CHEMICAL HYGIENE PLAN

April 2014

Table of Contents

I. Glossary **4**

A) Acronyms
B) Definitions

II. Introduction **9**

III. Chemical Hygiene Responsibilities **10**

A) Administration
B) Student Supervision – Safety and Liability
C) General Rules for Employees
D) Chemical Hygiene Officer
E) Teachers
F) Students
G) Employee Training

IV. General Protocols for Laboratory Work Involving Chemicals **17**

A) Fundamental Principles to Avoid Exposure to Hazardous Chemicals
B) General Safety Rules for Teachers and Students
C) Personal Protective Equipment (PPE)
D) Personal Apparel
E) General Housekeeping Practices in the Laboratory
F) Signs and Labels
G) Laboratory Equipment
H) Environmental Monitoring
I) Medical Monitoring Program
J) Record Maintenance
K) Unattended Operations
L) Use of Chemical Hoods

V. Chemical Management **27**

A) Chemical Procurement
B) Chemical Storage Rules and Procedures
C) Specific Rules and Guidelines for Chemical Safety
D)

I. Glossary

A) Acronyms

ACGIH	American Conference of Governmental Industrial Hygienists
ANSI	American National Standards Institute
CAS	Chemical Abstracts Service
CDC	Centers for Disease Control and Prevention
CFR	Code of Federal Regulations
CGA	Compressed Gas Association
CHP	Chemical Hygiene Plan
CHO	Chemical Hygiene Officer
DOT	Department of Transportation
DVUSD	Deer Valley Unified School District #97
EPA	Environmental Protection Agency
GHS	Globally Harmonized System of Classification and Labeling of Chemicals
HCS	Hazard Communication Standard
HEPA	High Efficiency Particulate Air
IDLH	Immediately Dangerous to Life and Health
SDS	Material Safety Data Sheets
NEC	National Electrical Code
NFPA	National Fire Protection Association
NIH	National Institutes of Health
NIOSH	National Institute of Occupational Safety and Health
NRC	National Research Council
NTP	National Toxicology Program
OEL	Occupational Exposure Limit
OSHA	Occupational Safety and Health Administration
PEL	Permissible Exposure Level
PPE	Personal Protective Equipment
SDS	Safety Data Sheets
SOP	Standard Operating Procedures
TLV	Threshold Limit Value
TWA	Time Weighted Average
WHO	World Health Organization

B) Definitions

Acute Exposure - Short durations of exposure to high concentrations of hazardous materials.

Allergen - A chemical substance that induces an immediate or delayed adverse reaction by the immune system.

Asphyxiant - A substance that can cause suffocation.

Chemical Hygiene Officer - An employee at the local school level (building) who is qualified, through training, education, and experience, to oversee the implementation of and subsequent reviews of the school Chemical Hygiene Plan, per OSHA 29 CFR 1910.1450, *Occupational Exposure to Hazardous Chemicals in Laboratories.*

Carcinogen - A substance that causes the development of cancerous growths in humans or is considered capable of causing cancer in humans. A substance is considered a carcinogen if:

1) It has been evaluated by the International Agency for Research on Cancer (IARC) and has been found to be a carcinogen or potential carcinogen;
2) It is listed in the National Toxicology Program's (NTP) *Annual Report on Carcinogens* as a carcinogen or potential carcinogen;
3) It is an OSHA-regulated carcinogen;
4) One study has been published which positively identifies the substance as a carcinogen.

Chemical Abstracts Service (CAS) Registration Number - A unique number that is assigned to a chemical as a means to identify the material.

Chemical Hygiene Plan - A written plan that is designed to protect laboratory workers from occupational exposure to hazardous chemicals, per OSHA 29 CFR 1910.1450, *Occupational Exposure to Hazardous Chemicals in Laboratories.*

Chronic Exposure - Continuous exposure over a long period of time to low concentrations of hazardous materials in the work place.

Chronic Toxicity - Adverse health effects that can be a result of long-term exposure to hazardous materials.

Combustible Material - A substance (solid, liquid, or gas) that must be moderately heated or exposed to relatively high ambient temperatures before ignition can occur.

Corrosive Material - A substance that can cause visible destruction of or irreversible alteration on physical contact with living tissue.

Embryotoxin - A material that is harmful to a developing embryo at a concentration that does not have adverse effects on the pregnant female.

Permissible Exposure Limit (PEL) - The maximum acceptable concentration of a chemical in the work place air. Commonly used exposure limits include TLV-TWA (Threshold Limit Value-Time Weighted Average), STEL (Short-Term Exposure Limit), and C (Ceiling Value).

Personal Protective Equipment (PPE) - Protective equipment (i.e., gloves, safety goggles, laboratory coat or apron, respirators) that is worn by laboratory workers to protect them from direct exposure to hazardous materials.

Physical Hazard - A substance that is a hazard of physical origin (i.e., a burn): A material that is flammable, explosive, water reactive, pyrophoric, or unstable; a combustible liquid, a compressed gas, an organic peroxide, or an oxidizer.

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TLV-Short Term Exposure Limit (STEL) - The maximum concentration of an airborne substance for a continuous exposure period of 15 minutes, with the following guidelines:

1) There will be a maximum of four 15-minute periods per day.
2) There will be at least 60 minutes between exposure periods.
3) The daily TLV-TWA will not be exceeded.

TLV-Time Weighted Average - The ACGIH term that is used to express the maximum allowable time weighted average concentration of an airborne substance for a normal 8-hour work day or 40-hour work week.

Toxic Material - A poisonous substance which has the ability to cause adverse health effects upon exposure.

III. Chemical Hygiene Responsibilities

A) Administration

1. The administration is ultimately responsible for the implementation, enforcement, and support of the Chemical Hygiene Plan and safety program.

2. Assumes responsibility for the laboratory use of hazardous chemicals and appoints one or more

2. Minimize all chemical exposure.

3. Not underestimate chemical hazards.

4. Know and understand the hazards of each chemical reactant and each of the products of chemical experiments as stated in the SDS, lab direction, etc.

5. Know how to properly store all chemicals. If there i

2.

3. Teachers must be familiar with all safety equipment and emergency procedures. Safety equipment (safety goggles, aprons, etc.) appropriate to the laboratory experiment must be provided. The teaching environment should be appropriate for the science activities performed. The teaching environment includes features such as room size, adequate ventilation, the presence of fire extinguishers, eye wash fountains, etc. Student maturity and behavior should be taken into consideration when selecting laboratory exercises.

4. Students must be instructed in safety rules before lab activities. The "Deer Valley Unified School District #97 Science Safety Rules and Procedures Agreement" is required for high school students enrolled in any science course.

If these employees have copies already, any changes or updates of information will be provided.

2. Locations of the chemical inventory and Safety Data Sheets. Copies of SDS should be in a location within the Science Department that is known by and accessible to all teachers who use these materials.

3. Procedure for reporting accidents. Use the "Incident Report" form (Appendix D) to report an accident.

4. Procedure for reporting unsafe conditions to school administrator. (Appendix E)

5. Procedure for medical treatment involving chemical exposure. Remember one source of information for medical treatment is found on Safety Data Sheets.

6. Procedure for acquiring and disposing of chemicals. The school's Chemical Hygiene Officer should send a request for disposal of unwanted chemicals including the name of the chemical, if known, and the quantity of the chemical to the Plant Foreman by December 10th and May 10th of each school year. The Chemical Hygiene Officer(s) mu

• How an employee might use the labels in the workplace. For example,

Explain how information on the label can be used to ensure proper storage of hazardous chemicals.

Explain how the information on the label might be used to quickly locate information on first aid when needed by employees or emergency personnel.

• General understanding of how the elements work together on a label. For example,

Explain that where a chemical has multiple hazards, dif

IV. General Protocols for Laboratory Work Involving Chemicals

A) Fundamental Principles to Avoid Exposure to Hazardous Chemicals

1. The number of occupants allowed in the laboratory must be set at a safe level based on building and fire safety codes, size and design of the laboratory teaching facility, chemical/physical/biological hazards, and students' needs (NSTA 2000; Roy 2006). Science classes should have no more than 24 students to allow for adequate supervision during science activities, even if the occupancy load limit might accommodate more (NSTA 2004). It is equally important to ensure adequate workspace for each student. NSTA recommends 60 sq. ft. for each secondary student and 45 sq. ft. for each elementary student in a laboratory/classroom setting (Motz et al. 2007). Research data show that accidents rise dramatically as class enrollments exceed 24 students or when inadequate individual workspace is provided (West et al. 2005).

2. Thoroughly review all proposed laboratory procedures to determine the potential health and safety hazards before beginning work in the laboratory. Refer to the SDS for guidance on chemical storage, handling, and disposal.

3. Avoid ingestion, injection, inhalation, eye contact, and skin contact with hazardous materials.

4. Observe the PEL (Permissible Exposure Limit) and TLV (Threshold Limit Value) of each hazardous material in the laboratory. These limits are listed on the SDS.

5. The choice of chemicals to be used in the laboratory shall be appropriate to the facilities, age level of the students, and shall not exceed the capacity of the exhaust system.

6. Do not smell or taste chemicals. When instructed to smell a chemical, gently waft the vapors toward your nose. Do not directly inhale the vapors.

7. Vent apparatuses which may discharge chemicals (vacuum pumps, distillation columns, etc) into local exhaust or hoods.

8. Inspect gloves and glove boxes before use.

9. Always wash exposed areas of skin after chemical usage and before exiting the laboratory.

10. Never wear gloves or lab coats outside of the laboratory or into areas where food is stored and consumed.

11. Eating, smoking, using smoke-less tobacco products, drinking, chewing gum, or applying cosmetics in areas where laboratory chemicals are present is prohibited.

12. Food, beverages, and cosmetics are not to be stored in chemical storage areas or refrigerators.

13. Do not use glassware or utensils used for laboratory work for any other purpose (i.e., drinking beverages in a beaker).

14. Laboratory workers should wash laboratory apparel separately from personal clothing.

15. Keep chemical containers closed when not in use. All containers with either mixed or discarded chemicals must be clearly labeled with contents as well as the date.

B) General Safety Rules for Teachers and Students

Chemical Guidelines:

Teachers who engage in laboratory activities involving chemicals need to consult the Chemical Hygiene Plan for more specific rules and procedures designed to protect them as empl

3. Instruct students in the proper use of flames or heating elements before use in an experiment. Use alcohol burners with caution. Do not allow students to fill burners; fill in well-ventilated areas. Never fill when flames are in use; never keep stock containers of alcohol or other flammables in a room where flames are in use. Never transport a lit alcohol burner.
4. Never allow a student to focus direct sunlight through a microscope. Magnifying glasses can

- Develop activities that promote observation and comparison skills that instill in students an appreciation for the value of life and the importance of caring for animals responsibly.

- Instruct students on safety precautions for handling live organisms and establish a plan for addressing such issues as allergies and fear of animals.

- Develop and implement a plan for future care or disposition of animals at the conclusion of the study as well as during school breaks and summer vacations.

- Espouse the importance of not conducting experimental procedures on animals if such procedures are likely to cause pain, induce nutritional deficiencies, or expose animals to parasites, hazardous/toxic chemicals, or radiation.

- Shelter animals when the classroom is being cleaned with chemical cleaners, sprayed with pesticides, and during other times when potentially harmful chemicals are being used.

- Refrain from releasing animals into a non-indigenous environment.

3. Care and common sense should be used in collecting and handling live insects and other invertebrates.

4. Vertebrate animals should be kept in the classroom only if they can be treated humanely and their handling monitored by the teacher. Animals capable of inflicting bites should be displayed only, not handled. No experimentation that causes pain, malnutrition, thirst, or other stress to an animal is permissible.

5. Students are not encouraged to bring pets from home. If a student brings an animal to school, it should support instruction based on the curriculum and be with the prior knowledge and approval of the teacher and the principal. Proper care and safe display of the animal must be provided.

6. Students and teachers should wash their hands thoroughly after handling chemicals, plants and/or animals.

C) Personal Protective Equipment (PPE)

1. Personal protective equipment must be available and compatible with the degree of potential chemical hazard. Always review new procedures and refer to the SDS to determine the degree of PPE that is required for each chemical that will be used in the laboratory. All photographs that are taken in a laboratory setting must depict laboratory workers who are wearing proper personal protective equipment (i.e., chemical splash goggles, gloves, and laboratory coat or apron). Notify the Administration and/or the

2. Access to exits, emergency equipment, and utilities must never be blocked. Coats, bags, and other personal items must be stored in the proper area, not on the bench tops or in the aisle ways.

3. Properly label chemicals and equipment for use and storage. Repair or replace any damaged labels immediately. Secondary containers must be labeled with the chemical name, common name (if available), chemical formula, manufacturer's name, hazard class, and any other special warnings.

4. The floors shall be cleaned on a regular basis. Promptly wipe up all liquid spills and ice on the floor.

5. Keep work areas clean and uncluttered. Bench tops and hoods should remain clear of broken glass, spilled chemicals, and paper litter.

6. Chemical hazards shall be maintained at least two inches from the edge of the bench tops.

7. Hallways, stairways, and fume hoods shall not be used as storage areas.

8. Do not conduct unattended experiments without the authorization and prior approval of the CHO.

9. Do not store materials or chemicals on the floor.

10. Do not block the sink drains. Place rubber matting in the bottom of the sinks to prevent breakage of glassware and avoid injuries.

11. Wear appropriate gloves to clean glassware. Do not pile up dirty glassware in the laboratory. Wash glassware carefully. Dirty water can mask glassware fragments.

12. Handle and store laboratory glassware with care. Promptly discard cracked or chipped glassware.

13. Cleanup work areas at the end of the operation or day.

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F) Signs and Labels

1. Emergency signs shall be posted on all laboratory and prep room doors. The signs must contain the names and telephone numbers of all emergency contact personnel.

2. Emergency evacuation routes must be posted and clearly marked.

3. Label all secondary containers, including waste receptacles, with the contents (chemical name, common name, chemical formula), manufacturer's name, appropriate warnings, and hazard class.

4. Have designated location(s) for safety shower, eyewash, fire extinguisher, first-aid station, fire blanket, and emergency telephone. Label all safety equipment.

5. Post warning signs for areas of special or unusual hazards.

G) Laboratory Equipment

1. Only trained individuals shall maintain electrical equipment. Properly ground all electrical equipment. Report any electrical failure or suspicious heating of equipment to the supervisor immediately. Periodically inspect electrical equipment. Ensure quick access to electrical equipment shut-offs in the event of an emergency. Ensure that all electrical hand tools are double insulated or grounded.

2. Microwave-assisted reactions that involve flammable liquids and other hazardous materials must be conducted in laboratory-grade microwave ovens that possess all required safety features and control systems. To avoid fires, explosions, personal injury, and facility damage, **domestic-grade microwave ovens shall not be used** to heat flammable liquids.

3. Centrifuges should be anchored securely to the bench top. Close the lid before operating and remain with the centrifuge until full operating speed is attained. If vibration occurs, stop the centrifuge and check the counter-balance load. Periodically clean the buckets and rotors to avoid contamination.

4. Securely lock down all balances to avoid theft.

5. Take extra precautions when using Dewar flasks; shield or wrap them with tape to contain implosions.

6. Use laboratory equipment for the intended purpose only.

7. Periodically clean and examine all laboratory equipment.

8.

9. When using lasers, always wear appropriate eye protection and do not look directly at the source of the beam. Do not aim the laser by sighting along the beam. Keep the laser beam at or below chest height. Reflective materials should not be allowed near the beam. Hang warning signs when lasers are in use.

10. When using UV lamps, wear appropriate eye protection, as described in the operating procedures for the instrument. Cover exposed skin.

K) Unattended Operations

1. Obtain permission from the CHO prior to conducting any unattended operations.

2. Leave lights on and post a sign on the door announcing an unattended operation.

3. Return periodically to check on the unattended operation.

4. Provide for the containment of toxic substances in the event of equipment or utility failure.

5. Water hoses must be securely fastened to faucets and apparatus to avoid floods.

6. The laboratory door should be posted with emergency contact names and telephone numbers.

L) Use of Chemical Fume Hoods

Fume hoods are an important feature in any laboratory using hazardous chemicals. Fume hoods provide a location for the dispensing and use of hazardous chemicals that are likely to form a vapor or aerosol that could be inhaled by the user of the chemical or others in the laboratory. Fume hoods are not designed for room ventilation. Fume hoods are only designed to ventilate the activity taking place in the fume hood itself and to prevent the release of hazardous chemicals into the general laboratory environment.

A fume hood should NEVER be used as storage space for chemicals or other items. Doing so not only decreases the efficiency of the hood, but also creates an unsafe situation for the user(s) of the hood. When items are stored in the hood they will prevent proper airflow, which decreases the hood's efficiency. Additionally, items stored in the hood force the users to perform their tasks closer to the front of the hood, which increases the possibility that the products or fumes from their activity will enter the general laboratory environment.

1. See the Chemical Guide located behind the front panel to verify the chemical(s) being used are compatible with the fume hood filters.

2. Do not use open flames inside the hood.

3. Ensure pre-filters are installed prior to use. Change the pre-filters quarterly.

4. Use care when installing filter cells, units are heavy.

5. Exhausted carbon filters will have absorbed vapors from chemicals used in the hood and therefore are chemical waste.

6. Users need to be familiar with the operating procedures for the hood.

V) Chemical Management

A) Chemical Procurement

No chemicals should be purchased or used in science laboratory exercises unless they support the Arizona Science Standards, Advanced Placement (AP), International Baccalaureate (IB) science curriculum, and are published in an appropriate laboratory manual with complete instructions.

Chemicals are to be purchased from commercial chemical suppliers. The only exceptions are those chemicals listed in Appendix A. **Under no circumstances** are chemicals to be accepted as gifts or otherwise acquired from private individuals, manufacturing companies, government agencies, etc. The teacher should be familiar with any exercise involving chemicals and follow safe procedures for use and storage of those chemicals.

The quantity of chemicals stored should not be excessive. Quantities should be limited to amounts no greater than what will be consumed over two academic years.

The following list of chemicals was prepared using data from the Flinn Chemical Catalog/Reference Manual. Evaluation of these chemicals involved reactivity, toxicity, carcinogenic potential, explosiveness, and flammability. This brief list should be compared to the chemical inventory. Those chemicals proceeded by an asterisk (*) should not be purchased, used, or stored. If those with an asterisk (*) are already present at the school/labs, a plan for their proper disposal should be made and carried out. The other chemicals listed should be used or stored only with appropriate cautions.

Acetamide – C

Acetic acid (glacial) – T, F, R

*Arsenic – T

*Arsenic chloride – T

*Cadmium chloride – C

*Cyclohexene – F, T, E

*Cyclohexanol – F, T

Dichlorobenzene – T

*Dimethylaniline – T

*Dichloroethane (ethylene dichloride) – C

*2,4-Dinitrophenol – T, E

*Diisopropyl ether – E

Dioxane – C

Hydrogen gas – F

Hydrogen peroxide (over 6% for high school only) – T, R

Hydrogen sulfide – T

Hydroquinone – T

Iodine crystals – T, R (High School Only, Demo Supply)

Isobutyl alcohol – F, T

Isopentyl alcohol – F, T
Isopropyl alcohol – F

Lactic acid –

*Millon's reagent solution – T

Nickel(ous) Ammonium sulfate crystals – T

Nickel carbonate – C

Nickel(ous) chloride – T, C

Nickel(ous) nitrate – T, C

Nickel oxide – C

Nickel(ous) sulfate – T, C

*Phosphorous pentoxide – F, R	Soda lime – R	*Sulfuric acid (fuming) – T, R
*Picric acid - E	Sodium metal – F, R (max. qty. – 1 yr. demo supply)	Sulfuric acid – R, T
Potassium metal – E, R (max. qty. – 1 yr. demo supply)	*Sodium arsenate – T, C	Tannic acid – C, T
*Potassium cyanide – T	*Sodium arsen	

Chemicals Purchased from Local Community Suppliers

The chemicals listed below may be purchas

B) Chemical Storage Rules and Procedures

No chemicals should be purchased or used in science laboratory exercises unless they meet the following three conditions.

(a) Their use suppor

7. To reduce the potential for overexposure to more hazardous materials consider purchasing ready-to-use products that require no mixing or dilution of concentrated ingredients when appropriate.

8. Store corrosives in appropriate corrosives cabinets.

9. No flammable materials should be stored outside of an approved flammables storage cabinet unless in safety cans.

10. Store flammables away from all sources of ignition.

11. Never store flammables in refrigera6(am)-6(-d (To)Tj .00,(m)-6(ab)-4(l)-16(es)-5(i)-6(n)-46-n)-46-norenurc

Section 9, Physical and chemical properties lists the chemical's characteristics.

Section 10, Stability and reactivity lists chemical stability and possibility of hazardous reactions.

Section 11, Toxicological information includes routes of exposure; related symptoms, acute and chronic effects; numerical measures of toxicity.

Section 12, Ecological information*
Section 13, Disposal considerations*
Section 14, Transport information*
Section 15, Regulatory information*
Section 16, Other information, includes the date of preparation or last revision.

***Note:** Since other Agencies regulate this information, OSHA will not be enforcing Sections 12 through 15 (29 CFR 1910.1200(g)(2)).

Employers must ensure that SDSs are readily accessible to employees.
See Appendix D of 29 CFR 1910.1200 for a detailed description of SDS contents.

Every chemical on campus is required to have a Safety Data Sheet.

D) Chemical Handling

The rules and guidelines below are designed to avoid a number of hazardous situations. However, it must be realized that some employees, such as chemistry teachers, may be exposed to chemicals on a daily basis for a long period of time. These employees should be especially aware of the toxicological information on the Safety Data Sheets for chemicals they frequently use.

1. Never perform unauthorized laboratory experiments. Perform chemical experiments from a published procedure with an understanding of possible hazards. Deviation from authorized lab experiments requires approval from the Department Chair, Chemical Hygiene Officer, and site Principal.

2. Inspect all protective safety equipment before use. If defective, do not use.

3. Have appropriate types and sizes of fire extinguishers. Tri-class ABC is appropriate for laboratories. Carbon dioxide fire extinguishers are inappropriate for laboratories. A Class D fire extinguisher or clean dry sand should be available when working with flammable solids. Fire extinguishers should be inspected every six months.

4. Do not block fire exits. Keep all aisles clear.

5. Post emergency telephone numbers in the chemical storage area. Have a telephone, intercom, or other means of emergency communication in the laboratory. In the event of a chemical

spill/explosion, evacuate the lab, call 911, and notify nurse and principal.

6. Clean up spills immediately and thoroughly. Follow approved spill cleanup procedures; spills should only be cleaned up by approved personnel.

7. The use or storage of mercury or mercury compounds is prohibited. Spills involving mercury need sill/exping me5.61(e)]TJ 3a

chemicals in schools.

10. Work and floor surfaces should be cleaned regularly and kept free of clutter.
11. Do not use chipped, etched, or cracked glassware. Glassware that is chipped or scratched presents a serious breakage hazard when heated or handled. Dispose of glassware in an approved container. Notify maintenance to empty container as needed.
12.

29. All accidents or near accidents (close calls) should be carefully analyzed with the results distributed to all who might benefit. Send the information to the Chemical Hygiene Officer

decontaminate by chemical conversion.

8. Store contaminated waste in closed, suitably labeled, secondary containers.

Select Carcinogens: (Further supplemental rules to be followed, in addition to all these previously mentioned.

1. Conduct all transfers and work with these substances in a designated area -

5. Do not store large quantities of flammable reagents in the laboratory.

6. Store flammable liquids in appropriate safety cabinets and/or safety cans.

E) Chemical Inventory

1. Perform biannual checks and annual revisions of chemical inventories for each chemical storage area.

2. Include the following information in the chemical inventory records:
   a. Chemical name
   b. CAS number
   c. Manufacturer
   d. Owner
   e. Room number
   f. Location within the room

3. When performing a chemical inventory, be sure to:
   a. Wear appropriate PPE
   b. Use a chemical cart to manipulate and move chemicals around the room
   c. Use an approved laboratory step stool
   d. Have extra gloves on hand
   e. Be familiar with the Emergency Action Plan
   f. Implement a Work Stand Down, if necessary, to avoid accidents while performing a chemical inventory.

F) Transportation of Chemicals

1. If chemicals are to be hand-carried, the chemicals should be placed in a safety container or rubber bucket.

2. Avoid transporting chemicals in crowded areas between classes. If possible, transport chemicals in a freight-only elevator and do not allow other passengers.

3. Chemicals should be transported on chemical carts with attached side rails to contain the bottles. Chemical carts should have trays of single piece construction at least two inches deep to contain any spill that may occur. Gas cylinders require special carts. Do not carry carts over obstructions or up or down stairs.

4. To protect teachers and students, all planned demonstrations and chemistry magic shows that will be performed by chemistry teachers that are not a part of normal instructional activities must be pre-approved and authorized by the Administration and Chemical Hygiene Officer. Teachers who are interested in participating in such activities and plan to use school chemicals and apparatus

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*The location of the demonstration
*The date of the event
*The age of the intended audience
*The number of persons who will attend the event
*The degree of audience participation
*The demonstrations that will be performed
*A list of chemicals that will be transported to the demonstration site
(copy of DOT permit for transport of listed chemicals)
*The personal protective equipment that will be worn and by whom

All chemicals that are transported to the demonstration site must be handled in a prudent manner, packaged appropriately, properly labeled, and transported back to the school for disposal via the chemical waste disposal system. Under no circumstances should any chemicals that originated at the school be left at the demonstration site or disposed of at the demonstration site.

Prior to the planned event, teachers should ensure that, in the event of an accident involving chemicals in their personal vehicles, they will be covered under their personal insurance policies. Many insurance policies forbid the transport of any chemicals from the workplace in personal vehicles.

G) Waste Disposal Program

1. Waste chemicals must be stored in separate screw cap containers and must be labeled in compliance with institutional regulations.

2. Waste containers shall be the minimum size that is required and shall contain one to two inches of headspace prior to collection.

3. Do not dispose of any chemical down the drain unless it meets the conditions stated in part 9c on page 36 or Flinn Catalog.

4. Contact the Chemical Hygiene Officer to obtain the departmental hazardous waste procedures and forms.

5. Contracted institutional personnel will collect hazardous waste at school's expense on a biannual basis.

VI. Facilities Management

A) Facilities and Safety Equipment for Science Laboratories

It is the school administrator's responsibility to provide and maintain safe laboratory facilities.

- Teachers must understand their responsibilities and duty of care.
- Teachers must be supervised and held accountable by school administration.
- Lack of training/leadership is more costly in the end.
- Create an environment of unity - teachers, students, and parents should work together to provide a safe classroom and laboratory environment.
- Mandate safety training.
- Mandate regular science safety meetings and keep copies of the sign-in sheets and notes on topics discussed.
- Duty to provide a safe environment include:

  The number of occupants allowed in the laboratory must be set at a safe level based on building and fire safety codes, size and design of the laboratory teaching facility, chemical/physical/biological hazards, and students' needs (NSTA 2000; Roy 2006). Science classes should have no more than 24 students to allow for adequate supervision during science activities, even if the occupancy load limit might accommodate more (NSTA 2004). It is equally important to ensure adequate workspace for each student. NSTA recommends 60 sq. ft. for each secondary student and 45 sq. ft. for each elementary student in a laboratory/classroom setting (Motz et al. 2007). Research data show that accidents rise dramatically as class enrollments exceed 24 students or when inadequate individual workspace is provided (West et al. 2005).

  All necessary Personal Protection Equipment (PPE) must be available in science laboratories at all times. PPE includes items such as goggles, gloves, and lab aprons.

  Laboratories are equipped with safety equipment - safety blanket, eye wash, body drench, proper ventilation, chemical safety shield, ABC fire extinguishers, etc.

  All equipment is in proper working condition before student use.

  Chemical storerooms should always be locked.

  Teachers and students must have a safe location to perform experiments that is equipped to handle chemicals.

Long-term substitute teachers must be held to the same standards as permanent science teachers. **Short-term substitutes should never perform a lab using chemicals**. Long-term substitute teachers should not be allowed to perform labs with students unless they meet the following criteria,

- Possess a science degree
- Have appropriate laboratory skill level
- Have approval from School Administration
- Certified in

equipment at the beginning of each semester and report deficiencies immediately. The Chemical Hygiene Officer must keep documentation of corrective actions taken.

B) Maintenance

Monitoring and changing the filters is the primary maintenance required with an exhaust fume hood. Under normal operations, the unit will require little routine maintenance. The following maintenance schedule is recommended:

Weekly

- Using an appropriate glass cleaner, clean the sash and sides. Wipe down the interior surfaces of the unit using a damp cloth.

- Clean the exterior surfaces of the unit, particularly the front and top to remove any accumulated dust.

Monthly

- Test the filter condition using a gas detector tube at intervals of 20% of the total estimated time. The exception to the 20% recommendation is formaldehyde or any carcinogen or suspected carcinogen. These hazardous chemicals must be checked at least every 10% of the total estimated time. Gas detector tubes for the specific chemicals that are being used in the enclosure can be obtained from your laboratory supply dealer.

- Check face velocity on the HEPA filtered models. Change HEPA filter when face

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VII. Emergency Preparedness

A) Emergency Action Plan

A written emergency action plan shall be developed and communicated to all personnel in the unit. The plan shall include procedures for evacuation, ventilation failure, first-aid, and incident reporting. Clear and concise instructions (with contact names and telephone numbers) on what to do in the event of:

Chemical spill
Fire
Medical emergency
Suspicious package

remain calm and carefully explain the situation to the dispatcher at 911. The dispatcher will advise you on further action.

Thermal Burns: Do not apply ointments or ice to the wound. For first-degree wounds, flush with copious amounts of tepid running water. Apply a moist dressing and bandage loosely. For second degree (with open blisters) and third degree burns, do not flush with water. Apply a dry dressing and bandage loosely. Immediately seek medical attention.

Chemical Burns: Immediately flush the area with tepid running water for 15 minutes. Remove any jewelry, contaminated clothing, and shoes. Place the victim in the safety shower, if necessary. **Do not apply ointments, baking soda, ice, or gauze coverings to the wound.** Seek immediate medical attention.

Eye Contact: Flush eyes with tepid water for 15 minutes and seek immediate medical attention.

Ingestion: DO NOT WASTE TIME. Call 911. Do not encourage vomiting except under the advice of a physician. **Call the National Poison Hotline immediately and consult the SDS for the appropriate action.**

NATIONAL POISON HOTLINE: 1-800-222-1222
Save all chemical containers and a small amount of vomitus, if possible, for analysis.
Stay with the victim until emergency medical assistance arrives.

Unconsciousness: Call 911. If it is safe for you to enter the area, place the victim on his or her back and cover with a blanket. Do not attempt to remove the victim from the area unless there is an immediate danger. Clear the area of any chemical spill or broken glassware. If the victim begins to vomit, turn the head so that the stomach contents are not aspirated into the lungs.

Convulsions: Call 911. If it is safe for you to enter the area, remove anything that might cause harm to the victim. Clear the area of any chemical spills or broken glassware. If the victim begins to vomit, turn the head so that the stomach contents are not aspirated into the lungs. Try to protect the victim from further danger with as little interference as possible.

D) Emergency Safety Equipment

1. Fire extinguishers, appropriate to the highest level of hazard, will be made available in the laboratory and will be tested on a regular basis.

2. Eye wash stations will be made available, inspected and tested monthly.

3. Safety showers will be made available and tested monthly.

4. Fire blankets will be made available in the laboratory, as required. Fire blankets should only be used to exterminate a fire when other means are not available (water is the first source of dousing the flames). They are also useful to cover a shock victim and for warmth and modesty when treating a victim under a safety shower in the event of a chemical spill.

5. Access to fire alarms and telephones will be made available for emergency use.

6. Maintain clear pathways to fire extinguishers, eye wash stations, fire blankets, first-aid kits, and safety showers.

E)

VIII. References

1. ANSI Z358.1-2004; *Emergency Eyewash and Shower Equipment*; American National Standards

IX. Appendices

Appendix A

Deer Valley Unified School District #97

Student Safety Contract

In order to ensure that science experiments are safe and positive learning experiences, students and their parents should read, discuss, and sign the science safety rules and procedures agreement. No student will be permitted to participate in laboratory work until the agreement is signed by a parent .lab Td (o)Tj 21 55 Td (b(Aw 0.247)Tj -0.002 T0s)-p(e)6(r)5(.01 T.)c 0 Tab.89 0 Td

11. Use caution when heating materials in the lab. Keep hands and face away from the mouth of a test tube or beaker being heated. Turn off burner or hot plate when you are finished – never leave an active heat source unattended.

12. Do not enter science prep rooms or storage areas unless under teacher supervision.

13. Never take chemicals, supplies, or equipment out of the laboratory without the knowledge and consent of the science teacher.

14. Clean your lab area; put away all equipment and reagents; wash your hands at the end of each work session. Report any damaged glassware or equipment to your teacher.

15. All personal items, backpack, bags, etc., are to remain safely stowed away. Personal items are not permitted on the lab tables.

Your Science Teacher may add a 1

_____A fire extinguisher is located in the chemical storage area.

Appendix C

Chemical Hygiene Plan Checklist

This chemical hygiene plan checklist is for use in Deer Valley Unified School District #97 for annual inspections of science departments to ensure effectiveness and compliance with OSHA Standard 29 CFR 1910.1450, Occupational Exposure to Hazardous Chemicals in Labora0 Tct/raCFRi Le bortm811(ur)3(e)]TJ 2.86 0 Td ( )Tj -0[(by)16(g Tw 0epe)-6(ns)9 (lT)19x

_____Employees are provided the opportunity to receive medical attention under the circumstances defined in the Standard.

_____Chemicals of unknown composition are assumed hazardous and covered in the Chemical Hygiene Plan.

_____Labels on incoming containers of hazardous chemicals are not removed or defaced.

_____The Chemical Hygiene Plan indicates particularly hazardous chemicals not allowed for laboratory use or storage.

_____Procedures for removal of unwanted or hazardous chemicals are explained.

_____The Chemical Hygiene Plan is reviewed and updated at least annually

Recommended Actions: (Attach any additional documents.)

Appendix D
Incident Report Form

Name of person involved_____

Address _____

_____

Date & Time of Incident_____

Location_____

Description of Incident (Please include names of individuals involved, nature of the incident, if injury or illness give name of physician/hospital used, names and addresses of witnesses, and narrative of what occurred.)

_____
_____
_____
_____
_____
_____

Final DVUSD Disposition (how you intend to handle the incident, any next steps required, or likely outcomes)

_____

_____

_____

_____

_____

_____

_____

_____

_____

Print Name of Person Submitting Report_____

Signature of Person Submitting Report_____

Date of Report_____**Date Submitted to School Administrator**_____

(USE ADDITIONAL PAGES IF NEEDED)

NOTE: Immediately following the incident, notify the school's office by telephone. Incident report form must be completed and submitted to principal/school administrator within 48 hours of incident.

Appendix E
Unsafe Conditions Report Form

School _____

Location: (Classroom/Lab/Storeroom)_____

Description of Unsafe Conditions_____

_____

_____

_____

_____

_____

_____

_____

_____

_____

_____

_____

_____

_____

_____

Print Name of Person Submitting Report_____

Signature of Person Submitting Report_____

Date of Report_____**Date Submitted to School Administrator**_____

(USE ADDITIONAL PAGES IF NEEDED)

Appendix F