

Chemical Hygiene

I. INTRODUCTION:

The safe use of chemicals is achieved by an integrated system of policies, regulations and activities which are designed to safeguard the employees, visitors, patients and the community at large from the potential hazards of chemical substances used and/or discharged by the department.

This document defines the policies, regulations and activities of the Chemical Hygiene Program, facets of which include: product selection, vendor selection, inventory, hazard assessment, labeling, storage, information and warning posting, safe use, employee training, handling and transportation, spill procedures, and disposal of hazardous chemical substances.

II. GOALS

- A.** Ensure the safe storage, use and disposal of chemical substances.
- B.** Ensure environmentally responsible storage, use and disposal of chemical substances.
- C.** Reduce the amount (by number, volume and frequency of use) of hazardous chemical substances used and disposed of.
- D.** Comply with local, state and federal regulations concerning storage, use and disposal of hazardous chemical substances and to meet the standards of the Joint Commission on Accreditation of Hospitals.

III. RESPONSIBILITIES:

A. The Departmental Safety Committee shall:

1. Set goals.
2. Design, formulate, monitor, review and modify the Chemical Hygiene Program to ensure that all goals are met.
3. Work with the Chemical Hygiene Officer to direct the implementation of the program.

B. The Departmental Chemical Hygiene Officer (via the laboratory Safety Coordinators) shall:

1. Work with the Administrative Director, Lab Supervisors, Section Directors and employees to develop appropriate, specific Chemical Hygiene policies, regulations and activities.
2. Monitor procurement, use and disposal of chemicals used within the area of responsibility.
3. Prepare reports on program activities as required by the facility or regulator.
4. Instruct and administer training materials to employees.
5. Review exposure monitoring programs.

D. The Laboratory Safety Coordinator and/ or Laboratory Supervisor shall:

1. Maintain inventory and chemical information records, MSDS files, personnel lists and training records.
2. Be responsible for implementation and enforcement of Chemical Hygiene policies, regulations and activities.
3. Participate in the determination of appropriateness and use of personal protective equipment.
4. Actively participate in hazard minimization by seeking alternative (non-hazardous or less hazardous) products, packaging, methodologies, etc.
5. Ensure the proper storage, labeling, use and disposal of chemical substances within the area of responsibility.
6. Complete audits, questionnaires and reports as required by the program.
7. Assign personnel for training and include satisfactory participation in required training activities as prerequisite for satisfactory performance evaluation and merit increase / promotion.
8. Direct employees to seek medical consultation when there is evidence or signs and symptoms of acute or chronic chemical exposure.
9. Direct employees, visitors, patients, vendors, outside contract employees, etc. in the proper storage, use and disposal of chemical substances and wastes in accordance with Chemical Hygiene policies and regulations.

E. The employee shall:

1. Diligently participate in all training and informational activities.
2. Become knowledgeable in the proper storage, labeling, use and disposal of chemical substances encountered in job performance.
3. Observe all posting and warning labels and use protective equipment as specified.
4. Conduct all activities in accordance with established Chemical Hygiene policies and regulations and to participate in all Chemical Hygiene activities.
5. Direct other employees, visitors, patients, vendors, outside contract employees, etc. in the proper safe storage, use and disposal of chemical substances and wastes in accordance with Chemical Hygiene policies and regulations.
6. Report, to the immediate supervisor, any unusual signs or symptoms that might be consistent with acute or chronic chemical exposure.
7. Report, to the immediate supervisor, any defective or leaky containers or equipment (including personal protective equipment) and take steps to minimize the damage and danger of any potentially hazardous situation.
8. Report, to the immediate supervisor, and correct any labeling, storage, use or transportation problems related to chemicals or wastes.

IV. CHEMICAL HYGIENE POLICIES:

A. PRODUCT / METHODOLOGY SELECTION

In consideration of products used and choice of methods of accomplishing tasks, safety and environmental considerations shall be addressed. Carcinogenic and other hazardous compounds and unsafe processes are to be avoided whenever safe alternatives exist. Likewise, mercury and mercury-containing products are to be avoided and eliminated whenever a technically-acceptable alternative can be found.

B. VENDOR / MANUFACTURER SELECTION

In consideration of vendor / manufacturer selection, safe labeling, packaging and hazard communication criteria shall be addressed. Vendors and manufacturers providing inadequate labeling, unsafe packaging (including container size and container material), or inadequate hazard communication (i.e. insufficient or inadequate MSDS information) shall be avoided.

C. QUANTITIES OF HAZARDOUS MATERIALS

Individual quantities (volume) of hazardous materials shall be minimized by prudent inventory control.

D. HAZARDOUS MATERIALS JUSTIFICATION

Use of items, which have been determined to be hazardous, shall be systematically challenged and justification for use documented.

E. HAZARDOUS MATERIAL DISPOSAL

Disposal of hazardous materials shall be reviewed to ensure compliance with local, state and federal guidelines.

V. CHEMICAL HYGIENE REGULATIONS:

A. Material Safety Data Sheets:

Material Safety Data Sheets (MSDS's) are maintained on each hazardous chemical substance used or encountered by employees for which an MSDS is available. The MSDS's are to be kept in accessible locations and should be made immediately available to any and all employees when possible, but must be provided no later than 24 hrs. after the request.

B. Labeling:

All chemical substance containers must be properly labeled as to content, storage conditions and hazard information and warnings. The manufacturer's (or responsible party's) name and address must also appear (note : the above are required by law, of the manufacturer, distributor or supplier). Many areas will require that received date and the opened /in use date must be indicated on the container. This is to be done in a way that does not obscure or deface the label information. Whenever possible, compounds must be kept in the original container but when transferring is necessary, the new container must be labeled appropriately (see examples in appendix). The new label must include content, storage and warning/caution (including hazard codes) information as described by the original label.

The labeling regulation is in addition to and does not supersede any special labeling regulations (i.e. in cases where special labeling is necessary, both labels must be used). Examples: Carcinogens, Formaldehyde.

C. Storage:

All chemical substances must be stored in accordance with manufacturer's recommendations as indicated on the label or the MSDS.

Items marked "Flammable" must be stored in a posted, approved flammable storage cabinet or specially designed flammable storage room. Single containers of one-gallon or less size may be stored in a work area when in use (except for ether). Capacity of storage cabinets must not be exceeded (e.g. more than 50 gal per 5000 sq. ft. of laboratory space.)

Caustics and corrosives must be stored below eye level, in a posted, cool, well ventilated cabinet (preferably near the floor). They may not be stored with flammables. Acids and bases must be stored in separate locations. Organic acids (e.g. acetic acid or acetic anhydride) must be stored separately from strong oxidants (e.g. sulfuric, nitric or perchlorate).

Carcinogens must be stored in a labeled, secure area with restricted access (via supervisory personnel).

Other special storage areas may be designated and used as per specific need or application.

D. Posting:

Special postings are required for:

1. carcinogen storage areas
2. flammable cabinets and rooms
3. caustic / corrosive storage areas
4. other as per specific need or application

E. Personal Protective Equipment:

Personal protective equipment including fume hoods, chemically resistant gloves, eye protection and protective clothing are provided whenever indicated by specific regulations.

F. Safe Use of Chemicals - Universal Precautions:

All chemical substances are to be considered hazardous from the standpoint of:

1. avoidance of skin and mucosal contact by use of personal protective equipment (protective gloves, eyewear, chemically resistant clothing, hoods etc.) in potential contact situations. Good work practices to avoid spillage and accidents are essential to good chemical hygiene, as are clean, well-lighted, well-ventilated and well-organized work spaces.

2. avoidance of ingestion by the use of proper transfer devices (i.e. no mouth siphoning, no mouth pipetting).

3. avoidance of inhalation of dry chemicals, airborne fibers or chemical fumes by working in well-ventilated areas and the use of fume hoods or specially ventilated areas when working with volatile substances. Employ additional special ventilation to outside areas when performing operations such as floor stripping/waxing, painting, or other maintenance activities that promote chemical fumes.

G. Disposal:

All processes resulting in the discharge of hazardous chemical substances must be evaluated to ensure that the discharge meets local, state and federal guidelines. Items which are prohibited from entering the waste stream are collected and stored for removal by an EPA approved hazardous material vendor (e.g. solvents) and or recycler (e.g. silver).

Unused, discontinued stock may be donated to local universities, other facilities (use form EK-720X), returned to the manufacturer or disposed of by approved hazardous material vendor. Disposal is to be documented on the generator/user level for donations and by the Safety Department when a disposal vendor is employed.

I. Carcinogens:

Carcinogens, by category, require additional regulations related to storage (see storage and special posting) and use (see below -Hazard Assessment).

Groups 1 and 2a compound access is limited to designated personnel and is under the direct control of the area supervisor. An employee exposure log is maintained by substance, and includes employee name, date, and length of time of exposure. Carcinogenic compounds are used under fume hoods with protective gloves and clothing. Medical monitoring, on a by substance basis, is performed in accordance with regulations related to the substance.

Group 2b compounds are handled using the universal precautions.

V. CHEMICAL HYGIENE ACTIVITIES

A. INVENTORY OF CHEMICAL SUBSTANCES:

An inventory of chemical substances is maintained by the Safety Coordinator for their area of responsibility. The data recorded includes, but is not limited to: chemical name, manufacturer (supplier), manufacturer (supplier) product number or chemical formula, storage and/or use area, and typical quantity of material on site (quantities are necessary only for hazardous chemical substances).

Hazardous chemical substances are categorized by hazard type via the NFPA (or manufacturer equivalent) system. Carcinogens are indicated and categorized by the World Health Organization system.

The inventory is updated periodically as new items are added and others eliminated and is completely updated once per calendar year (in the fourth fiscal quarter).

B. HAZARD ASSESSMENT:

Contents of each item on the inventory are reviewed against the product MSDS and/or reference materials (below) in order to identify hazards. Items that appear in the documents listed are categorized as hazardous chemical substances. New items are added to the inventory and are assessed in the same manner as they are introduced to the work environment.

1. REFERENCES FOR HAZARD ASSESSMENT:

The product MSDS and/or:

a. Threshold Limit Values and Biological Exposure Indices, American Conference of Governmental Industrial Hygienists, Cincinnati, OH.

b. 29 Code of Federal Regulations (CFR), Part 1910, Subpart Z (Air Contaminants-Permissible Exposure Limits). U.S. Dept. of Labor , Occupational Safety and Health Administration. Washington D.C.

-----For Carcinogen Assessment-----

c. IARC Monographs on the Evaluation of Carcinogenic Risks to Humans (vol. 1- 42) World Health Organization, Albany ,NY.

d. Annual Report on Carcinogens (3rd.), National Toxicology Program, Research Triangle Park, NC.

temperatures and pressures

Shock and heat may detonate	3
May react violently, Violent chemical change, Rapid release of energy	2
Unstable if heated, Unstable at high pressure	1
Stable, Non reactive	0

d. Other Hazard Ratings: (other hazard information may be given on the MSDS - use the following code)

Oxidizer	OXY
Acid	ACID
Alkali	ALK
Corrosive	COR
Use no water	-W-
Radiation Haz.	RAD
Carcinogen rating	Group 1, 2A, 2B or 3

C. MATERIAL SAFETY DATA SHEETS

The material safety data sheet (MSDS) is the primary source of specific chemical information. Manufacturers and suppliers of materials containing significant quantities of hazardous substances are required to provide a MSDS when a product is purchased. A MSDS is maintained for each hazardous chemical substance. These are kept in file maintained by the laboratory Safety Coordinator and are made available to all employees. The Safety Coordinator must ensure that all newly requisitioned hazardous items are accompanied by an MSDS and should strive to obtain MSDS's on all hazardous substances already in stock. Employees may request an MSDS but employees are encouraged to utilize the copies of MSDS in the work place. Employees are encouraged to review the MSDS for each item used and are trained to interpret and understand the information (see training).

D. Disposal

Alcohols, xylenes, silver contaminated wastes, and other hazardous chemical substances that are determined to be inappropriate for waste stream disposal are disposed of via a hazardous wastes disposal contract. Pickup is arranged via the Fire and Safety Department who will advise on packaging and segregating procedures and will pick up and store the waste material for removal in a timely manner. The Fire and Safety department will maintain records of wastes picked up by. Hazardous wastes manifests and EPA documentation is maintained by the Hazardous Materials Coordinator (Fire and safety Department).

F. Exposure Monitoring

Exposure monitoring is indicated whenever exposure to a hazardous chemical substance is likely to exceed the Permissible Exposure Limits (PEL's) listed in Air Contaminants- Permissible Exposure Limits. or if indicated by special regulations (formaldehyde). Monitoring activities are overseen by the department Chemical Hygiene Officer and are reported to the Hazardous Materials Coordinator. Administration of these activities include record keeping and posting of monitoring results in the work area within 15 days of the monitoring process.

Regular monitoring may be discontinued after two successive monitors (conducted at least one week apart) show acceptable levels. Any work changes likely to result in increased exposure (i.e. significant increase in volumes used, change of technique or change in work environment) will indicate resumption of regular monitoring.

G. Medical Surveillance

Medical Surveillance is indicated whenever exposure to a hazardous chemical substance exceeds the Permissible Exposure Limit or action limit as specified by special regulations. The surveillance activity is conducted by the Employee Health Clinic Director who reports activity to the Chemical Hygiene Officer and the Hazardous Materials Coordinator (see addendum).

H. Medical Consultation

Medical Consultation by Employee Health Clinic physicians is indicated and initiated by surveillance activities or employee request. Consultation activity (general findings- not patient information) are documented via written reports to the Chemical Hygiene Officer and Hazardous Materials Coordinator.

I. Corrective Action Plans

Written corrective action plans are indicated whenever exposure to a hazardous chemical substance exceeds the PEL or action limit. The written plan should include proposed work practice changes and physical plant modifications. Plans are to be formulated, implemented and evaluated under the direction of the Chemical Hygiene Officer and Safety Committee.

J. Emergency Procedures

Spills, exposures and releases of hazardous chemical substances:

Spills of hazardous chemical substances pose a potential hazard to employees, visitors, patients and the community at large. Spill handling materials and procedures must be in place in every work area handling and/or using hazardous chemical substances. Each department/division Chemical Hygiene Officer must assign and designate a spill response team and notification system to handle spill emergencies and conduct periodic drills. See addendum.

General Guidelines:

- * Small Spills- Small hazardous chemical substance spills (less one quart (liter) of liquid) may be handled, documented, etc. within the work area so long as the spill is contained within the work area and has no potential for impacting other work areas or departments (see exceptions/special procedures for mercury, antineoplastic agents and radiological materials (radiation safety manual)).
- * Large Spills- Spills of hazardous chemicals substances spreading to other work areas/departments must involve the notification of the Safety Director, Hazardous Materials Coordinator, Hospital Security and the Chemical Hygiene Officer.
- * Spills with the potential to leave the MCL campus may require use of the local HAZMAT response mechanism (911) with subsequent reporting requirements under CERCLA regulations (EPA).

Procedure: (for team response, see addendum)

1. Isolate the spill from any possible sources of ignition (for flammable items).
2. Limit the spread of the material as follows:
 - a. Liquid material- Limit the spread of the chemical using absorbent spill material or spill control pillows.
 - b. Powders and dry material- Cover the spill with damp cloths or towels
3. Attend to exposure victims:
 - a. Remove contaminated clothing and flush exposed areas for 15 min. (sink, safety shower or eyewash).
 - b. Transport victim(s) to the emergency room. If possible, bring the MSDS or label information on the material involved.
4. For large spills notify the spill response team, Hospital Security and Hazardous Materials Coordinator.
5. Restrict access to the area and take steps to ventilate in case of fume producing material. Open windows and secure fans from Central Material Services to exhaust fumes to the outside.
6. On consultation with the Safety Director, Chemical Hygiene Officer and spill response team members, develop and implement a cleanup strategy, using the MSDS as a guide. It may be appropriate to contact the local HAZMAT team (911) if it is determined that chemical exposure may exceed the protective capacity of available personal protective equipment, or that the cleanup equipment is inadequate. It may be necessary to contact professional chemists and/or support staff of the manufacturer for guidelines (use the MSDS- to find contact phone #'s). In all cases use personal protective equipment appropriate to the risk (consult the MSDS), and ensure that the cleanup team is observed from a safe distance. Be prepared to rescue cleanup personnel should they exhibit any signs of distress.
7. Document the incident and all corrective action via the incident report and accident investigation form. Include all of the who, what, where and why's of the operation. Describe the cleanup activities. The investigation should include explorations of the causes of the incident and preventative measures.

Specific Cleanup Guidelines:

Caustic Materials: Cover the spill with additional absorbent material working from the outside toward the center to prevent spreading. For Acids and add sufficient Sodium Carbonate, Sodium Bicarbonate (Baking Soda) or equivalent. For bases, use citric acid neutralizer (or equivalent). In either case, mix well until all evidence of reaction (bubbling, heat etc.) ceases. Add additional neutralizer and again mix and observe until there is total cessation of reactivity. Finally scoop and package material for disposal. A properly neutralized spill will have nearly neutral pH (if in doubt, check with pH paper) and once checked may be discarded via the solid waste.

Solvents / flammables and other organic liquids: Remove all sources of ignition and ventilate area (to outside). Evacuate and restrict the area and enter only when safety can be determined. Clean by covering the spill with additional absorbent material. DO NOT MIX. Work from the outside to prevent spreading and once the material is dry, package in a sturdy, well labeled container for disposal via the solvent / flammable waste procedure.

Mercury: Contact housekeeping department for removal of the material by mercury vacuum.

J. Training:

Training programs are to be administered appropriate to the needs of personnel .

Basic Training:

Basic training for the Chemical Hygiene Program is accomplished by an on-going program of training bulletins, video presentations and safety meetings and demonstrations for all employees and topics include, but are not limited to:

- * Requirements of the OSHA Hazard Communication Standard (Employee "Right -to-Know and EPA Community Right-to- Know.) written program, major features, locations, responsibilities.
- * Labeling Systems & Storage
hazard symbols & pictographs, NFPA labeling, storage regulations.
- * Reading and interpretation of Material Safety Data Sheets.
physical characteristics, exposure limits, hazards, handling instruction, disposal etc.
- * Emergency procedures.
recognizing spills and releases, abatement, notification procedure, immediate response, cleanup guidelines.
- * Storage and transport
storage categories, incompatible chemicals, volume regulations.

- * Signs, symptoms and procedure for evaluating possible chemical exposure. signs and symptoms of exposure. Exposure monitoring, medical surveillance and

Advanced/Specific Training: For personnel to serve as Safety Coordinators

- * Administering the Chemical Hygiene Program
Responsibilities, policies, regulations and activities of the Chemical Hygiene Program. Use of the CMP software. Record keeping and training administration.

- * Hazard Assessment
Interpreting the MSDS. Assignment of hazard ratings.

- *Emergency Response Planning:
Spill kit preparation. Notification procedures.

Advanced / Specific Training: For personnel performing tasks which involve exposure to hazardous chemical substances above the laboratory scale (formaldehyde) .

- * Specific chemical hazard information including review of the MSDS and specific signs and symptoms discussion.

- * Specific work area controls, ventilation, work practice information, monitoring and other hazard controls and procedures.

- * Proper handling techniques specific to the material, disposal and storage and hygiene procedures.

- * Specific emergency procedures (SpillX FP).

K. Contractors and Temporary Workers:All contractors are responsible for the training of their personnel. However, the criteria for safe behavior must comply with MCL safety policies, regulations and practices outlined in this document. Copies of the written chemical Hygiene program are available along with lists of hazardous chemical substances and information on labeling and MSDS locations and other appropriate training materials. Contractors must reciprocate and provide information on hazardous chemical substances that they may use which might result in an exposure or incident involving MCL personnel. Assistance is to be provided by MCL departments on disposal , ventilation, posting, area restriction and any other issues that may occur.

L. Annual report /Program review from the Chemical Hygiene Officer to the Administrative Director

may include such items as:

- * Training summary
- * Incident summary
- * Summary of problems
- * Goals and priorities

M. Record Keeping:

Inventory records, training records and records of activities are to be maintained for at least thirty years following the termination of employment. Records are to be made available for review by employees on a written request basis.

GLOSSARY:

Action Limit- Exposure level given by specific OSHA regulation for which a specific activity is dictated.

Carcinogen - Substance for which there is scientifically valid evidence that the substance causes cancer. (Scientifically valid as determined by groups such as the International Agency for Research on Cancer (IARC))

Group 1 carcinogen- agent for which there is sufficient evidence of carcinogenicity (these agents are known to cause cancer in humans).

Group 2A carcinogen- agents which are probably carcinogenic based on evidence (probably cause cancer)

Group 2B carcinogen- agents which are possibly carcinogenic (possibly cause cancer).

Group 3 -agent is not classifiable (these agents do not fall into any group).

Group 4 - agent is probably not carcinogenic (probably does not cause cancer).

CHEMICAL SUBSTANCE - any element, chemical compound or mixture of elements or compounds.

EPA COMMUNITY RIGHT-TO KNOW- Title III of the Superfund Amendments and Reauthorization Act (SARA)- sections 311 and 312.

EXTREMELY HAZARDOUS SUBSTANCE- Any item on the EPA , Community Right-to-Know Act of 1986, "extremely hazardous substances" list.

HAZARDOUS CHEMICAL SUBSTANCE - any element, chemical compound or mixture of elements or compounds that is a physical or health hazard.

Physical hazard- a substance for which there is scientifically valid evidence that it is a combustible liquid, a compressed gas, explosive, flammable, an organic peroxide, an oxidizer, pyrophoric, unstable (reactive), or water-reactive.

Health Hazard- a substance for which there is statistically significant evidence based on at least one scientific study that acute or chronic health effects may occur in exposed employees. The term "health hazard" includes chemicals which are cancer causing, toxic or highly toxic, reproductive toxins, irritants, corrosives, sensitizers, hepatotoxins, nephrotoxins, neurotoxins, agents which act on the hematopoietic system and agents which damage the lungs, skin, eyes or mucous membranes.

Laboratory Scale - Use of chemicals where the containers used for reactions, transfers and other handling of substances are designed to be easily and safely manipulated by one person.

MSDS- Material Safety Data Sheet - Printed sheet provided by manufacturer and/or supplier which contains substance information essential to the Right- to- Know process.

OSHA Right-to-Know (RTK)- 29 CFR-1910 - The Occupational Safety and Health Administration's hazard communication standard.

Permissible Exposure Limit (PEL)- The maximum air contaminant concentration a worker can be exposed to on a repeated basis without developing adverse effects. (PELs are in CFR 1910.1000 subpart Z and are enforced by OSHA).

Short Term Exposure Limit (STEL) - The recommended maximum exposure that a worker may receive during a 15 min. interval during a work day as established by the ACGIH.

Time Weighted Average (TWA)- A type of TVL established by the ACGIH which represents the level at which workers may be exposed day after day without adverse effects.

Threshold Value Limit (TVL) - Recommended exposure concentration for workers established by the American Conference of Governmental Industrial Hygienists (ACGIH).

Threshold Planning Quantity (TPQ)- The amount of an Extremely Hazardous Substance above which reporting under Community Right-to-Know regulations is required.

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