Background

On January 31, 1990, the Occupational Health and Safety Administration (OSHA) developed and implemented the Occupational Exposure to Hazardous Chemicals in Laboratory Standard (29 CFR 1910.1450). The standard applies to all laboratories that use hazardous chemicals in accordance with the definitions of “laboratory use” and “laboratory scale.” The Laboratory Standard is associated with the Hazardous Communication Standard (29 CFR 1910.1200). Both standards address limiting employees' exposure to hazardous chemicals in the workplace. The Laboratory Standard obligates employers to develop and implement a Chemical Hygiene Plan.

Chemical Hygiene Plan

The Chemical Hygiene Plan (CHP) is developed to protect laboratory workers from harm due to chemical hazards. The CHP is a written program that establishes policies, procedures, and responsibilities that protect workers from chemical hazards in the workplace. This CHP is developed for Long Beach Unified School District (LBUSD). The primary goal of the CHP is to maintain a safe learning environment for LBUSD teachers, students, and other district staff.

The CHP will cover the following topics:

1. Designation and responsibilities of individuals involved in maintaining a safe learning environment for science departments
2. Information to be provided to teachers and faculty members working with hazardous substances
3. Standard Operating Procedures (SOP) relevant for maintaining a safe learning environment for activities involving the use of hazardous chemicals
4. Proper procurement and storage of chemicals for preventing or minimizing injury and illness
5. Proper laboratory environment for minimizing injury and illness
6. Proper use of protective equipment, including Personal Protective Equipment (PPE)
7. Inspecting and maintaining a safe laboratory environment
8. Accident and exposure response procedures
9. Record keeping procedures
10. Chemical waste management procedures
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This document is a collaborative product for LBUSD, Environmental Health & Safety and Science Curriculum Offices.
DISTRICTWIDE RESPONSIBILITIES

Board of Education and Superintendent:
- Provide safe working conditions within LBUSD.
- Support the implementation of this CHP.

Science Curriculum Leader:
- Ensure that the implementation of the science program does not conflict with the standards set forth in the CHP.
- Facilitate and schedule appropriate chemical hygiene training for all district employees whose normal work locations include laboratory areas in conjunction with the District Chemical Hygiene Officer (DCHO).
- Advise the DCHO when changes in the adopted science curriculum materials or expected instructional practices have implications for maintaining LBUSD compliance with the CHP.
- Serve as a member of the Hazard Review Committee to review requests to use hazardous chemicals in the science instructional program.
- Work with school principals and science department heads to identify laboratory safety issues to bring to the attention of the DCHO.

District Chemical Hygiene Officer (DCHO):
- A position appointed by the Environmental Health and Safety Office.
- Oversee the implementation of the CHP.
- Work with administrators and teachers to develop and implement appropriate chemical hygiene policies and practices, including chairing the district Hazard Review Committee.
- Work with science department heads at the schools to coordinate and monitor implementation of the CHP.
- See that required inspections are performed and appropriate records are maintained.
- Provide technical assistance to schools and employees on the CHP.
- Know the most current legal requirements concerning regulated substances and justify that the CHP is in accord with those requirements.
- Make recommendations to the Hazard Review Committee regarding requests to use chemicals not included on the district Approved Chemicals List, including those identified as: explosive, carcinogenic, mutagenic, highly toxic, or otherwise unsuitable for general school laboratories.
- Determine need for PPE beyond that specified for general laboratory use.
- Contract for appropriate chemical hygiene training for all district employees whose normal work locations include laboratory areas.
- Conduct an annual review of the CHP and recommend revisions when appropriate.

School Principal:
- Be responsible for chemical hygiene in the school.
- Monitor school employees' compliance with the CHP.
- Maintain required records of incidents, employee exposures, and chemical hygiene training of employees outside the science department.
DISTRICTWIDE RESPONSIBILITIES

Hazard Review Committee:

- Committee includes the following groups impacted by the CHP:
  - District CHO (Committee chair)
  - District Science Curriculum Leader
  - Representative from district maintenance division responsible for facility issues
  - One science teacher from each high school, selected by the science department head
  - One science teacher from each middle or K-8 school containing science laboratory areas selected by the principal and science department head

- Specific responsibilities:
  - Meet once per school year.
  - Review and rule on requests to purchase and use chemicals not on the district's Approved Chemicals List.
  - Perform an annual review of the CHP and propose needed updates and revisions.
  - Advise the district CHO of chemical hygiene and laboratory safety issues at district and school levels.

Science Department Head:

- Specific responsibilities:
  - Serves as the site's contact person for the CHP.
  - Ensures that employees have received appropriate training and have access to the CHP, (Material) Safety Data Sheets [(M)SDS], and other reference materials.
  - Coordinates a regular process for conducting chemical hygiene and housekeeping inspections, including routine inspections of emergency equipment.
  - Ensures that employees have received appropriate training and have access to the CHP, (M)SDS, and other reference materials.
  - Coordinates requests to the Hazard Review Committee for acquisition and use of chemicals not on the district Approved Chemicals List, including those that are explosive, carcinogenic, mutagenic, highly toxic, or possess other characteristics that make them unsuitable for general school laboratories.
  - Oversee purchase, storage, and disposal of chemicals in accordance with the CHP.
  - Maintain required records of science teacher training, current inventory, and inspections and maintenance of facilities and equipment.

- If a school lacks a science department head, the principal will appoint a qualified teacher to act as "School Chemical Hygiene Officer" with the responsibilities listed above.

School Employees:

- All employees performing work with hazardous substances must accept a shared responsibility for operating in a safe manner once they have been informed about the extent of risk and safe procedures for their activities.

- All school employees whose normal work locations include a laboratory area have the following specific responsibilities:
  - Take responsibility for his/her own safety.
  - Maintain awareness of health and safety hazards by participating in required training programs and updating knowledge through optional training and accessing reference materials.
  - Plan and conduct daily activities in accordance with the district chemical hygiene standards and procedures, including chemical preparation, handling, and disposal.
  - Use good personal chemical hygiene habits in their own work, as well as modeling and enforcing these habits for students.
  - Inform supervisors of accidents and work practices, or working conditions they believe are hazardous to one's health or to the health of others.
  - Keep records of all safety instructions given, and written proof of student understanding of the class safety rules and procedures.
DISTRICTWIDE RESPONSIBILITIES

Students:

- While students are not covered under the provisions of the Laboratory Standard (OSHA), they should be made aware of chemical health and safety hazard in classroom situations.
- Students should be provided with information and equipment to protect themselves from those hazards.
- Teachers should provide student training at the beginning of each course in which hazardous chemicals are used.
- Specific safety instructions should be provided at the beginning of each laboratory period.

Hierarchy of Responsibility
HAZARD COMMUNICATION

Science teachers, school faculty members, students, and other persons handling chemicals must be informed of all hazards associated from working with chemicals. They must understand the meaning of labels (e.g., pictograms) found on chemical bottles and (M)SDS, and chemical classifications. Chemicals are labeled and classified according to the Globally Harmonized System (GHS). The GHS was adopted by the Occupational Health and Safety Administration (OSHA). OSHA is part of the United States Department of Labor, in charge of assuring a safe and hygienic workplace for the workforce.


The following are the requirements set forth by the HCS:

- Development and maintenance of a Hazard Communication Program
- Development and maintenance of list(s) of hazardous chemicals at the workplace
- Proper labeling of chemical containers and (M)SDS, according to the GHS
- Proper hazard classification, storage, and disposal of chemicals, according to the GHS
- Distribution of SDSs for all chemicals at a workplace
- Training

Hazard Classification

Chemical hazards must be classified by their manufacturers. They must be classified using the GHS. Chemical manufacturers must classify chemicals by its physical, health, and environmental hazards. Hazards of a chemical must be categorized based on an established set of criteria formulated by the GHS. The categories/classes/divisions of a chemical indicate the severity of hazard associated with the chemical (e.g., Division 1.1 - Massive explosion hazard).

The following are the classifications and examples of hazards set forth by the GHS:

Physical Hazards [solid, liquid, or gas]

Explosives
- Division 1.1 through 1.6 [Division 1.1 being more severe than Division 1.6]
  - Division 1.1 - Mass explosion hazard
  - Division 1.2 - Projection hazard
  - Division 1.3 - Fire hazard or minor projection hazard
  - Division 1.4 - No significant hazard
  - Division 1.5 - Very insensitive substances with mass explosion hazard
  - Division 1.6 - Extremely insensitive articles with no mass explosion hazard

Flammable gases
- A gas having a flammable range in air at 20°C and a standard pressure of 101.3 kPa.

Flammable liquids
- Category 1 through 4 [Category 1 being more severe than Category 4]
  - Severity is based on a lower flashpoint.
HAZARD COMMUNICATION

Hazard Classification

Physical Hazards (cont’d)

Flammable Solids
- Category 1 and 2 [Category 1 being more severe than Category 2]
  - Category 1 – burning time of less than or equal to 5 minutes
  - Category 2 – burning time of more than 5 minutes but less than or equal to 10 minutes

Flammable aerosols
- Classified as Category 1 or 2 if they contain any component classified as flammable.
  - This is according to the GHS criteria for flammable liquids, flammable gases, or flammable solids.

Gases under pressure
- Compressed gas
- Refrigerated liquefied gas
- Liquefied gas
- Dissolved gas

Organic peroxides
- Type A through G [Type A being more severe than Type G]
  - Type A – can detonate.
  - Type B – possess explosive properties and which, as packaged, neither detonates nor deflagrates\(^1\) rapidly, but is liable to undergo a thermal explosion in that package.
  - Type C – possess explosive properties when the substance or mixture as packaged cannot detonate or deflagrate rapidly or undergo a thermal explosion.
  - Type D – detonates partially, does not deflagrate rapidly and shows no violent effect when heated under confinement. Does not detonate at all, deflagrates slowly and shows no violent effect when heated under confinement. Or, does not detonate or deflagrate at all and shows a medium effect when heated under confinement.
  - Type G – neither detonates in the cavitated\(^2\) state nor burn away 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 to 75°C for a 50 kg package), and, for liquid mixtures, a diluents having a boiling point not less than 150°C is used for desensitization.

Self-reactive substances
- Type A through G [Type A being more severe than Type G]
  - Type A – can detonate or burn away rapidly, as packaged.
  - Type G – neither detonates in the cavitated state nor burns away 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 to 75°C for a 50 kg package), and, for liquid mixtures, a diluents having a boiling point not less than 150°C is used for desensitization.

Substances corrosive to metals
- Substance or mixture that will materially damage, or even destroy, metals

Other physical hazards
- Oxidizing solids, liquids, or gases
- Self-heating substances

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\(^1\) Burn away or cause (a substance) to burn away with a sudden flame and rapid, sharp combustion
\(^2\) Forms bubbles within a liquid

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HAZARD COMMUNICATION

Hazard Classification

Health Hazards

Acute Toxicity
- oral, dermal, and or inhalation (gases, vapors, dust, and mists)
- Category 1 through 5 [Category 1 being more severe than Category 4]
  - Category 5 is for chemicals having relatively low acute toxicity but which, under certain circumstances, pose hazards to vulnerable populations.

Skin Corrosion/Irritation
- Category 1 - skin corrosion (destruction to skin)
- Category 2 - skin irritation (reversible)
- Category 3 - mild skin irritation (reversible)

Serious Eye Damage/Irritation
- Category 1 – serious eye damage, after 21 days of exposure
- Category 2 – reversible adverse effects on cornea, iris, conjunctiva

Respiratory or Skin Sensitization
- hypersensitivity of airways if inhaled or allergic response to skin contact

Carcinogenicity
- Category 1 – known carcinogen
  - 1A – based on human evidence
  - 1B – based on animal evidence
- Category 2 – suspected Carcinogen (not enough evidence)

Reproductive Toxicity
- Category 1 – known carcinogen
  - 1A – based on human evidence
  - 1B – based on animal evidence
- Category 2 – suspected (not enough evidence)
- Category 3 – may be a cause of concern for breastfeeding children

Environmental Hazards

Hazardous to the Aquatic Environment (Acute and chronic toxicity categories)
- Acute aquatic toxicity is causing injury to an aquatic organism after a short term exposure.
  - Category 1 through 3 [Category 1 being more severe than Category 3]
- Chronic aquatic toxicity is causing injury to an aquatic organism during exposures that are determined in relation to the life cycle of the organism.
  - Category 1 through 4 [Category 1 being more severe than Category 4]
HAZARD COMMUNICATION

Chemical Labels

Chemical labels have been standardized by the **Globally Harmonized System** (GHS). As defined by the GHS, standardization means identical with no variation. The standardized label elements included in the GHS are:

- **Symbols (hazard pictograms)**
  - convey health, physical, and environmental hazard information, assigned to a GHS hazard class and category

- **Signal word**
  - “Warning” or “danger” is used to emphasize hazards and indicate the relative level of severity.
  - Warning – less severe hazards
  - Danger – more severe hazards

- **Hazard statements**
  - Standard phrases assigned to a hazard class and category that describe the nature of the hazard.

- **Precautionary statement and pictograms**

- **Measures to minimize or prevent adverse health effects**

- **Ingredient disclosure**

- **Supplier identification**

- **Supplemental information (extra information)**

The following is an example of common GHS pictograms science teachers will encounter:

The National Fire Protection Agency (NFPA) developed a Hazard Code System. The system NFPA rates chemical safety “under fire conditions.” The system does not necessarily represent hazards under normal laboratory use conditions. LBUSD provides specifications of the Hazard Code System to all high schools, middle schools, and K-8 schools.
HAZARD COMMUNICATION

Chemical Labels

Secondary Containers:

- A container must be labeled if the bottle contains a chemical for more than one day.
- Labels should not be defaced or removed until the bottle is empty. The label must contain the following:
  - chemical name (chemical formula alone is not permitted)
  - concentration (where applicable)
  - hazard information
  - date prepared
  - name/initials of the preparer

(Material) Safety Data Sheet

Chemical manufacturers are changing from a Material Safety Data Sheet (MSDS) format to a Safety Data Sheet (SDS) format. A (M)SDS provides important information regarding a chemical. The (M)SDS provides employers and workers with information on chemical hazards and provides advice on safety precautions. The information is specific to the chemical. Each school must have an (M)SDS for every chemical onsite, and the copy must be readily available. (M)SDS’s are organized into the following categories:

1. Chemical Identification
2. Hazards Identification
3. Composition/Information on Ingredients
4. First-aid Measures
5. Firefighting Measures
6. Accidental Release Measures
7. Handling and Storage Measures
8. Exposure Control/Personal Protective Equipment (PPE)
9. Physical and Chemical Properties
10. Stability and Reactivity
11. Toxicological Information
12. Ecological Information
13. Disposal Consideration
14. Transport Information
15. Regulatory Information
16. Other Information

Laboratory Hazards Signage

Warning signs must be clearly posted in all laboratory, preparation, and chemical storage areas. The warning signs should allow anyone entering this space to identify all the hazards associated with their surroundings. LBUSD will provide standard signage that includes:

- telephone numbers of emergency response personnel (fire, medical, chemical spill, and poison control)
- standard laboratory procedures, safety precautions, and emergency medical procedures
- location signs for exits, evacuation routes, safety showers, eyewash stations, fire extinguishers, fire blankets, first aid kits, used chemical containers, and other safety equipment
- warnings for areas or equipment where special or unusual hazards exist, such as lasers, vacuums, or biohazards
- signs indicating Designated Areas for restricted use of specially authorized chemicals

Training

All school personnel handling chemicals shall participate in a training program. The training program is based on handling chemicals safely and hygienically, recognizing and interpreting labels and (M)SDS information, and taking appropriate action in response to chemical hazards. This includes, but is not limited to, transporting chemicals, storing chemicals, labeling secondary chemical bottles, managing chemical spills, and chemical disposals, etc.
General Laboratory Procedures

There are potential dangers during laboratory activities. Safety is the responsibility of administrators, teachers, staff, and students. The following practices and techniques are appropriate laboratory conduct:

General Laboratory Practices and Techniques

1. Before conducting any laboratory experiment, make sure to understand all the Standard Operating Procedures (SOP).
2. Use appropriate Personal Protective Equipment (PPE) during laboratory experiments:
   - safety goggles
   - gloves
   - lab apron or coat
   - any other required PPE
3. ALWAYS handle dry ice with insulated gloves and wear eye protection.
4. ALWAYS label containers properly.
5. NEVER use squeeze bottles near open flames.
6. Tabletops should be protected from extreme heat by using insulation underneath burners or heated objects.
7. To insert glass tubing into stopper, conduct the following:
   - Polish or file the edge of glass tubing until smooth.
   - Aim glass away from the palm of the hand (hand holding the stopper).
   - Hold glass as close to the opening as possible.
   - Use water, diluted soap solution, glycerin, or petroleum jelly as a lubricant when pressing the glass tube into the hole (use twisting motion).
8. Make sure the connections between the burner and gas outlets are protected from pinches or from being disconnected.
9. Make sure fume hoods are working properly. To quickly assess functionality, a piece of light plastic or paper may be taped at the bottom of the sash to determine if there is air flow into the unit.
10. NEVER use hoods to store books or supplies.
11. NEVER use the same refrigerator to store both chemicals and food.
12. DO NOT block sinks and safety equipment (e.g., eyewash and/or shower) with clutter.
13. Properly dispose of broken glassware and other sharp objects in designated containers (containers must be labeled accordingly).

General Laboratory Conduct for Students

1. DO NOT participate in rowdy conduct and/or practical jokes.
2. DO NOT perform unauthorized experiments.
3. ALL laboratory activities must be monitored by the teacher.
4. DO NOT sit on laboratory benches.
5. NEVER threaten another student;
6. NEVER leave experiments or students unattended.
7. Immediately report any spills, accidents, and/or injuries to your teacher.
8. NEVER eat, drink, apply makeup, or chew gum in the laboratory.
9. Make sure no flammable solvents are near a flame.
10. Leave all laboratory equipment, chemicals, and experiment products in the laboratory, unless you get approval.
11. DO NOT use cell phones, music, and/or video equipment.
12. Keep coats, bags, and other personal items should never be present in the work space.
General Laboratory Procedures

General Safety Practices

1. ALWAYS wear appropriate Personal Protective Equipment (e.g., gloves, eye goggles, lab apron, etc.).
   - Eye goggles must protect against chemical splashes and fumes.
   - Lab apron should be chemical-resistant.
   - Nitrile or non-permeable latex gloves should be worn when appropriate.

2. Perform a visual inspection of the safety equipment prior to working with any chemicals. Safety equipment includes: safety goggles, aprons, fire extinguishers, spill-kits, fire blankets, etc.

3. ALWAYS wash hands after removal of gloves before handling personal items or leaving the laboratory.

4. ALWAYS wear closed-toe and closed-heel shoes.

5. ALWAYS wear clothes that cover the arms, legs, and torso.

6. ALWAYS confine long hair and loose clothing.

7. ALWAYS remove any jewelry from fingers, wrists, and neck that may impede movement during a chemical activity.

8. ALWAYS wash your hands after working with chemicals.

9. NEVER taste, smell, or touch any chemicals.

10. Keep gloved hands away from skin, eye, and mouth when working with chemicals.

11. Ensure that aisle ways, exits, and paths to safety equipment are unblocked.

Preparing for Laboratory Activities

1. Prior to performing any laboratory activity:
   - Weigh the risk factor against the educational value.
   - Instruct students on all laboratory procedures that will be conducted.

2. Understand all potential hazards of the material, process, and equipment involved in every laboratory activity.

3. Discuss all safety concerns and potential hazards associated with the laboratory activity. Make sure students understand all concerns and hazards.

4. Inspect all equipment to be used during the laboratory activity.

5. After completing laboratory activities, clean laboratory work area and place equipment and chemicals back in their appropriate place.

End of the Year Cleanup and Energy Savings Procedure

1. Inventory all chemicals.

2. Remove all substances that are outdated, deteriorated, potentially dangerous, and unlikely to be used in the near future.

3. Pack all substances in a box by compatible category and clearly mark the boxes “CHEMICALS FOR DISPOSAL.” Attach a list of contents to the boxes. Contact the district Environmental Health and Safety Department for disposal [(562) 997-7510, ext. 1481].

4. Be certain all gas cylinders are capped and properly secured for the summer, if applicable.

5. Cleanout and unplug refrigerator during the summer months, and leave doors open to allow air circulation.

6. Arrange for shutoff of any water heaters in the science department.

7. Unplug all electrical devices, including, but not limited to, the following:
   - isolated wall clocks
   - timers
   - personal clocks or radios
   - hot plates
   - aquarium pumps
   - computers and terminals
   - all power strips and chargers
   - any other electrical instrument

8. Arrange for adequate temperature control and ventilation of sensitive equipment and chemicals.
Student Safety Laboratory Practice

1. Immediately report any accidents to the teacher, no matter how minor the accident is (e.g., burns, scratches, cuts, broken glass, etc). Remove broken glass from area as soon as feasible. NEVER handle broken glass with bare hands – a counter brush and dustpan can be used.
2. Prepare for each laboratory activity:
   - Read laboratory activity instructions prior to class
   - Follow all directions
   - Make note of any modification in procedure by the teacher
3. Any science project or individually planned experiments must first be approved by the teacher.
4. Only use materials and equipment authorized by the teacher.
5. Notify your teacher of any sensitivity to chemicals, if known.
6. Immediately inform the teacher of any equipment not properly working.
7. Immediately clean up any non-hazardous spills on the floor or workspace.
8. Wear appropriate eye protection when performing laboratory activities, as instructed by the teacher (e.g., heating liquids, working with corrosive chemicals). Students who wear contact lenses should wear regular glasses underneath their safety goggles, when appropriate.
9. Students with open skin wounds on hands must wear gloves or be excused from the laboratory activity.
10. NEVER carry hot equipment or dangerous chemicals through a group of students.
11. Check bottle and equipment labels carefully. Be sure to use items correctly.
12. Be aware of the chemical being used during the laboratory activity. Know the location of the (M)SDS and how to locate important information (i.e., First-Aid, health hazards, etc.).
13. NEVER taste chemicals, unless instructed by the teacher.
14. NEVER touch the chemicals with your bare hands, unless instructed by the teacher.
15. To smell a chemical, wave hand over the top of the chemical container and sniff from a distance.
16. Eating or drinking in the laboratory is not permitted.
17. NEVER use your mouth to pipet small quantities of liquid. Use a pipet filler.
18. When heating material in a test tube, DO NOT point opening towards anyone or yourself during the activity.
19. NEVER pour reagents back into their original bottle.
20. NEVER exchange stoppers with another chemical.
21. When diluting acid, ALWAYS pour acid into water. Pour the acid slowly into the water with constant stirring.
22. Know the location of the emergency shower, eyewash, First-Aid kit, fire extinguisher, fire alarm box, all exits, etc.;
23. Know the emergency procedures (e.g., fire and earthquake drill procedures).
24. Keep hands from eyes, face, and clothes when working with chemicals. ALWAYS wash your hands after performing laboratory activities, or as needed.
25. Roll long sleeves up above the wrist.
26. Long hanging necklaces, bulky jewelry, and excessive or bulky clothing should not be worn during laboratory activities.
27. Confine long hair during laboratory activities.
28. ALWAYS wear closed-toe shoes.
29. Keep work area clean. Floors and aisles must be clear of clutter (i.e., equipment, books, backpacks, etc). Place items in a designated storage area. Take only your lab notebook and needed implements to your work area.
30. Keep entire laboratory area clean.
31. DO NOT light gas burners unless instructed by your teacher. Use with extreme caution. Keep head and clothing away from flame. ALWAYS turn off gas valve when not in use. Make sure no volatile materials are used near the burner when in use (e.g., alcohol or acetone).
32. Dispose of laboratory waste as instructed by your teacher. Use separate, designated waste containers (not a regular waste basket) for the following:
   - Matches, litmus paper, wooden splints, toothpicks, etc.
   - Rags, paper towels, or other absorbent material used to clean up flammable liquid or solids
   - Broken and waste glass
   - Hazardous/toxic liquids and solids
STANDARD OPERATING PROCEDURES

Student Safety Laboratory Practice (cont’d)

33. Operate electrical equipment away from water; hands must be dry.
34. When unplugging an electrical cord, make sure to pull the plug directly from the outlet. Do not pull from the cord.
35. Students are not permitted in chemical storage room.
36. DO NOT remove equipment or chemicals from the laboratory.
37. ALWAYS approach laboratory activities in a serious and considerate manner.

Chemical Handling Procedures

1. Before using chemicals, consult the CHP.
2. Consult the (M)SDS to identify and understand chemical hazards, the proper Personal Protective Equipment (PPE) to use, First-Aid measures, etc.
3. Understand how to operate the safety equipment and where the safety equipment is located. NEVER WORK WITH CHEMICALS UNTIL YOU HAVE COMPLETELY UNDERSTOOD HOW TO OPERATE SAFETY EQUIPMENT AND PPE.
4. Make sure to have adequate ventilation. Opening doors and utilizing the classrooms ventilation system reduces accumulation of chemical vapors.
5. ALWAYS wear proper PPE when working with chemicals (e.g., goggles, gloves, clothing, etc.).
6. ALWAYS use the proper method of transporting chemicals within the facility. Use acid/base carriers when moving corrosive materials. Use cylinder carts when transporting cylinders. Make sure that any carts used to transport chemicals are sturdy and tight, without loose connections.
7. Use spatula or scoopula to remove a solid reagent from a container. NEVER use a metal tool when working with peroxides.
8. DO NOT mix chemicals known to have incompatible properties.
9. ALWAYS add acid to water. NEVER add water to concentrated acid. To dilute acid, add small quantities of acid to water in a heat-resistant beaker or flask while stirring constantly.
10. Avoid inhalation of chemicals. DO NOT “sniff” to test chemicals.
11. DO NOT pipette anything by mouth; use pipet bulb or manual pipet pump.
12. DO NOT taste chemicals. Avoid ingestion of chemicals.
13. Use fume hood if there is a potential of producing toxic vapors, gases, and/or solids. When using a hood, keep the sash as low as possible. Keep head and body outside the hood at all times.
14. For dry chemicals, remove only the amount needed. DO NOT return the excess to the original container. Dispose in a proper container.
15. ALWAYS return the chemical bottles to the chemical storage room, or secure in a designated cabinet. NEVER keep chemical bottles inside the classroom after its use.
16. NEVER pour chemicals or chemical waste into sinks or wastebaskets. ALWAYS place waste or chemical in proper containers (properly labeled).
17. NEVER cap a bottle or use a solid stopper in a bottle containing dry ice or cryogenic liquids. ALWAYS plug loosely with cotton or use a stopper with a hole.
18. Clean up the work area upon completion of an operation or at the end of the day.
19. Properly and promptly clean up all spills (refer to chemicals (M)SDS).
20. ALWAYS wash your hands after working with chemicals.
21. At the end of each workday, treat the contents of all containers of used chemicals in accordance with district-approved procedures for used and waste chemicals.
22. Properly dispose of weigh boats, gloves, filter paper, and paper towels in a dry chemical waste container (properly labeled).
23. Keep the classrooms and chemical storage room in a clean and orderly condition. Keep floors, shelves, and tables clear of chemicals not in use. Keep aisles and passageways to all exits and safety equipment clear. Do not store materials near doorways.
24. Before leaving the laboratory, turn off all services (gas, water, and electricity). Lower the fume hood sash.
25. Lock the laboratory door upon exiting.
Hygiene Practices

1. Keep your hands away from your eyes, face, mouth, and body while using chemicals.
2. Food and drinks (open or closed) should not be brought into the laboratory or chemical storage area, unless approved by the teacher.
3. NEVER use laboratory glassware for eating or drinking purposes.
4. DO NOT apply cosmetics while in the laboratory or chemical storage room.
5. Wash hands after removing gloves, and before leaving the laboratory.
6. Remove any PPE before leaving the laboratory (e.g., goggles, apron, coat, etc.).

Handling Gas Cylinders

1. Make sure contents of the cylinder are clearly marked on the cylinder. NEVER use cylinder with missing content labels or markings.
2. DO NOT identify cylinders by manufacturers’ codes.
3. Check cylinder for damage before using.
4. Be familiar with the hazards and properties.
5. Wear appropriate PPE.
6. Use proper regulator for each cylinder. DO NOT attempt to repair a damaged gas cylinder regulator.
7. NEVER lubricate, modify, or force cylinder valves.
8. Open valves slowly and with a wrench or cylinder supplier’s tool. Direct the opening away from people and yourself.
9. Check for leaks around the valve and handle. Use soapy solution, “snoop” liquid, or an electronic leak detector.
10. Close valves and relieve pressure on cylinder regulator when not in use.
11. Label empty cylinders "Empty" or “MT” and date it. Empty cylinders should be stored away from full cylinders.
12. ALWAYS attach valve safety caps when storing or moving cylinders.
13. Transport cylinders with an approved cart and chains. NEVER move or roll by hand.
14. Securely attach cylinders to a wall with a clamp or chain, even if empty. Or, secure in a metal base in an upright position.
15. Store cylinders by gas type, separating oxidizing and flammable gases. There should be at least 20 feet separating the cylinders or a 30-minute firewall that is five feet high.
16. Store in a cool, dry, well-ventilated area. Cylinders should be stored away from incompatible materials and ignition sources. DO NOT subject any part of the cylinders to temperatures higher than 150°F or lower than 50°F.

Recommended PPE

- safety goggles
- face shields, if needed
- lab coat or apron
- gloves (selected based on laboratory experiment)
Recommended Safety and Emergency Equipment

All Science Classes

- emergency signs and placards
- emergency telephone numbers
- emergency lights
- fire detection or alarm system with pull station
- first-aid Kit
- appropriate chemical storage location that is lockable and ventilated
- (M)SDS for all chemicals
- labeled chemical storage cabinets (e.g., Flammable, Corrosive, etc.)

Additional for High School Biological Science and Chemistry Classes

- eyewash station (conform to ANSI Z358.1 - 2009)
- fire Extinguisher (appropriate for the chemicals onsite)
- fire blanket
- sand bucket
- secondary containment for bulk chemical waste
- container for broken glass and other sharp waste

Additional for High School Chemistry Classes

- lab coat or apron
- face shields (conform to ANSI Z358.1 - 2009)
- spill-Kit (absorbent and neutralizing agents)
- fume hoods (capture velocity should be 60-100 ft/min and vented outside)
Laboratory Design

The laboratory will be designed to provide sufficient space and a safe learning environment.

The following laboratory environment is recommended:

1. District personnel working inside the laboratory, conducting or supervising laboratory procedures must have proper qualifications and be trained on the specifics of this document.
2. The classroom area assigned for science laboratory activities must meet the safety standards specified in this document. Avoid using the laboratory classroom for teaching any other subject.
3. Exit doors will be clearly marked and free of any obstruction to allow a quick, safe escape in case of an emergency.
4. Furniture will be arranged to maximize the workspace while maintaining safe working conditions.
5. Desks must be separate from the lab bench and aisles should not be obstructed.
6. Ventilation must be adequate inside the laboratory classroom throughout the school year, especially during experimental procedures. Adequate ventilation is considered no less than six air changes per hour, and not more than 12 air changes per hour. Some laboratory classrooms are equipped with a switchable auxiliary exhaust system.
7. Experimental procedures expected to exceed the Permissible Exposure Level (PEL) and Threshold Limit Value (TLV) set forth by OSHA and the American Conference of Governmental Industrial Hygienists (ACGIH) must have fully functioning fume hoods available inside laboratory classrooms. Typically, (M)SDS will inform requirements for a fume hood. The (M)SDS will use terminology such as “use with adequate ventilation”, “avoid vapor inhalation”, “use in a fume hood”, or “provide local exhaust ventilation”. If working with hazardous chemicals that warrant the use of a fume hood, the following guidelines must be followed:
   a. Conduct all the operations inside the fume hood.
   b. Keep the hood sash closed at all times except when using the hood.
   c. If working with boiling liquids or reactive chemicals, use sash as a safety shield.
   d. Do not have sources of ignition inside the hood when flammable liquids or gases are present.
   e. Do not use the hood as a waste disposal mechanism except for very small quantities of volatile materials.
   f. Airflow in the hood should be checked periodically prior to performing any experiments. The airflow should be approximately 100 feet per minute (fpm). If there is an airflow change, notify the science department chair for corrective action.
8. Designated areas must be established for those chemicals that are highly hazardous. These chemicals are typically not approved to work with. If the chemical has been approved, then a designated area will be established. The chemical bottle will be marked, indicating that the use of this chemical is only to be worked on in this designated area.
9. Safety stations (e.g., eyewash and shower stations, first-aid, emergency information poster) and sinks must not be blocked with clutter.
Chemical Storage Facility

All K-8, middle, and high schools must have a designated chemical storage room with suitable shelf space, arrangement, and ventilation for the nature of the housed chemicals. The chemical storage room will have the following features:

1. Chemicals are stored and secured properly in storage room, or approved storage cabinet;
2. DO NOT store chemicals in aisles or stairwells, on desks or laboratory benches, on floors, in hallways, inside fume hoods, or in cabinets in rooms.
3. The area must be clean and orderly.
4. A telephone is readily available (cell phones are acceptable).
5. A current list of emergency telephone numbers is readily available.
6. CHP is readily available.
7. (M)SDS is readily available to teachers, students, and faculty members for each chemical stored.
8. Doors to the storage room need to be secured at all times. The doors will be lockable, and access will be limited to authorized personnel ONLY. Students are NOT allowed inside the storage room.
9. Ventilation inside the storage room must be sufficient to prevent a build-up of vapors above the recommended safety levels. Air should be changed four times per hour.
10. Temperature must be controlled throughout the year, which includes summer months. Temperature should never exceed 75°F (25°C).
11. Shelves or cabinets need to be firmly secured to the wall, with a maximum shelf height of 6 feet. The shelf clips need to be corrosion-resistant, or actively monitored throughout the calendar year.
12. An ABC fire extinguisher and a fire blanket must be near the storage room exit, or within 25 feet of the storage area. If there are reactive metals (e.g., magnesium, sodium, etc.) stored inside the storage room, then a Class D extinguisher must also be available inside the storage area, or available within five feet of the storage room.
13. Eyewash and a shower or drench hose must be available within 25 feet of the storage area. The stream of ambient-temperature water will conform to ANSI Z358.1-1991 criteria. The drench hose must not be used as a replacement for the eyewash.
14. Ceiling-mounted smoke or fire detector with an outside alarm must be present.
15. Dedicated cabinets for flammables and corrosives must be present if these chemicals are present.
16. First-Aid kit is readily available.
17. Spill-kit, chemical splash goggles, and chemical-resistant gloves are readily available.
18. Chemicals should be stored in proper storage pattern (Flinn storage pattern is recommended).
19. Chemicals should be properly labeled and stored in appropriate containers, especially secondary containers.
20. Chemicals should be continuously inventoried and inspected each year. Chemical bottles should not have any signs or corrosion or leakage.
21. Inventory list of chemicals should include the following:
   a. chemical name
   b. location
   c. date of purchase
   d. shelf life
   e. projected disposal date
   f. hazards associated with chemical
22. Only store chemicals that are actively used.
23. DO NOT hoard chemicals. Amount of chemical stored should not exceed a one year supply unless chemical has an unlimited shelf life.
24. No chemicals designated as unsafe for school laboratory may be stored, unless prior approval is given by DCHO.
CHEMICAL PROCUREMENT AND STORAGE

25. Compressed gas tanks must be secured upright to the wall, with caps in place, if applicable. Gas cylinders must be stored away from heat and direct sunlight.

26. Nonreactive waste receptacles must be available for chemical waste management.

27. Storage room door must be self-closing and locked when not in use.

28. Teachers must be adequately trained in chemical storage policies.

Chemical Storage Procedures

1. Chemicals must be stored in an orderly fashion. According to the Flinn hazard class or general hazard class. LBUSD provides the Suggested Shelf Storage Patterns to all high schools, middle schools, and K-8 schools in the Approved Chemicals List document.

2. All chemical containers must be properly labeled.

3. Do not crowd chemical bottles on shelves. The bottles should have a minimum space of two fingers (i.e., the width of your index and middle fingers touching).

4. All storage cabinets and shelves must contain a lip or wire in case of an earthquake.

5. Highly corrosive chemicals, flammables, and oxidizers should be stored separately in approved, designated storage cabinets. Storage cabinets must be:
   a. dense, one-inch plywood and contain no uncoated metal hinges or locks. Hinges constructed from wood or plastic material are preferred.
   b. fabricated to ensure that shelf supports will not corrode to compromise stability.
   c. provided with a recessed area or pan on the floor that will collect hazardous substance, which can prevent damage to shelves.
   d. constructed in compliance with local safety requirements.
   e. equipped with self-closing doors and locks, and are painted with fire resistant paint.
   f. marked with appropriate chemical class:
      i. Acids (Oxidizing acids, like nitric acid, must be separated from other acids.)
      ii. Corrosive Bases
      iii. Flammables (Keep away from all potential sources of ignition.)
      iv. Extreme Poisons

6. Unlabeled or unidentified chemicals must not be kept in storage room or anywhere. Contact Maintenance for removal at (562) 997-7510, ext. 1481. (See also Unknown Chemicals on p. 36.)

7. Periodically check the storage cabinets and shelves to ensure a safe environment (no spillage, damage, etc.).

8. An up-to-date Chemical Inventory List must be maintained inside the storage room.

9. Bottles of acid or volatile organic liquids should be kept from heating pipe, or direct sunlight (avoids pressure build up within storage vessel).

Using Chemicals Not Included on the Approved Chemicals List

Teachers wishing to use chemicals that are not included on the district Approved Chemicals list must submit a request form through the science department head and principal to the Science Curriculum Leader. The request form is provided by LBUSD.

When the request is received, the Science Curriculum Leader and DCHO will determine whether or not to approve the chemical purchase. If the chemical purchase is approved, they will provide guidelines for its use. A copy of the determination and its rationale will be sent to the teacher(s) making the request, the science department head, and the principal.

The Hazard Review Committee will then determine whether the chemical should be added to the district’s Approved Chemicals List. The DCHO will authorize the marking of any necessary designated areas. These areas are the only areas where the chemical work can be conducted. Appropriate signs will be placed to identify the designated area and to indicate the hazards of the chemical to be used there. Special labels will be affixed to all containers that indicate the date of its approval for use, and designated areas to which its use is restricted.
CHEMICAL PROCUREMENT AND STORAGE

Ordering Chemicals

Procedure for ordering chemicals:
1. Any order must be requested through the chemical inventory system.
2. From the inventory system, find the chemical on the list and click the reorder button. If the chemical is not on the list, click the request chemical button.
3. The request will be verified.
4. The request will then be reviewed against the current school inventory and the purchase/use history of the chemical.
5. After the order is reviewed, the order will be placed.
6. All chemical orders will be accompanied with a (M)SDS from the vendor.

Chemical Receiving Procedures

1. The chemical will be delivered to the science department head (or designee\(^1\)).
2. The department head (or designee) will mark the acquisition date on the chemical bottle. All chemical bottles must have an acquisition date on them.
3. The department head (or designee) will review the (M)SDS for hazards, proper procedures for:
   - chemical hazards
   - chemical handling
   - chemical storage requirements
   - chemical first aid
   - chemical spill procedures and disposal requirements
4. The department head (or designee) will sign the Chemical Receiving Report stating that they understand the chemical safety procedure, and they will be responsible for informing the other teachers about the proper chemical safety measures.
5. Chemical bottles must be stored in their proper location, at an appropriate height.
6. Chemical inventory must be kept updated.

\(^1\) Designee is typically a lead chemistry teacher at high schools or an 8th grade teacher at middle and k-8 schools.
PROTECTIVE EQUIPMENT AND APPAREL

Protective equipment and apparel essential for protecting individuals against potential accidents help to prevent or minimize an injury that may occur during laboratory activities. Protective equipment can either be apparel or equipment. Protective equipment must be utilized by the teachers, faculty members, and students conducting laboratory activities. Teachers and faculty members are responsible for implementing the proper protective equipment during laboratory activities, and making sure the students are properly utilizing the protective equipment.

The (M)SDS will provide some information as to what sorts of protective equipment is warranted for a specific chemical. At times, the (M)SDS may not be specific enough about the protective equipment that is necessary. The teacher must understand all the hazards associated with the chemical to provide the best protective equipment for the hazards.

Protective Equipment

Each laboratory classroom must contain the following:

1. **Eyewash station** that is located within 40 feet or 10 second travel time from any point in the laboratory under normal working conditions. An eyewash must be within 25 feet of areas where highly corrosive chemicals (i.e., pH 2.0 or less and pH 12.5 or greater) are used.

2. **Shower or drench hose** that is within 100 feet from any point in the laboratory under normal working conditions if using chemicals with a pH 4.0 or less, or greater than or equal to 9.0.

3. **Fire extinguisher**, Type ABC (up to ten pound charge), that is mounted and available within 50 feet from any point in the laboratory under normal working conditions. One fire extinguisher will be located near the exit from the laboratory area. If a laboratory activity involves a potential risk of metal fire (e.g., magnesium, sodium, etc.), a Class D fire extinguisher will be available within 75 feet from any point in the laboratory.

4. **Smoke detectors or fire detectors** that are ceiling-mounted.

5. **First aid kit** that is approved by the DCHO.

6. **Chemical spill kit** that contains chemical splash goggles, chemical-resistant gloves, appropriate neutralizing materials for the chemicals to be used in the laboratory, plastic bags, and scooper.

7. **Fire blanket** within 50 feet from any point in the laboratory. A non-asbestos containing fire blanket is required.

8. **Telephone** or other means of communication to use for emergencies.

The following must be kept near, but not necessarily inside, the laboratory classroom:

- master gas and electricity cut-offs
- fire alarm actuator
- means to sterilize goggles and other protective equipment

“Prior to performing laboratory experiments, wear proper attire.”
General Laboratory Apparel

Head
- ALWAYS wear eye protection when conducting laboratory activities.
- Secure long hair and remove jewelry, especially dangling jewelry.

Hands
- ALWAYS wear the appropriate gloves when conducting chemical laboratory activities.
- Synthetic fingernails are not recommended in the laboratory.

Torso
- Avoid wearing shirts that expose the torso.
- Wear a full-length, long-sleeved laboratory coat when conducting laboratory activities. Chemical resistant lab aprons can be utilized, but arm protection should be considered as appropriate.
- Secure loose clothing.

Legs
- Wear long pants that cover the entire leg area.
- Avoid wearing shorts or short skirts.

Feet
- ALWAYS wear shoes that cover the entire foot. Low-heeled shoes with nonslip soles are preferred.
- DO NOT wear sandals, open-toed shoes, open-backed shoes, or high-heeled shoes.

Personal Protective Equipment

PPE is to be utilized during any laboratory activity. PPE will be readily available to all parties involved in the laboratory activity. The following are PPE items:
- Safety goggles must protect against chemical splash and impact. Safety goggles must meet the ANSI Standard Z87.1-1989 standard. If there are other hazards (e.g., flying particles) then the appropriate goggles must be worn.
- Non-permeable gloves must be utilized while handling chemicals. Nitrile gloves are desired, but not mandatory unless the (M)SDS specifies its need.
- Laboratory aprons must be made of chemically inert material. Lab coats made of ordinary material that are non-chemical-resistant material are not acceptable.
- Other PPE (e.g., respirator) if designated by the DCHO. Training on the proper use of the PPE might be warranted. If training is required, it will be in accordance with the relevant standard.
INSPECTIONS AND MAINTENANCE

All safety equipment must be in good working order (OSHA Laboratory Standard 29 CFR 1910.1450). The teacher must check the equipment prior to using it in a laboratory activity. The following will describe procedures to minimize the risk of an accident or injury.

Responsibilities for Inspecting and Reporting

The science department heads are responsible for working with the DCHO to coordinate inspections and manage a safe learning and working environment. The DCHO, or person appointed by the DCHO, will inspect the laboratory spaces, preparation areas, and chemical storage room(s). Inspection should occur once per school. Managing a safe learning and work environment must ensue throughout the year.

The DCHO (or person appointed by the DCHO) will use an Inspector Checklist during an inspection. Two Copies of the report will be generated – one copy will remain with the DCHO and one copy will be given to the head of the science department. Any equipment tags will be updated upon passing an inspection.

School Level Inspection Responsibilities and Standards

All teachers are responsible for maintaining an organized and safe learning environment. Each science teacher will ensure that their safety equipment is working properly, and report any equipment problems to their department head and the DCHO.

The following are the responsibilities of each science teacher on a daily basis:

1. Make sure the number of laboratory occupants does not exceed the available working space.
2. Keep laboratory area and backroom area are clear of clutter so that aisles and evacuation routes are unobstructed.
3. Ensure appropriate signage is readily viewable.
4. See that chemicals are stored in their appropriate place.
5. Make sure chemical bottles are properly labeled.
6. Make all required protective equipment available and ready for use.

The following are the responsibilities of each science teacher on a monthly basis:

1. Flush each eyewash Station for at least for one minute.
2. Verify that first aid kit is present and adequately supplied.
3. Verify that chemical spill kits are present and adequately supplied.
4. Ensure that there is an adequate supply of Personal Protective Equipment (PPE) and that each piece is in proper condition to protect the individual wearing it.
5. See that goggle sanitizer (UV) is working properly, or regular cleaning process is in place.
INSPECTIONS AND MAINTENANCE

School Level Inspection Responsibilities and Standard

The following are also responsibilities of each science teacher during the school year:

1. Shower or drench hose must be flushed for at least 1 minute on a quarterly basis.
2. Master cutoff switches for gas and electricity and auxiliary exhaust are checked to ensure they are operating properly on a quarterly basis.
3. Check that fire extinguishers have not exceeded their inspection dates. The district must be notified if the dates have been surpassed.

District Level Inspection Responsibilities and Standards

The DCHO, district-assigned, or contracted personnel must inspect and document the following:

1. Fume hoods are operating at a face velocity of 80-100 linear feet per minute (fpm) with low turbulence.
2. Laboratory ventilation is operating at 6 to 8 room changes per hour.
3. Laboratory smoke or fire detectors are working properly, with their sensitivity falling within rate specifications.
4. Fire alarms are operating properly.
5. Emergency showers, drench hoses, and eyewashes have been regularly flushed. (Check the checklist).
6. PPE and emergency equipment are in adequate supply and condition.
7. All appropriate emergency and safety signs are in good condition and properly placed.
8. The laboratory, preparation and storage areas provide a safe environment for all occupants.
   A safe environment includes, but is not limited to:
   • chemical storage room that is clean and organized
   • chemicals placed in their designated locations
   • laboratory classrooms clear of clutter
   • preparation area that is free of broken or dirty glassware
9. Records are up-to-date with site inspections, chemical inventories, (M)SDS, etc.

Maintenance and Repair of Protective Equipment

Science department heads must note all deficiencies identified in their inspection. The notes must be presented to the school principal and DCHO. The department head, school principal, and DCHO will jointly prioritize all deficiencies and submit a prioritized list to the district superintendent. The district superintendent will authorize the plan of action for correcting the deficiencies. The DCHO will monitor the progress of correcting the deficiencies.

Maintenance and/or repair of protective equipment will be provided by qualified district personnel, or by other qualified contracted personnel. Maintenance of fume hoods must be performed by personnel specifically trained to do so.

Equipment identified as inoperative or operating below standards must be clearly tagged and removed from use. This equipment must not be used under any circumstance until properly repaired and certified according to standards.
Chemical Inventory

Long Beach Unified School District (LBUSD) must develop and maintain a standard chemical inventory list. The list includes chemicals approved for use by LBUSD. Each K-8, middle and high school working with chemicals must have an up-to-date chemical inventory. The science department head at each school must oversee an update of all chemicals stored in the school building. The inventory must include the following:

1. chemical name
2. quantity of chemical on hand
3. hazard information
4. storage location

A list of chemicals not approved for use by LBUSD must be noted. The science department heads must verify that approval was granted prior to storage of these chemicals.

The science department heads at each school must maintain chemical inventory and order records. A copy of records must be sent to the DCHO. The DCHO must maintain schools chemical inventory. He or she will ensure that updated chemical inventories are available to local agencies in compliance with pertinent regulations (e.g., fire department). Chemical inventories must be kept on file for at least five years.

Maintenance and Repair

The science department heads must note all equipment deficiencies identified in their inspection. The notes must be presented to the school principal and DCHO. Maintenance and/or repair of protective equipment will be provided by qualified district personnel, or by other qualified contracted personnel, in a timely manner. Equipment identified as inoperative or operating below standards must be clearly tagged and removed from use. This equipment must not be used under any circumstance until properly repaired and certified, according to standards. Maintenance and inspection records will be kept for at least five years.

Training

Dates and content of chemical hygiene training sessions for each employee must be recorded. Records must be completed and retained by the DCHO. The head of the science department and the principal must maintain copies. Training records must be kept for at least one year after an employee leaves his or her position.

Incident/Accident Reports

Incident and accident reports (also see page 34) are retained in the school principal’s office, with a copy sent to the DCHO, Nursing Services, and the Risk Management Office. Reports are kept for at least ten years.
Medical Consultation and Examination Report

Records of medical consultations and examinations must be maintained for at least 30 years after the employee leaves LBUSD employment. These records are kept by the appropriate school and the Office of Environmental Health and Safety.

Request to Use Chemicals Not on the Approved Chemicals List

The DCHO must maintain records of requests for non-standard chemicals and the determination of the Hazard Review Committee. A copy will be sent to the science department head and principal for the respective school. Records will be kept for at least five years.
CHEMICAL HEALTH HAZARDS

Routes of Exposure

Chemicals can enter the body in different ways. The three main routes are as follows:

DERMAL
- Some chemicals can enter the bloodstream by absorbing through the skin or damage the surface of the skin (e.g., solvents).
- Chemicals are easily absorbed through injured, chapped, and/or cracked skin.
- Depending on the substance and length of exposure, repeated exposure to the skin can increase the severity of reaction over time.

INHALATION
- Chemical gases, vapors, mists, fumes, and dust can enter the body through your nose and/or mouth.
- Chemicals can irritate the nose, throat, and lungs.
- Mucous membranes of the nose, trachea, bronchi, and lungs absorb the chemical(s).
- Once absorbed through the lungs, chemicals can be distributed throughout the body.

INGESTION
- Chemicals enter the body through the mouth.
- Chemical dust, particles, and mists may be inhaled through the nose and swallowed.
- Contaminated body parts may lead to accidental ingestion.

Common Chemical Injuries

Chemical injuries are mostly caused by human error, equipment failure, or intentional acts. The most commonly reported health effects from chemical exposure include:
- nausea
- dizziness
- headache
- respiratory ailment
ACCIDENT RESPONSE

General Accident Response

Science teachers and any other personnel working in a laboratory setting for LBUSD must be knowledgeable about proper procedures in case of an accident.

The following are the most common anticipated accidents:
- general thermal and chemical burns
- chemical(s) in eyes
- skin contact and irritation by chemical(s)
- inhalation, ingestion, or skin absorption of chemical(s)
- cuts and puncture wounds

Anyone working in a laboratory setting must be familiar with their work area. They must know the location and proper use of the following safety items:
- fire extinguishers and fire blankets
- eyewash and shower/drench hose
- chemical spill clean-ups kits
- first aid kits
- master utility cut-offs for the laboratory(s)
- emergency telephone and emergency phone numbers

See Appendix B for emergency information:
- Fire Department
- Hospital

The following are **DO**’s and **DON’T**s when administering first aid:

**DO**’s: (during an emergency)
1. Remain calm, cool, and collected.
2. Obtain assistance from other trained personnel, if feasible.
3. Handle the injured person as little as possible.
4. Call 911, if necessary.

**DO**’s: (after an emergency)
1. Check with the victim and with any other witnesses about what happened.
2. Make a prompt, complete, and accurate report of the situation. Provide report to the science department head and school administrator.
3. Note all injuries that occurred on the way to or from school, as well as those that occurred at school.

**DON’T**s:
- Don’t give liquids or medicine to an unconscious person.
- Don’t attempt to raise an unconscious person.
- Don’t cut the skin, break a blister, etc.
- Don’t diagnose.
- Don’t give medical advice.
- Don’t reduce dislocation.
- Don’t transport an injured student in a private car.
- Don’t send a student home without consulting/informing a parent or guardian.
- Don’t treat injuries that occurred at home.
- Don’t use a fire extinguisher on a person, which can cause frostbite.
ACCIDENT RESPONSE

Provide the following general information upon contacting emergency relief:

1. If contacting a fire or medical facility
   - type of emergency (e.g., explosion, chemical or electrical fire, etc.)
   - number of individuals
   - state of individuals (e.g., unconscious, burned, trapped, etc.)
   - victim’s name
   - telephone number
   - building and room number
   - meeting location for emergency relief personnel

2. If contacting Poison Control Center Hotline (1-800-222-1222)
   - victims age
   - name of the poison
   - amount of exposure
   - condition of the victim
   - victims name
   - time of exposure
   - any first aid performed

3. If medical help is sent, meet the emergency relief personnel at the indicated location, or send someone to meet them.

4. DO NOT move any injured person unless they are in further danger and it is feasible. Use general first aid techniques where appropriate.

5. DO NOT make any other calls unless it relates to controlling the emergency.

Universal precautions must be followed when administering first aid to a victim. Universal precautions are safety practices to assume that all bodily fluids are contaminated. Utilizing these precautions may reduce the chances of contaminating the person providing first aid. The following precautions should be followed:

1. Wash hands after providing first aid.
2. Dispose of any clothing that may have come in contact with bodily fluids.
3. Wear nitrile or latex gloves, if possible (especially if blood is involved).
Responding to Accidents Involving Individuals

Chemical spillage on unprotected parts of a person requires immediate attention. Treatment must begin immediately on affected body part(s). When a person’s wounds stabilize, proceed to the (M)SDS of the chemical to determine if any delayed effects are expected and the best course of action to take. The following standard procedures are recommended during an emergency:

**SKIN**

**Chemical Burns**

1. Flush with plenty of cold water for at least 10 minutes. The water pressure must be low.
2. Remove clothing as skin is being flushed (Clothing should be cut off, not pulled off, to minimize the spread of chemical(s)).
3. Consult the (M)SDS for further information.
4. Seek medical attention, if necessary.

- Other considerations:
  - Use a non-medicated, non-adhesive, and multi-layer material to cover the wound, if necessary.
  - DO NOT try and neutralize the affected area.
    - NEVER pour vinegar or citrus juice on alkali burns.
    - NEVER pour baking soda on acid burns.

**Non-chemical Burns**

- If over 10% of the body is burned, seek immediate medical attention.
- Burns to the facial area may suggest injury to the respiratory tract, seek immediate medical attention.
- Identify what type of burn occurred to administer the appropriate First-Aid method:
  - **First Degree** – Minor burns (e.g., over exposure to the sun or lightly touching a hot surface)
    1. Apply or submerge in room temperature water for no longer than 10 minutes to stop the burn process.
    2. Use a dry dressing.
  - **Second Degree** – Deep burns (very deep sunburn or contact with hot liquids), red appearance, blisters may be present
    1. Immerse burn area in room temperature water (NOT in ice water).
    2. Apply dry, sterile gauze or clean cloth to affected area.
    3. Avoid using antiseptic preparation, ointment, sprays, or home remedies.
    4. Keep affected arms or legs elevated.
    5. Seek medical attention.
  - **Third Degree** – Deep tissue destruction; white, dark brown, mottled or charred appearance (may resemble a second degree burn at first)
    1. Extinguish fire on clothing with water or fire blanket or any available clothing.
      - Stop, drop, and roll.
    2. Cover the patient with a blanket
      - DO NOT attempt to remove the clothing.
    3. Slightly elevate the head if burned. Pay attention to the victims breathing.
    4. Keep burnt feet or legs elevated.
    5. Keep burnt hands above the level of the heart.
    6. Avoid immersing affected area with ice water. Apply cool water instead.
    7. Seek immediate medical attention.
Responding to Accidents Involving Individuals

**EYES (Identify the type of chemical)**

- **Acid or Base**
  1. Remove any contact lenses.
  2. Rinse with plenty of water for at least 15 minutes using an eyewash station, if possible.
  3. If person is lying down, tilt head to the side and flush eye from inward to outward.
  4. Cover the eye with a dry, clean protective dressing (DO NOT use cotton).
  5. DO NOT rub eyes.
  6. Seek immediate medical attention.

- **Other**
  1. Remove any contact lenses.
  2. Rinse with plenty of water for at least 15 minutes using an eyewash station, if possible.
  3. Consult (M)SDS or Poison Control Center Hotline (1-800-222-1222).
  4. Seek medical attention.

**INHALED (Identify the type of chemical)**

1. If possible, immediately carry victim to fresh air. If unable to do so, open all doors and windows.
2. Loosen clothing.
3. If not breathing, perform CPR (must be trained). Make sure you do not inhale the poison.
4. Contact the Poison Control Center Hotline (1-800-222-1222).
5. Monitor victim for shock.

**INGESTED (Identify the type of chemical)**

1. Contact the Poison Control Center Hotline (1-800-222-1222).
2. DO NOT automatically induce vomiting or administer syrup of ipecac.
3. If the victim is transported to a hospital, remember to send the chemical bottle along.
4. If there is a delay in help:
   - Rinse mouth with water.
   - Drink a small quantity of water (2 to 4 ounces or 60 to 120 ml of water).

**SHOCK**

**Symptoms**

- pale or bluish skin (For darker-skin, check mucus membrane inside mouth or under eyelids.)
- moist or clammy skin
- rapid pulse, often too faint to be felt at the wrist
- rapid breathing (Shallow breathing may occur due to chest or abdominal pain.)
- weakness
- deep thirst
- vomiting
  1. Save sample of vomit in closable container. DO NOT touch vomit without gloves.
  2. DO NOT give fluids or induce vomiting.
  3. if victim stops breathing, use CPR mask or body fluid barrier when performing CPR.
Responding to Chemical Spills

The following procedures are recommended (ALWAYS wear appropriate attire):

**Minimal Hazard** – the material is not particularly toxic or volatile.
1. Control the spill as much as possible.
2. Cover the spill with absorbent from the spill kit. If no spill kit is available, use vermiculite, kitty litter, etc.
3. Scoop into plastic disposable bag(s).
4. Follow disposal instructions described in the (M)SDS.
5. Clean area with soapy water after removing the spill.

**Corrosive Material**
1. Control the spill as much as possible.
2. Neutralize with appropriate agent:
   - Acids – baking soda
   - Bases – vinegar
3. Cover the spill with absorbent material from the spill kit. If no spill kit is available, use vermiculite, kitty litter, etc.
4. Scoop into plastic disposable bag(s).
5. Follow disposal instructions described in the (M)SDS.
6. Clean area with soapy water after removing the spill.

**Volatile (Flammable) Material**
1. Immediately extinguish flames and turn off electrical devices.
2. Evacuate the area using established routes.
   **If trained to handle this type of spill:**
   1. Control the spill, especially a large spill.
   2. Cover the spill with absorbent material from the spill kit. If no spill kit is available, use vermiculite, kitty litter, etc.
   3. Scoop into plastic disposable bag(s).
   4. Follow disposal instructions described in the (M)SDS.
   5. Clean area with soapy water after removing the spill.
   **If not trained to handle this type of spill:**
   1. Seal the area; and
   2. Contact the appropriate personnel to arrive and handle the spill.

**Volatile (Toxic) Material** – if chemical(s) spilled outside the fume hood
1. Evacuate the area using established routes.
2. Seal the area.
3. Contact the appropriate personnel to arrive and handle the spill.

**Nonvolatile (Toxic) Material**
1. Isolate the area of the spill.
2. Consult the (M)SDS for appropriate cleaning procedures.
3. If amount or toxicity of the chemical exceeds the person’s ability or training to handle, evacuate the area until appropriate personnel arrive and handle the spill.

**Multiple Mixtures**
1. Make sure incompatible chemicals are not combined in the same chemical receptacles.
2. Treat absorbent material as chemical waste and dispose of accordingly.
3. DO NOT dispose of waste chemicals in ordinary trashcans.
Controlling Fires

Fires in a Small Container or Vessel
1. Suffocate the fire by covering the small container or vessel with an inverted container.
2. Remove nearby flammable material.
3. DO NOT use dry towels or cloth.

All Other Types of Fires
1. The fire must appear to be controllable first.
2. Grab the proper fire extinguisher.
3. Always fight the fire from a position of escape.
4. DO NOT discharge a fire extinguisher at an uncontained pool of burning liquid.
5. Direct the discharge from a fire extinguisher toward the base of the flames.
6. Avoid breathing gases and smoke.
7. If an electrical device catches fire, shut off the electricity to the affected outlet.
8. Immediately after the fire, all extinguishers utilized must be recharged or replaced with full ones.

Uncontrollable Fires (too large to suffocate or produce toxic fumes)
1. Vacate the area following established evacuation routes.
2. Sound the fire alarm.
3. Notify the fire department or call 9-1-1.
4. Inform fire fighters what chemicals are involved, or those which may become involved.

The following are classes of fire extinguishers, which are specific for a type of fire:

**Class A – Water Extinguishers**
- Effective against burning *paper* and *trash*.
- DO NOT use for electrical, liquid, or metal fires.

**Class B and C – Carbon Dioxide and Dry Powder Extinguishers**
- Effective against burning *liquids* and *electrical fires*.
- Less effective against burning paper or metal fires.
- If able to, avoid using in areas with delicate instruments and computers. There is a massive clean-up effort required afterwards.

**Class D – Met-L-X and Certain Dry Chemical Extinguishers**
- Effective against burning *metal* (e.g., magnesium or sodium).
ACCIDENT RESPONSE

Incident/Accident Reporting

All incidents and accidents must be reported on the approved form, even if no injuries occurred at the time. Attach report from any eyewitness(es) as well. Copies of incident/accident reports will be kept by the school principal, DCHO, and the risk management office. These reports will be carefully evaluated to determine if district safety policies and training were adequate for the circumstances. Any recommendations that a policy or practice needs to be changed, or simply reinforced, will be distributed to all who might benefit. A periodic review of incident reports by the Hazard Review Committee will look for problem areas that need special attention.

Exposure Assessment

It is the policy of the LBUSD to investigate, in a prompt manner, all employee-reported incidents in which there is a possibility of overexposure to a toxic substance.

Monitoring

Initial monitoring may be necessary for laboratories working with highly toxic substances or those that are under renovation, modernization, or hood installation. Monitoring for specific airborne substances must be performed in case of suspected or known employee exposure. If the measured concentrations exceed the PEL, TLV, or other specified action level, then steps must be taken to reduce these levels (29 CFR 1910.1000 through 1910.1199). Laboratory employees must be notified within 15 days of the measured results. Further monitoring must be taken to verify that steps towards minimizing the concentrations are effective. Monitoring will be discontinued if measurements are consistently below the action level for the specific substance.

Medical Consultations

Science teachers do not regularly handle significant quantities of substances that are acutely or chronically toxic. As a result, regular medical surveillance is not justified.
CHEMICAL WASTE MANAGEMENT

All LBUSD schools containing active science laboratories are considered a small quantity generator per the Environmental Protection Agency (EPA), unless otherwise notified. Appropriate documentation is kept on file with the DCHO and the office of Environmental Health and Safety.

The used and waste chemical program for LBUSD is designed in accordance with all local, state, and federal regulations. The program is adapted to the volume and diversity of chemicals involved during laboratory activities. The goal of the used and waste chemical program is to assure minimal harm to humans, organisms, and the environment from the disposal of unwanted laboratory chemicals. The following are the established priorities of the program:

1. micro-scaling laboratory chemical activities
2. purchasing chemicals in a limited quantity (one year supply)
3. recovery of chemicals from reaction products

Storing Chemical Waste

Each science laboratory conducting chemical experiments must have properly marked containers to dispose used chemicals. LBUSD must provide “Hazardous Waste” stickers to each school. The sticker must be properly filled out by the chemical waste producer. The following procedure is recommended:

1. Wear proper PPE.
2. Store all waste in containers that are in good condition.
3. Chemical waste must be segregated into compatible classes or classified as one of the following:
   - Ignitables
   - Corrosives (e.g., neutralized inorganic acid or organic acid or base)
   - Toxic (e.g., poison)
   - Reactives (e.g., to water or air)
   - Other (must specify)
4. DO NOT overfill the container. There should be several inches of space at the top of the bottle.
5. Bottle should be capped when not in use.
6. The following must be clearly marked on the container:
   - "Hazardous Waste" sticker
   - names of the chemical(s)
   - if there is a mixture, approximate percentage or amount of each of the constituents
   - accumulation date
   - name of teacher(s)
7. Store in a designated area. Waste containers should be stored away from daily laboratory activities, sinks, and floor drains.
8. No more than 50 gallons of hazardous chemical waste should be stored at one time.
9. Hazardous chemical waste must be picked up by the district within 90 days. To arrange for pick-up of waste chemicals, complete a Work Order online from the Maintenance website at http://tma.lbusd.k12.ca.us:82/home.html, or call Environmental Health and Safety, at (562) 997-7510, ext. 1481.
CHEMICAL WASTE MANAGEMENT

Other Considerations for Storing Chemical Waste

- If possible, recycle or reclaim used chemicals to minimize chemical waste.
- DO NOT dispose of chemical waste by pouring down the drain, adding them to mixed refuse for landfill burial, or evaporating volatiles in the hood.

Certain chemicals may be permitted to be disposed of down the drain. These chemicals can be disposed of by diluting with copious amounts of water. Prior approval by the DCHO is needed. The DCHO will provide a list of chemicals approved for sink disposal to the science department heads.

- DO NOT treat hazardous waste onsite.

Managing Empty Containers

A container is any portable device in which materials can be stored, handled, treated, transported, recycled, or disposed. Any container, or inner liner removed from a container that previously held hazardous material or hazardous waste must be treated as hazardous waste.

A container is considered empty when the following occurs:

- Container with pourable material – Material is no longer pouring as a steady stream from the container by means of draining, pouring, or aspirating.
- Container with non-pourable material – Material can no longer be feasibly scraped, chipped, or rinsed.
- Container with acute or extremely hazardous waste – Material is removed by triple-rinsing a container using a solvent that is capable of removing the material. These activities may require a formal permit.

Containers considered empty and ready for disposal must be marked with the date emptied and be removed within one year of that date. Containers should also have the name, site, and telephone extension of the emptier. When this is done, contact Environmental Health and Safety, at (562) 997-7510, ext. 1481, to arrange pick up of the containers.

Other Issues

Unknown Chemicals

On occasion, chemical bottles may lose their label or become illegible. Unknown chemicals cannot be evaluated for their hazards. Furthermore, they cannot be packed for disposal until they are identified. The science department head (or designee) should make every effort to identify the chemical(s) in the container, using tests such as those in the "Mystery Substances Identification Guide" in the Flinn Science catalog. (PDF version is available for free download.) The department head will notify the DCHO of the presence of containers and the steps taken to identify the contents.

Biohazards

A biohazard includes only those infectious agents presenting a risk or potential risk to the well-being of persons. Orange biohazard identity tags are used to identify containers of these materials. Specimens labeled in this manner require special disposal, separate from chemical disposal. The science department head will notify the DCHO when biohazard materials are present. The DCHO will arrange for qualified persons to pick up, transport, and dispose of the materials.
APPENDIX A - GLOSSARY

ACGIH (AMERICAN CONFERENCE OF GOVERNMENTAL INDUSTRIAL HYGIENISTS)
A voluntary membership organization of professional industrial hygiene personnel in governmental or educational institutions.

ACID
A substance that dissolves in water and releases hydrogen ions (H⁺). Depending on the strength of an acid, it may cause irritation, burns, or more serious damage to tissue. Acid strength is measured by pH. Values below 7.0 are acidic. The closer to 0, the stronger the acid.

ACTION LEVEL
A concentration, calculated as an eight-hour time-weighted average, that initiates certain required activities such as exposure monitoring and medical surveillance (29 CFR part 1910 for a specific substance).

ACUTE TOXICITY
Adverse effects resulting from a single dose, or exposure to a substance within 24 hours (or within 4 hours if inhaled).

ANSI (AMERICAN NATIONAL STANDARD INSTITUTE)
A voluntary membership organization (run with private funding) that develops national consensus standards for a wide variety of devices and procedures

ASPHYXIANT
A substance that interferes with the transport of an adequate supply of oxygen to the body by either displacing oxygen from the air or combining with hemoglobin thereby reduces the blood’s ability to transport oxygen.

BASE
A substance that dissolves in water and releases hydroxide ions (OH⁻). Depending on the strength of a base, it may cause irritation, burns, or more serious damage to tissue. Base strength is measured by pH. Values above 7.0 are basic. The closer to 14, the stronger the base.

BOILING POINT
The temperature at which the vapor pressure of a liquid equals atmospheric pressure or at which the liquid changes to the gas phase. If a flammable material has a low boiling point, it indicates a special fire hazard.

CARCINOGEN
A substance that causes cancer.

CAS REGISTRY NUMBER
An internationally recognized unique registration number assigned by the Chemical Abstracts Service to a chemical, a group of similar chemicals, or a mixture. CAS numbers can be found in a (M)SDS.

CEILING LIMIT “C”
The maximum permissible concentration of a material in the working environment. This concentration level should never be exceeded.

CFR (CODE OF FEDERAL REGULATIONS)
CHP (CHEMICAL HYGIENE PLAN)
A written program that outlines safe procedures, equipment, and work practices where hazardous chemicals are present. The program strives to protect employees from health hazards present in the workplace.

CHRONIC TOXICITY
Adverse effects resulting from repeated doses of, or exposures to, a substance by any route for an extended period of time (days, weeks, or years).

COMBUSTABLE LIQUIDS
Liquids having a flash point at or above 100°F (37.8°C), or liquids that will burn (DOT and NFPA). They do not ignite as easily as flammable liquids. However, combustible liquids can be ignited under certain circumstance, and must be handled with caution.

COMPRESSED GAS
A substance in a container with an absolute pressure greater than 276 kilopascals (kPa) or 40 pounds per square inch (psi) at 21°C, or an absolute pressure greater than 717 kPa (104 psi) at 54°C.

CONCENTRATION
The relative amount of a material in combination with another material.

CORROSIVE
A substance capable of causing visible destruction of, or irreversible changes to living tissue by chemical action at the site of contact (i.e., strong acids, strong bases, dehydrating agents, and oxidizing agents).

CYTOTOXIN
A substance toxic to cells in culture or in an organism.

DERMAL
Pertaining to or affecting the skin.

DERMATITIS
An inflammation of the skin.

DESIGNATED AREA
An area which may be used for work, storage of chemicals or waste, etc. This area may be the entire laboratory or an area under a device such as a laboratory hood.

DCHO (DISTRICT CHEMICAL HYGIENE OFFICER)
An employee who is designated by the employer, and who is qualified by training and experience, to provide guidance in the development and implementation of the provisions of the Chemical Hygiene Plan. This definition is not intended to place limitations on the position description or job classification that the designated individual shall hold within the employer’s organizational structure.

DOT (DEPARTMENT OF TRANSPORTATION)
U.S. Federal agency that regulates the labeling and transportation of hazardous materials.

EMPLOYEE
An individual who works in a laboratory setting and may be exposed to hazardous chemicals in the course of his or her assignment.
APPENDIX A - GLOSSARY

EPA (ENVIRONMENTAL PROTECT AGENCY)
U.S. Federal agency that develops and enforces regulations to protect human health and the natural environment.

EPIDEMIOLOGY
The study of disease in human populations.

EXPLOSIVE
A substance that causes a sudden, almost instantaneous release of pressure, gas, and heat when subjected to sudden shock, pressure, or high temperature.

EXPOSURE LIMITS
The concentration of a substance in the workplace to which most workers can be exposed during a normal daily and weekly work schedule without adverse effects.

FLAMMABLE GAS
A gas that, at an ambient temperature and pressure, form a flammable mixture with air.

FLAMMABLE LIQUID
A liquid having a flash point below 100°F.

FLAMMABLE SOLID
A solid, other than a blasting agent or explosive, 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 it creates a serious hazard.

FLASHPOINT
The minimum temperature at which a liquid or a solid produces a vapor near its surface sufficient to form an ignitable mixture with the air. The lower the flash point, the easier it is to ignite the material.

FUME
A solid particle that has condensed from the vapor state.

GAS
Chemical substances that exists in the gaseous state at room temperature.

GHS (GLOBALLY HARMONIZED SYSTEM)
An international system to update chemical labeling to clearly communicate health, physical, and environmental hazards of chemicals in a standardized way.

HAZARDOUS SUBSTANCE
Any substance or mixture of substances that is toxic, corrosive, an irritant, a strong sensitizer, flammable or combustible, or generates pressure through decomposition, heat or other means, if it may cause substantial personal injury or illness during or as a proximate result of any customary or reasonably foreseeable handling or use, including reasonably foreseeable ingestion by children (Federal Hazardous Substances Act (FHSA) at 16 CFR § 1500.3(b)(4)(i)(A)).

HEALTH HAZARD
A chemical for which there is scientifically valid evidence that acute or chronic health effects may occur in exposed persons. Some examples included are: allergens, carcinogens, toxic or highly toxic agents, reproductive toxicants, irritants, corrosives, sensitizers, and agents which damage the lungs, skin, eyes, or mucous membranes.
APPENDIX A - GLOSSARY

IGNITABLE
Capable of bursting into flames. Substances that are ignitable pose a fire hazard.

INCOMPATIBLE
The term applied to two substances to indicate that one material cannot be mixed with the other without the possibility of a dangerous reaction.

INGESTION
Taking a substance into the body by mouth and swallowing it.

INHALATION
Breathing a substance into the lungs. Substances may be in the form of gas, fumes, mist, vapors, dusts, or aerosols.

IRRITANT
A substance that causes a reversible inflammatory effect on living tissue by chemical action at the site of contact.

KNOWN HUMAN CARCINOGEN
A substance for which there is sufficient evidence of a cause and effect relationship between exposure to the material and cancer in humans.

LABORATORY
A facility where relatively small quantities of hazardous materials are used on a non-production basis.

LABORATORY SCALE
Work with substances in which the containers used for reactions, transfers, and other handling of substances are designed to be easily and safely manipulated by one person.

LABORATORY-TYPE HOOD
A device constructed and maintained to draw air from the laboratory and to prevent or minimize the escape of air contaminants into the laboratory.

$\text{LC}_{50}$ (LETHAL CONCENTRATION 50)
The concentration of a chemical in air that kills 50% of a sample population, typically expressed in mass per unit volume of air.

$\text{LD}_{50}$ (LETHAL DOSE 50)
The dose of a chemical that kills 50% of a sample population, typically expressed as milligrams per kilogram of body weight.

LEL (LOWER EXPLOSIVE LIMIT)
The lowest concentration of a substance that will produce a fire or flash when an ignition source is present (e.g., flame, spark, etc.). LEL is sometimes called a Lower Flammable Limit (LFL).

LEV (LOCAL EXHAUST VENTILATION)
A ventilation system that captures and removes air contaminants at the point they are being produced before they escape into the workroom air. LEV is sometimes called exhaust ventilation.

MEDICAL CONSULTATION
A consultation which takes place between an employee and a licensed physician for the purpose of determining what medical examinations or procedures, if any, are needed in cases where a significant exposure to a hazardous chemical may have taken place.
APPENDIX A - GLOSSARY

**MSDS (MATERIAL SAFETY DATA SHEET)**
Old format of information provided by chemical manufacturers listing physical properties and hazard information about a specific chemical. This information is required for each chemical purchased.

**MUTAGEN**
A substance capable of changing genetic material in a cell.

**NFPA (NATIONAL FIRE PROTECTION ASSOCIATION)**
An organization that provides information about fire protection and prevention. The NFPA developed a standard outlining a hazard-warning labeling system that rates the hazard(s) of a material during a fire. These hazards are divided into health, flammability, and reactivity hazards and appear in a well-known diamond system using from zero through four to indicate severity of the hazard. Zero indicates essentially no hazard and four indicates severe hazard.

**NIOSH (NATIONAL INSTITUTE FOR OCCUPATIONAL SAFETY AND HEALTH)**
U.S. Federal agency of the Centers for Disease Control and Prevention (CDC) that investigates and evaluates potential hazards in the workplace. NIOSH is also responsible for conducting research and providing recommendations for the prevention of work-related illness and injuries.

**OSHA (OCCUPATIONAL SAFETY AND HEALTH ADMINISTRATION)**
U.S. Federal agency that develops and enforces occupational safety and health standards for all general, as well as, construction and maritime industries and businesses in the U.S.

**OXIDIZERS**
A substance that can cause the ignition of combustible materials without an external source of ignition. Oxidizers aggressively pull electrons from other substances like oxygen, and therefore support combustion even in an oxygen-free atmosphere.

**PEL (PERMISSIBLE EXPOSURE LIMIT)**
The legally enforceable maximum amount or concentration of a chemical that a worker may be exposed to under OSHA regulations.

**PEROXIDES**
Substances that include explosive peroxy compounds that are shock, pressure, or heat sensitive.

**pH**
A measure of the acidity or alkalinity (basic) of a material when dissolved in water, expressed on a scale from 0 to 14. [0 ...acidic... 7.0 ...basic... 14]

**PHYSICAL HAZARD**
A chemical that has scientifically valid evidence proving it to be potentially dangerous as a combustible liquid, a compressed gas, explosive, flammable, an organic peroxide, an oxidizer, pyrophoric, unstable (reactive), or water-reactive.

**PPE (PERSONAL PROTECTIVE EQUIPMENT)**
Any clothing and/or equipment used to protect the head, torso, arms, hands, and feet from exposure to chemical, physical, or thermal hazards.

**Pyrophoric**
A substance that ignites spontaneously in air at or below 55°C (130°F).
APPENDIX A - GLOSSARY

**REACTIVITY**
The capacity of a substance to combine chemically with other substances.

**REPRODUCTIVE TOXICITY**
Adverse effects on sexual function and fertility in adult males and females, as well as developmental toxicity in the offspring (International Programme on Chemical Safety (IPCS) Environmental Health Criteria 225, Principles for Evaluating Health Risks to Reproduction Associated with Exposure to Chemicals).

**RESPRIRATOR**
A device which is designed to protect the wearer from inhaling harmful contaminants.

**RESPRATORY HAZARD**
An airborne contaminant that, when inhaled, results in some bodily function impairment or even death.

**SDS (SAFETY DATA SHEET)**
New format of information provided by chemical manufacturers listing physical properties and hazard information about a specific chemical that is aligned to the GHS. This information is required for each chemical purchased.

**SECONDARY CONTAINER**
An empty chemical-resistant container used for the storage of a chemical or mixture of chemicals.

**SENSITIZER**
A substance that may cause no reaction in a person during initial exposures, but subsequent exposures will cause an allergic response to the substance.

**STEL (SHORT TERM EXPOSURE LIMIT)**
The maximum concentration to which workers can be exposed for a short period of time (15 minutes).

**SYSTEMIC**
Affecting many or all body systems or organs (not localized in one spot or area).

**TERATOGEN**
A substance that can interfere with the development of a fetus during pregnancy, resulting in loss of the baby or birth defects.

**TLV (THRESHOLD LIMIT VALUE)**
A term (used by ACGIH) to express the recommended exposure limits of a chemical to which nearly all workers may be repeatedly exposed, day after day, without adverse effect.

**TOXICITY**
The potential of a substance to exert a harmful effect on humans or animals, and a description of the effects and conditions under which the effect takes place.

**TWA (TIME-WEIGHTED AVERAGE)**
The average concentration to which an average worker can be exposed for a normal, 8 hour workday.

**UNSTABLE**
A chemical that, in its pure state or as commercially produced will react vigorously in some hazardous way under shock conditions (i.e., dropping), certain temperatures, or pressures.
APPENDIX A - GLOSSARY

**VAPOR**
The gaseous state of substances which are normally in the liquid or solid state (at normal room temperature and pressure). Vapors evaporate into the air from liquids, such as solvents (solvents with low boiling points will evaporate quickly).

**VAPOR PRESSURE**
The pressure that a solid or liquid exerts when it is in equilibrium with its vapor at a given temperature.

**WATER REACTIVE MATERIAL**
A substance that reacts rapidly with water and can generate enough heat for the sample to spontaneously combust or explode. The reaction may also release a gas that is either flammable or presents a respiratory health hazard.
APPENDIX B – EMERGENCY INFORMATION

HIGH SCHOOLS

**AVALON K-12 (310) 510-0790**
Hospital Information
- Catalina Medical Center
  - 100 Falls Canyon Road
  - Avalon, CA 90704
  - (310) 510-0700
Fire Department Information
- Avalon Fire Department
  - 420 Avalon Canyon Road
  - Avalon, CA 90704
  - (310) 510-0203

**MCBRIDE (562) 425-3539**
Hospital Information
- Community Hospital Long Beach
  - 1720 Termino Avenue
  - Long Beach, CA 90804
  - (562) 498-1000
Fire Department Information
- Long Beach Fire Station 5
  - 7575 East Wardlow Road
  - Long Beach, CA 90808
  - (562) 570-2500

**CABRILLO (562) 951-7700**
Hospital Information
- Long Beach Memorial Medical Center
  - 2801 Atlantic Avenue
  - Long Beach, CA 90806
  - (562) 933-2000
Fire Department Information
- Long Beach Fire Station 13
  - 2475 Adriatic Avenue
  - Long Beach, CA 90810
  - (562) 570-2500

**MILLIKAN (562) 425-7441**
Hospital Information
- Community Hospital Long Beach
  - 1720 Termino Avenue
  - Long Beach, CA 90804
  - (562) 498-1000
Fire Department Information
- Long Beach Fire Station 5
  - 7575 East Wardlow Road
  - Long Beach, CA 90808
  - (562) 570-2500

**CAMs (310) 243-2025**
Hospital Information
- Harbor-UCLA Medical Center
  - 1000 West Carson Street
  - Torrance, CA 90502
  - (310) 222-2345
Fire Department Information
- LA County Fire Department Station 116
  - 755 E Victoria St
  - Carson, CA 90746
  - (310) 324-5941

**POLYTECHNIC (562) 591-0581**
**POLY - PAAL (562) 591-1381**
Hospital Information
- Saint Mary Medical Center
  - 1050 Linden Avenue
  - Long Beach, CA 90813
  - (562) 491-9785
Fire Department Information
- Long Beach Fire Station 3
  - 1222 Daisy Avenue
  - Long Beach, CA 90813
  - (562) 570-2500

**JORDAN (562) 423-1471**
**JORDAN PLUS (562) 984-3710**
Hospital Information
- Long Beach Memorial Medical Center
  - 2801 Atlantic Avenue
  - Long Beach, CA 90806
  - (562) 933-2000
Fire Department Information
- Long Beach Fire Station 12
  - 1199 East Artesia Boulevard
  - Long Beach, CA 90805
  - (562) 570-2500

**WILSON (562) 433-0481**
Hospital Information
- Community Hospital Long Beach
  - 1720 Termino Avenue
  - Long Beach, CA 90804
  - (562) 498-1000
Fire Department Information
- Long Beach Fire Station 17
  - 2241 Argonne Avenue
  - Long Beach, CA 90815
  - (562) 570-2500

Immediate Emergency Response: 9-1-1

Poison Control: (800) 222-1222
www.poison.org

www.poison.org
APPENDIX B – EMERGENCY INFORMATION

MIDDLE AND K-8 SCHOOLS

BANCROFT (562) 425-7461
Hospital Information
Lakewood Regional Medical Center
3700 E. South Street
Lakewood, CA 90712
(562) 531-2550
Fire Department Information
Long Beach Fire Station 19
3559 Clark Avenue
Long Beach, CA 90808
(562) 570-2500

COMPERS (562) 925-2285
Hospital Information
Lakewood Regional Medical Center
3700 E. South Street
Lakewood, CA 90712
(562) 531-2550
Fire Department Information
Long Beach Fire Station 19
3559 Clark Avenue
Long Beach, CA 90808
(562) 570-2500

BURCHAM (562) 420-2685
Hospital Information
Community Hospital Long Beach
1720 Termino Avenue
Long Beach, CA 90804
(562) 498-1000
Fire Department Information
Long Beach Fire Station 19
3559 Clark Avenue
Long Beach, CA 90808
(562) 570-2500

HAMILTON (562) 602-0302
Hospital Information
The Children’s Clinic Family Health Center
1060 East 70th Street
Long Beach, CA 90805
(562) 531-7284
Fire Department Information
Long Beach Fire Station 12
1199 East Artesia Boulevard
Long Beach, CA 90805
(562) 570-2500

CUBBERLEY (562) 420-8810
Hospital Information
Community Hospital Long Beach
1720 Termino Avenue
Long Beach, CA 90804
(562) 498-1000
Fire Department Information
Long Beach Fire Station 5
7575 East Wardlow Road
Long Beach, CA 90808
(562) 570-2500

HENRY (562) 421-3754
Hospital Information
Community Hospital Long Beach
1720 Termino Avenue
Long Beach, CA 90804
(562) 498-1000
Fire Department Information
Long Beach Fire Station 18
3361 Palo Verde Avenue
Long Beach, CA 90808
(562) 570-2500

FRANKLIN (562) 435-4952
Hospital Information
Saint Mary Medical Center
1050 Linden Avenue
Long Beach, CA 90813
(562) 491-9785
Fire Department Information
Long Beach Fire Station 2
1645 East 3rd Street
Long Beach, CA 90802
(562) 570-2500

HILL (562) 998-7611
Hospital Information
Long Beach Memorial Medical Center
2801 Atlantic Avenue
Long Beach, CA 90806
(562) 933-2000
Fire Department Information
Long Beach Fire Station 18
3361 Palo Verde Avenue
Long Beach, CA 90808
(562) 570-2500
<table>
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<tr>
<th>School</th>
<th>Phone Number</th>
<th>Hospital Information</th>
<th>Fire Department Information</th>
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<tbody>
<tr>
<td>HOOVER</td>
<td>(562) 421-1213</td>
<td>Lakewood Regional Medical Center 3700 E. South Street Lakewood, CA 90712 (562) 531-2550</td>
<td>Los Angeles County Fire Department 2600 Greenmeadow Road Lakewood, CA 90712 (562) 421-7713</td>
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<td>LINDBERGH</td>
<td>(562) 422-2615</td>
<td>Lakewood Regional Medical Center 3700 E. South Street Lakewood, CA 90712 (562) 531-2550</td>
<td>Long Beach Fire Station 11 160 East Market Street Long Beach, CA 90805 (562) 570-2500</td>
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<td>HUDSON</td>
<td>(562) 426-0470</td>
<td>Long Beach Memorial Medical Center 2801 Atlantic Avenue Long Beach, CA 90806 (562) 933-2000</td>
<td>Long Beach Fire Station 13 2475 Adriatic Avenue Long Beach, CA 90810 (562) 570-2500</td>
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<td>LINDSEY</td>
<td>(562) 423-6451</td>
<td>Long Beach Memorial Medical Center 2801 Atlantic Avenue Long Beach, CA 90806 (562) 933-2000</td>
<td>Long Beach Fire Station 11 160 East Market Street Long Beach, CA 90805 (562) 570-2500</td>
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<td>HUGHES</td>
<td>(562) 595-0831</td>
<td>Long Beach Memorial Medical Center 2801 Atlantic Avenue Long Beach, CA 90806 (562) 933-2000</td>
<td>Long Beach Fire Station 9 3917 Long Beach Boulevard Long Beach, CA 90807 (562) 570-2500</td>
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<tr>
<td>MARSHALL</td>
<td>(562) 429-7013</td>
<td>Community Hospital Long Beach 1720 Termino Avenue Long Beach, CA 90804 (562) 498-1000</td>
<td>Long Beach Fire Station 18 3361 Palo Verde Avenue Long Beach, CA 90808 (562) 570-2500</td>
</tr>
<tr>
<td>MONROE</td>
<td>(562) 429-8911</td>
<td>Bellflower Medical Center 9542 Artesia Boulevard Bellflower, CA 90706 (562) 866-2041</td>
<td>Long Beach Fire Station 5 7575 E. Wardlow Road Long Beach, CA 90808 (562) 570-2500</td>
</tr>
</tbody>
</table>
## MIDDLE AND K-8 SCHOOLS

### MIJIR (562) 426-5571
- **Hospital Information**
  - Long Beach Memorial Medical Center
  - 2801 Atlantic Avenue
  - Long Beach, CA 90806
  - (562) 933-2000
- **Fire Department Information**
  - Long Beach Fire Station 13
  - 2475 Adriatic Avenue
  - Long Beach, CA 90810
  - (562) 570-2500

### NELSON (562) 591-6041
- **Hospital Information**
  - Community Hospital Long Beach
  - 1720 Termeno Avenue
  - Long Beach, CA 90804
  - (562) 498-1000
- **Fire Department Information**
  - Los Angeles County Fire Department Station 60
  - 2700 East 27th Street
  - Signal Hill, CA 90755
  - (562) 570-2500

### ROBINSON (562) 492-6003
- **Hospital Information**
  - Long Beach Memorial Medical Center
  - 2801 Atlantic Avenue
  - Long Beach, CA 90806
  - (562) 933-2000
- **Fire Department Information**
  - Long Beach Fire Station 13
  - 2475 Adriatic Avenue
  - Long Beach, CA 90810
  - (562) 570-2500

### ROGERS (562) 434-7411
- **Hospital Information**
  - Community Hospital Long Beach
  - 1720 Termino Avenue
  - Long Beach, CA 90804
  - (562) 498-1000
- **Fire Department Information**
  - Long Beach Fire Station 21
  - 225 Marina Drive
  - Long Beach, CA 90803
  - (562) 570-2500

### STANDFORD (562) 594-9793
- **Hospital Information**
  - Community Hospital Long Beach
  - 1720 Termino Avenue
  - Long Beach, CA 90804
  - (562) 498-1000
- **Fire Department Information**
  - Long Beach Fire Station 19
  - 3559 Clark Avenue
  - Long Beach, CA 90808
  - (562) 570-2500

### STEPHENS (562) 595-0841
- **Hospital Information**
  - Long Beach Memorial Medical Center
  - 2801 Atlantic Avenue
  - Long Beach, CA 90806
  - (562) 933-2000
- **Fire Department Information**
  - Long Beach Fire Station 3
  - 1222 Daisy Avenue
  - Long Beach, CA 90813
  - (562) 570-2500

### POWELL (310) 631-8794
- **Hospital Information**
  - Lakewood Regional Medical Center
  - 3700 E. South Street
  - Lakewood, CA 90712
  - (562) 531-2550
- **Fire Department Information**
  - Long Beach Fire Station 11
  - 160 East Market Street
  - Long Beach, CA 90805
  - (562) 570-2500
APPENDIX B – EMERGENCY INFORMATION

MIDDLE AND K-8 SCHOOLS

TINCHER (562) 493-2636
Hospital Information
   Community Hospital Long Beach
   1720 Termino Avenue
   Long Beach, CA 90804
   (562) 498-1000
Fire Department Information
   Long Beach Fire Station 18
   3361 Palo Verde Avenue
   Long Beach, CA 90808
   (562) 570-2500

WASHINGTON (562) 591-2434
Hospital Information
   Saint Mary Medical Center
   1050 Linden Avenue
   Long Beach, CA 90813
   (562) 491-9785
Fire Department Information
   Long Beach Fire Station 3
   1222 Daisy Avenue
   Long Beach, CA 90813
   (562) 570-2500
APPENDIX C – REFERENCES

ANSI, American National Standards Institute – Various sections.


Code of Federal Regulations (CFR) 40, Environmental Protection Agency (EPA), Various Sections.

Code of Regulations (CRF) 49, Department of Transportation (DOT), Various Sections.

Compressed Gas Association, (1965)


Uniform Fire Code.

Utah Division of Epidemiology and Laboratory Services, Larry Scanlan, Salt Lake City, UT.