CATEGORY 1: Substances that have produced significant toxicity in humans, or that, on the basis of evidence from studies in experimental animals can be presumed to have the potential to produce significant toxicity in humans following repeated or prolonged exposure. Substances are classified in Category 1 for specific target organ toxicity (repeated exposure) on the basis of:

- (a) reliable and good quality evidence from human cases or epidemiological studies; or,
- (b) observations from appropriate studies in experimental animals in which significant and/or severe toxic effects, of relevance to human health, were produced at generally low exposure concentrations. Guidance dose/concentration values are provided below (See A.9.2.9) to be used as part of weight-of-evidence evaluation.

CATEGORY 2: Substances that, on the basis of evidence from studies in experimental animals can be presumed to have the potential to be harmful to human health following repeated or prolonged exposure.

Substances are classified in Category 2 for specific target organ toxicity (repeated exposure) on the basis of observations from appropriate studies in experimental animals in which significant toxic effects, of relevance to human health, were produced at generally moderate exposure concentrations. Guidance dose/concentration values are provided below (See A.9.2.9) in order to help in classification.

In exceptional cases human evidence can also be used to place a substance in Category 2 (See A.9.2.6).

Note: The primary target organ/system shall be identified where possible, or the substance shall be identified as a general toxicant. The data shall be carefully evaluated and, where possible, shall not include secondary effects (e.g., a hepatotoxicant can produce secondary effects in the nervous or gastro-intestinal systems).

A.9.2.2 The relevant route of exposure by which the classified substance produces damage shall be identified.

A.9.2.3 Classification is determined by expert judgment, on the basis of the weight of all evidence available including the guidance presented below.

A.9.2.4 Weight of evidence of all data, including human incidents, epidemiology, and studies conducted in experimental animals, is used to substantiate specific target organ toxic effects that merit classification.

A.9.2.5 The information required to evaluate specific target organ toxicity comes either from repeated exposure in humans, e.g., exposure at home, in the workplace or environmentally, or from studies conducted in experimental animals. The standard animal studies in rats or mice that provide this information are 28 day, 90 day or lifetime studies (up to 2 years) that include hematological, clinico-chemical and detailed macroscopic and microscopic examination to enable the toxic effects on target tissues/organs to be identified. Data from repeat dose studies performed in other species may also be used. Other long-term exposure studies, e.g., for carcinogenicity, neurotoxicity or reproductive toxicity, may also provide evidence of specific target organ toxicity that could be used in the assessment of classification.

A.9.2.6 In exceptional cases, based on expert judgment, it may be appropriate to place certain substances with human evidence of specific target organ toxicity in Category 2: (a) when the weight of human evidence is not sufficiently convincing to warrant Category 1 classification, and/or (b) based on the nature and severity of effects. Dose/concentration levels in humans shall not be considered in the classification and any available evidence from animal studies shall be consistent with the Category 2 classification. In other words, if there are also animal data available on the substance that warrant Category 1 classification, the substance shall be classified as Category 1.

A.9.2.7 Effects Considered To Support Classification

A.9.2.7.1 Classification is supported by reliable evidence associating repeated exposure to the substance with a consistent and identifiable toxic effect.

A.9.2.7.2 Evidence from human experience/incidents is usually restricted to reports of adverse health consequences, often with uncertainty about exposure conditions, and may not provide the scientific detail that can be obtained from well-conducted studies in experimental animals.

A.9.2.7.3 Evidence from appropriate studies in experimental animals can furnish

much more detail, in the form of clinical observations, hematology, clinical chemistry, macroscopic and microscopic pathological examination and this can often reveal hazards that may not be life-threatening but could indicate functional impairment. Consequently all available evidence, and relevance to human health, must be taken into consideration in the classification process. Relevant toxic effects in humans and/or animals include, but are not limited to:

(a) Morbidity or death resulting from repeated or long-term exposure. Morbidity or death may result from repeated exposure, even to relatively low doses/concentrations, due to bioaccumulation of the substance or its metabolites, or due to the overwhelming of the de-toxication process by repeated exposure;

(b) Significant functional changes in the central or peripheral nervous systems or other organ systems, including signs of central nervous system depression and effects on special senses (e.g., sight, hearing and sense of smell);

(c) Any consistent and significant adverse change in clinical biochemistry, hematology, or urinalysis parameters;

(d) Significant organ damage that may be noted at necropsy and/or subsequently seen or confirmed at microscopic examination;

(e) Multi-focal or diffuse necrosis, fibrosis or granuloma formation in vital organs with regenerative capacity;

(f) Morphological changes that are potentially reversible but provide clear evidence of marked organ dysfunction (e.g., severe fatty change in the liver); and,

(g) Evidence of appreciable cell death (including cell degeneration and reduced cell number) in vital organs incapable of regeneration.

A.9.2.8 Effects Considered Not To Support Classification

Effects may be seen in humans and/or animals that do not justify classification. Such effects include, but are not limited to:

(a) Clinical observations or small changes in bodyweight gain, food consumption or water intake that may have some toxicological importance but that do not, by themselves, indicate "significant" toxicity;

(b) Small changes in clinical biochemistry, hematology or urinalysis parameters and/or transient effects, when such changes or effects are of doubtful or of minimal toxicological importance;

(c) Changes in organ weights with no evidence of organ dysfunction;

(d) Adaptive responses that are not considered toxicologically relevant;

(e) Substance-induced species-specific mechanisms of toxicity, i.e., demonstrated with reasonable certainty to be not relevant for human health, shall not justify classification.

A.9.2.9 Guidance Values To Assist With Classification Based on the Results Obtained From Studies Conducted in Experimental Animals

A.9.2.9.1 In studies conducted in experimental animals, reliance on observation of effects alone, without reference to the duration of experimental exposure and dose/concentration, omits a fundamental concept of toxicology, i.e., all substances are potentially toxic, and what determines the toxicity is a function of the dose/concentration and the duration of exposure. In most studies conducted in experimental animals the test guidelines use an upper limit dose value.

A.9.2.9.2 In order to help reach a decision about whether a substance shall be classified or not, and to what degree it shall be classified (Category 1 vs. Category 2), dose/concentration "guidance values" are provided in Table A.9.1 for consideration of the dose/concentration which has been shown to produce significant health effects. The principal argument for proposing such guidance values is that all chemicals are potentially toxic and there has to be a reasonable dose/concentration above which a degree of toxic effect is acknowledged. Also, repeated-dose studies conducted in experimental animals are designed to produce toxicity at the highest dose used in order to optimize the test objective and so most studies will reveal some toxic effect at least at this highest dose. What is therefore to be decided is not only what effects have been produced, but also at what dose/concentration they were produced and how relevant is that for humans.

A.9.2.9.3 Thus, in animal studies, when significant toxic effects are observed that indicate classification, consideration of the duration of experimental exposure and the dose/concentration at which these effects were seen, in relation to the suggested guidance values, provides useful information to help assess the need to classify (since the toxic effects are a consequence of the hazardous property(ies) and also the duration of exposure and the dose/concentration).

A.9.2.9.4 The decision to classify at all can be influenced by reference to the dose/concentration guidance values at or below which a significant toxic effect has been observed.

A.9.2.9.5 The guidance values refer to effects seen in a standard 90-day toxicity study conducted in rats. They can be used as a basis to extrapolate equivalent guidance values for toxicity studies of greater or lesser duration, using dose/exposure time extrapolation similar to Haber's rule for inhalation, which states essentially that the effective dose is directly proportional to the exposure concentration and the duration of exposure. The assessment should be done on a case-by-case basis; for example, for a 28-day study the guidance values below would be increased by a factor of three.

A.9.2.9.6 Thus for Category 1 classification, significant toxic effects observed in a 90-day repeated-dose study conducted in experimental animals and seen to occur at or below the (suggested) guidance values (C) as indicated in Table A.9.1 would justify classification:

TABLE A.9.1—GUIDANCE VALUES TO ASSIST IN CATEGORY 1 CLASSIFICATION

[Applicable to a 90-day study]

Route of exposure	Units	Guidance values (dose/concentration)
Oral (rat)	mg/kg body weight/day	C ≤10.
Dermal (rat or rabbit)	mg/kg body weight/day	C ≤20.
Inhalation (rat) gas	ppmV/6h/day	C ≤50.
Inhalation (rat) vapor	mg/liter/6h/day	C ≤0.2.
Inhalation (rat) dust/mist/fume	mg/liter/6h/day	C ≤0.02.

A.9.2.9.7 For Category 2 classification, significant toxic effects observed in a 90-day repeated-dose study conducted in

experimental animals and seen to occur within the (suggested) guidance value ranges

as indicated in Table A.9.2 would justify classification:

TABLE A.9.2—GUIDANCE VALUES TO ASSIST IN CATEGORY 2 CLASSIFICATION

[Applicable to a 90-day study]

Route of exposure	Units	Guidance values (dose/concentration)
Oral (rat)	mg/kg body weight/day	10 <C ≤100.
Dermal (rat or rabbit)	mg/kg body weight/day	20 <C ≤200.
Inhalation (rat) gas	ppmV/6h/day	50 <C ≤250.
Inhalation (rat) vapor	mg/liter/6h/day	0.2 <C ≤1.0.
Inhalation (rat) dust/mist/fume	mg/liter/6h/day	0.02 <C ≤0.2.

A.9.2.9.8 The guidance values and ranges mentioned in A.2.9.9.6 and A.2.9.9.7 are

intended only for guidance purposes, i.e., to be used as part of the weight of evidence

approach, and to assist with decisions about

classification. They are not intended as strict demarcation values.

A.9.2.9.9 Thus, it is possible that a specific profile of toxicity occurs in repeat-dose animal studies at a dose/concentration below the guidance value, e.g., <100 mg/kg body weight/day by the oral route, however the nature of the effect, e.g., nephrotoxicity seen only in male rats of a particular strain known to be susceptible to this effect, may result in the decision not to classify. Conversely, a specific profile of toxicity may be seen in animal studies occurring at above a guidance value, e.g., ≥100 mg/kg body weight/day by the oral route, and in addition there is supplementary information from other sources, e.g., other long-term administration studies, or human case experience, which supports a conclusion that, in view of the weight of evidence, classification is prudent.

A.9.2.10 Other Considerations

A.9.2.10.1 When a substance is characterized only by use of animal data the classification process includes reference to dose/concentration guidance values as one of the elements that contribute to the weight of evidence approach.

A.9.2.10.2 When well-substantiated human data are available showing a specific target organ toxic effect that can be reliably attributed to repeated or prolonged exposure to a substance, the substance shall be classified. Positive human data, regardless of probable dose, predominates over animal data. Thus, if a substance is unclassified

because no specific target organ toxicity was seen at or below the dose/concentration guidance value for animal testing, if subsequent human incident data become available showing a specific target organ toxic effect, the substance shall be classified.

A.9.2.10.3 A substance that has not been tested for specific target organ toxicity may in certain instances, where appropriate, be classified on the basis of data from a scientifically validated structure activity relationship and expert judgment-based extrapolation from a structural analogue that has previously been classified together with substantial support from consideration of other important factors such as formation of common significant metabolites.

A.9.3 Classification Criteria for Mixtures

A.9.3.1 Mixtures are classified using the same criteria as for substances, or alternatively as described below. As with substances, mixtures may be classified for specific target organ toxicity following single exposure, repeated exposure, or both.

A.9.3.2 Classification of Mixtures When Data Are Available for the Complete Mixture

When reliable and good quality evidence from human experience or appropriate studies in experimental animals, as described in the criteria for substances, is available for the mixture, then the mixture shall be classified by weight of evidence evaluation of these data. Care shall be exercised in evaluating data on mixtures, that the dose,

duration, observation or analysis, do not render the results inconclusive.

A.9.3.3 Classification of Mixtures When Data Are Not Available for the Complete Mixture: Bridging Principles

A.9.3.3.1 Where the mixture itself has not been tested to determine its specific target organ toxicity, but there are sufficient data on both the individual ingredients and similar tested mixtures to adequately characterize the hazards of the mixture, these data shall be used in accordance with the following bridging principles as found in paragraph A.0.5 of this Appendix: Dilution; Batching; Concentration of mixtures; Interpolation within one toxicity category; Substantially similar mixtures; and Aerosols.

A.9.3.4 Classification of Mixtures When Data Are Available for All Ingredients or Only for Some Ingredients of the Mixture

A.9.3.4.1 Where there is no reliable evidence or test data for the specific mixture itself, and the bridging principles cannot be used to enable classification, then classification of the mixture is based on the classification of the ingredient substances. In this case, the mixture shall be classified as a specific target organ toxicant (specific organ specified), following single exposure, repeated exposure, or both when at least one ingredient has been classified as a Category 1 or Category 2 specific target organ toxicant and is present at or above the appropriate cut-off value/concentration limit specified in Table A.9.3 for Category 1 and 2 respectively.

TABLE A.9.3—CUT-OFF VALUE/CONCENTRATION LIMITS OF INGREDIENTS OF A MIXTURE CLASSIFIED AS A SPECIFIC TARGET ORGAN TOXICANT THAT WOULD TRIGGER CLASSIFICATION OF THE MIXTURE AS CATEGORY 1 OR 2

Ingredient classified as:		Cut-off values/concentration limits triggering classification of a mixture as:	
		Category 1	Category 2
Category 1	Target organ toxicant	≥1.0%	.....
Category 2	Target organ toxicant .....	.....	≥1.0%

A.9.3.4.2 These cut-off values and consequent classifications shall be applied equally and appropriately to both single- and repeated-dose target organ toxicants.

A.9.3.4.3 Mixtures shall be classified for either or both single- and repeated-dose toxicity independently.

A.9.3.4.4 Care shall be exercised when toxicants affecting more than one organ system are combined that the potentiation or synergistic interactions are considered, because certain substances can cause specific target organ toxicity at <1% concentration when other ingredients in the mixture are known to potentiate its toxic effect.

A.10 ASPIRATION HAZARD

A.10.1 Definitions and General and Specific Considerations

A.10.1.1 *Aspiration* means the entry of a liquid or solid chemical directly through the oral or nasal cavity, or indirectly from vomiting, into the trachea and lower respiratory system.

A.10.1.2 Aspiration toxicity includes severe acute effects such as chemical pneumonia, varying degrees of pulmonary injury or death following aspiration.

A.10.1.3 Aspiration is initiated at the moment of inspiration, in the time required to take one breath, as the causative material lodges at the crossroad of the upper

respiratory and digestive tracts in the laryngopharyngeal region.

A.10.1.4 Aspiration of a substance or mixture can occur as it is vomited following ingestion. This may have consequences for labeling, particularly where, due to acute toxicity, a recommendation may be considered to induce vomiting after ingestion. However, if the substance/mixture also presents an aspiration toxicity hazard, the recommendation to induce vomiting may need to be modified.

A.10.1.5 Specific Considerations

A.10.1.5.1 The classification criteria refer to kinematic viscosity. The following provides the conversion between dynamic and kinematic viscosity:

$$\frac{\text{Dynamic viscosity (mPa}\cdot\text{s)}}{\text{Density (g/cm}^3\text{)}} = \text{Kinematic viscosity (mm}^2\text{/s)}$$

A.10.1.5.2 Although the definition of aspiration in A.10.1.1 includes the entry of solids into the respiratory system, classification according to (b) in table A.10.1 for Category 1 is intended to apply to liquid substances and mixtures only.

A.10.1.5.3 Classification of aerosol/mist products.

Aerosol and mist products are usually dispensed in containers such as self-

pressurized containers, trigger and pump sprayers. Classification for these products shall be considered if their use may form a pool of product in the mouth, which then may be aspirated. If the mist or aerosol from a pressurized container is fine, a pool may not be formed. On the other hand, if a pressurized container dispenses product in a stream, a pool may be formed that may then be aspirated. Usually, the mist produced by

trigger and pump sprayers is coarse and therefore, a pool may be formed that then may be aspirated. When the pump mechanism may be removed and contents are available to be swallowed then the classification of the products should be considered.

A.10.2 Classification Criteria for Substances

TABLE A.10.1—CRITERIA FOR ASPIRATION TOXICITY

Category	Criteria
Category 1: Chemicals known to cause human aspiration toxicity hazards or to be regarded as if they cause human aspiration toxicity hazard.	A substance shall be classified in Category 1: (a) If reliable and good quality human evidence indicates that it causes aspiration toxicity (See note); or (b) If it is a hydrocarbon and has a kinematic viscosity ≤ 20.5 mm ² /s, measured at 40 °C.

Note: Examples of substances included in Category 1 are certain hydrocarbons, turpentine and pine oil.

A.10.3 Classification Criteria for Mixtures

A.10.3.1 Classification When Data Are Available for the Complete Mixture

A mixture shall be classified in Category 1 based on reliable and good quality human evidence.

A.10.3.2 Classification of Mixtures When Data Are Not Available for the Complete Mixture: Bridging Principles

A.10.3.2.1 Where the mixture itself has not been tested to determine its aspiration toxicity, but there are sufficient data on both the individual ingredients and similar tested mixtures to adequately characterize the hazard of the mixture, these data shall be used in accordance with the following bridging principles as found in paragraph A.0.5 of this Appendix: Dilution; Batching; Concentration of mixtures; Interpolation within one toxicity category; and Substantially similar mixtures. For application of the dilution bridging principle, the concentration of aspiration toxicants shall not be less than 10%.

A.10.3.3 Classification of Mixtures When Data Are Available for All Ingredients or Only for Some Ingredients of the Mixture

A.10.3.3.1 A mixture which contains $\geq 10\%$ of an ingredient or ingredients classified in Category 1, and has a kinematic viscosity ≤ 20.5 mm²/s, measured at 40 °C, shall be classified in Category 1.

A.10.3.3.2 In the case of a mixture which separates into two or more distinct layers, one of which contains $\geq 10\%$ of an ingredient or ingredients classified in Category 1 and has a kinematic viscosity ≤ 20.5 mm²/s, measured at 40 °C, then the entire mixture shall be classified in Category 1.

APPENDIX B TO § 1910.1200—PHYSICAL CRITERIA (MANDATORY)

B.1 EXPLOSIVES

B.1.1 Definitions and General Considerations

B.1.1.1 An *explosive chemical* is a solid or liquid chemical which is in itself capable by chemical reaction of producing gas at such a temperature and pressure and at such a

speed as to cause damage to the surroundings. Pyrotechnic chemicals are included even when they do not evolve gases.

A *pyrotechnic chemical* is a chemical designed to produce an effect by heat, light, sound, gas or smoke or a combination of these as the result of non-detonative self-sustaining exothermic chemical reactions.

An *explosive item* is an item containing one or more explosive chemicals.

A *pyrotechnic item* is an item containing one or more pyrotechnic chemicals.

An *unstable explosive* is an explosive which is thermally unstable and/or too sensitive for normal handling, transport, or use.

An *intentional explosive* is a chemical or item which is manufactured with a view to produce a practical explosive or pyrotechnic effect.

B.1.1.2 The class of explosives comprises:

(a) Explosive chemicals;

(b) Explosive items, except devices containing explosive chemicals in such quantity or of such a character that their inadvertent or accidental ignition or initiation shall not cause any effect external to the device either by projection, fire, smoke, heat or loud noise; and

(c) Chemicals and items not included under (a) and (b) above which are manufactured with the view to producing a practical explosive or pyrotechnic effect.

B.1.2 Classification Criteria

Chemicals and items of this class shall be classified as unstable explosives or shall be assigned to one of the following six divisions depending on the type of hazard they present:

(a) Division 1.1—Chemicals and items which have a mass explosion hazard (a mass explosion is one which affects almost the entire quantity present virtually instantaneously);

(b) Division 1.2—Chemicals and items which have a projection hazard but not a mass explosion hazard;

(c) Division 1.3—Chemicals and items which have a fire hazard and either a minor blast hazard or a minor projection hazard or both, but not a mass explosion hazard;

(i) Combustion of which gives rise to considerable radiant heat; or

(ii) Which burn one after another, producing minor blast or projection effects or both;

(d) Division 1.4—Chemicals and items which present no significant hazard: chemicals and items which present only a small hazard in the event of ignition or initiation. The effects are largely confined to the package and no projection of fragments of appreciable size or range is to be expected. An external fire shall not cause virtually instantaneous explosion of almost the entire contents of the package;

(e) Division 1.5—Very insensitive chemicals which have a mass explosion hazard: chemicals which have a mass explosion hazard but are so insensitive that there is very little probability of initiation or of transition from burning to detonation under normal conditions;

(f) Division 1.6—Extremely insensitive items which do not have a mass explosion hazard: items which contain only extremely insensitive detonating chemicals and which demonstrate a negligible probability of accidental initiation or propagation.

B.1.3 Additional Classification Considerations

B.1.3.1 Explosives shall be classified as unstable explosives or shall be assigned to one of the six divisions identified in B.1.2 in accordance with the three step procedure in Part I of the UN ST/SG/AC.10 (incorporated by reference; See § 1910.6). The first step is to ascertain whether the substance or mixture has explosive effects (Test Series 1). The second step is the acceptance procedure (Test Series 2 to 4) and the third step is the assignment to a hazard division (Test Series 5 to 7). The assessment whether a candidate for "ammonium nitrate emulsion or suspension or gel, intermediate for blasting explosives (ANE)" is insensitive enough for inclusion as an oxidizing liquid (See B.13) or an oxidizing solid (See B.14) is determined by Test Series 8 tests.

Note: Classification of solid chemicals shall be based on tests performed on the chemical as presented. If, for example, for the purposes of supply or transport, the same

chemical is to be presented in a physical form different from that which was tested and which is considered likely to materially alter its performance in a classification test, classification must be based on testing of the chemical in the new form.

B.1.3.2 Explosive properties are associated with the presence of certain chemical groups in a molecule which can react to produce very rapid increases in temperature or pressure. The screening procedure in B.1.3.1 is aimed at identifying the presence of such reactive groups and the potential for rapid energy release. If the screening procedure identifies the chemical as a potential explosive, the acceptance procedure (See section 10.3 of the UN ST/SG/AC.10 (incorporated by reference; See § 1910.6)) is necessary for classification.

Note: Neither a Series 1 type (a) propagation of detonation test nor a Series 2 type (a) test of sensitivity to detonative shock is necessary if the exothermic decomposition energy of organic materials is less than 800 J/g.

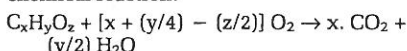
B.1.3.3 If a mixture contains any known explosives, the acceptance procedure is necessary for classification.

B.1.3.4 A chemical is not classified as explosive if:

(a) There are no chemical groups associated with explosive properties present in the molecule. Examples of groups which may indicate explosive properties are given in Table A6.1 in Appendix 6 of the UN ST/SG/AC.10 (incorporated by reference; See § 1910.6); or

(b) The substance contains chemical groups associated with explosive properties which include oxygen and the calculated oxygen balance is less than -200.

The oxygen balance is calculated for the chemical reaction:



using the formula:

$$\text{oxygen balance} = -1600 [2x + (y/2) - z] / \text{molecular weight};$$

or

(c) The organic substance or a homogenous mixture of organic substances contains

chemical groups associated with explosive properties but the exothermic decomposition energy is less than 500 J/g and the onset of exothermic decomposition is below 500 °C (932 °F). The exothermic decomposition energy may be determined using a suitable calorimetric technique; or

(d) For mixtures of inorganic oxidizing substances with organic material(s), the concentration of the inorganic oxidizing substance is:

(i) Less than 15%, by mass, if the oxidizing substance is assigned to Category 1 or 2;

(ii) Less than 30%, by mass, if the oxidizing substance is assigned to Category 3.

B.2 FLAMMABLE GASES

B.2.1 Definition

Flammable gas means a gas having a flammable range with air at 20 °C (68 °F) and a standard pressure of 101.3 kPa (14.7 psi).

B.2.2 Classification Criteria

A flammable gas shall be classified in one of the two categories for this class in accordance with Table B.2.1:

TABLE B.2.1—CRITERIA FOR FLAMMABLE GASES

Category	Criteria
1	Gases, which at 20 °C (68 °F) and a standard pressure of 101.3 kPa (14.7 psi): (a) are ignitable when in a mixture of 13% or less by volume in air; or (b) have a flammable range with air of at least 12 percentage points regardless of the lower flammable limit.
2	Gases, other than those of Category 1, which, at 20 °C (68 °F) and a standard pressure of 101.3 kPa (14.7 psi), have a flammable range while mixed in air.

Note: Aerosols should not be classified as flammable gases. See B.3.

B.2.3 Additional Classification Considerations

Flammability shall be determined by tests or by calculation in accordance with ISO 10156 (incorporated by reference; See § 1910.6). Where insufficient data are available to use this method, equivalent validated methods may be used.

B.3 FLAMMABLE AEROSOLS

B.3.1 Definition

Aerosol means any non-refillable receptacle containing a gas compressed, liquefied or dissolved under pressure, and fitted with a release device allowing the contents to be ejected as particles in suspension in a gas, or as a foam, paste, powder, liquid or gas.

B.3.2 Classification Criteria

B.3.2.1 Aerosols shall be considered for classification as flammable if they contain any component which is classified as

flammable in accordance with this Appendix, i.e.:

Flammable liquids (See B.6);
Flammable gases (See B.2);
Flammable solids (See B.7).

Note 1: Flammable components do not include pyrophoric, self-heating or water-reactive chemicals.

Note 2: Flammable aerosols do not fall additionally within the scope of flammable gases, flammable liquids, or flammable solids.

B.3.2.2 A flammable aerosol shall be classified in one of the two categories for this class in accordance with Table B.3.1.

TABLE B.3.1—CRITERIA FOR FLAMMABLE AEROSOLS

Category	Criteria
1	Contains ≥85% flammable components and the chemical heat of combustion is ≥30 kJ/g; or (a) For spray aerosols, in the ignition distance test, ignition occurs at a distance ≥75 cm (29.5 in), or (b) For foam aerosols, in the aerosol foam flammability test. (i) The flame height is ≥20 cm (7.87 in) and the flame duration ≥2 s; or (ii) The flame height is ≥4 cm (1.57 in) and the flame duration ≥7 s.
2	Contains >1% flammable components, or the heat of combustion is ≥20 kJ/g; and (a) for spray aerosols, in the ignition distance test, ignition occurs at a distance ≥15 cm (5.9 in), or in the enclosed space ignition test, the (i) Time equivalent is ≤300 s/m ³ ; or (ii) Deflagration density is ≤300 g/m ³ . (b) For foam aerosols, in the aerosol foam flammability test, the flame height is ≥4 cm and the flame duration is ≥2 s and it does not meet the criteria for Category 1.

Note: Aerosols not submitted to the flammability classification procedures in this Appendix shall be classified as extremely flammable (Category 1).

B.3.3 Additional Classification Considerations

B.3.3.1 To classify a flammable aerosol, data on its flammable components, on its

chemical heat of combustion and, if applicable, the results of the aerosol foam flammability test (for foam aerosols) and of the ignition distance test and enclosed space test (for spray aerosols) are necessary.

B.3.3.2 The chemical heat of combustion (ΔH_c), in kilojoules per gram (kJ/g), is the product of the theoretical heat of combustion

(ΔH_{comb}), and a combustion efficiency, usually less than 1.0 (a typical combustion efficiency is 0.95 or 95%).

For a composite aerosol formulation, the chemical heat of combustion is the summation of the weighted heats of combustion for the individual components, as follows:

$$\Delta H_c(\text{product}) = \sum_i^n [w_i\% \times \Delta H_c(i)]$$

Where:

ΔH_c = chemical heat of combustion (kJ/g);
 $w_i\%$ = mass fraction of component i in the product;

$\Delta H_c(i)$ = specific heat of combustion (kJ/g) of component i in the product;

The chemical heats of combustion shall be found in literature, calculated or determined by tests (See ASTM D240-02, ISO 13943, Sections 86.1 to 86.3, and NFPA 30B (incorporated by reference; See § 1910.6)).

B.3.3.3 The Ignition Distance Test, Enclosed Space Ignition Test and Aerosol

Foam Flammability Test shall be performed in accordance with sub-sections 31.4, 31.5 and 31.6 of the of the UN ST/SG/AC.10 (incorporated by reference; See § 1910.6).

B.4 OXIDIZING GASES

B.4.1 Definition

Oxidizing gas means any gas which may, generally by providing oxygen, cause or contribute to the combustion of other material more than air does.

Note: "Gases which cause or contribute to the combustion of other material more than

air does" means pure gases or gas mixtures with an oxidizing power greater than 23.5% (as determined by a method specified in ISO 10156 or 10156-2 (incorporated by reference, See § 1910.6) or an equivalent testing method.)

B.4.2 Classification Criteria

An oxidizing gas shall be classified in a single category for this class in accordance with Table B.4.1:

TABLE B.4.1—CRITERIA FOR OXIDIZING GASES

Category	Criteria
1	Any gas which may, generally by providing oxygen, cause or contribute to the combustion of other material more than air does.

B.4.3 Additional Classification Considerations

Classification shall be in accordance with tests or calculation methods as described in ISO 10156 (incorporated by reference; See § 1910.6) and ISO 10156-2 (incorporated by reference; See § 1910.6).

B.5 GASES UNDER PRESSURE

B.5.1 Definition

Gases under pressure are gases which are contained in a receptacle at a pressure of 200 kPa (29 psi) (gauge) or more, or which are liquefied or liquefied and refrigerated.

They comprise compressed gases, liquefied gases, dissolved gases and refrigerated liquefied gases.

B.5.2 Classification Criteria

Gases under pressure shall be classified in one of four groups in accordance with Table B.5.1:

TABLE B.5.1—CRITERIA FOR GASES UNDER PRESSURE

Group	Criteria
Compressed gas	A gas which when under pressure is entirely gaseous at $-50\text{ }^{\circ}\text{C}$ ($-8\text{ }^{\circ}\text{F}$), including all gases with a critical temperature ¹ $\leq -50\text{ }^{\circ}\text{C}$ ($-58\text{ }^{\circ}\text{F}$).
Liquefied gas	A gas which when under pressure is partially liquid at temperatures above $-50\text{ }^{\circ}\text{C}$ ($-58\text{ }^{\circ}\text{F}$). A distinction is made between: (a) High pressure liquefied gas: A gas with a critical temperature ¹ between $-50\text{ }^{\circ}\text{C}$ ($-58\text{ }^{\circ}\text{F}$) and $+65\text{ }^{\circ}\text{C}$ ($149\text{ }^{\circ}\text{F}$); and (b) Low pressure liquefied gas: A gas with a critical temperature ¹ above $+65\text{ }^{\circ}\text{C}$ ($149\text{ }^{\circ}\text{F}$).
Refrigerated liquefied gas	A gas which is made partially liquid because of its low temperature.
Dissolved gas	A gas which when under pressure is dissolved in a liquid phase solvent.

¹ The critical temperature is the temperature above which a pure gas cannot be liquefied, regardless of the degree of compression.

B.6 FLAMMABLE LIQUIDS

B.6.1 Definition

Flammable liquid means a liquid having a flash point of not more than $93\text{ }^{\circ}\text{C}$ ($199.4\text{ }^{\circ}\text{F}$).

Flash point means the minimum temperature at which a liquid gives off vapor in sufficient concentration to form an ignitable mixture with air near the surface of the liquid, as determined by a method identified in Section B.6.3.

B.6.2 Classification Criteria

A flammable liquid shall be classified in one of four categories in accordance with Table B.6.1:

TABLE B.6.1—CRITERIA FOR FLAMMABLE LIQUIDS

Category	Criteria
1	Flash point $<23\text{ }^{\circ}\text{C}$ ($73.4\text{ }^{\circ}\text{F}$) and initial boiling point $\leq 35\text{ }^{\circ}\text{C}$ ($95\text{ }^{\circ}\text{F}$).

TABLE B.6.1—CRITERIA FOR FLAMMABLE LIQUIDS—Continued

Category	Criteria
2	Flash point <23 °C (73.4 °F) and initial boiling point >35 °C (95 °F).
3	Flash point ≥23 °C (73.4 °F) and ≤60 °C (140 °F).
4	Flash point >60 °C (140 °F) and ≤93 °C (199.4 °F).

B.6.3 Additional Classification Considerations

The flash point shall be determined in accordance with ASTM D56–05, ASTM D3278, ASTM D3828, ASTM D93–08 (incorporated by reference; See § 1910.6), or any other method specified in GHS Revision 3, Chapter 2.6.

The initial boiling point shall be determined in accordance with ASTM D86–07a or ASTM D1078 (incorporated by reference; See § 1910.6).

B.7 FLAMMABLE SOLIDS

B.7.1 Definitions

Flammable solid means a solid which is a readily combustible solid, or which may cause or contribute to fire through friction.

Readily combustible solids are powdered, granular, or pasty chemicals which are dangerous if they can be easily ignited by brief contact with an ignition source, such as a burning match, and if the flame spreads rapidly.

B.7.2 Classification Criteria

B.7.2.1 Powdered, granular or pasty chemicals shall be classified as flammable solids when the time of burning of one or more of the test runs, performed in accordance with the test method described in the UN ST/SG/AC.10 (incorporated by reference; See § 1910.6), Part III, sub-section 33.2.1, is less than 45 s or the rate of burning is more than 2.2 mm/s (0.0866 in/s).

B.7.2.2 Powders of metals or metal alloys shall be classified as flammable solids when

they can be ignited and the reaction spreads over the whole length of the sample in 10 min or less.

B.7.2.3 Solids which may cause fire through friction shall be classified in this class by analogy with existing entries (e.g., matches) until definitive criteria are established.

B.7.2.4 A flammable solid shall be classified in one of the two categories for this class using Method N.1 as described in Part III, sub-section 33.2.1 of the UN ST/SG/AC.10 (incorporated by reference; See § 1910.6), in accordance with Table B.7.1:

TABLE B.7.1—CRITERIA FOR FLAMMABLE SOLIDS

Category	Criteria
1	Burning rate test: Chemicals other than metal powders: (a) Wetted zone does not stop fire; and (b) Burning time <45 s or burning rate >2.2 mm/s. Metal powders: Burning time ≤5 min.
2	Burning rate test: Chemicals other than metal powders: (a) Wetted zone stops the fire for at least 4 min; and (b) Burning time <45 s or burning rate >2.2 mm/s. Metal powders: Burning time >5 min and ≤10 min.

Note: Classification of solid chemicals shall be based on tests performed on the chemical as presented. If, for example, for the purposes of supply or transport, the same chemical is to be presented in a physical form different from that which was tested and which is considered likely to materially alter its performance in a classification test, classification must be based on testing of the chemical in the new form.

B.8 SELF-REACTIVE CHEMICALS

B.8.1 Definitions

Self-reactive chemicals are thermally unstable liquid or solid chemicals liable to undergo a strongly exothermic decomposition even without participation of oxygen (air). This definition excludes chemicals classified under this section as explosives, organic peroxides, oxidizing liquids or oxidizing solids.

A self-reactive chemical is regarded as possessing explosive properties when in laboratory testing the formulation is liable to detonate, to deflagrate rapidly or to show a violent effect when heated under confinement.

B.8.2 Classification Criteria

B.8.2.1 A self-reactive chemical shall be considered for classification in this class unless:

(a) It is classified as an explosive according to B.1 of this appendix;

(b) It is classified as an oxidizing liquid or an oxidizing solid according to B.13 or B.14 of this appendix, except that a mixture of oxidizing substances which contains 5% or more of combustible organic substances shall be classified as a self-reactive chemical according to the procedure defined in B.8.2.2;

(c) It is classified as an organic peroxide according to B.15 of this appendix;

(d) Its heat of decomposition is less than 300 J/g; or

(e) Its self-accelerating decomposition temperature (SADT) is greater than 75 °C (167 °F) for a 50 kg (110 lb) package.

B.8.2.2 Mixtures of oxidizing substances, meeting the criteria for classification as oxidizing liquids or oxidizing solids, which contain 5% or more of combustible organic substances and which do not meet the criteria mentioned in B.8.2.1 (a), (c), (d) or (e), shall be subjected to the self-reactive chemicals classification procedure in B.8.2.3. Such a mixture showing the properties of a

self-reactive chemical type B to F shall be classified as a self-reactive chemical.

B.8.2.3 Self-reactive chemicals shall be classified in one of the seven categories of "types A to G" for this class, according to the following principles:

(a) Any self-reactive chemical which can detonate or deflagrate rapidly, as packaged, will be defined as self-reactive chemical TYPE A;

(b) Any self-reactive chemical possessing explosive properties and which, as packaged, neither detonates nor deflagrates rapidly, but is liable to undergo a thermal explosion in that package will be defined as self-reactive chemical TYPE B;

(c) Any self-reactive chemical possessing explosive properties when the chemical as packaged cannot detonate or deflagrate rapidly or undergo a thermal explosion will be defined as self-reactive chemical TYPE C;

(d) Any self-reactive chemical which in laboratory testing meets the criteria in (d)(i), (ii), or (iii) will be defined as self-reactive chemical TYPE D:

(i) Detonates partially, does not deflagrate rapidly and shows no violent effect when heated under confinement; or

(ii) Does not detonate at all, deflagrates slowly and shows no violent effect when heated under confinement; or

(iii) Does not detonate or deflagrate at all and shows a medium effect when heated under confinement;

(e) Any self-reactive chemical which, in laboratory testing, neither detonates nor deflagrates at all and shows low or no effect when heated under confinement will be defined as self-reactive chemical TYPE E;

(f) Any self-reactive chemical which, in laboratory testing, neither detonates in the cavitated state nor deflagrates at all and shows only a low or no effect when heated under confinement as well as low or no explosive power will be defined as self-reactive chemical TYPE F;

(g) Any self-reactive chemical which, in laboratory testing, neither detonates in the cavitated state nor deflagrates at all and shows no effect when heated under confinement nor any explosive power, provided that it is thermally stable (self-accelerating decomposition temperature is 60 °C (140 °F) to 75 °C (167 °F) for a 50 kg (110 lb) package), and, for liquid mixtures, a

diluent having a boiling point greater than or equal to 150 °C (302 °F) is used for desensitization will be defined as self-reactive chemical TYPE G. If the mixture is not thermally stable or a diluent having a boiling point less than 150 °C (302 °F) is used for desensitization, the mixture shall be defined as self-reactive chemical TYPE F.

B.8.3 Additional Classification Considerations

B.8.3.1 For purposes of classification, the properties of self-reactive chemicals shall be determined in accordance with test series A to H as described in Part II of the UN ST/SG/AC.10 (incorporated by reference; See § 1910.6).

B.8.3.2 Self-accelerating decomposition temperature (SADT) shall be determined in accordance with the UN ST/SG/AC.10, Part II, section 28 (incorporated by reference; See § 1910.6).

B.8.3.3 The classification procedures for self-reactive substances and mixtures need not be applied if:

(a) There are no chemical groups present in the molecule associated with explosive or self-reactive properties; examples of such

groups are given in Tables A6.1 and A6.2 in the Appendix 6 of the UN ST/SG/AC.10 (incorporated by reference; See § 1910.6); or

(b) For a single organic substance or a homogeneous mixture of organic substances, the estimated SADT is greater than 75 °C (167 °F) or the exothermic decomposition energy is less than 300 J/g. The onset temperature and decomposition energy may be estimated using a suitable calorimetric technique (See 20.3.3.3 in Part II of the UN ST/SG/AC.10 (incorporated by reference; See § 1910.6)).

B.9 PYROPHORIC LIQUIDS

B.9.1 Definition

Pyrophoric liquid means a liquid which, even in small quantities, is liable to ignite within five minutes after coming into contact with air.

B.9.2 Classification Criteria

A pyrophoric liquid shall be classified in a single category for this class using test N.3 in Part III, sub-section 33.3.1.5 of the UN ST/SG/AC.10 (incorporated by reference; See § 1910.6), in accordance with Table B.9.1:

TABLE B.9.1—CRITERIA FOR PYROPHORIC LIQUIDS

Category	Criteria
1	The liquid ignites within 5 min when added to an inert carrier and exposed to air, or it ignites or chars a filter paper on contact with air within 5 min.

B.9.3 Additional Classification Considerations

The classification procedure for pyrophoric liquids need not be applied when experience in production or handling shows that the chemical does not ignite spontaneously on coming into contact with air at normal temperatures (i.e., the substance is known to

be stable at room temperature for prolonged periods of time (days)).

B.10 PYROPHORIC SOLIDS

B.10.1 Definition

Pyrophoric solid means a solid which, even in small quantities, is liable to ignite within

five minutes after coming into contact with air.

B.10.2 Classification Criteria

A pyrophoric solid shall be classified in a single category for this class using test N.2 in Part III, sub-section 33.3.1.4 of the UN ST/SG/AC.10 (incorporated by reference; See § 1910.6), in accordance with Table B.10.1:

TABLE B.10.1—CRITERIA FOR PYROPHORIC SOLIDS

Category	Criteria
1	The solid ignites within 5 min of coming into contact with air.

Note: Classification of solid chemicals shall be based on tests performed on the chemical as presented. If, for example, for the purposes of supply or transport, the same chemical is to be presented in a physical form different from that which was tested and which is considered likely to materially alter its performance in a classification test, classification must be based on testing of the chemical in the new form.

B.10.3 Additional Classification Considerations

The classification procedure for pyrophoric solids need not be applied when experience in production or handling shows that the chemical does not ignite spontaneously on

coming into contact with air at normal temperatures (i.e., the chemical is known to be stable at room temperature for prolonged periods of time (days)).

B.11 SELF-HEATING CHEMICALS

B.11.1 Definition

A *self-heating chemical* is a solid or liquid chemical, other than a pyrophoric liquid or solid, which, by reaction with air and without energy supply, is liable to self-heat; this chemical differs from a pyrophoric liquid or solid in that it will ignite only when in large amounts (kilograms) and after long periods of time (hours or days).

Note: Self-heating of a substance or mixture is a process where the gradual

reaction of that substance or mixture with oxygen (in air) generates heat. If the rate of heat production exceeds the rate of heat loss, then the temperature of the substance or mixture will rise which, after an induction time, may lead to self-ignition and combustion.

B.11.2 Classification Criteria

B.11.2.1 A self-heating chemical shall be classified in one of the two categories for this class if, in tests performed in accordance with test method N.4 in Part III, sub-section 33.3.1.6 of the UN ST/SG/AC.10 (incorporated by reference; See § 1910.6), the result meets the criteria shown in Table B.11.1.

TABLE B.11.1—CRITERIA FOR SELF-HEATING CHEMICALS

Category	Criteria
1	A positive result is obtained in a test using a 25 mm sample cube at 140 °C (284 °F).
2	A negative result is obtained in a test using a 25 mm cube sample at 140 °C (284 °F), a positive result is obtained in a test using a 100 mm sample cube at 140 °C (284 °F), and: (a) The unit volume of the chemical is more than 3 m³; or (b) A positive result is obtained in a test using a 100 mm cube sample at 120 °C (248 °F) and the unit volume of the chemical is more than 450 liters; or (c) A positive result is obtained in a test using a 100 mm cube sample at 100 °C (212 °F).

B.11.2.2 Chemicals with a temperature of spontaneous combustion higher than 50 °C (122 °F) for a volume of 27 m³ shall not be classified as self-heating chemicals.

B.11.2.3 Chemicals with a spontaneous ignition temperature higher than 50 °C (122 °F) for a volume of 450 liters shall not be classified in Category 1 of this class.

B.11.3 Additional Classification Considerations

B.11.3.1 The classification procedure for self-heating chemicals need not be applied if the results of a screening test can be adequately correlated with the classification test and an appropriate safety margin is applied.

B.11.3.2 Examples of screening tests are:

(a) The Greiner Oven test (VDI guideline 2263, part 1, 1990, Test methods for the Determination of the Safety Characteristics of Dusts) with an onset temperature 80°K above the reference temperature for a volume of 1 l;

(b) The Bulk Powder Screening Test (Gibson, N. Harper, D. J. Rogers, R. Evaluation of the fire and explosion risks in drying powders, Plant Operations Progress, 4 (3), 181–189, 1985) with an onset temperature 60°K above the reference temperature for a volume of 1 l.

B.12 CHEMICALS WHICH, IN CONTACT WITH WATER, EMIT FLAMMABLE GASES

B.12.1 Definition

Chemicals which, in contact with water, emit flammable gases are solid or liquid chemicals which, by interaction with water, are liable to become spontaneously flammable or to give off flammable gases in dangerous quantities.

B.12.2 Classification Criteria

B.12.2.1 A chemical which, in contact with water, emits flammable gases shall be classified in one of the three categories for this class, using test N.5 in Part III, sub-section 33.4.1.4 of the UN ST/SG/AC.10 (incorporated by reference; See § 1910.6), in accordance with Table B.12.1:

TABLE B.12.1—CRITERIA FOR CHEMICALS WHICH, IN CONTACT WITH WATER, EMIT FLAMMABLE GASES

Category	Criteria
1	Any chemical which reacts vigorously with water at ambient temperatures and demonstrates generally a tendency for the gas produced to ignite spontaneously, or which reacts readily with water at ambient temperatures such that the rate of evolution of flammable gas is equal to or greater than 10 liters per kilogram of chemical over any one minute.
2	Any chemical which reacts readily with water at ambient temperatures such that the maximum rate of evolution of flammable gas is equal to or greater than 20 liters per kilogram of chemical per hour, and which does not meet the criteria for Category 1.
3	Any chemical which reacts slowly with water at ambient temperatures such that the maximum rate of evolution of flammable gas is equal to or greater than 1 liter per kilogram of chemical per hour, and which does not meet the criteria for Categories 1 and 2.

Note: Classification of solid chemicals shall be based on tests performed on the chemical as presented. If, for example, for the purposes of supply or transport, the same chemical is to be presented in a physical form different from that which was tested and which is considered likely to materially alter its performance in a classification test, classification must be based on testing of the chemical in the new form.

B.12.2.2 A chemical is classified as a chemical which, in contact with water emits flammable gases if spontaneous ignition takes place in any step of the test procedure.

B.12.3 Additional Classification Considerations

The classification procedure for this class need not be applied if:

(a) The chemical structure of the chemical does not contain metals or metalloids;

(b) Experience in production or handling shows that the chemical does not react with water, (e.g., the chemical is manufactured with water or washed with water); or

(c) The chemical is known to be soluble in water to form a stable mixture.

B.13 OXIDIZING LIQUIDS

B.13.1 Definition

Oxidizing liquid means a liquid which, while in itself not necessarily combustible, may, generally by yielding oxygen, cause, or contribute to, the combustion of other material.

B.13.2 Classification Criteria

An oxidizing liquid shall be classified in one of the three categories for this class using test O.2 in Part III, sub-section 34.4.2 of the UN ST/SG/AC.10 (incorporated by reference; See § 1910.6), in accordance with Table B.13.1:

TABLE B.13.1—CRITERIA FOR OXIDIZING LIQUIDS

Category	Criteria
1	Any chemical which, in the 1:1 mixture, by mass, of chemical and cellulose tested, spontaneously ignites; or the mean pressure rise time of a 1:1 mixture, by mass, of chemical and cellulose is less than that of a 1:1 mixture, by mass, of 50% perchloric acid and cellulose;

TABLE B.13.1—CRITERIA FOR OXIDIZING LIQUIDS—Continued

Category	Criteria
2	Any chemical which, in the 1:1 mixture, by mass, of chemical and cellulose tested, exhibits a mean pressure rise time less than or equal to the mean pressure rise time of a 1:1 mixture, by mass, of 40% aqueous sodium chlorate solution and cellulose; and the criteria for Category 1 are not met;
3	Any chemical which, in the 1:1 mixture, by mass, of chemical and cellulose tested, exhibits a mean pressure rise time less than or equal to the mean pressure rise time of a 1:1 mixture, by mass, of 65% aqueous nitric acid and cellulose; and the criteria for Categories 1 and 2 are not met.

B.13.3 Additional Classification Considerations

B.13.3.1 For organic chemicals, the classification procedure for this class shall not be applied if:

(a) The chemical does not contain oxygen, fluorine or chlorine; or

(b) The chemical contains oxygen, fluorine or chlorine and these elements are chemically bonded only to carbon or hydrogen.

B.13.3.2 For inorganic chemicals, the classification procedure for this class shall not be applied if the chemical does not contain oxygen or halogen atoms.

B.13.3.3 In the event of divergence between test results and known experience in the handling and use of chemicals which shows them to be oxidizing, judgments based on known experience shall take precedence over test results.

B.13.3.4 In cases where chemicals generate a pressure rise (too high or too low), caused by chemical reactions not characterizing the oxidizing properties of the chemical, the test described in Part III, sub-section 34.4.2 of the UN ST/SG/AC.10 (incorporated by reference; See § 1910.6) shall be repeated with an inert substance (e.g., diatomite (kieselguhr)) in place of the cellulose in order to clarify the nature of the reaction.

B.14 OXIDIZING SOLIDS**B.14.1 Definition**

Oxidizing solid means a solid which, while in itself is not necessarily combustible, may, generally by yielding oxygen, cause, or contribute to, the combustion of other material.

B.14.2 Classification Criteria

An oxidizing solid shall be classified in one of the three categories for this class using test O.1 in Part III, sub-section 34.4.1 of the UN ST/SG/AC.10 (incorporated by reference; See § 1910.6), in accordance with Table B.14.1:

TABLE B.14.1—CRITERIA FOR OXIDIZING SOLIDS

Category	Criteria
1	Any chemical which, in the 4:1 or 1:1 sample-to-cellulose ratio (by mass) tested, exhibits a mean burning time less than the mean burning time of a 3:2 mixture, by mass, of potassium bromate and cellulose.
2	Any chemical which, in the 4:1 or 1:1 sample-to-cellulose ratio (by mass) tested, exhibits a mean burning time equal to or less than the mean burning time of a 2:3 mixture (by mass) of potassium bromate and cellulose and the criteria for Category 1 are not met.
3	Any chemical which, in the 4:1 or 1:1 sample-to-cellulose ratio (by mass) tested, exhibits a mean burning time equal to or less than the mean burning time of a 3:7 mixture (by mass) of potassium bromate and cellulose and the criteria for Categories 1 and 2 are not met.

Note 1: Some oxidizing solids may present explosion hazards under certain conditions (e.g., when stored in large quantities). For example, some types of ammonium nitrate may give rise to an explosion hazard under extreme conditions and the "Resistance to detonation test" (IMO: Code of Safe Practice for Solid Bulk Cargoes, 2005, Annex 3, Test 5) may be used to assess this hazard. When information indicates that an oxidizing solid may present an explosion hazard, it shall be indicated on the Safety Data Sheet.

Note 2: Classification of solid chemicals shall be based on tests performed on the chemical as presented. If, for example, for the purposes of supply or transport, the same chemical is to be presented in a physical form different from that which was tested and which is considered likely to materially alter its performance in a classification test, classification must be based on testing of the chemical in the new form.

B.14.3 Additional Classification Considerations

B.14.3.1 For organic chemicals, the classification procedure for this class shall not be applied if:

(a) The chemical does not contain oxygen, fluorine or chlorine; or

(b) The chemical contains oxygen, fluorine or chlorine and these elements are chemically bonded only to carbon or hydrogen.

B.14.3.2 For inorganic chemicals, the classification procedure for this class shall not be applied if the chemical does not contain oxygen or halogen atoms.

B.14.3.3 In the event of divergence between test results and known experience in the handling and use of chemicals which shows them to be oxidizing, judgments based on known experience shall take precedence over test results.

B.15 ORGANIC PEROXIDES**B.15.1 Definition**

B.15.1.1 *Organic peroxide* means a liquid or solid organic chemical which contains the bivalent -O-O- structure and as such is considered a derivative of hydrogen peroxide, where one or both of the hydrogen atoms have been replaced by organic radicals. The term organic peroxide includes organic peroxide mixtures containing at least one organic peroxide. Organic peroxides are thermally unstable chemicals, which may undergo exothermic self-accelerating decomposition. In addition, they may have one or more of the following properties:

- (a) Be liable to explosive decomposition;
- (b) Burn rapidly;
- (c) Be sensitive to impact or friction;
- (d) React dangerously with other substances.

B.15.1.2 An organic peroxide is regarded as possessing explosive properties when in laboratory testing the formulation is liable to detonate, to deflagrate rapidly or to show a violent effect when heated under confinement.

B.15.2 Classification Criteria

B.15.2.1 Any organic peroxide shall be considered for classification in this class, unless it contains:

- (a) Not more than 1.0% available oxygen from the organic peroxides when containing not more than 1.0% hydrogen peroxide; or
- (b) Not more than 0.5% available oxygen from the organic peroxides when containing more than 1.0% but not more than 7.0% hydrogen peroxide.

Note: The available oxygen content (%) of an organic peroxide mixture is given by the formula:

$$16 \times \sum_i^n \left(\frac{n_i \times c_i}{m_i} \right)$$

Where:

n_i = number of peroxygen groups per molecule of organic peroxide i ;

c_i = concentration (mass %) of organic peroxide i ;

m_i = molecular mass of organic peroxide i .

B.15.2.2 Organic peroxides shall be classified in one of the seven categories of "Types A to G" for this class, according to the following principles:

(a) Any organic peroxide which, as packaged, can detonate or deflagrate rapidly shall be defined as organic peroxide TYPE A;

(b) Any organic peroxide possessing explosive properties and which, as packaged, neither detonates nor deflagrates rapidly, but is liable to undergo a thermal explosion in that package shall be defined as organic peroxide TYPE B;

(c) Any organic peroxide possessing explosive properties when the chemical as packaged cannot detonate or deflagrate rapidly or undergo a thermal explosion shall be defined as organic peroxide TYPE C;

(d) Any organic peroxide which in laboratory testing meets the criteria in (d)(i), (ii), or (iii) shall be defined as organic peroxide TYPE D:

(i) Detonates partially, does not deflagrate rapidly and shows no violent effect when heated under confinement; or

(ii) Does not detonate at all, deflagrates slowly and shows no violent effect when heated under confinement; or

(iii) Does not detonate or deflagrate at all and shows a medium effect when heated under confinement;

(e) Any organic peroxide which, in laboratory testing, neither detonates nor deflagrates at all and shows low or no effect when heated under confinement shall be defined as organic peroxide TYPE E;

(f) Any organic peroxide which, in laboratory testing, neither detonates in the cavitated state nor deflagrates at all and shows only a low or no effect when heated under confinement as well as low or no explosive power shall be defined as organic peroxide TYPE F;

(g) Any organic peroxide which, in laboratory testing, neither detonates in the cavitated state nor deflagrates at all and shows no effect when heated under confinement nor any explosive power, provided that it is thermally stable (self-accelerating decomposition temperature is 60 °C (140 °F) or higher for a 50 kg (110 lb) package), and, for liquid mixtures, a diluent having a boiling point of not less than 150 °C (302 °F) is used for desensitization, shall be defined as organic peroxide TYPE G. If the organic peroxide is not thermally stable or a diluent having a boiling point less than 150 °C (302 °F) is used for desensitization, it shall be defined as organic peroxide TYPE F.

B.15.3 Additional Classification Considerations

B.15.3.1 For purposes of classification, the properties of organic peroxides shall be

determined in accordance with test series A to H as described in Part II of the UN ST/SG/AC.10 (incorporated by reference; See § 1910.6).

B.15.3.2 Self-accelerating decomposition temperature (SADT) shall be determined in accordance with the UN ST/SG/AC.10 (incorporated by reference; See § 1910.6), Part II, section 28.

B.15.3.3 Mixtures of organic peroxides may be classified as the same type of organic peroxide as that of the most dangerous ingredient. However, as two stable ingredients can form a thermally less stable mixture, the SADT of the mixture shall be determined.

B.16 CORROSIVE TO METALS

B.16.1 Definition

A chemical which is corrosive to metals means a chemical which by chemical action will materially damage, or even destroy, metals.

B.16.2 Classification Criteria

A chemical which is corrosive to metals shall be classified in a single category for this class, using the test in Part III, sub-section 37.4 of the UN ST/SG/AC.10 (incorporated by reference; See § 1910.6), in accordance with Table B.16.1:

TABLE B.16.1—CRITERIA FOR CHEMICALS CORROSIVE TO METAL

Category	Criteria
1	Corrosion rate on either steel or aluminium surfaces exceeding 6.25 mm per year at a test temperature of 55 °C (131 °F) when tested on both materials.

Note: Where an initial test on either steel or aluminium indicates the chemical being tested is corrosive, the follow-up test on the other metal is not necessary.

B.16.3 Additional Classification Considerations

The specimen to be used for the test shall be made of the following materials:

(a) For the purposes of testing steel, steel types S235JR+CR (1.0037 resp.St 37-2), S275J2G3+CR (1.0144 resp.St 44-3), ISO 3574, Unified Numbering System (UNS) G 10200, or SAE 1020;

(b) For the purposes of testing aluminium: Non-clad types 7075-T6 or AZ5GU-T6.

APPENDIX C TO § 1910.1200—ALLOCATION OF LABEL ELEMENTS (MANDATORY)

C.1 The label for each hazardous chemical shall include the product identifier used on the safety data sheet.

C.1.1 The labels on shipped containers shall also include the name, address, and telephone number of the chemical manufacturer, importer, or responsible party.

C.2 The label for each hazardous chemical that is classified shall include the signal word, hazard statement(s), pictogram(s), and precautionary statement(s) specified in C.4 for each hazard class and associated hazard category, except as provided for in C.2.1 through C.2.4.

C.2.1 Precedence of Hazard Information

C.2.1.1 If the signal word "Danger" is included, the signal word "Warning" shall not appear;

C.2.1.2 If the skull and crossbones pictogram is included, the exclamation mark pictogram shall not appear where it is used for acute toxicity;

C.2.1.3 If the corrosive pictogram is included, the exclamation mark pictogram shall not appear where it is used for skin or eye irritation;

C.2.1.4 If the health hazard pictogram is included for respiratory sensitization, the exclamation mark pictogram shall not appear where it is used for skin sensitization or for skin or eye irritation.

C.2.2 Hazard Statement Text

C.2.2.1 The text of all applicable hazard statements shall appear on the label, except

as otherwise specified. The information in italics shall be included as part of the hazard statement as provided. For example: "causes damage to organs (*state all organs affected*) through prolonged or repeated exposure (*state route of exposure if no other routes of exposure cause the hazard*)". Hazard statements may be combined where appropriate to reduce the information on the label and improve readability, as long as all of the hazards are conveyed as required.

C.2.2.2 If the chemical manufacturer, importer, or responsible party can demonstrate that all or part of the hazard statement is inappropriate to a specific substance or mixture, the corresponding statement may be omitted from the label.

C.2.3 Pictograms

C.2.3.1 Pictograms shall be in the shape of a square set at a point and shall include a black hazard symbol on a white background with a red frame sufficiently wide to be clearly visible. A square red frame set at a point without a hazard symbol is not a pictogram and is not permitted on the label.

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C.2.3.2 One of eight standard hazard symbols shall be used in each pictogram. The eight hazard symbols are depicted in Figure C.1. A pictogram using the exclamation mark symbol is presented in Figure C.2, for the purpose of illustration.

Figure C.1 – Hazard Symbols and Classes

Flame	Flame Over Circle	Exclamation Mark	Exploding Bomb
 Flammables Self Reactives Pyrophorics Self-heating Emits Flammable Gas Organic Peroxides	 Oxidizers	 Irritant Dermal Sensitizer Acute Toxicity (harmful) Narcotic Effects Respiratory Tract Irritation	 Explosives Self Reactives Organic Peroxides
Corrosion	Gas Cylinder	Health Hazard	Skull and Crossbones
 Corrosives	 Gases Under Pressure	 Carcinogen Respiratory Sensitizer Reproductive Toxicity Target Organ Toxicity Mutagenicity Aspiration Toxicity	 Acute Toxicity (severe)

Figure C.2 – Exclamation Mark Pictogram



C.2.3.3 Where a pictogram required by the Department of Transportation under Title 49 of the Code of Federal Regulations appears on a shipped container, the pictogram specified in C.4 for the same hazard shall not appear.

BILLING CODE 4510-26-C

C.2.4 Precautionary Statement Text

C.2.4.1 There are four types of precautionary statements presented, “prevention,” “response,” “storage,” and “disposal.” The core part of the precautionary statement is presented in bold print. This is the text, except as otherwise specified, that shall appear on the label. Where additional information is required, it is indicated in plain text.

C.2.4.2 When a backslash or diagonal mark (/) appears in the precautionary statement text, it indicates that a choice has to be made between the separated phrases. In such cases, the chemical manufacturer, importer, or responsible party can choose the most appropriate phrase(s). For example, “Wear protective gloves/protective clothing/eye protection/face protection” could read “wear eye protection”.

C.2.4.3 When three full stops (* * *) appear in the precautionary statement text, they indicate that all applicable conditions are not listed. For example, in “Use explosion-proof electrical/ventilating/lighting/* * */equipment”, the use of “* * *” indicates that other equipment may need to be specified. In such cases, the chemical manufacturer, importer, or responsible party can choose the other conditions to be specified.

C.2.4.4 When text in *italics* is used in a precautionary statement, this indicates specific conditions applying to the use or allocation of the precautionary statement. For example, “Use explosion-proof electrical/ventilating/lighting/* * */equipment” is only required for flammable solids “*if dust clouds can occur*”. Text in *italics* is intended to be an explanatory, conditional note and is not intended to appear on the label.

C.2.4.5 Where square brackets ([]) appear around text in a precautionary

statement, this indicates that the text in square brackets is not appropriate in every case and should be used only in certain circumstances. In these cases, conditions for use explaining when the text should be used are provided. For example, one precautionary statement states: “[In case of inadequate ventilation] wear respiratory protection.” This statement is given with the condition for use “– text in square brackets may be used if additional information is provided with the chemical at the point of use that explains what type of ventilation would be adequate for safe use”. This means that, if additional information is provided with the chemical explaining what type of ventilation would be adequate for safe use, the text in square brackets should be used and the statement would read: “In case of inadequate ventilation wear respiratory protection.” However, if the chemical is supplied without such ventilation information, the text in square brackets should not be used, and the precautionary statement should read: “Wear respiratory protection.”

C.2.4.6 Precautionary statements may be combined or consolidated to save label space and improve readability. For example, “Keep away from heat, sparks and open flame,” “Store in a well-ventilated place” and “Keep cool” can be combined to read “Keep away from heat, sparks and open flame and store in a cool, well-ventilated place.”

C.2.4.7 In most cases, the precautionary statements are independent (e.g., the phrases for explosive hazards do not modify those related to certain health hazards, and products that are classified for both hazard classes shall bear appropriate precautionary statements for both). Where a chemical is classified for a number of hazards, and the precautionary statements are similar, the most stringent shall be included on the label (this will be applicable mainly to preventive measures). An order of precedence may be

imposed by the chemical manufacturer, importer or responsible party in situations where phrases concern “Response.” Rapid action may be crucial. For example, if a chemical is carcinogenic and acutely toxic, rapid action may be crucial, and first aid measures for acute toxicity will take precedence over those for long-term effects. In addition, medical attention to delayed health effects may be required in cases of incidental exposure, even if not associated with immediate symptoms of intoxication.

C.2.4.8 If the chemical manufacturer, importer, or responsible party can demonstrate that a precautionary statement is inappropriate to a specific substance or mixture, the precautionary statement may be omitted from the label.

C.3 Supplementary Hazard Information

C.3.1 To ensure that non-standardized information does not lead to unnecessarily wide variation or undermine the required information, supplementary information on the label is limited to when it provides further detail and does not contradict or cast doubt on the validity of the standardized hazard information.

C.3.2 Where the chemical manufacturer, importer, or distributor chooses to add supplementary information on the label, the placement of supplemental information shall not impede identification of information required by this section.

C.3.3 Where an ingredient with unknown acute toxicity is used in a mixture at a concentration $\geq 1\%$, and the mixture is not classified based on testing of the mixture as a whole, a statement that X% of the mixture consists of ingredient(s) of unknown acute toxicity is required on the label.

BILLING CODE 4510-26-P

C.4 REQUIREMENTS FOR SIGNAL WORDS, HAZARD STATEMENTS, PICTOGRAMS, AND PRECAUTIONARY STATEMENTS

C.4.1 ACUTE TOXICITY – ORAL (Classified in Accordance with Appendix A.1)

Pictogram
Skull and crossbones



Hazard category	Signal word	Hazard statement
1	Danger	Fatal if swallowed
2	Danger	Fatal if swallowed

Precautionary statements		
Prevention	Response	Storage
Wash ...thoroughly after handling. ... Chemical manufacturer, importer, or distributor to specify parts of the body to be washed after handling. Do not eat, drink or smoke when using this product.	If swallowed: Immediately call a poison center/doctor/... ... Chemical manufacturer, importer, or distributor to specify the appropriate source of emergency medical advice. Specific treatment (see ... on this label) ... Reference to supplemental first aid instruction. - <i>if immediate administration of antidote is required.</i> Rinse mouth.	Store locked up.
		Dispose of contents/container to... ... in accordance with local/regional/national/international regulations (to be specified).

C.4.1 ACUTE TOXICITY – ORAL (CONTINUED)
(Classified in Accordance with Appendix A.1)

Hazard category **Signal word** **Hazard statement**
 3 Danger Toxic if swallowed

Pictogram
 Skull and crossbones



Precautionary statements			
Prevention	Response	Storage	Disposal
Wash ... thoroughly after handling. ... Chemical manufacturer, importer, or distributor to specify parts of the body to be washed after handling. Do not eat, drink or smoke when using this product.	If swallowed: Immediately call a poison center/doctor/... ... Chemical manufacturer, importer, or distributor to specify the appropriate source of emergency medical advice. Specific treatment (see ... on this label) ... Reference to supplemental first aid instruction. - <u>if immediate administration of antidote is required.</u> Rinse mouth.	Store locked up.	Dispose of contents/container to... ... in accordance with local/regional/national/international regulations (to be specified).

C.4.1 ACUTE TOXICITY – ORAL (CONTINUED)
(Classified in Accordance with Appendix A.1)

Hazard category	Signal word	Hazard statement
4	Warning	Harmful if swallowed

Pictogram
Exclamation mark



Precautionary statements			
Prevention	Response	Storage	Disposal
Wash ... thoroughly after handling. ... Chemical manufacturer, importer, or distributor to specify parts of the body to be washed after handling. Do not eat, drink or smoke when using this product.	If swallowed: Call a poison center/doctor/.../ if you feel unwell. ... Chemical manufacturer, importer, or distributor to specify the appropriate source of emergency medical advice. Rinse mouth.		Dispose of contents/container to... in accordance with local/regional/national/international regulations (to be specified).

C.4.2 ACUTE TOXICITY - DERMAL
(Classified in Accordance with Appendix A.1)



Hazard category	Signal word	Hazard statement
1	Danger	Fatal in contact with skin
2	Danger	Fatal in contact with skin

Precautionary statements			
Prevention	Response	Storage	Disposal
Do not get in eyes, on skin, or on clothing. Wash ... thoroughly after handling. ... Chemical manufacturer, importer, or distributor to specify parts of the body to be washed after handling. Do not eat, drink or smoke when using this product. Wear protective gloves/protective clothing. Chemical manufacturer, importer, or distributor to specify type of equipment.	If on skin: Wash with plenty of water/... ... Chemical manufacturer, importer, or distributor may specify a cleansing agent if appropriate, or may recommend an alternative agent in exceptional cases if water is clearly inappropriate. Immediately call a poison center/doctor/... ... Chemical manufacturer, importer, or distributor to specify the appropriate source of emergency medical advice. Specific treatment (see ... on this label) ... Reference to supplemental first aid instruction. - <i>if immediate measures such as specific cleansing agent is advised.</i> Take off immediately all contaminated clothing and wash it before reuse.	Store locked up.	Dispose of contents/container to... in accordance with local/regional/national/international regulations (to be specified).

C.4.2 ACUTE TOXICITY – DERMAL (CONTINUED)
(Classified in Accordance with Appendix A.1)

Hazard category 3
Signal word Danger
Hazard statement Toxic in contact with skin

Pictogram

Skull and crossbones



Precautionary statements			
Prevention	Response	Storage	Disposal
Wear protective gloves/protective clothing. Chemical manufacturer, importer, or distributor to specify type of equipment.	If on skin: Wash with plenty of water/... ... Chemical manufacturer, importer, or distributor may specify a cleansing agent if appropriate, or may recommend an alternative agent in exceptional cases if water is clearly inappropriate. Call a poison center/doctor/.../if you feel unwell. ... Chemical manufacturer, importer, or distributor to specify the appropriate source of emergency medical advice. Specific treatment (see ... on this label) ... Reference to supplemental first aid instruction. - <i>if measures such as specific cleansing agent is advised.</i> Take off immediately all contaminated clothing and wash it before reuse.	Store locked up.	Dispose of contents/container to... ... in accordance with local/regional/national/international regulations (to be specified).

C.4.2 ACUTE TOXICITY – DERMAL (CONTINUED)
(Classified in Accordance with Appendix A.1)

Pictogram
 Exclamation mark



Hazard category **Signal word** **Hazard statement**

4 Warning Harmful in contact with skin

Precautionary statements			
Prevention	Response	Storage	Disposal
Wear protective gloves/protective clothing Chemical manufacturer, importer, or distributor to specify type of equipment.	If on skin: Wash with plenty of water/... ... Chemical manufacturer, importer, or distributor may specify a cleansing agent if appropriate, or may recommend an alternative agent in exceptional cases if water is clearly inappropriate. Call a poison center/doctor/.../if you feel unwell. ... Chemical manufacturer, importer, or distributor to specify the appropriate source of emergency medical advice. Specific treatment (see ... on this label) ... Reference to supplemental first aid instruction. - <i>if measures such as specific cleansing agent is advised.</i>		Dispose of contents/container to... ... in accordance with local/regional/national/international regulations (to be specified).
	Take off contaminated clothing and wash it before reuse.		

C.4.3 ACUTE TOXICITY - INHALATION (Classified in Accordance with Appendix A.1)

Pictogram
Skull and crossbones



Hazard category	Signal word	Hazard statement
1	Danger	Fatal if inhaled
2	Danger	Fatal if inhaled

Precautionary statements			
Prevention	Response	Storage	Disposal
Do not breathe dust/fume/gas/mist/vapors/spray. Chemical manufacturer, importer, or distributor to specify applicable conditions. Use only outdoors or in a well-ventilated area. [In case of inadequate ventilation] wear respiratory protection. Chemical manufacturer, importer, or distributor to specify equipment. - <u>Text in square brackets may be used if additional information is provided with the chemical at the point of use that explains what type of ventilation would be adequate for safe use.</u>	If inhaled: Remove person to fresh air and keep comfortable for breathing. Immediately call a poison center/doctor/... ... Chemical manufacturer, importer, or distributor to specify the appropriate source of emergency medical advice. Specific treatment is urgent (see ... on this label) ... Reference to supplemental first aid instruction. - <u>if immediate administration of antidote is required.</u>	Store in a well-ventilated place. Keep container tightly closed. - <u>if product is volatile as to generate hazardous atmosphere.</u> Store locked up.	Dispose of contents/container to... ... in accordance with local/regional/national/international regulations (to be specified).

C.4.3 ACUTE TOXICITY – INHALATION (CONTINUED)
(Classified in Accordance with Appendix A.1)

Pictogram
 Skull and crossbones

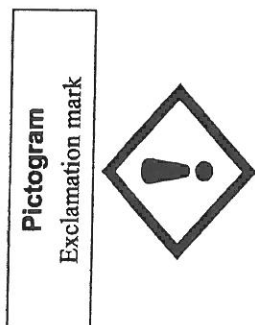


Hazard category **Signal word** **Hazard statement**

3 Danger Toxic if inhaled

Precautionary statements			
Prevention	Response	Storage	Disposal
Avoid breathing dust/fume/gas/mist/vapors/spray. Chemical manufacturer, importer, or distributor to specify applicable conditions. Use only outdoors or in a well-ventilated area.	If inhaled: Remove person to fresh air and keep comfortable for breathing. Call a poison center/doctor/... ... Chemical manufacturer, importer, or distributor to specify the appropriate source of emergency medical advice. Specific treatment (see ... on this label) ... Reference to supplemental first aid instruction. - <i>if immediate specific measures are required.</i>	Store in a well-ventilated place. Keep container tightly closed. - <i>if product is volatile so as to generate hazardous atmosphere.</i> Store locked up.	Dispose of content/container to... in accordance with local/regional/national/international regulations (to be specified).

C.4.3 ACUTE TOXICITY – INHALATION (CONTINUED)
(Classified in Accordance with Appendix A.1)



Hazard category	Signal word	Hazard statement
4	Warning	Harmful if inhaled

Precautionary statements			
Prevention	Response	Storage	Disposal
Avoid breathing dust/fume/gas/mist/vapors/spray. Chemical manufacturer, importer, or distributor to specify applicable conditions. Use only outdoors or in a well-ventilated area.	If inhaled: Remove person to fresh air and keep comfortable for breathing. Call a poison center/doctor/.../if you feel unwell. ... Chemical manufacturer, importer, or distributor to specify the appropriate source of emergency medical advice.		

C.4.4 SKIN CORROSION/IRRITATION
(Classified in Accordance with Appendix A.2)

Hazard category 1A to 1C **Signal word** Danger **Hazard statement** Causes severe skin burns and eye damage

Pictogram
Corrosion



Precautionary statements		
Prevention	Response	Storage Disposal
Do not breathe dusts or mists. - <i>if inhalable particles of dusts or mists may occur during use.</i> Wash ...thoroughly after handling. ...Chemical manufacturer, importer, or distributor to specify parts of the body to be washed after handling. Wear protective gloves/protective clothing/eye protection/face protection. Chemical manufacturer, importer, or distributor to specify type of equipment.	If swallowed: Rinse mouth. Do NOT induce vomiting. If on skin (or hair): Take off immediately all contaminated clothing. Rinse skin with water/shower. Wash contaminated clothing before reuse. If inhaled: Remove person to fresh air and keep comfortable for breathing. Immediately call a poison center/doctor/... ... Chemical manufacturer, importer, or distributor to specify the appropriate source of emergency medical advice. Specific treatment (see ... on this label) ... Reference to supplemental first aid instruction. - <i>Manufacturer, importer, or distributor may specify a cleansing agent if appropriate.</i> If in eyes: Rinse cautiously with water for several minutes. Remove contact lenses, if present and easy to do. Continue rinsing.	Store locked up. Dispose of contents/container to... ... in accordance with local/regional/national/international regulations (to be specified).

C.4.4 SKIN CORROSION/IRRITATION (CONTINUED)

(Classified in Accordance with Appendix A.2)

Hazard category 2 **Signal word** Warning **Hazard statement** Causes skin irritation

Pictogram
Exclamation mark



Precautionary statements			
Prevention	Response	Storage	Disposal
Wash ... thoroughly after handling. ... Chemical manufacturer, importer, or distributor to specify parts of the body to be washed after handling. Wear protective gloves. Chemical manufacturer, importer, or distributor to specify type of equipment.	If on skin: Wash with plenty of water/... ... Chemical manufacturer, importer, or distributor may specify a cleansing agent if appropriate, or may recommend an alternative agent in exceptional cases if water is clearly inappropriate. Specific treatment (see ... on this label) ... Reference to supplemental first aid instruction. - <u>Manufacturer, importer, or distributor may specify a cleansing agent if appropriate.</u> If skin irritation occurs: Get medical advice/attention. Take off contaminated clothing and wash it before reuse.		

C.4.5 EYE DAMAGE/IRRITATION
(Classified in Accordance with Appendix A.3)

Hazard category **Signal word** **Hazard statement**

1 Danger Causes serious eye damage

Pictogram
Corrosion



Precautionary statements		
Prevention	Response	Storage Disposal
Wear eye protection/face protection. Chemical manufacturer, importer, or distributor to specify type of equipment.	If in eyes: Rinse cautiously with water for several minutes. Remove contact lenses, if present and easy to do. Continue rinsing. Immediately call a poison center/doctor/... ... Chemical manufacturer, importer, or distributor to specify the appropriate source of emergency medical advice.	

C.4.5 EYE DAMAGE/IRRITATION (CONTINUED)
(Classified in Accordance with Appendix A.3)

Pictogram
Exclamation mark



Hazard category **Signal word** **Hazard statement**
2A Warning Causes serious eye irritation

Precautionary statements			
Prevention	Response	Storage	Disposal
Wash ... thoroughly after handling. ... Chemical manufacturer, importer, or distributor to specify parts of the body to be washed after handling.	If in eyes: Rinse cautiously with water for several minutes. Remove contact lenses, if present and easy to do. Continue rinsing.		
Wear eye protection/face protection. Chemical manufacturer, importer, or distributor to specify type of equipment.	If eye irritation persists: Get medical advice/attention.		

C.4.5 EYE DAMAGE/IRRITATION (CONTINUED)
(Classified in Accordance with Appendix A.3)

				Pictogram <i>No Pictogram</i>
Hazard category	Signal word	Hazard statement		
2B	Warning	Causes eye irritation		
Precautionary statements				
Prevention		Response	Storage	Disposal
Wash ... thoroughly after handling. ... Chemical manufacturer, importer, or distributor to specify parts of the body to be washed after handling.		If in eyes: Rinse cautiously with water for several minutes. Remove contact lenses, if present and easy to do. Continue rinsing. If eye irritation persists: Get medical advice/attention.		

C.4.6 SENSITIZATION - RESPIRATORY (Classified in Accordance with Appendix A.4)

Pictogram
Health hazard



Hazard category	Signal word	Hazard statement
1 (including both sub-categories 1A and 1B)	Danger	May cause allergy or asthma symptoms or breathing difficulties if inhaled

Precautionary statements			
Prevention	Response	Storage	Disposal
Avoid breathing dust/fume/gas/mist/vapors/spray. Chemical manufacturer, importer, or distributor to specify applicable conditions. [In case of inadequate ventilation] wear respiratory protection. Chemical manufacturer, importer, or distributor to specify equipment - <i>Text in square brackets may be used if additional information is provided with the chemical at the point of use that explains what type of ventilation would be adequate for safe use.</i>	If inhaled: If breathing is difficult, remove person to fresh air and keep comfortable for breathing. If experiencing respiratory symptoms: Call a poison center/doctor/... ... Chemical manufacturer, importer, or distributor to specify the appropriate source of emergency medical advice.		Dispose of contents/container to... ... in accordance with local/regional/national/international regulations (to be specified).

C.4.7 SENSITIZATION - SKIN
(Classified in Accordance with Appendix A.4)

Hazard category **Signal word** **Hazard statement**

1 (including both sub-categories 1A and 1B) Warning May cause an allergic skin reaction

Pictogram

Exclamation mark



Precautionary statements			
Prevention	Response	Storage	Disposal
Avoid breathing dust/fume/gas/mist/vapors/spray. Chemical manufacturer, importer, or distributor to specify applicable conditions. Contaminated work clothing must not be allowed out of the workplace. Wear protective gloves. Chemical manufacturer, importer, or distributor to specify type of equipment.	If on skin: Wash with plenty of water/... ... Chemical manufacturer, importer, or distributor may specify a cleansing agent if appropriate, or may recommend an alternative agent in exceptional cases if water is clearly inappropriate. If skin irritation or rash occurs: Get medical advice/attention. Specific treatment (see ... on this label) ... Reference to supplemental first aid instruction. - <u>Manufacturer, importer, or distributor may specify a cleansing agent if appropriate.</u> Wash contaminated clothing before reuse.		Dispose of contents/container to... ... in accordance with local/regional/national/international regulations (to be specified).

C.4.8 GERM CELL MUTAGENICITY (Classified in Accordance with Appendix A.5)

Pictogram
Health hazard



Hazard category Signal word Hazard statement

1A and 1B May cause genetic defects <...>

2 Suspected of causing genetic defects <...>

(state route of exposure if no other routes of exposure cause the hazard)

Precautionary statements			
Prevention	Response	Storage	Disposal
Obtain special instructions before use. Do not handle until all safety precautions have been read and understood. Wear protective gloves/protective clothing/eye protection/face protection. Chemical manufacturer, importer, or distributor to specify type of equipment, as required.	If exposed or concerned: Get medical advice/attention.	Store locked up.	Dispose of contents/container to... in accordance with local/regional/national/international regulations (to be specified).

C.4.9 CARCINOGENICITY (Classified in Accordance with Appendix A.6)

Hazard category	Signal word	Hazard statement
1A and 1B	Danger	May cause cancer <...>
2	Warning	Suspected of causing cancer <...>

(state route of exposure if no other routes of exposure cause the hazard)

Pictogram
Health hazard



Precautionary statements			
Prevention	Response	Storage	Disposal
Obtain special instructions before use. Do not handle until all safety precautions have been read and understood. Wear protective gloves/protective clothing/eye protection/face protection. Chemical manufacturer, importer, or distributor to specify type of equipment, as required.	If exposed or concerned: Get medical advice/attention.	Store locked up.	Dispose of contents/container to... ... in accordance with local/regional/national/international regulations (to be specified).

Note: If a Category 2 carcinogen ingredient is present in the mixture at a concentration between 0.1% and 1%, information is required on the SDS for a product; however, a label warning is optional. If a Category 2 carcinogen ingredient is present in the mixture at a concentration of $\geq 1\%$, both an SDS and a label is required and the information must be included on each.

C.4.10 TOXIC TO REPRODUCTION
(Classified in Accordance with Appendix A.7)

Hazard category	Signal word	Hazard statement
1A and 1B	Danger	May damage fertility or the unborn child <...> <<...>>
2	Warning	Suspected of damaging fertility or the unborn child <...> <<...>> (state specific effect if known) (state route of exposure if no other routes of exposure cause the hazard)

Pictogram
Health hazard



Precautionary statements			
Prevention	Response	Storage	Disposal
Obtain special instructions before use. Do not handle until all safety precautions have been read and understood. Wear protective gloves/protective clothing/eye protection/face protection. Chemical manufacturer, importer, or distributor to specify type of equipment, as required.	If exposed or concerned: Get medical advice/attention.	Store locked up.	Dispose of contents/container to... ... in accordance with local/regional/national/international regulations (to be specified).

C.4.10 TOXIC TO REPRODUCTION (CONTINUED)
(Classified in Accordance with Appendix A.7)
(EFFECTS ON OR VIA LACTATION)

Pictogram
No Pictogram

Hazard category **Signal word** **Hazard statement**
No designated number No signal word May cause harm to breast-fed children

(See Table A.7.1 in
Appendix A.7)

Precautionary statements			
Prevention	Response	Storage	Disposal
Obtain special instructions before use. Do not breathe dusts or mists. - <u>if inhalable particles of dusts or mists may occur during use.</u> Avoid contact during pregnancy/while nursing. Wash ... thoroughly after handling. ...Chemical manufacturer, importer, or distributor to specify parts of the body to be washed after handling. Do not eat, drink or smoke when using this product.	If exposed or concerned: Get medical advice/attention.		

C.4.11 SPECIFIC TARGET ORGAN TOXICITY (Single Exposure)
(Classified in Accordance with Appendix A.8)

Pictogram
Health hazard



Hazard category

1

Signal word

Danger

Hazard statement

Causes damage to organs <...> <<...>>

<...> (or state all organs affected if known)

<<...>> (state route of exposure if no other routes of exposure cause the hazard)

Precautionary statements			
Prevention	Response	Storage	Disposal
Do not breathe dust/fume/gas/mist/vapors/spray. ... Chemical manufacturer, importer, or distributor to specify applicable conditions. Wash ...thoroughly after handling. ... Chemical manufacturer, importer, or distributor to specify parts of the body to be washed after handling. Do not eat, drink or smoke when using this product.	If exposed: Call a poison center/doctor/... ... Chemical manufacturer, importer, or distributor to specify the appropriate source of emergency medical advice. Specific treatment (see ... on this label) ... Reference to supplemental first aid instruction. - if <u>immediate measures are required</u>.	Store locked up.	Dispose of contents/container to... ... in accordance with local/regional/national/international regulations (to be specified).

C.4.11 SPECIFIC TARGET ORGAN TOXICITY (Single Exposure) (CONTINUED)
(Classified in Accordance with Appendix A.8)

Hazard category 2	Signal word Warning	Hazard statement May cause damage to organs <...> <<...>> <...> (or state all organs affected, if known) <<...>> (state route of exposure if no other routes of exposure cause the hazard)	Pictogram Health hazard
			

Precautionary statements			
Prevention	Response	Storage	Disposal
Do not breathe dust/fume/gas/mist/vapors/spray. ... Chemical manufacturer, importer, or distributor to specify applicable conditions. Wash ... thoroughly after handling. ... Chemical manufacturer, importer, or distributor to specify parts of the body to be washed after handling. Do not eat, drink or smoke when using this product.	If exposed or concerned: Call a poison center/doctor/... ... Chemical manufacturer, importer, or distributor to specify the appropriate source of emergency medical advice.	Store locked up.	Dispose of contents/container to... ... in accordance with local/regional/national/international regulations (to be specified).

C.4.11 SPECIFIC TARGET ORGAN TOXICITY (Single Exposure) (CONTINUED)
(Classified in Accordance with Appendix A.8)

Pictogram
Exclamation mark



Hazard category	Signal word	Hazard statement
3	Warning	May cause respiratory irritation; or May cause drowsiness or dizziness

Precautionary statements			
Prevention	Response	Storage	Disposal
Avoid breathing dust/fume/gas/mist/vapors/spray. Chemical manufacturer, importer, or distributor to specify applicable conditions. Use only outdoors or in a well-ventilated area.	If inhaled: Remove person to fresh air and keep comfortable for breathing. Call a poison center/doctor!.../if you feel unwell. ... Chemical manufacturer, importer, or distributor to specify the appropriate source of emergency medical advice.	Store in a well-ventilated place. Keep container tightly closed. - <i>if product is volatile so as to generate hazardous atmosphere.</i> Store locked up.	Dispose of contents/container to... ... in accordance with local/regional/national/international regulations (to be specified).

C.4.12 SPECIFIC TARGET ORGAN TOXICITY (Repeated Exposure)
(Classified in Accordance with Appendix A.9)

Pictogram
 Health hazard



Hazard category 1	Signal word Danger	Hazard statement Causes damage to organs <...> through prolonged or repeated exposure <<...>> <...> <i>(state all organs affected, if known)</i> <<...>> <i>(state route of exposure if no other routes of exposure cause the hazard)</i>
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Precautionary statements			
Prevention	Response	Storage	Disposal
Do not breathe the dust/fume/gas/mist/vapors/spray. Chemical manufacturer, importer, or distributor to specify applicable conditions. Wash ... thoroughly after handling. ... Chemical manufacturer, importer, or distributor to specify parts of the body to be washed after handling. Do not eat, drink or smoke when using this product.	Get medical advice/attention if you feel unwell.		Dispose of contents/container to... ... in accordance with local/regional/national/international regulations (to be specified).

C.4.12 SPECIFIC TARGET ORGAN TOXICITY (Repeated Exposure) (CONTINUED)
(Classified in Accordance with Appendix A.9)

Pictogram
Health hazard



Hazard category	Signal word	Hazard statement
2	Warning	May cause damage to organs <...> through prolonged or repeated exposure <<...>> <...> <i>(state all organs affected, if known)</i> <<...>> <i>(state route of exposure if no other routes of exposure cause the hazard)</i>

Precautionary statements		
Prevention	Response	Storage
Do not breathe dust/fume/gas/mist/vapors/spray. Chemical manufacturer, importer, or distributor to specify applicable conditions.	Get medical advice/attention if you feel unwell.	Dispose of contents/container to... ... in accordance with local/regional/national/international regulations (to be specified).

C.4.13 ASPIRATION HAZARD
(Classified in Accordance with Appendix A.10)

Pictogram
Health hazard



Hazard category	Signal word	Hazard statement
1	Danger	May be fatal if swallowed and enters airways

Precautionary statements			
Prevention	Response	Storage	Disposal
	If swallowed: Immediately call a poison center/doctor/... ... Chemical manufacturer, importer, or distributor to specify the appropriate source of emergency medical advice. Do NOT induce vomiting.	Store locked up.	Dispose of contents/container to... ... in accordance with local/regional/national/international regulations (to be specified).

C.4.14 EXPLOSIVES
(Classified in Accordance with Appendix B.1)

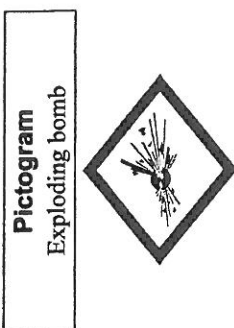
Pictogram
Exploding bomb



Hazard category	Signal word	Hazard statement
Unstable explosive	Danger	Unstable explosive

Precautionary statements			
Prevention	Response	Storage	Disposal
Obtain special instructions before use. Do not handle until all safety precautions have been read and understood. Wear personal protective equipment/face protection. Chemical manufacturer, importer, or distributor to specify type of equipment, as required.	Explosion risk in case of fire. Do NOT fight fire when fire reaches explosives. Evacuate area.	Store ... ...in accordance with local/regional/national/international regulations (to be specified).	Dispose of contents/container to ... ...in accordance with local/regional/national/international regulations (to be specified).

C.4.14 EXPLOSIVES (CONTINUED)
(Classified in Accordance with Appendix B.1)

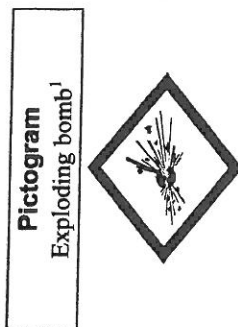


Hazard category	Signal word	Hazard statement
Division 1.1	Danger	Explosive; mass explosion hazard
Division 1.2	Danger	Explosive; severe projection hazard
Division 1.3	Danger	Explosive; fire, blast or projection hazard

Precautionary statements			
Prevention	Response	Storage	Disposal
Keep away from heat/sparks/open flames/hot surfaces. - No smoking. Chemical manufacturer, importer, or distributor to specify applicable ignition source(s). Keep wetted with... ... Chemical manufacturer, importer, or distributor to specify appropriate material. - <i>if drying out increases explosion hazard, except as needed for manufacturing or operating processes (e.g., nitrocellulose).</i> Ground/bond container and receiving equipment. - <i>if the explosive is electrostatically sensitive.</i> Do not subject to grinding/shock/.../friction. ... Chemical manufacturer, importer, or distributor to specify applicable rough handling. Wear face protection. Chemical manufacturer, importer, or distributor to specify type of equipment.	In case of fire: evacuate area. Explosion risk in case of fire. Do NOT fight fire when fire reaches explosives.	Store in accordance with local/regional/national/international regulations (to be specified).	Dispose of contents/container to in accordance with local/regional/national/international regulations (to be specified).

Note: Unpackaged explosives or explosives repacked in packagings other than the original or similar packaging shall have the label elements assigned to Division 1.1 unless the hazard is shown to correspond to one of the hazard categories in Appendix B.1, in which case the corresponding symbol, signal word and/or the hazard statement shall be assigned.

C.4.14 EXPLOSIVES (CONTINUED)
(Classified in Accordance with Appendix B.1)



Hazard statement
Fire or projection hazard

Hazard category
Division 1.4

Signal word
Warning

Precautionary statements ¹		
Prevention	Response	Storage
Keep away from heat/sparks/open flames/hot surfaces. - No smoking. Chemical manufacturer, importer, or distributor to specify applicable ignition source(s). Ground/bond container and receiving equipment. - <i>if the explosive is electrostatically sensitive.</i> Do not subject to grinding/shock/.../friction. Chemical manufacturer, importer, or distributor to specify applicable rough handling. Wear face protection. Chemical manufacturer, importer, or distributor to specify type of equipment.	In case of fire: Evacuate area. Explosion risk in case of fire. - <i>except if explosives are 1.4S ammunition and components thereof.</i> Do NOT fight fire when fire reaches explosives. Fight fire with normal precautions from a reasonable distance - <i>if explosives are 1.4S ammunition and components thereof.</i>	Store ......in accordance with local/regional/national/international regulations (to be specified). Dispose of contents/container to... ... in accordance with local/regional/national/international regulations (to be specified).

Note: Unpackaged explosives or explosives repacked in packagings other than the original or similar packaging shall have the label elements assigned to Division 1.1 unless the hazard is shown to correspond to one of the hazard categories in Appendix B.1, in which case the corresponding symbol, signal word and/or the hazard statement shall be assigned.¹

¹ Except no pictogram is required for explosives that are 1.4S small arms ammunition and components thereof. Labels for 1.4S small arms ammunition and components shall include appropriate precautionary statements.

C.4.14 EXPLOSIVES (CONTINUED)
(Classified in Accordance with Appendix B.1)

Pictogram
No pictogram

Hazard category **Signal word** **Hazard statement**
 Division 1.5 Danger May mass explode in fire

Precautionary statements			
Prevention	Response	Storage	Disposal
Keep away from heat/sparks/open flames/hot surfaces. - No smoking. Chemical manufacturer, importer, or distributor to specify applicable ignition source(s). Keep wetted with... ... Chemical manufacturer, importer, or distributor to specify appropriate material. - <u>if drying out increases explosion hazard, except as needed for manufacturing or operating processes (e.g., nitrocellulose).</u> Ground/bond container and receiving equipment - <u>if the explosive is electrostatically sensitive.</u> Do not subject to grinding/shock/.../friction. ... Chemical manufacturer, importer, or distributor to specify applicable rough handling. Wear face protection. Chemical manufacturer, importer, or distributor to specify type of equipment.	In case of fire: Evacuate area. Explosion risk in case of fire. Do NOT fight fire when fire reaches explosives.	Store ... ...in accordance with local/regional/national/international regulations (to be specified).	Dispose of contents/container to in accordance with local/regional/national/international regulations (to be specified).

Note: Unpackaged explosives or explosives repacked in packagings other than the original or similar packaging shall have the label elements assigned to Division 1.1 unless the hazard is shown to correspond to one of the hazard categories in Appendix B.1, in which case the corresponding symbol, signal word and/or the hazard statement shall be assigned.

C.4.14 EXPLOSIVES (CONTINUED)
(Classified in Accordance with Appendix B.1)

Pictogram <i>No pictogram</i>

Hazard category Division 1.6	Signal word <i>No signal word</i>	Hazard statement <i>No hazard statement</i>
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Precautionary statements			
Prevention	Response	Storage	Disposal
None assigned.	None assigned	None assigned	None assigned

Note: Unpackaged explosives or explosives repacked in packagings other than the original or similar packaging shall have the label elements assigned to Division 1.1 unless the hazard is shown to correspond to one of the hazard categories in Appendix B.1, in which case the corresponding symbol, signal word and/or the hazard statement shall be assigned.

C.4.15 FLAMMABLE GASES
(Classified in Accordance with Appendix B.2)

Pictogram
Flame



Hazard category
1

Signal word
Danger

Hazard statement
Extremely flammable gas

Precautionary statements			
Prevention	Response	Storage	Disposal
Keep away from heat/sparks/open flames/hot surfaces. -No smoking. Chemical manufacturer, importer, or distributor to specify applicable ignition source(s).	Leaking gas fire: Do not extinguish, unless leak can be stopped safely. Eliminate all ignition sources if safe to do so.	Store in well-ventilated place.	

C.4.15 FLAMMABLE GASES (CONTINUED)
(Classified in Accordance with Appendix B.2)

Hazard category		Signal word	Hazard statement	Pictogram <i>No Pictogram</i>	
2		Warning	Flammable gas		
Precautionary statements					
Prevention		Response	Storage	Disposal	
Keep away from heat/sparks/open flames/hot surfaces. -No smoking. Chemical manufacturer, importer, or distributor to specify applicable ignition sources(s).		Leaking gas fire: Do not extinguish, unless leak can be stopped safely. Eliminate all ignition sources if safe to do so.	Store in well-ventilated place.		

C.4.16 FLAMMABLE AEROSOLS
(Classified in Accordance with Appendix B.3)

Pictogram
Flame



Hazard category	Signal word	Hazard statement
1	Danger	Extremely flammable aerosol
2	Warning	Flammable aerosol

Precautionary statements			
Prevention	Response	Storage	Disposal
Keep away from heat/sparks/open flames/hot surfaces. -No smoking. Chemical manufacturer, importer, or distributor to specify applicable ignition sources(s). Do not spray on an open flame or other ignition source. Pressurized container: Do not pierce or burn, even after use.		Protect from sunlight. Do not expose to temperatures exceeding 50 °C/122 °F.	

C.4.17 OXIDIZING GASES
(Classified in Accordance with Appendix B.4)

Hazard category
1

Signal word
Danger

Hazard statement
May cause or intensify fire; oxidizer

Pictogram
Flame over circle



Precautionary statements			
Prevention	Response	Storage	Disposal
Keep/Store away from clothing/.../combustible materials. ...Chemical manufacturer, importer, or distributor to specify other incompatible materials. Keep reduction valves/valves and fittings free from oil and grease.	In case of fire: Stop leak if safe to do so.	Store in well-ventilated place.	

C.4.18 GASES UNDER PRESSURE
(Classified in Accordance with Appendix B.5)

Pictogram
 Gas cylinder



Hazard category	Signal word	Hazard statement
Compressed gas	Warning	Contains gas under pressure; may explode if heated
Liquefied gas	Warning	Contains gas under pressure; may explode if heated
Dissolved gas	Warning	Contains gas under pressure; may explode if heated

Precautionary statements			
Prevention	Response	Storage	Disposal
		Protect from sunlight. Store in a well-ventilated place.	

C.4.18 GASES UNDER PRESSURE (CONTINUED)
(Classified in Accordance with Appendix B.5)

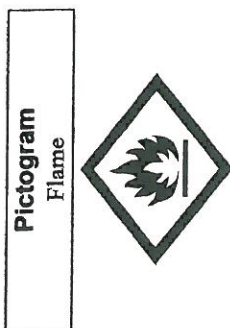
Pictogram
Gas cylinder



Hazard category	Signal word	Hazard statement
Refrigerated liquefied gas	Warning	Contains refrigerated gas; may cause cryogenic burns or injury

Precautionary statements			
Prevention	Response	Storage	Disposal
Wear cold insulating gloves/face shield/eye protection.	Thaw frosted parts with lukewarm water. Do not rub affected area. Get immediate medical advice/attention	Store in well-ventilated place.	

C.4.19 FLAMMABLE LIQUIDS
(Classified in Accordance with Appendix B.6)



Hazard category	Signal word	Hazard statement
1	Danger	Extremely flammable liquid and vapor
2	Danger	Highly flammable liquid and vapor
3	Warning	Flammable liquid and vapor

Precautionary statements		
Prevention	Response	Storage
Dispose of contents/container to... ... in accordance with local/regional/national/ international regulations (to be specified).	Store in a well-ventilated place. Keep cool.	Dispose of contents/container to... ... in accordance with local/regional/national/ international regulations (to be specified).
Keep away from heat/sparks/open flames/hot surfaces.— No smoking. Chemical manufacturer, importer, or distributor to specify applicable ignition source(s). Keep container tightly closed. Ground/Bond container and receiving equipment - <i>if electrostatically sensitive material is for reloading.</i> - <i>if product is volatile so as to generate hazardous atmosphere.</i> Use explosion-proof electrical/ventilating/lighting/.../equipment. ... Chemical manufacturer, importer, or distributor to specify other equipment. Use only non-sparking tools. Take precautionary measures against static discharge. Wear protective gloves/eye protection/face protection Chemical manufacturer, importer, or distributor to specify type of equipment.	If on skin (or hair): Take off immediately all contaminated clothing. Rinse skin with water/shower. In case of fire: Use ... to extinguish. ... Chemical manufacturer, importer, or distributor to specify appropriate media. - <i>if water increases</i> <i>risk.</i>	Store in a well-ventilated place. Keep cool.

C.4.19 FLAMMABLE LIQUIDS (CONTINUED)
(Classified in Accordance with Appendix B.6)

Pictogram
No Pictogram

Hazard category **Signal word** **Hazard statement**
 4 Warning Combustible liquid

Precautionary statements			
Prevention	Response	Storage	Disposal
Keep away from flames and hot surfaces. – No smoking. Wear protective gloves/eye protection/face protection Chemical manufacturer, importer, or distributor to specify type of equipment.	In case of fire: Use ... to extinguish. ... Chemical manufacturer, importer, or distributor to specify appropriate media. - <i>if water increases risk.</i>	Store in a well-ventilated place. Keep cool.	Dispose of contents/container to... in accordance with local/regional/national/international regulations (to be specified).

C.4.20 FLAMMABLE SOLIDS
(Classified in Accordance with Appendix B.7)

Hazard category

1 **Signal word**
 Danger

2 Warning

Hazard statement
Flammable solid
Flammable solid

Pictogram
Flame



Precautionary statements			
Prevention	Response	Storage	Disposal
Keep away from heat/sparks/open flames/hot surfaces. - No smoking. Chemical manufacturer, importer, or distributor to specify applicable ignition source(s). Ground/Bond container and receiving equipment. - <u>if electrostatically sensitive material is for reloading.</u> Use explosion-proof electrical/ventilating/ lighting/... /equipment. ... Chemical manufacturer, importer, or distributor to specify other equipment. - <u>if dust clouds can occur.</u> Wear protective gloves/eye protection/face protection Chemical manufacturer, importer, or distributor to specify type of equipment.	In case of fire: Use ... to extinguish ... Chemical manufacturer, importer, or distributor to specify appropriate media. - <u>if water increases risk.</u>		

C.4.21 SELF-REACTIVE SUBSTANCES AND MIXTURES
(Classified in Accordance with Appendix B.8)

Pictogram
 Exploding bomb



Hazard category **Signal word** **Hazard statement**
 Type A Danger Heating may cause an explosion

Precautionary statements			
Prevention	Response	Storage	Disposal
Keep away from heat/sparks/open flames/hot surfaces. - No smoking. Chemical manufacturer, importer, or distributor to specify applicable ignition source(s). Keep/Store away from clothing/.../combustible materials. ... Chemical manufacturer, importer, or distributor to specify other incompatible materials. Keep only in original container. Wear protective gloves/eye protection/face protection. Chemical manufacturer, importer, or distributor to specify type of equipment.	In case of fire: Use ... to extinguish ... Chemical manufacturer, importer, or distributor to specify appropriate media. - <i>if water increases risk.</i> In case of fire: Evacuate area. Fight fire remotely due to the risk of explosion.	Store in a well-ventilated place. Keep cool. Store at temperatures not exceeding ... °C/... °F. ... Chemical manufacturer, importer, or distributor to specify temperature. Store away from other materials.	Dispose of contents/container to... ... in accordance with local/regional/national/international regulations (to be specified).

C.4.21 SELF-REACTIVE SUBSTANCES AND MIXTURES (CONTINUED)
(Classified in Accordance with Appendix B.8)

Hazard category Type B	Signal word Danger	Hazard statement Heating may cause a fire or explosion	Pictograms Exploding bomb and flame
			 

Precautionary statements			
Prevention	Response	Storage	Disposal
Keep away from heat/sparks/open flames/hot surfaces. - No smoking. Chemical manufacturer, importer, or distributor to specify applicable ignition source(s). Keep/Store away from clothing/.../combustible materials. ... Chemical manufacturer, importer, or distributor to specify other incompatible materials.	In case of fire: Use ... to extinguish. ... Chemical manufacturer, importer, or distributor to specify appropriate media. - <u>if water increases risk.</u> In case of fire: Evacuate area. Fight fire remotely due to the risk of explosion.	Store in a well-ventilated place. Keep cool. Store at temperatures not exceeding ...°C/...°F. ... Chemical manufacturer, importer, or distributor to specify temperature.	Dispose of contents/container to... ...in accordance with local/regional/national/international regulations (to be specified).
Keep only in original container. Wear protective gloves/eye protection/face protection. Chemical manufacturer, importer, or distributor to specify type of equipment.		Store away from other materials.	

C.4.21 SELF-REACTIVE SUBSTANCES AND MIXTURES (CONTINUED)
(Classified in Accordance with Appendix B.8)

Pictogram
Flame



Hazard category	Signal word	Hazard statement
Type C	Danger	Heating may cause a fire
Type D	Danger	Heating may cause a fire
Type E	Warning	Heating may cause a fire
Type F	Warning	Heating may cause a fire

Precautionary statements		
Prevention	Response	Storage
Keep away from heat/sparks/open flames/hot surfaces. - No smoking. Chemical manufacturer, importer, or distributor to specify applicable ignition source(s). Keep/Store away from clothing/.../combustible materials. ...Chemical manufacturer, importer, or distributor to specify other incompatible materials. Keep only in original container. Wear protective gloves/eye protection/face protection. Chemical manufacturer, importer, or distributor to specify type of equipment.	In case of fire: Use ... to extinguish ... Chemical manufacturer, importer, or distributor to specify appropriate media. - <i>if water increases risk.</i>	Dispose of contents/container to... ...in accordance with local/regional/national/international regulations (to be specified). Store in a well-ventilated place. Keep cool. Store at temperatures not exceeding ...°C/...°F. ...Chemical manufacturer, importer, or distributor to specify temperature. Store away from other materials.

C.4.22 PYROPHORIC LIQUIDS
(Classified in Accordance with Appendix B.9)

Hazard category 1 **Signal word** Danger **Hazard statement** Catches fire spontaneously if exposed to air

Pictogram
Flame



Precautionary statements			
Prevention	Response	Storage	Disposal
Keep away from heat/sparks/open flames/hot surfaces. - No smoking. Chemical manufacturer, importer, or distributor to specify applicable ignition sources(s). Do not allow contact with air. Wear protective gloves/eye protection/face protection. Chemical manufacturer, importer, or distributor to specify type of equipment.	If on skin: Immerse in cool water/wrap with wet bandages In case of fire: Use ... to extinguish ... Chemical manufacturer, importer, or distributor to specify appropriate media. - <i>if water increases risk.</i>	Store contents under ... Chemical manufacturer, importer, or distributor to specify appropriate liquid or inert gas.	

C.4.23 PYROPHORIC SOLIDS
(Classified in Accordance with Appendix B.10)

Pictogram
Flame



Hazard category	Signal word	Hazard statement
1	Danger	Catches fire spontaneously if exposed to air

Precautionary statements			
Prevention	Response	Storage	Disposal
Keep away from heat/sparks/open flames/hot surfaces. - No smoking. Chemical manufacturer, importer, or distributor to specify applicable ignition source(s). Do not allow contact with air. Wear protective gloves/eye protection/face protection Chemical manufacturer, importer, or distributor to specify type of equipment.	Brush off loose particles from skin. Immerse in cool water/wrap in wet bandages. In case of fire: Use ... to extinguish ... Chemical manufacturer, importer, or distributor to specify appropriate media. - <i>if water increases risk.</i>	Store contents under ... Chemical manufacturer, importer, or distributor to specify appropriate liquid or inert gas.	

C.4.24 SELF-HEATING SUBSTANCES AND MIXTURES
(Classified in Accordance with Appendix B.11)

Hazard category	Signal word	Hazard statement
1	Danger	Self-heating; may catch fire
2	Warning	Self-heating in large quantities; may catch fire

Pictogram
Flame



Precautionary statements		
Prevention	Response	Storage
Keep cool. Protect from sunlight. Wear protective gloves/eye protection/face protection. Chemical manufacturer, importer, or distributor to specify type of equipment.		Storage Maintain air gap between stacks/pallets. Store bulk masses greater than ... kg/...lbs at temperatures not exceeding ...°C/...°F. ... Chemical manufacturer, importer, or distributor to specify mass and temperature.
		Disposal Store away from other materials.

C.4.25 SUBSTANCES AND MIXTURES WHICH, IN CONTACT WITH WATER, EMIT FLAMMABLE GASES
(Classified in Accordance with Appendix B.12)

Hazard category	Signal word	Hazard statement	Pictogram Flame
1	Danger	In contact with water releases flammable gases, which may ignite spontaneously	
2	Danger	In contact with water releases flammable gas	

Precautionary statements			
Prevention	Response	Storage	Disposal
Do not allow contact with water. Handle under inert gas. Protect from moisture. Wear protective gloves/eye protection/face protection. Chemical manufacturer, importer, or distributor to specify type of equipment.	Brush off loose particles from skin and immerse in cool water/wrap in wet bandages. In case of fire: Use ... to extinguish ... Chemical manufacturer, importer, or distributor to specify appropriate media. - <i>if water increases risk.</i>	Store in a dry place. Store in a closed container.	Dispose of contents/container to... ...in accordance with local/regional/national/ international regulations (to be specified).

C.4.25 SUBSTANCES AND MIXTURES WHICH, IN CONTACT WITH WATER, EMIT FLAMMABLE GASES
(CONTINUED)
(Classified in Accordance with Appendix B.12)

Pictogram
 Flame



Hazard category	Signal word	Hazard statement
3	Warning	In contact with water releases flammable gas

Precautionary statements			
Prevention	Response	Storage	Disposal
Handle under inert gas. Protect from moisture. Wear protective gloves/eye protection/face protection. Chemical manufacturer, importer, or distributor to specify type of equipment.	In case of fire: Use ... to extinguish. ... Chemical manufacturer, importer, or distributor to specify appropriate media. - <i>if water increases risk.</i>	Store in a dry place. Store in a closed container.	Dispose of contents/container to... ... in accordance with local/regional/national/international regulations (to be specified).

C.4.26 OXIDIZING LIQUIDS (Classified in Accordance with Appendix B.13)

Pictogram
Flame over circle



Hazard category 1
Signal word Danger
Hazard statement May cause fire or explosion; strong oxidizer

Precautionary statements		
Prevention	Response	Storage
Keep away from heat. Keep/Store away from clothing and other combustible materials. Take any precaution to avoid mixing with combustibles/... ... Chemical manufacturer, importer, or distributor to specify other incompatible materials. Wear protective gloves /eye protection/face protection. Chemical manufacturer, importer, or distributor to specify type of equipment. Wear fire/flammable resistant/retardant clothing.	If on clothing: Rinse immediately contaminated clothing and skin with plenty of water before removing clothes. In case of major fire and large quantities: Evacuate area. Fight fire remotely due to the risk of explosion. In case of fire: Use ... to extinguish. ... Chemical manufacturer, importer, or distributor to specify appropriate media. - <i>if water increases risk.</i>	Disposal Dispose of contents/container to... ...in accordance with local/regional/national/international regulations (to be specified).

C.4.26 OXIDIZING LIQUIDS (CONTINUED)
(Classified in Accordance with Appendix B.13)

Pictogram
 Flame over circle



Hazard category	Signal word	Hazard statement
2	Danger	May intensify fire; oxidizer
3	Warning	May intensify fire; oxidizer

Precautionary statements		
Prevention	Response	Storage
Keep away from heat. Keep/Store away from clothing/.../combustible materials. ...Chemical manufacturer, importer, or distributor to specify other incompatible materials. Take any precaution to avoid mixing with combustibles/... ... Chemical manufacturer, importer, or distributor to specify other incompatible materials. Wear protective gloves/eye protection/face protection. Chemical manufacturer, importer, or distributor to specify type of equipment.	In case of fire: Use ... to extinguish. ... Chemical manufacturer, importer, or distributor to specify appropriate media. - <i>if water increases risk.</i>	Dispose of contents/container to... ...in accordance with local/regional/national/international regulations (to be specified).

C.4.27 OXIDIZING SOLIDS
(Classified in Accordance with Appendix B.14)

Hazard category 1 **Signal word** Danger **Hazard statement** May cause fire or explosion; strong oxidizer

Pictogram

Flame over circle



Precautionary statements			
Prevention	Response	Storage	Disposal
Keep away from heat. Keep away from clothing and other combustible materials. Take any precaution to avoid mixing with combustibles/... ... Chemical manufacturer, importer, or distributor to specify other incompatible materials. Wear protective gloves/eye protection/face protection. Chemical manufacturer, importer, or distributor to specify type of equipment. Wear fire/flammable resistant/retardant clothing.	If on clothing: Rinse immediately contaminated clothing and skin with plenty of water before removing clothes. In case of major fire and large quantities: Evacuate area. Fight fire remotely due to the risk of explosion. In case of fire: Use ... to extinguish. ... Chemical manufacturer, importer, or distributor to specify appropriate media. - <i>if water increases risk.</i>		Dispose of contents/container to... ...in accordance with local/regional/national/international regulations (to be specified).

C.4.27 OXIDIZING SOLIDS (CONTINUED)
(Classified in Accordance with Appendix B.14)

Pictogram
 Flame over circle



Hazard category	Signal word	Hazard statement
2	Danger	May intensify fire; oxidizer
3	Warning	May intensify fire; oxidizer

Precautionary statements			
Prevention	Response	Storage	Disposal
Keep away from heat. Keep/Store away from clothing/.../ combustible materials. ... Chemical manufacturer, importer, or distributor to specify incompatible materials. Take any precaution to avoid mixing with combustibles/... ... Chemical manufacturer, importer, or distributor to specify other incompatible materials. Wear protective gloves/eye protection/face protection. Chemical manufacturer, importer, or distributor to specify type of equipment.	In case of fire: Use ... to extinguish. ... Chemical manufacturer, importer, or distributor to specify appropriate media. - <i>if water increases risk.</i>		Dispose of contents/container to... ... in accordance with local/regional/national/international regulations (to be specified).

C.4.28 ORGANIC PEROXIDES
(Classified in Accordance with Appendix B.15)

Pictogram
Exploding bomb



Hazard category **Signal word** **Hazard statement**
Type A Danger Heating may cause an explosion

Precautionary statements			
Prevention	Response	Storage	Disposal
Keep away from heat/sparks/open flames/hot surfaces.- No smoking. Chemical manufacturer, importer, or distributor to specify applicable ignition source(s). Keep/Store away from clothing/.../combustible materials. ... Chemical manufacturer, importer, or distributor to specify incompatible materials. Keep only in original container. Wear protective gloves/eye protection/face protection. Chemical manufacturer, importer, or distributor to specify type of equipment.		Store at temperatures not exceeding ...°C/...°F. Keep cool. ... Chemical manufacturer, importer, or distributor to specify temperature. Protect from sunlight. Store away from other materials.	Dispose of contents/container to... ... in accordance with local/regional/national/international regulations (to be specified).

C.4.28 ORGANIC PEROXIDES (CONTINUED)
(Classified in Accordance with Appendix B.15)

Hazard category
Type B

Signal word
Danger

Hazard statement
Heating may cause a fire or explosion

Pictograms

Exploding bomb and flame



Precautionary statements			
Prevention	Response	Storage	Disposal
Keep away from heat/sparks/open flames/hot surfaces. - No smoking. Chemical manufacturer, importer, or distributor to specify applicable ignition source(s). Keep /Store away from clothing/.../combustible materials. ... Chemical manufacturer, importer, or distributor to specify incompatible materials. Keep only in original container. Wear protective gloves/eye protection/face protection. Chemical manufacturer, importer, or distributor to specify type of equipment.		Store at temperatures not exceeding ...°C/...°F. Keep cool. Chemical manufacturer, importer, or distributor to specify temperature. Protect from sunlight. Store away from other materials.	Dispose of contents/container to... ... in accordance with local/regional/national/international regulations (to be specified).

C.4.28 ORGANIC PEROXIDES (CONTINUED)

(Classified in Accordance with Appendix B.15)

Pictogram
Flame



Hazard category	Signal word	Hazard statement
Type C	Danger	Heating may cause a fire
Type D	Danger	Heating may cause a fire
Type E	Warning	Heating may cause a fire
Type F	Warning	Heating may cause a fire

Precautionary statements		
Prevention	Response	Storage
Keep away from heat/sparks/open flames/hot surfaces. - No smoking. Chemical manufacturer, importer, or distributor to specify applicable ignition source(s). Keep/Store away from clothing/.../ combustible materials ... Chemical manufacturer, importer, or distributor to specify incompatible materials. Keep only in original container. Wear protective gloves/eye protection/face protection. Chemical manufacturer, importer, or distributor to specify type of equipment.		Store at temperatures not exceeding ...°C/...°F. Keep cool. ... Chemical manufacturer, importer, or distributor to specify temperature. Protect from sunlight. Store away from other materials.
		Dispose of contents/container to... ... in accordance with local/regional/national/international regulations (to be specified).

C.4.29 CORROSIVE TO METALS
(Classified in Accordance with Appendix B.16)

Pictogram
Corrosion



Hazard category	Signal word	Hazard statement
1	Warning	May be corrosive to metals

Precautionary statements			
Prevention	Response	Storage	Disposal
Keep only in original container.	Absorb spillage to prevent material damage.	Store in corrosive resistant/... container with a resistant inner liner. ... Chemical manufacturer, importer, or distributor to specify other compatible materials.	

C.4.30 Label elements for OSHA defined hazards

Hazard Pyrophoric Gas	Signal word Danger	Hazard statement Catches fire spontaneously if exposed to air	Pictogram Flame 
Hazard Simple Asphyxiant	Signal word Warning	Hazard statement May displace oxygen and cause rapid suffocation	Pictogram <i>No Pictogram</i>
Hazard Combustible Dust ²	Signal word Warning	Hazard statement May form combustible dust concentrations in air	Pictogram <i>No Pictogram</i>

² The chemical manufacturer or importer shall label chemicals that are shipped in dust form, and present a combustible dust hazard in that form when used downstream, under paragraph (f)(1); 2) the chemical manufacturer or importer shipping chemicals that are in a form that is not yet a dust must provide a label to customers under paragraph (f)(4) if, under normal conditions of use, the chemicals are processed in a downstream workplace in such a way that they present a combustible dust hazard; and 3) the employer shall follow the workplace labeling requirements under paragraph (f)(6) where combustible dust hazards are present.

Appendix D to § 1910.1200—Safety Data Sheets (Mandatory)

A safety data sheet (SDS) shall include the information specified in Table D.1 under the

section number and heading indicated for sections 1–11 and 16. If no relevant information is found for any given subheading within a section, the SDS shall

clearly indicate that no applicable information is available. Sections 12–15 may be included in the SDS, but are not mandatory.

TABLE D.1—MINIMUM INFORMATION FOR AN SDS

Heading	Subheading
1. Identification	(a) Product identifier used on the label; (b) Other means of identification; (c) Recommended use of the chemical and restrictions on use; (d) Name, address, and telephone number of the chemical manufacturer, importer, or other responsible party; (e) Emergency phone number.
2. Hazard(s) identification	(a) Classification of the chemical in accordance with paragraph (d) of § 1910.1200; (b) Signal word, hazard statement(s), symbol(s) and precautionary statement(s) in accordance with paragraph (f) of § 1910.1200. (Hazard symbols may be provided as graphical reproductions in black and white or the name of the symbol, e.g., flame, skull and crossbones); (c) Describe any hazards not otherwise classified that have been identified during the classification process; (d) Where an ingredient with unknown acute toxicity is used in a mixture at a concentration ≥1% and the mixture is not classified based on testing of the mixture as a whole, a statement that X% of the mixture consists of ingredient(s) of unknown acute toxicity is required.
3. Composition/information on ingredients	Except as provided for in paragraph (i) of § 1910.1200 on trade secrets: For Substances (a) Chemical name; (b) Common name and synonyms; (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. For Mixtures In addition to the information required for substances: (a) The chemical name and concentration (exact percentage) or concentration ranges of all ingredients which are classified as health hazards in accordance with paragraph (d) of § 1910.1200 and (1) Are present above their cut-off/concentration limits; or (2) Present a health risk below the cut-off/concentration limits. (b) The concentration (exact percentage) shall be specified unless a trade secret claim is made in accordance with paragraph (i) of § 1910.1200, when there is batch-to-batch variability in the production of a mixture, or for a group of substantially similar mixtures (See A.0.5.1.2) with similar chemical composition. In these cases, concentration ranges may be used. For All Chemicals Where a Trade Secret is Claimed Where a trade secret is claimed in accordance with paragraph (i) of § 1910.1200, a statement that the specific chemical identity and/or exact percentage (concentration) of composition has been withheld as a trade secret is required.
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 fire-fighters.
6. Accidental release measures	(a) Personal precautions, protective equipment, and emergency procedures. (b) 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) OSHA permissible exposure limit (PEL), American Conference of Governmental Industrial Hygienists (ACGIH) Threshold Limit Value (TLV), and any other exposure limit used or recommended by the chemical manufacturer, importer, or employer preparing the safety data sheet, where available. (b) Appropriate engineering controls. (c) Individual protection measures, such as personal protective equipment.
9. Physical and chemical properties	(a) Appearance (physical state, color, etc.); (b) Odor; (c) Odor 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;

TABLE D.1—MINIMUM INFORMATION FOR AN SDS—Continued

Heading	Subheading
	(k) Vapor pressure; (l) Vapor density; (m) Relative density; (n) Solubility(ies); (o) Partition coefficient: n-octanol/water; (p) Auto-ignition temperature; (q) Decomposition temperature; (r) Viscosity.
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	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). (e) Whether the hazardous chemical is listed in the National Toxicology Program (NTP) Report on Carcinogens (latest edition) or has been found to be a potential carcinogen in the International Agency for Research on Cancer (IARC) Monographs (latest edition), or by OSHA.
12. Ecological information (Non-mandatory)	(a) Ecotoxicity (aquatic and terrestrial, where available); (b) Persistence and degradability; (c) Bioaccumulative potential; (d) Mobility in soil; (e) Other adverse effects (such as hazardous to the ozone layer).
13. Disposal considerations (Non-mandatory) ...	Description of waste residues and information on their safe handling and methods of disposal, including the disposal of any contaminated packaging.
14. Transport information (Non-mandatory)	(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 (Non-mandatory)	Safety, health and environmental regulations specific for the product in question.
16. Other information, including date of preparation or last revision.	The date of preparation of the SDS or the last change to it.

Appendix F to § 1910.1200—Guidance for Hazard Classifications Re: Carcinogenicity (Non-Mandatory)

The mandatory criteria for classification of a chemical for carcinogenicity under HCS (§ 1910.1200) are found in Appendix A.6 to this section. This non-mandatory Appendix provides additional guidance on hazard classification for carcinogenicity. Part A of Appendix F includes background guidance provided by GHS based on the Preamble of the International Agency for Research on Cancer (IARC) "Monographs on the Evaluation of Carcinogenic Risks to Humans" (2006). Part B provides IARC classification information. Part C provides background guidance from the National Toxicology Program (NTP) "Report on Carcinogens" (RoC), and Part D is a table that compares GHS carcinogen hazard categories to carcinogen classifications under IARC and NTP, allowing classifiers to be able to use information from IARC and NTP RoC carcinogen classifications to complete their classifications under the GHS, and thus the HCS.

Part A: Background Guidance¹

As noted in Footnote 6 of Appendix A.6, to this section, the GHS includes as guidance for classifiers information taken from the Preamble of the International Agency for Research on Cancer (IARC) "Monographs on the Evaluation of Carcinogenic Risks to Humans" (2006), providing guidance on the evaluation of the strength and evidence of carcinogenic risks to humans. This guidance also discusses some additional considerations in classification and an approach to analysis, rather than hard-and-fast rules. Part A is consistent with Appendix A.6, and should help in evaluating information to determine carcinogenicity.

Carcinogenicity in humans:

¹ The text of Appendix F, Part A, on the IARC Monographs, is paraphrased from the 2006 Preamble to the "Monographs on the Evaluation of Carcinogenic Risks to Humans"; the Classifier is referred to the full IARC Preamble for the complete text. The text is not part of the agreed GHS text on the harmonized system developed by the OECD Task Force-HCL.

The evidence relevant to carcinogenicity from studies in humans is classified into one of the following categories:

(a) Sufficient evidence of carcinogenicity: A causal relationship has been established between exposure to the agent and human cancer. That is, a positive relationship has been observed between the exposure and cancer in studies in which chance, bias and confounding could be ruled out with reasonable confidence.

(b) Limited evidence of carcinogenicity: A positive association has been observed between exposure to the agent and cancer for which a causal interpretation is considered by the Working Group to be credible, but chance, bias or confounding could not be ruled out with reasonable confidence.

In some instances, the above categories may be used to classify the degree of evidence related to carcinogenicity in specific organs or tissues.

Carcinogenicity in experimental animals:

The evidence relevant to carcinogenicity in experimental animals is classified into one of the following categories:

(a) Sufficient evidence of carcinogenicity: A causal relationship has been established between the agent and an increased incidence of malignant neoplasms or of an appropriate combination of benign and malignant neoplasms in two or more species of animals or two or more independent studies in one species carried out at different times or in different laboratories or under different protocols. An increased incidence of tumors in both sexes of a single species in a well-conducted study, ideally conducted under Good Laboratory Practices, can also provide sufficient evidence.

Exceptionally, a single study in one species and sex might be considered to provide sufficient evidence of carcinogenicity when malignant neoplasms occur to an unusual degree with regard to incidence, site, type of tumor or age at onset, or when there are strong findings of tumors at multiple sites.

(a) Limited evidence of carcinogenicity: The data suggest a carcinogenic effect but are limited for making a definitive evaluation because, e.g. the evidence of carcinogenicity is restricted to a single experiment; there are unresolved questions regarding the adequacy of the design, conduct or interpretation of the studies; the agent increases the incidence only of benign neoplasms or lesions of uncertain neoplastic potential; or the evidence of carcinogenicity is restricted to studies that demonstrate only promoting activity in a narrow range of tissues or organs.

Guidance on How To Consider Important Factors in Classification of Carcinogenicity (See Reference Section)

The weight of evidence analysis called for in GHS and the HCS (§ 1910.1200) is an integrative approach that considers important factors in determining carcinogenic potential along with the strength of evidence analysis. The IPCS "Conceptual Framework for Evaluating a Mode of Action for Chemical Carcinogenesis" (2001), International Life Sciences Institute (ILSI) "Framework for Human Relevance Analysis of Information on Carcinogenic Modes of Action" (Meek, et al., 2003; Cohen et al., 2003, 2004), and Preamble to the IARC Monographs (2006; Section B.6. (Scientific Review and Evaluation; Evaluation and Rationale)) provide a basis for systematic assessments that may be performed in a consistent fashion. The IPCS also convened a panel in 2004 to further develop and clarify the human relevance framework. However, the above documents are not intended to dictate answers, nor provide lists of criteria to be checked off.

Mode of Action

Various documents on carcinogen assessment all note that mode of action in and of itself, or consideration of comparative metabolism, should be evaluated on a case-by-case basis and are part of an analytic evaluative approach. One must look closely at any mode of action in animal experiments, taking into consideration comparative toxicokinetics/toxicodynamics between the animal test species and humans to determine the relevance of the results to humans. This may lead to the possibility of discounting very specific effects of certain types of

substances. Life stage-dependent effects on cellular differentiation may also lead to qualitative differences between animals and humans. Only if a mode of action of tumor development is conclusively determined not to be operative in humans may the carcinogenic evidence for that tumor be discounted. However, a weight of evidence evaluation for a substance calls for any other tumorigenic activity to be evaluated, as well.

Responses in Multiple Animal Experiments

Positive responses in several species add to the weight of evidence that a substance is a carcinogen. Taking into account all of the factors listed in A.6.2.5.2 and more, such chemicals with positive outcomes in two or more species would be provisionally considered to be classified in GHS Category 1B until human relevance of animal results are assessed in their entirety. It should be noted, however, that positive results for one species in at least two independent studies, or a single positive study showing unusually strong evidence of malignancy may also lead to Category 1B.

Responses Are in One Sex or Both Sexes

Any case of gender-specific tumors should be evaluated in light of the total tumorigenic response to the substance observed at other sites (multi-site responses or incidence above background) in determining the carcinogenic potential of the substance.

If tumors are seen only in one sex of an animal species, the mode of action should be carefully evaluated to see if the response is consistent with the postulated mode of action. Effects seen only in one sex in a test species may be less convincing than effects seen in both sexes, unless there is a clear patho-physiological difference consistent with the mode of action to explain the single sex response.

Confounding Effects of Excessive Toxicity or Localized Effects

Tumors occurring only at excessive doses associated with severe toxicity generally have doubtful potential for carcinogenicity in humans. In addition, tumors occurring only at sites of contact and/or only at excessive doses need to be carefully evaluated for human relevance for carcinogenic hazard. For example, forestomach tumors, following administration by gavage of an irritating or corrosive, non-mutagenic chemical, may be of questionable relevance. However, such determinations must be evaluated carefully in justifying the carcinogenic potential for humans; any occurrence of other tumors at distant sites must also be considered.

Tumor Type, Reduced Tumor Latency

Unusual tumor types or tumors occurring with reduced latency may add to the weight of evidence for the carcinogenic potential of a substance, even if the tumors are not statistically significant.

Toxicokinetic behavior is normally assumed to be similar in animals and humans, at least from a qualitative perspective. On the other hand, certain tumor types in animals may be associated with toxicokinetics or toxicodynamics that are unique to the animal species tested and may not be predictive of carcinogenicity in

humans. Very few such examples have been agreed internationally. However, one example is the lack of human relevance of kidney tumors in male rats associated with compounds causing $\alpha_2\mu$ -globulin nephropathy (IARC, Scientific Publication N° 147²). Even when a particular tumor type may be discounted, expert judgment must be used in assessing the total tumor profile in any animal experiment.

Part B: International Agency for Research on Cancer (IARC)³

IARC Carcinogen Classification Categories:
Group 1: The agent is *carcinogenic to humans*

This category is used when there is *sufficient evidence of carcinogenicity* in humans. Exceptionally, an agent may be placed in this category when evidence of carcinogenicity in humans is less than *sufficient* but there is *sufficient evidence of carcinogenicity* in experimental animals and strong evidence in exposed humans that the agent acts through a relevant mechanism of carcinogenicity.

Group 2:

This category includes agents for which, at one extreme, the degree of evidence of carcinogenicity in humans is almost *sufficient*, as well as those for which, at the other extreme, there are no human data but for which there is evidence of carcinogenicity in experimental animals. Agents are assigned to either Group 2A (*probably carcinogenic to humans*) or Group 2B (*possibly carcinogenic to humans*) on the basis of epidemiological and experimental evidence of carcinogenicity and mechanistic and other relevant data. The terms *probably carcinogenic* and *possibly carcinogenic* have no quantitative significance and are used simply as descriptors of different levels of evidence of human carcinogenicity, with *probably carcinogenic* signifying a higher level of evidence than *possibly carcinogenic*.

Group 2A: The agent is *probably carcinogenic to human*.

This category is used when there is *limited evidence of carcinogenicity* in humans and *sufficient evidence of carcinogenicity* in experimental animals. In some cases, an agent may be classified in this category when there is *inadequate evidence of carcinogenicity* in humans and *sufficient evidence of carcinogenicity* in experimental animals and strong evidence that the carcinogenesis is mediated by a mechanism that also operates in humans. Exceptionally, an agent may be classified in this category solely on the basis of *limited evidence of carcinogenicity* in humans. An agent may be assigned to this category if it clearly belongs, based on mechanistic considerations, to a class of agents for which one or more members have been classified in Group 1 or Group 2A.

² While most international agencies do not consider kidney tumors coincident with $\alpha_2\mu$ -globulin nephropathy to be a predictor of risk in humans, this view is not universally held. (See: Doi et al., 2007).

³ Preamble of the International Agency for Research on Cancer (IARC) "Monographs on the Evaluation of Carcinogenic Risks to Humans" (2006).

Group 2B: The agent is *possibly carcinogenic to humans*.

This category is used for agents for which there is *limited evidence of carcinogenicity* in humans and less than *sufficient evidence of carcinogenicity* in experimental animals. It may also be used when there is *inadequate evidence of carcinogenicity* in humans but there is *sufficient evidence of carcinogenicity* in experimental animals. In some instances, an agent for which there is *inadequate evidence of carcinogenicity* in humans and less than *sufficient evidence of carcinogenicity* in experimental animals together with supporting evidence from mechanistic and other relevant data may be placed in this group. An agent may be classified in this category solely on the basis of strong evidence from mechanistic and other relevant data.

Part C: National Toxicology Program (NTP), "Report on Carcinogens", Background Guidance

NTP Listing Criteria ⁴:

The criteria for listing an agent, substance, mixture, or exposure circumstance in the Report on Carcinogens (RoC) are as follows:

Known To Be A Human Carcinogen: There is sufficient evidence of carcinogenicity from studies in humans ⁵ that indicates a causal

relationship between exposure to the agent, substance, or mixture, and human cancer.

Reasonably Anticipated To Be A Human Carcinogen: There is limited evidence of carcinogenicity from studies in humans that indicates that a causal interpretation is credible, but that alternative explanations, such as chance, bias, or confounding factors, could not adequately be excluded,

or

there is sufficient evidence of carcinogenicity from studies in experimental animals that indicates there is an increased incidence of malignant and/or a combination of malignant and benign tumors in multiple species or at multiple tissue sites, or by multiple routes of exposure, or to an unusual degree with regard to incidence, site, or type of tumor, or age at onset,

or

there is less than sufficient evidence of carcinogenicity in humans or laboratory animals; however, the agent, substance, or mixture belongs to a well-defined, structurally-related class of substances whose members are listed in a previous Report on Carcinogens as either known to be a human carcinogen or reasonably anticipated to be a human carcinogen, or there is convincing relevant information that the agent acts

through mechanisms indicating it would likely cause cancer in humans.

Conclusions regarding carcinogenicity in humans or experimental animals are based on scientific judgment, with consideration given to all relevant information. Relevant information includes, but is not limited to, dose response, route of exposure, chemical structure, metabolism, pharmacokinetics, sensitive sub-populations, genetic effects, or other data relating to mechanism of action or factors that may be unique to a given substance. For example, there may be substances for which there is evidence of carcinogenicity in laboratory animals, but there are compelling data indicating that the agent acts through mechanisms that do not operate in humans and would therefore not reasonably be anticipated to cause cancer in humans.

Part D: Table Relating Approximate Equivalences Among IARC, NTP RoC, and GHS Carcinogenicity Classifications

The following table may be used to perform hazard classifications for carcinogenicity under the HCS (§ 1910.1200). It relates the approximated GHS hazard categories for carcinogenicity to the classifications provided by IARC and NTP, as described in Parts B and C of this Appendix.

APPROXIMATE EQUIVALENCES AMONG CARCINOGEN CLASSIFICATION SCHEMES

IARC	GHS	NTP RoC
Group 1	Category 1A	Known.
Group 2A	Category 1B	Reasonably Anticipated.
Group 2B	Category 2	(See Note 1).

Note 1:

1. Limited evidence of carcinogenicity from studies in humans (corresponding to IARC 2A/GHS 1B);
2. Sufficient evidence of carcinogenicity from studies in experimental animals (again, essentially corresponding to IARC 2A/GHS 1B);
3. Less than sufficient evidence of carcinogenicity in humans or laboratory animals; however:
 - a. The agent, substance, or mixture belongs to a well-defined, structurally-related class of substances whose members are listed in a previous RoC as either "Known" or "Reasonably Anticipated" to be a human carcinogen, or
 - d. There is convincing relevant information that the agent acts through mechanisms indicating it would likely cause cancer in humans.

***References**

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- * * * * *
- 33. Amend § 1910.1450 as follows:
- A. Remove the definitions of *Combustible liquid*, *Compressed gas*, *Explosive*, *Flammable*, *Flashpoint*, *Organic peroxide*, *Oxidizer*, *Unstable (reactive)*, and *Water-reactive* from paragraph (b);
- B. Revise the definitions of *Hazardous chemical*, *Physical hazard*, and *Reproductive toxins* in paragraph (b);
- C. Add definitions of *Health hazard* and *Mutagen* in alphabetical order in paragraph (b);

⁴ See: <http://ntp.niehs.nih.gov/go/15209>.

⁵ This evidence can include traditional cancer epidemiology studies, data from clinical studies, and/or data derived from the study of tissues or

cells from humans exposed to the substance in question that can be useful for evaluating whether a relevant cancer mechanism is operating in people.

■ D. In paragraphs (f)(3)(v), (h)(1) introductory text, (h)(1)(ii) and (h)(2)(iii), remove the phrases “Material Safety Data Sheets” and “material safety data sheets” and add in their place “safety data sheets”;

■ E. In Appendix A to § 1910.1450, in the Table of Contents (item “G”) remove “Material Safety Data Sheets” and add in its place “Safety Data Sheets”;

■ F. In Appendix A to § 1910.1450, revise the heading “G. Material Safety Data Sheets” and revise the text following the heading.

The revisions read as follows:

§ 1910.1450 Occupational exposure to hazardous chemicals in laboratories.

* * * * *

(b) * * *

Hazardous chemical means any chemical which is classified as health hazard or simple asphyxiant in accordance with the Hazard Communication Standard (§ 1910.1200).

Health hazard means a chemical that is classified as posing one of the following hazardous effects: Acute toxicity (any route of exposure); skin corrosion or irritation; serious eye damage or eye irritation; respiratory or skin sensitization; germ cell mutagenicity; carcinogenicity; reproductive toxicity; specific target organ toxicity (single or repeated exposure); aspiration hazard. The criteria for determining whether a chemical is classified as a health hazard are detailed in Appendix A of the Hazard Communication Standard (§ 1910.1200) and § 1910.1200(c) (definition of “simple asphyxiant”).

* * * * *

Mutagen means chemicals that cause permanent changes in the amount or structure of the genetic material in a cell. Chemicals classified as mutagens in accordance with the Hazard Communication Standard (§ 1910.1200) shall be considered mutagens for purposes of this section.

* * * * *

Physical hazard means a chemical that is classified as posing one of the following hazardous effects: Explosive; flammable (gases, aerosols, liquids, or solids); oxidizer (liquid, solid, or gas); self reactive; pyrophoric (gas, liquid or solid); self-heating; organic peroxide; corrosive to metal; gas under pressure; in contact with water emits flammable gas; or combustible dust. The criteria for determining whether a chemical is classified as a physical hazard are in Appendix B of the Hazard Communication Standard (§ 1910.1200) and § 1910.1200(c) (definitions of

“combustible dust” and “pyrophoric gas”).

* * * * *

Reproductive toxins mean chemicals that affect the reproductive capabilities including adverse effects on sexual function and fertility in adult males and females, as well as adverse effects on the development of the offspring. Chemicals classified as reproductive toxins in accordance with the Hazard Communication Standard (§ 1910.1200) shall be considered reproductive toxins for purposes of this section.

* * * * *

Appendix A to § 1910.1450—National Research Council Recommendations Concerning Chemical Hygiene in Laboratories (Non-Mandatory)

* * * * *

G. Safety Data Sheets

Safety data sheets are presented in “Prudent Practices” for the chemicals listed below. (Asterisks denote that comprehensive safety data sheets are provided).

* * * * *

PART 1915—OCCUPATIONAL SAFETY AND HEALTH STANDARDS FOR SHIPYARD EMPLOYMENT

■ 34. Revise the authority citation for part 1915 to read as follows:

Authority: Section 41, Longshore and Harbor Workers' Compensation Act (33 U.S.C. 941); Sections. 4, 6, and 8 of the Occupational Safety and Health Act of 1970 (29 U.S.C. 653, 655, 657); Secretary of Labor's Order No. 12–71 (36 FR 8754), 8–76 (41 FR 25059), 9–83 (48 FR 35736), 1–90 (55 FR 9033), 6–96 (62 FR 111), 3–2000 (65 FR 50017), 5–2002 (67 FR 65008), 5–2007 (72 FR 31160), 4–2010 (75 FR 55355), or 1–2012 (77 FR 3912), as applicable; 29 CFR Part 1911.

Section 1915.100 also issued under 49 U.S.C. 1801–1819 and 5 U.S.C. 553.

Sections 1915.120 and 1915.152 of 29 CFR also issued under 29 CFR part 1911.

Subpart Z—[Amended]

■ 35. Revise § 1915.1001 paragraphs (i)(3), (k)(7), and (k)(8) to read as follows:

§ 1915.1001 Asbestos.

* * * * *

(i) * * *

(3) The employer shall ensure that contaminated clothing is transported in sealed impermeable bags, or other closed, impermeable containers, and labeled in accordance with paragraph (k) of this section.

* * * * *

(k) * * *

(7) *Hazard communication.* (i) Labels shall be affixed to all products

containing asbestos and to all containers containing such products, including waste containers. Where feasible, installed asbestos products shall contain a visible label.

(ii) *General.* The employer shall include asbestos in the program established to comply with the Hazard Communication Standard (HCS) (§ 1910.1200). The employer shall ensure that each employee has access to labels on containers of asbestos and safety data sheets, and is trained in accordance with the provisions of the HCS and paragraph (k)(9) of this section. The employer shall ensure that at least the following hazards are addressed: Cancer and lung effects.

(iii) *Labels.* (A) The employer shall ensure that labels of bags or containers of protective clothing and equipment, scrap, waste, and debris containing asbestos fibers bear the following information:

DANGER
CONTAINS ASBESTOS FIBERS
MAY CAUSE CANCER
CAUSES DAMAGE TO LUNGS
DO NOT BREATHE DUST
AVOID CREATING DUST

(B)(1) Prior to June 1, 2015, employers may include the following information on raw materials, mixtures or labels of bags or containers of protective clothing and equipment, scrap, waste, and debris containing asbestos fibers in lieu of the labeling requirements in paragraphs (k)(7)(ii) and (k)(7)(iii)(A) of this section:

DANGER
CONTAINS ASBESTOS FIBERS
AVOID CREATING DUST
CANCER AND LUNG DISEASE HAZARD

(2) Labels shall also contain a warning statement against breathing asbestos fibers.

(iv) The provisions for labels required in paragraph (k)(7) of this section do not apply where:

(A) Asbestos fibers have been modified by a bonding agent, coating, binder, or other material, provided that the manufacturer can demonstrate that, during any reasonably foreseeable use, handling, storage, disposal, processing, or transportation, no airborne concentrations of asbestos fibers in excess of the permissible exposure limit and/or excursion limit will be released, or

(B) Asbestos is present in a product in concentrations less than 1.0 percent.

(8) *Signs.* (i) Warning signs that demarcate the regulated area shall be provided and displayed at each location where a regulated area is required to be established by paragraph (e) of this section. Signs shall be posted at such a distance from such a location that an

employee may read the signs and take necessary protective steps before entering the area marked by the signs.

(ii) The warning signs required by this paragraph (k)(8) shall bear the following legend:

DANGER
ASBESTOS
MAY CAUSE CANCER
CAUSES DAMAGE TO LUNGS
AUTHORIZED PERSONNEL ONLY

(iii) In addition, where the use of respirators and protective clothing is required in the regulated area under this section, the warning signs shall include the following:

WEAR RESPIRATORY PROTECTION
AND PROTECTIVE CLOTHING IN THIS
AREA

(iv) The employer shall ensure that employees working in and contiguous to regulated areas comprehend the warning signs required to be posted by paragraph (k)(8) of this section. Means to ensure employee comprehension may include the use of foreign languages, pictographs, and graphics.

(v) When a building/vessel owner or employer identifies previously installed PACM and/or ACM, labels or signs shall be affixed or posted so that employees will be notified of what materials contain PACM and/or ACM. The employer shall attach such labels in areas where they will clearly be noticed by employees who are likely to be exposed, such as at the entrance to mechanical room/areas. Signs required by paragraph (k)(6) of this section may be posted in lieu of labels, so long as they contain information required for labeling. The employer shall ensure, to the extent feasible, that employees who come in contact with these signs or labels can comprehend them. Means to ensure employee comprehension may include the use of foreign languages, pictographs, graphics, and awareness training.

(vi) Prior to June 1, 2016, employers may use the following legend in lieu of that specified in paragraph (k)(8)(ii) of this section:

DANGER
ASBESTOS
CANCER AND LUNG DISEASE HAZARD
AUTHORIZED PERSONNEL ONLY

(vii) Prior to June 1, 2016, employers may use the following legend in lieu of that specified in paragraph (k)(8)(iii) of this section:

RESPIRATORS AND PROTECTIVE
CLOTHING ARE REQUIRED IN THIS
AREA

* * * * *

■ 36. Revise § 1915.1026 paragraphs (g)(2)(iv) and (j)(1), to read as follows;

§ 1915.1026 Chromium (VI).

* * * * *

(g) * * *

(2) * * *

(iv) The employer shall ensure that bags or containers of contaminated protective clothing or equipment that are removed from change rooms for laundering, cleaning, maintenance, or disposal are labeled in accordance with the requirements of the Hazard Communication Standard, § 1910.1200.

* * * * *

(j) * * *

(1) *Hazard communication.* The employer shall include chromium (VI) in the program established to comply with the Hazard Communication Standard (HCS) (§ 1910.1200). The employer shall ensure that each employee has access to labels on containers of chromium (VI) and safety data sheets, and is trained in accordance with the provisions of HCS and paragraph (j)(2) of this section. The employer shall ensure that at least the following hazards are addressed: Cancer; skin sensitization; and eye irritation.

* * * * *

PART 1926—SAFETY AND HEALTH REGULATIONS FOR CONSTRUCTION

Subpart D—[Amended]

■ 38. Revise § 1926.60 paragraphs (l)(1) and (l)(2) to read as follows:

§ 1926.60 Methylenedianiline.

* * * * *

(l) * * *

(1) *Hazard communication.* The employer shall include

Methylenedianiline (MDA) in the program established to comply with the Hazard Communication Standard (HCS) (§ 1910.1200). The employer shall ensure that each employee has access to labels on containers of MDA and safety data sheets, and is trained in accordance with the provisions of HCS and paragraph (l)(3) of this section. The employer shall ensure that at least the following hazards are addressed: Cancer; liver effects; and skin sensitization.

(2) *Signs and labels.* (i) *Signs.* (A) The employer shall post and maintain legible signs demarcating regulated areas and entrances or access-ways to regulated areas that bear the following legend:

DANGER
MDA
MAY CAUSE CANCER
CAUSES DAMAGE TO THE LIVER
RESPIRATORY PROTECTION AND
PROTECTIVE CLOTHING MAY BE
REQUIRED IN THIS AREA
AUTHORIZED PERSONNEL ONLY

(B) Prior to June 1, 2016, employers may use the following legend in lieu of that specified in paragraph (l)(2)(i)(A) of this section:

DANGER
MDA
MAY CAUSE CANCER
LIVER TOXIN
AUTHORIZED PERSONNEL ONLY
RESPIRATORS AND PROTECTIVE
CLOTHING MAY BE REQUIRED TO BE
WORN IN THIS AREA

(ii) *Labels.* (A) The employer shall ensure that labels or other appropriate forms of warning are provided for containers of MDA within the workplace. The labels shall comply with the requirements of § 1910.1200(f) and shall include at least the following information for pure MDA and mixtures containing MDA:

DANGER
CONTAINS MDA
MAY CAUSE CANCER
CAUSES DAMAGE TO THE LIVER

(B) Prior to June 1, 2015, employers may include the following information workplace labels in lieu of the labeling requirements in paragraph (l)(2)(ii)(A) of this section:

(1) For Pure MDA:

DANGER
CONTAINS MDA
MAY CAUSE CANCER
LIVER TOXIN

(2) For mixtures containing MDA:

DANGER
CONTAINS MDA
CONTAINS MATERIALS WHICH MAY
CAUSE CANCER

LIVER TOXIN

* * * *

■ 39. Amend § 1926.62 by revising paragraph (g)(2)(vii), the heading of paragraph (l), paragraph (l)(1)(i), and paragraph (m), and Appendix B to § 1926.62 section XI, to read as follows:

§ 1926.62 Lead.

* * * *

(g) * * *

(2) * * *

(vii)(A) The employer shall ensure that the containers of contaminated protective clothing and equipment required by paragraph (g)(2)(v) of this section are labeled as follows:

DANGER: CLOTHING AND EQUIPMENT CONTAMINATED WITH LEAD. MAY DAMAGE FERTILITY OR THE UNBORN CHILD. CAUSES DAMAGE TO THE CENTRAL NERVOUS SYSTEM. DO NOT EAT, DRINK OR SMOKE WHEN HANDLING. DO NOT REMOVE DUST BY BLOWING OR SHAKING. DISPOSE OF LEAD CONTAMINATED WASH WATER IN ACCORDANCE WITH APPLICABLE LOCAL, STATE, OR FEDERAL REGULATIONS.

(B) Prior to June 1, 2015, employers may include the following information on bags or containers of contaminated protective clothing and equipment required by paragraph (g)(2)(v) in lieu of the labeling requirements in paragraph (g)(2)(vii)(A) of this section:

Caution: Clothing contaminated with lead. Do not remove dust by blowing or shaking. Dispose of lead contaminated wash water in accordance with applicable local, state, or federal regulations.

* * * *

(l) *Communication of hazards.*

(1) * * *

(i) *Hazard communication.* The employer shall include lead in the program established to comply with the Hazard Communication Standard (HCS) (§ 1910.1200). The employer shall ensure that each employee has access to labels on containers of lead and safety data sheets, and is trained in accordance with the provisions of HCS and paragraph (l) of this section. The employer shall ensure that at least the following hazards are addressed:

- (A) Reproductive/developmental toxicity;
- (B) Central nervous system effects;
- (C) Kidney effects;
- (D) Blood effects; and
- (E) Acute toxicity effects.

* * * *

(m) *Signs.*

(1) *General.*

(i) The employer shall post the following warning signs in each work area where an employee's exposure to lead is above the PEL.

DANGER

LEAD WORK AREA

MAY DAMAGE FERTILITY OR THE

UNBORN CHILD

CAUSES DAMAGE TO THE CENTRAL

NERVOUS SYSTEM

DO NOT EAT, DRINK OR SMOKE IN THIS AREA

(ii) The employer shall ensure that no statement appears on or near any sign required by this paragraph (m) that contradicts or detracts from the meaning of the required sign.

(iii) The employer shall ensure that signs required by this paragraph (m) are illuminated and cleaned as necessary so that the legend is readily visible.

(iv) The employer may use signs required by other statutes, regulations or ordinances in addition to, or in combination with, signs required by this paragraph (m).

(v) Prior to June 1, 2016, employers may use the following legend in lieu of that specified in paragraph (m)(1)(i) of this section:

WARNING

LEAD WORK AREA

POISON

NO SMOKING OR EATING

* * * *

Appendix B to § 1926.62—Employee Standard Summary

* * * *

XI. Signs—Paragraph (M)

The standard requires that the following warning sign be posted in work areas when the exposure to lead is above the PEL:

DANGER

LEAD WORK AREA

MAY DAMAGE FERTILITY OR THE

UNBORN CHILD

CAUSES DAMAGE TO THE CENTRAL

NERVOUS SYSTEM

DO NOT EAT, DRINK OR SMOKE IN THIS AREA

Prior to June 1, 2016, employers may use the following legend in lieu of that specified above:

WARNING

LEAD WORK AREA

POISON

NO SMOKING OR EATING

* * * *

■ 40. Revise § 1926.64 paragraphs (a)(1)(ii) introductory text, (a)(1)(ii)(B), and (d)(1)(vii), and the note following paragraph (d)(1)(vii), to read as follows:

§ 1926.64 Process safety management of highly hazardous chemicals.

* * * *

(a) * * *

(1) * * *

(ii) A process which involves a Category 1 flammable gas (as defined in § 1910.1200(c)) or flammable liquid with a flashpoint below 100 °F (37.8 °C)

on site in one location, in a quantity of 10,000 pounds (4535.9 kg) or more except for:

* * * *

(B) Flammable liquids with a flashpoint below 100 °F (37.8 °C) stored in atmospheric tanks or transferred that are kept below their normal boiling point without benefit of chilling or refrigeration.

* * * *

(d) * * *

(1) * * *

(vii) Hazardous effects of inadvertent mixing of different materials that could foreseeably occur.

Note to paragraph (d)(1): Safety data sheets meeting the requirements of § 1910.1200(g) may be used to comply with this requirement to the extent they contain the information required by this paragraph (d)(1).

* * * *

■ 41. Amend § 1926.65 paragraph (a)(3) by revising the definition of "Health hazard" to read as follows:

§ 1926.65 Hazardous waste operations and emergency response.

(a) * * *

(3) * * *

Health hazard means a chemical or a pathogen where acute or chronic health effects may occur in exposed employees. It also includes stress due to temperature extremes. The term *health hazard* includes chemicals that are classified in accordance with the Hazard Communication Standard, § 1910.1200, as posing one of the following hazardous effects: acute toxicity (any route of exposure); skin corrosion or irritation; serious eye damage or eye irritation; respiratory or skin sensitization; germ cell mutagenicity; carcinogenicity; reproductive toxicity; specific target organ toxicity (single or repeated exposure); aspiration toxicity or simple asphyxiant. (See Appendix A to § 1910.1200—Health Hazard Criteria (Mandatory) for the criteria for determining whether a chemical is classified as a health hazard.)

* * * *

Subpart F—[Amended]

■ 43. Amend § 1926.152 as follows:

■ A. Revise the section heading;

■ B. Remove the words “and combustible” from the first sentence in paragraph (a)(1), the heading of paragraph (b), and paragraphs (b)(2) introductory text, (b)(4)(viii), (h) introductory text, and (h)(1);

■ C. Remove the words “or combustible” wherever it appears in paragraphs (a)(2), (b)(1), (b)(4)(iii), (b)(5), and (c)(3);

■ D. Remove the words “or combustible” in paragraphs (d) (the heading), (d)(1), (d)(4), (e)(1), (e)(3), (f)(2), (g)(1), and (g)(8);

■ E. Remove the words “or combustible” wherever it appears in paragraphs (i)(1)(i)(D) and (F), (i)(1)(iii)(D), (i)(2)(ii)(A), (D), and (F), (i)(2)(vii)(B)(2), (i)(4)(iv)(C), (i)(5)(vi)(A), (D), (G), (V) introductory text, and (i)(5)(vi)(V)(1); (j)(1)(i), (j)(2)(ii), (j)(5), and (k)(4);

■ F. Amend the fifth sentence of paragraph (b)(4)(vi) by adding the words “Category 1, 2, or 3” before the words “flammable liquids”;

■ G. Amend paragraphs (e)(2), (e)(5), (g)(7)(i), and (g)(7)(ii), by adding the words “Category 1, 2, or 3” before the words “flammable liquids”;

■ H. Amend paragraphs (f)(1) and (f)(3) by removing the words “Flammable liquids” and adding in their place the words “Category 1, 2, or 3 flammable liquids”;

■ I. Revise paragraphs (b)(2)(iii), (b)(3), (h) introductory text, (i)(2)(iv)(F) and (G), (i)(2)(vi)(B), (i)(2)(viii)(E), (i)(3)(i), (i)(3)(iv)(A) and (C), (i)(3)(v)(D), and (i)(4)(iv)(E);

■ J. Revise Table F–19 and paragraph (k)(3)(iv).

The revisions read as follows:

§ 1926.152 Flammable liquids.

* * * * *

(b) * * *

(2) * * *

(iii) Cabinets shall be labeled in conspicuous lettering, “Flammable—Keep Away from Open Flames.”

(3) Not more than 60 gallons of Category 1, 2 and/or 3 flammable liquids or 120 gallons of Category 4 flammable liquids shall be stored in any one storage cabinet. Not more than three such cabinets may be located in a single storage area. Quantities in excess of this shall be stored in an inside storage room.

* * * * *

(h) *Scope.* This section applies to the handling, storage, and use of flammable

liquids with a flashpoint at or below 199.4 °F (93 °C). This section does not apply to:

* * * * *

(i) * * *

(2) * * *

(iv) * * *

(F) Tanks and pressure vessels storing Category 1 flammable liquids shall be equipped with venting devices that shall be normally closed except when venting to pressure or vacuum conditions. Tanks and pressure vessels storing Category 2 flammable liquids, or Category 3 flammable liquids with a flashpoint below 100 °F (37.8 °C), shall be equipped with venting devices that shall be normally closed except when venting under pressure or vacuum conditions, or with approved flame arresters.

Exemption: Tanks of 3,000 bbls (barrels) (84 m(3)) capacity or less containing crude petroleum in crude-producing areas; and, outside aboveground atmospheric tanks under 1,000 gallons (3,785 L) capacity containing other than Category 1 flammable liquids may have open vents. (See paragraph (i)(2)(vi)(B) of this section.)

(G) Flame arresters or venting devices required in paragraph (i)(2)(iv)(F) of this section may be omitted for Category 2 flammable liquids or Category 3 flammable liquids with a flashpoint below 100 °F (37.8 °C) where conditions are such that their use may, in case of obstruction, result in tank damage.

* * * * *

(vi) * * *

(B) Where vent pipe outlets for tanks storing Category 1 or 2 flammable liquids, or Category 3 flammable liquids with a flashpoint below 100 °F (37.8 °C), are adjacent to buildings or public ways, they shall be located so that the vapors are released at a safe point outside of buildings and not less than 12 feet (3.658 m) above the adjacent ground level. In order to aid their dispersion, vapors shall be discharged upward or horizontally away from closely adjacent walls. Vent outlets shall be located so that flammable vapors will not be trapped by eaves or other obstructions and shall be at least 5 feet (1.52 m) from building openings.

(viii) * * *

(E) For Category 2 flammable liquids or Category 3 flammable liquids with a flashpoint below 100 °F (37.8 °C), other than crude oils, gasolines, and asphalts, the fill pipe shall be so designed and installed as to minimize the possibility of generating static electricity. A fill pipe entering the top of a tank shall terminate within 6 inches (15.24 cm) of

the bottom of the tank and shall be installed to avoid excessive vibration.

* * * * *

(3) * * *

(i) *Location.* Evacuation for underground storage tanks shall be made with due care to avoid undermining of foundations of existing structures. Underground tanks or tanks under buildings shall be so located with respect to existing building foundations and supports that the loads carried by the latter cannot be transmitted to the tank. The distance from any part of a tank storing Category 1 or 2 flammable liquids, or Category 3 flammable liquids with a flashpoint below 100 °F (37.8 °C), to the nearest wall of any basement or pit shall be not less than 1 foot (0.304 m), and to any property line that may be built upon, not less than 3 feet (0.912 m). The distance from any part of a tank storing Category 3 flammable liquids with a flashpoint at or above 100 °F (37.8 °C) or Category 4 flammable liquids to the nearest wall of any basement, pit or property line shall be not less than 1 foot (0.304 m).

* * * * *

(iv) * * *

(A) Location and arrangement of vents for Category 1 or 2 flammable liquids, or Category 3 flammable liquids with a flashpoint below 100 °F (37.8 °C). Vent pipes from tanks storing Category 1 or 2 flammable liquids, or Category 3 flammable liquids with a flashpoint below 100 °F (37.8 °C), shall be so located that the discharge point is outside of buildings, higher than the fill pipe opening, and not less than 12 feet (3.658 m) above the adjacent ground level. Vent pipes shall discharge only upward in order to disperse vapors. Vent pipes 2 inches (5.08 cm) or less in nominal inside diameter shall not be obstructed by devices that will cause excessive back pressure. Vent pipe outlets shall be so located that flammable vapors will not enter building openings, or be trapped under eaves or other obstructions. If the vent pipe is less than 10 feet (3.04 m) in length, or greater than 2 inches (5.08 cm) in nominal inside diameter, the outlet shall be provided with a vacuum and pressure relief device or there shall be an approved flame arrester located in the vent line at the outlet or within the approved distance from the outlet.

* * * * *

(C) Location and arrangement of vents for Category 3 flammable liquids with a flashpoint at or above 100 °F (37.8 °C) or Category 4 flammable liquids. Vent pipes from tanks storing Category 3 flammable liquids with a flashpoint at or above 100 °F (37.8 °C) or Category 4

flammable liquids shall terminate outside of the building and higher than the fill pipe opening. Vent outlets shall be above normal snow level. They may be fitted with return bends, coarse screens or other devices to minimize ingress of foreign material.

* * * * *

(v) * * *

(D) For Category 2 flammable liquids, or Category 3 flammable liquids with a flashpoint below 100 °F (37.8 °C), other

than crude oils, gasolines, and asphalts, the fill pipe shall be so designed and installed as to minimize the possibility of generating static electricity by terminating within 6 inches (15.24 cm) of the bottom of the tank.

* * * * *

(4) * * *

(iv) * * *

(E) For Category 2 flammable liquids, or Category 3 flammable liquids with a flashpoint below 100 °F (37.8 °C), other

than crude oils, gasolines, and asphalts, the fill pipe shall be ~~so~~ designed and installed as to minimize the possibility of generating static electricity by terminating within 6 inches (15.24 cm) of the bottom of the tank.

* * * * *

(k) * * *

(3) * * *

* * * * *

BILLING CODE 4510-26-P

TABLE F-19 - ELECTRICAL EQUIPMENT HAZARDOUS AREAS - SERVICE STATIONS

Location	Class I Group D division	Extent of classified area
Underground tank:		
Fill opening	1	Any pit, box or space below grade level, any part of which is within the Division 1 or 2 classified area.
	2	Up to 18 inches (45.72 cm) above grade level within a horizontal radius of 10 feet (3.04 m) from a loose fill connection and within a horizontal radius of 5 feet (1.52 m) from a tight fill connection.
Vent - Discharging upward...	1	Within 3 feet (0.912 m) of open end of vent, extending in all directions.
	2	Area between 3 feet (0.912 m) and 5 feet (1.52 m) of open end of vent, extending in all directions.
Dispenser:		
Pits.....	1	Any pit, box or space below grade level, any part of which is within the Division 1 or 2 classified area.
Dispenser enclosure.....	1	The area 4 feet (1.216 m) vertically above base within the enclosure and 18 inches (45.72 cm) horizontally in all directions.
Outdoor.....	2	Up to 18 inches (45.72 cm) above grade level within 20 feet (6.08 m) horizontally of any edge of enclosure.
Indoor:		
With mechanical ventilation.	2	Up to 18 inches (45.72 cm) above grade level within 20 feet (6.08 m) horizontally of any edge of enclosure.
With gravity ventilation....	2	Up to 18 inches (45.72 cm) above grade or floor level within 25 feet (7.6 m) horizontally of any edge of enclosure.
Remote pump - Outdoor.....	1	Any pit, box or space below grade level if any part is within a horizontal distance of 10 feet (3.04 m) from any edge of pump.
	2	Within 3 feet (0.912 m) of any edge of pump, extending

Remote pump - Indoor.....	1	in all directions. Also up to 18 inches (45.72 cm) above grade level within 10 feet (3.04 m) horizontally from any edge of pump.
	2	Entire area within any pit. Within 5 feet (1.52 m) of any edge of pump, extending in all directions. Also up to 3 feet (3.04 m) above floor or grade level within 25 feet (6.08 m) horizontally from any edge of pump.
Lubrication or service room.	1	Entire area within any pit.
	2	Area up to 18 inches (45.72 cm) above floor or grade level within entire lubrication room.
Dispenser for Category 1 or 2 flammable liquids, or Category 3 flammable liquids with a flashpoint below 100 ° F (37.8 ° C)	2	Within 3 feet (0.912 m) of any fill or dispensing point, extending in all directions.
Special enclosure inside building per 1910.106(f)(1)(ii).	1	Entire enclosure.
Sales, storage and rest rooms.....	(1)	If there is any opening to these rooms within the extent of a Division 1 area, the entire room shall be classified as Division 1.

(1) Ordinary.

* * * * *

BILLING CODE 4510-26-C

(iv) Piping handling Category 1 or 2 flammable liquids, or Category 3 flammable liquids with a flashpoint below 100 ° F (37.8 ° C), shall be grounded to control stray currents.

* * * * *

■ 44. Amend § 1926.155 as follows:

- A. Remove and reserve paragraph (c);
- B. Revise paragraphs (h) and (i)(1) and (2).

The revisions read as follows:

§ 1926.155 Definitions applicable to this subpart.

* * * * *

(h) *Flammable liquid* means any liquid having a vapor pressure not exceeding 40 pounds per square inch (absolute) at 100 ° F (37.8 ° C) and having a flashpoint at or below 199.4 ° F (93 ° C). Flammable liquids are divided into four categories as follows:

(1) Category 1 shall include liquids having flashpoints below 73.4 ° F (23 ° C)

and having a boiling point at or below 95 ° F (35 ° C).

(2) Category 2 shall include liquids having flashpoints below 73.4 ° F (23 ° C) and having a boiling point above 95 ° F (35 ° C).

(3) Category 3 shall include liquids having flashpoints at or above 73.4 ° F (23 ° C) and at or below 140 ° F (60 ° C).

(4) Category 4 shall include liquids having flashpoints above 140 ° F (60 ° C) and at or below 199.4 ° F (93 ° C).

(i) * * *

(1) The flashpoint of liquids having a viscosity less than 45 Saybolt Universal Second(s) at 100 ° F (37.8 ° C) and a flashpoint below 175 ° F (79.4 ° C) shall be determined in accordance with the Standard Method of Test for Flash Point by the Tag Closed Tester, ASTM D-56-69 (incorporated by reference; See § 1926.6), or an equivalent method as defined by § 1910.1200 appendix B.

(2) The flashpoints of liquids having a viscosity of 45 Saybolt Universal

Second(s) or more at 175 ° F (79.4 ° C) or higher shall be determined in accordance with the Standard Method of Test for Flash Point by the Pensky Martens Closed Tester, ASTM D-93-69 (incorporated by reference; See § 1926.6), or an equivalent method as defined by § 1910.1200 appendix B.

* * * * *

Subpart Z—[Amended]

■ 45. Revise the authority citation for subpart Z to read as follows:

Authority: Section 107 of the Contract Work Hours and Safety Standards Act (40 U.S.C. 3704); Sections 4, 6, and 8 of the Occupational Safety and Health Act of 1970 (29 U.S.C. 653, 655, 657); and Secretary of Labor's Order No. 12-71 (36 FR 8754), 8-76 (41 FR 25059), 9-83 (48 FR 35736), 1-90 (55 FR 9033), 6-96 (62 FR 111), 3-2000 (65 FR 50017), 5-2002 (67 FR 65008), 5-2007 (72 FR 31159), 4-2010 (75 FR 55355), or 1-2012 (77 FR 3912) as applicable; and 29 CFR part 1911.

Section 1926.1102 not issued under 29 U.S.C. 655 or 29 CFR part 1911; also issued under 5 U.S.C. 553.

■ 46. Amend § 1926.1101 as follows:

■ A. Redesignate paragraph (k)(1) as (k)(1)(i) and add a new heading to paragraph (k)(1);

■ B. Add new paragraphs (k)(1)(ii), (k)(7)(ii)(C), (k)(7)(ii)(D), and (k)(8)(iv);

■ C. Amend paragraphs (k)(2)(i) and (k)(3)(i) by removing the references to "(k)(1)" and adding in their place "(k)(1)(i)";

■ D. Revise paragraphs (k)(7)(ii)(A) and (B), and (k)(8)(ii) and (iii);

The revisions read as follows:

§ 1926.1101 Asbestos.

* * * * *

(k) * * *

(1) *Hazard communication.*

* * * * *

(ii) The employer shall include asbestos in the program established to comply with the Hazard Communication Standard (HCS) (§ 1910.1200). The employer shall ensure that each employee has access to labels on containers of asbestos and safety data sheets, and is trained in accordance with the provisions of HCS and paragraphs (k)(9) and (10) of this section. The employer shall provide information on at least the following hazards: Cancer and lung effects.

* * * * *

(7) * * *

(ii) * * *

(A) The warning signs required by paragraph (k)(7) of this section shall bear the following information.

DANGER
ASBESTOS
MAY CAUSE CANCER
CAUSES DAMAGE TO LUNGS
AUTHORIZED PERSONNEL ONLY

(B) In addition, where the use of respirators and protective clothing is required in the regulated area under this section, the warning signs shall include the following:

WEAR RESPIRATORY PROTECTION AND
PROTECTIVE CLOTHING IN THIS AREA

(C) Prior to June 1, 2016, employers may use the following legend in lieu of that specified in paragraph (k)(7)(ii)(A) of this section:

DANGER
ASBESTOS
CANCER AND LUNG DISEASE HAZARD
AUTHORIZED PERSONNEL ONLY

(D) Prior to June 1, 2016, employers may use the following legend in lieu of that specified in paragraph (k)(7)(ii)(B) of this section:

RESPIRATORS AND PROTECTIVE
CLOTHING ARE REQUIRED IN THIS AREA

* * * * *

(8) * * *

(ii) The employer shall ensure that such labels comply with paragraphs (k) of this section.

(iii) The employer shall ensure that labels of bags or containers of protective clothing and equipment, scrap, waste, and debris containing asbestos fibers bear the following information:

DANGER
CONTAINS ASBESTOS FIBERS
MAY CAUSE CANCER
CAUSES DAMAGE TO LUNGS
DO NOT BREATHE DUST
AVOID CREATING DUST

(iv) (A) Prior to June 1, 2015, employers may include the following information on raw materials, mixtures or labels of bags or containers of protective clothing and equipment, scrap, waste, and debris containing asbestos fibers in lieu of the labeling requirements in paragraphs (k)(8)(ii) and (k)(8)(iii) of this section:

DANGER
CONTAINS ASBESTOS FIBERS
AVOID CREATING DUST
CANCER AND LUNG DISEASE HAZARD

(B) Labels shall also contain a warning statement against breathing asbestos fibers.

* * * * *

■ 47. Revise § 1926.1126 paragraphs (g)(2)(iv) and (j)(1) to read as follows:

§ 1926.1126 Chromium (VI).

* * * * *

(g) * * *

(2) * * *

(iv) The employer shall ensure that bags or containers of contaminated protective clothing or equipment that are removed from change rooms for laundering, cleaning, maintenance, or disposal shall be labeled in accordance with the requirements of the Hazard Communication Standard, § 1910.1200.

* * * * *

(j) * * *

(1) *Hazard communication.* The employer shall include chromium (VI) in the program established to comply with the Hazard Communication Standard (HCS) (§ 1910.1200). The employer shall ensure that each employee has access to labels on containers of chromium and safety data sheets, and is trained in accordance with the provisions of § 1910.1200 and paragraph (j)(2) of this section. The employer shall provide information on at least the following hazards: Cancer; eye irritation; and skin sensitization.

* * * * *

■ 48. Revise § 1926.1127 paragraphs (i)(2)(iv), (k)(7), and (m)(1), (m)(2), and (m)(3), to read as follows:

§ 1926.1127 Cadmium.

* * * * *

(i) * * *

(2) * * *

(iv) The employer shall ensure that containers of contaminated protective clothing and equipment that are to be taken out of the change rooms or the workplace for laundering, cleaning, maintenance or disposal shall bear labels in accordance with paragraph (m)(3)(ii) of this section.

(k) * * *

(7) Waste, scrap, debris, bags, and containers, personal protective equipment and clothing contaminated with cadmium and consigned for disposal shall be collected and disposed of in sealed impermeable bags or other closed, impermeable containers. These bags and containers shall be labeled in accordance with paragraph (m)(3)(ii) of this section.

* * * * *

(m) * * *

(1) *Hazard communication.* The employer shall include cadmium in the program established to comply with the Hazard Communication Standard (HCS) (§ 1910.1200). The employer shall ensure that each employee has access to labels on containers of cadmium and safety data sheets, and is trained in accordance with the provisions of HCS and paragraph (m)(4) of this section. The employer shall provide information on at least the following hazards: Cancer; lung effects; kidney effects; and acute toxicity effects.

(2) *Warning signs.* (i) Warning signs shall be provided and displayed in regulated areas. In addition, warning signs shall be posted at all approaches to regulated areas so that an employee may read the signs and take necessary protective steps before entering the area.

(ii) Warning signs required by paragraph (m)(2)(i) of this section shall bear the following legend:

DANGER
CADMIUM
MAY CAUSE CANCER
CAUSES DAMAGE TO LUNGS AND
KIDNEYS
WEAR RESPIRATORY PROTECTION IN
THIS AREA
AUTHORIZED PERSONNEL ONLY

(iii) The employer shall ensure that signs required by this paragraph (m)(2) are illuminated, cleaned, and maintained as necessary so that the legend is readily visible.

(iv) Prior to June 1, 2016, employers may use the following legend in lieu of

that specified in paragraph (m)(2)(ii) of this section:

DANGER
CADMIUM
CANCER HAZARD
CAN CAUSE LUNG AND KIDNEY DISEASE
AUTHORIZED PERSONNEL ONLY
RESPIRATORS REQUIRED IN THIS AREA

(3) *Warning labels.* (i) Shipping and storage containers containing cadmium or cadmium compounds shall bear appropriate warning labels, as specified in paragraph (m)(1) of this section.

(ii) The warning labels for containers of cadmium-contaminated protective

clothing, equipment, waste, scrap, or debris shall include at least the following information:

DANGER
CONTAINS CADMIUM
MAY CAUSE CANCER
CAUSES DAMAGE TO LUNGS AND KIDNEYS
AVOID CREATING DUST

(iii) Where feasible, installed cadmium products shall have a visible label or other indication that cadmium is present.

(iv) Prior to June 1, 2015, employers may include the following information

on shipping and storage containers containing cadmium, cadmium compounds, or cadmium-contaminated clothing, equipment, waste, scrap, or debris in lieu of the labeling requirements specified in paragraphs (m)(3)(i) and (m)(3)(ii) of this section:

DANGER
CONTAINS CADMIUM
CANCER HAZARD
AVOID CREATING DUST
CAN CAUSE LUNG AND KIDNEY DISEASE

* * * * *

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Side-by-Side Comparison of OSHA's Existing Hazard Communication Standard (HCS 1994) vs. the Revised Hazard Communication Standard (HCS 2012)

This document provides a comparison of the changes from the existing Hazard Communication Standard (the current Hazard Communication Standard, 1910.1200, as published in the Code of Federal Regulations (CFR) on March 11, 1994; herein referred to as HCS 1994) and the final rule revising the Hazard Communication Standard to be consistent with the United Nations Globally Harmonized System of Classification and Labelling of Chemicals (herein referred to as the HCS 2012).

The HCS 1994 is a performance-oriented standard that provides guidance for defining hazards and for performing hazard determinations. However, the current standard does not specify an approach or format to follow. The Globally Harmonized System of Classification and Labelling of Chemicals (GHS) has certain aspects that are performance-oriented, but the key provisions are a *uniformity-oriented* approach for the classification and presentation, through labeling and safety data sheets, of hazard information.

The HCS 2012 is written as a modification to the existing standard, and those parts of the standard that do not relate to the GHS, or are already consistent with it remain unchanged. Additionally, some minor changes to terminology have been made in order to align this rule with language used in the GHS. For example, the term "hazard determination" has been changed to "hazard classification" and "material safety data sheet" has been changed to "safety data sheet."

The following side-by-side comparison shows the changes made to the HCS 1994 as stricken text in the left-hand column. Additions or changes made to the existing HCS (1994) to create the revised HCS (aligning the HCS with the GHS, and effective 2012) are shown as underlined text in the right-hand column.

Purpose.

The Hazard Communication Standard (HCS) 1994 includes a paragraph that describes the purpose of the HCS, and addresses preemption of state and local laws. The Hazard Communication Standard (HCS 2012) includes essentially the same paragraph as the HCS 1994. The primary modification to this paragraph is to state affirmatively that part of the purpose is to harmonize with international requirements. OSHA also clarified the standard's preemptive affect on State laws. Other than terminology, no additional substantive changes have been made in this paragraph of the HCS.

HCS 1994

(a) Purpose.

(a)(1) The purpose of this section is to ensure that the hazards of all chemicals produced or imported are evaluated, and that information concerning their hazards is transmitted to employers and employees. This transmittal of information is to be accomplished by means of comprehensive hazard communication programs, which are to include container labeling and other forms of warning, material safety data sheets and employee training.

(a)(2) This occupational safety and health standard is intended to address comprehensively the issue of evaluating the potential hazards of chemicals, and communicating information concerning hazards and appropriate protective measures to employees, and to preempt any legal requirements of a state, or political subdivision of a state, pertaining to this subject. Evaluating the potential hazards of chemicals, and communicating information concerning hazards and appropriate protective measures to employees, may include, for example, but is not limited to, provisions for: developing and maintaining a written hazard communication program for the workplace, including lists of hazardous chemicals present; labeling of containers of chemicals in the workplace, as well as of containers of chemicals being shipped to other workplaces; preparation and distribution of material safety data sheets to employees and downstream employers; and development and implementation of employee training programs regarding hazards of chemicals and protective measures. Under section 18 of the Act, no state or political subdivision of a state may adopt or enforce, through any court or agency, any requirement relating to the issue addressed by this Federal standard, except pursuant to a Federally-approved state plan.

HCS 2012

(a) Purpose.

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

(a)(2) This occupational safety and health standard is intended to address comprehensively the issue of classifying the potential hazards of chemicals, and communicating information concerning hazards and appropriate protective measures to employees, and to preempt any legislative or regulatory enactments of a state, or political subdivision of a state, pertaining to this subject. Classifying the potential hazards of chemicals and communicating information concerning hazards and appropriate protective measures to employees, may include, for example, but is not limited to, provisions for: developing and maintaining a written hazard communication program for the workplace, including lists of hazardous chemicals present; labeling of containers of chemicals in the workplace, as well as of containers of chemicals being shipped to other workplaces; preparation and distribution of safety data sheets to employees and downstream employers; and development and implementation of employee training programs regarding hazards of chemicals and protective measures. Under section 18 of the Act, no state or political subdivision of a state may adopt or enforce any requirement relating to the issue addressed by this Federal standard, except pursuant to a Federally-approved state plan.

Scope and Application.

In this paragraph, OSHA has removed reference to Appendix E, which previously provided employers with guidance information regarding the determination of their compliance obligations. Rather than include this information in the Appendix, OSHA will provide separate guidance documents to employers. Additionally, this paragraph in the HCS 2012 will continue to address the many practical accommodations OSHA has made regarding application of the HCS to different types of workplaces, as well as deal with the interface of the HCS to other Federal laws that address similar areas. No changes in these rules are necessary to incorporate the GHS; therefore, only terminology changes have been made in this paragraph of the HCS.

HCS 1994

(b) Scope and application.

(b)(1) This section requires chemical manufacturers or importers to assess the hazards of chemicals which they produce or import, and all employers to provide information to their employees about the hazardous chemicals to which they are exposed, by means of a hazard communication program, labels and other forms of warning, material safety data sheets, and information and

HCS 2012

(b) Scope and application.

(b)(1) This section requires chemical manufacturers or importers to classify the hazards of chemicals which they produce or import, and all employers to provide information to their employees about the hazardous chemicals to which they are exposed, by means of a hazard communication program, labels and other forms of warning, safety data sheets, and information and training. In

training. In addition, this section requires distributors to transmit the required information to employers. (Employers who do not produce or import chemicals need only focus on those parts of this rule that deal with establishing a workplace program and communicating information to their workers. **Appendix E of this section is a general guide for such employers to help them determine their compliance obligations under the rule.**)

(b)(2) This section applies to any chemical which is known to be present in the workplace in such a manner that employees may be exposed under normal conditions of use or in a foreseeable emergency.

(b)(3) This section applies to laboratories only as follows:

(b)(3)(i) Employers shall ensure that labels on incoming containers of hazardous chemicals are not removed or defaced;

(b)(3)(ii) Employers shall maintain any ~~material~~ safety data sheets that are received with incoming shipments of hazardous chemicals, and ensure that they are readily accessible during each workshift to laboratory employees when they are in their work areas;

(b)(3)(iii) Employers shall ensure that laboratory employees are provided information and training in accordance with paragraph (h) of this section, except for the location and availability of the written hazard communication program under paragraph (h)(2)(iii) of this section; and,

(b)(3)(iv) Laboratory employers that ship hazardous chemicals are considered to be either a chemical manufacturer or a distributor under this rule, and thus must ensure that any containers of hazardous chemicals leaving the laboratory are labeled in accordance with paragraph (f)(4) of this section, and that a ~~material~~ safety data sheet is provided to distributors and other employers in accordance with paragraphs (g)(6) and (g)(7) of this section.

(b)(4) In work operations where employees only handle chemicals in sealed containers which are not opened under normal conditions of use (such as are found in marine cargo handling, warehousing, or retail sales), this section applies to these operations only as follows:

(b)(4)(i) Employers shall ensure that labels on incoming containers of hazardous chemicals are not removed or defaced;

(b)(4)(ii) Employers shall maintain copies of any ~~material~~ safety data sheets that are received with incoming shipments of the sealed containers of hazardous chemicals, shall obtain a ~~material~~ safety data sheet as soon as possible for sealed containers of hazardous chemicals received without a ~~material~~ safety data sheet if an employee requests the ~~material~~ safety data sheet, and shall ensure that the ~~material~~ safety data sheets are readily accessible during each work shift to employees when they are in their work area(s); and,

(b)(4)(iii) Employers shall ensure that employees are provided with information and training in accordance with paragraph (h) of this section (except for the location and availability of the written hazard communication program under paragraph (h)(2)(iii) of this section), to the extent necessary to protect them in the event of a spill or leak of a hazardous chemical from a sealed container.

(b)(5) This section does not require labeling of the following chemicals:

(b)(5)(i) Any pesticide as such term is defined in the Federal Insecticide, Fungicide, and Rodenticide Act (7 U.S.C. 136 et seq.), when subject to the labeling requirements of that Act and labeling regulations issued under that Act by the Environmental Protection Agency;

(b)(5)(ii) Any chemical substance or mixture as such terms are defined in the Toxic Substances Control Act (15 U.S.C. 2601 et seq.), when subject to the labeling requirements of that Act and labeling regulations issued under that Act by the Environmental Protection Agency;

(b)(5)(iii) Any food, food additive, color additive, drug, cosmetic, or medical or veterinary device or product, including materials intended for use as ingredients in such products (e.g. flavors and fragrances), as such terms are defined in the Federal Food, Drug, and Cosmetic Act (21 U.S.C. 301 et seq.) or the Virus-Serum-Toxin Act of 1913 (21 U.S.C. 151 et seq.), and regulations issued under those Acts, when they are subject to the labeling requirements under those Acts by either the Food and Drug Administration or the Department of Agriculture;

(b)(5)(iv) Any distilled spirits (beverage alcohols), wine, or malt beverage intended for nonindustrial use, as such terms are defined in the Federal Alcohol Administration Act (27 U.S.C. 201 et seq.) and regulations issued under that Act, when subject to the labeling requirements of that Act and labeling regulations issued under that Act by the Bureau of Alcohol, Tobacco, ~~and~~ **Firearms**;

(b)(5)(v) Any consumer product or hazardous substance as those terms are defined in the Consumer Product Safety Act (15 U.S.C. 2051 et seq.) and Federal Hazardous Substances Act (15 U.S.C. 1261 et seq.) respectively, when subject to a consumer product safety standard or labeling requirement of those Acts, or regulations issued under those Acts by the Consumer Product Safety

addition, this section requires distributors to transmit the required information to employers. (Employers who do not produce or import chemicals need only focus on those parts of this rule that deal with establishing a workplace program and communicating information to their workers.)

(b)(2) This section applies to any chemical which is known to be present in the workplace in such a manner that employees may be exposed under normal conditions of use or in a foreseeable emergency.

(b)(3) This section applies to laboratories only as follows:

(b)(3)(i) Employers shall ensure that labels on incoming containers of hazardous chemicals are not removed or defaced;

(b)(3)(ii) Employers shall maintain any safety data sheets that are received with incoming shipments of hazardous chemicals, and ensure that they are readily accessible during each workshift to laboratory employees when they are in their work areas;

(b)(3)(iii) Employers shall ensure that laboratory employees are provided information and training in accordance with paragraph (h) of this section, except for the location and availability of the written hazard communication program under paragraph (h)(2)(iii) of this section; and,

(b)(3)(iv) Laboratory employers that ship hazardous chemicals are considered to be either a chemical manufacturer or a distributor under this rule, and thus must ensure that any containers of hazardous chemicals leaving the laboratory are labeled in accordance with paragraph (f) of this section, and that a safety data sheet is provided to distributors and other employers in accordance with paragraphs (g)(6) and (g)(7) of this section.

(b)(4) In work operations where employees only handle chemicals in sealed containers which are not opened under normal conditions of use (such as are found in marine cargo handling, warehousing, or retail sales), this section applies to these operations only as follows:

(b)(4)(i) Employers shall ensure that labels on incoming containers of hazardous chemicals are not removed or defaced;

(b)(4)(ii) Employers shall maintain copies of any safety data sheets that are received with incoming shipments of the sealed containers of hazardous chemicals, shall obtain a safety data sheet as soon as possible for sealed containers of hazardous chemicals received without a safety data sheet if an employee requests the safety data sheet, and shall ensure that the safety data sheets are readily accessible during each work shift to employees when they are in their work area(s); and,

(b)(4)(iii) Employers shall ensure that employees are provided with information and training in accordance with paragraph (h) of this section (except for the location and availability of the written hazard communication program under paragraph (h)(2)(iii) of this section), to the extent necessary to protect them in the event of a spill or leak of a hazardous chemical from a sealed container.

(b)(5) This section does not require labeling of the following chemicals:

(b)(5)(i) Any pesticide as such term is defined in the Federal Insecticide, Fungicide, and Rodenticide Act (7 U.S.C. 136 et seq.), when subject to the labeling requirements of that Act and labeling regulations issued under that Act by the Environmental Protection Agency;

(b)(5)(ii) Any chemical substance or mixture as such terms are defined in the Toxic Substances Control Act (15 U.S.C. 2601 et seq.), when subject to the labeling requirements of that Act and labeling regulations issued under that Act by the Environmental Protection Agency;

(b)(5)(iii) Any food, food additive, color additive, drug, cosmetic, or medical or veterinary device or product, including materials intended for use as ingredients in such products (e.g. flavors and fragrances), as such terms are defined in the Federal Food, Drug, and Cosmetic Act (21 U.S.C. 301 et seq.) or the Virus-Serum-Toxin Act of 1913 (21 U.S.C. 151 et seq.), and regulations issued under those Acts, when they are subject to the labeling requirements under those Acts by either the Food and Drug Administration or the Department of Agriculture;

(b)(5)(iv) Any distilled spirits (beverage alcohols), wine, or malt beverage intended for nonindustrial use, as such terms are defined in the Federal Alcohol Administration Act (27 U.S.C. 201 et seq.) and regulations issued under that Act, when subject to the labeling requirements of that Act and labeling regulations issued under that Act by the Bureau of Alcohol, Tobacco, Firearms and Explosives;

(b)(5)(v) Any consumer product or hazardous substance as those terms are defined in the Consumer Product Safety Act (15 U.S.C. 2051 et seq.) and Federal Hazardous Substances Act (15 U.S.C. 1261 et seq.) respectively, when subject to a consumer product safety standard or labeling requirement of those Acts, or regulations issued under those Acts by the Consumer Product Safety Commission; and,

(b)(5)(vi) Agricultural or vegetable seed treated with pesticides and labeled in

Commission; and,

(b)(5)(vi) Agricultural or vegetable seed treated with pesticides and labeled in accordance with the Federal Seed Act (7 U.S.C. 1551 et seq.) and the labeling regulations issued under that Act by the Department of Agriculture.

(b)(6) This section does not apply to:

(b)(6)(i) Any hazardous waste as such term is defined by the Solid Waste Disposal Act, as amended by the Resource Conservation and Recovery Act of 1976, as amended (42 U.S.C. 6901 et seq.), when subject to regulations issued under that Act by the Environmental Protection Agency;

(b)(6)(ii) Any hazardous substance as such term is defined by the Comprehensive Environmental Response, Compensation and Liability Act (CERCLA) (42 U.S.C. 9601 et seq.) when the hazardous substance is the focus of remedial or removal action being conducted under CERCLA in accordance with the Environmental Protection Agency regulations.

(b)(6)(iii) Tobacco or tobacco products;

(b)(6)(iv) Wood or wood products, including lumber which will not be processed, where the chemical manufacturer or importer can establish that the only hazard they pose to employees is the potential for flammability or combustibility (wood or wood products which have been treated with a hazardous chemical covered by this standard, and wood which may be subsequently sawed or cut, generating dust, are not exempted);

(b)(6)(v) Articles (as that term is defined in paragraph (c) of this section);

(b)(6)(vi) Food or alcoholic beverages which are sold, used, or prepared in a retail establishment (such as a grocery store, restaurant, or drinking place), and foods intended for personal consumption by employees while in the workplace;

(b)(6)(vii) Any drug, as that term is defined in the Federal Food, Drug, and Cosmetic Act (21 U.S.C. 301 et seq.), when it is in solid, final form for direct administration to the patient (e.g., tablets or pills); drugs which are packaged by the chemical manufacturer for sale to consumers in a retail establishment (e.g., over-the-counter drugs); and drugs intended for personal consumption by employees while in the workplace (e.g., first aid supplies);

(b)(6)(viii) Cosmetics which are packaged for sale to consumers in a retail establishment, and cosmetics intended for personal consumption by employees while in the workplace;

(b)(6)(ix) Any consumer product or hazardous substance, as those terms are defined in the Consumer Product Safety Act (15 U.S.C. 2051 et seq.) and Federal Hazardous Substances Act (15 U.S.C. 1261 et seq.) respectively, where the employer can show that it is used in the workplace for the purpose intended by the chemical manufacturer or importer of the product, and the use results in a duration and frequency of exposure which is not greater than the range of exposures that could reasonably be experienced by consumers when used for the purpose intended;

(b)(6)(x) Nuisance particulates where the chemical manufacturer or importer can establish that they do not pose any physical or health hazard covered under this section;

(b)(6)(xi) Ionizing and nonionizing radiation; and,

(b)(6)(xii) Biological hazards.

accordance with the Federal Seed Act (7 U.S.C. 1551 et seq.) and the labeling regulations issued under that Act by the Department of Agriculture.

(b)(6) This section does not apply to:

(b)(6)(i) Any hazardous waste as such term is defined by the Solid Waste Disposal Act, as amended by the Resource Conservation and Recovery Act of 1976, as amended (42 U.S.C. 6901 et seq.), when subject to regulations issued under that Act by the Environmental Protection Agency;

(b)(6)(ii) Any hazardous substance as such term is defined by the Comprehensive Environmental Response, Compensation and Liability Act (CERCLA) (42 U.S.C. 9601 et seq.) when the hazardous substance is the focus of remedial or removal action being conducted under CERCLA in accordance with Environmental Protection Agency regulations.

(b)(6)(iii) Tobacco or tobacco products;

(b)(6)(iv) Wood or wood products, including lumber which will not be processed, where the chemical manufacturer or importer can establish that the only hazard they pose to employees is the potential for flammability or combustibility (wood or wood products which have been treated with a hazardous chemical covered by this standard, and wood which may be subsequently sawed or cut, generating dust, are not exempted);

(b)(6)(v) Articles (as that term is defined in paragraph (c) of this section);

(b)(6)(vi) Food or alcoholic beverages which are sold, used, or prepared in a retail establishment (such as a grocery store, restaurant, or drinking place), and foods intended for personal consumption by employees while in the workplace;

(b)(6)(vii) Any drug, as that term is defined in the Federal Food, Drug, and Cosmetic Act (21 U.S.C. 301 et seq.), when it is in solid, final form for direct administration to the patient (e.g., tablets or pills); drugs which are packaged by the chemical manufacturer for sale to consumers in a retail establishment (e.g., over-the-counter drugs); and drugs intended for personal consumption by employees while in the workplace (e.g., first aid supplies);

(b)(6)(viii) Cosmetics which are packaged for sale to consumers in a retail establishment, and cosmetics intended for personal consumption by employees while in the workplace;

(b)(6)(ix) Any consumer product or hazardous substance, as those terms are defined in the Consumer Product Safety Act (15 U.S.C. 2051 et seq.) and Federal Hazardous Substances Act (15 U.S.C. 1261 et seq.) respectively, where the employer can show that it is used in the workplace for the purpose intended by the chemical manufacturer or importer of the product, and the use results in a duration and frequency of exposure which is not greater than the range of exposures that could reasonably be experienced by consumers when used for the purpose intended;

(b)(6)(x) Nuisance particulates where the chemical manufacturer or importer can establish that they do not pose any physical or health hazard covered under this section;

(b)(6)(xi) Ionizing and nonionizing radiation; and,

(b)(6)(xii) Biological hazards.

Definitions.

Several key changes have been made to update the definitions section. This final rule provides more detailed physical and health hazard criteria. However, this information has now been moved from this section into Appendices A and B.

Additionally, in order to be consistent with the GHS, OSHA has added, deleted, and modified a number of the definitions. The following changes were made to definitions in the HCS 2012:

Added the following definitions: Classification, Hazard category, Hazard class, Hazard not otherwise classified, Hazard statement, Label elements, Pictogram, Precautionary statement, Product identifier, Pyrophoric Gas, Safety data sheet, Signal word, Simple asphyxiant, and Substance.

Deleted the following definitions: Combustible liquid, Compressed gas, Explosive, Flammable, Flashpoint, Hazard warning, Identity, Material safety data sheet, Organic peroxide, Oxidizer, Pyrophoric, Unstable (reactive), and Water-reactive.

Revised the following definitions: Chemical, Chemical name, Hazardous chemical, Health hazard, Label, Mixture, Physical hazard, and Trade secret.

The definition of Hazardous Chemical was located incorrectly in the HCS 1994 and here in this document it has been properly relocated to where it should have been placed in the correct alphabetical order. While it remains an important definition in both the HCS 1994 and the HCS 2012, the proper relocation in alphabetical order is the reason for this definition being struck in the

Refer to the Summary and Explanation of the Final Rule to gain a better understanding of the changes.

HCS 1994

(c) Definitions.

HCS 2012

(c) Definitions.

"Article" means a manufactured item other than a fluid or particle: (i) which is formed to a specific shape or design during manufacture; (ii) which has end use function(s) dependent in whole or in part upon its shape or design during end use; and (iii) which under normal conditions of use does not release more than very small quantities, e.g., minute or trace amounts of a hazardous chemical (as determined under paragraph (d) of this section), and does not pose a physical hazard or health risk to employees.

"Assistant Secretary" means the Assistant Secretary of Labor for Occupational Safety and Health, U.S. Department of Labor, or designee.

"Chemical" means any ~~element, chemical compound~~ or mixture of ~~elements and/or compounds~~.

"Chemical manufacturer" means an employer with a workplace where chemical (s) are produced for use or distribution.

"Chemical name" means the scientific designation of a chemical in accordance with the nomenclature system developed by the International Union of Pure and Applied Chemistry (IUPAC) or the Chemical Abstracts Service (CAS) rules of nomenclature, or a name ~~which~~ will clearly identify the chemical for the purpose of conducting a hazard ~~evaluation~~.

"Combustible liquid" means ~~any liquid having a flashpoint at or above 100 deg. F (37.8 deg. C), but below 200 deg. F (93.3 deg. C), except any mixture having components with flashpoints of 200 deg. F (93.3 deg. C), or higher, the total volume of which make up 99 percent or more of the total volume of the mixture.~~

"Commercial account" means an arrangement whereby a retail distributor sells hazardous chemicals to an employer, generally in large quantities over time and/or at costs that are below the regular retail price.

"Common name" means any designation or identification such as code name, code number, trade name, brand name or generic name used to identify a chemical other than by its chemical name.

"Compressed gas" means:

(i) A gas or mixture of gases having, in a container, an absolute pressure exceeding 40 psi at 70 deg. F (21.1 deg. C); or

(ii) A gas or mixture of gases having, in a container, an absolute pressure exceeding 104 psi at 130 deg. F (54.4 deg. C) regardless of the pressure at 70 deg. F (21.1 deg. C); or

(iii) A liquid having a vapor pressure exceeding 40 psi at 100 deg. F (37.8 deg. C) as determined by ASTM D-323-72.

"Container" means any bag, barrel, bottle, box, can, cylinder, drum, reaction vessel, storage tank, or the like that contains a hazardous chemical. For purposes of this section, pipes or piping systems, and engines, fuel tanks, or other operating systems in a vehicle, are not considered to be containers.

"Designated representative" means any individual or organization to whom an employee gives written authorization to exercise such employee's rights under this section. A recognized or certified collective bargaining agent shall be treated automatically as a designated representative without regard to written employee authorization.

"Director" means the Director, National Institute for Occupational Safety and Health, U.S. Department of Health and Human Services, or designee.

"Distributor" means a business, other than a chemical manufacturer or importer, which supplies hazardous chemicals to other distributors or to employers.

"Employee" means a worker who may be exposed to hazardous chemicals under normal operating conditions or in foreseeable emergencies. Workers such as office workers or bank tellers who encounter hazardous chemicals only in non-routine, isolated instances are not covered.

"Employer" means a person engaged in a business where chemicals are either used, distributed, or are produced for use or distribution, including a contractor or subcontractor.

"Explosive" means ~~a chemical that causes a sudden, almost instantaneous release of pressure, gas, and heat when subjected to sudden shock, pressure, or high temperature.~~

"Exposure or exposed" means that an employee is subjected in the course of employment to a chemical that is a physical or health hazard, and includes potential (e.g. accidental or possible) exposure. "Subjected" in terms of health hazards includes any route of entry (e.g. inhalation, ingestion, skin contact or absorption.)

"Flammable" means a chemical that falls into one of the following categories:

"Article" means a manufactured item other than a fluid or particle: (i) which is formed to a specific shape or design during manufacture; (ii) which has end use function(s) dependent in whole or in part upon its shape or design during end use; and (iii) which under normal conditions of use does not release more than very small quantities, e.g., minute or trace amounts of a hazardous chemical (as determined under paragraph (d) of this section), and does not pose a physical hazard or health risk to employees.

"Assistant Secretary" means the Assistant Secretary of Labor for Occupational Safety and Health, U.S. Department of Labor, or designee.

"Chemical" means any substance, or mixture of substances.

"Chemical manufacturer" means an employer with a workplace where chemical (s) are produced for use or distribution.

"Chemical name" means the scientific designation of a chemical in accordance with the nomenclature system developed by the International Union of Pure and Applied Chemistry (IUPAC) or the Chemical Abstracts Service (CAS) rules of nomenclature, or a name that will clearly identify the chemical for the purpose of conducting a hazard classification.

"Classification" means to identify the relevant data regarding the hazards of a chemical; review those data to ascertain the hazards associated with the chemical; and decide whether the chemical will be classified as hazardous according to the definition of hazardous chemical in this section. In addition, classification for health and physical hazards includes the determination of the degree of hazard, where appropriate, by comparing the data with the criteria for health and physical hazards.

"Commercial account" means an arrangement whereby a retail distributor sells hazardous chemicals to an employer, generally in large quantities over time and/or at costs that are below the regular retail price.

"Common name" means any designation or identification such as code name, code number, trade name, brand name or generic name used to identify a chemical other than by its chemical name.

"Container" means any bag, barrel, bottle, box, can, cylinder, drum, reaction vessel, storage tank, or the like that contains a hazardous chemical. For purposes of this section, pipes or piping systems, and engines, fuel tanks, or other operating systems in a vehicle, are not considered to be containers.

"Designated representative" means any individual or organization to whom an employee gives written authorization to exercise such employee's rights under this section. A recognized or certified collective bargaining agent shall be treated automatically as a designated representative without regard to written employee authorization.

"Director" means the Director, National Institute for Occupational Safety and Health, U.S. Department of Health and Human Services, or designee.

"Distributor" means a business, other than a chemical manufacturer or importer, which supplies hazardous chemicals to other distributors or to employers.

"Employee" means a worker who may be exposed to hazardous chemicals under normal operating conditions or in foreseeable emergencies. Workers such as office workers or bank tellers who encounter hazardous chemicals only in non-routine, isolated instances are not covered.

"Employer" means a person engaged in a business where chemicals are either used, distributed, or are produced for use or distribution, including a contractor or subcontractor.

"Exposure or exposed" means that an employee is subjected in the course of employment to a chemical that is a physical or health hazard, and includes potential (e.g. accidental or possible) exposure. "Subjected" in terms of health hazards includes any route of entry (e.g. inhalation, ingestion, skin contact or absorption.)

"Foreseeable emergency" means any potential occurrence such as, but not limited to, equipment failure, rupture of containers, or failure of control equipment which could result in an uncontrolled release of a hazardous chemical into the workplace.

"Hazard category" means the division of criteria within each hazard class, e.g., oral acute toxicity and flammable liquids include four hazard categories. These categories compare hazard severity within a hazard class and should not be taken as a comparison of hazard categories more generally.

"Hazard class" means the nature of the physical or health hazards, e.g., flammable solid, carcinogen, oral acute toxicity.

"Hazard not otherwise classified (HNOC)" means an adverse physical or health effect identified through evaluation of scientific evidence during the classification process that does not meet the specified criteria for the physical and health hazard classes addressed in this section. This does not extend coverage to adverse physical and health effects for which there is a hazard

(i) "Aerosol, flammable" means an aerosol that, when tested by the method described in 16 CFR 1500.45, yields a flame projection exceeding 10 inches at full valve opening, or a flashback (a flame extending back to the valve) at any degree of valve opening;

(ii) "Gas, flammable" means: (A) A gas that, at ambient temperature and pressure, forms a flammable mixture with air at a concentration of thirteen (13) percent by volume or less; or

(B) A gas that, at ambient temperature and pressure, forms a range of flammable mixtures with air wider than twelve (12) percent by volume, regardless of the lower limit;

(iii) "Liquid, flammable" means any liquid having a flashpoint below 100 deg. F (37.8 deg. C), except any mixture having components with flashpoints of 100 deg. F (37.8 deg. C) or higher, the total of which make up 99 percent or more of the total volume of the mixture;

(iv) "Solid, flammable" means a solid, other than a blasting agent or explosive as defined in 1910.109(a), that is liable to cause fire through friction; absorption of moisture; spontaneous chemical change; or retained heat from manufacturing or processing, or which can be ignited readily and when ignited burns so vigorously and persistently as to create a serious hazard. A chemical shall be considered to be a flammable solid if, when tested by the method described in 16 CFR 1500.44, it ignites and burns with a self-sustained flame at a rate greater than one-tenth of an inch per second along its major axis;

"Flashpoint" means the minimum temperature at which a liquid gives off a vapor in sufficient concentration to ignite when tested as follows:

(i) Tagliabue Closed Tester (See American National Standard Method of Test for Flash Point by Tag Closed Tester, Z11.24-1979 (ASTM D 56-79)) for liquids with a viscosity of less than 45 Saybolt Universal Seconds (SUS) at 100 deg. F (37.8 deg. C); that do not contain suspended solids and do not have a tendency to form a surface film under test; or

(ii) Pensky-Martens Closed Tester (see American National Standard Method of Test for Flash Point by Pensky-Martens Closed Tester, Z11.7-1979 (ASTM D 93-79)) for liquids with a viscosity equal to or greater than 45 SUS at 100 deg. F (37.8 deg. C); or that contain suspended solids; or that have a tendency to form a surface film under test; or

(iii) Setateflash Closed Tester (see American National Standard Method of Test for Flash Point by Setateflash Closed Tester (ASTM D 3270-70)).

Organic peroxides, which undergo autoaccelerating thermal decomposition, are excluded from any of the flashpoint determination methods specified above:

"Foreseeable emergency" means any potential occurrence such as, but not limited to, equipment failure, rupture of containers, or failure of control equipment which could result in an uncontrolled release of a hazardous chemical into the workplace.

"Hazardous chemical" means any chemical which is a physical hazard or a health hazard:

"Hazard warning" means any words, pictures, symbols, or combination thereof appearing on a label or other appropriate form of warning which convey the specific physical and health hazard(s), including target organ effects, of the chemical(s) in the container(s). (See the definitions for "physical hazard" and "health hazard" to determine the hazards which must be covered.)

"Health hazard" means a chemical for which there is statistically significant evidence based on at least one study conducted in accordance with established scientific principles that acute or chronic health effects may occur in exposed employees. The term "health hazard" includes chemicals which are carcinogens, toxic or highly toxic agents, reproductive toxins, irritants, corrosives, sensitizers, hepatotoxins, nephrotoxins, neurotoxins, agents which act on the hematopoietic system, and agents which damage the lungs, skin, eyes, or mucous membranes. Appendix A provides further definitions and explanations of the scope of health hazards covered by this section, and Appendix B describes the criteria to be used to determine whether or not a chemical is to be considered hazardous for purposes of this standard.

"Identity" means any chemical or common name which is indicated on the material safety data sheet (MSDS) for the chemical. The identity used shall permit cross-references to be made among the required list of hazardous chemicals, the label and the MSDS.

"Immediate use" means that the hazardous chemical will be under the control of and used only by the person who transfers it from a labeled container and only within the work shift in which it is transferred.

"Importer" means the first business with employees within the Customs Territory of the United States which receives hazardous chemicals produced in other countries for the purpose of supplying them to distributors or employers within the United States.

"Label" means any written, printed, or graphic material displayed on or affixed

class addressed in this section, but the effect either falls below the cut-off value/concentration limit of the hazard class or is under a GHS hazard category that has not been adopted by OSHA (e.g., acute toxicity Category 5).

"Hazard statement" means a statement assigned to a hazard class and category that describes the nature of the hazard(s) of a chemical, including, where appropriate, the degree of hazard.

"Hazardous chemical" means any chemical which is classified as a physical hazard or a health hazard, a simple asphyxiant, combustible dust, pyrophoric gas, or hazard not otherwise classified.

"Health hazard" means a chemical which is classified as posing one of the following hazardous effects: acute toxicity (any route of exposure); skin corrosion or irritation; serious eye damage or eye irritation; respiratory or skin sensitization; germ cell mutagenicity; carcinogenicity; reproductive toxicity; specific target organ toxicity (single or repeated exposure); or aspiration hazard. The criteria for determining whether a chemical is classified as a health hazard are detailed in Appendix A to §1910.1200 -- Health Hazard Criteria.

"Immediate use" means that the hazardous chemical will be under the control of and used only by the person who transfers it from a labeled container and only within the work shift in which it is transferred.

"Importer" means the first business with employees within the Customs Territory of the United States which receives hazardous chemicals produced in other countries for the purpose of supplying them to distributors or employers within the United States.

"Label" means an appropriate group of written, printed or graphic information elements concerning a hazardous chemical that is affixed to, printed on, or attached to the immediate container of a hazardous chemical, or to the outside packaging.

"Label elements" means the specified pictogram, hazard statement, signal word and precautionary statement for each hazard class and category.

"Mixture" means a combination or a solution composed of two or more substances in which they do not react.

"Physical hazard" means a chemical that is classified as posing one of the following hazardous effects: explosive; flammable (gases, aerosols, liquids, or solids); oxidizer (liquid, solid or gas); self-reactive; pyrophoric (liquid or solid); self-heating; organic peroxide; corrosive to metal; gas under pressure; or in contact with water emits flammable gas. See Appendix B to §1910.1200 -- Physical Hazard Criteria.

"Pictogram" means a composition that may include a symbol plus other graphic elements, such as a border, background pattern, or color, that is intended to convey specific information about the hazards of a chemical. Eight pictograms are designated under this standard for application to a hazard category.

"Precautionary statement" means a phrase that describes recommended measures that should be taken to minimize or prevent adverse effects resulting from exposure to a hazardous chemical, or improper storage or handling.

"Product identifier" means the name or number used for a hazardous chemical on a label or in the SDS. It provides a unique means by which the user can identify the chemical. The product identifier used shall permit cross-references to be made among the list of hazardous chemicals required in the written hazard communication program, the label and the SDS.

"Produce" means to manufacture, process, formulate, blend, extract, generate, emit, or repackage.

"Pyrophoric gas" means a chemical in a gaseous state that will ignite spontaneously in air at a temperature of 130 degrees F (54.4 degrees C) or below.

"Responsible party" means someone who can provide additional information on the hazardous chemical and appropriate emergency procedures, if necessary.

"Safety data sheet (SDS)" means written or printed material concerning a hazardous chemical that is prepared in accordance with paragraph (g) of this section.

"Signal word" means a word used to indicate the relative level of severity of hazard and alert the reader to a potential hazard on the label. The signal words used in this section are "danger" and "warning." "Danger" is used for the more severe hazards, while "warning" is used for the less severe.

"Simple asphyxiant" means a substance or mixture that displaces oxygen in the ambient atmosphere, and can thus cause oxygen deprivation in those who are exposed, leading to unconsciousness and death.

"Specific chemical identity" means the chemical name, Chemical Abstracts Service (CAS) Registry Number, or any other information that reveals the precise chemical designation of the substance.

to containers of hazardous chemicals:

"Material safety data sheet (MSDS)" means written or printed material concerning a hazardous chemical which is prepared in accordance with paragraph (g) of this section:

"Mixture" means any combination of two or more chemicals if the combination is not, in whole or in part, the result of a chemical reaction:

"Organic peroxide" means an organic compound that contains the bivalent -O-O- structure and which may be considered to be a structural derivative of hydrogen peroxide where one or both of the hydrogen atoms has been replaced by an organic radical:

"Oxidizer" means a chemical other than a blasting agent or explosive as defined in 1910.109(a); that initiates or promotes combustion in other materials, thereby causing fire either of itself or through the release of oxygen or other gases:

"Physical hazard" means a chemical for which there is scientifically valid evidence that it is a combustible liquid, a compressed gas, explosive, flammable, an organic peroxide, an oxidizer, pyrophoric, unstable (reactive) or water-reactive:

"Produce" means to manufacture, process, formulate, blend, extract, generate, emit, or repackage.

"Pyrophoric" means a chemical that will ignite spontaneously in air at a temperature of 130 deg. F (54.4 deg. C) or below:

"Responsible party" means someone who can provide additional information on the hazardous chemical and appropriate emergency procedures, if necessary.

"Specific chemical identity" means the chemical name, Chemical Abstracts Service (CAS) Registry Number, or any other information that reveals the precise chemical designation of the substance.

"Trade secret" means any confidential formula, pattern, process, device, information or compilation of information that is used in an employer's business, and that gives the employer an opportunity to obtain an advantage over competitors who do not know or use it. ~~Appendix D~~ sets out the criteria to be used in evaluating trade secrets.

"Unstable (reactive)" means a chemical which in the pure state, or as produced or transported, will vigorously polymerize, decompose, condense, or will become self-reactive under conditions of shocks, pressure or temperature:

"Use" means to package, handle, react, emit, extract, generate as a byproduct, or transfer.

"Water-reactive" means a chemical that reacts with water to release a gas that is either flammable or presents a health hazard:

"Work area" means a room or defined space in a workplace where hazardous chemicals are produced or used, and where employees are present.

"Workplace" means an establishment, job site, or project, at one geographical location containing one or more work areas.

"Substance" means chemical elements and their compounds in the natural state or obtained by any production process, including any additive necessary to preserve the stability of the product and any impurities deriving from the process used, but excluding any solvent which may be separated without affecting the stability of the substance or changing its composition.

"Trade secret" means any confidential formula, pattern, process, device, information or compilation of information that is used in an employer's business, and that gives the employer an opportunity to obtain an advantage over competitors who do not know or use it. Appendix E to §1910.1200-Definition of Trade Secret, sets out the criteria to be used in evaluating trade secrets.

"Use" means to package, handle, react, emit, extract, generate as a byproduct, or transfer.

"Work area" means a room or defined space in a workplace where hazardous chemicals are produced or used, and where employees are present.

"Workplace" means an establishment, job site, or project, at one geographical location containing one or more work areas.

Hazard classification.

The hazard classification approach in the GHS is quite different from the performance-oriented approach in the HCS 1994. The GHS has specific criteria for each health and physical hazard, along with detailed instructions for hazard evaluation and determinations as to whether mixtures of the substance are covered. OSHA has included the general provisions for hazard classification in paragraph (d) of the revised rule, and added extensive appendixes that address the criteria for each health or physical effect. Mandatory Appendixes A and B provide classification guidance for Health Hazards and Physical Hazards, respectively. The hazard classification criteria contained in the HCS 2012 is test method-neutral. That is, the person classifying a chemical or substance should use available data and no additional testing is required to classify a chemical.

Please refer to the Summary and Explanation of the Final Rule to gain a better understanding of the changes.

HCS 1994

(d) Hazard ~~determination~~:

(d)(1) Chemical manufacturers and importers shall evaluate chemicals produced in their workplaces or imported by them to ~~determine if they are hazardous~~. Employers are not required to ~~evaluate~~ chemicals unless they choose not to rely on the ~~evaluation~~ performed by the chemical manufacturer or importer for the chemical to satisfy this requirement.

(d)(2) Chemical manufacturers, importers or employers ~~evaluating~~ chemicals shall identify and consider the available scientific evidence concerning ~~such~~ hazards. For health hazards, ~~evidence which is statistically significant and which is based on at least one positive study conducted in accordance with established scientific principles is considered to be sufficient to establish a hazardous effect if the results of the study meet the definitions of health hazards in this section.~~ Appendix A shall be consulted for the ~~scope of health hazards covered~~, and Appendix B shall be consulted for the ~~criteria to be~~

HCS 2012

(d) Hazard classification:

(d)(1) Chemical manufacturers and importers shall evaluate chemicals produced in their workplaces or imported by them to classify the chemicals in accordance with this section. For each chemical, the chemical manufacturer or importer shall determine the hazard classes, and where appropriate, the category of each class that apply to the chemical being classified. Employers are not required to classify chemicals unless they choose not to rely on the classification performed by the chemical manufacturer or importer for the chemical to satisfy this requirement.

(d)(2) Chemical manufacturers, importers or employers classifying chemicals shall identify and consider the full range of available scientific literature and other evidence concerning the potential hazards. There is no requirement to test the chemical to determine how to classify its hazards. Appendix A to §1910.1200 shall be consulted for classification of health hazards, and

followed with respect to the completeness of the evaluation, and the data to be reported:

(d)(3) The chemical manufacturer, importer or employer evaluating chemicals shall treat the following sources as establishing that the chemicals listed in them are hazardous:

(d)(3)(i) 29 CFR part 1910, subpart Z, Toxic and Hazardous Substances; Occupational Safety and Health Administration (OSHA); or;

(d)(3)(ii) "Threshold Limit Values for Chemical Substances and Physical Agents in the Work Environment," American Conference of Governmental Industrial Hygienists (ACGIH) (latest edition). The chemical manufacturer, importer, or employer is still responsible for evaluating the hazards associated with the chemicals in these source lists in accordance with the requirements of this standard:

(d)(4) Chemical manufacturers, importers and employers evaluating chemicals shall treat the following sources as establishing that a chemical is a carcinogen or potential carcinogen for hazard communication purposes:

(d)(4)(i) National Toxicology Program (NTP), "Annual Report on Carcinogens" (latest edition);

(d)(4)(ii) International Agency for Research on Cancer (IARC) "Monographs" (latest editions); or

(d)(4)(iii) 29 CFR part 1910, subpart Z, Toxic and Hazardous Substances; Occupational Safety and Health Administration:

Note: The "Registry of Toxic Effects of Chemical Substances" published by the National Institute for Occupational Safety and Health indicates whether a chemical has been found by NTP or IARC to be a potential carcinogen:

(d)(5) The chemical manufacturer, importer or employer shall determine the hazards of mixtures of chemicals as follows:

(d)(5)(i) If a mixture has been tested as a whole to determine its hazards, the results of such testing shall be used to determine whether the mixture is hazardous;

(d)(5)(ii) If a mixture has not been tested as a whole to determine whether the mixture is a health hazard, the mixture shall be assumed to present the same health hazards as do the components which comprise one percent (by weight or volume) or greater of the mixture, except that the mixture shall be assumed to present a carcinogenic hazard if it contains a component in concentrations of 0.1 percent or greater which is considered to be a carcinogen under paragraph (d)(4) of this section;

(d)(5)(iii) If a mixture has not been tested as a whole to determine whether the mixture is a physical hazard, the chemical manufacturer, importer, or employer may use whatever scientifically valid data is available to evaluate the physical hazard potential of the mixture; and;

(d)(5)(iv) If the chemical manufacturer, importer, or employer has evidence to indicate that a component present in the mixture in concentrations of less than one percent (or in the case of carcinogens, less than 0.1 percent) could be released in concentrations which would exceed an established OSHA permissible exposure limit or ACGIH Threshold Limit Value, or could present a health risk to employees in those concentrations, the mixture shall be assumed to present the same hazard:

(d)(6) Chemical manufacturers, importers, or employers evaluating chemicals shall describe in writing the procedures they use to determine the hazards of the chemical they evaluate. The written procedures are to be made available, upon request, to employees, their designated representatives, the Assistant Secretary and the Director. The written description may be incorporated into the written hazard communication program required under paragraph (e) of this section:

Appendix B to §1910.1200 shall be consulted for the classification of physical hazards.

(d)(3) Mixtures.

(d)(3)(i) Chemical manufacturers, importers, or employers evaluating chemicals shall follow the procedures described in Appendices A and B to §1910.1200 to classify the hazards of the chemicals, including determinations regarding when mixtures of the classified chemicals are covered by this section.

(d)(3)(ii) When classifying mixtures they produce or import, chemical manufacturers and importers of mixtures may rely on the information provided on the current safety data sheets of the individual ingredients except where the chemical manufacturer or importer knows, or in the exercise of reasonable diligence should know, that the safety data sheet misstates or omits information required by this section.

Hazard Communication Program.

This section of the HCS 1994 was retained. As the GHS does not include any requirements regarding Hazards Communication Programs, OSHA is maintaining the provisions of the HCS 1994. No substantive changes (only terminology) have been made in this paragraph of the HCS.

HCS 1994

(e) *Written hazard communication program.*

(e)(1) Employers shall develop, implement, and maintain at each workplace, a written hazard communication program which at least describes how the criteria specified in paragraphs (f), (g), and (h) of this section for labels and other forms of warning, material safety data sheets, and employee information and training will be met, and which also includes the following:

(e)(1)(i) A list of the hazardous chemicals known to be present using an identity that is referenced on the appropriate material safety data sheet (the list may be compiled for the workplace as a whole or for individual work

HCS 2012

(e) *Written hazard communication program.*

(e)(1) Employers shall develop, implement, and maintain at each workplace, a written hazard communication program which at least describes how the criteria specified in paragraphs (f), (g), and (h) of this section for labels and other forms of warning, safety data sheets, and employee information and training will be met, and which also includes the following:

(e)(1)(i) A list of the hazardous chemicals known to be present using a product identifier that is referenced on the appropriate safety data sheet (the list may be compiled for the workplace as a whole or for individual work areas); and,

areas); and,

(e)(1)(ii) The methods the employer will use to inform employees of the hazards of non-routine tasks (for example, the cleaning of reactor vessels), and the hazards associated with chemicals contained in unlabeled pipes in their work areas.

(e)(2) "Multi-employer workplaces." Employers who produce, use, or store hazardous chemicals at a workplace in such a way that the employees of other employer(s) may be exposed (for example, employees of a construction contractor working on-site) shall additionally ensure that the hazard communication programs developed and implemented under this paragraph (e) include the following:

(e)(2)(i) The methods the employer will use to provide the other employer(s) on-site access to ~~material~~ safety data sheets for each hazardous chemical the other employer(s)' employees may be exposed to while working;

(e)(2)(ii) The methods the employer will use to inform the other employer(s) of any precautionary measures that need to be taken to protect employees during the workplace's normal operating conditions and in foreseeable emergencies; and,

(e)(2)(iii) The methods the employer will use to inform the other employer(s) of the labeling system used in the workplace.

(e)(3) The employer may rely on an existing hazard communication program to comply with these requirements, provided that it meets the criteria established in this paragraph (e).

(e)(4) The employer shall make the written hazard communication program available, upon request, to employees, their designated representatives, the Assistant Secretary and the Director, in accordance with the requirements of 29 CFR 1910.1020 (e).

(e)(5) Where employees must travel between workplaces during a workshift, i.e., their work is carried out at more than one geographical location, the written hazard communication program may be kept at the primary workplace facility.

(e)(1)(ii) The methods the employer will use to inform employees of the hazards of non-routine tasks (for example, the cleaning of reactor vessels), and the hazards associated with chemicals contained in unlabeled pipes in their work areas.

(e)(2) "Multi-employer workplaces." Employers who produce, use, or store hazardous chemicals at a workplace in such a way that the employees of other employer(s) may be exposed (for example, employees of a construction contractor working on-site) shall additionally ensure that the hazard communication programs developed and implemented under this paragraph (e) include the following:

(e)(2)(i) The methods the employer will use to provide the other employer(s) on-site access to safety data sheets for each hazardous chemical the other employer(s)' employees may be exposed to while working;

(e)(2)(ii) The methods the employer will use to inform the other employer(s) of any precautionary measures that need to be taken to protect employees during the workplace's normal operating conditions and in foreseeable emergencies; and,

(e)(2)(iii) The methods the employer will use to inform the other employer(s) of the labeling system used in the workplace.

(e)(3) The employer may rely on an existing hazard communication program to comply with these requirements, provided that it meets the criteria established in this paragraph (e).

(e)(4) The employer shall make the written hazard communication program available, upon request, to employees, their designated representatives, the Assistant Secretary and the Director, in accordance with the requirements of 29 CFR 1910.1020 (e).

(e)(5) Where employees must travel between workplaces during a workshift, i.e., their work is carried out at more than one geographical location, the written hazard communication program may be kept at the primary workplace facility.

Labels.

This paragraph has been extensively re-written. While, the HCS 1994 had a simple and performance-oriented approach to labels, this final rule sets forth detailed and specific provisions for labeling. Additionally, a new mandatory Appendix C indicates what specific information is to be provided for each hazard class and category once a chemical is classified.

Under this revised paragraph, chemical manufacturers and importers must provide a label that includes: the product identifier, supplier information which is to include name, address and phone number of manufacturer, importer or distributor; and the signal word, pictogram, and hazard statement for each hazard class and category. Precautionary statements must also be provided. The HCS 1994 does not require the use of pictograms, specific signal words, or precautionary statements.

HCS 1994

(f) *Labels and other forms of warning.*

(f)(1) The chemical manufacturer, importer, or distributor shall ensure that each container of hazardous chemicals leaving the workplace is labeled, tagged or marked ~~with the following information~~:

(f)(1)(i) ~~Identity of the hazardous chemical(s);~~

(f)(1)(ii) ~~Appropriate hazard warnings; and~~

(f)(1)(iii) Name ~~and~~ address of the chemical manufacturer, importer, or other responsible party.

(f)(2)(i) For solid metal (such as a steel beam or a metal casting), solid wood, or plastic items that are not exempted as articles due to their downstream use, or shipments of whole grain, the required label may be transmitted to the customer at the time of the initial shipment, and need not be included with subsequent shipments to the same employer unless the information on the label changes;

(f)(2)(ii) The label may be transmitted with the initial shipment itself, or with the ~~material~~ safety data sheet that is to be provided prior to or at the time of the first shipment; and,

(f)(2)(iii) This exception to requiring labels on every container of hazardous chemicals is only for the solid material itself, and does not apply to hazardous chemicals used in conjunction with, or known to be present with, the material and to which employees handling the items in transit may be exposed (for example, cutting fluids or pesticides in grains).

(f)(3) Chemical manufacturers, importers, or distributors shall ensure that each container of hazardous chemicals leaving the workplace is labeled, tagged, or marked in accordance with this section in a manner which does not conflict with the requirements of the Hazardous Materials Transportation Act (49 U.S.C. 1801 et seq.) and regulations issued under that Act by the Department of

HCS 2012

(f) *Labels and other forms of warning.*

(f)(1) Labels on shipped containers. The chemical manufacturer, importer, or distributor shall ensure that each container of hazardous chemicals leaving the workplace is labeled, tagged or marked. Hazards not otherwise classified do not have to be addressed on the container. Where the chemical manufacturer or importer is required to label, tag, or mark the following information shall be provided:

(f)(1)(i) Product identifier;

(f)(1)(ii) Signal word;

(f)(1)(iii) Hazard statement(s);

(f)(1)(iv) Pictogram(s);

(f)(1)(v) Precautionary statement(s); and,

(f)(1)(vi) Name, address, and telephone number of the chemical manufacturer, importer, or other responsible party.

(f)(2) The chemical manufacturer, importer, or distributor shall ensure that the information provided under paragraphs (f)(1)(i) through (v) of this section is in accordance with Appendix C to §1910.1200, for each hazard class and associated hazard category for the hazardous chemical, prominently displayed, and in English (other languages may also be included if appropriate).

(f)(3) The chemical manufacturer, importer, or distributor shall ensure that the information provided under paragraphs (f)(1)(ii) through (iv) of this section is located together on the tag, label or mark.

(f)(4) Solid materials

(f)(4)(i) For solid metal (such as a steel beam or a metal casting), solid wood,

Transportation.

~~(f)(4) If the hazardous chemical is regulated by OSHA in a substance-specific health standard, the chemical manufacturer, importer, distributor or employer shall ensure that the labels or other forms of warning used are in accordance with the requirements of that standard.~~

(f)(5) Except as provided in paragraphs (f)(6) and (f)(7) of this section, the employer shall ensure that each container of hazardous chemicals in the workplace is labeled, tagged or marked with the following information:

(f)(5)(i) ~~Identity of the hazardous chemical(s) contained therein; and,~~

(f)(5)(ii) ~~Appropriate hazard warnings, or alternatively,~~ words, pictures, symbols, or combination thereof, which provide at least general information regarding the hazards of the chemicals, and which, in conjunction with the other information immediately available to employees under the hazard communication program, will provide employees with the specific information regarding the physical and health hazards of the hazardous chemical.

(f)(6) The employer may use signs, placards, process sheets, batch tickets, operating procedures, or other such written materials in lieu of affixing labels to individual stationary process containers, as long as the alternative method identifies the containers to which it is applicable and conveys the information required by paragraph (f)(5) of this section to be on a label. The written materials ~~shall be~~ readily accessible to the employees in their work area throughout each work shift.

(f)(7) The employer is not required to label portable containers into which hazardous chemicals are transferred from labeled containers, and which are intended only for the immediate use of the employee who performs the transfer. For purposes of this section, drugs which are dispensed by a pharmacy to a health care provider for direct administration to a patient are exempted from labeling.

(f)(8) The employer shall not remove or deface existing labels on incoming containers of hazardous chemicals, unless the container is immediately marked with the required information.

(f)(9) The employer shall ensure that labels or other forms of warning are legible, in English, and prominently displayed on the container, or readily available in the work area throughout each work shift. Employers having employees who speak other languages may add the information in their language to the material presented, as long as the information is presented in English as well.

~~(f)(10) The chemical manufacturer, importer, distributor or employer need not affix new labels to comply with this section if existing labels already convey the required information.~~

(f)(11) Chemical manufacturers, importers, distributors, or employers who become newly aware of any significant information regarding the hazards of a chemical shall revise the labels for the chemical within three months of becoming aware of the new information. Labels on containers of hazardous chemicals shipped after that time ~~shall~~ contain the new information. If the chemical is not currently produced or imported, the chemical manufacturer, importer, distributor, or employer shall add the information to the label before the chemical is shipped or introduced into the workplace again.

or plastic items that are not exempted as articles due to their downstream use, or shipments of whole grain, the required label may be transmitted to the customer at the time of the initial shipment, and need not be included with subsequent shipments to the same employer unless the information on the label changes;

(f)(4)(ii) The label may be transmitted with the initial shipment itself, or with the safety data sheet that is to be provided prior to or at the time of the first shipment; and,

(f)(4)(iii) This exception to requiring labels on every container of hazardous chemicals is only for the solid material itself, and does not apply to hazardous chemicals used in conjunction with, or known to be present with, the material and to which employees handling the items in transit may be exposed (for example, cutting fluids or pesticides in grains).

(f)(5) Chemical manufacturers, importers, or distributors shall ensure that each container of hazardous chemicals leaving the workplace is labeled, tagged, or marked in accordance with this section in a manner which does not conflict with the requirements of the Hazardous Materials Transportation Act (49 U.S.C. 1801 et seq.) and regulations issued under that Act by the Department of Transportation.

(f)(6) Workplace labeling. Except as provided in paragraphs (f)(7) and (f)(8) of this section, the employer shall ensure that each container of hazardous chemicals in the workplace is labeled, tagged or marked with either:

(f)(6)(i) The information specified under paragraphs (f)(1)(i) through (v) of this section for labels on shipped containers; or,

(f)(6)(ii) Product identifier and words, pictures, symbols, or combination thereof, which provide at least general information regarding the hazards of the chemicals, and which, in conjunction with the other information immediately available to employees under the hazard communication program, will provide employees with the specific information regarding the physical and health hazards of the hazardous chemical.

(f)(7) The employer may use signs, placards, process sheets, batch tickets, operating procedures, or other such written materials in lieu of affixing labels to individual stationary process containers, as long as the alternative method identifies the containers to which it is applicable and conveys the information required by paragraph (f)(6) of this section to be on a label. The employer shall ensure the written materials are readily accessible to the employees in their work area throughout each work shift.

(f)(8) The employer is not required to label portable containers into which hazardous chemicals are transferred from labeled containers, and which are intended only for the immediate use of the employee who performs the transfer. For purposes of this section, drugs which are dispensed by a pharmacy to a health care provider for direct administration to a patient are exempted from labeling.

(f)(9) The employer shall not remove or deface existing labels on incoming containers of hazardous chemicals, unless the container is immediately marked with the required information.

(f)(10) The employer shall ensure that workplace labels or other forms of warning are legible, in English, and prominently displayed on the container, or readily available in the work area throughout each work shift. Employers having employees who speak other languages may add the information in their language to the material presented, as long as the information is presented in English as well.

(f)(11) Chemical manufacturers, importers, distributors, or employers who become newly aware of any significant information regarding the hazards of a chemical shall revise the labels for the chemical within six months of becoming aware of the new information, and shall ensure that labels on containers of hazardous chemicals shipped after that time contain the new information. If the chemical is not currently produced or imported, the chemical manufacturer, importer, distributor, or employer shall add the information to the label before the chemical is shipped or introduced into the workplace again.

HCS Pictograms and Hazards

Health Hazard



- Carcinogen
- Mutagenicity
- Reproductive Toxicity
- Respiratory Sensitizer
- Target Organ Toxicity
- Aspiration Toxicity

Flame



- Flammables
- Pyrophorics
- Self-Heating
- Emits Flammable Gas
- Self-Reactives
- Organic Peroxides

Exclamation Mark



- Irritant (skin and eye)
- Skin Sensitizer
- Acute Toxicity
- Narcotic Effects
- Respiratory Tract Irritant
- Hazardous to Ozone Layer (Non-Mandatory)

Gas Cylinder  ■ Gases Under Pressure	Corrosion  ■ Skin Corrosion/Burns ■ Eye Damage ■ Corrosive to Metals	Exploding Bomb  ■ Explosives ■ Self-Reactives ■ Organic Peroxides
Flame Over Circle  ■ Oxidizers	Environment (Non-Mandatory)  ■ Aquatic Toxicity	Skull and Crossbones  ■ Acute Toxicity (fatal or toxic)

Safety Data Sheets.

Safety Data Sheets, previously referred to as Material Safety Data Sheets, will now require a 16-section format that is essentially the same as the ANSI standard for *Hazardous Workplace Chemicals-Hazard Evaluation and Safety Data Sheets and Precautionary Labeling Preparation* (ANSI Z400.1 & Z129.1 - 2010), already familiar to U.S. employers. Paragraph (g) lists the sections in the order they are to be provided on the Safety Data Sheets.

This paragraph is supplemented by new mandatory Appendix D, which details the information to be included under each heading. The HCS 1994 requires similar information, but allows any format to be used. This final rule is designed more in-line with the GHS, which has a uniform approach. This uniformity will improve the effectiveness of the safety data sheet, as well as make it easier for employers to comply.

The appendix to this side-by-side analysis compares the requirements of the new mandatory Appendix D of the final rule to the current requirements of the HCS 1994.

HCS 1994	HCS 2012
(g) Material safety data sheets. (g)(1) Chemical manufacturers and importers shall obtain or develop a material safety data sheet for each hazardous chemical they produce or import. Employers shall have a material safety data sheet in the workplace for each hazardous chemical which they use. (g)(2) Each material safety data sheet shall be in English (although the employer may maintain copies in other languages as well), and shall contain at least the following information: (g)(2)(i) The identity used on the label, and, except as provided for in paragraph (i) of this section on trade secrets: (g)(2)(i)(A) If the hazardous chemical is a single substance, its chemical and common name(s); (g)(2)(i)(B) If the hazardous chemical is a mixture which has been tested as a whole to determine its hazards, the chemical and common name(s) of the ingredients which contribute to these known hazards, and the common name(s) of the mixture itself; or, (g)(2)(i)(C) If the hazardous chemical is a mixture which has not been tested as a whole: (g)(2)(i)(C)(1) The chemical and common name(s) of all ingredients which have been determined to be health hazards, and which comprise 1% or greater of the composition, except that chemicals identified as carcinogens under paragraph (d) of this section shall be listed if the concentrations are 0.1% or greater; and, (g)(2)(i)(C)(2) The chemical and common name(s) of all ingredients which have been determined to be health hazards, and which comprise less than 1% (0.1% for carcinogens) of the mixture, if there is evidence that the ingredient(s) could be released from the mixture in concentrations which would exceed an established OSHA permissible exposure limit or ACGIH Threshold Limit Value, or could present a health risk to employees; and, (g)(2)(i)(C)(3) The chemical and common name(s) of all ingredients which have been determined to present a physical hazard when present in the mixture; (g)(2)(ii) Physical and chemical characteristics of the hazardous chemical (such as vapor pressure, flash point); (g)(2)(iii) The physical hazards of the hazardous chemical, including the potential for fire, explosion, and reactivity; (g)(2)(iv) The health hazards of the hazardous chemical, including signs and symptoms of exposure, and any medical conditions which are generally recognized as being aggravated by exposure to the chemical;	(g) <u>Safety data sheets.</u> (g)(1) Chemical manufacturers and importers shall obtain or develop a safety data sheet for each hazardous chemical they produce or import. Employers shall have a safety data sheet in the workplace for each hazardous chemical which they use. (g)(2) <u>The chemical manufacturer or importer preparing the safety data sheet shall ensure that it is in English (although the employer may maintain copies in other languages as well), and includes at least the following section numbers and headings, and associated information under each heading, in the order listed (See Appendix D to §1910.1200--Safety Data Sheets, for the specific content of each section of the safety data sheet):</u> (i) <u>Section 1, Identification;</u> (ii) <u>Section 2, Hazard(s) identification;</u> (iii) <u>Section 3, Composition/information on ingredients;</u> (iv) <u>Section 4, First-aid measures;</u> (v) <u>Section 5, Fire-fighting measures;</u> (vi) <u>Section 6, Accidental release measures;</u> (vii) <u>Section 7, Handling and storage;</u> (viii) <u>Section 8, Exposure controls/personal protection;</u> (ix) <u>Section 9, Physical and chemical properties;</u> (x) <u>Section 10, Stability and reactivity;</u> (xi) <u>Section 11, Toxicological information;</u> (xii) <u>Section 12, Ecological information;</u> (xiii) <u>Section 13, Disposal considerations;</u> (xiv) <u>Section 14, Transport information;</u> (xv) <u>Section 15, Regulatory information; and</u> (xvi) <u>Section 16, Other information, including date of preparation or last revision.</u> <u>Note 1 to paragraph (g)(2): To be consistent with the GHS, an SDS must also include the headings in paragraphs (g)(2)(xii) through (g)(2)(xv) in order.</u>

(g)(2)(v) The primary route(s) of entry;

(g)(2)(vi) The OSHA permissible exposure limit, ACGIH Threshold Limit Value, and any other exposure limit used or recommended by the chemical manufacturer, importer, or employer preparing the material safety data sheet, where available;

(g)(2)(vii) Whether the hazardous chemical is listed in the National Toxicology Program (NTP) Annual Report on Carcinogens (latest edition) or has been found to be a potential carcinogen in the International Agency for Research on Cancer (IARC) Monographs (latest editions), or by OSHA;

(g)(2)(viii) Any generally applicable precautions for safe handling and use which are known to the chemical manufacturer, importer or employer preparing the material safety data sheet, including appropriate hygienic practices, protective measures during repair and maintenance of contaminated equipment, and procedures for clean-up of spills and leaks;

(g)(2)(ix) Any generally applicable control measures which are known to the chemical manufacturer, importer or employer preparing the material safety data sheet, such as appropriate engineering controls, work practices, or personal protective equipment;

(g)(2)(x) Emergency and first aid procedures;

(g)(2)(xi) The date of preparation of the material safety data sheet or the last change to it; and,

(g)(2)(xii) The name, address and telephone number of the chemical manufacturer, importer, employer or other responsible party preparing or distributing the material safety data sheet, who can provide additional information on the hazardous chemical and appropriate emergency procedures, if necessary;

(g)(3) If no relevant information is found for any given category on the material safety data sheet, the chemical manufacturer, importer or employer preparing the material safety data sheet shall mark it to indicate that no applicable information was found.

(g)(4) Where complex mixtures have similar hazards and contents (i.e. the chemical ingredients are essentially the same, but the specific composition varies from mixture to mixture), the chemical manufacturer, importer or employer may prepare one material safety data sheet to apply to all of these similar mixtures.

(g)(5) The chemical manufacturer, importer or employer preparing the material safety data sheet shall ensure that the information recorded accurately reflects the scientific evidence used in making the hazard determination. If the chemical manufacturer, importer or employer preparing the material safety data sheet becomes newly aware of any significant information regarding the hazards of a chemical, or ways to protect against the hazards, this new information shall be added to the material safety data sheet within three months. If the chemical is not currently being produced or imported the chemical manufacturer or importer shall add the information to the material safety data sheet before the chemical is introduced into the workplace again.

(g)(6)(i) Chemical manufacturers or importers shall ensure that distributors and employers are provided an appropriate material safety data sheet with their initial shipment, and with the first shipment after a material safety data sheet is updated;

(g)(6)(ii) The chemical manufacturer or importer shall either provide material safety data sheets with the shipped containers or send them to the distributor or employer prior to or at the time of the shipment;

(g)(6)(iii) If the material safety data sheet is not provided with a shipment that has been labeled as a hazardous chemical, the distributor or employer shall obtain one from the chemical manufacturer or importer as soon as possible; and,

(g)(6)(iv) The chemical manufacturer or importer shall also provide distributors or employers with a material safety data sheet upon request.

(g)(7)(i) Distributors shall ensure that material safety data sheets, and updated information, are provided to other distributors and employers with their initial shipment and with the first shipment after a material safety data sheet is updated;

(g)(7)(ii) The distributor shall either provide material safety data sheets with the shipped containers, or send them to the other distributor or employer prior to or at the time of the shipment;

(g)(7)(iii) Retail distributors selling hazardous chemicals to employers having a commercial account shall provide a material safety data sheet to such employers upon request, and shall post a sign or otherwise inform them that a material safety data sheet is available;

(g)(7)(iv) Wholesale distributors selling hazardous chemicals to employers over-the-counter may also provide material safety data sheets upon the

Note 2 to paragraph (g)(2): OSHA will not be enforcing information requirements in sections 12 through 15, as these areas are not under its jurisdiction.

(g)(3) If no relevant information is found for any sub-heading within a section on the safety data sheet, the chemical manufacturer, importer or employer preparing the safety data sheet shall mark it to indicate that no applicable information was found.

(g)(4) Where complex mixtures have similar hazards and contents (i.e. the chemical ingredients are essentially the same, but the specific composition varies from mixture to mixture), the chemical manufacturer, importer or employer may prepare one safety data sheet to apply to all of these similar mixtures.

(g)(5) The chemical manufacturer, importer or employer preparing the safety data sheet shall ensure that the information provided accurately reflects the scientific evidence used in making the hazard classification. If the chemical manufacturer, importer or employer preparing the safety data sheet becomes newly aware of any significant information regarding the hazards of a chemical, or ways to protect against the hazards, this new information shall be added to the safety data sheet within three months. If the chemical is not currently being produced or imported the chemical manufacturer or importer shall add the information to the safety data sheet before the chemical is introduced into the workplace again.

(g)(6)(i) Chemical manufacturers or importers shall ensure that distributors and employers are provided an appropriate safety data sheet with their initial shipment, and with the first shipment after a safety data sheet is updated;

(g)(6)(ii) The chemical manufacturer or importer shall either provide safety data sheets with the shipped containers or send them to the distributor or employer prior to or at the time of the shipment;

(g)(6)(iii) If the safety data sheet is not provided with a shipment that has been labeled as a hazardous chemical, the distributor or employer shall obtain one from the chemical manufacturer or importer as soon as possible; and,

(g)(6)(iv) The chemical manufacturer or importer shall also provide distributors or employers with a safety data sheet upon request.

(g)(7)(i) Distributors shall ensure that safety data sheets, and updated information, are provided to other distributors and employers with their initial shipment and with the first shipment after a safety data sheet is updated;

(g)(7)(ii) The distributor shall either provide safety data sheets with the shipped containers, or send them to the other distributor or employer prior to or at the time of the shipment;

(g)(7)(iii) Retail distributors selling hazardous chemicals to employers having a commercial account shall provide a safety data sheet to such employers upon request, and shall post a sign or otherwise inform them that a safety data sheet is available;

(g)(7)(iv) Wholesale distributors selling hazardous chemicals to employers over-the-counter may also provide safety data sheets upon the request of the employer at the time of the over-the-counter purchase, and shall post a sign or otherwise inform such employers that a safety data sheet is available;

(g)(7)(v) If an employer without a commercial account purchases a hazardous chemical from a retail distributor not required to have safety data sheets on file (i.e., the retail distributor does not have commercial accounts and does not use the materials), the retail distributor shall provide the employer, upon request, with the name, address, and telephone number of the chemical manufacturer, importer, or distributor from which a safety data sheet can be obtained;

(g)(7)(vi) Wholesale distributors shall also provide safety data sheets to employers or other distributors upon request; and,

(g)(7)(vii) Chemical manufacturers, importers, and distributors need not provide safety data sheets to retail distributors that have informed them that the retail distributor does not sell the product to commercial accounts or open the sealed container to use it in their own workplaces.

(g)(8) The employer shall maintain in the workplace copies of the required safety data sheets for each hazardous chemical, and shall ensure that they are readily accessible during each work shift to employees when they are in their work area(s). (Electronic access and other alternatives to maintaining paper copies of the safety data sheets are permitted as long as no barriers to immediate employee access in each workplace are created by such options.)

(g)(9) Where employees must travel between workplaces during a workshift, i.e., their work is carried out at more than one geographical location, the safety data sheets may be kept at the primary workplace facility. In this situation, the employer shall ensure that employees can immediately obtain the required information in an emergency.

(g)(10) Safety data sheets may be kept in any form, including operating procedures, and may be designed to cover groups of hazardous chemicals in a

request of the employer at the time of the over-the-counter purchase, and shall post a sign or otherwise inform such employers that a ~~material~~ safety data sheet is available;

(g)(7)(v) If an employer without a commercial account purchases a hazardous chemical from a retail distributor not required to have ~~material~~ safety data sheets on file (i.e., the retail distributor does not have commercial accounts and does not use the materials), the retail distributor shall provide the employer, upon request, with the name, address, and telephone number of the chemical manufacturer, importer, or distributor from which a ~~material~~ safety data sheet can be obtained;

(g)(7)(vi) Wholesale distributors shall also provide ~~material~~ safety data sheets to employers or other distributors upon request; and,

(g)(7)(vii) Chemical manufacturers, importers, and distributors need not provide ~~material~~ safety data sheets to retail distributors that have informed them that the retail distributor does not sell the product to commercial accounts or open the sealed container to use it in their own workplaces.

(g)(8) The employer shall maintain in the workplace copies of the required ~~material~~ safety data sheets for each hazardous chemical, and shall ensure that they are readily accessible during each work shift to employees when they are in their work area(s). (Electronic access, ~~microfiche~~, and other alternatives to maintaining paper copies of the ~~material~~ safety data sheets are permitted as long as no barriers to immediate employee access in each workplace are created by such options.)

(g)(9) Where employees must travel between workplaces during a workshift, i.e., their work is carried out at more than one geographical location, the ~~material~~ safety data sheets may be kept at the primary workplace facility. In this situation, the employer shall ensure that employees can immediately obtain the required information in an emergency.

(g)(10) ~~Material~~ safety data sheets may be kept in any form, including operating procedures, and may be designed to cover groups of hazardous chemicals in a work area where it may be more appropriate to address the hazards of a process rather than individual hazardous chemicals. However, the employer shall ensure that in all cases the required information is provided for each hazardous chemical, and is readily accessible during each work shift to employees when they are in ~~in~~ their work area(s).

(g)(11) ~~Material~~ safety data sheets shall also be made readily available, upon request, to designated representatives ~~and to the Assistant Secretary, in accordance with the requirements of 29 CFR 1910.1020(e). The Director shall also be given access to material safety data sheets in the same manner.~~

work area where it may be more appropriate to address the hazards of a process rather than individual hazardous chemicals. However, the employer shall ensure that in all cases the required information is provided for each hazardous chemical, and is readily accessible during each work shift to employees when they are in their work area(s).

(g)(11) Safety data sheets shall also be made readily available, upon request, to designated representatives, the Assistant Secretary, and the Director, in accordance with the requirements of 29 CFR 1910.1020(e).

Training and Information.

The provisions in paragraph (h) indicate that the new label, safety data sheet formats and presentation of information must be discussed in training. All employers will be required to conduct additional training to ensure that their employees are familiar with the new standardized labels and safety data sheets. Otherwise, the training provisions remain the same as the HCS 1994.

HCS 1994	HCS 2012
(h) <i>Employee information and training.</i> (h)(1) Employers shall provide employees with effective information and training on hazardous chemicals in their work area at the time of their initial assignment, and whenever a new physical or health hazard the employees have not previously been trained about is introduced into their work area. Information and training may be designed to cover categories of hazards (e.g., flammability, carcinogenicity) or specific chemicals. Chemical-specific information must always be available through labels and material safety data sheets. (h)(2) Information. Employees shall be informed of: (h)(2)(i) The requirements of this section; (h)(2)(ii) Any operations in their work area where hazardous chemicals are present; and, (h)(2)(iii) The location and availability of the written hazard communication program, including the required list(s) of hazardous chemicals, and material safety data sheets required by this section. (h)(3) Training. Employee training shall include at least: (h)(3)(i) Methods and observations that may be used to detect the presence or release of a hazardous chemical in the work area (such as monitoring conducted by the employer, continuous monitoring devices, visual appearance or odor of hazardous chemicals when being released, etc.); (h)(3)(ii) The physical and health hazards of the chemicals in the work area; (h)(3)(iii) The measures employees can take to protect themselves from these hazards, including specific procedures the employer has implemented to	(h) <i>Employee information and training.</i> (h)(1) Employers shall provide employees with effective information and training on hazardous chemicals in their work area at the time of their initial assignment, and whenever a new chemical hazard the employees have not previously been trained about is introduced into their work area. Information and training may be designed to cover categories of hazards (e.g., flammability, carcinogenicity) or specific chemicals. Chemical-specific information must always be available through labels and safety data sheets. (h)(2) Information. Employees shall be informed of: (h)(2)(i) The requirements of this section; (h)(2)(ii) Any operations in their work area where hazardous chemicals are present; and, (h)(2)(iii) The location and availability of the written hazard communication program, including the required list(s) of hazardous chemicals, and safety data sheets required by this section. (h)(3) Training. Employee training shall include at least: (h)(3)(i) Methods and observations that may be used to detect the presence or release of a hazardous chemical in the work area (such as monitoring conducted by the employer, continuous monitoring devices, visual appearance or odor of hazardous chemicals when being released, etc.); (h)(3)(ii) The physical, health, simple asphyxiation, combustible dust and pyrophoric gas hazards, as well as hazards not otherwise classified, of the chemicals in the work area; (h)(3)(iii) The measures employees can take to protect themselves from these

protect employees from exposure to hazardous chemicals, such as appropriate work practices, emergency procedures, and personal protective equipment to be used; and,

(h)(3)(iv) The details of the hazard communication program developed by the employer, including an explanation of the labeling system ~~and the material~~ safety data sheet, and how employees can obtain and use the appropriate hazard information.

hazards, including specific procedures the employer has implemented to protect employees from exposure to hazardous chemicals, such as appropriate work practices, emergency procedures, and personal protective equipment to be used; and,

(h)(3)(iv) The details of the hazard communication program developed by the employer, including an explanation of the labels received on shipped containers and the workplace labeling system used by their employer; the safety data sheet, including the order of information and how employees can obtain and use the appropriate hazard information.

Trade secrets.

The trade secret provisions of the GHS are consistent with the HCS 1994 and therefore only a few changes were made to this section. The GHS, unlike the current HCS, requires disclosure of the percentage composition of mixtures on the SDS. This final rule adopts this requirement, but allows the manufacturer to claim trade secret protection for this requirement. This is the only substantive change to the existing standard's trade secret protections.

HCS 1994	HCS 2012
(i) <i>Trade secrets.</i> (i)(1) The chemical manufacturer, importer, or employer may withhold the specific chemical identity, including the chemical name and other specific identification of a hazardous chemical, from the material safety data sheet, provided that: (i)(1)(i) The claim that the information withheld is a trade secret can be supported; (i)(1)(ii) Information contained in the material safety data sheet concerning the properties and effects of the hazardous chemical is disclosed; (i)(1)(iii) The material safety data sheet indicates that the specific chemical identity is being withheld as a trade secret; and, (i)(1)(iv) The specific chemical identity is made available to health professionals, employees, and designated representatives in accordance with the applicable provisions of this paragraph. (i)(2) Where a treating physician or nurse determines that a medical emergency exists and the specific chemical identity of a hazardous chemical is necessary for emergency or first-aid treatment, the chemical manufacturer, importer, or employer shall immediately disclose the specific chemical identity of a trade secret chemical to that treating physician or nurse, regardless of the existence of a written statement of need or a confidentiality agreement. The chemical manufacturer, importer, or employer may require a written statement of need and confidentiality agreement, in accordance with the provisions of paragraphs (i)(3) and (4) of this section, as soon as circumstances permit. (i)(3) In non-emergency situations, a chemical manufacturer, importer, or employer shall, upon request, disclose a specific chemical identity, otherwise permitted to be withheld under paragraph (i)(1) of this section, to a health professional (i.e. physician, industrial hygienist, toxicologist, epidemiologist, or occupational health nurse) providing medical or other occupational health services to exposed employee(s), and to employees or designated representatives, if: (i)(3)(i) The request is in writing; (i)(3)(ii) The request describes with reasonable detail one or more of the following occupational health needs for the information: (i)(3)(ii)(A) To assess the hazards of the chemicals to which employees will be exposed; (i)(3)(ii)(B) To conduct or assess sampling of the workplace atmosphere to determine employee exposure levels; (i)(3)(ii)(C) To conduct pre-assignment or periodic medical surveillance of exposed employees; (i)(3)(ii)(D) To provide medical treatment to exposed employees; (i)(3)(ii)(E) To select or assess appropriate personal protective equipment for exposed employees; (i)(3)(ii)(F) To design or assess engineering controls or other protective measures for exposed employees; and, (i)(3)(ii)(G) To conduct studies to determine the health effects of exposure. (i)(3)(iii) The request explains in detail why the disclosure of the specific chemical identity is essential and that, in lieu thereof, the disclosure of the following information to the health professional, employee, or designated representative, would not satisfy the purposes described in paragraph (i)(3)(ii) of this section: (i)(3)(iii)(A) The properties and effects of the chemical;	(i) <i>Trade secrets.</i> (i)(1) The chemical manufacturer, importer, or employer may withhold the specific chemical identity, including the chemical name, other specific identification of a hazardous chemical, <u>or the exact percentage (concentration) of the substance in a mixture</u>, from the safety data sheet, provided that: (i)(1)(i) The claim that the information withheld is a trade secret can be supported; (i)(1)(ii) Information contained in the safety data sheet concerning the properties and effects of the hazardous chemical is disclosed; (i)(1)(iii) The safety data sheet indicates that the specific chemical identity <u>and/or percentage of composition</u> is being withheld as a trade secret; and, (i)(1)(iv) The specific chemical identity <u>and percentage</u> is made available to health professionals, employees, and designated representatives in accordance with the applicable provisions of this paragraph (i). (i)(2) Where a treating physician or nurse determines that a medical emergency exists and the specific chemical identity <u>and/or specific percentage of composition</u> of a hazardous chemical is necessary for emergency or first-aid treatment, the chemical manufacturer, importer, or employer shall immediately disclose the specific chemical identity <u>or percentage composition</u> of a trade secret chemical to that treating physician or nurse, regardless of the existence of a written statement of need or a confidentiality agreement. The chemical manufacturer, importer, or employer may require a written statement of need and confidentiality agreement, in accordance with the provisions of paragraphs (i)(3) and (4) of this section, as soon as circumstances permit. (i)(3) In non-emergency situations, a chemical manufacturer, importer, or employer shall, upon request, disclose a specific chemical identity <u>or percentage composition</u>, otherwise permitted to be withheld under paragraph (i)(1) of this section, to a health professional (i.e. physician, industrial hygienist, toxicologist, epidemiologist, or occupational health nurse) providing medical or other occupational health services to exposed employee(s), and to employees or designated representatives, if: (i)(3)(i) The request is in writing; (i)(3)(ii) The request describes with reasonable detail one or more of the following occupational health needs for the information: (i)(3)(ii)(A) To assess the hazards of the chemicals to which employees will be exposed; (i)(3)(ii)(B) To conduct or assess sampling of the workplace atmosphere to determine employee exposure levels; (i)(3)(ii)(C) To conduct pre-assignment or periodic medical surveillance of exposed employees; (i)(3)(ii)(D) To provide medical treatment to exposed employees; (i)(3)(ii)(E) To select or assess appropriate personal protective equipment for exposed employees; (i)(3)(ii)(F) To design or assess engineering controls or other protective measures for exposed employees; and, (i)(3)(ii)(G) To conduct studies to determine the health effects of exposure. (i)(3)(iii) The request explains in detail why the disclosure of the specific chemical identity <u>or percentage composition</u> is essential and that, in lieu thereof, the disclosure of the following information to the health professional, employee, or designated representative, would not satisfy the purposes described in paragraph

(i)(3)(iii)(B) Measures for controlling workers' exposure to the chemical;

(i)(3)(iii)(C) Methods of monitoring and analyzing worker exposure to the chemical; and,

(i)(3)(iii)(D) Methods of diagnosing and treating harmful exposures to the chemical;

(i)(3)(iv) The request includes a description of the procedures to be used to maintain the confidentiality of the disclosed information; and,

(i)(3)(v) The health professional, and the employer or contractor of the services of the health professional (i.e. downstream employer, labor organization, or individual employee), employee, or designated representative, agree in a written confidentiality agreement that the health professional, employee, or designated representative, will not use the trade secret information for any purpose other than the health need(s) asserted and agree not to release the information under any circumstances other than to OSHA, as provided in paragraph (i)(6) of this section, except as authorized by the terms of the agreement or by the chemical manufacturer, importer, or employer.

(i)(4) The confidentiality agreement authorized by paragraph (i)(3)(iv) of this section:

(i)(4)(i) May restrict the use of the information to the health purposes indicated in the written statement of need;

(i)(4)(ii) May provide for appropriate legal remedies in the event of a breach of the agreement, including stipulation of a reasonable pre-estimate of likely damages; and,

(i)(4)(iii) May not include requirements for the posting of a penalty bond.

(i)(5) Nothing in this standard is meant to preclude the parties from pursuing non-contractual remedies to the extent permitted by law.

(i)(6) If the health professional, employee, or designated representative receiving the trade secret information decides that there is a need to disclose it to OSHA, the chemical manufacturer, importer, or employer who provided the information shall be informed by the health professional, employee, or designated representative prior to, or at the same time as, such disclosure.

(i)(7) If the chemical manufacturer, importer, or employer denies a written request for disclosure of a specific chemical identity, the denial must:

(i)(7)(i) Be provided to the health professional, employee, or designated representative, within thirty days of the request;

(i)(7)(ii) Be in writing;

(i)(7)(iii) Include evidence to support the claim that the specific chemical identity is a trade secret;

(i)(7)(iv) State the specific reasons why the request is being denied; and,

(i)(7)(v) Explain in detail how alternative information may satisfy the specific medical or occupational health need without revealing the **specific chemical identity**.

(i)(8) The health professional, employee, or designated representative whose request for information is denied under paragraph (i)(3) of this section may refer the request and the written denial of the request to OSHA for consideration.

(i)(9) When a health professional, employee, or designated representative refers the denial to OSHA under paragraph (i)(8) of this section, OSHA shall consider the evidence to determine if:

(i)(9)(i) The chemical manufacturer, importer, or employer has supported the claim that the specific chemical identity is a trade secret;

(i)(9)(ii) The health professional, employee, or designated representative has supported the claim that there is a medical or occupational health need for the information; and,

(i)(9)(iii) The health professional, employee or designated representative has demonstrated adequate means to protect the confidentiality.

(i)(10)(i) If OSHA determines that the specific chemical identity requested under paragraph

(i)(3) of this section is not a "bona fide" trade secret, or that it is a trade secret, but the requesting health professional, employee, or designated representative has a legitimate medical or occupational health need for the information, has executed a written confidentiality agreement, and has shown adequate means to protect the confidentiality of the information, the chemical manufacturer, importer, or employer will be subject to citation by OSHA.

(i)(3)(ii) of this section:

(i)(3)(iii)(A) The properties and effects of the chemical;

(i)(3)(iii)(B) Measures for controlling workers' exposure to the chemical;

(i)(3)(iii)(C) Methods of monitoring and analyzing worker exposure to the chemical; and,

(i)(3)(iii)(D) Methods of diagnosing and treating harmful exposures to the chemical;

(i)(3)(iii)(iv) The request includes a description of the procedures to be used to maintain the confidentiality of the disclosed information; and,

(i)(3)(iii)(v) The health professional, and the employer or contractor of the services of the health professional (i.e. downstream employer, labor organization, or individual employee), employee, or designated representative, agree in a written confidentiality agreement that the health professional, employee, or designated representative, will not use the trade secret information for any purpose other than the health need(s) asserted and agree not to release the information under any circumstances other than to OSHA, as provided in paragraph (i)(6) of this section, except as authorized by the terms of the agreement or by the chemical manufacturer, importer, or employer.

(i)(4) The confidentiality agreement authorized by paragraph (i)(3)(iv) of this section:

(i)(4)(i) May restrict the use of the information to the health purposes indicated in the written statement of need;

(i)(4)(ii) May provide for appropriate legal remedies in the event of a breach of the agreement, including stipulation of a reasonable pre-estimate of likely damages; and,

(i)(4)(iii) May not include requirements for the posting of a penalty bond.

(i)(5) Nothing in this standard is meant to preclude the parties from pursuing non-contractual remedies to the extent permitted by law.

(i)(6) If the health professional, employee, or designated representative receiving the trade secret information decides that there is a need to disclose it to OSHA, the chemical manufacturer, importer, or employer who provided the information shall be informed by the health professional, employee, or designated representative prior to, or at the same time as, such disclosure.

(i)(7) If the chemical manufacturer, importer, or employer denies a written request for disclosure of a specific chemical identity or percentage composition, the denial must:

(i)(7)(i) Be provided to the health professional, employee, or designated representative, within thirty days of the request;

(i)(7)(ii) Be in writing;

(i)(7)(iii) Include evidence to support the claim that the specific chemical identity or percent of composition is a trade secret;

(i)(7)(iv) State the specific reasons why the request is being denied; and,

(i)(7)(v) Explain in detail how alternative information may satisfy the specific medical or occupational health need without revealing the trade secret.

(i)(8) The health professional, employee, or designated representative whose request for information is denied under paragraph (i)(3) of this section may refer the request and the written denial of the request to OSHA for consideration.

(i)(9) When a health professional, employee, or designated representative refers the denial to OSHA under paragraph (i)(8) of this section, OSHA shall consider the evidence to determine if:

(i)(9)(i) The chemical manufacturer, importer, or employer has supported the claim that the specific chemical identity or percentage composition is a trade secret;

(i)(9)(ii) The health professional, employee, or designated representative has supported the claim that there is a medical or occupational health need for the information; and,

(i)(9)(iii) The health professional, employee or designated representative has demonstrated adequate means to protect the confidentiality.

(i)(10)(i) If OSHA determines that the specific chemical identity or percentage composition requested under paragraph (i)(3) of this section is not a "bona fide" trade secret, or that it is a trade secret, but the requesting health professional, employee, or designated representative has a legitimate medical or occupational health need for the information, has executed a written

(i)(10)(ii) If a chemical manufacturer, importer, or employer demonstrates to OSHA that the execution of a confidentiality agreement would not provide sufficient protection against the potential harm from the unauthorized disclosure of a trade secret ~~specific chemical identity~~, the Assistant Secretary may issue such orders or impose such additional limitations or conditions upon the disclosure of the requested chemical information as may be appropriate to assure that the occupational health services are provided without an undue risk of harm to the chemical manufacturer, importer, or employer.

(i)(11) If a citation for a failure to release ~~specific chemical identity~~ information is contested by the chemical manufacturer, importer, or employer, the matter will be adjudicated before the Occupational Safety and Health Review Commission in accordance with the Act's enforcement scheme and the applicable Commission rules of procedure. In accordance with the Commission rules, when a chemical manufacturer, importer, or employer continues to withhold the information during the contest, the Administrative Law Judge may review the citation and supporting documentation "in camera" or issue appropriate orders to protect the confidentiality of such matters.

(i)(12) Notwithstanding the existence of a trade secret claim, a chemical manufacturer, importer, or employer shall, upon request, disclose to the Assistant Secretary any information which this section requires the chemical manufacturer, importer, or employer to make available. Where there is a trade secret claim, such claim shall be made no later than at the time the information is provided to the Assistant Secretary so that suitable determinations of trade secret status can be made and the necessary protections can be implemented.

(i)(13) Nothing in this paragraph shall be construed as requiring the disclosure under any circumstances of process ~~or percentage of mixture~~ information, which is a trade secret.

confidentiality agreement, and has shown adequate means to protect the confidentiality of the information, the chemical manufacturer, importer, or employer will be subject to citation by OSHA.

(i)(10)(ii) If a chemical manufacturer, importer, or employer demonstrates to OSHA that the execution of a confidentiality agreement would not provide sufficient protection against the potential harm from the unauthorized disclosure of a trade secret, the Assistant Secretary may issue such orders or impose such additional limitations or conditions upon the disclosure of the requested chemical information as may be appropriate to assure that the occupational health services are provided without an undue risk of harm to the chemical manufacturer, importer, or employer.

(i)(11) If a citation for a failure to release ~~trade secret~~ information is contested by the chemical manufacturer, importer, or employer, the matter will be adjudicated before the Occupational Safety and Health Review Commission in accordance with the Act's enforcement scheme and the applicable Commission rules of procedure. In accordance with the Commission rules, when a chemical manufacturer, importer, or employer continues to withhold the information during the contest, the Administrative Law Judge may review the citation and supporting documentation "in camera" or issue appropriate orders to protect the confidentiality of such matters.

(i)(12) Notwithstanding the existence of a trade secret claim, a chemical manufacturer, importer, or employer shall, upon request, disclose to the Assistant Secretary any information which this section requires the chemical manufacturer, importer, or employer to make available. Where there is a trade secret claim, such claim shall be made no later than at the time the information is provided to the Assistant Secretary so that suitable determinations of trade secret status can be made and the necessary protections can be implemented.

(i)(13) Nothing in this paragraph shall be construed as requiring the disclosure under any circumstances of process information which is a trade secret.

OSHA's final rule requires employers to train employees on the new label elements and safety data sheet format by December 1, 2013. All other provisions are to be in effect by June 1, 2015, with two exceptions. First, distributors will be given an extra six months to ensure all manufacturer labels are updated. Second, all employers will have an additional year to ensure that updated workplace signs, hazard communication program, and auxiliary training necessary for newly identified physical or health hazards, as provided in (h)(1), are in place.

HCS 1994	HCS 2012
(j) <i>Effective dates.</i> Chemical manufacturers, importers, distributors, and employers shall be in compliance with all provisions of this section by March 11, 1994. <i>Note:</i> The effective date of the clarification that the exemption of wood and wood products from the Hazard Communication standard in paragraph (b)(6)(iv) only applies to wood and wood products including lumber which will not be processed, where the manufacturer or importer can establish that the only hazard they pose to employees is the potential for flammability or combustibility, and that the exemption does not apply to wood or wood products which have been treated with a hazardous chemical covered by this standard, and wood which may be subsequently sawed or cut generating dust has been stayed from March 11, 1994 to August 11, 1994.	(j) <i>Effective dates.</i> (j)(1) <u>Employers shall train employees regarding the new label elements and safety data sheets format by December 1, 2013.</u> (j)(2) Chemical manufacturers, importers, distributors, and employers shall be in compliance with all <u>modified provisions of this section no later than June 1, 2015, except:</u> (j)(2)(i) <u>After December 1, 2015, the distributor shall not ship containers labeled by the chemical manufacturer or importer unless the label has been modified to comply with paragraph (f)(1) of this section.</u> (j)(2)(ii) <u>All employers shall, as necessary, update any alternative workplace labeling used under paragraph (f)(6) of this section, update the hazard communication program required by paragraph (h)(1), and provide any additional employee training in accordance with paragraph (h)(3) for newly identified physical or health hazards no later than June 1, 2016.</u> (j)(3) <u>Chemical manufacturers, importers, distributors, and employers may comply with either §1910.1200, revised as of October 1, 2011, or the current version of this standard or both during the transition period.</u>

Appendix

Section-By-Section Comparison of the Changes to Safety Data Sheets to the Requirements of the 1994 Hazard Communication Standard

Section 1. Identification: The requirements in this section are not new except for format and the requirement to list recommended uses and restrictions on use.

HCS 1994	HCS 2012
• Product identity same as on label and common names (g)(2)(i)(A) - (C) • Name address and telephone number of the manufacturer, distributor, employer or other responsible party (g)(2)(xii)	1. Identification (a) Product identifier used on the label; (b) Other means of identification; (c) Recommended use of the chemical and restrictions on use; (d) Name, address, and telephone number of the manufacturer, importer, or other responsible party; (e) Emergency phone number.

Section 2. Hazard(s) identification: In this section, the employer must identify the hazards according to the new classification criteria in Appendices A and B. Pictograms, standardized hazard statements, signal words, and precautionary statements are now required.

HCS 1994	HCS 2012
- Physical hazards (g)(2)(iii) - Health hazards (g)(2)(iv)	2. Hazard(s) identification (a) Classification of the chemical in accordance with paragraph (d) of §1910.1200; (b) Signal word, hazard statement(s), symbol(s) and precautionary statement(s) in accordance with paragraph (f) of §1910.1200. (Hazard symbols may be provided as graphical reproductions in black and white or the name of the symbol, e.g., flame, skull and crossbones); (c) Describe any hazards not otherwise classified that have been identified during the classification process; (d) Where an ingredient with unknown acute toxicity is used in a mixture at a concentration $\geq 1\%$ and the mixture is not classified based on testing of the mixture as a whole, a statement that X% of the mixture consists of ingredient (s) of unknown acute toxicity is required.

Section 3. Composition/information on ingredients. This section contains no new requirements other than format.

HCS 1994	HCS 2012
- Chemical and common name of ingredients contributing to known hazards (g)(2)(i)(A), (B) - For untested mixtures, the chemical and common name of ingredients at 1% or more that present a health hazard and those that present a physical hazard in the mixture (g)(2)(i)(C)(1), (3) - Ingredients at 0.1% or greater, if listed carcinogens (g)(2)(i)(C)(2)	3. Composition/information on ingredients Except as provided for in paragraph (i) of §1910.1200 on trade secrets: For Substances (a) Chemical name; (b) Common name and synonyms; (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. For Mixtures In addition to the information required for substances: (a) The chemical name and concentration (exact percentage) or concentration ranges of all ingredients which are classified as health hazards in accordance with paragraph (d) of §1910.1200 and (1) are present above their cut-off/concentration limits; or (2) present a health risk below the cut-off/concentration limits. (b) The concentration (exact percentage) shall be specified unless a trade secret claim is made in accordance with §1910.1200(i), when there is batch-to-batch variability in the production of a mixture, or for a group of substantially similar mixtures (See A.0.5.1.2) with similar chemical composition. In these cases, concentration ranges may be used. For All Chemicals Where a Trade Secret is Claimed Where a trade secret is claimed in accordance with paragraph (i) of §1910.1200, a statement that the specific chemical identity and/or exact percentage of composition (concentration) has been withheld as a trade secret is required.

Section 4. First-aid measures. This section contains no new requirements other than format.

HCS 1994	HCS 2012
4. First-aid measures - Emergency and first-aid procedures (g)(2)(x) - Signs and symptoms of exposure (g)(2)(iv)	(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.

Section 5. Fire-fighting measures. This section contains no new requirements other than format.

HCS 1994	HCS 2012
- Physical hazards (potential for fire, explosion) (g)(2)(iii) - Emergency procedures (g)(2)(x)	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).

Section 6. Accidental release measures. This section contains no new requirements other than format.

HCS 1994	HCS 2012
- Procedures for cleanup of spills and leaks (g)(2)(viii) - Protective measures during maintenance and repair of contaminated equipment (g)(2)(viii)	6. Accidental release measures (a) Personal precautions, protective equipment, and emergency procedures. (b) Methods and materials for containment and cleaning up.

Section 7. Handling and storage. This section contains no new requirements other than format

HCS 1994	HCS 2012
Precautions for safe handling and use, including appropriate hygienic practices (g)(2)(viii)	7. Handling and storage (a) Precautions for safe handling.
	Section 8. Exposure controls/personal protection. This section contains no new requirements other than format.
HCS 1994	HCS 2012
- General applicable control measures, such as appropriate engineering controls, work practices, and personal protective equipment (g)(2)(ix) - Protective measures during maintenance and repair of contaminated equipment (g)(2)(viii) (g)(2)(ix) - Permissible exposure levels, threshold limit values, listed by OSHA, ACGIH, and other limit recommended or used by the MSDS preparer (g)(2)(vi)	8. Exposure controls/personal protection (a) OSHA permissible exposure limit (PEL), American Conference of Governmental Industrial Hygienists (ACGIH) Threshold Limit Value (TLV), and any other exposure limit used or recommended by the chemical manufacturer, importer, or employer preparing the safety data sheet, where available. (b) Appropriate engineering controls.

Section 9. Physical and chemical properties. This section contains no new requirements other than format.

HCS 1994	HCS 2012
Physical and chemical properties such as vapor pressure, flash point, etc. (g)(2)(ii)	9. Physical and chemical properties (a) Appearance (physical state, color, etc.); (b) Odor; (c) Odor 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) Vapor pressure; (l) Vapor density; (m) Relative density; (n) Solubility(ies); (o) Partition coefficient: n-octanol/water; (p) Auto-ignition temperature; (q) Decomposition temperature; (r) Viscosity.

Section 10. Stability and reactivity. Although the information on conditions to avoid and hazardous decomposition products is new to HCS, it has been required in the ANSI Z400.1 standard for a number of years.

HCS 1994	HCS 2012
Physical hazards (potential for fire, explosion, reactivity) (g)(2)(iii)	10. Stability and reactivity

Organic peroxides, pyrophoric, unstable(reactive), or water-reactive hazards (g)(2)(iii), definitions in (c)	(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.
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Section 11. Toxicological information. This section contains no new requirements other than format.

HCS 1994	HCS 2012
- Health hazards, including signs and symptoms of exposure, and any medical conditions which are generally recognized as being aggravated by exposure to the chemical (g)(2)(iv) - Primary routes of entry (g)(2)(iv) - Whether the hazardous chemical is listed in the National Toxicology Program (NTP) Report on Carcinogens (latest edition) or has been found to be a potential carcinogen in the International Agency for Research on Cancer (IARC) Monographs (latest editions), or by OSHA. (g)(2)(vi)	11. Toxicological information 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). (e) Whether the hazardous chemical is listed in the National Toxicology Program (NTP) Report on Carcinogens (latest edition) or has been found to be a potential carcinogen in the International Agency for Research on Cancer (IARC) Monographs (latest editions), or by OSHA.

Section 12. Ecological information (Non-mandatory). To be GHS-compliant the requirements for this section are provided.

HCS 1994	HCS 2012
No present requirements	12. Ecological information (Non-mandatory) (a) Ecotoxicity (aquatic and terrestrial, where available); (b) Persistence and degradability; (c) Bioaccumulative potential; (d) Mobility in soil;

Section 13. Disposal considerations (Non-mandatory). To be GHS-compliant the requirements for this section are provided, but OSHA will not enforce. However, OSHA may enforce provisions associated with safe handling and use, including appropriate hygienic practices. See Section 7 above.

HCS 1994	HCS 2012
- See Section 7 - No present requirements	13. Disposal considerations (Non-mandatory) Description of waste residues and information on their safe handling and methods of disposal, including the disposal of any contaminated packaging.

Section 14. Transport information (Non-mandatory). To be GHS-compliant the requirements for this section are provided, but OSHA will not enforce.

HCS 1994	HCS 2012
No present requirements	14. Transport information (Non-mandatory) (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.

Section 15. Regulatory information (Non-mandatory). To be GHS-compliant the requirements for this section are provided, but OSHA will not enforce.

HCS 1994

· No present requirements

HCS 2012

15. Regulatory information (Non-mandatory)

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

Section 16. Other information, including date of preparation or last revision. This section contains no new requirements other than format.

HCS 1994

· Date of preparation of MSDS or date of last change **(g)(2)(xi)**

HCS 2012

16. Other information, including date of preparation or last revision.

The date of preparation of the SDS or the last change to it.

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