Chemical Hygiene Plan

Eastern Virginia Medical School

Revised:
June 2014
INTRODUCTION

The Eastern Virginia Medical School Chemical Hygiene Plan was developed to meet the requirements of the Occupational Safety and Health Administration standard on “Occupational Exposures to Hazardous Chemicals in Laboratories”, 29 CFR 1910.1450. The standard is known as the “Laboratory Standard.”

Many laboratory chemicals are hazardous; however, if used properly in adequate facilities and with appropriate personal protective equipment, they may be used safely. The Chemical Hygiene Plan establishes procedures, equipment and work practices to protect laboratory employees from physical and health hazards presented by chemicals. Each laboratory, whether research or clinical, is unique in design and available equipment. Employees must be familiar with chemicals used in their laboratory, containment and storage equipment and emergency procedures. To accomplish this, a Laboratory Safety course is presented periodically.

We, as members of the Chemical and Environmental Safety Committee and staff in the EVMS Department of Environmental Health & Safety (EH&S), believe that this Chemical Hygiene Plan contains information useful to your daily laboratory work. It is your responsibility to be familiar with its practices and procedures to minimize risk while working in the laboratory. Please contact EH&S with your questions, concerns and suggestions about safety.

Neel Krishna, Ph.D.
Chair, Chemical and Environmental Safety Committee

Courtney Kerr, CEM, CHMM
Director, Environmental Health and Safety

Aaron Decker, M.S.
Chemical Hygiene Officer

EMERGENCY TELEPHONE NUMBERS

Environmental Health & Safety.........................................................446-5798
Emergency .........................................................................................911
Fire and Life Safety Officer...............................................................446-5990
Police and Public Safety .................................................................446-5199 / 5911
Fire .....................................................................................................911
Occupational Health.................................................................446-5870
Emergency Medical Services..........................................................911
Poison Control Center.................................................................800 222-1222
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CHEMICAL HYGIENE PLAN

1. RESPONSIBILITIES

While each individual using chemicals is responsible for awareness of hazardous characteristics and safe use of the product, the Eastern Virginia Medical School administration is responsible for advocating chemical hygiene within the institution.

1.1 President, Provost and Dean

The President, Provost and Dean are responsible for supporting chemical safety at Eastern Virginia Medical School.

1.2 Chemical and Environmental Safety Committee

The Chemical and Environmental Safety Committee is responsible for reviewing and recommending institutional policy on the use, storage and disposal of chemicals and to review and make recommendations on institutional policy concerning other non-biological hazards.

1.3 Department Chairman/Program Director

The Department Chairman or Program Director is responsible for chemical safety in their department and supporting implementation of programs, practices and procedures to achieve chemical safety, including requirements in the Chemical Hygiene Plan.

1.4 Director of Environmental Health and Safety

The Director of Environmental Health & Safety is responsible for implementing programs, procedures and practices necessary to meet requirements of Federal, State and local regulatory agencies concerning health and safety and to identify resources required to accomplish these tasks.
1.5 Chemical Hygiene Officer

The Chemical Hygiene Officer (CHO) is an employee of EH&S and is responsible for daily operation of chemical hygiene at the Eastern Virginia Medical School. Specifically, the CHO will:

1. Review and update the Chemical Hygiene Plan
2. Develop and conduct training and information programs on laboratory safety to promote safe handling of hazardous materials
3. Provide technical assistance to investigators and laboratory staff on issues of laboratory safety
4. Review application of chemical safety practices and procedures through periodic evaluation of laboratories and safety equipment such as eyewash stations, safety showers and fume hoods
5. Investigate reported laboratory incidents and recommend corrective action to reduce potential for recurrence
6. Maintain knowledge of Federal, State and local regulations concerning hazardous materials use and disposal
7. Manage disposal of hazardous materials and develop methods to minimize hazardous waste

1.6 Principal Investigator/Laboratory Supervisor

The Principal Investigator/Laboratory Supervisor is responsible for chemical safety in their laboratory and will:

1. Be aware of hazards associated with chemicals used and inform laboratory staff of these hazards
2. Select and employ laboratory practices and engineering controls to minimize the potential for exposure to hazardous materials and reduce the production of hazardous waste whenever possible
3. Develop written standard operating procedures (SOPs) for each procedure involving hazardous substances to assure work practices, engineering controls and personal protective equipment are in place in order to reduce the potential for exposure to the lowest practical level. Procedures established by manufacturers or in text books can suffice as SOPs as long as they are identified as such and are kept with all other SOPs. (See Appendix A for sample)
4. Ensure that laboratory staff receives laboratory safety training and employs practices and procedures identified in the standard operating procedures of each protocol
5. Ensure laboratory staff completes the “Safety Orientation Review Sheet” and maintain records with the Chemical Hygiene Plan. (Appendix B)
1.7 Laboratory Employee/Staff

The Laboratory employee is responsible for safe use of chemicals in laboratories and following prescribed practices and procedures to minimize risk, as well as being aware of information in Safety Data Sheets for chemicals used in lab studies or procedures. In addition, the employee shall immediately report to the Principal Investigator or Laboratory Supervisor all facts pertaining to accidents or unsafe conditions involving potential exposure to hazardous materials. The employee shall wear appropriate lab attire and understand the capabilities and limitations of personal protective equipment issued.
2. **GENERAL LABORATORY SAFETY PROCEDURES**

Laboratories contain many potential hazards for the untrained and uninformed individual. The hazards may include toxic chemicals, infectious materials, radioactive materials, hot surfaces, electric currents, glassware, systems under pressure, spinning devices, extremely cold items, a combination of these hazards or other hazards not mentioned. With proper training and an understanding of practices to reduce exposure to these materials, employees can perform assigned tasks with minimal health risk. While certain laboratory protocols require extensive safety precautions, most can be performed safely by observing these general procedures:

1. Thoroughly wash your hands with soap and water to prevent ingestion of harmful materials before leaving the lab or handling food or drink
2. Mouth pipetting is strictly prohibited
3. Use proper personal protective equipment such as gloves, safety glasses, goggles, lab coat, closed toe shoes, etc.
4. Contact lenses should not be worn when working with volatile chemicals
5. Do not smell or taste chemicals
6. Know the location of the nearest fire extinguisher and fire alarm pull-station
7. Place broken glass or other sharp objects in puncture resistant containers
8. Dispose of chemicals properly (See section 6)
9. Store chemicals properly and minimize quantities handled (See section 4)
10. Use a laboratory fume hood when working with volatile compounds (See section 7)

To summarize these general procedures, maintain good personal hygiene, store materials properly, be familiar with chemical characteristics and use adequate personal protective equipment and engineering controls. Employing these “common sense” procedures will help achieve a safe and productive work area.

2.1 Eating, Drinking, Smoking in Laboratories

Eating, drinking, smoking, gum chewing, applying cosmetics and taking medicine in laboratories is strictly prohibited. Food, beverages, cups and other drinking and eating utensils shall not be stored in areas where chemicals are handled or stored. Glassware used for laboratory operations should never be used to prepare or consume food or beverages. Laboratory refrigerators, ice chests, cold rooms, ovens and other equipment should not be used for food storage or preparation. Laboratory water sources and deionized laboratory water should not be used for drinking water.

2.2 Children in Laboratories

Due to the nature of inherent hazards in laboratories, children shall not enter or be brought to laboratories unless in a learning activity that is under close supervision. Prudent oversight of the child’s activities is necessary to avoid undue risks to the individual or other lab staff and distraction of the parent involved in laboratory studies. The fascination and curiosity of an unsupervised child can result in an unfortunate accident or injury.
2.3 Pregnancy

Reproductive toxins are substances that adversely affect the reproductive process. These toxins include mutagens that can cause chromosomal damage and teratogens, the effects of which include retarded fetal growth, birth defects, fetal malformations and fetal death.

Knowledge of how chemicals affect reproductive health is in its preliminary stage. It has been only since 1973 that manufacturers were required by the Toxic Substances Control Act (TSCA) to test chemicals other than drugs for their effects on reproductive health.

Although a few well-controlled studies have been conducted, the evidence for most chemicals is limited to case reports or to studies done on a small group of exposed people after a problem emerged. Of approximately 100,000 chemicals (according to World Health Organization) that are produced on an industrial scale in commercial production (not including drugs, pesticides, and food additives) only a limited number have been tested thoroughly for reproductive effects.

Pregnant women and women intending to become pregnant should review Safety Data Sheets for special precautions before working with substances that are suspected to be reproductive toxins. As minimal precautions, the procedures outlined in Section 8 (Acutely Toxic Chemicals, Germ Cell Mutagens, Carcinogens, and Reproductive Toxins) should be followed for work with such compounds.
3. **SAFETY DATA SHEETS**

3.1 General

The Occupational Safety and Health Administration (OSHA) require chemical manufacturers and importers to develop or obtain a Safety Data Sheet (SDS) for each chemical they produce or import. SDSs contain information about the chemical, its physical and health hazards and other Health & Safety data. SDSs are sent along with chemicals that are ordered by labs. It is a requirement that each laboratory shall have a binder containing the respective SDSs.

3.2 Description

All SDSs have specific sections that contain standard information about the chemical. The SDS includes the following information:

- Identify the substance designated on the container label
- Physical and chemical characteristics of the hazardous chemical
- Physical hazards
- Known acute and chronic health effects and related health information
- Primary routes of entry into the body
- Information on exposure limits
- Whether a hazardous chemical is considered a carcinogen by OSHA, the International Agency for Research on Cancer or the National Toxicology Program
- Precautions for safe handling
- Generally acceptable control measures (engineering controls, work practices, personal protective equipment)
- Emergency and first aid procedures, including a 24-hour emergency phone contact
- Date of SDS preparation or most recent revision
- Name, address and phone number of the party responsible for preparing and distributing the SDS
The Hazard Communication Standard (HCS) requires chemical manufacturers, distributors, and importers to provide SDSs to communicate the hazards of hazardous chemical products. As of June 1, 2015, the HCS will require new SDSs to be in a uniform format, and include the section numbers, the headings, and associated information under the headings below:

Section 1 – Identification of the substance or mixture
- GHS product identifier
- Other means of identification
- Recommended use of the chemical/restrictions on use
- Supplier details
- Emergency phone number

Section 2 – Hazards Identification
- GHS classification of the substance/mixture
- GHS label elements, including precautionary statements
- Other hazards that do not result in classification/not covered by GHS

Section 3 – Composition/Information on ingredients
- Chemical identity, concentration
- Common name, synonyms
- CAS number
- Impurities and stabilizing additives

Section 4 – First Aid Measures
- Description of necessary measures, subdivided according to the different routes of exposure
- Most important symptoms

Section 5 – Firefighting Measures
- Media to use in event of fire and special firefighting measures/PPE
- Specific hazards arising from the chemical

Section 6 – Accidental Release Measures
- Personal precautions, protective equipment and emergency procedures
- Environmental precautions
- Methods and materials for containment and cleaning up

Section 7 – Handling and Storage
- Precautions for safe handling
- Conditions for safe storage, including any incompatibilities
Section 8 – Exposure Control and Personal Protection
- Control parameters
- Appropriate engineering controls
- Individual protection measures (PPE)

Section 9 – Physical and Chemical Properties
- Appearance, boiling point, flashpoint, specific gravity, etc.

Section 10 – Stability and Reactivity
- Chemical stability
- Hazardous reactions
- Conditions to avoid
- Incompatible materials
- Hazardous decomposition products

Section 11 – Toxicological Information
- Likely routes of exposure
- Symptoms/delayed and immediate effects/chronic effects
- Numerical measures of toxicity

Section 12 – Ecological Information
- Ecotoxicity
- Persistence and degradability
- Bioaccumulative potential
- Mobility in soil
- Other adverse effects

Section 13 – Disposal Consideration
- EPA and RCRA waste classifications and recommendations for disposal including any contaminated packaging

Section 14 – Transport Information
- DOT Labeling Requirements
- UN number/proper shipping name
- Transport hazard class
- Packing group
- Marine pollutant
- Special precautions

Section 15 – Regulatory Information
- Summary of reviews, standards and regulations, presenting toxicity and grant findings from IARC, ACGIH, OSHA, MSHA, NIOSH, EPA, NTP, etc.

Section 16 – Other Information
- Miscellaneous information and disclaimers
4. CHEMICAL USE AND HANDLING

Chemicals are essential components of laboratory research. Of paramount importance is minimizing the quantities used, which will reduce the amount that must be purchased and later disposed. The cost to dispose of partially used products can equal or exceed the initial purchase cost and increases with time. By using micro techniques, much smaller volumes of reagents are needed which requires fewer products purchased and stored.

4.1 Purchasing

When purchasing chemicals, be aware of their handling and storage requirements and ensure that laboratory staff has proper facilities and personal protective equipment to use and store the product. Order only quantities needed; surplus containers consume storage space and may decompose or become unstable when stored for long periods. Also consider that large “economy size” containers often dictate a need for other equipment such as smaller transfer containers, funnels, pumps and labels, as well as additional time and labor to prepare smaller volumes.

4.1.1 Requisition

Complete the purchase requisition in accordance with directions provided by Materials Management. Use the 007326 object code to identify chemicals:

- 007326: Chemicals (e.g., solvents, acids, bases, reagents, etc.)

<table>
<thead>
<tr>
<th>Example:</th>
</tr>
</thead>
<tbody>
<tr>
<td>101 120</td>
</tr>
</tbody>
</table>

Note: 007301 – Office Supply – Use for toner, pens, paper, etc. 
007307 – General Lab Supply – Tubes, glassware, PPE, etc. 
These object codes should NOT be used when ordering chemicals

4.1.2 Receiving

When packages of chemicals are opened in the laboratory, laboratory personnel should verify that the container is intact and is labeled, at a minimum, with an accurate name on a well-adhered label. The users name and date of receipt should be placed on the label. New chemicals shall be immediately entered into the laboratory’s inventory and placed in the appropriate storage area.
4.2 Inventory

An inventory of all chemicals in each laboratory must be prepared and updated by the lab. The purpose of the inventory is to know what chemicals and quantities are in the laboratory in event of an accident and ensure that SDSs are available to inform laboratory staff of potential chemical hazards. To prepare the initial inventory for new labs, use the form “Chemical Inventory by Laboratory” (Appendix D) and submit to EH&S for entry into the chemical inventory database. After the initial inventory has been established, each lab is responsible for the continual upkeep of their inventory by utilizing the online chemical inventory database, ChemTracker. ChemTracker allows the user to preform many functions besides viewing and manipulating the chemical inventory. This online database will make SDSs and other safety related material (such as: chemical storage, hazard classes, and reports) easy to access. When a new chemical is received or consumed/removed, update the quantity in the online database. Additionally, an annual chemical inventory audit is required to ensure the inventory is accurate and up to date. Labs may query the database via EH&S to locate a needed chemical. EH&S maintains the user access list; if a member of the laboratory is leaving or being hired, notify EH&S to create a username and password. If a user can not remember their username or password, contact EH&S. To access this database, go to: http://chemtracker.stanford.edu/members/ and for more information read Appendix M.

4.3 Container Labels

Manufacturers, importers and distributors must label all containers of hazardous chemicals. The label will often indicate how to store and handle the chemical, what protective clothing you should wear, and other safety procedures. All information on primary and secondary containers must be in English.

4.3.1 Primary Label

The label must contain the product identifier, pictograms, hazard statement, signal words, precautionary statements/pictograms and the manufacturer or importer Information. Hazard statements are be indicated by standardized and assigned phrases that describe the hazard(s) as determined by hazard classification. Hazard pictograms convey health, physical and environmental hazard information, assigned to a GHS hazard class and category. The signal word indicates the relative degree of severity a hazard. The signal words used in the GHS are "Danger" for the more severe hazards, and “Warning” for the less severe hazards. Precautionary information supplements the hazard information by briefly providing measures to be taken to minimize or prevent adverse effects from physical, health or environmental hazards. The labels shall remain intact until the container is empty and shall be defaced before the container is discarded.
4.3.2 Secondary Container Labels

Chemicals are frequently transferred into smaller containers from bulk drums or other large containers. Each secondary container must have a label that contains, at a minimum, the following information: name of the chemical, date of transfer, name of person transferring the material, and hazard warning terms that appear on the primary container. Abbreviations for chemical names are discouraged; however, if they are used a list of abbreviations must be posted prominently in the lab and in front of the SDS binder. Proper labeling of numerous small secondary containers prevents errors when adding reagents and enables proper disposal of the contents. An example of a secondary container label is illustrated below:

CHLOROFORM

Transferred on 04/01/2014
Jane Doe
DANGER - Highly Toxic and Carcinogen

NOTE: An exception to this requirement is secondary containers into which hazardous chemicals are transferred from labeled containers, and which are intended only for the immediate use (within the day) by the employee who performs the transfer.
4.4 Minimize

The American Chemical Society advocates a “Less Is Better” philosophy of hazardous waste management. It is based on reducing the amount of chemicals that may become waste. This can be done by either eliminating a specific chemical or reducing the quantity used.

To reduce the amount of hazardous wastes produced in a laboratory, it is prudent to consider how the chemical is used. Purchasing smaller quantities and replacement with alternate non-hazardous chemicals can effectively reduce hazardous waste produced. A smaller quantity purchased results in less unused chemicals being stored and reduces the potential for chemical exposure to personnel. Extended storage of unused chemicals increases the risk of accidents.

When developing laboratory protocols, consider using and ordering smaller quantities of chemicals. Disposing waste chemicals costs most institutions tens to hundreds of thousands of dollars per year and a large portion of the waste is from unused chemicals.

4.5 Laboratory Evaluations

In order to monitor the procurement, use, disposal, chemical safety practices and procedures of chemicals used at EVMS, annual Laboratory Evaluations are performed. The list of inspection items is included in Appendix E and includes an evaluation of the following areas:

- **Engineering Controls**
  - Fume Hoods
  - Eyewash Stations
  - Safety Showers
  - Compressed Gas Cylinders
  - Egress
  - Designated Areas
  - Sharps Containers
  - Fire Extinguishers

- **Handling Hazardous Materials**
  - Storage
  - Labeling
  - Disposal
  - Lab Practices
  - Personal Protective Equipment

- **Administrative Controls**
  - Chemical Hygiene Plan
  - Safety Data Sheets
  - Inventory

- **Training Requirements**
  - Chemical Hygiene Plan
  - Respirator
  - Special Hazards
5. CHEMICAL STORAGE

To reduce risk in event of an accident or fire, the quantity of chemicals stored in a laboratory must be kept at a minimum, consistent with needs of the investigator and fire code. As indicated in Section 4 (Chemical Use and Handling), all primary and secondary storage containers must be labeled to identify the chemical, its manufacturer or importer and the hazard warning. If there is a need to store large quantities of solvents, there are bulk chemical storerooms at Lewis Hall and Lester Hall. Contact EH&S about utilizing these areas.

5.1 Chemical Storage Method

Store chemicals by hazard classification (e.g., oxidizer, combustible, corrosive, unstable, water reactive, etc.) rather than alphabetical in cabinets or on open shelving not higher than eye level. Containers on shelves tend to “creep” or “walk” over time or in the event of an earthquake, so they should be restrained behind cabinet doors or with the use of a ¼ to ½ inch raised lip across the open front to prevent containers from falling off the shelf. To determine the chemical’s hazard class, check the label for hazard information or consult the SDS.

Examples of Incompatible Hazard Classes

Do not store List A chemicals next to List B chemicals

<table>
<thead>
<tr>
<th>List A</th>
<th>List B</th>
</tr>
</thead>
<tbody>
<tr>
<td>Organic</td>
<td>Oxidizer</td>
</tr>
<tr>
<td>Flammable</td>
<td>Oxidizer</td>
</tr>
<tr>
<td>Flammable</td>
<td>Poison</td>
</tr>
<tr>
<td>Poison</td>
<td>Corrosive</td>
</tr>
<tr>
<td>Acid</td>
<td>Base</td>
</tr>
<tr>
<td>Acid</td>
<td>Cyanide</td>
</tr>
<tr>
<td>Acid</td>
<td>Sulfide</td>
</tr>
<tr>
<td>Organic acid</td>
<td>Oxidizing acid</td>
</tr>
<tr>
<td>Water reactive</td>
<td>Aqueous solutions</td>
</tr>
</tbody>
</table>

See Appendix K for additional storage guidelines.

Once chemicals are segregated by hazard class, compatible classes can be stored together. Incompatible classes must be physically separated from each other. Separation of chemical groups can be by different shelves within the same cabinet; providing secondary containment is used to retain materials should the primary container be breached. Storage areas and containers should be inspected periodically for signs of deterioration (e.g., rust, corrosion, leakage, pressure build up, etc.). Several of the major chemical distributors have developed systems using a color code to define the groups that should be stored together. Unfortunately, although there are some similarities, the schemes of different companies are not wholly compatible.
5.2 Storage Quantities

5.2.1 Flammable Liquids

A flammable liquid is a liquid having a flash point of not more than 93°C. A flammable liquid is classified in one of four categories according to the following table:

Criteria for Flammable Liquids

<table>
<thead>
<tr>
<th>Category</th>
<th>Criteria</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>Flash Point &lt;23°C and Initial Boiling Point ≤35°C</td>
</tr>
<tr>
<td>2</td>
<td>Flash Point &lt;23°C and Initial Boiling Point &gt;35°C</td>
</tr>
<tr>
<td>3</td>
<td>Flash Point ≥23°C and ≤60°C</td>
</tr>
<tr>
<td>4</td>
<td>Flash Point &gt;60°C and ≤93°C</td>
</tr>
</tbody>
</table>

Label Elements for Flammable Liquids

<table>
<thead>
<tr>
<th>Symbol</th>
<th>Category 1</th>
<th>Category 2</th>
<th>Category 3</th>
<th>Category 4</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Flame</td>
<td>Flame</td>
<td>Flame</td>
<td>No symbol</td>
</tr>
<tr>
<td>Signal Word</td>
<td>Danger</td>
<td>Danger</td>
<td>Warning</td>
<td>Warning</td>
</tr>
<tr>
<td>Hazard Statement</td>
<td>Extremely</td>
<td>Highly</td>
<td>Flammable</td>
<td>Combustible</td>
</tr>
<tr>
<td></td>
<td>flammable liquid and vapor</td>
<td>flammable liquid and vapor</td>
<td>liquid and vapor</td>
<td>liquid</td>
</tr>
</tbody>
</table>

The maximum quantity of flammable and combustible liquids that can be stored in a laboratory outside a safety cabinet is 10 gallons (40 liters). If a safety cabinet is used, the maximum storage quantity is listed on the cabinet, usually 40 gallons (150 liters). Glass bottles containing flammable or any other chemicals should not be stored on the floor in front of benches, since pedestrian traffic or items falling from the bench may break the bottles.
5.3 Peroxide-Forming Chemicals

Materials that are susceptible to peroxide formation are ones that typically react with air, moisture or impurities and produce a change in their chemical composition in normal storage. Peroxides may abruptly detonate with extreme forcefulness when concentrated by evaporation or distillation, when combined with other compounds, or when disturbed by heat, shock or friction. Chemicals that are sensitive to peroxide formation can be broken into three categories (Prudent Practices in the Laboratory, 2011), as shown in the following lists: (bold are most common chemicals)

Class A: Form potentially explosive peroxides without concentration. All have been responsible for fatalities. Discard after 3 months.
- Butadiene
- Chloroprene
- Divinyl acetylene
- Isopropyl ether
- Potassium amide
- Potassium metal
- Sodium amide
- Tetrafluoroethylene
- Vinlylidene chloride

Class B: Chemicals that form explosive levels of peroxides on concentration. Test for peroxide formation or discard after 12 months.
- Acetal
- Cumene
- Cyclohexene
- Cyclooctene
- Cyclopentene
- Diaacetylene
- Dicyclopentadiene
- Diethyl ether
- Diglyme
- Dioxane
- Dimethoxyethane (DME)
- Furan
- Methyl acetylene
- Methyl cyclopentane
- Methyl isobutyl ketone
- Tetrahydrofuran
- Tetrahydronaphthalene
- Vinyl ethers

Class C: Chemicals that may autopolymerize as result of peroxide formation. * Test for peroxide formation or discard after 12 months.
- Acrylic acid
- Butadiene
- Chlorotrifluoroethylene
- Ethyl acrylate
- Methyl methacrylate
- Styrene
- Vinyl acetate
- Vinyl chloride
- Vinyl pyridine

*Under storage conditions in the liquid state, the peroxide-forming potential increases and certain of the monomers should be discarded after three months.

Note: Class lists are illustrative but not comprehensive.

All compounds containing C-H bonds pose the risk of peroxide formation if contaminated with various radical initiators, photosensitizers, or catalysts. For instance, secondary alcohols such as isopropanol form peroxides when exposed to normal fluorescent lighting and contaminated with photosensitizers, such as benzophenone.

Any unopened container from the manufacturer must be tested or disposed of after 18 months.
Detection of Peroxide Formation in Laboratory Chemicals

Test 1:
Peroxide formation may be detected by visual inspection for crystalline solids or viscous liquids. If crystalline solids or viscous liquids are detected, do not handle. Call EH&S at 5798.

Test 2:
One method involves chemical test strips that are available from scientific or safety equipment vendors. Another peroxide detection test includes mixing 1 to 3 mL equal volume of test liquid and acetic acid. Add a few drops of 5% aqueous potassium iodide solution, and shake. The appearance of a yellow to brown color indicates the presence of peroxides. A test indicating a peroxide concentration greater than 100 ppm indicates a potentially dangerous level and the chemical should be disposed.

Required Work Practices
To minimize the hazard of peroxide formation, observe the following safety guidelines:

- Any peroxidizable chemical with visible discoloration, crystallization or liquid stratification should be treated as potentially explosive. Do not handle and immediately call EH&S at ext. 5798.
- Label all containers of peroxide-forming chemicals with the date the chemical was received and the date the container was opened.
- Use or discard containers by the manufacturer's expiration date, if the expiration date is available. If there is no expiration date stamped on the container, discard according to the schedules listed above.
- Keep an inventory of peroxide-forming chemicals in the laboratory. NEVER purchase large containers of peroxide-forming chemicals if the quantity exceeds your actual need within the three or twelve month expiration period.
- NEVER distill potential peroxide-forming chemicals to dryness. Always leave a minimum of 20% of the original volume in the distillation apparatus. When possible, adding a non-volatile organic compound (such as mineral oil) can dilute the peroxides remaining after distillation. When preparing to distill or evaporate compounds listed in the tables above, always test for peroxides first.
- NEVER attempt to open a rusted or stuck cap on a peroxide-forming container.
- NEVER scrape or scrub glassware or containers that have been used with peroxide-forming compounds if you see an oily or crusty residue.

References
5.4 Compressed Gas

Compressed gases and the cylinders containing them present both chemical and physical hazards. Depending on the gas, there could be a hazard of fire, explosion, toxicity or asphyxia due to the rapid diffusion of the gas into a laboratory space. Additionally, the cylinder itself could become a projectile!

5.4.1 Ordering

When ordering compressed gas cylinders, order from vendors that exchange the cylinders or will take the cylinder back when empty. Compressed gas cylinders are very expensive to dispose. Prior to ordering a cylinder ensure there is adequate storage space within the laboratory or department. Specify delivery of the cylinder directly to the laboratory.

5.4.2 Storage and Use

Upon receipt, check the label on the cylinder to ensure the contents are the same as that ordered. Store the cylinder in a well-ventilated area and secure it with a clamp, belt or chain to prevent the cylinder from falling over.

When ready for use, move the cylinder using a cart and make sure the cap is secured. Compressed Gas Association threading exists to prevent mixing of incompatible gases due to an interchange of connections. Outlet threads vary in diameter; some are internal, others are external, and some are right handed and others left-handed. The threads on cylinder valves, regulators and other fittings should be examined to ensure they correspond to one another and are undamaged. Pressure regulators are specific to the type of cylinder. Never modify, force or tamper with these regulators.

NOTE: DO NOT LUBRICATE REGULATOR OR CYLINDER VALVES OR THREADES AS OIL OR GREASE ON THESE MAY CREATE AN EXPLOSION HAZARD.

Procedures for safe use of compressed gas cylinders:

- Identify the contents prior to use by checking the label
- If the cylinder cannot be positively identified, mark the cylinder with the words “CONTENTS UNKNOWN” and return to vendor – do not use
- Use the minimum size cylinder necessary
- Vent relief valves on cylinders of flammable, toxic or otherwise hazardous gases to a fume hood
- Never empty a cylinder completely; contamination could occur if the valve is left open
- Clearly mark the cylinder with an “EMPTY” tag when the contents are depleted
- Remove regulators from empty cylinders and re-install the cap at once
- Wear safety glasses or goggles when using compressed gas
- Do not use compressed gas to blow away dust or dirt since flying debris is an eye hazard.
5.5 Refrigerators

Flammable and toxic chemicals should not be stored in standard household refrigerators. Sparks from lamp connections, thermostats and fan switches may be ignition sources for flammable and combustible vapors. Additionally, laboratory workers generally place their face in the refrigerator when looking for samples, increasing the likelihood of inhaling unvented (toxic) vapors.

All chemicals in a refrigerator must be labeled and no food or drink may be stored in a refrigerator with chemicals.

There are two types of laboratory refrigerators that reduce the risk of ignition of flammable vapors:

- “Explosion-proof” refrigerators are required only where there is a risk of ignition both inside and “outside” the unit.
- Explosion-safe or “laboratory-safe” refrigerators and freezers are more commonly used in the laboratory environment as they are designed to eliminate ignition of vapors “inside” the storage compartment by sources also within the environment. Associated design features include self-closing doors, special materials for the inner shell, and the location of the compressor and its controls at the top of the unit away from any potential floor-level accumulation.

NOTE: Regardless of the approach used, every laboratory refrigerator should be clearly labeled to indicate its intended use.

5.6 Environmental Rooms

Environmental rooms, either as refrigeration cold rooms or as warm rooms for growth of organisms and cells, have the inherent property of being a closed air-circulation system. Thus, the release of any toxic substance in these areas poses potential dangers. In addition, because of the contained atmosphere in these rooms, there is a significant potential for the creation of aerosols and cross-contamination of research projects. These problems should be controlled by preventing the release of aerosols, gases or volatile solvents into the room environment.
6. **CHEMICAL DISPOSAL**

The Eastern Virginia Medical School is regulated by a variety of Federal, State and local agencies to dispose of chemicals in a safe and environmentally sound manner. Therefore, the following requirements must be met:

1. **DO NOT** dispose of chemicals or chemical waste in the drains or general trash. Surplus chemicals or chemical waste will be picked up and disposed of by EH&S (x5798).


3. All constituents of the waste including the matrix must be listed, to total 100% of the waste. (Matrices may include gloves, paper, plastic, glass, water, ethanol, etc.) **DO NOT** use abbreviations, chemical formulas or trade names. Provide as much information as possible when offering an “unknown.” Containers must have labels identifying contents and hazards.

4. Chemicals must be placed in containers impervious to their inherent hazards (including lids). In addition, containers must be leak proof and allow headspace or expansion. Do not seal containers with parafilm only or by other non-secure means. Empty product bottles may be used if the former contents are compatible with the waste and old labels are defaced.

5. Keep solid and liquid forms of waste separate where possible; remember that contaminated articles such as gloves, absorbent pads, etc. constitute hazardous waste by definition.

6. Segregate aqueous from organic wastes and halogenated from non-halogenated solvents where possible. Halogenated solvents contain Fluorine, Chlorine, Bromine, Iodine, or uncommonly Astatine within their composition. This helps to decrease disposal costs and increase the potential for recycling/reuse/reclamation options.

7. Note when wastes are “used” or “spent,” as opposed to surplus/obsolete virgin products. The latter may be offered for reuse within EVMS rather than disposed. If used or spent, be sure to note any contaminants in the waste.

8. Empty containers must be completely empty and free from any residual hazards. If the chemical is the sole active ingredient and it appears on the EPA P-Listed or U-Listed Waste Lists (See Listed Waste in Glossary – Appendix H), the container must be triple rinsed with an appropriate solvent, collecting the rinsate as hazardous waste. Finally, write the word EMPTY on the face of the label and dispose the container to general trash.

9. Mercury and chromium compounds require special disposal. Keep these wastes segregated and properly labeled.

10. Minimize wastes where possible by reducing volume on hand and substituting less hazardous chemicals for hazardous materials. Keep chemical inventories current and offer unused or unneeded chemicals for Chemical Morgue recirculation through EH&S. Utilize EH&S assistance in obtaining small quantities of chemicals or infrequently used chemicals via the Chemical Morgue or Chemical Inventory Search.
11. Store chemical waste only within distinctly segregated hazard classes, minimizing risk of reactions in the event of a release. Utilize grounding, ventilation, and containment devices where appropriate. Remember that flammable chemical waste is included in the 10-gallon limit of flammables permitted in the lab outside of an approved flammable solvent storage cabinet. Do not store chemicals or chemical waste in the aisles or where risk of breakage is likely.

12. Photographic chemicals from automatic developers in x-ray and other sources should be managed as hazardous wastes. Keep fixers and developers segregated.

13. See Section 5.3 for a list of some chemicals that form peroxides as they age, or upon exposure to air. Mark these products and wastes with the date received or prepared, date opened, and circle expiration date on virgin containers. These compounds become increasingly unstable and should be disposed of within 6 months of opening or 1 year from receipt if unopened. Do not keep peroxide forming chemicals beyond the expiration date.

14. Sharps, broken glass, and other puncture causing items should be disposed of in sturdy, sealed puncture-resistant containers marked SHARPS or BROKEN GLASS. If blood-borne pathogens are present, the container must also be red, bear the St. Andrews Cross marking and identify the hazard in text.

15. Dispose of waste containers regularly and promptly (i.e. within one year of accumulation start date). Be sure to clear out wastes and unused chemicals prior to individuals vacating the lab due to retirement, relocation, etc. Clean out refrigerators frequently, eliminating old and unknown items. Inform EH&S if the waste must be kept cold until ultimate disposition.

7. LABORATORY FUME HOODS

A laboratory fume hood is a form of local ventilation used when performing work with flammable, toxic, corrosive or malodorous fumes, vapors or dusts. Its purpose is to minimize escape of contaminants into laboratory air and provide containment for reacting chemicals. Most fume hoods exhaust directly to the outside and might be the only exhaust in a laboratory. Care must be taken not to obstruct airflow within the hood.

This section addresses chemical fume hoods; biological safety cabinets are discussed in the EVMS Biosafety Procedure Manual.

7.1 Fume Hood Use

Successful fume hood operation depends on an adequate and uniform air velocity moving across the hood face, i.e., the open side of the hood. The face velocity and uniform pattern is modified by:

1. Sash height (only on constant volume hoods)
2. Baffle adjustment
3. Bulky equipment and excess storage containers in the hood

For most situations, an unperturbed hood face velocity of 100 linear feet per minute is desired with the sash open 12 to 18 inches. Face velocity is measured at nine points at the face of the hood with the sash lowered to normal working height. A high face velocity can cause turbulence, while a low face velocity may not completely exhaust hood contaminants. The most important factor in determining hood effectiveness is the user and their work practices. To achieve maximum protection based on hood design:

- Use the minimum sash height possible and use the sash as a physical barrier between the laboratory worker and the chemical
- Place work at least 6 inches inside the hood
- Place bulky items and equipment to the rear of the hood and raise it with blocks
- Obstructing the exhaust slots at the top and bottom of the rear wall perturbs the airflow and reduces the hood efficiency
- Ensure adequate illumination within the fume hood
- Place heat-generating devices in the rear of the hood as they may disrupt airflow
- Store only chemicals needed for the specific procedure being performed in the hood
- Wear personal protective equipment such as gloves, goggles or safety glasses, face shield, apron, lab coat, etc., based on the procedure being performed

Prior to starting a procedure with hazardous materials in the fume hood, verify that the hood is operating properly. This can be done by checking airflow with an anemometer or velometer, or call EH&S for assistance. Fume hood airflow is measured quarterly or more frequently depending on hood use. If the hood is not operating, notify the Maintenance Department immediately.
7.1.1 Fume Hood Types

There are two types of fume hoods on campus, Constant Air Volume (CAV) and Variable Air Volume (VAV).

Constant volume fume hoods exhaust a constant volume of air regardless of sash position. Because the volume is constant, the face velocity varies inversely with the sash position.

Variable air volume fume hoods exhaust a variable volume of air regardless of sash position. These hood styles are also known as constant face velocity hoods. As the sash is lowered or raised, the volume of air is increased or decreased which keeps the face velocity uniform at 100 linear feet per minute. The majority of fume hoods across campus are VAV fume hoods. Please call EH&S if an alarm is activated on your fume hood.

Regardless of fume hood type, the 12 to 18 inch sash max height is still recommended for splash and reaction protection. Close the fume hood sash entirely when not working at the hood; this saves building heating and cooling costs and encloses the hood in the event of a chemical reaction or fire.

7.2 Perchloric Acid

Perchloric acid heated in a fume hood forms organic perchlorate vapor that condenses while passing through the exhaust system. With sufficient consolidation, an explosive situation may exist that can detonate upon contact during cleaning, modification or repair. There are no perchloric acid hoods at EVMS. Perchloric acid hoods are generally constructed of stainless steel, welded seams and have water wash-down systems. If considering heavy use of perchloric acid digestion, contact EH&S for consultation.
8. ACUTELY TOXIC CHEMICALS, GERM CELL MUTAGENS, CARCINOGENS, AND REPRODUCTIVE TOXINS

8.1 Definitions

Acutely Toxic

Acutely toxic chemicals have the ability to damage or severely interfere with living tissue. A chemical is considered acutely toxic if it meets one of the following criteria:

<table>
<thead>
<tr>
<th>Acute toxicity</th>
<th>Cat. 1</th>
<th>Cat. 2</th>
<th>Cat. 3</th>
<th>Cat. 4</th>
<th>Category 5</th>
</tr>
</thead>
<tbody>
<tr>
<td>Oral (mg/kg)</td>
<td>≤ 5</td>
<td>&gt; 5</td>
<td>&gt; 5</td>
<td>&gt; 300</td>
<td>≤ 2000</td>
</tr>
<tr>
<td>Dermal (mg/kg)</td>
<td>≤ 50</td>
<td>&gt; 50</td>
<td>&gt; 200</td>
<td>&gt; 1000</td>
<td>≤ 2000</td>
</tr>
<tr>
<td>Gases (ppm)</td>
<td>≤ 100</td>
<td>&gt; 100</td>
<td>&gt; 500</td>
<td>&gt; 2500</td>
<td>≤ 5000</td>
</tr>
<tr>
<td>Vapors (mg/l)</td>
<td>≤ 0.5</td>
<td>&gt; 0.5</td>
<td>&gt; 2.0</td>
<td>&gt; 10</td>
<td>≤ 20</td>
</tr>
<tr>
<td>Dust &amp; mists (mg/l)</td>
<td>≤ 0.05</td>
<td>&gt; 0.05</td>
<td>&gt; 0.5</td>
<td>&gt; 1.0</td>
<td>≤ 5</td>
</tr>
</tbody>
</table>

Criteria:
- Anticipated oral LD₅₀ between 2000 and 5000 mg/kg;
- Indication of significant effect in humans;*
- Any mortality at class 4;*
- Significant clinical signs at class 4;*
- Indications from other studies.*

*If assignment to more hazardous class is not warranted.

Germ Cell Mutagenicity

Chemicals that may cause mutations in the germ cells of humans that can be transmitted to the progeny.

Category 1: Known or Presumed Mutagen
- Sub-category 1A: Known Mutagen: Positive evidence from epidemiological studies
- Sub-category 1B: Presumed Mutagen: Positive evidence from human germ cell tests or in vivo tests

Category 2: Suspected or Possible Mutagen

Carcinogen

Chemical substance or mixture that induces cancer or increases its incidence.

Category 1: Known or Presumed Carcinogen
- Sub-category 1A: Known Carcinogen: Positive human carcinogenic evidence
- Sub-category 1B: Presumed Carcinogen: Positive animal carcinogenic evidence

Category 2: Suspected or Possible Carcinogen
Reproductive Toxin

Chemicals that include adverse effects on sexual function and fertility in adult males and females as well as developing toxicity in the offspring.

Category 1: Known or Presumed Human Reproductive Toxin
   Sub-category 1A: Known Human Reproductive Toxin: Based on evidence from humans
   Sub-category 1B: Presumed Human Reproductive Toxin: Based on evidence from experimental animals
Category 2: Suspected human reproductive toxin
Other Category: Effects on or via Lactation

Designated Area

A “designated area” means an area, which may be used for work with substances meeting the above criteria. This area may be the entire laboratory, an area of a laboratory or a device such as a chemical fume hood.

8.2 Procedures and Precautions

1. Work areas where carcinogens or acutely toxic substances are being used should be marked appropriately.

   CAUTION

   Designated Work Area

   Select carcinogens, reproductive hazards or substances of high acute toxicity may be present.

2. These areas should have controlled access and be entered only by persons authorized by the principal investigator or his or her designee. Access doors to these areas should be kept closed while experiments involving carcinogens or acutely toxic chemicals are in progress. While working with these hazardous materials, assure two people are present and aware of what symptoms would appear if an exposure occurs.

3. All work surfaces should be covered with stainless steel or plastic trays, dry absorbent plastic-backed paper or other impervious material in order to contain any spills.

4. Review SOPs for each procedure involving these substances to assure work practices, engineering controls and personal protective equipment are in place in order to reduce the potential for exposure to the lowest practical level.
5. Use the appropriate hood for operations that might result in release of a toxic chemical vapor or dust. As a rule of thumb, use a hood or other local ventilation device when working with substances meeting the definition of acutely toxic and/or carcinogen.

6. When procedures involve powders on the open benchtop, which meet the definition of acute toxicity, select carcinogens, or reproductive toxin, a disposable NIOSH approved dust/mist respirator may be worn. This will provide protection against dusts and mists with TWA (Time Weighted Average) not less than 0.05 mg/m³.

7. When work is completed, properly dispose of hazardous wastes. Collect chemical wastes and contaminated articles in appropriate containers for disposal as hazardous waste. Decontaminate the controlled area before normal work is resumed there.

8. An accurate record of the amount of such substances being stored and of the amounts used, dates of use, and name of users should be maintained.
9. EMPLOYEE INFORMATION AND TRAINING

The Chemical Hygiene Officer will provide laboratory employees with information and training concerning the hazards of chemicals present in the laboratories. To accomplish this, “General Laboratory Safety” courses are presented on a regular basis. Newly hired laboratory employees will be informed of the next available course by their Principal Investigator or supervisor and will be required to attend. Information and training will be provided in accordance with OSHA’s standard on “Occupational Exposures to Hazardous Chemicals in Laboratories,” 29 CFR 1910.1450.

9.1 Informational Requirements

Employees will be informed of:
- The contents of the “Laboratory Standard” and its appendices that shall be made available to employees.
- The location and availability of EVMS’s Chemical Hygiene Plan.
- The permissible exposure limits for OSHA regulated substances or recommended exposure limits for other hazardous chemicals where there is no applicable OSHA standard.
- Signs and symptoms associated with exposures to hazardous chemicals used in the laboratory.
- The location and availability of known reference material on the hazards, safe handling, storage and disposal of hazardous chemicals found in the laboratory including, but not limited to Safety Data Sheets received from the chemical supplier.

9.2 Employee Training

Employee training will include:
- Methods and observations that may be used to detect the presence or release of a chemical (such as monitoring, continuous monitoring devices, visual appearance or odor of chemicals when being released, etc.)
- The physical and health hazards of chemicals in the work area
- The measures employees can take to protect themselves from these hazards, including specific procedures EVMS has implemented to protect employees from exposure to hazardous chemicals, such as appropriate work practices, emergency procedures and personal protective equipment to be used
- The applicable details of EVMS’s written Chemical Hygiene Plan
10. PERSONAL PROTECTIVE EQUIPMENT

Personal protective equipment (PPE) includes all clothing and other work accessories designed to create a barrier against workplace hazards. These barriers are intended to protect the eyes and face, hands and arms, and body. Laboratory workers must be aware that PPE does not eliminate the hazard; if the PPE fails or is improperly used, exposure will likely occur. An assessment of the laboratory environment at EVMS indicates that at a minimum, a laboratory coat, gloves and eye protection should be worn during procedures involving wet chemistries or similar manipulations with toxic or corrosive materials. Personal protective equipment shall be made available to employees by their Principal Investigator.

10.1 Eye and Face Protection

The most likely incident involving the eye or face is a chemical splash. Protection from chemical splashes is attained by wearing safety glasses, goggles or a face shield. Safety glasses are impact resistant and offer minimal protection from other than a direct splash. Side shields are available that increase protection from the side. Goggles cover the eyes and reduce the likelihood of splashes entering the eye from above, below or the sides. Most goggles provide both impact and splash protection, and are available to fit over corrective lenses.

Contact lenses should not be worn in laboratories where chemical splashes may occur or where organic vapors may be present. In event of a chemical splash, it is extremely difficult to remove the contact lens to irrigate the eye due to involuntary spasms of the eyelid. Additionally, gases and vapors may concentrate under the contact lens and cause permanent eye injury.

Face shields cover the eyes, face and throat, providing protection when working with systems under pressure and reactive mixtures. They should always be worn with primary eye protection such as safety glasses or goggles.

Contact EH&S for assistance in selecting eye protection.

10.2 Hand Protection

Gloves create a barrier between the hand and contact with hazardous materials. Selecting the correct type of glove depends on the work practice and chemicals used. Each type of glove material (butyl, neoprene, nitrile, latex, etc.) is tested against various chemicals to determine its permeability and break through time. Refer to glove materials and break through charts from vendors to determine the type of glove that is suitable for your particular application. Gloves selected for chemical resistant properties also protect against dry powders.
10.3 Thermal Hand/Arm Protection

Special gloves may be necessary to handle items at extreme temperatures – both cold and hot. Select gloves based on their intended use and check their specifications against the temperatures to be encountered. For arm protection, use gloves with gauntlets or over-sleeves. Most laboratories should have one or two pair of these special gloves or related items that is nondisposable.

10.4 Protective Apparel

Clothing worn in the laboratory is important to worker safety. The following items should not be worn in a laboratory:

- Loose or dangling clothing or jewelry
- Shorts
- Unrestrained long hair
- Sandals or other open toe shoes

Upon arrival at the laboratory, either working at the bench-top or not, proper lab attire is required. Either arrive at the laboratory wearing the proper lab attire or bring a change of clothes and shoes that follow appropriate lab attire listed below. Having that extra layer of material between skin and the experiment prevents possible contamination, burns, cuts and death.

Appropriate attire in the laboratory is as followed:

- Pants covering the ankles, or long dress
- Closed toe, protective shoes
- Non-dangling jewelry and clothing
- Restrained long hair, tied back

In most instances, a laboratory coat provides adequate barrier protection from minor chemical splashes and contact with other hazardous materials. Most lab coats however, are combustible! In situations involving a fire, the lab coat as well as other fabrics, such as rayon and polyester may present an additional hazard to the wearer.

When working with large quantities (e.g. 4 liters of a corrosive liquid) of chemicals, a chemical resistant apron is required to protect against splashes or a spill. Select aprons that are resistant to solvents, acids and other chemicals.
11. MOVING PROCEDURE

This procedure applies to investigators who are closing out a laboratory as well as moving previously established laboratories within EVMS.

1. Prior to the closing or moving a laboratory, EH&S must be notified by the Principal Investigator or Department Chairman in writing. This notification should provide as much lead-time as possible, but two weeks is a minimum. EH&S will provide assistance to assure that the movement of hazardous chemicals, radioactive materials and infectious agents are done in compliance with the appropriate regulatory agencies.

2. A “close-out survey” must be performed for all previously occupied laboratory areas prior to their being used again. This survey will verify these areas are free of radioactive contamination, hazardous chemicals and infectious agents.

3. Movement of potentially contaminated equipment, (refrigerator/ freezers, centrifuges, vortexes, benchtops, etc.) must be approved and the equipment must be surveyed by EH&S before it is transferred to another area. It is the responsibility of the laboratory to provide effective decontamination/deactivation of the various hazards involved. After approval, equipment will be tagged as follows:

   THIS EQUIPMENT HAS BEEN PROPERLY DISINFECTED AND DECONTAMINATED AND IS FREE OF CHEMICAL, INFECTIOUS OR RADIOACTIVE CONTAMINATION.

   SURVEYED BY: ______________________________

   DATE: ______________________________

4. Researchers who are moving labs within EVMS are reminded to update their Radioactive Material Possession and Use Forms, Chemical Inventories and Institutional Biosafety Committee approvals with the proper laboratory locations and any changes that may occur during the move.

   NOTE: If laboratory equipment is to be discarded, be aware that capacitors, transformers, mercury switches, mercury thermometers, radioactive sources and chemicals must be removed before disposal.
12. **EMERGENCY PROCEDURES**

12.1 **General**

Laboratories contain hazardous chemicals that may be spilled or released from reactions or as result of fire. The most common incident involves spilling liquid chemicals from a glass container. Response to the incident depends on the chemical involved, extent of personal injury, and facility damage. Information about the chemical(s) involved is available in the SDS and the identification should be made by the user, if present. Once the chemical is identified, specific steps will be directed by EH&S to reduce the hazard and clean up the material.

12.2 **Spill Response**

Response to a chemical spill must occur at several levels. For laboratory workers, some spills must be cleaned-up at the first level - theirs. There are other times when EH&S must manage the spill.

For the purpose of this procedure, a spill is defined as “a material out of control.” In a practical sense, the quantity of material is not important. The essential issue is whether the hazards, the location and the quantity cause the situation to be beyond the control of the laboratory worker.

Certain spills must be reported, regardless of the quantity (beyond *de minimis*).

- All spills of extremely flammable materials (flash point less than 20°F) must be reported.
- All spills of extremely toxic materials \((\leq 5 \text{ mg/kg } LD_{50})\) must be reported.
- All mercury spills must be reported.
- All personal contaminations must be reported.
- All uncontrolled compressed gas releases must be reported.

Personnel are responsible to have procedures for spills that are below the reportable level. These procedures are explained below.

The primary consideration for laboratory personnel when a material is spilled is safety. Safety for every person in the laboratory and in the building is of paramount importance. If the spill could potentially harm someone, call EH&S or Police and Public Safety. Otherwise, the laboratory workers who will clean-up the spill must follow specific procedures to do so safely and effectively.
1. **Personal Protective Equipment (PPE)**
Before attempting to clean-up a spill, the lab responder must put on the following minimum amount of personal protective equipment (PPE):

- Safety glasses
- Lab coat
- Nitrile or latex gloves

2. **Clean-up Materials**
Laboratories must have certain supplies available before attempting to clean-up a spill. The actual materials to be used will depend upon the hazards posed by the spilled material. A recommended list of supplies is presented below:

- Absorbent pads
- Absorbent socks
- Acid neutralizer
- Activated carbon
- Caustic neutralizer
- Dustpan and brush
- Heavy-duty plastic trash bags
- Laboratory tongs
- One or five gallon plastic bucket with lid

Note: This procedure is not applicable to spills of mercury, radioactive or biological materials.

3. **Clean-Up Procedure**

   **i. PPE**
   Don the appropriate PPE. If, during the spill or subsequent actions, any person is exposed to a chemical, refer to the manufacturer’s Safety Data Sheet for First Aid guidance.

   **ii. Control**
   Control the source of the spill, if it is still present. A bottle, for example, which was knocked over, will still have some material in it. The responder should carefully upright the container, place it on an absorbent pad in a safe location and replace the lid on the container. Any spread of spilled material must also be controlled. This is best done by placing absorbent pads or socks around and on the spill. Many laboratory spills involve broken glass. The spill responder must be careful to avoid being cut.

   **iii. Absorb/Remove**
   - **Acidic, Caustic, or other Non-Flammable Liquids**
     These are most easily absorbed with absorbent pads and socks. Place used absorbent pads and socks in a trash bag. Frequently, laboratory spills will spread into drawers and behind or under equipment. The responder must be careful to locate all such contaminated areas.

   - **Flammable Liquids**
     Flammable liquids should be absorbed on activated carbon or absorbent pads and socks. Use approximately 2 pounds of activated carbon per pint (0.5 liters) of liquid. Use the dust brush or spatula to mix the activated carbon with the liquid thoroughly. Use the dustpan and brush to collect all residues. Remove large pieces of broken glass as described in the next step and place all other debris in a plastic trash bag or appropriate container.
iv. **Remove broken glass**
Using tongs or gloved fingers, carefully remove all large pieces of glass and place them in an appropriate container.

v. **Decontaminate**
   - **Acidic Liquids**
     Apply acid neutralizer on all surfaces affected by the spill. Soak up the neutralizer and apply fresh neutralizer. Remove the residues with absorbent pads or paper towels and then thoroughly wash the affected area with hot soapy water. Use absorbent pads to finish cleaning the area.

   - **Caustic Liquids**
     Apply caustic neutralizer on all surfaces affected by the spill. Soak up the neutralizer and apply fresh neutralizer. Remove the residues with absorbent pads or paper towels, and then thoroughly wash the affected area with hot soapy water. Use absorbent pads to finish cleaning the area.

   - **Flammable Liquids**
     Thoroughly wash the area with hot soapy water. Use absorbent pads to finish cleaning the area.

vi. **Container**
Use absorbent pads, neutralizers and hot soapy water as appropriate, to remove all traces of spilled material from the container. Remember to clean the bottom of the container.

vii. **Inspect**
Carefully check the entire affected area for spill residue, hidden contamination or unsafe conditions, and act accordingly.

viii. **Package Spill Residues**
Place all spill residues and contaminated PPE in plastic bags. Seal the bags and place in the bucket or other appropriate container. Complete a chemical waste removal request form and submit to EH&S for collection. The form can be accessed at the EH&S MyPortal page: https://myportal.evms.edu/media/evmspublic/departments/environmentalhealthsafety/private/EH\_S-3.pdf

ix. **Restock Spill Supplies**
Gather and restock supplies as needed.

**NOTE:** Other initial procedures may be appropriate for specific chemicals, consult the SDS before use to be aware of recommended spill procedures.
12.3 Follow-up Actions

Decontamination and cleanup are under the direction of EH&S and laboratory staff will assist as requested by EH&S staff.

12.4 Injury

**Emergency** – report to the Emergency Room, Sentara Norfolk General Hospital in event of severe bleeding, head injury, broken bones, respiratory distress or other life threatening injuries. If patient transport or paramedic services are necessary, dial 911. Report injury to Occupational Health as soon as possible.

**Non-emergency** – If the injury is not an emergency but requires treatment, call Occupational Health, 446-5870 (after hours pager: 660-1157), and report to the Occupational Health Nurse, Andrews Hall 273, for evaluation during normal working hours. Follow-up visits or visits to specialists will be arranged by Ghent Family Practice. Report the injury to your supervisor.

**NOTE:** You may be responsible for all medical expenses incurred if you do not report the injury to Occupational Health/Human Resources.

12.5 Decontamination and Chemical Waste

Decontamination supplies and personal protective equipment are kept by EH&S. The EH&S staff is trained to wear respiratory protection and has a variety of respirator cartridges available depending on the chemical involved. Chemical waste, including contaminated absorbents and articles, must be prepared and labeled for disposal. Broken glass must be placed in puncture resistant containers for proper disposal, keeping in mind that it may also be contaminated.
EMERGENCY TELEPHONE NUMBERS

Environmental Health & Safety ..................................................446-5798
Emergency .................................................................911
Fire and Life Safety Officer .........................................................446-5990
Police and Public Safety .........................................................446-5199 / 5911
Occupational Health ............................................................446-5870
Occupational Health (After hours pager) .....................660-1157
Fire ........................................................................911
Emergency Medical Services .................................................800 222-1222

Please post in the laboratory, near the telephone
Appendix A: Standard Operating Procedure
CAUTION: Ethidium bromide is a mutagen and environmental hazard. It should be handled carefully with gloves, labcoat and eye protection and disposed of properly. (See EVMS Waste Management procedures on the following page.)

CAUTION: To avoid potentially serious eye injury by Ultraviolet light, wear UV blocking glasses or face shield.

CAUTION: Acrylamide is a neurotoxin and probable human carcinogen. When preparing stock solutions in “designated area” wear gloves, labcoat, eye protection and a NIOSH approved dust/mist disposable respirator.
STANDARD OPERATING PROCEDURE ETHIDIUM BROMIDE WASTE MANAGEMENT

Ethidium bromide decomposes above 500°F. Autoclaves will not destroy it. Incineration at a regulated waste incinerator is recommended as a cost effective, compliant method of disposal.

NOTE: Do not use bleach (hypochlorite) for decontamination. Bleach reduces the mutagenic activity of ethidium bromide in the Salmonella/microsome assay, but it converts the dye into a mutagenic compound in the absence of microsomes.

WEAR LAB COAT, GLOVES AND EYE PROTECTION FOR THESE PROCEDURES

SOLUTIONS

This procedure is for <0.5 µg/mL ethidium bromide/water solutions only. Other constituents and concentrations may invalidate the procedure.

Add 100 mg powdered activated charcoal per 100 ml solution. One teaspoonful is adequate for solutions up to one-gallon.

Store the solution for one hour, shaking intermittently. Filter the solution through a Whatman No. 1 filter, and discard the filtrate.

Seal the filter and activated charcoal in a plastic bag and offer it for incineration at a regulated medical waste facility.

If you are using a commercial product such as the Amresco Destaining Bag, follow the manufacturer’s instructions.

GELS

Agarose gels must be packaged for transportation to a permitted medical waste incinerator that can accept this waste.

Place the gels in leak proof containers. One-gallon plastic jugs must be over-packed transportation. Over-packing can consist of placing the one-gallon jugs into a medical waste box that is lined with a red plastic bag. Please note that these boxes usually have a weight limitation of 50 lbs.; therefore, a limited number of gel jugs may be placed in one box.

If gels are generated frequently, 5-gallon polyethylene pails may be a more practical container. These pails will not require overpacking as long as the pail is 1) red, 2) labeled properly, 3) lined with a red plastic bag (sealed prior to sealing the pail itself) and 4) the lid to the pail is securely attached, assuring the leak proof integrity of the container.
Labeling should consist of the following wording:

REGULATED MEDICAL WASTE

Generator:
Eastern Virginia Medical School (Name of Department)
700 Olney Road, Norfolk, VA 23507 (Department Telephone Number)

Start Date: (Fill in with date of first contribution to container)

CONTAMINATED ARTICLES

Pipettes, gloves, plastic ware, etc., contaminated with ethidium bromide should be placed in jugs or bags. Pipettes or articles that may protrude through a bag should be placed in a puncture resistant container. These articles can then be placed in the regulated medical waste box if the lab has one. If not, label the container, fill out a REQUEST FOR REMOVAL OF HAZARDOUS CHEMICAL WASTE form and send it to EH&S. The waste will be added to the box in this office for incineration off-site.

SPILLS

Notify EH&S Regarding Extent of Release and any Contaminated Personnel.

Absorb free liquids from the edge of the spill site inward with absorbent pads, paper towels, or other absorbent media. Collect these items in a plastic bag for disposal as contaminated articles. Use pads/towels to wrap any broken glass and include waste bag.

Prepare aqueous activated carbon slurry. Using absorbent pads or paper towels, mop the spill site with the slurry. The ethidium bromide will adhere to the carbon thus “decontaminating” the area. Collect the absorbents for disposal.

Mop the area again using clean water and a new absorbent pads or paper towels to clean up any remaining carbon.

Place gloves in contaminated waste bag. Seal and label bag.

Manage waste as contaminated article. (See above)

Questions pertaining to this policy may be directed to EH&S.
Appendix B: Safety Orientation Review Sheet
SAFETY ORIENTATION REVIEW SHEET

1. Review EVMS Chemical Hygiene Plan
2. Identify the location of the Safety Data Sheet (SDS) binder
3. Distribute and review use of personal protective equipment
4. Review Standard Operating Procedures (SOPs) for procedures and equipment employee/volunteer will be expected to use
5. Full-time/part-time personnel:
   Attend Chemical Hygiene Plan training
   Date attended: __________________________________

   Short-term (less than three months) volunteer non-compensated personnel:
   Contact EH&S for training requirement evaluations
   Date completed: __________________________________

6. Identify emergency stations and equipment available
7. Review emergency procedures and phone numbers
8. Review evacuation procedures in case of fire or disaster
9. Identify fire extinguishers and fire alarm pull stations

__________________________________   __________________________
Supervisor’s Signature      Date

__________________________________   __________________________
Employee’s Signature       Date
Appendix C: Safety Data Sheet
1. PRODUCT AND COMPANY IDENTIFICATION

1.1 Product identifiers

Product name: Acetone

Product Number: 00561
Brand: Sigma
Index-No.: 606-001-00-8
REACH No.: 01-2119471330-49-XXXX
CAS-No.: 67-64-1

1.2 Relevant identified uses of the substance or mixture and uses advised against

Identified uses: Laboratory chemicals, Manufacture of substances

1.3 Details of the supplier of the safety data sheet

Company: Sigma-Aldrich
3050 Spruce Street
SAINT LOUIS MO 63103
USA

Telephone: +1 800-325-5832
Fax: +1 800-325-5052

1.4 Emergency telephone number

Emergency Phone #: (314) 776-6555

2. HAZARDS IDENTIFICATION

2.1 Classification of the substance or mixture

GHS Classification in accordance with 29 CFR 1910 (OSHA HCS)

Flammable liquids (Category 2), H225
Eye irritation (Category 2A), H319
Specific target organ toxicity - single exposure (Category 3), Central nervous system, H336

For the full text of the H-Statements mentioned in this Section, see Section 16.

2.2 GHS Label elements, including precautionary statements

Pictogram

Signal word: Danger

Hazard statement(s)

H225 Highly flammable liquid and vapour.
H319 Causes serious eye irritation.
H336 May cause drowsiness or dizziness.

Precautionary statement(s)

P210 Keep away from heat/sparks/open flames/hot surfaces. - No smoking.
P233 Keep container tightly closed.
P240 Ground/bond container and receiving equipment.
P241 Use explosion-proof electrical/ventilating/lighting/equipment.
P242 Use only non-sparking tools.
P243 Take precautionary measures against static discharge.
P281 Avoid breathing dust/ fume/ gas/ mist/ vapours/ spray.
P264 Wash skin thoroughly after handling.
P271 Use only outdoors or in a well-ventilated area.
P280 Wear protective gloves/ protective clothing/ eye protection/ face protection.
P303 + P361 + P353 IF ON SKIN (or hair): Remove/ Take off immediately all contaminated clothing. Rinse skin with water/ shower.
P304 + P340 IF INHALED: Remove victim to fresh air and keep at rest in a position comfortable for breathing.
P305 + P351 + P338 IF IN EYES: Rinse cautiously with water for several minutes. Remove contact lenses, if present and easy to do. Continue rinsing.
P312 Call a POISON CENTER or doctor/ physician if you feel unwell.
P337 + P313 If eye irritation persists: Get medical advice/ attention.
P337 + P370 In case of fire: Use dry sand, dry chemical or alcohol-resistant foam for extinguishment.
P403 + P233 Store in a well-ventilated place. Keep container tightly closed.
P403 + P235 Store in a well-ventilated place. Keep cool.
P405 Store locked up.
P501 Dispose of contents/ container to an approved waste disposal plant.

2.3 Hazards not otherwise classified (HNOC) or not covered by GHS
Repeated exposure may cause skin dryness or cracking.

3. COMPOSITION/INFORMATION ON INGREDIENTS

3.1 Substances

<table>
<thead>
<tr>
<th>Component</th>
<th>Classification</th>
<th>Concentration</th>
</tr>
</thead>
<tbody>
<tr>
<td>Acetone</td>
<td>Flam. Liq. 2; Eye Irrit. 2A; STOT SE 3; H225, H319, H336</td>
<td>-</td>
</tr>
</tbody>
</table>

For the full text of the H-Statements mentioned in this Section, see Section 16.

4. FIRST AID MEASURES

4.1 Description of first aid measures

General advice
Consult a physician. Show this safety data sheet to the doctor in attendance. Move out of dangerous area.

If inhaled
If breathed in, move person into fresh air. If not breathing, give artificial respiration. Consult a physician.

In case of skin contact
Wash off with soap and plenty of water. Consult a physician.

In case of eye contact
Rinse thoroughly with plenty of water for at least 15 minutes and consult a physician.

If swallowed
Do NOT induce vomiting. Never give anything by mouth to an unconscious person. Rinse mouth with water. Consult a physician.

4.2 Most important symptoms and effects, both acute and delayed
The most important known symptoms and effects are described in the labelling (see section 2.2) and/or in section 11
4.3 Indication of any immediate medical attention and special treatment needed
no data available

5. FIREFIGHTING MEASURES
5.1 Extinguishing media
Suitable extinguishing media
Use water spray, alcohol-resistant foam, dry chemical or carbon dioxide.

5.2 Special hazards arising from the substance or mixture
Carbon oxides

5.3 Advice for firefighters
Wear self contained breathing apparatus for fire fighting if necessary.

5.4 Further information
Use water spray to cool unopened containers.

6. ACCIDENTAL RELEASE MEASURES
6.1 Personal precautions, protective equipment and emergency procedures
Use personal protective equipment. Avoid breathing vapours, mist or gas. Ensure adequate ventilation. Remove all sources of ignition. Evacuate personnel to safe areas. Beware of vapours accumulating to form explosive concentrations. Vapours can accumulate in low areas.
For personal protection see section 8.

6.2 Environmental precautions
Prevent further leakage or spillage if safe to do so. Do not let product enter drains.

6.3 Methods and materials for containment and cleaning up
Contain spillage, and then collect with an electrically protected vacuum cleaner or by wet-brushing and place in container for disposal according to local regulations (see section 13).

6.4 Reference to other sections
For disposal see section 13.

7. HANDLING AND STORAGE
7.1 Precautions for safe handling
Avoid contact with skin and eyes. Avoid inhalation of vapour or mist.
Use explosion-proof equipment. Keep away from sources of ignition. No smoking. Take measures to prevent the build up of electrostatic charge.
For precautions see section 2.2.

7.2 Conditions for safe storage, including any incompatibilities
Keep container tightly closed in a dry and well-ventilated place. Containers which are opened must be carefully resealed and kept upright to prevent leakage.

7.3 Specific end use(s)
Apart from the uses mentioned in section 1.2 no other specific uses are stipulated.

8. EXPOSURE CONTROLS/PERSONAL PROTECTION
8.1 Control parameters

<table>
<thead>
<tr>
<th>Component</th>
<th>CAS-No.</th>
<th>Value</th>
<th>Control parameters</th>
<th>Basis</th>
</tr>
</thead>
<tbody>
<tr>
<td>Acetone</td>
<td>67-64-1</td>
<td>TWA</td>
<td>500 ppm</td>
<td>USA, ACGIH Threshold Limit Values (TLV)</td>
</tr>
</tbody>
</table>

Remarks
- Eye & Upper Respiratory Tract irritation
- Central Nervous System impairment
- Hematologic effects
- Substances for which there is a Biological Exposure Index or Indices (see BEI® section)
- Not classifiable as a human carcinogen
<table>
<thead>
<tr>
<th>Component</th>
<th>CAS-No.</th>
<th>Parameters</th>
<th>Value</th>
<th>Biological Specimen</th>
<th>Basis</th>
</tr>
</thead>
<tbody>
<tr>
<td>Acetone</td>
<td>67-64-1</td>
<td>Acetone</td>
<td>50 mg/l</td>
<td>Urine</td>
<td>ACGIH - Biological Exposure Indices (BEI)</td>
</tr>
</tbody>
</table>

**Basis**

**Remarks**
End of shift (As soon as possible after exposure ceases)

### 8.2 Exposure controls

**Appropriate engineering controls**

Handle in accordance with good industrial hygiene and safety practice. Wash hands before breaks and at the end of workday.

**Personal protective equipment**

#### Eye/face protection

Face shield and safety glasses Use equipment for eye protection tested and approved under appropriate government standards such as NIOSH (US) or EN 166(EU).

#### Skin protection

Handle with gloves. Gloves must be inspected prior to use. Use proper glove removal technique (without touching glove's outer surface) to avoid skin contact with this product. Dispose of contaminated gloves after use in accordance with applicable laws and good laboratory practices. Wash and dry hands.

- **Full contact**
  - Material: butyl-rubber
  - Minimum layer thickness: 0.3 mm
  - Break through time: 480 min
  - Material tested: Butolite® (KCL 897 / Aldrich Z677647, Size M)

- **Splash contact**
  - Material: butyl-rubber
  - Minimum layer thickness: 0.3 mm
  - Break through time: 480 min
  - Material tested: Butolite® (KCL 897 / Aldrich Z677647, Size M)

Data source: KCL GmbH, D-36124 Eichenzell, phone +49 (0)6659 87300, e-mail sales@kcl.de, test method: EN374

If used in solution, or mixed with other substances, and under conditions which differ from EN 374, contact the supplier of the CE approved gloves. This recommendation is advisory only and must be evaluated by an industrial hygienist and safety officer familiar with the specific situation of anticipated use by our customers. It should not be construed as offering an approval for any specific use scenario.
**Body Protection**
Impervious clothing. Flame retardant antistatic protective clothing. The type of protective equipment must be selected according to the concentration and amount of the dangerous substance at the specific workplace.

**Respiratory protection**
Where risk assessment shows air-purifying respirators are appropriate use a full-face respirator with multi-purpose combination (US) or type AXBEK (EN 14387) respirator cartridges as a backup to engineering controls. If the respirator is the sole means of protection, use a full-face supplied air respirator. Use respirators and components tested and approved under appropriate government standards such as NIOSH (US) or CEN (EU).

**Control of environmental exposure**
Prevent further leakage or spillage if safe to do so. Do not let product enter drains.

### 9. PHYSICAL AND CHEMICAL PROPERTIES

#### 9.1 Information on basic physical and chemical properties

<p>| | |</p>
<table>
<thead>
<tr>
<th></th>
<th></th>
</tr>
</thead>
</table>
| a) Appearance | Form: liquid, clear  
Colour: colourless |
| b) Odour | no data available |
| c) Odour Threshold | no data available |
| d) pH | no data available |
| e) Melting point/freezing point | Melting point/range: -94 °C (-137 °F) |
| f) Initial boiling point and boiling range | 56 °C (133 °F) at 1,013 hPa (760 mmHg) |
| g) Flash point | -17.0 °C (1.4 °F) - closed cup |
| h) Evaporation rate | no data available |
| i) Flammability (solid, gas) | no data available |
| j) Upper/lower explosivity or explosive limits | Upper explosion limit: 13 % (V)  
Lower explosion limit: 2 % (V) |
| k) Vapour pressure | 533.3 hPa (400.0 mmHg) at 39.5 °C (103.1 °F)  
245.3 hPa (184.0 mmHg) at 20.0 °C (68.0 °F) |
| l) Vapour density | no data available |
| m) Relative density | 0.791 g/mL at 25 °C (77 °F) |
| n) Water solubility | completely miscible |
| o) Partition coefficient: n-octanol/water | log Pow: -0.24 |
| p) Auto-ignition temperature | 465.0 °C (869.0 °F) |
| q) Decomposition temperature | no data available |
| r) Viscosity | no data available |
| s) Explosive properties | no data available |
| t) Oxidizing properties | no data available |

#### 9.2 Other safety information

<p>| | |</p>
<table>
<thead>
<tr>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Surface tension 23.2 mN/m at 20.0 °C (68.0 °F)</td>
</tr>
</tbody>
</table>
10. STABILITY AND REACTIVITY

10.1 Reactivity
no data available

10.2 Chemical stability
Stable under recommended storage conditions.

10.3 Possibility of hazardous reactions
Vapours may form explosive mixture with air.

10.4 Conditions to avoid
Heat, flames and sparks. Extremes of temperature and direct sunlight

10.5 Incompatible materials
Bases, Oxidizing agents, Reducing agents, Acetone reacts violently with phosphorous oxychloride.

10.6 Hazardous decomposition products
Other decomposition products - no data available
In the event of fire: see section 5

11. TOXICOLOGICAL INFORMATION

11.1 Information on toxicological effects

Acute toxicity
LD50 Oral - rat - 5,800 mg/kg
LC50 Inhalation - rat - 8 h - 50,100 mg/m3
Inhalation: no data available
LD50 Dermal - guinea pig - 7,426 mg/kg
no data available

Skin corrosion/irritation
Skin - rabbit
Result: Mild skin irritation - 24 h

Serious eye damage/eye irritation
Eyes - rabbit
Result: Eye irritation - 24 h

Respiratory or skin sensitisation
no data available

Germ cell mutagenicity
no data available

Carcinogenicity
This product is or contains a component that is not classifiable as to its carcinogenicity based on its IARC, ACGIH, NTP, or EPA classification.

IARC: No component of this product present at levels greater than or equal to 0.1% is identified as probable, possible or confirmed human carcinogen by IARC.

NTP: No component of this product present at levels greater than or equal to 0.1% is identified as a known or anticipated carcinogen by NTP.

OSHA: No component of this product present at levels greater than or equal to 0.1% is identified as a carcinogen or potential carcinogen by OSHA.

Reproductive toxicity
no data available
no data available

**Specific target organ toxicity - single exposure**
May cause drowsiness or dizziness.

**Specific target organ toxicity - repeated exposure**
no data available

**Aspiration hazard**
no data available

**Additional Information**
RTECS: AL3150000
To the best of our knowledge, the chemical, physical, and toxicological properties have not been thoroughly investigated.

Kidney - Irregularities - Based on Human Evidence
Kidney - Irregularities - Based on Animal Evidence

---

**12. ECOLOGICAL INFORMATION**

**12.1 Toxicity**
no data available
Toxicity to daphnia and EC50 - Daphnia magna (Water flea) - 13,500.00 mg/l - 48 h
other aquatic invertebrates

**12.2 Persistence and degradability**
no data available

**12.3 Bioaccumulative potential**
no data available

**12.4 Mobility in soil**
no data available

**12.5 Results of PBT and vPvB assessment**
PBT/vPvB assessment not available as chemical safety assessment not required/not conducted

**12.6 Other adverse effects**
no data available

---

**13. DISPOSAL CONSIDERATIONS**

**13.1 Waste treatment methods**

**Product**
Burn in a chemical incinerator equipped with an afterburner and scrubber but exert extra care in igniting as this material is highly flammable. Offer surplus and non-recyclable solutions to a licensed disposal company. Contact a licensed professional waste disposal service to dispose of this material.

**Contaminated packaging**
Dispose of as unused product.

---

**14. TRANSPORT INFORMATION**

**DOT (US)**

<table>
<thead>
<tr>
<th>UN number: 1090</th>
<th>Class: 3</th>
<th>Packing group: II</th>
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</thead>
<tbody>
<tr>
<td>Proper shipping name: Acetone</td>
<td>Reportable Quantity (RQ): 5000 lbs</td>
<td>Poison Inhalation Hazard: No</td>
</tr>
<tr>
<td>Marine pollutant: No</td>
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<td></td>
</tr>
</tbody>
</table>

**IMDG**

<table>
<thead>
<tr>
<th>UN number: 1090</th>
<th>Class: 3</th>
<th>Packing group: II</th>
<th>EMS-No: F-E, S-D</th>
</tr>
</thead>
<tbody>
<tr>
<td>Proper shipping name: ACETONE</td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>
53

Marine pollutant: No

IATA
UN number: 1090  Class: 3  Packing group: II
Proper shipping name: Acetone

15. REGULATORY INFORMATION

REACH No.: 01-2119471330-49-XXXX

SARA 302 Components
SARA 302: No chemicals in this material are subject to the reporting requirements of SARA Title III, Section 302.

SARA 313 Components
SARA 313: This material does not contain any chemical components with known CAS numbers that exceed the threshold (De Minimis) reporting levels established by SARA Title III, Section 313.

SARA 311/312 Hazards
Fire Hazard, Acute Health Hazard, Chronic Health Hazard

Massachusetts Right To Know Components

<table>
<thead>
<tr>
<th>CAS-No.</th>
<th>Revision Date</th>
</tr>
</thead>
<tbody>
<tr>
<td>Acetone</td>
<td>67-64-1</td>
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</table>

Pennsylvania Right To Know Components

<table>
<thead>
<tr>
<th>CAS-No.</th>
<th>Revision Date</th>
</tr>
</thead>
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<tr>
<td>Acetone</td>
<td>67-64-1</td>
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New Jersey Right To Know Components

<table>
<thead>
<tr>
<th>CAS-No.</th>
<th>Revision Date</th>
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<tbody>
<tr>
<td>Acetone</td>
<td>67-64-1</td>
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</tbody>
</table>

California Prop. 65 Components
This product does not contain any chemicals known to State of California to cause cancer, birth defects, or any other reproductive harm

16. OTHER INFORMATION

Full text of H-Statements referred to under sections 2 and 3.

Eye Irrit.  Eye irritation
Flam. Liq.  Flammable liquids
H225  Highly flammable liquid and vapour
H319  Causes serious eye irritation.
H336  May cause drowsiness or dizziness.
STOT SE  Specific target organ toxicity - single exposure

HMIS Rating
Health hazard:  2
Chronic Health Hazard: *
Flammability:  3
Physical Hazard:  0

NFPA Rating
Health hazard:  2
Fire Hazard:  3
Reactivity Hazard:  0

Further Information
Copyright 2014 Sigma-Aldrich Co. LLC. License granted to make unlimited paper copies for internal use only. The above information is believed to be correct but does not purport to be all inclusive and shall be used only as a guide. The information in this document is based on the present state of our knowledge and is applicable to the product with regard to appropriate safety precautions. It does not represent any guarantee of the properties of the product. Sigma-Aldrich Corporation and its Affiliates shall not be held liable for any damage resulting from handling
or from contact with the above product. See www.sigma-aldrich.com and/or the reverse side of invoice or packing slip for additional terms and conditions of sale.

**Preparation Information**
Sigma-Aldrich Corporation
Product Safety – Americas Region
1-800-521-8956

Version: 4.7 Revision Date: 02/13/2014 Print Date: 03/19/2014
Appendix D: Chemical Inventory by Laboratory
## LABORATORY CHEMICAL INVENTORY

<table>
<thead>
<tr>
<th>SDS</th>
<th>NAME OF CHEMICAL</th>
<th>QTY</th>
<th>UNIT</th>
<th>SUPPLIER</th>
<th>CAT. NO.</th>
</tr>
</thead>
<tbody>
<tr>
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</tbody>
</table>

EHS-2 REV. 03/14
Appendix E: Lab Evaluation Check List
• Engineering Controls
  o Fume Hoods
    ▪ Is the fume hood face velocity between 80 lf/m and 120 lf/m?
    ▪ Is the fume hood clear of stored materials and equipment?
    ▪ Is the fume hood operating properly? If not, has a work order been submitted?
    ▪ Is a fume hood present?
  o Eyewash and Safety Shower Stations
    ▪ Have the eyewash and safety shower passed an inspection in the past two weeks?
    ▪ Are the eyewash and safety shower identified with highly visible signs?
    ▪ Are the eyewash and safety shower unobstructed?
    ▪ Are the eyewash and safety shower within 55 feet (10 seconds) from the laboratory?
    ▪ Are the nozzles to the eyewash station protected from airborne contaminants?
    ▪ Is the eyewash a plumbed unit?
  o Compressed Gas Cylinders
    ▪ Are compressed gas cylinders stored in a well-ventilated area?
    ▪ Are empty cylinders marked with an "empty" label?
    ▪ Are cylinders stored with their caps on when not in use?
    ▪ Do cylinders contain a label identifying the contents and manufacturer?
    ▪ Is each cylinder secured from falling with straps, chains or clamps?
  o Egress
    ▪ Are laboratory aisles unobstructed to allow easy access/exit?
    ▪ Is the laboratory maintained in a clean and organized state?
  o Designated Areas
    ▪ Are work areas containing acutely toxic substances and carcinogens clearly marked?
  o Sharps Containers
    ▪ Is contaminated waste disposed of properly?
  o Fire Extinguishers
    ▪ Is an ABC type fire extinguisher accessible in the laboratory?
• Handling Hazardous Materials
  o Storage
    ▪ Are chemicals stored compatibly?
    ▪ Are chemicals stored alphabetically within their classification?
    ▪ Are chemicals segregated by classification?
    ▪ Is the total volume of stored flammable solvents in the flammable storage cabinet below the stated limit?
    ▪ Is the volume of flammable solvents on the bench top less than 10 gallons?
    ▪ Are halogenated solvents segregated from non-halogenated solvents?
  o Labeling
    ▪ Are chemicals/compounds labeled properly?
    ▪ Are secondary containers properly labeled?
  o Disposal
    ▪ Are chemicals disposed of properly into chemical waste containers?
    ▪ Are peroxide formers dated on arrival and disposed of according to by consensus standard timelines?
    ▪ Do chemical waste containers list contents by name and percent composition?
o Lab Practices
  ▪ Is glassware cleaned with liquid detergent and water?
  ▪ Are highly toxic and reactive chemicals present in the laboratory?
  ▪ Are organic peroxide containers dated and disposed of properly?
  ▪ Does the lab only use mercury-free thermometers and equipment?
  ▪ Are "No Food or Drink" labels clearly displayed on each refrigerator, freezer, and microwave present in the laboratory?
  ▪ Is the lab void of electrical hazards?
  ▪ Is all equipment located outside of the PI's laboratory labeled with the PI's emergency contact information?
  ▪ Is the laboratory void of evidence of eating, drinking, and applying cosmetics in the laboratory?

o Personal Protective Equipment
  ▪ Are all personnel wearing appropriate footwear?
  ▪ Is appropriate eye protection maintained in the laboratory and used when necessary?
  ▪ Are appropriate gloves maintained in the laboratory and used when working with hazardous materials?
  ▪ Are all personnel wearing appropriate laboratory attire?
  ▪ Are lab coats worn when working with biological, chemical, and/or radioactive materials?
  ▪ Are respirators available and used when necessary in the laboratory?

• Administrative Controls
  o Chemical Hygiene Plan
    ▪ Is a copy of the EVMS Chemical Hygiene Plan present and accessible in the laboratory?
  o Safety Data Sheets
    ▪ Does the laboratory maintain Safety Data Sheets for each chemical present in the laboratory?
  o Inventory
    ▪ Is the laboratory's chemical inventory complete and up-to-date on ChemTracker?

• Training Requirements
  o Chemical Hygiene Plan
    ▪ Have all laboratory personnel completed Chemical Hygiene Plan training?
  o Respirator
    ▪ Have all personnel who require the use of a respirator completed Respiratory Protection training and been fit tested for a respirator?
  o Special Hazards
    ▪ Has special training been completed by all personnel who work with and handle high hazard chemicals?
    ▪ Are hazard evaluations and employee training records maintained in the laboratory?
Appendix F: Request for Removal of Hazardous Chemical Waste
Request for Removal of Chemical Waste
Use separate form for each container

General Information:
Generator of Waste:
Department:
Building and Room Number:
Principal Investigator:
Office Phone Number:
Email Address:

Identification of Waste Chemicals:
List the chemical name in the fields below. Do not list abbreviations, formulas, or trade names. This list must match the information on the waste container. List all components in percentage to total 100 percent. Include contaminants and trace chemicals (if present).

<table>
<thead>
<tr>
<th>Chemical</th>
<th>Percent</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
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</tbody>
</table>

Total Quantity:
Liters for liquid waste, Kilograms for solid waste

Comments:
Use this area to write special comments about the waste and precautions that the handlers should observe. List type of container (glass, metal, plastic, or other).

This material is properly described, has appropriate labels, and is in a proper container for handling.

Signature: ____________________________ Date: ____________

EHS USE ONLY
Accumulation Start Date: ____________
Tag Control Number: ____________

Community focus. World impact.

EHS-3 REV. 03/14
Appendix G: EVMS Mercury Policy
It is the goal at EVMS to reduce or eliminate mercury-containing devices (e.g. thermometers, sphygmomanometers, esophageal dilators, barometers, etc.) in keeping with the goals of the Memorandum of Understanding (MOU) between the U.S. Environmental Protection Agency (EPA) and the American Hospital Association (AHA). This agreement in 1998 implemented pollution prevention actions within hospitals. One of the top priorities of the MOU was to eliminate mercury-containing waste from hospital waste streams by 2005. This goal is important because of the toxic effects of mercury on human health and the environment.

Mercury occurs in several forms. It may occur naturally in the environment as elemental mercury (quicksilver); it may be dissolved in rainwater as (Hg^{12}); it may appear in solid mineral form as cinnabar (HgS); and as methyl mercury (HgCH_{3}), an organo-metal. Biotransformation of inorganic mercury in the environment to methyl mercury enables entrance into food chains. Methyl mercury is the most toxic form of mercury to animals and humans. Mercury can cause human health problems when it accumulates in the tissue of fish and other aquatic animals that are used as a human food source. Elimination of methyl mercury occurs very slowly with various half-lives of months to years.

Because of mercury’s toxic effects, all departments, laboratories and clinical areas are urged to remove mercury-containing devices from their spaces and replace them with suitable non-mercury equivalents. Where no alternatives are available, mercury-containing equipment should be appropriately labeled as hazardous. The Department of Environmental Health and Safety will collect discarded mercury-containing devices and manage them as hazardous waste.

Principle Sources of Mercury at EVMS:

- Thermometers
- Sphygmomanometers (blood pressure devices)
- Barometers
- Lab chemicals
- Fluorescent lights
- Data projector lights
- Special lights and lamps

References:

Eliminating Mercury in Hospitals, EPA, November 2002
Memorandum of Understanding Between the United States Environmental Protection Agency and the American Hospital Association, June 1998
Mercury, EPA web site
National Survey Finds Most Hospital Eliminating Mercury, Hospitals for a Healthy Environment, September 2005
ACGIH (American Conference of Governmental Industrial Hygienists): An organization of professionals in governmental agencies or educational institutions engaged in occupational safety & health programs. ACGIH develops and publishes recommended occupational exposure limits for chemical substances and physical agents. (See TLV)

Acutely Toxic Chemical: A chemical having the ability to damage or severely interfere with the metabolism of living tissue. The relative acute toxicity of a chemical can be evaluated by determining its LD₅₀ for ingestion and contact hazards (skin and eye absorption), and the TLV or PEL for air contaminants (inhalation). If the chemical has an LD₅₀ of less than 50 mg/kg (Category 2 or 1 Acute Toxin), a TLV value of less than 50 PPM or a PEL value of 100 mg/m³, it is considered to be acutely toxic. Examples include DFP (diisopropyl fluorophosphate), hydrogen cyanide, hydrogen sulfide and nitrogen dioxide.

ALC (Approximate Lethal Concentration): The approximate lethal concentration in air for experimental animals: The value is expressed in mg/liter, mg/m³ or PPM.

ANSI (American National Standards Institute): A privately funded organization that identifies industrial and public national consensus standards and oversees their development. Many of these standards relate to safe design and performance of equipment and safe work practices and procedures.

Asphyxiant: A chemical gas or vapor that can cause death or unconsciousness by suffocation. Simple asphyxiants, such as nitrogen, either consume or displace oxygen in the air. They become especially dangerous in confined or enclosed spaces. Chemical asphyxiants, such as carbon monoxide and hydrogen sulfide, interfere with the body's ability to absorb or transport oxygen to the tissues.

Aspiration Hazard: Toxicity from the entry of a liquid or solid chemical through the oral or nasal cavity, or indirectly from vomiting into the trachea and lower respiratory system. (Category: 1, 2)

ASTM (American Society for Testing and Materials): An organization that develops consensus standards for materials characterization and use. ASTM is a resource for sampling and testing methods, Health & Safety aspects of materials, safe performance guidelines and effect of physical, biological and chemical agents.

Autoclave: An apparatus for effecting sterilization by steam under pressure (121°C at 15 psi for 90 minutes).

Biohazard: A biological agent or condition that constitutes a hazard to humans and their environments. This includes infectious agents transmitted by blood, body fluids and tissue.
**Biosafety Level** (BSL): There are four biosafety levels designated in ascending order, by order of protection to personnel, the environment and the community, that are recommended for a variety of infectious agents in various laboratory settings. Recommendations for biosafety levels for specific agents are made based on the potential hazard of the agent and of the laboratory function or activity. (See EVMS Biosafety Procedure Manual)

**Carcinogen**: Any substance or mixture, which induces cancer or increases its incidence. (Category: 1A, 1B, 2)


**CHP** (Chemical Hygiene Plan): A written program developed and implemented by the employer which sets forth procedures, equipment and work practices that are capable of protecting employees from the health hazards presented by hazardous chemicals used in that particular workplace.

**Chronically Toxic Chemical**: Chemical which causes damage after repeated or long-duration exposure or which causes damage that becomes evident only after a long latency period. Chronic toxins include all carcinogens and many heavy metals with their compounds (such as mercury and lead and their derivatives).

**Combustible Liquid**: A liquid having a flash point above 140°F (60°C) but at or below 200°F (93°C). (Category 4 of Flammable Liquid)

**Corrosive to Skin/Metal**: A chemical liquid or solid that causes irreversible damage to human skin tissue at the site of contact namely visible necrosis through the epidermis and into the dermis, following the application of a substance for up to four hours or, liquid that has a severe corrosion rate on steel or aluminum. (Category (metal): 1 Category (skin): 1A, 1B, 1C, 1D),

**Cryogenic Material**: Any material whose purpose is to lower the temperature of another material. The primary hazard of cryogenic materials is their extreme coldness. These materials and the surfaces they cool can cause severe burns if allowed to contact the skin. In addition, the potential exists for the implosion or explosion of the systems containing the liquids.

**Cyanide or Sulfide Bearing Chemicals**: These chemicals, when exposed to pH conditions between 2 and 12.5, can generate toxic gases, vapors or fumes in a quantity sufficient to present a danger to human health or the environment.

**Designated area**: An area that may be used for work with carcinogenic materials, reproductive toxins or substances that have a high degree of acute toxicity. A designated area may be the entire laboratory, an area of a laboratory, or a device such as a laboratory fume hood.
**Dust:** Solid particles of a substance or mixture suspended in a gas. Dust that has settled on a surface is also included.

**Embryotoxins:** A substance or mixture that may kill, deform, retard the growth or effect the development of specific functions in the unborn child, or cause postnatal functional problems. Examples of embryotoxins include aflatoxin, ochratoxin, formamide, organic mercury compounds, other heavy metals, radiation and some drugs.

**Engineering Controls:** Systems that reduce potential hazards by isolating the worker from the hazard or by removing the hazard from the work area. Methods include ventilation, isolation and enclosure. Engineering controls are preferred over personal protective equipment and should be used in conjunction with administrative practices.

**Environmental Health & Safety (EH&S):** Refers to the Environmental Health & Safety Department at the Eastern Virginia Medical School, Lewis Hall 2132 and 2142 (446-5798).

**EPA (U.S. Environmental Protection Agency):** federal agency with environmental protection, regulatory and enforcement authority. Administers the Clean Water Act, Clear Air Act, RCRA, other federal environmental laws.

**Explosive:** A solid or liquid substance or mixture that is in itself capable by chemical reaction of producing a gas at such a temperature and pressure and at such a speed to cause damage to the surroundings. Pyrotechnic substances are included even when they do not evolve gasses. (See GHS for categories)

**Flammable Gas:** A gas having a flammable range with air that, at atmospheric temperature (20°C) and pressure (101.3 kPa), forms a flammable mixture. (Category: 1, 2)
- Chemically unstable gas: A flammable gas that is able to react explosively even in the absence of air or oxygen. (Category: A, B)

**Flammable Liquid:** A liquid having a flash point below 93°C (200°F). (Category: 1, 2, 3, 4)

**Flammable Solid:** A solid, other than a blasting agent or explosive, that is liable to cause fire through friction, or powdered, granular or pasty substances that can be easily ignited by brief contact with an ignition source and when ignited will spread rapidly.

**Flash Point:** The lowest temperature at which a liquid gives off vapor in sufficient concentration to form an ignitable mixture with air near the surface of the liquid.

**FM:** Factory Mutual, a nationally accepted testing laboratory and approval service recognized by OSHA.

**Fume:** Airborne particulate formed by the evaporation of solid materials (e.g. metal fume during welding).
Gas under pressure:
A gas or mixture of gases contained in a receptacle, a pressure at or exceeding 200 kPa at 20°C (68°F). Gases under pressure are classified according to their physical state when packaged, in one of four groups:

- Compressed gas: A gas which when packaged under pressure is entirely gaseous at -50°C
- Liquefied gas: A gas which when packaged under pressure, is partially liquid at temperatures above -50°C
- Refrigerated liquefied gas: A gas which when packaged is made partially liquid because of its low temperature
- Dissolved gas: A gas which when packaged under pressure is dissolved in a liquid phase solvent

Germ Cell Mutagen: The chemicals that may cause mutations in the germ cells of humans that can be transmitted to the progeny. (Category: 1A, 1B, 2)

Globally Harmonized System of Classification and Labeling of Chemicals (GHS): The GHS is a system for standardizing and harmonizing the classification and labeling of chemicals. It is a logical and comprehensive approach to:

- Defining health, physical and environmental hazards of chemicals;
- Creating classification processes that use available data on chemicals for comparison with the defined hazard criteria; and
- Communicating hazard information, as well as protective measures, on labels and SDSs.

Hazard Category by GHS: Usually numerical and/or alphabetical and will start with the highest hazard. Category 1, Category A, or Category 1A will have the highest hazard associated.

Hazard Communication Standard (29 CFR 1910.1200) (HCS): The purpose of this standard is to inform employees of the hazards they work with and how they can minimize both the probability and severity of potential harm.

Hazardous Chemical: Any chemical that presents a physical hazard or a health hazard;

- Health Hazard: Chemicals that are carcinogens, toxic or highly toxic agents, reproductive toxins, irritants, corrosives, sensitizers, hepatotoxins, nephrotoxins, neurotoxins, agents that act on the hematopoietic systems, and agents that damage the lungs, skin, eyes, or mucous membranes under acute or chronic exposure to employees.
- Physical Hazard: Chemicals for which there is scientifically valid evidence that it is a combustible liquid, a compressed gas, an explosive, a flammable, an organic peroxide, an oxidizer, a pyrophoric, an unstable (reactive) or a water-reactive. (Could pose harm without contact).

IARC (International Agency for Research on Cancer): One of the three sources that OSHA refers to data on a material’s carcinogenicity (see select carcinogen.)
Irritant:

- **Skin Irritant**: A substance which is not corrosive, but that causes a reversible inflammatory effect to the skin following the application of a test substance for up to four hours. (Category: 2, 3 – Category 1 falls under skin corrosion)

- **Eye Irritation**: is the production of changes in the eye following the application of test substance to the anterior surface of the eye, which are fully reversible within 21 days of application. (Category: 2A, 2B – Category 1 falls under serious eye damage)

Laboratory: A facility where the laboratory use of hazardous chemicals occurs, where relatively small quantities of hazardous chemicals are used on a non-production basis.

Laboratory Standard (29 CFR 1910.1450): The purpose of this standard is to set new performance provisions to protect laboratory workers. In most research laboratories, it takes precedence over the Hazard Communication Standard.

\[ \text{LC}_{50} \]: The concentration of a toxin in air that causes death of 50% of test animals who are exposed to it. The test animal and the test conditions should be specified; the value is expressed in mg/liter, mg/m³ or PPM.

\[ \text{LD}_{50} \]: The quantity of material than when ingested, injected or applied to the skin, as a single dose will cause death of 50% of test animals who are exposed to it: The test conditions should be specified; the value is expressed in g/kg or mg/kg of body weight.

\text{LEL} (Lower explosive limit): the concentration (percent by volume) of the vapor in air below which a flame is not propagated when an ignition source is present. Below this concentration, the mixture is too lean to burn.


Mutation: A permanent change in the amount or structure of the genetic material in a cell.

NFPA (National Fire Protection Association): A voluntary membership organization to promote/improve fire protection and prevention and establish safeguards against loss of life and property by fire.

NFPA 704: System for identification of hazardous materials with diamond-shaped labels. It has the advantage of giving an indication of the severity of hazard in four different categories:

- Flammability (red background – top corner)
- Reactivity (yellow background – right corner)
- Health (blue background – left corner)
- Special Hazard (white background – lower corner)

Note: Numerals 0, 1, 2, 3 and 4 are used in the Flammability, Reactivity and Health hazard-rating areas with 0 representing no significant hazard of the particular type, and 4 representing a very serious hazard of that type. When appropriate a symbol representing special hazard (water reactive = \( \mathcal{W} \), Oxidizer = OX, Asphyxiant Gas = SA) is placed in the lower corner of the diamond.
NIOSH: National Institute of Occupational Safety and Health of the Public Health Service, U.S. Department of Health and Human Services (DHHS); federal agency that tests and certifies respiratory protective devices, recommends occupational exposure limits for various substances (RELS), and assists OSHA and MSHA in occupational health investigations and research.

NTP (National Toxicology Program): Federal activity overseen by the Department of Health and Human Services with resources from the National Institutes of Health, the Food and Drug Administration, and the Centers for Disease Control. Its goals are to develop tests useful for public health regulations to toxic chemicals, to develop toxicological profiles of materials, to faster testing of materials, and to communicate the results for use by others.

Organic Peroxide: See Reactive Material.

OSHA (Occupational Safety and Health Administration of the U.S. Department of Labor): federal agency with safety and health regulatory and enforcement authorities for most U.S. industry and business.

Oxidizer: A solid or liquid chemical, other than a blasting agent or explosive, while in itself not necessarily combustible, may generally by yielding oxygen, cause or contribute to, the combustion of other material.

PEL (Permissible Exposure Limit): Permissible exposure limits for the workplace, set by regulation and enforced by OSHA. Most of these limit values were originally set by consensus, because the ACGIH wanted to assist industrial hygienists in implementing exposure control programs. As law, these are listed in 29 CFR 1910.1000 and subject to revision through the regulatory process.

Poison: Any substance that, when ingested, inhaled, or absorbed, or when applied to, injected into, or developed within the body by its chemical action may cause damage to structure or disturbance of function.

Pyrophoric: A chemical substance or mixture that will ignite spontaneously in dry or moist air at or below 130 °F (54.4 °C).

Reactive Material: Chemical substance or mixture that may vigorously polymerize, decompose, condense or become self-reactive under conditions of shock, pressure or temperature and includes a chemical substance or mixture that falls within any of the following categories:

- **Explosive Material**: A chemical substance or mixture that causes sudden, almost instantaneous release of pressure, gas and heat when subjected to sudden shock, pressure or high temperature.
- **Organic Peroxide**: An organic compound that contains the bivalent -O-O- structural derivative of hydrogen peroxide where one or both of the hydrogen atoms have been replaced by an organic radical. As a class, they are low-power explosives, hazardous because of their extreme sensitivity to shock, or other forms of accidental ignition.
- **Pressure-Generating Material**: A chemical substance or mixture which may spontaneously polymerize, with an increase in pressure unless protected by the addition of an inhibitor, or by refrigeration or other thermal control; may decompose to release gas in its container; or comprises the contents of self-pressurized container.
- **Water Reactive**: A chemical substance or mixture that reacts with water to release heat or gases, fumes, or vapors that are flammable, toxic or explosive.

Reproductive Toxicity: Any substance or mixture that includes adverse effects on the sexual function and fertility in adult males and females (mutagenesis), as well as developmental toxicity in the offspring (teratogenesis). (Category: 1A, 1B, 2, Effects on or via lactation)

RTECS (Registry of Toxic Effects of Chemical Substances): Presents basic toxicity data on thousands of materials published by NIOSH. Its objective is to identify known toxic substances and refer to the original studies.

Sensitizer:

- **Respiratory Sensitizer**: A substance that will lead to hypersensitivity of the airways following inhalation of the substance. (Category: 1A, 1B)

- **Skin Sensitizer**: A substance that will lead to an allergic response following skin contact. (Category: 1A, 1B).

Serious Eye Damage: is the production of tissue damage in the eye or physical decay of vision, following application of a test substance to the anterior surface of the eye, which is not fully reversible within 21 days of application. (Category: 1)

Spore Vial: Sealed glass ampoules used as a biological indicator for saturated steam sterilization cycles in order to determine that adequate decontamination or sterilization of materials has been achieved. The sealed ampoules contain suspensions of spores of *Bacillus stearothermophilus* in culture medium containing bromcresol purple as an indicator.

STEL (Short Term Exposure Limit): OSHA established maximum concentration to which workers can be exposed for periods up to 15 minutes. Such exposures should be limited to no more than four per day with periods of at least 60 minutes each between exposures; the total time-weighted exposure per day should not exceed the PEL value.
**Teratogen**: Chemical that has been demonstrated to cause physical defects in the developing embryo. (Now listed as Reproductive Toxin under GHS).

**TLV-TWA** (Threshold Limit Value-Time Weighted Average): The threshold limit value established by the ACGIH: The time-weighted average concentration for a normal 8-hour workday or 40-hour workweek to which nearly all workers may be repeatedly exposed, day after day, without adverse effect.

**UEL** (Upper explosive limit): the concentration (percent by volume) of the vapor in air above which a flame is not propagated when an ignition source is present. Above this concentration, the mixture is too rich to burn.

**Vapor**: Gaseous form of a substance or mixture released from its liquid or solid state (e.g. water vapor, gasoline).

**Volatility**: The tendency of a solid or liquid material to pass into the vapor state at a given temperature. Specifically, volatility is the vapor pressure of a component divided by its mole fraction in the liquid or solid phase.

**Water Reactive**: See Reactive Material.
Appendix I: Sources of Additional Safety Information
American Conference of Governmental Industrial Hygienists
1330 Kemper Meadow Drive
Cincinnati, OH 45240
Phone: (513) 742-2020
www.acgih.org

American Society of Safety Engineers
1800 E. Oakton Street
Des Plaines, IL 60018
Phone: (847) 699-2929
www.asse.org

American Industrial Hygiene Association
3141 Fairview Park Drive, Suite 777
Falls Church, VA 22042
Phone: (703) 849-8888
www.aiha.org

Campus Safety Health and Environmental Management Association
One City Centre, Suite 204
120 West Seventh Street
Bloomington IN 47404
Phone: (812) 245-8084
www.cshema.org

Centers for Disease Control and Prevention
1600 Clifton Road
Atlanta, GA 30333
Phone: (800) 232-4636
www.cdc.gov

Chemical Abstracts Service
P.O. Box 3012
Columbus, OH 43210
Phone: (800) 848-6538
www.cas.org

American Chemical Society
1155 16th Street, NW
Washington, DC 20036
Phone: (800) 227-5558
www.acs.org

National Fire Protection Association
1 Batterymarch Park
Quincy, MA 02169
Phone: (617) 770-3000
www.nfpa.org

National Institute for Occupational Safety and Health
395 E. Street, SW, Suite 9200
Washington, DC 20201
Phone: (202) 245-0625
www.cdc.gov/niosh

National Safety Council
1121 Spring Lake Drive
Itasca, IL 60143
Phone: (630) 285-1121
www.nsc.org

Occupational Safety and Health Administration
200 Constitution Avenue
Washington, DC 20210
Phone: (800) 321-6742
www.osha.gov

U.S. Environmental Protection Agency
1200 Pennsylvania Ave., NW
Washington, DC 20460
Phone: (202) 382-4700
www.epa.gov

Compressed Gas Association
14501 George Carter Way, Suite 103
Chantilly, VA 20151
Phone: (703) 788-2700
www.cganet.com

Sigma-Aldrich Tech. Services
P.O. Box 14508
St. Louis, MO 63178
Phone: (800) 325-5832
www.sigmaaldrich.com
U.S. Department of Health and Human Services
200 Independence Avenue, SW
Washington, DC 20201
Phone: (877) 696-6775
www.hhs.gov

Fisher Scientific
300 Industry Drive
Pittsburgh, PA 15275
Phone: (800) 766-7000
www.fishersci.com

Department of General Services
Division of Consolidated Laboratory Services
600 North 5th Street
Richmond, VA 23219
Phone: (804) 648-4480
www.dgs.state.va.us/

National Animal Disease Center
U.S. Department of Agriculture
P.O. Box 70 – 1920 Dayton Ave.
Ames, IA 50010
Phone: (202) 720-3656
ars.usda.gov

Merck Publishing Group
Merck and Co. Inc.
P.O. Box 2000 RY34-A426
Rahway, NJ 07065
Phone: (732) 594-4600
www.merkbooks.com

Virginia Occupational Safety and Health Administration
Interstate Corporate Center, Building 6
6363 Center Drive, Suite 101
Norfolk, VA 23502
Phone: (757-455-0891
www.doli.virginia.gov

Virginia Department of Environmental Quality
5636 Southern Blvd.
Virginia Beach, VA 23462
Phone: (757) 518-2000
www.deq.virginia.gov
Appendix J: GHS Pictograms/Hazard Ratings
<table>
<thead>
<tr>
<th>Health Hazard</th>
<th>Flame</th>
<th>Exclamation Mark</th>
</tr>
</thead>
<tbody>
<tr>
<td>- Carcinogen</td>
<td>- Flammables</td>
<td>- Irritant (skin and eye)</td>
</tr>
<tr>
<td>- Mutagenicity</td>
<td>- Pyrophorics</td>
<td>- Skin Sensitizer</td>
</tr>
<tr>
<td>- Reproductive Toxicity</td>
<td>- Self-Heating</td>
<td>- Acute Toxicity</td>
</tr>
<tr>
<td>- Respiratory Sensitizer</td>
<td>- Emits Flammable Gas</td>
<td>- Narcotic Effects</td>
</tr>
<tr>
<td>- Target Organ Toxicity</td>
<td>- Self-Re actives</td>
<td>- Respiratory Tract</td>
</tr>
<tr>
<td>- Aspiration Toxicity</td>
<td>- Organic Peroxides</td>
<td>- Irritant</td>
</tr>
<tr>
<td></td>
<td></td>
<td>- Hazardous to Ozone Layer (Non-Mandatory)</td>
</tr>
<tr>
<td><strong>Gas Cylinder</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td>- Gases Under Pressure</td>
<td>- Skin Corrosion/Burns</td>
<td>- Explosives</td>
</tr>
<tr>
<td></td>
<td>- Eye Damage</td>
<td>- Self-Re actives</td>
</tr>
<tr>
<td></td>
<td>- Corrosive to Metals</td>
<td>- Organic Peroxides</td>
</tr>
<tr>
<td><strong>Flame Over Circle</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td>- Oxidizers</td>
<td></td>
<td>- Acute Toxicity (fatal or toxic)</td>
</tr>
<tr>
<td></td>
<td>(Non-Mandatory)</td>
<td></td>
</tr>
<tr>
<td></td>
<td>- Aquatic Toxicity</td>
<td></td>
</tr>
</tbody>
</table>
Hazard Category Ratings through GHS

Be aware of the fact that a significant change has occurred with respect to hazard ratings under GHS. Numeric hazard ratings in GHS are the OPPOSITE of what they were with the Hazardous Materials Identification System (HMIS) and the National Fire Protection Agency (NFPA). Now, the lower the rating, the higher the hazard! The numeric hazard ratings for a chemical will be included on the SDS. In most cases, this should be found in the Hazards Identification section, section 2.
Appendix K: Chemical Storage Requirements
## Stanford University Compatible Storage Group Classification System

Should be used in conjunction with specific storage conditions taken from the manufacturer's label and MSDS.

### STORAGE GROUPS

Store chemicals in separate secondary containment and cabinets

<p>| | |</p>
<table>
<thead>
<tr>
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<tbody>
<tr>
<td><strong>A</strong></td>
<td>Compatible Organic Bases</td>
</tr>
<tr>
<td><strong>B</strong></td>
<td>Compatible Pyrophoric &amp; Water Reactive Materials</td>
</tr>
<tr>
<td><strong>C</strong></td>
<td>Compatible Inorganic Bases</td>
</tr>
<tr>
<td><strong>D</strong></td>
<td>Compatible Organic Acids</td>
</tr>
<tr>
<td><strong>E</strong></td>
<td>Compatible Oxidizers including Peroxides</td>
</tr>
<tr>
<td><strong>F</strong></td>
<td>Compatible Inorganic Acids not Including Oxidizers or Combustible</td>
</tr>
<tr>
<td><strong>G</strong></td>
<td>Not Intrinsically Reactive or Flammable or Combustible</td>
</tr>
<tr>
<td><strong>J</strong></td>
<td>Poison Compressed Gases</td>
</tr>
<tr>
<td><strong>K</strong></td>
<td>Compatible Explosive or other highly Unstable Material</td>
</tr>
<tr>
<td><strong>L</strong></td>
<td>Non-Reactive Flammable and Combustible, including solvents</td>
</tr>
<tr>
<td><strong>X</strong></td>
<td>Incompatible with ALL other storage groups</td>
</tr>
</tbody>
</table>

*Storage Groups J, K and X: Consult EHS Department For specific storage - consult manufacturer’s MSDS

If space does not allow Storage Groups to be kept in separate cabinets the following scheme can be used with extra care taken to provide stable, uncrowded, and carefully monitored conditions.

Storage Group X must be segregated from all other chemicals.

Storage Group B is not compatible with any other storage group.
<table>
<thead>
<tr>
<th>Code</th>
<th>Storage Groups</th>
<th>Examples</th>
</tr>
</thead>
<tbody>
<tr>
<td>A</td>
<td>Compatible Organic Bases</td>
<td>• BIS TRIS</td>
</tr>
<tr>
<td></td>
<td></td>
<td>• Diethylamine</td>
</tr>
<tr>
<td></td>
<td></td>
<td>• Imidazole</td>
</tr>
<tr>
<td></td>
<td></td>
<td>• Triethanolamine</td>
</tr>
<tr>
<td>B</td>
<td>Compatible Pyrophoric and Water Reactive Materials</td>
<td>• Tert-Butyllithium</td>
</tr>
<tr>
<td></td>
<td></td>
<td>• Sodium Borohydride</td>
</tr>
<tr>
<td>C</td>
<td>Compatible Inorganic Bases</td>
<td>• Sodium Hydroxide</td>
</tr>
<tr>
<td></td>
<td></td>
<td>• Ammonium Hydroxide</td>
</tr>
<tr>
<td>D</td>
<td>Compatible Organic Acids</td>
<td>• Acetic Acid</td>
</tr>
<tr>
<td></td>
<td></td>
<td>• Maleic Acid</td>
</tr>
<tr>
<td>E</td>
<td>Compatible Oxidizers including Peroxides</td>
<td>• Nitric Acid</td>
</tr>
<tr>
<td></td>
<td></td>
<td>• Periodic Acid</td>
</tr>
<tr>
<td></td>
<td></td>
<td>• Perchloric Acid</td>
</tr>
<tr>
<td></td>
<td></td>
<td>• Potassium Permanganate</td>
</tr>
<tr>
<td>F</td>
<td>Compatible Inorganic Acids not including Oxidizers or Combustibles</td>
<td>• Phosphoric Acid</td>
</tr>
<tr>
<td></td>
<td></td>
<td>• Hydrochloric Acid</td>
</tr>
<tr>
<td></td>
<td></td>
<td>• Sulfuric Acid</td>
</tr>
<tr>
<td>G</td>
<td>Not Intrinsically Reactive or Flammable or Combustible</td>
<td>• Acrylamide</td>
</tr>
<tr>
<td></td>
<td></td>
<td>• Sodium Bisulfate</td>
</tr>
<tr>
<td></td>
<td></td>
<td>• Coomassie Blue</td>
</tr>
<tr>
<td></td>
<td></td>
<td>• Sodium Chloride</td>
</tr>
<tr>
<td>J</td>
<td>Poison Compressed Gases</td>
<td>• Ethylene Oxide</td>
</tr>
<tr>
<td></td>
<td></td>
<td>• Sulfur Dioxide</td>
</tr>
<tr>
<td>K</td>
<td>Compatible Explosive or other highly unstable materials</td>
<td>• Picric Acid, Dry</td>
</tr>
<tr>
<td></td>
<td></td>
<td>• Tetrazole</td>
</tr>
<tr>
<td></td>
<td></td>
<td>• Ammonium Permanganate</td>
</tr>
<tr>
<td>L</td>
<td>Non-Reactive Flammables and Combustibles, including solvents</td>
<td>• 1-Butanol</td>
</tr>
<tr>
<td></td>
<td></td>
<td>• 1-Propanol</td>
</tr>
<tr>
<td></td>
<td></td>
<td>• Acetic Anhydride</td>
</tr>
<tr>
<td></td>
<td></td>
<td>• Acrolein</td>
</tr>
<tr>
<td></td>
<td></td>
<td>• Formamide</td>
</tr>
<tr>
<td></td>
<td></td>
<td>• Sigmacote</td>
</tr>
<tr>
<td>X</td>
<td>Incompatible with All Other Storage Groups</td>
<td>• Sodium Azide</td>
</tr>
<tr>
<td></td>
<td></td>
<td>• Picric Acid, Moist</td>
</tr>
<tr>
<td></td>
<td></td>
<td>• Arsine</td>
</tr>
</tbody>
</table>
Appendix L: Chemical Inventory: ChemTracker Information
Overview
Eastern Virginia Medical School requires all laboratories to maintain an inventory of all chemicals and report annually on the types, quantities and locations where these chemicals are being stored and used. The chemical inventory must be submitted to Environmental Health and Safety (EH&S) on an annual basis. EH&S will compile all the annual chemical inventory reports and submit the reports to the appropriate Federal, state, and local government agencies as part of the Community Right-to-Know Program. EH&S will perform a Security Vulnerability Assessment as part of the Department of Homeland Security Chemical Facility Anti-Terrorism Standards. To facilitate this inventory process, EVMS has implemented the ChemTracker (CT) Chemical Inventory System.

ChemTracker is a web-based inventory system for chemical management within research laboratories and facilities. Authorized ChemTracker users may update chemical inventory information, prepare reports, and obtain chemical safety information. ChemTracker also allows users to:

- Track all chemicals by location, owner, container, and among other criteria
- Link directly to Safety Data Sheets and additional safety information
- Look up hazard, toxicological, and physical references
- Identify specific chemical containers by unique barcode
- Save money and space by reducing or eliminating unnecessary purchases
- List chemicals in surplus and search for other surplus chemicals
- Increase efficiency by making chemicals easier to locate in storage and location groups
- Identify chemicals with specific shelf life and storage requirements

Applicability
Chemical inventories must be maintained in ChemTracker and updated regularly to reflect the typical quantities of chemicals present in that area. For example, if an area typically maintains approximately four 4-liter bottles of ethanol, the four bottles would be entered into ChemTracker. The inventory does not need to reflect the routine inventory fluctuations associated with general use and re-ordering.

Responsibilities
Environmental Health and Safety (EH&S) maintains the user and chemical owner accounts in ChemTracker; audits the chemical inventory data; prepares and submits chemical inventories to appropriate government agencies; and provides assistance and training on the use of ChemTracker.

Principal Investigators: Ensure a chemical inventory for their area(s) is (are) maintained and updated in the ChemTracker database; informs EH&S on changes in staff to be added or removed from ChemTracker.

Chemical User: Add and delete chemicals on a regular basis for your Principal Investigator. Audit chemical inventory annually and search for chemical hazards and SDS as needed.

Exclusions
Chemicals/materials that are excluded from inventorying are:
- Licensed Radioactive materials
- Biological/Biohazardous Materials (e.g., enzymes, antibodies, custom DNA / RNA sequences)
- FDA-approved drugs and medications
- Any consumer products in the same form and concentration that are used in the workplace in the same manner as normal consumer use and the use results in a duration and frequency of exposure which is not greater than exposures experienced by consumer (e.g., household bleach, dishwashing detergent, vinegar, et al.)
- Working solutions (materials that will be used or disposed within the day)
- Growth Media and Non-hazardous Buffers

**Procedures for Maintaining a Chemical Inventory**

1. **ROLES AND ACCESS RIGHTS**

Due to confidentiality and security issues, a user’s access is restricted according to their access category. The authorization levels allow users of different needs to access only the information and tools necessary to perform their daily responsibilities. Individual access rights can be added or removed at any time upon request by the chemical owner. Listed below are the ChemTracker access categories and associated access rights.

<table>
<thead>
<tr>
<th>ChemTracker Access Category</th>
<th>Access Rights</th>
</tr>
</thead>
<tbody>
<tr>
<td>Department Administrators</td>
<td>• Review chemical inventory for all Chemical Owners within their Department</td>
</tr>
<tr>
<td></td>
<td>• Identify available chemical stocks for departmental use</td>
</tr>
<tr>
<td></td>
<td>• Look-up specific chemical information (e.g., SDS, molecular structure)</td>
</tr>
<tr>
<td>Chemical Owners</td>
<td>• Chemicals assigned to chemical owners</td>
</tr>
<tr>
<td></td>
<td>• Add, modify, and delete chemical inventory</td>
</tr>
<tr>
<td></td>
<td>• Review chemical inventory (entire inventory or storage area)</td>
</tr>
<tr>
<td></td>
<td>• Look-up specific chemical information (e.g., SDS, molecular structure)</td>
</tr>
<tr>
<td>Managers or Senior Staff</td>
<td>• Add, modify, and delete chemical inventory for assigned Chemical Owner</td>
</tr>
<tr>
<td></td>
<td>• Review chemical inventory (entire inventory or storage area)</td>
</tr>
<tr>
<td></td>
<td>• Look-up specific chemical information (e.g., SDS, molecular structure)</td>
</tr>
<tr>
<td>General Staff</td>
<td>• Review chemical inventory (entire inventory or storage area)</td>
</tr>
<tr>
<td></td>
<td>• Look-up specific chemical information (e.g., SDS, molecular structure)</td>
</tr>
</tbody>
</table>
2. NEW CHEMICAL OWNERS AND USERS
All new chemical owner and user accounts must be created by EH&S before accessing ChemTracker utilizing the following steps:
   a. Chemical Owner or designated Laboratory Safety Coordinator submits an email to EH&S at ehs@evms.edu
   b. Users will receive a unique ChemTracker username (e.g., Novel user name when available) and temporary password via e-mail.
   c. To login into ChemTracker, go to http://chemtracker.stanford.edu/members/, Click CT V4 by Eastern Virginia Medical School, and then enter the username and password to access the inventory.

3. CHEMTRACKER INFORMATION AND TRAINING
EH&S is available to provide help and individual training on ChemTracker upon request. Additional training materials are provided within ChemTracker through Stanford University by clicking the Help button. Two PDF handouts are posted on the help page. The links are also provided in your username and password email.

4. CHEMICAL INVENTORY INFORMATION
The information in ChemTracker is utilized to comply with all Federal chemical inventory annual reporting requirements. Therefore, when entering a chemical into ChemTracker, the information must include, at a minimum:
   • Owner ____________ The name of the Principal Investigator/chemical owner.
   • Department ________ The primary department name for the PI(s).
   • Building ___________ The building where the chemicals are located.
   • Room _____________ The room number where the chemicals are physically located.
   • Chemical Name _____ Enter the full chemical name of each hazardous chemical.
   • Physical State ______ Physical state (solid, liquid, gas) of the chemical being entered.
   • Container Count ____ The number of containers (of the same chemical and size) added.
   • Amount ___________ Enter the numerical value of the container’s volume or weight.
   • Unit ______________ Enter the correlating unit of measure for volume or weight.

Notes: Each entry represents one container.

5. ADD CHEMICALS TO INVENTORY
1. Click on the “Add” tab at the top of the main page to open the Add Inventory page.
   a. Valid information must be entered in the nine required fields indicated by the shaded box on the top portion of the page for the system to accept a record. Additional information can be added to the other field names below this box to allow for more details.
2. Click on the “Owner” arrow on the right. Enter two characters and select your PI’s name from the list to accept.
3. Click on the “Department” arrow on the right. Enter three characters and select your department from the list to accept.
4. Click on the “Building” arrow on the right. Enter two characters and select your building’s name from the list to accept.
5. Click on the “Room” arrow on the right. Select your room from the list to accept.
TIP 1: If the manufacturer’s product number is contained within Stanford’s Reference Database, the chemical name and physical state (among many other fields) will be filled in automatically. You are strongly encouraged, but not required, to include the product number. Select the appropriate size and jump to step 11.

6. If you do not enter the product number, enter the first three characters of the chemical in the “Chemical Name” field. Click the magnifying glass to run your query. Scroll down the list and click your selection to accept.
7. Click on the 'Physical State' arrow on the right. Select solid, liquid, or gas to accept.
8. Click on the “Amount” text box and enter in the numerical amount of product. Do not include units in this field.
9. Click on the “Units” arrow on the right. Click the appropriate units to accept.
10. Enter the number of containers you would like to enter of the same material and size in the “Container Count” field.
11. If you know the storage location, manufacturer and product number/barcode, CAS number and chemical formula, type this information into the appropriate fields if you did not (or could not) enter the product number.
12. Click on the “Add Inventory” button to save this chemical to your inventory.

TIP 2: For future ease in data entry, enter data for your Chemical owner, department, building and room and click on “Save as Add Template” at the bottom of the “Add Inventory” page. This will keep these values filled and you will not have to enter them each time. To load the saved template, click on “Access Add Inventory Templates” at the “Add Inventory” page and pick the saved template that you want to use.

6. **SEARCH AND DELETE CHEMICALS FROM INVENTORY**

Individual chemical records can be retrieved, edited and deleted from one location.

1. Click the Search tab at the top of the main page. The Search page will appear.

2. Enter at least one criterion to perform the query.

3. Enter the criteria in the field(s) and click the Search button at the bottom of the page. Your chemical inventory should appear within a short period.

4. The total number of items for that chemical appears in column 2; Chemical name appears alphabetically in column 9.

5. Scroll down to search for the desired chemical and click on it.

6. Click on the Details button (or the arrow and click “details for all data”) to show one (or all) chemical details. The Details page will appear.

7. To delete the chemical, select the chemical to be removed.
   a. To remove chemicals scattered on the page click to select the chemicals to be removed
   b. To remove all of the chemicals listed, click on the arrow next to the delete button

8. Click the Delete button (or ‘delete all’ button).

9. Please confirm that you wish to delete the selected chemicals.
7. **EDIT CHEMICALS PRESENT IN INVENTORY**

Starting from the search window (Section 6 - Searching and Deleting Chemicals, Step 5):

1. Scroll down to search for the desired entry and click on it.
2. Click on the Details button (or the arrow and click “details for all data”) to show one (or all) chemical details. The Details page will appear.
3. Scroll down to search for the desired entry and click on it.
4. Click the Modify button to change that chemical. Make the changes to the entry.
5. Click the “Save” link in the first column to save the changes or click “Cancel” to return without changing.

8. **OBTAIN SAFETY INFORMATION**

When you select a chemical, you may choose any of the following buttons to obtain additional safety information:

- ChemInfo – provides a brief synopsis of chemical information.
- SDS – will take you to a page to obtain an SDS.

9. **PERFORM AN AUDIT**

To complete the annual inventory, complete an audit by preforming these steps: (not implemented as of yet)

1. At the “Welcome to ChemTracker” screen, click the Search tab enter a search criterion.
2. Click on the Search button.
3. The total number of items for that chemical appears in column 2; Chemical name appears alphabetically in column 9.
4. Click the arrow next to the Details button and click on “Details for all data” to show all data.
5. The details for all chemicals will appear.
6. Physically find the chemical in your lab. Scroll down your inventory list to find the matching record. Click on that record.
7. Click the “Touch” button. This changes the Modified Date to today. Separate this chemical from the non-audited.
8. Repeat Steps 6 and 7 for all chemicals physically present.
9. For all chemicals physically present but not in the inventory, add the chemicals in the “Add” tab. (See Section 5).
10. Perform a search again and scroll to the right of the Inventory details page. Find the Modified column.
11. Click on the column title to sort the inventory by the date modified.
12. The chemicals are now listed in ascending order.
13. Click on the first chemical that was modified before today’s date. Click the “Delete” button and click Yes.
14. Repeat step 13 for all chemicals modified before today’s date.
15. Send an email to ehs@evms.edu stating you have completed these steps and fulfilled your annual inventory report.
10. PRINT INVENTORY
   1. Complete a Query (See: Section Number 6). Stop at direction number 5.
   2. For the Summary of all chemicals, click on the arrow next to the download button. Skip to step number 4.
   3. For the Details (and all information recorded on the chemicals for your lab), click on the arrow next to the Details button. Then click on “Details for all data” button. Click on the arrow next to the Download button.
   4. Click on “Download all data”. You will be presented with an Excel Spreadsheet.
   5. Hide and widen (or shrink) the columns to see more data and to fit.
   6. Print the Inventory.