Hazard Communication Program

Bloom Energy

4353 North First Street, San Jose, CA 94089

March 2022

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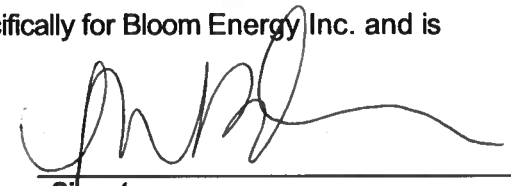
Appendices

Review and Approval

This Hazard Communication Program is written specifically for Bloom Energy Inc. and is approved and effective as of this date.

Marisa Blackshire	
Name	**Signature**
Senior Director Environmental Compliance and EH&S	March 30, 2022
Title	**Date**

Policy Statement and Scope

Bloom Energy has developed a Hazard Communication Program to ensure protection of employee health from chemical hazards in the work environment. As a California employer, Bloom Energy is required to provide and maintain this Hazard Communication Program in areas where employees may be exposed to hazardous substances (8 CCR § 5194, General Industry Safety Orders).

The Hazard Communication Program covers the following elements:

- Program responsibilities
- Safety Data Sheets (SDSs)
- Labeling hazardous materials containers
- Training
- Information and procedures for the safe handling and use of hazardous substances

This written Hazard Communication Program is available upon request to any Bloom Energy employee, their designated representatives, OSHA, and the California Occupational Safety and Health Administration (Cal-OSHA), in accordance with Section 5194 (e) 3. Employees will not be discharged or otherwise discriminated against for exercising the rights afforded by this program.

Marisa Blackshire	
Name	**Signature**
Senior Director Environmental Compliance and EH&S	March 30, 2022
Title	**Date**

Hazard Communication Program Responsibilities

Bloom Energy has developed a comprehensive Hazard Communication Program (HazCom Program) to inform and train employees about hazardous substances in the work place. The following responsibilities are assigned under this program.

Senior Director of Environmental Compliance and EH&S

Overall responsibility for implementation of the HazCom program falls to the Senior Director of Environmental Compliance and EH&S.

EH&S Manager

- Maintain, review, and annually update the HazCom Program with input from managers
- Coordinate employee training and annual retraining, and maintain training records
- Review and approve hazardous substances before purchase (BE Hazard Assessment Checklist for New Chemicals or Materials, DOC-1006326, Rev A)
- Continuously maintain and update the Hazardous Material Inventory Statement (HMIS) per SARA312
- Maintain chemical inventory list; review and update list annually
- Maintain SDS list for hazardous chemicals
- Assist managers with labeling, engineering controls, and personal protective equipment (PPE) in areas where hazardous substances are used
- Ensure contractors are aware of the provisions of the HazCom Program

Facilities Specialists

The Facility Specialists are responsible for maintaining equipment, processes, and Bloom Energy property.

Facility Specialists are responsible for reviewing and documenting outside contractors agreement on Blooms Corporate Contractor safety program.

It is the responsibility of the Facility Manager to provide the EHS Manager the Hazard Assessment Checklist prior to purchase of any new chemicals. (BE Hazard Assessment Checklist for New Chemicals or Materials, DOC-1006326, Rev A)

Procurement personnel

Procurement personnel for each facility are responsible for the following:

- Send revised copies of SDSs to the EHS Manager.
- Communicate with pertinent personnel any updates or changes of hazardous materials or chemicals
- Provide completed copies of the Hazard Assessment Checklist for New Chemicals or Materials, (DOC-1006326, Rev A) to the EHS Manager and ensure approval prior to purchase.
- Ensure SDSs and GHS compliant labels are available at point of use.

Supervisors and Managers

- Submit Hazard Assessment Checklist for New Chemicals or Materials, (DOC-1006326, Rev A) to EHS Manager and ensure approval prior to purchase.
- Ensure employees are trained in the potential hazards of their job.
- Provide regular updates to the EHS Manager concerning any changes in chemical use and/or quantity levels, ventilation, area add or change, and application technique.
- Label chemical containers per OSHA regulation 1910.1200.
- Ensure employees are trained on how to use, handle, store and dispose of hazardous substances appropriately.
- Ensure appropriate PPE and spill cleanup supplies are available in chemical use areas.
- Ensure employees attend HazCom Training.

Employees

- Employees shall participate in the HazCom Program.
- Know the location of SDSs.
- Ensure secondary containers are labeled with manufacturer information and hazards.
- Complete all required training assigned in a timely manner.
- Promptly report incidents or unsafe conditions/acts to the manager and EHS Manager.
- Know what type and the proper use of PPE needed for the task at hand.
- Properly handle, use, store and dispose of chemicals.

Outside Contractors

- Take precautions necessary to protect Bloom Energy employees and property.
- Review Bloom Energy's Contractor Safety Video
- Provide Bloom Energy's Facility Manager with copies of SDSs for chemicals before bringing them on site.
- Provide pertinent training documentation to Bloom Energy before work starts per the Corporate contractor safety program
- Follow Bloom Energy policies, regulations, codes, and other legal obligations.
- Inform employees on unique or unseen hazards they may encounter at the job site.
- Supply required PPE and other necessary equipment to employees.
- Supply equipment to perform the contracted work.
- Immediately report hazards or incidents to Bloom Energy Facility Manager and the EHS Manager.

Safety Data Sheet Control and Acquisition

A Safety Data Sheet (SDS) is kept on file for each hazardous substance listed on the Bloom Energy site specific inventory list. The most current SDSs from the manufacturer are filed in area-specific binders and maintained in each chemical use location.

The EHS Manager obtains the most current SDS from the chemical manufacturer and maintains the SDS binders and any government required documentation relating to hazardous chemicals. The EHS Representative keeps a master copy of the chemical inventory list, which can be obtained upon request. A description of the information contained in each section of the SDS is provided in Appendix B.
Before purchasing new substances, or having free samples or no charge items delivered to
the facility, the responsible person must complete and submit a Chemical Approval Form, which includes submitting an SDS from the manufacturer, and provide a copy to the EHS Manager for review. The EHS Manager will review the form, approve or deny the use of the chemical, and update the master SDS binder, as necessary.

Container Labeling/Storage

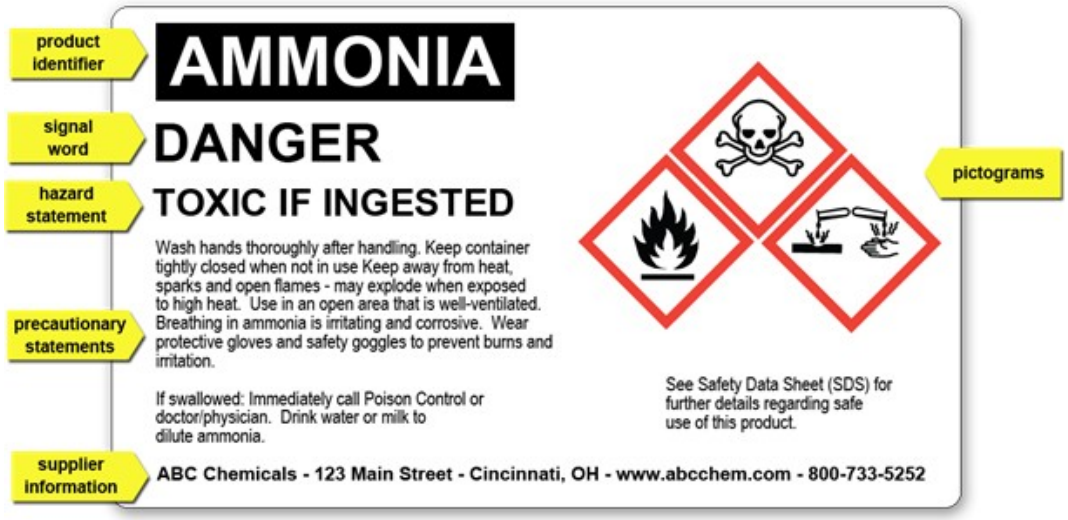
Labeling

Primary Containers

A primary container is the container in which the product is received from the manufacturer or distributor and should contain the following information:

- Name, Address and Telephone Number
- Product Identifier
- Signal Word
- Hazard Statement(s)
- Precautionary Statement(s)
- Pictogram

The following is an example of a primary label for ammonia.



Employees shall ensure that labels on incoming containers of hazardous chemicals are not removed or defaced.

Secondary Containers

Secondary containers, such as squeeze bottles or flip-top containers, must also be labeled. The Manager/Supervisor/Lead in each department are to ensure secondary containers are labeled with the following information:

- Chemical name
- Manufacturers name
- Hazard class (i.e., corrosive, flammable, irritant, etc.)
- Signal Word (Danger, Warning)
- pictogram

The following is an example of a secondary label for isopropyl alcohol.

ISOPROPYL ALCOHOL

DANGER -- FLAMMABLE

Can be irritating to the skin, eyes, and respiratory system. Prolonged inhalation may cause central nervous system effects. Flush eyes and skin with copious amounts of water, if contact occurs.

Storage

Primary and secondary containers should be closed, capped, or otherwise covered when not in use. Flammable substances (> 1 gallon) should be stored in a flammable storage cabinet after use or when not in use.

Proposition 65 (California Sites)

According to Proposition 65, it is the responsibility of Bloom Energy to inform its employees of chemicals known to the State of California to cause cancer, birth defects, or reproductive harm. Bloom Energy also must obtain updates of Proposition 65 listed chemicals and provide new information to affected employees.

The following warning must be posted:

Entering this area can expose you to chemicals known to the State of California to cause cancer and birth defects or other reproductive harm, including benzyl butyl phthalate and nickel oxide, from print inks. For more information go to www.P65Warnings.ca.gov.

In the case of newly added chemicals to the Proposition 65 list, warning requirements take effect 12 months from the date of listing.

Contractors

Facilities Manager Responsibilities

To ensure the safety of outside contractors working at a Bloom Energy site, the Facilities Manager shall be responsible for informing contractors of hazardous chemicals and/or processes they may encounter, and the necessary precautions needed should an incident occur.

Information is to include the following:

- Protective measures
- PPE requirements
- Company specific safety program requirements
- Procedures for specific locations
- Emergency procedures and contact list

Outside Contractor Companies Responsibilities

To ensure the safety of employees and visitors and protect Bloom Energy property, outside contractors who use hazardous substances ***must*** have written approval from the Facility Coordinator prior to bringing chemicals on site. Contractors will make the following information available to Facilities Coordinators:

- SDSs for all material used during the job
- An explanation of labeling and/or warning system used to identify hazardous materials
- Job descriptions for all hazardous work being performed (e.g., welding, volatile solvent use, operating equipment powered by internal combustion engines, laser use, etc.)
- Contingency plan for isolating the construction/renovation area from adjacent occupied work areas and for preventing the release of hazardous materials to the environment (e.g., release of contaminated liquid to a storm drain)

Contractors are responsible for providing their own PPE. Hazardous waste generated by the contractor must be removed from Bloom Energy property in an appropriate manner at the end of each workday/shift.

Safety Orientation Training

Safety orientation training for Bloom Energy employees covers the requirements contained in the Injury and Illness Prevention Plan (IIPP) and HazCom programs in accordance with OSHA regulations and Bloom specific policies. This includes:

- Location and availability of written HazCom and IIPP programs
- Incident/Exposure reporting and investigations
- Location and information of work areas and processes utilizing hazardous substances
- Explanation of safety training requirements
- Training in chemical labeling and SDS understanding (SDS section definitions and spill/exposure response actions)
- Actions regarding hazardous substances employees may be exposed to
- Training on methods and/or techniques used to identify a release of hazardous substances in the work area (i.e. sensors, meters, alarms and how they function).
- Training on the various types of PPE used to prevent exposure to hazardous substances and injuries.
- Emergency and first aid procedures.
- Chemical spill, leak, or exposure procedures

Job-specific Hazard Training

Employees who work with chemicals as part of their routine standard work will be given job-specific hazard training. The training will be provided by the EHS Representative, Supervisor, and/or their designee. Employees must complete and pass HazCom training before working with chemicals. Training records are maintained by the EHS Manager.

Chemical Safety

Used improperly, chemicals can cause serious injury through inhalation, absorption through the skin, or ingestion; however, if their hazardous chemical and physical properties are fully understood, chemicals in any form can be stored, handled, and used safely.

Bloom Energy uses a wide variety of chemicals, including solvents, corrosives, flammable liquids, and gases. A comprehensive list of all chemicals used at the facility can be found on the chemical inventory list maintained by the EHS Manager.

Hazard Control

Chemical and physical hazards are controlled through a combination of techniques.

Engineering controls: This is the most effective control method and includes local exhaust ventilation, chemical isolation, and/or substitution for less hazardous materials.

Administrative controls: include establishing safe work practices, designing safer procedures for processes, etc.

PPE: such as chemical resistant gloves, safety glasses, safety shoes and protective clothing.

Hazardous Non-routine Tasks

All necessary precautions will be used to eliminate or control hazardous conditions prior to performing a hazardous non-routine task. The supervisor is to provide the employee information on all hazards associated with the task in which they may be exposed, including the following information:

- Specific hazards
- Measures taken to reduce the risk of hazards, such as ventilation, ensuring the presence of another employee, a respiratory protection program, and established emergency procedures
- Required protective and safety measures

Storage and Use

Properly stored chemicals can avert serious safety hazards.

Incompatible chemicals shall be stored separately in the event there is a spill and to prevent accidents, such as fire, explosion, or a release of toxic gases. Mixtures can produce fire, explosion, or a release of toxic gases. Incompatible chemicals should be stored separately to prevent accidents (in the case of a spill). All containers in storage must have adequate secondary containment. For additional storage guidelines refer to the manufacturer's SDS.

Chemical containers should be clearly labeled with the chemical name and hazard warning property. Hazard labels should be read before each chemical use. Unlabeled and unattended containers should be immediately reported to the area Supervisor and EHS Manager.

Disposal

Bloom Energy employees are responsible for proper storage and handling of waste before pick- up.

Used, non-hazardous chemical containers placed into waste receptacles to be disposed of as municipal waste. Hazardous substance containers are to be disposed of as hazardous waste.

Chemical wastes possess the same hazards as the original material and should be handled appropriately. Contact your Supervisor or EHS Manager in any uncertain situation.

Hazardous waste is handled and collected by the following authorities or approved contractors at the various Bloom Energy facilities:

- California sites: Veolia Environmental Services
- Delaware (Newark) sites: Eldredge Inc.

Any questions regarding companies used for hazardous chemical disposal, please contact the EHS Manager for information.

Emergency Response

Direct or suspected contact with chemicals at the facility should be immediately treated following the procedures below:

- Flush the affected area with running water for 15 minutes if safe to do so per SDS.
- Remove contaminated clothing.
- Notify your supervisor.
- Seek medical attention, if necessary.

Designated medical care providers during normal business hours include the following facilities:

- California Santa Clara County Sites: El Camino Hospital
- California Alameda County sites: Washington Hospital Healthcare System
- Delaware sites: ChristianaCare Christiana Hospital

See Appendix D for locations of the medical clinics.

Appendix A:

Global Harmonization System (GHS) Label

Hazard pictograms form part of the international Globally Harmonized System of Classification and Labelling of Chemicals (GHS). Hazard pictograms are one of the key elements for the labelling of containers under the GHS, along with:

- *An identification of the product*
- *A signal word – either Danger or Warning*
- *Hazard statements*
- *Precautionary statements (how the product should be handled), and*
- *The identity of the supplier*

Appendix B:

Understanding a Safety Data Sheet (SDS)

Introduction

The purpose of the SDS is to provide vital information on health and physical hazards and information for first responders (e.g., Fire Department).

This Section of the Manual will describe each section of the SDS.

The SDS must contain 16 sections to be consistent with the UN Globally Harmonized System of Classification and Labeling of Chemicals (GHS). However, sections 12 through 15 concern matters handled by other agencies and therefore are not enforced by OSHA.

The SDS is prepared by the manufacturer of the product; style and layout may vary. Some data sheets contain excellent information, some are adequate, and others are poor. However, every section should be completed, even if the item is not applicable (indicated by N/A). Note that some information, such as the chemical family, may be included, but is not required. Other sources of data on toxic and health effects can be consulted for more complete information. Contact the EHS Manager if additional information or clarification is needed.

The American National Standards Institute (ANSI) developed a new standard (Z400.1) to assist with the format and preparation of an SDS. The purpose of this standard is to provide information in a consistent manner and to make it easier to find information regardless of the supplier of SDS. Sixteen sections are included as follows:

SDS Section 1: Identification

This section identifies the chemical on the SDS as well as the recommended uses. It provides the information on product identifier used on the label and any other common names or synonyms by which the substance is known. It also lists the name, address, and the phone number of the company, manufacturer, or distributor.

SDS Section 2: Hazard Identification

This section discusses the health effects one may encounter when exposed to the material. The section describes the appearance of the material, the potential health effects and symptoms associated with exposure, routes of entry, target organs that could be affected, etc.

SDS Section 3: Composition, Information or Ingredients

This section must identify all of the hazardous ingredients of the material. This section may also include OSHA Permissible Exposure Limits (PELs) and American Conference of Governmental Industrial Hygienists (ACGIH) Threshold Limit Values (TLVs).

SDS Section 4: First Aid Measures

This section describes possible first aid procedures for each route of entry. The procedures will be written so that untrained individuals can understand this information.

SDS Section 5: Fire-Fighting Measures

This section describes information on the fire and explosive properties of the material, extinguishing items, and general fire-fighting instructions.

SDS Section 6: Accidental Release Measures

This section gives information on how to respond when a material spills, leaks, or is released into the air. This information may include how to contain a spill or the types of equipment that may be needed for protection.

SDS Section 7: Handling and Storage

This section discusses information on handling and storage of the material. Topics that could be described are general warnings to prevent overexposure, handling procedures, and hygiene instruction to prevent continued exposure.

SDS Section 8: Exposure Controls and Personal Protection

This section discusses engineering controls and personal protective equipment that would help reduce exposure to the material. The necessary personal protective equipment should be considered for eye/face protection, skin protection, and respiratory protection.

SDS Section 9: Physical and Chemical Properties

This section includes information about the physical and chemical properties of the material. The following characteristics should be detailed: appearance, odor, physical state, pH, vapor pressure, vapor density, boiling point, freezing/melting point, solubility in water, and specific gravity or density. If these characteristics to not apply to the material, it should be indicated.

SDS Section 10: Stability and Reactivity

This section requires that potentially hazardous chemical reactions be identified and addresses chemical stability, conditions to avoid, incompatibility with other material, hazardous decomposition, and hazardous polymerization.

SDS Section 11: Technological Information

This section discusses toxicological data used to determine the hazards that are given in Section 3, “Hazard Identification.” The following information can be addressed: acute data, carcinogenicity, reproductive effects, target organs, etc.

SDS Section 12: Ecological Information

This section helps determine the environmental impact should the material ever be released into the environment.

SDS Section 13: Disposal Considerations

This section gives important information that may be helpful in the proper disposal of the material. The information can cover disposal, recycling, and reclamation.

SDS Section 14: Transport Information

This section is designed to give basic shipping information. The basic shipping information could include: the hazardous material description, hazard class, and identification numbers.

SDS Section 15: Regulatory Information

This section identifies the safety, health, and environmental regulations specific for the product that is not indicated anywhere else on the SDS. Examples of a few regulatory agencies are OSHA, Toxic Substances Control Act (TSCA), Comprehensive Environmental Response, Compensation and Liability Act (CERCLA or Superfund), Superfund Amendment and Recovery Act (SARA Title III).

SDS Section 16: Other Information

This section should include any other important information concerning the material. This information can include hazard ratings, preparation and revisions of the SDS, and label information.

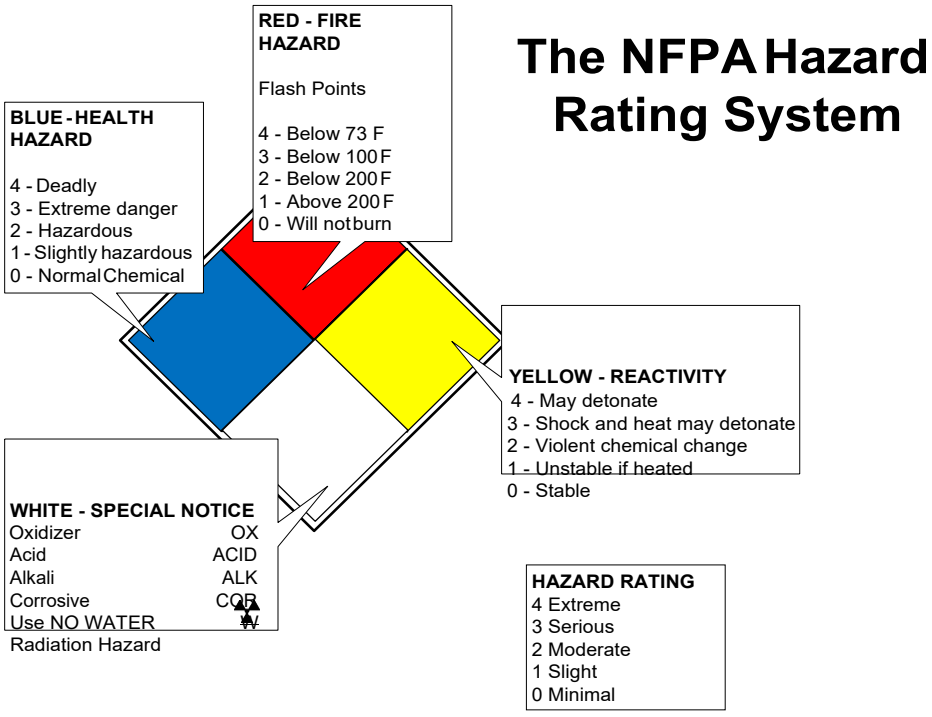
Appendix C: NFPA Labeling System

The National Fire Protection Association (NFPA) 704 standard presents a hazard labeling system that incorporates information on toxicity, flammability, reactivity, and special hazards. This system was designed to provide uniform, clearly visible information to Fire Department personnel (e.g., fire fighters, inspectors). The following, adapted from the appendix of the NFPA standard, summarizes the hazard information.

The numbers from 0 through 4 are placed in the three upper squares of the diamond to show the degree of hazard present for each of the three hazard categories. The 0 indicates the lowest degree of hazard, and 4, the highest. The fourth square, at the bottom, is used for special information. Two symbols for this bottom space are recognized by NFPA 704 (See Figure 5), they are:

- A letter *W* with a bar (**W**) indicates that a material may react with water. This does not mean "do not use water," since some forms of water - fog or fine spray - may be used in many cases.
- The letters *OX* indicates an oxidizer.

Although not recognized by NFPA 704, some users will insert the letters *ALK* for alkaline materials and *ACID* for acidic materials.



Appendix D: Contacts

External Contacts

CA-Moffett Field

Agency/Emergency Type	Organization Name	Address	Telephone
Fire, Police, Ambulance	NASA	Moffett Field	911 or 650-604-5416
Hospital, Med Center	El Camino Gen Acute Care	2500 Grant Road Mountain View	650-940-7000
Hazardous Waste/Spill Response Contractor	Clean Harbor	1021 Berryessa Rd San Jose, CA 95133	800-645-8265

CA-Orleans Drive, Moffett Park Drive, and Humboldt Court

Agency/Emergency Type	Organization Name	Address	Telephone
Fire, Police, Ambulance	Sunnyvale Public Safety	795 E. Arques Avenue at Wolfe Road	911
Hospital, Med Center	El Camino Gen Acute Care	2500 Grant Road Mountain View	650-940-7000
Hazardous Waste/Spill Response Contractor	Clean Harbor	1021 Berryessa Rd San Jose, CA 95133	800-645-8265

CA-Fremont Facilities

Agency/Emergency Type	Organization Name	Address	Telephone
Fire, Police, Ambulance	City of Fremont Public Safety	2000 Stevenson Blvd. Fremont, CA 94538	911
Hospital, Med Center	Washington Hospital Healthcare System	2000 Mowry Ave Fremont, CA 94538	510797-1111
Hazardous Waste/Spill Response Contractor	Clean Harbor	1021 Berryessa Rd San Jose, CA 95133	800-645-8265

DE - Christina Parkway

Agency/Emergency Type	Organization Name	Address	Telephone
Fire, Police, Ambulance	Aetna Hose, Hook and Ladder	31 Academy St. Newark, DE 19711	911 or 302-454-3300
Police	University of Delaware Police	413 Academy St. Newark, DE 19716	911 or 302-831-2222
Hospital	ChristianaCare Christiana Hospital	47515 Ogletown Rd. Newark, DE 19713	302-733-1000
Occupational Health Center	Pivot Occupational Health Center	15 Omega Dr., Bldg. K Newark, DE 19713	302-368-5100
Hazardous Waste/Spill Response Contractor	Miller Environmental Group	544 Webb's Lane Dover, DE 19904	302-653-0333

DE - Interchange Boulevard

Agency/Emergency Type	Organization Name	Address	Telephone
Fire, Police, Ambulance	Aetna Hose, Hook and Ladder	31 Academy St. Newark, DE 19711	911 or 302-454-3300
Police	Newark, DE Police	220 Main St. Newark, DE 19711	911 or 302-366-7111 (NE)
Hospital	ChristianaCare Christiana Hospital	47515 Ogletown Rd. Newark, DE 19713	302-733-1000
Occupational Health Center	Pivot Occupational Health Center	15 Omega Dr., Bldg. K Newark, DE 19713	302-368-5100
Hazardous Waste/Spill Response Contractor	Miller Environmental Group	544 Webb's Lane Dover, DE 19904	302-653-0333

Appendix E: Glossary of Terms

A

Action Level - A concentration for a specific substance, calculated as an eight (8)- hour time-weighted average, which initiates certain required activities such as exposure monitoring and medical surveillance.

Acute effect - Symptom of exposure to a hazardous material that soon appears after a short-term exposure, coming quickly to a crisis.

Acute exposure - A single, brief exposure to a large dose of a toxic substance. Adverse health effects are evident soon after exposure.

Acute toxicity - Adverse biological effects of a single dose of a toxic agent.

Aerosol- A suspension of fine solid or liquid particles in air (e.g., paint spray, mist, fog).

Anesthetic - A chemical that causes drowsiness. Large doses of anesthetic chemicals can cause unconsciousness, coma, and death.

ANSI - American National Standards Institute. This privately funded, voluntary organization develops standards for the safe design and operation of equipment and safe practices or procedures for industry.

Asphyxiant - A chemical vapor or gas that replaces air and can, thereby, cause death by suffocation. Asphyxiants are especially hazardous in confined spaces.

C

Carcinogen - A chemical or physical agent that is known to cause cancer in humans or is thought possibly to cause cancer, based on evidence from experimental animals.

Cardiac - Term used to refer to the heart.

CAS Number - Chemical Abstract Service registry number, which is used to identify a specific chemical.

cc - Cubic centimeter. A metric-system volume measurement equal to a milliliter (ml). One quart is about 946 cc (946 ml).

Ceiling Limit - The maximum allowable exposure limit for an airborne chemical, which is not to be exceeded even momentarily. See also PEL and TLV.

Central nervous system - The part of the body made up of the brain, spinal cord, and nerves.

Chemical family - Chemicals with similar structural characteristics are grouped into a chemical family (e.g., ketones, alcohols, hydrocarbons).

Chronic exposure - Repeated exposure or contact with a toxic substance over a long period. Adverse biological effects from chronic exposure develop slowly, last a long time, and frequently recur.

Chronic effect - Symptom of exposure to a hazardous material that develops slowly after many exposures or that recurs often.

Chronic toxicity - Adverse biological effect of repeated doses or long-term exposure to a toxic agent.

Combustible - Able to catch on fire and burn. A liquid that will burn is called a "combustible liquid." Nonliquid substances that will burn, such as wood and paper, are called "ordinary combustibles." (See flammables)
Combustible gas - means: (i) A gas or mixture of gases having, in a container, an absolute pressure exceeding 40 psi at 70ºF (21.1ºC); or (ii) A gas or mixture of gases having, in a container, an absolute pressure exceeding 104 psi at 130ºF (54.4ºC) regardless of the pressure at 70ºF (21.1ºC); or (iii) A liquid having a vapor pressure exceeding 40 psi at 100ºF (37.8ºC) as determined by ASTM D-323-72.

Concentration - The relative amount of a given substance present when mixed with another substance(s). Concentration is often expressed as parts per million (ppm), percent, or weight per unit volume, e.g., milligrams/cubic meter (mg/m^3).
Corrosive - A chemical that causes visible destruction of, or irreversible changes in living tissue by chemical action at the site of contact, or that has a sever corrosion rate on structural substances.

D

Decomposition - The breakdown of a material into a simpler compound by chemical reaction, decay, heat, or other process.

Density - The mass of a solid per unit volume. The density of a substance is usually compared to water, which has a density of 1. Substances that float on water have densities of less than 1; substances that sink in water have densities greater than 1.

Dermal - Term used to refer to skin.

Dermatitis - An inflammation of the skin, which can be caused by irritation (chemical, physical, or mechanical) or allergic reaction.

Designated area - means an area that may be used for work with "select carcinogens," reproductive toxins or substances that have a high degree of acute toxicity. A designated area may be the entire laboratory, an area of a laboratory or a device such as a laboratory hood.

Dose - The amount of a substance received during exposure.

E

Epidemiology - The branch of medical science that deals with the incidence, distribution, and control of disease in a population.

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.

F

Flammable - A flammable substance is one that will catch on fire and burn rapidly under ordinary conditions; for example, liquids with a flash point below 100^{o}F and solids that ignite readily.

Flash point - means the minimum temperature at which a liquid gives off a vapor in sufficient concentration to ignite.

Formula - The molecular composition of a chemical compound written in scientific symbols. Water is H_2O; hydrochloric acid is HCL.

G

g/kg - Grams per kilogram. A term used in experimental testing to indicate the dose of a test substance, in grams, given for each kilogram of the test subject's body weight.

H

Hazard warning - The words, pictures, and symbols, or combination thereof that appear on a label and indicate the hazards of the substance in the container.

Hazardous chemical - A chemical or mixture of chemicals that can produce adverse physical effects (e.g., fire, explosion) or health effects (e.g., dermatitis, cancer).

Health hazards - Substances for which there is evidence, from at least one scientific study, that acute or chronic health effects may occur in exposed persons. These chemicals include carcinogens, toxic agents, reproductive toxins (mutagens and teratogens), irritants, corrosives, sensitizers, hepatotoxins, nephrotoxins, neurotoxins, agents which act on the hematopoietic system, and agents that damage the lungs, skin, eyes, or mucous membranes.

Hematopoietic system - The blood-forming organs of the body, including bone marrow and the spleen.

Hepatotoxic - A chemical that can cause liver damage (e.g., carbon tetrachloride)

I

IARC - International Agency for Research on Cancer. IARC publishes "Monographs on the Evaluation of the Carcinogenic Risk of Chemicals to Man," one of the publications used to determine the cancer risk of a chemical.

Ignition temperature - The lowest temperature at which a substance will ignite and continue to burn. The lower the ignition temperature, the more likely the substance is to be a fire hazard.

Ingestion - Taking a material into the body through the mouth and swallowing it.

Inhalation - Taking a material in the form of a vapor, gas, dust, fume, or mist into the body by breathing it.

Inhibitor - A chemical added to a substance to prevent the occurrence of an undesirable chemical reaction.

Irritant - A substance that may not be corrosive but that can, with direct contact, cause a reversible effect on the skin, eyes, or respiratory system.

L

Laboratory-type hood - means a device located in a laboratory, enclosure on five sides with a moveable sash or fixed partial enclosed on the remaining side; constructed and maintained to draw air from the laboratory and to prevent or minimize the escape of air contaminants into the laboratory; and allows chemical manipulations to be conducted in the enclosure without insertion of any portion of the employee's body other than hands and arms.

Lacrimation - Abnormal or excessive production of tears because of exposure of the eyes to an irritant.

LC_{50} - The concentration of a substance in air that will kill half (50%) of the exposed test animals. A measure of acute toxicity.

LD_{50} - The dose of a substance that will kill half (50%) of the treated test animals when

given as a single dose. A measure of acute toxicity.

LEL or LFL - Lower Explosive Limit or Lower Flammable Limit.

Local exhaust - A ventilation method for removing contaminated air at the point where the contaminants are generated (e.g., a fume hood).

M

m^3 - Cubic meter. A volume measurement in the metric system. One m^3 is about 35.3 cubic feet or 1.3 cubic yards.

Mechanical exhaust - A powered device, e.g., a motor-driven fan that removes contaminants from a work area or enclosure.

mg/kg - Milligrams per kilogram. A term used in experimental testing to indicate the dose of a test substance, in milligrams, that was given for each kilogram of body weight of the test animal.

mg/m^3 - Milligrams per cubic meter. A way of expressing the concentration of dusts, gases, aerosols, or mists in the air.

Mist - A suspension in air of finely divided particles of liquid.

Mucous membrane s - A protective lining of cells found, for example, in the mouth, throat, nose, and other parts of the respiratory system.

Mutagen - A substance capable of causing damage to genes and chromosomes, particularly those of sperm or egg cells, resulting in mutations.

Mutation - A genetic alteration that can be inherited, thus affecting future generations.

N

Narcosis - A state of deep unconsciousness caused by the influence of a drug or other chemical.

Nephrotoxic - A chemical that causes kidney damage (e.g., uranium).

Neurotoxin - A chemical whose primary toxic effect is on the nervous system (e.g., carbon disulfide).

NFPA - National Fire Protection Association. This organization provides information on fire protection and prevention. The NFPA 704 "Standard of the Identification of the Fire Hazards of Materials" describes a hazard-warning placarding and labeling system.

NIOSH - National Institute for Occupational Safety and Health. This agency of the Public Health Service, U.S. Department of Health and Human Services (DHHS), tests and certifies respiratory devices, recommends occupational exposure limits, and assist OSHA by conducting research and investigations.

NTP - National Toxicology Program. Publishes "Annual Report on Carcinogens," listing substances either known or anticipated to be carcinogens.

O

Odor threshold - The lowest concentration of a substance's vapor, in air, that a person can detect by smell. Odor thresholds are highly variable, depending on the individual and the nature of the substance.

Olfactory - Term used to refer to the sense of smell.

Oral - Term used to refer to the mouth.

Organic peroxide - A type of oxidizer that is very useful because of its reactive properties,

considered by law (OSHA) to be a physical hazard.

OSHA - Occupational Safety and Health Administration. This government agency develops and enforces occupational safety and health standards for most industry and business in the U.S.

Oxidation - A reaction in which a substance combines with oxygen to cause chemical change (e.g., fire). In a broader sense, oxidation is a reaction in which electrons are lost and is accompanied by reduction -- a reaction in which electrons are gained.

Oxidizer - A material that causes the ignition of combustible materials without an external source of ignition. When mixed with combustible materials, an oxidizer increases the rate of burning of these substances when the mixtures are ignited. Oxidizers usually contain their own oxygen, can, therefore, burn in an oxygen-free atmosphere, are usually very unstable or reactive, and pose a serious fire hazard.

P

PEL - Permissible Exposure Limit. The legal maximum amount of a substance allowed by OSHA in workplace air. This limit must not be exceeded.

pH - A measure of how acidic or basic (caustic) a substance is on a scale of 1 (very acidic) to 14 (very basic); pH 7 indicates that the substance is neutral.

Physical hazard - A substance that is a combustible liquid, a compressed gas, an organic peroxide, or an oxidizer and is explosive, flammable, pyrophoric, unstable (reactive), or water-reactive.

Polymerization - A chemical reaction in which individual molecules combine to form a single large molecule (a polymer). Hazardous polymerization is an uncontrolled reaction releasing large amounts of energy (heat).

ppb - Parts per billion. A term used to express very small concentrations of a given substance present in a mixture. Often used as a unit to measure the parts (by volume) of a gas or vapor in a billion parts of air.

ppm - Parts per million. A term used to express very small concentrations of a given substance present in a mixture. Often used as a unit to measure the parts (by volume) of a gas or vapor in a million parts of air.

Primary Container - A primary container is the container in which the product is received from the manufacturer or distributor.

Pulmonary - Term used to refer to the lungs.

Pyrophoric - A chemical that can catch on fire spontaneously in air at or below 130ºF.

R

Re activity - A term used to describe the ease with which a chemical can undergo change, usually by reacting with another substance or by breaking down. Highly reactive substance may explode.

Re productive toxins - means chemicals, which affect the reproductive capabilities including chromosomal damage (mutations) and effects on fetuses (teratogenesis).

Respiratory protective equipment - Air cleaning or air supply respirators that protect against toxic substances in the air.

Route of entry - The way a toxic substance enters the body. For example, absorption through the skin, inhalation, ingestion. May also be called mode of entry.

S

Secondary Container - A secondary container is the container in which the product is dispensed for use (e.g., squeeze bottle).

Select carcinogen - means any substance which meets one of the following criteria:

(i) It is regulated by OSHA as a carcinogen; or (ii) It is listed under the category, "known to be carcinogens," in the Annual Report on Carcinogens published by the National Toxicology Program
(NTP) (latest edition); or (iii) It is listed under Group 1 ("carcinogenic to humans") by the International Agency for Research on Cancer Monographs (IARC) (latest editions); or (iv) It Group 2A or 2B by IARC or under the category, "reasonably anticipated to be carcinogens" by NTP, and causes statistically significant tumor incidence in experimental animals.

Sensitizer - A substance that can cause an allergic reaction, which usually appears after repeated exposure.

Solubility in water - A term used to indicate the amount, in %, of a substance that will dissolve in water. Solubility information is important for determining spill-cleanup and firefighting procedures.

Solvent - A liquid that dissolves other substances. Some common solvents are water, alcohol, and mineral spirits.

STEL - Short Term Exposure Limit is the maximum concentration allowed in a continuous, 15-minute exposure. There may be no more than four such exposures each day with at least one hour between exposures. The daily TWA cannot be exceeded, however.

Suspect carcinogen - A substance that might cause cancer in humans but has not yet been proven to do so.

Synonym - Another name by which a chemical is known. For example, synonyms for methyl alcohol are methanol and wood alcohol.

Systemic poison - A substance that has a toxic effect upon several organ systems of the body.

T

Target organ effects - Effects on specific organs of the body caused by exposure to a hazardous chemical.

TLV - Threshold Limit Value. The airborne concentration of a substance below which, no adverse health effects should occur. TLVs, established by the American Conference of Governmental Industrial Hygienists (ACGIH), are voluntary limits expressed in three ways (STEL, TLV-C, TWA).

TLV-C - Threshold Limit Value-Ceiling is the maximum concentration of a toxic substance for which exposure is allowed. This limit is not to be exceeded, even momentarily. The TWA must still be observed.

TWA - Time Weighted Average is the exposure limit averaged over a normal 8-hour workday or 40- hour workweek.

Toxic substance - A substance that causes harmful biological effects after either short-term or long- term exposure.

Toxicity - All the adverse biological effects resulting from exposure to a harmful substance.

U

UEL – Upper Explosive Limit.

UFL - Upper Flammable Limit

Unstable - A chemical is unstable if it tends to decompose or undergo other undesirable chemical changes during normal handling or storage.

V

Vapor - The gas given off by a liquid or solid at room temperature.

Ventilation - Term used to describe the method by which inside air is circulated.

Vertigo - Term meaning to be dizzy, feeling of dizziness

Viscosity - A term used to describe the rate at which a liquid flows or pours. A very viscous liquid, like molasses, flows slowly.

Volatile - A term used for liquid that evaporate at room temperature. Very volatile liquids, such as gasoline, form vapors (evaporate) quickly and are a breathing hazard.

W

Water-reactive - A chemical that reacts with water to release a flammable or toxic gas.