



LEAD * EDUCATE * INSPIRE

SECONDARY SCIENCE SAFETY HANDBOOK

Outlining

The Laboratory Standard

For a

Chemical Safety Program

Featuring a

Chemical Hygiene Plan

For

Utah Secondary Science Teachers

As suggested by

Utah's State Department of Education (USOE)

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School District Emergency Phone Numbers/Contacts

In Case of Emergency..... 911

Local Fire Departments by City:

WEST JORDAN: (801) 260-7300

SOUTH JORDAN: (801) 254-0948

HERRIMAN: (801) 254-3528

RIVERTON: (801) 254-4365

**JSD Fire/Security Department (Available 24 hours/7days a week
..... (801) 567-8865**

JSD RISK MANAGEMENT: Ron Boshard..... (801) 381-5817

ASB Main Office (801) 567-8753

Executive Directors by Feeder:

BINGHAM: Anthony Godfrey..... (801) 567-8316

COPPER HILLS: Anthony Godfrey..... (801) 567-8316

HERRIMAN: Terri Timpson..... (801) 567-8342

RIVERTON: Terri Timpson..... (801) 567-8342

WEST JORDAN: Bevan Wasden..... (801) 567-8232

Poison Control 1-(800) 222-1222

USOE Chemical Safety Program

The Laboratory Standard

USOE Safety Mission Statement

Safety is not a simple matter of compliance, but an on going move toward a "safer" educational environment.

USOE Goals of Safety Training

- The primary goal of this program is to provide tools, training, and mentor support to Utah science teachers in matters of chemical safety.
- The program should empower teachers to create a reasonably safe laboratory environment without sacrificing a strong hands-on approach to learning science.
- This program involves school support personnel, administrators at every level, and a variety of public safety services.
- The heart of this program is the individual science teacher because of his/her position to establish and maintain chemical safety at the school and classroom level.
- This program is intended to be an on going, proactive process.
- The goal is to enlist the participation of every science teacher in the state, especially chemistry teachers.
- *Chemical safety is an area of science education that needs to be attended to vigilantly.*
- Most accidents occur because of neglect, poor judgment, or ignorance.
- Utah science teachers should use this program to improve safety in their schools and to educate themselves and their students.
- This program is not merely a checklist of do's and don'ts.
- It is an on-going program to train science teachers.
- No program can free teachers, administrators and other personnel from risk or personal responsibility.
- These safety program goals are intended to help teachers to:
 - assess the chemical safety needs of their schools
 - find answers to questions
 - locate resources
 - develop safe laboratory strategies
 - teach safety to their students
 - avoid legal problems through compliance with the law
 - document the progress of safety improvement
 - create an ongoing and improving safety systems for the school
 - develop a mentoring network among science teachers, thereby learning from the experience of others

USOE Secondary Science Safety Training Overview and Introduction

A laboratory program is an essential part of the learning experience for a secondary science student. *A safe and exciting laboratory can be the highlight of a science program.* Some teachers are afraid of the laboratory while others should learn to exercise more caution in the lab. *The State of Utah requires annual safety training appropriate for each science teacher.* With on going training and the proper resources, each teacher will be able to make more responsible decisions about laboratory safety and chemical storage, and *to limit liability in the classroom.*

Some safety training could include but should not be limited to some of the following activities:

- Read and act on this document.
 - Take the Risk Management Survey.
 - Make a plan to act on those areas where your school needs to improve safety.
- Read and act on the "Right-to-know Laws" section found in the Flinn Catalog.
- View and discuss the "Flinn Scientific Safety Video."
- Organize and discuss safety protocols and future needs with other teachers (or administrators) as needed.
- Use the resources found in this document's Appendix. Make a list of needs for future improvement.
- Apply for and utilize the Safety Mentoring System for education, training, and chemical storage.

Any of these activities may be repeated as necessary. The task of safety is so large that working on one or two of these items per year should represent a reasonable effort in safety training.

USOE General Laboratory Safety

- ***Knowledge of current safety procedures is part of every science teacher's professional responsibility.***
- It is the teacher's responsibility to instruct students in proper laboratory etiquette.
- Every student must understand the established rules and procedures to be followed.
- *One effective means of verification of this is the student safety contract.*
- A safety contract goes a long way in letting students and parents know the teacher is serious about safety.
- *There should be teacher imposed consequences,* and students should also know what possible real consequences may be if safety rules are broken.
- Safety contracts and posting safety guidelines is a recommended practice for science classrooms, but *courts have declared contracts and posting to be insufficient, in and of themselves to ensure students' safety.*
- The *science teacher must continually remind students* of both general and specific hazards before the performance of laboratory activities in which any element of danger might exist.
- *Students should not be allowed unsupervised access to potentially dangerous materials or equipment and should be under continual supervision in all laboratory situations.*

- Monitoring or supervising a laboratory setup during passing periods is an essential condition.
- One major source of concern is the use of appropriate eye wear.
 - While the exact type and style is up to the individual teacher, all should bear the "Meets ANSI Z87.1 Standards" label.
 - ANSI states that "the teacher must make a judgment in selection of the appropriate protective equipment so that the protection is greater than the estimated hazards" (ANSI Z87.1 Section 7.3(3) page 15).
- OSHA states that school laboratories should include "protective apparel compatible with the required degree of protection for substances being handled" (OSHA 1910.1450 (Laboratory Standard) Section D6).
- Therefore, teachers should consider the hazards of the chemicals that are being used when selecting eye wear. What may be fine for a staining lab in biology may not be appropriate for an acid-base titration in chemistry.
- Whatever you choose, ALL students must wear the required eye wear when chemicals, glassware, or heat are used. This must be strictly enforced.

USOE Chemical Storage and Materials Safety Data Sheets (MSDS)

Chemical Storage

- A reasonable chemical storage pattern avoids any unwanted reactions in chemicals stored together (including reactions which may occur with accidental shelf collapse). Unfortunately, many safe chemical directives do not inform us of specific incompatibilities. Besides being difficult to use, such lists are inherently flawed because they presume a specific inventory which will be different for each storage area.
- Store chemicals within compatible groups and err on the side of assuming that all chemicals from any other group are incompatible.
- The state has a list of chemicals that should NOT be in the schools and some which may be kept in limited quantities. See "Limited Access Chemicals" listed in the "Chemical safety Table" and the "Flinn 40 Devils" in the appendix of this document.
- USOE suggests that these chemicals be stored with special caution (see mentoring system below) or removed entirely if unneeded at the school. (Many but not all of the "Limited Access Chemicals" and the Flinn "40 Devils" are the same.)

MSDS

- MSDS sheets are required for all chemicals used in the science lab.
- The law requires all vendors to provide these sheets to their customers. By providing this information, the vendor can limit liability.
- Many MSDS disclosures are too detailed and too comprehensive to be of practical use to a science teacher. However, these sheets do have safety information which users should know.
- A three ring binder with a hard copy of all MSDS is required in the science lab and stockroom. All major scientific vendors (including Flinn) sell discs or CD's with most MSDS on them. There are also some free internet sites which provide MSDS information. Refer to the Internet sites in the appendix of this document.

Limiting Liability

- Although somewhat protected, the teacher is vulnerable to damaging lawsuits. It is important to plan preventive steps that will minimize accidents, and reduce both individual and district liability.
- Essentially, such steps include effective safety instruction, prudent selection of activities, careful supervision of all activities, and proper maintenance of laboratory and classroom equipment.
- The court uses a "reasonable man" rule to determine whether the responsible individuals exercised the proper degree of caution and judgment.
- The question is "Would an average person with this training and background have acted the same under similar circumstances?"
- To avoid lawsuits, a "reasonable" science teacher investigates the following:
What are the hazards? Know them before you do the activity.
What are the worst things that can happen? Prepare for them.
Use student safety contracts and laboratory safety tests.
Use the appropriate accident, district contact, and report forms if an accident occurs.
Use the check lists and risk management forms found in the appendix to evaluate safety practices, safety equipment, and protective facilities needed to minimize risk.

The following vocabulary list and explanations are important to limiting liability:

- **Instruction:** It is assumed that teachers are experienced in safe laboratory procedures and that students are not. Teachers must be careful to instruct so as to reach the most inexperienced student. Printed safety instructions cannot take the place of teacher instruction.
- **Supervision:** A teacher stands in Loco Parentis. Teachers of laboratory classes are held to a much stricter standard than other classroom teachers. Handing out a set of safety rules alone does not suffice. The teacher must be able to show that the rules were enforced.
- **Good Judgment:** It is the duty of the teacher to select learning activities that can reasonably be conducted in a safe manner. If you know of a hazardous condition and fail to tell your students, it is likely that you will be found negligent should an injury occur.
- **Negligence:** is the failure to act as a reasonable and prudent person would act in similar circumstances to prevent harm to others. The plaintiff must show that he was harmed by the action or lack of action of the defendant. (The goal is to have no harm. No harm means no law suit.)
- **Malfeasance:** is doing that which should NOT have been done (i.e. forcing or allowing a student to assume an unnecessary risk). It is the improper performance of a lawful act (i.e. improper first aid, emergency response or instruction).
- **Proximate Cause:** There must be some direct connection between the defendant's action or failure to act and the plaintiff's injury. Leaving students unattended is one of the surest ways for teachers to be found liable for student injuries.

USOE Safety Mentor System (Optional)

- A safety mentor system has been established to assist science teachers in all aspects of science safety. Primarily, safety is the responsibility of the individual science teacher. Therefore, the science teachers in the school will guide the mentor's training agenda. The mentor will be a resource to the school by the invitation of the science teacher.
- From experience, most schools need mentoring in the areas of specific chemical safety training, handling, and storage. **Most mentors will perform four major duties:**
 - Discuss problems or problematic situations, which the science teachers have identified. Hopefully, chemical safety, handling, storage and methods of clean up will be discussed.
 - Familiarize science teachers with the resources available specific to their needs.
 - Examine the facilities and storage areas in the school, so that the mentor can point out some remedies to problems and assess the relative merits of the suggested courses of action.
 - Help teachers with chemical storage, disposal, and inventory.
- The mentor will also assist the teacher in setting up an Active Safety File as a resource for communication with district and local authorities. It will be the responsibility of the teacher then to implement the plan into their lab and make contact with appropriate District personnel outlined in the plan.
- Interested teachers or schools should have their administration contact the State Science Coordinator. Together they will identify an authorized Safety Mentor who will visit their school.
- An individual school may only request mentor help only once in any given year.
- Persons wishing to become mentors must be authorized through the State Science Coordinator.
- A mentor must be a currently certificated chemistry teacher, have minimum 3 years teaching chemistry, and be familiar with the state safety requirements and the Flinn Scientific Storage method.
- A new mentor will be trained by a currently authorized mentor on at least three school visits.
- Forms to apply for the mentoring program can be found in the appendix.

The Risk Management Survey

- The "Risk management Survey" can be found in the appendix of this document.
- As its name implies, there are numerous practices and policies we as teachers can maintain to limit:
 - 1. the risk of an accident occurring**
 - 2. the risk of bodily injury in the event of an accident**
 - 3. liabilities of all responsible parties in the event of an accident**
- The questions in this survey are designed to help you and your colleagues gauge your school's level of safety and preparedness in case of emergency.

- These questions are generated from OSHA standards and from a State of Utah "Risk Management Self-Inspection Survey Report for Laboratories" in an effort to help us answer the question "Do we maintain and operate a safe lab environment?"
- Some general categories of these questions are...
 1. **safety of the physical environment**
 2. **chemical inventory, storage, disposal, cleanup, etc.**
 3. **"right-to-know" situations (MSDS, hygiene plan, etc)**
 4. **operating procedures**
 5. **education - training**
- This survey acts as a checklist for safety.
- Its strength lies in that it is a mandate to come into compliance with the law. If something is needed on that list, the strength of law is on the side of obtaining it.
- The weakness of this checklist is a false sense of security if the school complies with it completely.
- No matter how hard someone tries to make a complete checklist, one may fall short of the mark. It is always the duty of the science teacher to constantly work to improve safety procedures.

Jordan School District (JSD) Chemical Hygiene Plan (CHP)

Overview

- This plan is essentially a compilation of all of your safety regulations and proper lab procedures in one manual or document.
- Federal law requires a "Laboratory Standard" as part of the Hazard Communication Act specifically for the research and academic laboratory.
- USOE suggests that these rules and procedures be well thought out with the goal of minimizing the exposure of the employees and students!!
- This document is an adoption from the Flinn Scientific generic chemical hygiene plan as suggested by and displayed on the USOE website

Introduction

- The Chemical Hygiene Plan (CHP) is the major ingredient of the Laboratory Standard.
- Jordan School District will carry out a written Chemical Hygiene Plan, which, as suggested by USOE, is capable of:
 - Protecting employees from health hazards associated with hazardous chemicals in the laboratory.
 - Keeping chemical exposures below established permissible exposure limits. (Consult your Flinn Chemical Catalog or a similar Reference Manual for specific chemical permissible exposure limits.)
- The CHP will be readily available to employees.
- The school district (JSD) shall review and evaluate the effectiveness of the CHP at least annually and update it as necessary.
- The CHP will, as suggested by USOE, include all of the following elements; outlined herein; and should include specific measures that the employer will take to ensure laboratory employee protection.

District and School Responsibilities

District

The District will:

Train employees to:

- Understand the hazards of chemicals that they use in the laboratory.
- Recognize signs and symptoms associated with overexposure to hazardous chemicals.
- Use personal protective equipment properly (fume hoods, respirators, goggles, etc.)
- Protect themselves from chemical exposure by following good laboratory procedures.
- Understand the content of the Chemical Hygiene Plan.

Schools

Schools will:

Record all employee exposures to hazardous chemicals:

- Obtain and keep up to date information provided by a medical examination.
- Forward copies of these records, including all employee exposure and medical records to the district.

Provide access to all employees of:

- MSDS (Material Safety Data Sheets).
- Previous exposure records.
- The Laboratory Standard and Chemical Hygiene Plan (CHP).
- Permissible exposure limits of hazardous chemicals used in the laboratory.
(Consult available resources such as the Flinn Chemical Catalog/Reference Manual, as suggested by USOE)

Upon receipt of chemical:

- Compile MSDS forms.
- Ensure that all labels are proper and contain the minimum amount of information, as follows:
 1. Chemical name.
 2. Hazard information.
 3. Name and address of the manufacturer.

Note from USOE: Schools must follow these steps for all chemicals and chemical solutions made and stored in your laboratory or chemical store room.

Standard Operating Procedures (SOPs)

General Safety Equipment (NOT in order of importance)

- Splash-proof goggles - for every student, instructor, and visitor
- Bag of cat litter, bucket of sand, or commercial absorbent- to smother alkali fires, dam around spills, reduce slippery conditions, and so on.
- Earthenware crock - for disposal of solid chemicals (If needed, have several crocks labeled to prevent mixing of incompatible chemicals.)
- Fume hoods, where appropriate
- Mercury clean-up chemicals (e.g. zinc dust, mercury "sponges")
- Neutralizing agents:
 - Acetic acid (30% [5M] solution) - for neutralizing spilled bases
 - Sodium bicarbonate (saturated solution) - for neutralizing spilled acids
- Rubber or nitrile gloves
- Safety equipment:
 - Eyewash/shower unit

- Face Shields
- Fire Blanket
- Fire extinguisher(s), multipurpose
- Safety shield

General Employee Safety Rules and Procedures

- Minimize all chemical exposures.
- Avoid allowing chemicals to come into contact with exposed skin.
- Avoid the underestimation of chemical hazards and risks.
- Post mandatory safety rules and chemical hazards signs in classrooms and storage rooms.
- Wear appropriate eye protection at all times.
- Wear chemical splash goggles any time chemicals, glassware or heat are used in the laboratory.
- Do NOT work alone in the laboratory, chemical storage or preparation areas-EVER.
- Give flammable liquids the special attention that they require.
- Do NOT use flammable materials near any source of ignition, spark or open flame-EVER.
- Do NOT perform a first-time chemical demonstration in front of your class-EVER
- Perform first-time demonstrations in front of other instructors or the District Secondary Science Specialist; which ever is more feasible; to help evaluate the safety of the demonstration.
- Do NOT store chemicals over, under or near a sink-EVER.
- Allow only authorized personnel access to chemical storerooms.
- Have a fire blanket easily accessible in case of an accident.
- Train all students on how to use all safety devices in the laboratory (e.g., eyewash, fire extinguisher, etc.)
- Teach all students and employees how/where to find appropriate safety devices quickly in an emergency.
- Ensure that all employees know appropriate procedures in the event of a power failure.
- Ensure that all employees know where/how to use meter utility controls to shut off gas, electrical and water supplies.
- Do NOT smell or taste chemicals-EVER
- Use a safety shield whenever an explosion or implosion might occur.
- Read all chemical labels prior to use.
- Know and understand the hazards of the chemical as stated in the MSDS and other references.
- Use protection safety equipment to reduce potential exposure, i.e. gloves, respirators, fume hood, etc.
- Know the locations for all personal safety and emergency equipment, eyewash, shower, fire extinguisher and spill control materials.
- Know how to properly store all chemicals in their compatible chemical families.
- Know the proper transportation and disposal procedures for chemicals.
- Know appropriate emergency procedures, waste disposal, spill clean up, evacuation routes, and fire emergency notification.

- Know and understand the personal hygiene practices outlined in the Chemical Hygiene Plan.
- Ensure that an annual training is carried out by the District's Secondary Science Specialist
- Have all appropriate documentation of annual safety training on file.

General Laboratory Safety Rules and Procedures

Emergency Procedures and Equipment

- Practice your emergency plans.
- Do not block access to exits, emergency equipment and master utility controls.
- Have an alternative evacuation route in the event that your primary route becomes blocked.
- Post emergency telephone numbers in chemical storage area.
- Have a telephone or some means of emergency communication in the laboratory, chemical storage area and prep area.
- Contact the school's first responder and appropriate administrator, in the event of an accident
- Call a physician, in the event of an accident.
- Document an accident; in the event that one occurs; by filling out an accident report form when time allows.
- Describe the event in detail and file the form with appropriate administrator.
- Analyze all accidents or near accidents (close calls), carefully.
- Distribute the results to all who might benefit.
- Have access to an approved eyewash station and fire blanket in the science lab.
- Be sure that all laboratories have eyewash stations that are capable of treating both eyes continuously for 15 minutes with copious quantities of potable water.
- Teach everyone how to use the eyewash quickly in case of an emergency.
- Provide safety showers or body drenches.

Precautionary Procedures

General

- Read all labels carefully-the names of many chemicals look alike at first glance.
- Keep all aisles and walkways clear.
- Do not run in the laboratory.
- Do not store any unlabeled products anywhere in the science facility.
- Be thoroughly familiar with the hazards and precautions for protection before using any chemical.
- Study and review contents of the precautionary label before using any chemical substance.
- Have materials, such as a spill kit, dry sand, kitty litter, and other spill control materials; readily available to neutralize chemicals.
- Dispose of all chemicals properly.

- Make sure that all disposal procedures conform to state and local regulations.
- Do not perform (or allow students to perform) unauthorized laboratory experiments.

Ventilation

- Be sure that the laboratory is always well ventilated.
- Be sure that the source of air for laboratory ventilation system flows directly into the laboratory from a non-laboratory areas and out to the exterior of the building.
- Check the ventilation system annually.

Eyewash Stations

- Inspect eyewash station operational effectiveness every three months.
- Repair any eyewash that does not meet the water flow requirements of ANSI Z358.1.

Showers

- Test showers or body drenches every six months.
- Repair any shower or body drench, which does not meet the water flow requirements of ANSI Z358.1.

Fire

- Have appropriate types and sizes of fire extinguishers. Tri-class ABC and/or Halon fire extinguishers are appropriate for laboratories. A Class D fire extinguisher should be available when working with flammable solids.
- Inspect Fire extinguishers every six months.
- Do not block fire exits.

Electrical

- Do not operate electrical equipment with wet hands.

Personal Hygiene Guidelines

- Do not smoke, eat, chew gum, or drink in the laboratory.
- Do not apply cosmetics in areas where laboratory chemicals are present.
- Avoid the use of contact lenses in the laboratory.
 - If contact lenses must be worn, the science teacher must be informed so special precautions can be taken.
- Do not pipette by mouth - always use a pipette bulb or other appropriate suction device.
- Wash thoroughly after any chemical exposure or before leaving the laboratory.
- Do not smell chemicals directly; always waft the odors to your nose using your hand.
- Do not bring foodstuffs, opened or closed, into the lab, chemical prep or storage area.
 - Foodstuffs, should not be eaten if in a room with toxic materials.
- Do not drink from lab glassware or other lab vessels.

Protective Clothing Requirements

- Inspect all protective safety equipment before use.

- If defective, do not use. Appropriate protective gloves will be available for student use when needed.
- Wear eye protection - ALWAYS.
 - Chemical splash goggles must meet ANSI Z87. 1 Standard.
- Wear face shields when dealing with corrosive liquids, (i.e., full strength acids and bases).
- Wear gloves that offer protection for all hazards you may find in the lab.
- Test for holes every time you wear your gloves.
- Wear a full-length lab coat or a chemical-resistant apron – ALWAYS.
- Wear low heeled shoes.
- Do not wear open-toed shoes or sandals of any kind.
- Wear socks in the laboratory – ALWAYS.
- Wear a respirator with the appropriate cartridge if you feel you might exceed permissible exposure limits as specified in the MSDS.
- Do not block access to emergency exits or equipment - EVER.
- Clean up all spills properly and promptly. (See Spill Appendage and refer to Flinn Scientific Catalog or similar source).
- Do not wear shorts - wear long pants
- Do not wear loose or balloon sleeves.
- Tie back long hair.
- Do not wear contact lenses - goggles fit over eyeglasses.
- Do not wear hanging jewelry.
- Do not wear a long or loose necktie.
- Do not wear an absorbent watchstrap.

Housekeeping Rules

- Do not use chipped, etched or cracked glassware.
 - Glassware that is chipped or scratched presents a serious breakage hazard when heated or handled.
- Keep chemicals in the chemical prep and storage area.
 - If chemicals are moved to the classroom for lab, they must be returned to their proper storage location at the end of the day's laboratory periods.
- Label all chemicals with names and hazards, even solutions.
- Place waste materials in proper containers and label them appropriately.
- Do not store items in the fume hood.
 - The storage of items in the fume hood is a fire hazard and decreases the efficiency of the fume hood.
- Do not block access to exits or emergency equipment.
- Clean up all spills properly and promptly.
- Clean work and floor surfaces regularly and keep all areas free of clutter.

Spill and Accident Procedures

- Notify all for help.
- Evacuate-Get everyone to a safe location.
- Assemble-Organize the students and all workers.
- Report-Fill out a detailed accident report after the emergency is over.
- Clean up spills immediately and thoroughly.
- Follow approved spill cleanup procedures, spills should only be cleaned up by approved personnel.
- Have a bucket of dry sand available as a Class D fire extinguisher and to aid in providing traction on a slippery floor.
- Have neutralizer for both acid and base spills available in the event of a chemical spill.

Chemical Storage Rules and Procedures

- Keep an updated inventory of all chemicals, their amounts and location.
 - Stored chemicals should be examined annually for replacement, deterioration and chemical integrity.
 - The entire Chemical Hygiene Plan is based on the proper updated inventory always being available.
- Label all chemical solutions you make with the identity of the contents, date, concentration, hazard information and your name.
- Write the purchase date on all chemicals.
 - This will allow anyone to determine the age of a substance at a later date.
- Establish a separate and secure storage area for chemicals.
- Do not allow incoming shipments of chemicals to be opened and transported by school personnel other than qualified science teachers.
 - The special and expensive shipping containers used are frequently discarded and would prove valuable for chemical storage.
- Store all chemicals in chemically compatible families (See Flinn Chemical Catalog Reference Manual, or similar source for details)
- Store the minimum amount of chemicals needed. Do not keep large quantities on hand.
- Store corrosives in appropriate corrosive cabinets.
- Do not store flammable materials outside of an approved flammable storage cabinet unless in safety cans.
- Do not store chemicals under a fume hood.
- Keep, if possible, certain items in the original shipping package.
- Avoid storing chemicals on shelves above eye level.
- Label the storage area and cabinets so as to identify the hazardous nature of the products stored within.
 - This will allow fire department officials to quickly see a potentially hazardous area.
- Keep shelving above any work area, such as a sink, free of chemicals or other loose miscellany.
- Secure shelving sections to walls or floor to prevent tipping of entire sections.

- Equip shelves with lips to prevent containers from rolling off.
- Do not store chemicals on the floor except in approved shipping containers.
- Ventilate storage area by at least four changes of air per hour.
- Isolate the chemical storage exhaust from the general building ventilation system.
- Do not store food in a laboratory refrigerator - EVER.
- Store chemicals in a separate, locked, dedicated storeroom.
- Store all poisons in a locked cabinet.
- Allow only authorized personnel in the chemical storage area.
- Do not EVER allow students in chemical storage areas.
- Avoid exposing chemicals to heat or direct sunlight.

Storage Requirements and Handling Instructions

Compressed Gases

- Handle compressed gases as high-energy sources, and therefore, as potential explosives.
- Protect the cylinder valve stem - ALWAYS.
- Avoid exposure of cylinders to heat.
- Do not store gas cylinders in direct sunlight.
- Do not lubricate, modify, force or tamper with a cylinder valve - EVER.
- Use cylinders of toxic, flammable or reactive gases only under a fume hood.
- Do not extinguish a flame involving a combustible gas until the gas is shut off otherwise it can re-ignite-possibly causing an explosion.
- Secure gas cylinders in place by chains, straps, etc.
 - They must be protected to prevent valve damage, which may be caused by falling.

Flammable Chemicals

- Store all flammables in a dedicated flammables cabinet.
- Keep cool, between 55°F and 80°F at all times.
- Store away from all sources of ignition.
- Store away from all oxidizers.
- Do not store flammables in refrigerators unless the refrigerator is explosion proof - EVER.
- Avoid storing any chemicals, especially flammable materials in direct sunlight.

Corrosive Materials

- Store corrosives in appropriate corrosive cabinets.
- Keep, if possible, certain items in the original shipping package.
- Wear special eye wear when working with corrosive materials, as required.
- Wear a chemical splash face shield when handling corrosive materials.
- Inspect all shelf clips in your acid cabinet to check for possible corrosion, annually.
 - These shelf clips are the only thing between you and a collapsed shelf.

- They require special attention.

Extremely Hazardous Chemicals

- Use a fume hood when the permissible exposure limit for a chemical is less than 50 ppm as indicated on the chemical MSDS.
- Do not use carcinogens, mutagens, teratogens and allergens in schools (See Flinn's List or similar source).
- Handle toxic, corrosive, flammable and noxious chemicals under a fume hood.
- Do not expose flammable liquids to open flame, sparks, heat or any source of ignition.
- Use flammable solids (sodium, potassium, lithium, etc.) in very small quantities, only.
- Use a safety shield when igniting flammable solids.
- Store water-reactive solids (sodium metal, potassium metal, etc.) under dry oil.
- Use extreme caution when handling finely divided (dust-like) material.
 - Finely divided materials may form explosive mixtures with air.
- Dispose of open cans of ether (ethyl ether) properly after use
 - Do not store unless absolutely necessary.
 - Rely on expiration date to dispose of the material.
- Have Glycerin available for use by the instructor, only.

Safety Equipment Inspection

There are many safety items necessary for compliance to the Laboratory Standard. They include, but are not limited to:

- Eye washes
- Fire extinguishers
- Goggles
- Respirators

All safety equipment in the facility must always be in good operating condition.

This statement applies to all safety equipment, required or recommended.

- Goggles always must be clean and functional.
- Laboratory ventilation must meet the standard of eight air changes per hour and must be tested quarterly.
- A respirator must be fit tested and the appropriate cartridges must be available.
- Fire extinguishers must be of the right type, Triclass ABC, and they must always be properly inspected.
- Eye washes must be functional and flushed at least once a month.
- Fume hoods must be operational at the level of 70-100 linear feet per minute as measured by a volumeter.

All of the above items and all safety equipment must be inspected every three months at the minimum.

Any safety equipment failing this quarterly inspection or reported to be out of order at any time must be reported to District Maintenance for repairs.

Employee Training - Ongoing Responsibilities

District

Jordan School District (JSD) Secondary Science Specialist will:

- Train all secondary science teachers on the contents of this manual to include the laboratory standards and the Chemical Hygiene Plan (CHP), annually.
- Train all teachers new to the district during new teacher induction (NTI).
- Keep records of all of the above safety training.

School

Each Secondary School will provide ongoing training sessions for site employees.

The training will include:

- Content and location of this safety manual containing the Laboratory Standard and the CHP.
- The proper use and location of all safety equipment.
- Potential hazards involved in using chemicals.
- Signs and symptoms of overexposure to chemicals. How to detect potentially harmful exposures before they are harmful.
- Location and availability of chemical Material Safety Data Sheets (MSDS).
- Understanding of the permissible exposure limits (PELs) used in the school.
- Record keeping by the administrator in charge or their designee of all on site safety training.

Medical Evaluations

General

It is the policy of ***every Secondary School*** to make medical consultation and examination available to our employees when:

- Any sign or symptom of an overexposure to a chemical is present.
- Monitoring has indicated an overexposure to a chemical has occurred.
- There has been a spill or uncontrolled release of chemical fumes.

The Secondary School will provide the physician with the names of the chemicals used, circumstances of the exposure and all signs and symptoms of the exposure.

The medical examinations dealing with the overexposure must be documented and other employees working under the same conditions must be notified.

All documentation must be kept on file with federal GRAMA Requirements, Risk Management, and Workers Comp Regulations.

Exposure Evaluation

It is the communicated policy of *every Secondary School* to investigate all suspected over-exposures to chemicals in a prompt and timely fashion.

In the event of an overexposure, after the immediate event, all chemicals and circumstances involved in the overexposure must be documented.

This information should be used to change safety practices to further improve lab safety.

Signs of over-exposure are numerous; they include:

- Accidental breakage of a hazardous material container.
- A skin rash or irritation occurring because of contact with a chemical.
- Caustic splash to eyes, face or body.
- Symptoms such as nausea, dizziness and others.

Note: If monitoring of the air is determined to be necessary, the results of the monitoring must be made available to the employees within 2 weeks.

Monitoring

- Monitoring will be necessary for substances regulated by a standard only if there is reason to believe that exposure levels for that substance routinely exceed the PEL for that substance.
- If you have no cause to suspect a hazard or an exposure, no monitoring is necessary.
- If monitoring is performed and this initial monitoring shows no evidence of exposure, the monitoring may be discontinued.
- If initial monitoring indicates an exposure, steps must be taken immediately to reduce the exposure to permissible limits.
- Monitoring must then be performed periodically to verify that the steps to reduce the exposure have been effective.
- Monitoring may be terminated after complying with the applicable standard for the hazardous material.
- All monitoring results and activities shall be fully accessible and in full knowledge of the employee(s).

Emergency Evacuation Plan

- Establish a chain of communication.
- Evacuation may or may not be necessary depending on the incident.
- Once it has been determined evacuation is necessary, proceed in an orderly fashion as you would in a fire drill evacuation.
- Send everyone to a predestinated area and then count heads to make sure everyone is out of the building.

- Proper evacuation procedures must be thoroughly planned, detailed in writing, and properly communicated in advance.
- In case of an emergency, you will not have time to determine "What do I do next?".
- This evacuation plan will be part of the Chemical Hygiene Plan.
- In case of Evacuation Emergency, procedures established will follow school emergency evacuation plan.

First Aid

General Information

Training Disclaimer

This section of the CHP does NOT serve as official First Aid training.

It is strongly suggested that each secondary science teacher take advantage of the opportunities provided to become certified in First Aid. Please see the person responsible for scheduling this training at your school site.

Basic Responsibilities

At times the science teacher might need to render assistance until advanced medical help arrives. At those times the teacher needs to take appropriate action. Each science classroom should be equipped with appropriate first-aid and safety materials.

If an accident or incident occurs, the teacher is expected to act in an informed and professional manner. Once assistance is given, it should be continued until the problem is resolved or until the patient is released to qualified medical help, the parent or another responsible person. Measures should be taken to reduce any anxiety or fear that the injured student or other students experience. A written accident report should be given to the school administrator when any such incident occurs; see the forms section of the Appendix for a sample Accident Report.

“Dos” in First Aid

- Do be cool, calm, and collected. Most cases are not serious.
- Do obtain staff assistance, if necessary.
- Do handle the person as little as possible. Do not move the person until the evaluation is complete. On completion of the emergency-handling phase:
- Do check with the victim and with any witnesses about what happened.
- Do make a prompt complete and accurate report of the incident to the department chairperson and the administration.

“Don’ts” in First Aid

- Don't give liquids (or medicines) to an unconscious person.
- Don't try to arouse an unconscious person.

- Don't cut the skin, break blisters, and so forth.
- Don't diagnose.
- Don't give medical advice.
- Don't transport an injured student in a private car.
- Don't send a student home before consulting a parent.
- Don't treat injuries that happened at home.

General First Aid Instructions

Basic First Aid Procedures

CPR Procedure

- Airway - Look, Listen, Feel -Tilt head to open airway
- Breathing 12-20 per minute
- Check for Pulse - in neck
- Basic CPR process 15 compression, 2 Breaths

Choking

- Any type of audible noise -- Leave them Alone
- Blue-gray, no noise -- find belly button, make fist above belly button, below xiphoid process, apply upward thrust.

Fainting

- Self correcting problem lay down, elevate feet, gradually bring up
- Look for other injuries because of fainting

Seizures

- Jerking movement get other students out- stop the embarrassment
- Protect from objects in the environment
- Might last 1 min., variable time, sit and rest Allergic Reaction
- Get away from source
- Can't breath (Asthma) -- very serious call ambulance

Electrical Shock

- Shut off electricity
- Heart can stop-- start CPR (15 compressions, 2 breaths)
- Wrap wound with a clean dry bandage

Bleeding (How to stop)

- Direct pressure (good psychology)
- Elevation
- Pressure points- close to bone
- Dressing- bandages
- Prevent shock !!!!

Exposure to blood and body fluids

- Use gloves
- Dispose of rags and towels used in clean-up

Impaled Objects

- Leave the object alone - Let a professional remove it

Chemicals in Eyes

- Flush minimum 20 minutes force eyes open

Chemical Burns of the Skin (Acid/ Base)

- Do Not Attempt To Neutralize Any Chemical - may cause further damage
- Gentle flow of large amounts of waters (Not under pressure)
- Follow instructions under ***Non-chemical Burns of the Skin***

Non-chemical Burns of the Skin

- Constant flow of cool water over burn-- DO NOT ICE !!!
- Do not cover burns with cotton or paper towel
- Do not put anything on it -- NO OINTMENTS ETC. !!!
- Watch for shock -- ELEVATE BURNED PARTS
- OBTAIN MEDICAL ASSISTANCE IMMEDIATLEY!!!

Science Classroom First Aid

First Aid kit Contents

- 10 -- 4x4 Sponges
- 2 -- Large Dressings
- 2 -- Eye Pads
- 1 -- Triangle Bandage
- 4 pair -- Latex Gloves
- Assortment -- Adhesive Band-aids
- A number of Q-TIPS
- Antispetic (Neosporin)
- 4 -- Antiseptic Wipes
- 1 -- CPR Micro Shield/Mouthpiece
- 1 -- Tape
- 1 -- Scissors
- 2 -- Empty Zip Lock Bags
- 2 -- Gauze Rolls (Kerlix)
- Irrigation Bottle !!!

Appendix Safety References and Sources of Safety Information

Internet

- *State Office of Education: Core Curriculum by Subject*
<http://www.schools.utah.gov/curr/core/page2.htm>
- *American Chemical Society (ACS)* – www.acs.org
- *Occupational Safety and Health Administration (OSHA)* – www.osha.gov
- *Counsel of State Science Supervisors (CSSS)* - www.csss-science.org
- *National Institutes of Health (NIH)* www.nih.gov
- *Flinn Safety* - <http://www.flinnsci.com/Sections/Safety/safety.asp>
- *LabSafety* - <http://www.LabSafety.com>

Text

- *ACS: Chemical Safety for Teachers and Their Supervisors*
http://portal.acs.org/portal/fileFetch/C/WPCP_012287/pdf/WPCP_012287.pdf
- *OSHA: Chemical Hazard Communication* -
<http://www.osha.gov/Publications/osha3084.pdf>
- *CSSS: Science & Safety – Making the Connection* –
<http://www.csss-science.org/downloads/scisafe.pdf>
- [**Flinn’s List of 40 Devils**](#)
- [**Utah State of Risk Management: Chemical Safety Table**](#)
- [**Common Safety Symbols**](#)

Video

- *Flinn Safety* - <http://labsafety.flinnsci.com/Home.aspx>

Risk Management Survey

[Laboratory Self Audit](#)

OSHA “Preparing and Implementing a Hazard Communication Program”

[Sample](#)

[Blank template](#)

Flinn Safety Lesson Plan

Sample: Safety Contract

Middle School (English) -

http://www.flinnsci.com/Documents/miscPDFs/safety_contract_MS.pdf

Middle school (Spanish) -

http://www.flinnsci.com/Documents/miscPDFs/safety_contract_MS_SP.pdf

High School (English)-

http://www.flinnsci.com/Documents/miscPDFs/Safety_Contract.pdf

High School (Spanish) –

http://www.flinnsci.com/Documents/miscPDFs/Safety_Contract_SP.pdf

Sample: Safety Assessment

Middle School (English) –

http://www.flinnsci.com/Documents/miscPDFs/Safety_exam_MS.pdf

Middle School (Spanish) -

http://www.flinnsci.com/Documents/miscPDFs/Safety_exam_MS_SP.pdf

High School (English) –

http://www.flinnsci.com/Documents/miscPDFs/Safety_exam_HS.pdf

High school (Spanish) –

http://www.flinnsci.com/Documents/miscPDFs/Safety_exam_HS_SP.pdf

USOE Safety Forms and Applications

[Accident/Incident Report Form](#)

[Report a Safety Concern Form](#)

[Application for State Approved Mentor Help in Chemical Storage](#)

[Chemical Safety Mentor Application](#)