

1. OCCUPATIONAL SAFETY & HEALTH
12. COMMUNICATION RULE - AIR
13. SUBJECTS STANDARD PRACTICES
14-15-16-17 1 OF 1 6900 RBW

AP00048889

Memorandum

AIR
PRODUCTS 

To: See Distribution Dept.:
From: J. C. Thirion Dept./Ext.: Corporate Safety/6206
Date: 19 June 1985
Subject: Standard Practices/Safety Guidelines - DRAFT II

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Attached are revised drafts of the Hazardous Material Communication and Material Safety Data Sheet standard practices and the Hazard Determination safety guideline. Comments received during the initial review have been incorporated into these documents.

Please review and submit your comments or suggestions by 8 July 1985. If your comments are not received by this date, it will be assumed these documents meet with your approval.



JCT/seb
Attachments

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I. SCOPE

Air Products - United States

II. PURPOSE

The purpose of this standard practice is to ensure that the hazards of all chemicals produced or imported by the company or present at our facilities are evaluated and that information concerning these hazards is transmitted to affected employees. This transmittal of information is to be accomplished by means of a comprehensive hazard communication program, which includes container labeling and other forms of warning, material safety data sheets (MSDS's), and employee training.

III. DEFINITIONS

Refer to the Appendix for the definitions of the italicized words.

IV. STANDARD PRACTICE

A. GENERAL

Part 1910.1200 of Title 29 of the Code of Federal Regulations (CFR 29, 1910.1200) addresses the evaluation and communication of chemical hazards to *employees* in the manufacturing sector.

It applies to any *chemical* known to present a hazard in the *workplace* in such a manner that employees may be *exposed* under normal conditions of use or in a *foreseeable emergency*.

It applies to laboratories and other non-manufacturing environments as follows:

- *Labels* on incoming containers of hazardous chemicals must be immediately replaced if removed or defaced.
- MSDS's received with incoming shipments of hazardous chemicals must be maintained and made readily accessible to employees.
- Employees must be apprised of the hazards of the chemicals in their workplaces (in accordance with the employee information and training section of this standard practice).

It does not apply to any hazardous waste covered by the Resource Conservation and Recovery Act of 1976. (Refer to Standard Practice 1101A, "Disposal of Hazardous Waste.")

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The Engineering Services Group must follow the employee information and training section of this standard practice when contracted by clients in SIC codes 20-39 (manufacturing sector).

B. HAZARD DETERMINATION

All chemicals *manufactured* or imported by Air Products shall be evaluated for *health and physical hazards* in accordance with the "Hazard Determination" safety guideline.

Information obtained from company and supplier MSDS's shall be used for health and physical hazard determination.

If a hazard determination cannot be conclusively determined from the MSDS, then group/division safety and/or Corporate Toxicology should be consulted for guidance. Additional hazard determination guidance may also be obtained from the "Hazard Determination" safety guideline.

C. WRITTEN HAZARD COMMUNICATION PROGRAM

Each company facility must have a written hazard communication program which describes how the criteria on labels and other forms of warning, MSDS'S, and employee information and training shall be met and identifies the individual(s) responsible for carrying out the program. The written hazard communication program must also include:

- A list of *hazardous chemicals* present in the workplace (using an *identity* which is referenced on the appropriate MSDS).
- A system which continually identifies all new hazardous chemicals entering the workplace and systematically includes them in the hazardous chemical inventory.
- The methods used for informing employees of the hazards of non-routine tasks and the hazards associated with chemicals contained in unlabeled pipes.
- The methods used to inform contractors of the hazardous chemicals contractor employees may be exposed to and appropriate protective measures. (Refer also to the "Contractor Safety" safety guideline.)

The written hazard communication program shall be made available, upon request, to employees, their designated representatives, the Occupational Safety and Health Administration (OSHA), and the National Institute for Occupational Safety and Health (NIOSH).

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D. LABELS AND OTHER FORMS OF WARNING

Containers of hazardous chemicals in the workplace shall be labeled, tagged, or marked with the identity of the substance and the appropriate *hazard warning*.

Portable containers into which hazardous chemicals are transferred from labeled containers and which are intended for *immediate use* do not have to be labeled.

Labels on incoming hazardous chemical containers shall not be defaced unless marked with the required information immediately.

NOTE: This standard practice does not apply to nor does it relieve label requirements for chemicals defined and regulated by the:

- Federal Insecticide, Fungicide, and Redenticide Act
- Federal Food, Drug and Cosmetic Act
- Federal Alcohol Administration Act
- Consumer Product Safety Act and Federal Hazardous Substances Act

E. MATERIAL SAFETY DATA SHEETS

Facilities must have an MSDS for each hazardous chemical they manufacture, import, or utilize or which is present at the facility (including those *intermediate chemicals* which can be isolated). MSDS's shall be made readily accessible during each work shift to employees in their *work areas*.

MSDS's may be kept in any form, including operating procedures, and may cover groups of chemicals or an entire process, provided they contain all of the required information outlined in Standard Practice 1007A, "Material Safety Data Sheets."

MSDS's must be made available upon request to employees, their representatives, and OSHA or NIOSH representatives.

Facilities which employ contractors must provide the contractor with an MSDS for each hazardous chemical to which the contractor employees will be exposed. (Refer to the "Contractor Safety" safety guideline.)

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F. EMPLOYEE INFORMATION AND TRAINING

Employees must be informed and trained on the hazardous chemicals in their work area at the time of their initial assignment and whenever a new hazardous chemical is introduced into the work area.

Employees must be informed of:

- The requirements of the hazard communication regulations.
- Any operations in their work area where hazardous chemicals are present.
- The location and availability of the written hazard communication program, including the list of hazardous chemicals and the respective MSDS's.

Employee training must include:

- The methods and techniques used to detect the presence or release of hazardous chemicals.
- The physical and health hazards associated with the chemicals in the work area.
- Measures used to protect employees, such as appropriate work practices, emergency procedures, and personal protective equipment.
- The details of the hazard communication program, including an explanation of the labeling system and MSDS's, and how to obtain and use the appropriate hazard information.

G. TRADE SECRETS

If a physician or nurse determines that a medical emergency exists and the *specific chemical identity* of a hazardous chemical is required for treatment, the specific chemical identity shall be immediately disclosed, if necessary, to that physician or nurse, regardless of any confidentiality agreement or statement of need.

If other non-emergency requests for trade secret/confidential information occur, the Law Department shall be consulted prior to any disclosures. (Refer to Standard Practice 111F, "Requirements Regarding the Receipt and Disclosure of Proprietary Information.")

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V. RESPONSIBILITIES

- A. The Director, Corporate Safety and Environmental Activities is responsible for the company's overall compliance with this standard practice.
- B. Facility managers are responsible for insuring that operations under their control are in compliance with this standard practice.
- C. Group/division staff is responsible for auditing its facilities to assure compliance with this standard practice and for establishing procedures to disseminate trade secret/confidential information in emergency situations.
- D. Local and corporate purchasing are responsible for obtaining MSDS's and other pertinent information from the suppliers of all hazardous chemicals and for assuring the information is transmitted to appropriate facility personnel for incorporation into the Hazard Communication Program.
- E. Distribution/sales is responsible for assuring that facilities, customers, and distributors receive MSDS's for chemicals which Air Products manufactures or imports.
- F. The Law Department is responsible for providing counsel on trade secret information.

VI. RELATED DOCUMENTS

Statement of Corporate Policy

1007 - "Product Safety and Integrity"

Standard Practices

111F - "Requirements Regarding the Receipt and Disclosure of Proprietary Information"

1007A - "Material Safety Data Sheets"

1101A - "Disposal of Hazardous Waste"

1202C - "Hazardous Material Empty Container Labeling"

Safety Guidelines

- "Hazard Determination"
- "Contractor Safety"

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APPENDIX

DEFINITIONS

Most of the definitions found in this appendix are taken in whole or in part or are paraphrased from CFR 29, 1910.1200.

Chemical - any element, chemical compound, or mixture of elements and/or compounds.

Container - any bag, barrel, bottle, box, can, cylinder, drum, reaction vessel, storage tank, or the like that contains a hazardous chemical; pipes or piping systems are not to be considered containers.

Employee - a worker employed by an employer in a workplace who may be exposed to hazardous chemicals under normal operating conditions or foreseeable emergencies, including but not limited to, production workers, line supervisors, and repair or maintenance personnel. Office workers, grounds maintenance personnel, security personnel, or non-resident management are generally not included, unless their job performance routinely involves potential exposure to hazardous chemicals.

Exposure or exposed - means that an employee is subjected to a hazardous chemical in the course of employment through any route of entry (inhalation, ingestion, skin contact, or absorption), and includes potential (accidental or possible) exposure.

Foreseeable emergency - 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 hazardous chemical into the workplace.

Hazard warning - any words, pictures, symbols, or combination thereof appearing on a label or other appropriate form of warning which conveys the hazards of the chemical(s) in the container(s).

Hazardous chemical - any chemical which is a physical hazard or a health hazard.

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Health hazard - 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.

Identity - any chemical or common name which is indicated on the 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 which it is transferred.

Intermediate chemical - a substance which is neither a raw material nor a product, but is manufactured in our company processes. An example is mononitrotoluene.

Label - any written, printed, or graphic material displayed on or affixed to containers of hazardous chemicals.

Material safety data sheet (MSDS) - a document containing detailed safety, health, and environmental protection information on a specific or family of gas and/or chemical products. (Refer to Standard Practice 1007A, "Material Safety Data Sheets.")

Physical hazard - a chemical for which there is scientifically valid evidence that it is cryogenic, a combustible liquid, a compressed gas, explosive, flammable, an organic peroxide, an oxidizer, pyrophoric, unstable (reactive) or water reactive.

Manufacture - to produce, process, formulate, or repackage.

Specific chemical identity - the chemical name, Chemical Abstracts Service (CAS) Registry Number, or any other information that reveals the precise chemical designation of the substance.

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Trade secret - any confidential formula, pattern, process, device, information, or compilation of information (including chemical name or other unique chemical identifier) that is used in our business, and that gives us an opportunity to obtain an advantage over competitors who do not know or use it.

Work area - a room or defined space in a workplace where hazardous chemicals are produced or used and where employees are present.

Workplace - an establishment at one geographical location containing one or more work areas.

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MATERIAL SAFETY
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I. SCOPE

Air Products - United States (excluding Engineering Services Group)

II. PURPOSE

The purpose of this standard practice is to define the methods and responsibilities concerning the development, approval, and distribution of material safety data sheets.

III. STANDARD PRACTICE

A. GENERAL

A material safety data sheet (MSDS) is a document containing detailed safety, health, and environmental protection information regarding a specific or family of gas and/or chemical products.

An MSDS shall be obtained or developed for each gas or chemical produced, imported, or tolled by Air Products.

The MSDS shall contain the safety related product information outlined in Section III.8 below. The information contained in the MSDS shall be obtained from the latest reliable sources. In situations where relevant information is unavailable in the literature, appropriate testing/research programs shall be established to obtain the information. In the case of products where safety information is not available or has not yet been fully investigated, the MSDS must make the user aware of this fact and recommend appropriate precautions both for samples and new products. Additional information may be added to the MSDS as needed.

B. INFORMATION ELEMENTS

The following information elements shall be included on all MSDS's. When specific information elements do not apply to a particular chemical, the absence of applicability shall be so stated on the MSDS.

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1. General

- Product name
- Trade name and synonyms
- Chemical name and synonyms
- Chemical family
- Formula
- Emergency telephone number(s)
- Company name and address
- Appropriate liability disclaimer
- Issue date

NOTE: The specific chemical identity of a substance may be withheld from the MSDS under the following conditions:

- The MSDS indicates that the specific chemical identity is being withheld as a trade secret.
- The claim that the information being withheld is a trade secret can be substantiated.
- The hazardous properties and health effects of the chemical are included on the MSDS.

2. Hazardous Ingredients

- The listing of mixture components in concentration of 1.0% or greater which pose fire or health hazards from normal or misuse (including recognized carcinogens present at 0.1% concentration or greater)
- Threshold limit value, permissible exposure limit, and other exposure limit used or recommended by the chemical manufacturer or importer preparing the MSDS for each hazardous ingredient

3. Physical data

- Boiling point
- Vapor pressure
- Vapor density
- Solubility in water
- Appearance and odor
- Freezing point
- Specific gravity
- Evaporation rate
- Percent volatile by volume
- pH

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4. Fire and explosion data

- Flash point
- Auto ignition temperature
- Electrical classification group
- Special fire fighting procedures
- Unusual fire and explosion hazards - hazardous combustion products
- Flammable limits
- Extinguishing media

5. Health hazard data

- Signs and symptoms of exposure
- Medical conditions generally recognized as aggravated by exposure
- Primary routes of entry
- Permissible exposure limit (PEL) and/or threshold limit value (TLV)
- Toxicological properties
- Emergency and first-aid procedures
- Notes to physician

6. Reactivity data

- Stability - stable or unstable
- Incompatibility (materials to avoid)
- Hazardous decomposition products
- Hazardous polymerization - will or will not occur and conditions to avoid
- Common material (liquid, gas or solid) with which the materials in question, when mixed, could create a hazardous situation

7. Environmental protection

- Spill or accidental release procedures
- Waste disposal methods
- Environmental compliance requirements (Resource Conservation and Recovery Act status)

8. Special protection information

- Respiratory protection
- Ventilation - local, mechanical, special, other
- Protective gloves
- Eye protection
- Other protective equipment

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The following Air Products personnel or organizations shall be provided with MSDS's:

- Corporate Coordinator of Toxicology and Environmental Activities
- All responders for the product listed in the Emergency Response Directory (including emergency operators)
- Members of the Hazard and Risk Analysis and Control (HARAC) team
- Corporate Safety
- Research and development libraries
- Health Unit
- Appropriate distribution departments
- Appropriate product managers
- Appropriate plant and distribution locations

All new and revised MSDS's shall be provided to Chemtrec.

E. REVISIONS

Each MSDS will be reviewed every three (3) years or sooner by the party responsible for the product to assure that the information is complete and current with the latest product related research developments. The appropriate safety, health, and environmental departments will establish procedures to assure this review is performed. An issue date shall be indicated on the MSDS for this purpose.

When new information regarding the hazards of a chemical or ways to protect against the hazards of a chemical becomes available, this information shall be evaluated in accordance with the "Hazard Determination" safety guideline and added to the MSDS within three (3) months if this information is determined to be significant.

NOTE: Prudence would dictate that significant information should be disseminated to customers and sample recipients as soon as possible.

F. LABELS

The information which appears on a specific material's label shall be compatible with the information on the current MSDS for that material.

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9. Special precautions

- Labeling information
- Special handling recommendations
- Special storage recommendations
- Special packaging recommendations
- Other appropriate recommendations
- Regulatory concerns - DOT shipping classifications, etc.
- Toxic Substances Control Act status

C. REVIEW AND APPROVAL

The initial MSDS and those with significant revision shall be reviewed and approved prior to publication and distribution by:

- Product manager
- Group/division safety, health, and environmental departments
- Corporate Toxicology Department
- Corporate Medical Department
- Law Department
- Others as required by group, division, and/or departmental procedures

D. DISTRIBUTION

An MSDS shall be distributed to each customer, distributor, toller, drumming facility, and recipient of a chemical sample with the initial shipment and with the first shipment after an MSDS has been updated.

NOTE: The distribution of a laboratory sample, developmental product, or new product and the corresponding hazard warning information must receive prior approval of the appropriate safety, health, and environmental department, appropriate research manager, and the Corporate Manager of Toxicology and Risk Control if a completed MSDS is not available. Once a specific substance has been approved for release, it is not necessary to obtain subsequent approval unless additional significant information regarding the hazards or properties of that substance has been obtained.

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IV. RESPONSIBILITIES

- A. The Director, Corporate Safety and Environmental Activities is generally responsible for the company's compliance with this standard practice.
- B. Group/division management is responsible for assigning responsibilities within their organization for developing, approving, reviewing, distributing, and revising MSDS's. This includes:
 - 1. Developing safety information needed to prepare an MSDS for the product in accordance with HARAC approved procedures.
 - 2. Reviewing the accuracy and adequacy of MSDS information and instructions developed.
 - 3. Preparing the MSDS and forwarding it to the appropriate personnel for review.
 - 4. Reviewing and, if necessary, revising the MSDS every three (3) years or sooner if significant new data becomes available.
- C. The HARAC team is responsible for reviewing the MSDS of all new or developmental products prior to their distribution
- D. The Corporate Coordinator of Toxicology and Environmental Activities is responsible for maintaining a current and historical file of MSDS's for all products produced, imported, or tolled by Air Products.

V. RELATED FORMS

- 3147 - "New Product and Waste Material Checksheet - Gas and Chemical"
- 3147-1 - "Chemical New Product/Waste Material Checksheet Supplement"

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VI. RELATED DOCUMENTS

Statement of Corporate Policy

1007 - "Product Safety and Integrity"

Standard Practices

1002A - "Emergency Response Program"

1202A - "New Product DOT Classification, Gas and Chemical Products"

CG 1202A - "Chemical New Product and Waste Material - Classification"

1202C - "Hazardous Material Empty Container Labeling"

"Hazard Communication"

Safety Guideline

"Hazard Determination"

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HAZARD DETERMINATION
SAFETY GUIDELINE

1.0 PURPOSE

- 1.1 To provide additional information and direction for compliance with the Hazardous Material Communication, Standard Practice.

2.0 SCOPE

- 2.1 This guideline applies to all APCI facilities under OSHA jurisdiction. (U.S. and Puerto Rico)

3.0 GENERAL REQUIREMENTS

- 3.1 Health and physical hazards shall be determined for all chemicals produced, imported, processed or tolled by APCI.
- 3.2 Information in any of the following sources shall be considered in the hazard determination of a chemical.

- 3.2.1 Scientifically controlled human and animal study reports.
- 3.2.2 29CFR1910, Subpart Z, Toxic and Hazardous Substances, OSHA.
- 3.2.3 Threshold Limit Values for Chemical Substances and Physical Agents in the Work Environment, ACGIH.
- 3.2.4 Annual Report on Carcinogens, National Toxicology Program (NTP).
- 3.2.5 Monographs, International Agency for Research on Cancer, (IARC).
- 3.2.6 29 CFR 1910.1001 (et. seq.) Subpart Z, Toxic and Hazardous Substances, OSHA.

NOTE: The latter three sources shall be used as the sole determinants for carcinogen hazards.

- 3.3 The evaluation of chemicals shall consider the available scientific data concerning the hazards of the substance. For health hazards, statistically significant evidence based on at least one positive study is considered to be sufficient to establish a hazardous effect, if the results meet the definitions of health hazards. (Paraphrased from 29 CFR 1910.1200(d)(2))

- 3.4 If no valid data from which a hazard determination can be made, the Corporate Manager of Toxicology and Risk Control should be consulted for recommendations regarding the methods to obtain the necessary information.
- 3.5 Toxicology studies, if necessary, shall be initiated by the Product Manager and overviewed by the Corporate Toxicology Department.
- 3.6 Prior to inclusion on the Material Safety Data Sheet (MSDS), data concerning the hazards of a newly developed substance shall be reviewed and approved by the Hazard and Risk Analysis Control (HARAC) team.

3.7 MIXTURES OF HAZARDOUS CHEMICALS

- 3.7.1 The results of testing mixtures as a whole may be used to determine whether the mixture is hazardous.
- 3.7.2 Mixtures not tested as a whole shall be assumed to present the same health hazards as do the components which comprise one percent (weight or volume) or greater of the mixture, except when available data on similar substances and products contradicts such an assumption. A mixture shall be assumed to present a carcinogenic hazard if it contains a component considered to be a carcinogen in a concentration of 0.1 percent or greater.
- 3.7.3 Any available scientifically valid data may be used to evaluate the physical hazard potential of a mixture if the mixture has not been tested as a whole.
- 3.7.4 When evidence indicates that a component of a mixture is in concentrations of less than one percent (0.1 percent for carcinogens) could be released in concentrations which would exceed OSHA permissible exposure limits or ACGIH Threshold Limit Values, or could present a health hazard to employees in those concentrations then the mixture shall be assumed to present the same hazard.

4.0 RESPONSIBILITIES

- 4.1 The Director, Corporate Safety and Environmental Activities is responsible for the overall administration of this safety guideline.

- 4.2 The Manager of Toxicology and Risk Control is responsible for providing assistance as required by groups/divisions in determining the hazards of chemicals which APCI manufactures, imports, sells or utilizes.
- 4.3 The Product Manager is responsible for insuring that an accurate hazard determination is made for each chemical under his/her control. If valid data is not available to make a hazard determination, then the Product Manager is responsible for initiating the request for a toxicology study. The toxicology study shall be coordinated through Corporate Toxicology.
- 4.4 Corporate Toxicology is responsible for determining the agent to be contracted for each toxicology study and analyzing and approving the data prior to inclusion on a Material Safety Data Sheet.
- 4.5 Group/Division Safety is responsible for coordinating hazard determinations with Corporate Toxicology.

5.0 DEFINITIONS

5.1 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.

5.1.1 Carcinogen: A chemical is considered to be a carcinogen if:

- It has been evaluated by the International Agency for Research on Cancer (IARC), and found to be a carcinogen or potential carcinogen; or
- It is listed as a carcinogen or potential carcinogen in the Annual Report on Carcinogens published by the National Toxicology Program (NTP) latest edition; or,
- It is regulated by OSHA as a carcinogen.

- 5.1.2 Corrosive: A chemical that causes visible destruction of, or irreversible alterations in, living tissue by chemical action at the site of contact. For example, a chemical is considered to be corrosive if, when tested on the intact skin of albino rabbits by the method described by the U.S. Department of Transportation in Appendix A to 49CFR Part 173, it destroys or changes irreversibly the structure of the tissue at the site of contact following an exposure period of four hours. This term shall not refer to action on inanimate surfaces.
- 5.1.3 Highly toxic: A chemical falling within any of the following categories:
- A chemical that has a median lethal dose (LD₅₀) of 50 milligrams or less per kilogram of body weight when administered orally to albino rats weighing between 200 and 300 grams each.
 - A chemical that has a median lethal dose (LD₅₀) of 200 milligrams or less per kilogram of body weight when administered by continuous contact for 24 hours (or less if death occurs within 24 hours) with the bare skin of albino rabbits weighing between two and three kilograms each.
 - A chemical that has a median lethal concentration (LC₅₀) in air of 200 parts per million by volume or less of gas or vapor, or 2 milligrams per liter or less of mist, fume, or dust, when administered by continuous inhalation for one hour (or less if death occurs within one hour) to albino rats weighing between 200 and 300 grams each.
- 5.1.4 Irritant: A chemical, which is not corrosive, but which causes a reversible inflammatory effect on living tissue by chemical action at the site of contact. A chemical is a skin irritant if, when tested on the intact skin of albino rabbits by the methods of 16 CFR 1500.41 for four hours exposure or by other appropriate techniques, it results in an empirical score of five or more. A chemical is an eye irritant if so determined under the procedure listed in 16 CFR 1500.42 or other appropriate techniques.

- 5.1.5 Sensitizer: A chemical that causes a substantial proportion of exposed people or animals to develop an allergic reaction in normal tissue after repeated exposure to the chemical.
- 5.1.6 Toxic: A chemical falling within any of the following categories:
- A chemical that has a median lethal dose (LD₅₀) of more than 50 milligrams per kilogram but not more than 500 milligrams per kilogram of body weight when administered orally to albino rats weighing between 200 and 300 grams each.
 - A chemical that has a median lethal dose (LD₅₀) of more than 200 milligrams per kilogram but not more than 1,000 milligrams per kilogram of body weight when administered by continuous contact for 24 hours (or less if death occurs within 24 hours) with the bare skin of albino rabbits weighing between two and three kilograms each.
 - A chemical that has a median lethal concentration (LC₅₀) in air of more than 200 parts per million but not more than 2,000 parts per million by volume of gas or vapor, or more than two milligrams per liter but not more than 20 milligrams per liter of mist, fume, or dust, when administered by continuous inhalation for one hour (or less if death occurs within one hour) to albino rats weighing between 200 and 300 grams each.
- 5.1.7 Target organ effects: The following is a target organ categorization of effects which may occur, including examples of signs and symptoms and chemicals which have been found to cause such effects. These examples are presented to illustrate the range and diversity of effects and hazards found in the workplace and the broad scope APCI must consider in this area but are not intended to be all inclusive.
- Hepatotoxins: Chemicals which produce liver damage.
Signs and Symptoms: Jaundice; liver enlargement.
Chemicals: Carbon tetrachloride; nitrosamines.
 - Nephrotoxins: Chemicals which produce kidney damage.
Signs and Symptoms: Edema; proteinuria.
Chemicals: Halogenated hydrocarbons; uranium.

- Neurotoxins: Chemicals which produce their primary toxic effects on the nervous system.
Signs and Symptoms: Narcosis; behavioral changes; decrease in motor functions.
Chemicals: Mercury, carbon disulfide.
 - Agents which act on the blood or hematopoietic system: Decrease hemoglobin function; deprive the body tissues of oxygen.
Signs and Symptoms: Cyanosis; loss of consciousness.
Chemicals: Carbon monoxide; cyanides .
 - Agents which damage the lungs: Chemicals which irritate or damage the pulmonary tissue.
Signs and Symptoms: Cough; tightness in chest; shortness of breath.
Chemicals: Silica; asbestos.
 - Reproductive toxins: Chemicals which affect the reproductive capabilities including chromosomal damage (mutations) and effects on fetuses (teratogenesis).
Signs and Symptoms: Birth defects; sterility.
Chemicals: Lead; DBCP.
 - Cutaneous hazards: Chemicals which affect the dermal layer of the body.
Signs and Symptoms: Defatting of the skin; rashes, irritation.
Chemicals: Ketones; chlorinated compounds.
 - Eye hazards: Chemicals which affect the eye or visual capacity.
Signs and Symptoms: Conjunctivitis; corneal damage.
Chemicals: Organic solvents; acids.
- 5.2 Physical Hazard - 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.
- 5.3 Tox - The activity of one organization, processing raw materials or substances into a product for another organization.