ABBREVIATION LIST.........................................................................................................................3

STANDARD OPERATING PROCEDURES.................................................................................................4

RESPONSIBILITY FOR SAFETY..............................................................................................................4

BASIC RULES AND PROCEDURES FOR WORKING WITH CHEMICALS: WEB INFORMATION (ADDED INSERT)..........................................................................................................................4

DISTRIBUTION OF CHEMICALS TO OR FROM THE LABORATORY..............................................................5

CHEMICAL EXPOSURE HEALTH-UNIVERSITY RESPONSIBILITIES:.....................................................5

EXPOSURE DETERMINATION....................................................................................................................5

MEDICAL CONSULTATION AND EXAMINATIONS..............................................................................6-7

INFORMATION AND TRAINING..............................................................................................................8

PERSONAL PROTECTION DEVICES.....................................................................................................9

VENTILATION AND CHEMICAL HOODS...............................................................................................9

GENERAL GUIDELINES FOR WASTE DISPOSAL...................................................................................9

DISPOSAL OF SOLID AND LIQUID CHEMICAL WASTES.......................................................................9

DISPOSAL OF ESPECIALLY HAZARDOUS WASTES...............................................................................10

INFECTIOUS WASTE MANAGEMENT PLAN......................................................................................10

RADIOACTIVE WASTES..........................................................................................................................10

EXPERIMENTATION REQUIRING REGISTRATION, DOCUMENTATION OR UNIVERSITY APPROVAL.................................................................................................................................10
<table>
<thead>
<tr>
<th>Abbreviation</th>
<th>Full Form</th>
</tr>
</thead>
<tbody>
<tr>
<td>ANSI</td>
<td>American National Standards Institute</td>
</tr>
<tr>
<td>CHO</td>
<td>Chemical Hygiene Officer</td>
</tr>
<tr>
<td>CHP</td>
<td>Chemical Hygiene Plan</td>
</tr>
<tr>
<td>dBA</td>
<td>Decibels</td>
</tr>
<tr>
<td>DOT</td>
<td>Department of Transportation</td>
</tr>
<tr>
<td>ESE</td>
<td>Environmental Science and Engineering (Dow building)</td>
</tr>
<tr>
<td>FM</td>
<td>Factory Mutual</td>
</tr>
<tr>
<td>GHS</td>
<td>Globally Harmonized System</td>
</tr>
<tr>
<td>GLRC</td>
<td>Great Lakes Research Center (building)</td>
</tr>
<tr>
<td>IDLH</td>
<td>Immediate Danger to Life or Health</td>
</tr>
<tr>
<td>LSO</td>
<td>Laser Safety Officer</td>
</tr>
<tr>
<td>MEEM</td>
<td>Mechanical Engineering-Engineering Mechanics (building)</td>
</tr>
<tr>
<td>MIOSHA</td>
<td>Michigan Occupational Safety and Health Administration (state)</td>
</tr>
<tr>
<td>MSDS</td>
<td>Material Safety Data Sheet (see SDS)</td>
</tr>
<tr>
<td>MTU</td>
<td>Michigan Technological University</td>
</tr>
<tr>
<td>NRC</td>
<td>Nuclear Regulatory Commission</td>
</tr>
<tr>
<td>OSHA</td>
<td>Occupational Safety and Health Administration (federal)</td>
</tr>
<tr>
<td>OSHS</td>
<td>Occupational Safety and Health Services (university)</td>
</tr>
<tr>
<td>PEL</td>
<td>Permissible Exposure Limits</td>
</tr>
<tr>
<td>PPE</td>
<td>Personal Protection Equipment</td>
</tr>
<tr>
<td>ppm</td>
<td>Part Per Million</td>
</tr>
<tr>
<td>PSPS</td>
<td>Public Safety and Police Services (university)</td>
</tr>
<tr>
<td>RSO</td>
<td>Radiation Safety Officer</td>
</tr>
<tr>
<td>SDS</td>
<td>Safety Data Sheets (new GHS designation)</td>
</tr>
<tr>
<td>SOP</td>
<td>Standard Operating Procedures</td>
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<tr>
<td>TLV</td>
<td>Threshold Limit Value</td>
</tr>
<tr>
<td>UL</td>
<td>Underwriters Laboratory</td>
</tr>
<tr>
<td>USDA</td>
<td>United States Department of Agriculture</td>
</tr>
</tbody>
</table>
STANDARD OPERATING PROCEDURES

Standard Operating Procedures (SOP’s) are specific procedures for a specific task or experiment that involves hazardous chemicals. Per MTU regulations and outlined in section 10 of the University Safety Manual.

Written SOP’s must include:

1. List of chemicals in use.
2. Required Personal Protective Equipment (PPE’s).
3. Safe working procedures.

SOP’s also should address:

4. Spill response.
5. Waste disposal.

RESPONSIBILITY FOR SAFETY

Policies and Procedures are outlined in the University Safety Manual and the Department of Biological Sciences Safety Manual.

See the Department’s web page for on-line versions of these manuals.

BASIC RULES AND PROCEDURES FOR WORKING WITH CHEMICALS

Before starting any work with chemicals, consult the appropriate Standard Operating Procedure (SOP) for specific protection and handling the associated chemicals. If a SOP is not available for specific procedure, consult with your supervisor prior to beginning the procedure.

When working with chemicals and/or in a lab that contains chemicals refer to the following guidelines as excerpted from the Department of Consumer and Industry Services, Director’s Office, Occupational Health Standards. Part 431. Hazardous Work in Laboratories:

DISTRIBUTION OF CHEMICALS TO OR FROM THE LABORATORY

When hazardous chemicals are hand carried, place the container in a secondary container or acid-carrying bucket to protect against breakage and spillage. If a wheeled cart is used, it should be stable under the load and have wheels that are large enough to handle uneven surfaces without tipping over or stopping suddenly. If small quantities of flammable liquids must be moved, use rugged pressure-resistant, non-venting containers, and eliminate potential ignition sources.

CHEMICAL EXPOSURE HEALTH-UNIVERSITY RESPONSIBILITIES

EXPOSURE DETERMINATION

Regular, routine monitoring of the airborne concentrations of a variety of different toxic materials is generally not required, as long as care is taken to ensure that:

(1) the laboratory workers are following good hygiene and laboratory safety practices;
(2) the ventilation system (including the hood) is performing and is being used properly; and
(3) the laboratory workers are using proper protective equipment and clothing.

However, there are situations where monitoring of individual compounds is appropriate or required (The Chemical Hygiene Officer or OSHS should be contacted to determine when exposure monitoring is necessary or appropriate):

In testing or redesigning hoods and other ventilation devices in the laboratory, air-sampling procedures may be helpful in the evaluation of the new ventilation situation.

If a specific substance is highly toxic and regularly and continuously used in the laboratory, instrumental monitoring of that substance may be appropriate. This is especially true if a relatively large amount of the material is being stored or used in the laboratory.

Measurement of employees’ exposure to any substance regulated by a standard which requires monitoring is necessary if there is reason to believe that exposure levels for that substance routinely exceed the action level for that substance (or, in the absence of an action level, the Permissible Exposure Limit). If this monitoring indicates exposure over the action level or PEL, then the employer must immediately comply with the monitoring provisions of the relevant standard. The University will notify employees of the results of any monitoring procedures. This notification will be in writing, within 15 days of the receipt of the monitoring.
MEDICAL CONSULTATION AND EXAMINATIONS

The Chemical Hygiene Plan provides the opportunity, under certain circumstances, for all employees who work with hazardous chemicals to receive medical attention, including any follow-up examinations which the examining doctor feels is necessary. It is university policy to promptly investigate all incidents to determine risk of employee over exposure to the toxic substances in their workplace. There should be a medical consultation whenever there is reason to believe an employee has been over exposed to a hazardous chemical. All medical examinations and consultations must be performed by, or under the direct supervision of, a licensed physician, at no cost to the employee, without loss of pay and at a reasonable time and place.

Some examples of circumstances that would indicate the possibility of exposure are:

The employee had direct skin or eye contact with any chemical which has a PEL or TLV below the odor threshold;

Odor was noticed if the employee was working with any chemical which has a PEL or TLV below the odor activity level;

The employee is experiencing health hazard symptoms such as headache, rash, nausea, coughing tearing, irritation or redness of eyes, irritation of nose or throat, dizziness, loss of motor dexterity or judgment which resemble drunkenness, etc.;

Some or all of the symptoms disappear when the employee is taken away from the chemical area again;

Symptoms previously reported reappear soon after the employee starts working with chemicals again;

Reported problems are received from more than one person in the same work area;

When exposure monitoring reveals an exposure level routinely above the action level (or PEL in the absence of an action level); or

Whenever there is a spill, leak, or other release resulting in the likelihood of a hazardous exposure.

The following information must be provided to the physician:

- The identity of the hazardous chemical to which the employee may have been exposed;

- A description of the conditions under which the exposure occurred, including quantitative exposure data, if available; and

- A description of the signs and symptoms of exposure that the employee is experiencing, if any.
The university must obtain a written report from the physician, which includes:

- The results of the medical examination and any associated tests;
- Any recommendations for further medical follow-up;
- Any medical condition revealed which may place the employee at increased risk as a result of a hazardous chemical found in the workplace; and
- A statement that the employee has been informed by the physician of the results of the examination, and any medical condition that may require further examination or treatment.
- The physician's statement should not include findings unrelated to occupational exposure.

It may be appropriate to conduct an "exposure evaluation" when there is a complaint of a possible hazardous exposure. The basic steps of this evaluation are:

1. Interviewing the person initiating the complaint, and the victim, if it is not the same person.
2. Listing the essential information about the circumstances of the complaint, including:
   - Chemical of suspicion;
   - Other chemicals in use by the victim;
   - Other chemicals being used by others in the immediate area;
   - Other chemicals stored in that area;
   - Signs and symptoms being experienced;
   - Were control measures, such as fume hoods and personal protective equipment used and were these control measures functioning properly?
   - Are any air sampling or monitoring devices in place or available?
3. Air sampling of the area for suspect chemicals.
4. Determining how the signs and symptoms being experienced compare with the information on the Material Safety Data Sheets for the chemicals involved.
5. Deciding whether to send the employee for medical evaluation.
6. Review of the present control measures and safety procedures.
INFORMATION AND TRAINING

Information and training is a key part of this Chemical Hygiene Plan. The training and education program must be a regular and on-going activity.

The employees of the laboratory must have the information to ensure that they know and understand the hazards of the chemicals in their work area. This information must be provided at the time of an employee’s initial assignment to a work area where hazardous chemicals are present, and before assignments involving new exposure situations.

Employees must be informed of:

The location, availability and contents of this written Chemical Hygiene Plan.

The location, availability and contents of the "Occupational Exposures to Hazardous Chemicals in Laboratories" OSHA Standard.

Information on the Permissible Exposure Limits (PEL) and Threshold Limit Values (TLV) for applicable OSHA regulated substances or other recommended limits in the absence of an OSHA standard; Signs and symptoms associated with exposures to hazardous chemicals used in the laboratory; The location and availability of standard reference material on the hazards, safe handling, storage and disposal of the hazardous chemicals in the laboratory. The reference material includes, but is not limited to, the Safety Data Sheets from the manufacturers.

The location of the Right-To-Know information, also known as the “Hazard Communication Program.”
PERSONAL PROTECTION DEVICES

See SOP’s for specific protection devices. General guidelines can be found in Sec 5.1 of the University Lab Safety Manual and expanded upon in the Departmental Safety Manual.

VENTILATION AND CHEMICAL HOODS

The department relies on facilities to maintain ventilation systems and perform fume hood maintenance. OSHS performs annual testing for adequate flow.

Specific hood use and other ventilation guidelines of fume hood use is in University Safety Manual 10.2.3.

GENERAL GUIDELINES FOR WASTE DISPOSAL

One principle must always be followed: The disposal method must not harm people or the environment.

Reducing the amount of waste generated will save time and money and reduce environmental impact. Prior to conducting experiments determine possible waste reduction methods such as recycling solvents and running smaller batches. When ordering chemicals it is tempting to order larger quantities to get discounts on bulk orders. However, it potentially stockpiles chemicals which eventually may be disposed of as waste.

Before a worker's employment in the laboratory ends, chemicals for which that person was responsible should be discarded or returned to storage.

DISPOSAL OF SOLID AND LIQUID CHEMICAL WASTES

Place chemical wastes in properly labeled containers, including a listing of what may and may not be put in those containers. The University has an established hazardous and non-hazardous waste disposal system in place – check with your supervisor, OSHS or Chemical Hygiene officers for details.

Do not discharge the following substances to the sewer system: concentrated acids or bases; highly toxic, malodorous, or lachrymatory substances; any substances which might interfere with the biological activity of waste water treatment plants or obstruct the flow; any substances that create fire or explosion hazards or cause structural damage. Check with your supervisor, the Chemical Hygiene Officer or OSHS about local, state, and Federal regulations about waste disposal.
DISPOSAL OF ESPECIALLY HAZARDOUS WASTES

This category includes very toxic substances, strong carcinogens, mutagens, nerve gases, and explosives.

The laboratory supervisor must make the proper arrangements for disposal of these materials. Check with OSHS.

When possible, develop laboratory procedures that produce less hazardous substances.

INFECTIOUS WASTE MANAGEMENT PLAN

The Michigan Department of Public Health requires every generator of infectious waste to develop an Infectious Waste Management Plan. Copies of the plan must be kept by Department Chair.

RADIOACTIVE WASTES

Contact OSHS prior to ordering radioactive materials. Waste disposal is included in the comprehensive radioactive training.

EXPERIMENTATION REQUIRING REGISTRATION, DOCUMENTATION OR UNIVERSITY APPROVAL

Individuals working with the following, and/or laboratories where such work is conducted may require documentation, registration, or approval from University committees. Contact Research Services, before ordering materials or commencing work with Live Vertebrate Animals or Human Subjects. Contact OSHS concerning Radioactive Materials, Recombinant DNA or Living Pathogenic Organism.

This information can be found at: