CHEMICAL HYGIENE PLAN

Chemistry Department

Skyline College
3300 College Drive
San Mateo, California

SAN MATEO COUNTY
COMMUNITY COLLEGE DISTRICT

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Chemical Hygiene Plan
Skyline College Chemistry Department

INTRODUCTION

The San Mateo County Community College District (herein "SMCCCD" or "District") has established a Hazard Communication Program (HAZCOM) Program. The District's HAZCOM Program, requires department-specific Chemical Hygiene Plans for each laboratory, workshop, and studio based on the California Occupational Safety and Health Administration (Cal/OSHA) Hazard Communication Standard (California Code of Regulations, Title 8, Section 5194). Appendix A presents the Site Map.

RESPONSIBILITIES FOR THE CHEMICAL HYGIENE PLAN

This document is a summary of the main requirements of the SMCCCD's Chemical Hygiene Plan, the individuals responsible for these requirements and the specific procedures to provide compliance with District's policies and Cal-OSHA standards. This document is to be used in conjunction with the SMCCCD HAZCOM Program document that explains these requirements in additional detail.

In accordance with the Cal-OSHA Hazard Communication Standard and SMCCCD procedures, the following Chemical Hygiene Plan has been developed for:

Dept , School , Division, Group, or Unit **Chemistry**	Preparation Date **July 30, 2007**
Responsible Supervisor: (First and Last Name) **Mike Williamson**	Job Title or Position **Dean of Science/Math/Technology**
Location: Campus, Bldg, room no. **Skyline College , Bldg 7A, Room 130**	**650-738-4221**

The Dean, Department Head, and Supervisor are responsible for providing that each department-specific Chemical Hygiene Plan is complete and is understood and followed by the employees under their supervision.

A copy of the SMCCCD HAZCOM Program and this department-specific Chemical Hygiene Plan are accessible to employees in the following locations:
Office of the Dean of Science/Math/Technology, Bldg 7A, Room 130 **Chemistry Stock Room, Bldg 7A, Room 339**

While the Dean, Department Head, or Supervisor is responsible for implementing each of the elements described within this Chemical Hygiene Plan, it is permissible to delegate some tasks to other capable employees (e.g. designee), provided the roles are clearly documented and understood.

TRAINING

The Dean, Department Head, Supervisor, or designee is responsible for providing that each employee receive the appropriate HAZCOM training, including both general and department-specific training. Refer to the SMCCCD HAZCOM Program document for a description of the required content of department-specific training. Training records, such as training sign-in sheets or course certificates, must be maintained by the Dean, Department Head, Supervisor, or designee, as well as, documentation of the content of department-specific HAZCOM training.

Employees receiving department-specific HAZCOM training:
1. New employees (new hires and newly assigned employees). 2. All employees when a new hazardous chemical or non-routine hazard is introduced, or when significant new hazard information is learned about existing chemicals.

SMCCCD employees performing work with hazardous chemicals are responsible for participating in HAZCOM training as directed by their Dean, Department Head, Supervisor, or designee.

Prior to the start of a non-routine project, the Dean, Department Head, Supervisor, or designee will provide training for each affected employee, including specific hazards of the chemicals that he or she may encounter during the activity.

The following table describes the anticipated non-routine tasks, associated hazardous chemicals, and the protective measures employees are to take. Appendix B presents Safety Control Measures.

Non-Routine Tasks/Chemical/Protective Measures		
Task/Emergency	**Hazardous Chemical**	**Protective Measures**

LABELS

Labels provide an immediate warning of the hazards to which employees may be exposed and provide a link to more detailed information (i.e. MSDS). The Dean, Department Head, Supervisor, or designee will provide that every container entering the laboratory, workshop, and studio has the required label affixed to the container.

If a chemical is transferred to another container, then the new or secondary container must be labeled, as well. The label on the secondary container must contain the same information required for the label on the original or primary container. Refer to the SMCCCD HAZCOM Program document for details about what information must be on a label, as well as, suggested methods for labeling secondary containers.

It is not necessary to label the secondary container if the employee who performs the transfer is the *only person* who uses the entire chemical from the new container, during a single work shift.

Labels: The following employee(s) are responsible for providing all containers of hazardous chemicals with appropriate original or secondary labels.
Mousa Ghanma, Anatomy/Chemistry Technician

HAZARD CHEMICAL INVENTORY

The Dean, Department Head, Supervisor, or designee is responsible for identifying and listing all hazardous chemicals in the Hazard Chemical Inventory (HCI) that are stored, used or generated in their laboratory, workshop, and studio. Appendix C presents the HCI.

This HCI also serves as a list of chemicals for which a Material Safety Data Sheet (MSDS) must be maintained, and is the initial step necessary for completion of the rest of the program. Compiling the HCI is not a one-time effort. Like all components of the HAZCOM Plan, the HCI must be updated and maintained as MSDSs are updated, chemicals are substituted or no longer used or new chemicals are brought on site. Appendix D presents the MSDSs. The HCI form is provided annually by the SMCCCD Senior Buyer to assist in completing and maintaining the chemical inventory. Appendix E presents Chemical Procurement, Distribution, and Storage for hazardous chemicals.

Hazard Chemical Inventory: The following employee(s) are responsible for maintaining the HCI for the Chemistry Department:
Mousa Ghanma, Anatomy/Chemistry Technician

A copy of the Hazard Chemical Inventory is accessible to employees in the following locations (Appendix C of this Chemical Hygiene Plan):
Office of the Dean of Science/Math/Technology, Bldg 7A, Room 130 **Chemistry Stock Room, Bldg 7A, Room 339**

MATERIAL SAFETY DATA SHEETS (MSDS)

The Dean, Department Head, Supervisor, or designee is will provide that all MSDSs are available for every hazardous chemical used in the laboratory, workshop, and studio and are available to employees on all work shifts. Appendix D provides the current MSDSs.

MSDS: The following employee(s) are responsible for obtaining and maintaining MSDSs
Mousa Ghanma, Anatomy/Chemistry Technician

The Dean, Department Head, Supervisor, or designee will determine the method used to organize, store, and maintain the MSDSs as described below. **Refer to the SMCCCD HAZCOM Program for details of MSDS accessibility requirements.**

MSDS files will be accessed in the following format and location(s):
Hard copy (Appendix D of this Chemical Hygiene Plan): (e.g. building, room, binder or file cabinet, etc.)
Office of the Dean of Science/Math/Technology, Bldg 7A, Room 130 and Chemistry Stock Room, Bldg 7A, Room 339
Electronic copy: (building, room, computer, file name, computer access if required, etc.)
Office of the Dean of Science/Math/Technology, Bldg 7A, Room 130

WORKING WITH CONTRACTORS

The District employee who coordinates/oversees the work of a contractor must advise the contractors of their responsibility to provide appropriate information for all hazardous chemicals brought onto SMCCCD campuses. If SMCCCD employees will be exposed to any of the hazardous chemicals brought on site by the contractor, the Vice-Chancellor of Facilities Planning, Management and Operations will contact the appropriate Dean, Department Head, Supervisor, or designee. A MSDS must be made available to the District and contractor employees.

Likewise, it is the responsibility of the District employee to provide the contractor with information about the hazardous chemicals to which they may be exposed while at an SMCCCD campus and, if applicable, the labeling system in use, protective measures to be taken, safe handling procedures, and the location and availability of MSDSs.

RECORDKEEPING

The Department must develop a plan to provide the continuity of all recordkeeping when a Supervisor leaves or is reassigned.

Recordkeeping The following employee(s) are responsible for maintaining records:
Mike Williamson, Dean of Science/Math/Technology and Mousa Ghanma, Anatomy/Chemistry Technician

Required Records are kept in the following location(s):
Training Records: **Office of the Dean of Science/Math/Technology, Bldg 7A, Room 130**
Old Chemical Inventories: **Chemistry Stock Room, Bldg 7A, Room 339**
Old MSDS: **Chemistry Stock Room, Bldg 7A, Room 339**

Training Records: Records of general and department-specific Chemical Hygiene Plan will be maintained by the Dean, Department Head, Supervisor, or designee. Records will be readily available for inspection by SMCCCD or Cal-OSHA representatives.

MSDSs: The Dean, Department Head, Supervisor, or designee is responsible for the MSDSs for hazardous chemicals currently used in the laboratory, workshop, and studio. MSDS must be maintained and updated as described in this department-specific Chemical Hygiene Plan and must be retained by the District for 30 years (per the Access to Employee Exposure and Medical Records Standard 29 CFR 1910.1020).

Hazard Chemical Inventory: The Dean, Department Head, Supervisor, or designee will provide that a list of hazardous chemicals is current and accurately maintained. Each calendar year the Dean, Department Head, Supervisor, or designee will sign and date a copy thus confirming the accuracy of the information on the CHI form. A file of these annual chemical inventories will be maintained by the District for 30 years.

REFERENCE DOCUMENTS AND FORMS

To assist the Dean, Department Head, Supervisor, or designee, Appendices F and G present Reference Documents and Forms, respectively.

Appendix B-1
General Chemical Safety

The following provides information on general chemical safety and is applicable to each laboratory, studio, or workshop within SMCCCD.

Do:

- Keep only the amount of chemicals you need for the immediate project.
- Perform laboratory, workshop, or studio work in the laboratory, workshop, or studio; not in storage or other spaces.
- Store toxic substances in unbreakable containers. Keep them in a clearly marked ventilated area.
- Check stored chemicals regularly for deterioration, and/or broken containers.
- Store breakable containers in chemically resistant trays or over wrap containers.
- Dispose chemicals, broken glass, and other wastes in the containers specifically approved for that use.
- Clean up broken glass and spills immediately.
- Post signs to warn others of toxic hazards in the laboratory, workshop, or studio.
- Keep the laboratory, workshop, or studio clean and neat.
- Dispose of materials safety and legally.
- Practice good personal hygiene in the laboratory, workshop, studio.
- Know what to do in an emergency.

Don't:

- Consume food or beverages, or smoke in areas where chemical material is being used or stored.
- Use damaged glassware or equipment.
- Store chemicals near heat or sunlight, or near other substances with which they might react dangerously.
- Pour chemicals down the drain.
- Store materials on bench tops.
- Store materials on floors or other places where they create tripping hazard.

- Keep materials that are no longer needed.
- Leave operating equipment unattended.
- Leave materials out at night - put them back in storage areas.
- Fool around in the laboratory, workshop, studio.

HAZARDOUS MATERIALS

Not every laboratory, workshop, or studio will require the use of chemicals. When chemicals are used, you must, for safety purposes, consider them as potentially hazardous. Hazardous chemicals are defined as those labeled as having a physical or health hazard. A chemical is a physical hazard if it is a combustible liquid, a compressed gas, explosive, flammable or organic peroxide, an oxidizer, pyrophoric, unstable or water reactive. It is a health hazard if there is evidence that the chemical can cause health problems.

There are publications entitled **Material Safety Data Sheets (MSDS)** available for most commercially produced chemicals that contains specific chemical hazard and safe handling information for that chemical. It is prepared in accordance with Occupational Safety and Health Administration (OSHA) Hazard Communication Standards. Every producer or manufacturer is obligated to have available an MSDS for every chemical they market.

The **MSDS** contains the following information:

- Substance Identification
- Components and Contaminants
- Physical Data
- Fire and Explosion Data
- Toxicity
- Health Effects and First Aid
- Reactivity
- Conditions to Avoid
- Spill and Leakage Procedures
- Protective Equipment

An MSDS must be acquired and made available in the laboratory, workshop, studio for each hazardous chemical used. MSDSs are presented in Appendix D of this Chemical Hygiene Plan.

LABORATORY, WORKSHOP, OR STUDIO SAFETY

In the laboratory, workshop, studio, it is important that you know what safety equipment is available, where it is located, how to use it and where all the exits are located. Since accidents are not programmed, it is essential that you know what to do when one occurs. *First,* and foremost, you must protect yourself and those around you. *Secondly,* assist to correct or contain what occurred. The *third* requirement is to clean up the area of the accident. It may be necessary to wear additional protective clothing, so be certain you know beforehand where such clothing is located.

GENERAL SAFETY RULES

Employees have the right to know of the hazards associated with laboratory, workshop, studio activities they undertake - it is public law - so be sure you understand all you need to know before starting your work.

There are many precautions you should undertake on your own. These are listed below:

- *Do not work alone* in the laboratory, workshop, studio where hazardous chemicals are used;
- Use the required protection equipment;
- Provide appropriate labels, including name, date and contents, are on all containers that hold chemical combinations you are storing;
- Avoid direct contact with any of the chemicals you are using;
- Do not smell, inhale or test any chemical;
- Do not dispense more of any chemical that is needed;
- Be familiar with the laboratory, workshop, studio ventilation system especially the hoods;
- Know where the first aid equipment is located;
- Check your equipment before adding a hazardous chemical;

- Respond quickly to hazardous chemical spillage and be certain that if you are the recipient of the spillage, you wash all body areas which were exposed to the chemical;
- Keep hazardous chemicals off clothing and wash your face and hands if spillage or splashing occurs;
- Clean up spills immediately;
- Constantly check your equipment; and
- Know the chemical ingredients of the chemicals, paints and cleaning fluids you are using.

If your laboratory, workshop, or studio work requires electrical circuitry to operate equipment or for research, do the following before applying electrical power:

- Locate emergency cut-off switch;
- Check bonding if it is required;
- Mark all open connections;
- Keep all electrical circuits away from liquids;
- Properly ground equipment if necessary; and
- Comply with electrical safety codes.

Additional safety measures may be required. Please observe them.

Chemicals, incautiously handled, can result in serious bodily injury and severe property damage. Skin contact with corrosive chemicals can cause ulcerated burns or dermatitis; inhalation, absorption or ingestion of toxic chemicals can cause illness or death; flammable liquids and solids can cause sustained fires and/or explosions. Basic information such as boiling point, flash point, vapor pressure, toxicity, explosive limits, incompatibility of the chemicals used and the observance of the following procedures will greatly aid in minimizing the potential hazards involved in laboratory, workshop, studio work.

1. Treat any unfamiliar chemical material as hazardous.
2. Consider a mixture at least as hazardous as its most hazardous component.
3. Do not use any unlabeled substances.
4. Follow all chemical safety instructions to the letter.

5. Keep MSDSs for each substance in use on hand in the laboratory, workshop, studio.
6. Photosensitive chemicals must be kept out of direct rays of sunlight.
7. Unused chemicals should never be returned to stock bottles.
8. Chemical spills should be handled cautiously:
    a. If a spill is flammable, immediately shut off all electrical heating units and open flames within the area
    b. Use exhaust hoods to ventilate room.
    c. Avoid breathing fumes. If respiratory protection is required because concentrations are questionable or offensive call 911 for an emergency response spill team.
    d. Wear rubber gloves when cleaning up corrosive materials. Each laboratory, workshop, studio is equipped with a spill kit containing:
        - Vermiculite (to be used as containment and for absorption).
        - Eye protection.
        - Nitrile gloves.
        - Dust mask (not to be used as a respirator).
9. Don't take chances. When in doubt, contact your Department Head, Dean or Supervisor immediately or make reference to the following:
    a. Manufacturers Material Safety Data Sheets
    b. SMCCCD Emergency Response Guidebook.

HAZARDOUS CHEMICAL WASTE DISPOSAL

A. All art supplies purchased or brought into campus laboratories, studios or workshops must have the prior approval of the Department Head, Dean or Supervisor.
B. Chemical wastes generated by College laboratories, studios or workshops, shops and custodial services as well as abandoned reagents, outdated medical supplies, solvents, thinners, oils, cleaning fluids and their containers will be securely stored. Hazardous waste disposal is arranged and scheduled by completing a Hazardous Waste Disposal Request form (Appendix G-5 of this document and available on the intranet) and forwarding it to the SMCCCD Senior Buyer. Based on the requests received, the SMCCCD Senior Buyer will schedule hazardous waste disposal with an appropriate vendor during each semester break, only if hazardous waste disposal has been requested.

SMCCCD College facilities personnel do not transport, package or dispose of hazardous waste generated by academic departments. The selected hazardous waste disposal vendor will pre-print a hazardous waste manifest for each College where hazardous waste is to be collected. Department Heads, Deans, and Supervisor should make a copy of the manifest when collection is made, but should not sign the manifest. When all collections of hazardous waste at a College have been completed, the hazardous waste disposal vendor will contact the College's Facility Manager to sign the actual hazardous waste manifest "on behalf" of the waste generator (the individual College, not the individual Department). This procedure will provide that the documentation of/for hazardous waste disposal from each College is consolidated in one location and that only one representative from each College is authorized to sign the manifest.

Collection and Segregation

1. Collection stations for the waste solvents have been set up in _____. Waste solvent will be collected separately by type. Chlorinated hydrocarbons will be separated from non-chlorinated hydrocarbons. Flammable and combustible liquid waste will be collected and stored in accordance with safe handling procedures for these wastes. The proper disposal methods as stated on the MSDSs for each substance will be followed.
2. Waste acids and alkalines will be collected in separate glass containers with screw caps.
3. Solid waste chemicals will be collected in appropriate screw cap glass containers.

Identification and Labeling

Once material is declared waste, labeling is the most important component in assuring proper disposal. All waste chemical containers must be labeled, along with the date of preparation.

Transfer

Properly identified labeled wastes will not be moved. Final packaging and drum labeling will be carried out by a permitted hazardous waste transporter.

FIRST AID

1. All injuries to SMCCCD employees, regardless of how minor, must be immediately reported to the appropriate Department Head, Dean or Supervisor to provide comprehensive treatment and prompt medical attention.
2. Chemical spillages on the skin should be immediately flushed away with copious amounts of water for at least 15 minutes and immediately report the incident to your Department Head, Dean or Supervisor to arrange for a supplemental medical evaluation and appropriate treatment. If irritation or pain persists, report to your Department Head, Dean or Supervisor to arrange additional medical attention.
3. Eyes contaminated with chemicals should be immediately flushed with plenty of water for at least 15 minutes and report the incident to your Department Head, Dean or Supervisor to arrange for supplemental medical evaluation and appropriate treatment.
4. Wash hands frequently when handling bottles of chemicals. Use chemical resistant gloves when working with corrosive and/or toxic chemicals.
5. In case of suffocation, due to inhalation of fumes, remove victim from contaminated area (rescuers must wear proper respiratory protection) to fresh air and get medical assistance by dialing 911.

ENGINEERING CONTROLS AND PERSONAL PROTECTIVE EQUIPMENT

1. All precautions listed in the section titled "Precautions for Safe Handling and Use" on the MSDS will be followed.
2. All container transfers involving chemicals classified as corrosive, flammable, toxic or carcinogenic will be made in an operating fume hood with door raised to level no higher than the 100 cubic foot per minute mark.
3. Personal protective equipment will consist of gloves, goggles, aprons, and dust masks. The use of respirators is limited to employees with a doctor’s clearance for use of any particular type of respirator. All employee respirator use will be governed by the "Respiratory Protection Plan" of the College in accordance with CFR 29 1910.134 (see also Appendix F-5 of this Chemical Hygiene Plan).
4. Each laboratory, workshop, studio supervisor will provide that proper housekeeping practices are followed and maintained.

EMERGENCY PROCEDURES - CHEMICAL SPILLS OR RELEASES

A. Know the Name of the Material Being Handled

Look for identifying label. The name of the chemical will be prominently displayed. Check the label for precautions and warnings. Very often the name of the chemical does not give an immediate clue as to procedures necessary to protect persons, contain the chemical and/or clean up the spill. Some chemicals have many different names and can be identified only by using appropriate references or calling the manufacturer.

B. Skin Contact

If the words ACID, CAUSTIC or CORROSIVE appear, keep in mind that water in generous amounts must be used to wash these chemicals off the skin.

C. Clothing Contact

If chemicals listed in B are splashed on shoes or clothing, the articles must be removed immediately. The area of skin under the clothing must be rinsed with large amounts of water. Shoes must be washed off under running water - use a brush or cloth to scrub the shoe. Articles of clothing must be submerged in running water and agitated to provide dilution of the chemical.

D. Respiratory Contact

Breathing fumes or dusts form spilled chemicals should be avoided. The vapors or dusts from many chemicals are irritating to mucous membranes even in small amounts. Occasional short-term exposure causes effects, which last only a few minutes. Some chemicals such as acids, chlorine, ammonia and certain powders may cause tissue damage that will last for several days. In very heavy concentrations, non-toxic vapors or gases may cause asphyxiation when released in confined spaces.

E. The Spill

1. If in doubt, leave the bottle or carton right where it falls; don't touch it with bare hands. (Rubber or plastic gloves may be needed).
2. Obtain all information possible such as the name of the product, the manufacturer, address and phone number. The name of the chemical may be the trade name or the actual chemical name.
3. Make certain it is spelled correctly; and then...

4. **Call Your Dean, Department Head, and Supervisor and _____.** Tell the receptionist you wish to report a chemical spill. Give the receptionist the information that is known.
5. If trained to use a spill kit, contain the spill by surrounding the spill area with an absorbent such as vermiculite or with sand. This action is imperative especially if the spill is large (4-5 gallons); the material is flammable and occurs near a floor drain. Containment will also facilitate clean up.

F. Evacuation
   1. The odor of a chemical is not necessarily an indicator of its possible effect. Do not remain in an enclosed space and breathe fumes from a spilled or released chemical, liquid or powder.
   2. Always ventilate the space by opening doors and windows. This will dilute vapor concentrations and help prevent development of harmful or flammable levels of vapors or dust. (A spill team member with a respirator may have to ventilate; others may have to leave immediately).

G. Clean up

   The local Fire Department Spill Team, in cooperation with the local College's Facility Coordinator will supervise the clean up and disposal of released chemicals by properly dressed and equipped personnel.

H. Warnings
   1. Liquids may be flammable. Do not permit open flames or cause sparks by turning lights on or off. Shut off all motors and open flames and leave off.
   2. Liquids or powders may be corrosive. Any contact with the skin must be washed off with water immediately.

SUMMARY OF PROCEDURES

1. Always check to see what you are handling.
2. Wash chemicals off skin with water - immediately.
3. Remove and immediately wash clothing after a chemical splash.
4. Leave broken bottles and cartons where they fall. Write down chemical name and telephone number. Call the Office of .
5. Evacuate - ventilate.
6. The Office of _____will supervise the clean up by the local City Fire Department spill team.

7. Warning: Treat all liquids as flammable and corrosive.
8. Keep vermiculite or sand on hand in the laboratory, workshop, studio to use as a dam to contain liquid spills.

If it is necessary to use a respirator to determine the chemical name and to ventilate the area, wait for the arrival of the City Fire Department spill team.

During the day shift, call the Office of _____ and report the spill or release. After 5:00 pm or on weekends call _____. Be prepared to give the proper information about the spill, such as chemical name, quantity spilled, location and any other pertinent information.

Warn others in the area of the spill or release. Evacuate the immediate area. Shut off all electrical devices and extinguish any open flame heat sources if material is flammable.

ACCIDENT AND EMERGENCY REPORTING

All accidents or emergencies will be reported immediately to:

1. Applicable Dean, Department Head, or Supervisor.
2. Vice-Chancellor of Facilities Planning, Maintenance & Operations
3. Applicable College Facilities Coordinator (for minor spills)
4. Local City Fire Department (for chemical spills)
5. Cal-OSHA Regional Office (for Cal-OSHA recordable injuries)

FIRES AND EXPLOSIONS

Small fires that can easily be extinguished without evacuating the building or calling the fire department, are among the most common laboratory, workshop, studio incidents. Actions to be taken in case of a small laboratory, workshop, studio fire are:

1. Alert other personnel in the laboratory, workshop, studio and send someone for assistance.
2. Attack the fire immediately, but never attempt to fight a fire alone. A fire in a small vessel can often be suffocated by covering the vessel with an inverted beaker or a watch glass. Use the proper extinguisher, directing the discharge of

the extinguisher at the base of the flame. (All laboratories, studios or workshops, are furnished with ABC fire extinguishers which can be used for Class A - ordinary combustible solids such as paper, wood, coal, rubber, and textiles; Class B - petroleum hydrocarbons and volatile flammable solvents; Class C - electrical equipment).

3. Avoid entrapment in a fire; always fight a fire from a position accessible to an exit. If there is any doubt whether the fire can be controlled by locally available personnel and equipment, the following actions should be taken:
    a. Activate the emergency alarm system; this will automatically notify the fire department and give them the location.
    b. Confine the emergency (close hood sashes, doors between laboratory, workshop, studios and fire doors) to prevent further spread of the fire.
    c. Assist injured personnel.
    d. Evacuate the building to avoid further damage to personnel.

In case of explosion, immediately turn off burners and other heating devices, stop any reactions in progress, assist in treating victims, and vacate the area until it has been decontaminated.

Taken from *Prudent Practices for Handling Hazardous Chemicals in Laboratory, Studios or Workshops: National Research Council* (National Academy Press, 1981. Washington, D.C.)

Provisions for Medical Evaluation Consultation

SMCCCD will provide employees who work with hazardous chemicals an opportunity to receive medical attention, including any follow-up examinations the examining physicians determines to be necessary, under the following conditions:

1. Whenever the employee develops signs or symptoms associated with a chemical exposure;
2. When exposure monitoring reveals an exposure level routinely above the Action Level, or in the absence of an Action Level, the Permissible Exposure Level for an OSHA regulated substance; and
3. Whenever an event takes place in the work area (such as a leak or spill) which results in the likelihood of a hazardous chemical exposure. SMCCCD will

provide specific exposure related information to examining physicians (substance identity, description of exposure, etc.). Examining physicians will submit a written opinion to the College, which discusses the findings of the examination.

RECORDKEEPING

The SMCCCD will establish and maintain for each employee an accurate record of any measurements taken to monitor employee exposures and any medical consultation and/or examinations (including tests or written opinions). Records will be kept, transferred and made available to employees or their representatives in accordance with OSHA's Access to Employee Exposure and Medical Records Standard (29 CFR 1910.20).

Employee Information and Training

Information

1. The SMCCCD "Hazardous Materials Plan," the SMCCCD "Regulated Hazardous Waste Disposal" procedures, and the "Department's Chemical Hygiene Plan" are on file in each Department office and Office of the Vice-Chancellor of Facilities, Maintenance and Planning. Employees will be given information concerning prudent laboratory, workshop, studio practices at the beginning of each semester.
2. Signs or symptoms of chemical exposure can be found by referring to the appropriate MSDS.
3. MSDSs can be found in the individual laboratories, studios or workshops s. Material suppliers must send MSDSs with initial purchase of the chemical substance.

Training

1. Employees will be shown the various ways chemicals can enter the body, how they affect the body, and how to protect themselves.
2. Employees will be taught the difference between physical and health hazards.
3. Employees will be shown the various methods of control - both engineering and personal protective.
4. Employees will be given details on the Chemical Hygiene Plan and their rights under the law.

Appendix B-2
Control Measures – Chemistry/Biology

In addition to the specific laboratory standard operating procedures, the following general requirements are recommended **(NOTE: Departments should revise these General Requirements as appropriate. Select, revise and use as appropriate)**:

1. Routes of emergency exit will be clearly indicated and unobstructed;
2. All fire extinguishers will remain functional and accessible;
3. Access to the laboratory will be restricted to authorized personnel only;
4. Safety glasses and a lab apron/coat are mandatory at all times in the laboratory;
5. Avoid all skin exposures to hazardous chemicals;
6. Other personal protective equipment will be used as directed by the Laboratory/Workshop/Studio (L/W/S) Technician;
7. Safety instruction signs, warning signs and exit signs will be utilized and maintained in legible condition;
8. Smoking, food, and beverages are prohibited in the laboratory at all times;
9. Good housekeeping procedures will be conducted daily;
10. Counter tops and work benches will be maintained clean, neat and orderly;
11. If an incidental spill occurs, clean it up immediately;
12. If a significant spill or leak occurs, the premises will be vacated immediately or the emergency response plan will be instituted;
13. Material Safety Data Sheets (MSDSs) received will be submitted to the L/W/S Technician;
14. No manufacturer's label will be removed or defaced from the original container;
15. Identifying labels will be utilized on all successive containers;
16. Breakable containers will be transported within a compatible, unbreakable, secondary container;

17. Equipment which is damaged or malfunctioning will not be used, particularly chipped glassware;
18. Electrical equipment will be maintained in good condition;
19. Compressed gas cylinders will be secured in an upright position;
20. Pipetting by mouth suction is strictly prohibited;
21. Procedures which are new or unfamiliar will be referred to the L/W/S Technician
22. Carcinogens will only be utilized only at the direction of the L/W/S Technician;
23. A comprehensive annual inventory, accompanied by an MSDS for each chemical listed, will be compiled by the L/W/S Technician and made a part of this Chemical Hygiene Plan.
24. Continuous records of chemical purchases and hazardous waste disposal will be maintained on all chemicals by the L/W/S Technician;
25. Hazardous waste disposal will be scheduled during each semester break by the L/W/S Technician, in coordination with the SMCCCD Senior Buyer.
26. Chemical stock will be rotated so that the shelf-life is not exceeded;
27. Incompatible chemicals will be segregated from each other;
28. Chemical disposal will be in accordance with SMCCCD procedures and all applicable laws and regulations;
29. Flammable liquids will be stored in a flammable storage cabinet;
30. Laboratory hoods will be utilized for all substances with an exposure level of 50 parts per million (ppm) or less, or unknown exposure limits or carcinogens;
31. Laboratory hoods will maintain a capture velocity of 100 linear feet per minute at the face of the hood;
32. Hood usage and incompatible chemicals will be segregated;
33. Hoods will not be utilized for storage purposes;
34. The L/W/S Technician will determine the adequacy of all lab hoods;
35. All personnel will wash their hands prior to entering and leaving the laboratory;

36. Respirators will be provided, maintained, used, and inspected in accordance with the SMCCCD Respiratory Protection Program;

37. Air purifying and air supplied respirators may only be worn by employees who:

- are enrolled in the SMCCCD medical surveillance program
- who have received annual medical authorization to wear a respirator
- have secured annual respirator fit testing
- have had initial and annual SMCCCD Respiratory Protection Program training

38. Safety inspections will be conducted by the L/W/S Technician at least once each semester and documented.

General Safety Dos and Don'ts:

Make sure you are properly trained in the use, storage, and handling of chemicals including reading and/or having access to MSDS sheets.

General Chemical Safety

Chemicals, incautiously handled, can result in serious bodily injury and severe property damage. Skin contact with corrosive chemicals can cause ulcerated burns or dermatitis; inhalation, absorption or ingestion of toxic chemicals can cause illness or death; flammable liquids and solids can cause sustained fires and/or explosions. Basic information such as boiling point, flash point, vapor pressure, toxicity, explosive limits, incompatibility of the chemicals used and the observance of the following procedures will greatly aid in minimizing the potential hazards involved in laboratory work.

1. Treat any unfamiliar chemical as hazardous.
2. Consider a mixture at least as hazardous as it's most hazardous component.
3. Do not use any unlabeled substances.
4. Follow all chemical safety instructions to the letter.
5. Keep MSDSs for each substance in use on hand in the laboratory.

6. Never test chemicals by taste. Assume that all are toxic. To sample a gas by odor, fan some towards the nose with the hand after filling the lungs with air.
7. Do not pipette chemicals or start siphons by mouth.
8. Keep stopcock firmly in place to avoid leakage on hands and arms when using a dropping or separatory funnel.
9. When heating flammable liquids, use a water bath or an electric mantle. Do not apply direct heat or flame.
10. Use exhaust ventilation hoods for chemical reactions involving toxic, aromatic or obnoxious gases such as hydrogen cyanide, phosgene, hydrogen sulfide, hydrogen fluoride, metal carbonyls and mercaptans.
11. Flammable chemicals that require refrigeration must be kept in an explosion proof refrigerator. Any refrigerator or walk-in with ordinary lights, door switch or internal regulator is **NOT** explosion proof.
12. Photosensitive chemicals must be kept out of direct rays of sunlight.
13. Unused chemicals should never be returned to stock bottles.
14. A compound that develops a gas by hydrolysis when exposed to air should not be tightly stoppered once it has been opened.
15. Reagent bottles should be filled only to the shoulder in order to allow for pressure adjustments.
16. Use a" safety carrier" when transporting corrosive liquids.
17. Chemical spills should be handled cautiously.
    a. If a spill is flammable immediately shut off all electrical heating units and open flames within the area.
    b. Use exhaust hoods to ventilate room.
    c. Avoid breathing fumes. If respiratory protection is required because concentrations are questionable or offensive, call _____ or _____.
    d. Wear rubber gloves when cleaning up corrosive materials. Each lab is equipped with a spill kit containing:

1. Vermiculite (to be used as containment and for absorption)
2. Eye Protection
3. Nitrile gloves
4. Dust mask (for clean up of powders only, not to be used as a respirator)

e. Don't take chances. When in doubt as to how to handle a chemical, ask!!!

GENERAL PROTECTIVE EQUIPMENT PERFORMANCE

1. Eye and Face Protection

Eye and face protection must be worn in the laboratory whenever there is reasonable probability of an injury that could be prevented by their use. Suitable eye and face protection is made conveniently available by the Chemistry Department whenever operations present the hazard of flying objects, glare, liquids, injurious radiation or a combination of these hazards. Employees must use the protectors. These stipulations apply also to supervisors, management and visitors while they are in hazardous areas.

a. Minimum Requirements

Eye and face protectors must meet the following minimum requirements:

i. Provide adequate protection against particular hazards for which they are designed.
ii. Be reasonably comfortable when worn under the designated conditions.
iii. Fit snugly without interfering with the movements or vision of the wearer.
iv. Be durable.
v. Be capable of being disinfected.
vi. Be easily cleanable.
vii. Be kept clean and in good repair.

b. Selection

Each eye, or eye and face protector is designed for a particular hazard. In selecting the protector, consideration should be given to the kind and degree of hazard, and the protector should be selected on that basis. Where a choice of protectors is given, and the degree of protection required is not an important issue, worker comfort may be a deciding factor.

c. Corrective lenses

Persons using corrective lenses are required to wear eye protection, must wear face shields, goggles, or spectacles of one of the following types:

i. Spectacles with protective lenses providing optical corrections.

ii. Goggles worn over corrective spectacles without disturbing the adjustment of the spectacles.

iii. Goggles that incorporate corrective lenses mounted behind the protective lenses.

d. Contact Lenses

Contact lenses do not provide eye protection. Gases and vapors can concentrate under such lenses and cause permanent eye damage. Furthermore, in the event of a chemical splash into the eye, it is often nearly impossible to remove the contact lenses to irrigate the eye because of unconscious spasm of the eyelid. Their use in the laboratory is discouraged and in no circumstances are they allowed without suitable eye protection.

2. Gloves

When working in the laboratory environment, the hands are often the most likely point of contact with hazardous chemicals. Skin or hand contact can occur in several circumstances, such as direct immersion, splashing, spills, contact with solvent-coated objects, or the selection of improper gloves. The most effective means of preventing skin exposure are by:

a. Substitution of a less hazardous substance; or

b. Redesign of experimental set up.

If these methods are not feasible or successful in eliminating potential exposure completely, gloves may be necessary.

a. Glove Selection

The most important thing to remember in selecting gloves is that there is no one glove material that is impervious to all chemicals. The glove selection process should include:

i. Review of the MSDS for the material. This reference or chemical permeation and degradation guides available from glove manufacturers may provide information on the type of glove that should be used with the chemicals you plan to handle.

ii. Evaluation of the additive or synergistic effects of a mixture of materials. You must establish that all of the chemicals in a mixture have been considered in selecting an appropriate glove.

iii. Determination of the potential consequences of skin contact by the chemical. You should be aware of the symptoms of overexposure and the health effects the material is capable of producing.

iv. Establishing a decontamination procedure for gloves that will be used more than once. The decontamination process must be effective in removing contamination and suitable for the glove chosen (not cause degradation of the glove material).

v. Establishing the dexterity and sizing requirements. Gloves come in all shapes and sizes. A glove that is too large, thick or stiff may not be satisfactory for precise laboratory work. A glove that is too small will cause the hand to fatigue easily.

vi. Determination of the physical resistance properties required of the glove. It needs to be cut and puncture resistant and insulated to protect against heat or cold.

vii. Other considerations might include selection of a contrasting color to highlight contamination, glove length, cuffs to catch drips and the use of liners to absorb moisture and reduce irritation.

b. Glove Use

i. Before donning gloves, they should be checked for imperfections, cracks or pinholes.

ii. Avoid touching anything except work materials. Remove gloves before touching door knobs, light switches, hood sashes or lab notebooks.

iii. Wash hands immediately after removing the gloves.

3. Fire Extinguishers

The use of fire extinguishers in the Chemistry Department laboratories conforms to the following guidelines:

a. Portable fire extinguishers suitable to the conditions and hazards involved are provided and maintained in an effective operating condition.

b. Portable fire extinguishers are conspicuously located and mounted where they will be readily accessible. Extinguishers are not to be obstructed or obscured from view.

c. Portable fire extinguishers are given maintenance service at least once a year and a written record kept to show the maintenance or re-charge date.

d. The employees are provided with an educational program to familiarize them with the general principles of fire extinguisher use and the hazards involved with initial stage fire fighting.

e. The portable fire extinguisher program instituted at the Chemistry Department conforms to the OSHA Fire Protection standard - 29CFR 1910.157.

4. Eyewash and Safety Showers

Where the eyes or body of any person may be exposed to injurious corrosive materials, suitable facilities for quick drenching or flushing of the eye and body are provided within the work area for immediate emergency use.

a. Safety Showers - The shower is periodically tested to be capable of drenching the subject immediately. It has a downward-pull ring connected to a quick-opening valve.

b. Eyewash Fountains - The eyewash fountains must provide a soft stream of water for an extended period of time.

The locations of eyewash fountains and safety showers are clearly marked and employees are familiarized with their locations and functioning. Access to these locations is free of clutter at all times.

Eyewash fountains and safety showers are inspected and tested for proper functioning every three months.

5. Other Protective Clothing

Laboratory coats are routinely worn by laboratory personnel. The design of coats is such that they can be removed quickly. Rubber or PVC protective aprons are also worn when large quantities of corrosives or other materials posing a skin contact hazard are being handled.

6. Fire Blankets and First Aid Kits

Fire blankets and first aid kits are also periodically inspected and a record is kept of their inventory and test dates.

7. Department Policy and Assigned Responsibility

It is Department policy to provide all laboratory employees with the necessary equipment to help protect them from injury. All laboratory personnel are expected to be thoroughly familiar with the general principles and procedures in the preceding paragraphs and must adhere to the following policies:

a. All personnel and any laboratory visitors are required to wear eye protection in eye hazard areas.

b. Areas of the laboratory where the use of additional personal protective equipment is required are identified and clearly indicated.

c. Every laboratory worker should be familiar with the location and proper use of the available protective clothing and safety equipment. Instructions on the proper use of such equipment are available to all personnel.

Appendix B-3
Control Measures – Fume Hoods

The primary form of protection from overexposure by inhalation in laboratories is the fume hood. Most laboratories are equipped with at least one negative pressure fume hood that pulls vapors of hazardous chemicals away from the user.

A fume hood should be used whenever exposure by inhalation is likely to exceed the threshold limits described in the MSDS for that particular chemical. Therefore, before using a chemical, check the MSDS for that chemical to evaluate whether it should be used exclusively in a fume hood.

a. Before Using a Fume Hood

Check to see that it is working properly. This can be accomplished by closing the sash to within one inch of being completely closed and taking a small strip of tissue and placing it near the one inch opening. If the hood is working, the strip of tissue should be drawn into the hood, demonstrating negative pressure. If the strip does not show negative pressure, then inform the lab supervisor.

b. Fume Hood Filtering Requirements

Certain chemicals require that the fume hood in which they are used have a filtered exhaust system. To evaluate if other chemicals require special filtration, the Department Head, Dean, or Supervisor can be contacted to ascertain requirements.

c. User Responsibilities

Ensure proper use. The quality of protection afforded by the fume hood is invariably affected by the manner in which the fume hood is used.

i. Maintain sash and/or sash-panels in proper position.

ii. Never remove sliding sashes which are permanently installed on fume hoods.

iii. Make sure that the vertical sash is lowered to the marks that THE LAST TEST AGENCY has indicated on the hood. This mark corresponds to a face velocity

meeting the Cal-OSHA requirements. This also provides splash protection from the operation being performed.

iv. The face velocity of the hood is dependent on the sash being in the proper position. If the face area of the hood is increased by sliding the sash too high, the face velocity will be lowered which reduces the capacity of the fume hood to capture and control airborne chemicals used inside of it. Decreasing the face area by pulling the sash down too low generally increases the face velocity. Increased velocities may create eddy currents around the body of the hood user and around articles inside the fume hood which may draw materials out of the hood and into the room, thereby compromising the protection the hood is designed to provide.

v. Confirm that the flow is sufficient in the hood by checking the testing sticker and magnehelic gauge. The testing sticker should show that the hood has been tested within the last year and that the indicated flow rate average air velocity is above 100 feet per minute (fpm) (150 fpm for carcinogen use). The magnehelic gauge should show a pressure consistent with previously observed acceptable readings.

vi. Do not put your head in the fume hood, particularly when there are contaminants in the hood.

vii. Perform work in a shallow tray if possible. If the hood does not have a recessed work area, minor spills will be contained in the tray or will serve to minimize spillage out onto the lab floor.

viii. Locate the procedure, experiment or apparatus as deeply as possible within the hood. This will act to maximize the efficiency of the hood.

ix. Keep the fume hood free of extraneous materials. Only those materials necessary to the procedure or experiment should be in the hood while work is being conducted.

x. Do not block the slots between the air flow distribution baffles by excess storage of containers in the hood. Blocking the baffles disrupts the air-flow distribution and is an additional cause of poor fume hood performance.

xi. Never evaporate perchloric acid in an ordinary hood. Perchloric acid evaporation requires the use of a specifically designed hood with water-

washdown capability. Failure to do this will result in the deposition of perchlorate crystals in the duct work, these crystals may detonate.

xii. Never perform repairs or make mechanical connections to an existing fume hood, fume hood ducting, or other local exhaust ventilation systems. The ventilation system may not have sufficient flow to handle the additional effluent and may disrupt other fume hoods and their users.

xiii. Never remove distribution baffles (panels) installed in the exhaust systems and at the rear and top of the fume hood. The purpose of these baffles is to properly distribute air flow over the hood opening and work area.

xiv. Never use a room or portable fan in a laboratory with a fume hood or local exhaust system. The air velocity developed by a room fan will disrupt the face velocity and overwhelm the ability of the fume hood to capture and control air contaminants generated inside.

xv. If the door to the laboratory is difficult to open when the fume hood or local exhaust ventilation system is operating, a "make-up" air problem may exist. This develops when an inadequate supply of air is delivered to the room to compensate for the air exhausted by the operating fume hood. Notify the supervisor should this happen.

xvi. Do not paint or cover fume hood inspection stickers or sash opening indicators.

xvii. Do not locate a work station opposite a fume hood. Materials splattered or forced out of a hood during an accident could injure a person seated across an aisle from a hood.

xviii. Do not locate a work station where the only egress from the work station requires passage in front of the hood. A fire or chemical accident, both of which often start in a fume hood, can block an exit rendering it impassable. For this reason all labs are required to maintain two unobstructed means of egress.

xix. Do not locate flammable/combustible storage cabinets directly under a fume hood. Storage of flammable and combustible liquids under a fume hood creates a potential fire hazard due to the uses of open flames and electrical devices in the fume hood.

xx. Use of portable hoods which can be inserted inside fume hoods for iodination procedures must be specifically approved by the Radiation Safety Officer.

Contact the Dean, Department Head, or Supervisor with any questions about user responsibilities or report any problems with the hood to your Supervisor.

d. Other Local Ventilation Devices

Ventilated storage cabinets, canopy hoods, snorkels, and other ventilation devices may be provided as needed. Each canopy hood and snorkel should have a separate exhaust duct.

e. Modifications

Any alteration of the ventilation system should be made only if thorough testing indicates that worker protection from airborne toxic substances will continue to be adequate. Contact the Dean for approval prior to making any modifications.

APPENDIX E

CHEMICAL PROCUREMENT, DISTRIBUTION, AND STORAGE

Controlling procurement, distribution and storage of chemicals is the essential part of this Chemical Hygiene Plan. Every laboratory, workshop, and studio should have an up-to-date written inventory of the chemicals present, including quantities on hand, date of receipt, and location in the laboratory, workshop, and studio. The major areas include:

PURCHASING CHEMICALS

The decision to procure a specific quantity of a specific chemical is a commitment to handle it responsibly from receipt to disposal. Chemicals are procured on campus in at least three ways:

- Regular orders from off-campus suppliers,
- Low-value blanket orders, and
- Personal acquisition, or transfer from other laboratories.

Irrespective of the route of procurement, the same safe procedures are required. Chemicals which are carcinogens or controlled substances are subject to additional legal regulations. Most chemicals may present hazards. In this instance the San Mateo County Community College District (herein “SMCCCD” or “District”) and the SMCCCD Safety Committees are authorized to limit the quantity, purchase, or specify the conditions of use of any chemical they deem too hazardous for use at District facilities.

Do not purchase a greater quantity of chemicals than is actually needed or can be safely stored.

Users are expected to be knowledgeable about the hazards of the chemicals that they work with. Material Safety Data Sheets (MSDS) and other published safety information must be readily available for use in an emergency. This information should be requested from the manufacturer when purchasing the chemical if it is not already available.

The Hazardous Waste Source Reduction and Management Review Act (SB 14) required a waste minimization program. This includes source reduction (limiting purchases to the

minimum quantities required) and substituting hazardous chemicals with non-hazardous (or less hazardous) chemicals when practical.

HAZARDOUS CHEMICAL INVENTORIES

Under the "Emergency Planning and Community Right to Know Act" of 1986 all facilities are required to provide certain information to local agencies. The City Fire Departments require that the District submit a detailed inventory of chemicals in use and update it annually. In addition, SMCCCD must report any changes in facilities or usage which impacts the validity of a previous submittal within 30 days of such changes. The District Vice-Chancellor of Facilities, Maintenance and Planning administers the HAZCOM Program and obtains the necessary permits for each College. Each laboratory, workshop, and studio using or storing chemicals is notified by SMCCCD when these submissions are due. The Hazardous Chemical Inventory is presented in Appendix C.

To assist in maintaining current inventories, and reducing the burden of annual inventories, please make sure that you inform District's Senior Buyer:

- When you purchase a chemical (via the Senior Buyer) that you did not use previously.
- When there is a change in usage of more than 25% per year.
- When your laboratory, workshop, and studio is moving, relocating or being remodeled.

TRANSPORTING HAZARDOUS CHEMICALS

Transporting hazardous chemicals inappropriately can result in spills and, in some instances, chemical exposures and fire hazards. The obvious preventive approach lies in providing that the chemical is packaged in an appropriate container, protected from external forces, and secured in an appropriate cart.

Hazardous chemicals are to be transported in containers made of materials that are compatible with the chemical. This is extremely important for waste chemicals that are removed through the District's waste disposal program

Hazardous chemicals are expected to be transported through public corridors in boxes or external containers which can reasonably be expected to withstand moderate forces that might be anticipated with accidental dropping.

Hazardous chemicals should be transported in freight or service elevators only. If necessary, chemicals can be transported on carts; consideration must be given to the weight and balance of the load. Loose bottles or containers of chemicals will not be carried by hand, down public corridors or in elevators. Use boxes and/or carts.

Note:
Off campus transportation of hazardous chemicals is severely restricted. Contact your Dean, Department Head, or Supervisor for answers to your questions.

LABELING CHEMICALS

Many of the chemicals utilized in the laboratory, workshop, and studio are hazardous, while others may be hazardous only when mixed with other chemicals. Therefore, it is important that containers of hazardous chemicals or mixtures be properly labeled.

a. Labeling of Hazardous Chemicals Minimum requirements on the label are:

i. Name of user
ii. Date
iii. Description of contents
iv. Concentration
v. Appropriate hazard labels

Chemicals in the original container, as supplied by the manufacturer, are usually correctly labeled.

b. Labeling Requirements

i. All chemical containers must be properly labeled.
ii. All chemicals in supplier's containers should have the following information written on the manufacturer's label for identification purposes:
    - Date of receipt in laboratory, workshop, and studio
    - Name of person who purchased the chemical

iii. Containers of dilutions made from the original stock bottle, should have the following information:
    - Date of preparation
    - Name of person who prepared the solution
    - Name of chemical or mixture and percent concentration(s)
    - Appropriate hazard labels

iv. All peroxide-forming chemicals must have a label which indicates the expiration date and date opened. Be familiar with the hazards of Peroxidizable chemicals.

GENERAL STORAGE GUIDELINES

a. Do not store excessive quantities of hazardous chemicals in the laboratory, workshop, and studio. Purchase the minimum amount required and dispose of unneeded chemicals in a timely fashion (contact the District's Senior Buyer for support in disposing of hazardous chemical wastes).
b. Hazardous chemicals and chemical mixtures must be plainly and permanently labeled (see Labeling Requirements section above).
c. Each chemical in the laboratory, workshop, and studio should have a definite storage space, consistent with the properties of that chemical.
e. Stored chemicals must have secondary containment of sufficient volume to hold the bottle's contents should it leak, and of a material resistant to the effects of the chemical.
f. Store reagents in cabinets or on shelves. Store largest bottles of chemicals on the lower shelves. Do not allow bottles to extend over the edge of the shelf. Be mindful of earthquake risks when storing chemicals on shelves.
g. When storing chemicals above bench level, it is preferable to store them in cabinets with sliding doors; the next preferable location is in cabinets with latched doors.
h. Storing chemicals on open shelves requires that the shelves have a minimum of 3/4 -inch lip. A solid metal, wood, or Lucite strip or strong wire may be used to modify shelves.
i. Do not store chemicals on bench tops. They are more readily knocked over and are unprotected from potential exposure to fire.

j. Chemicals requiring refrigeration should be properly labeled, and sealed to prevent escape of vapors. Only refrigerators designated and approved for chemical storage should be used.
k. Fume hoods should not be used for chemical storage. Such storage interferes with the air flow in the hood, causes clutter, and increases the fuel load in the event of a hood fire. If small quantities of highly hazardous chemicals must be stored in the hood, they should be placed on an elevated shelf.
l. No chemicals (either reagents or waste chemicals) should ever be stored on the floor. Floor storage presents a major hazard because bottles can be knocked over and broken.
m. Flammable, toxic, and corrosive chemical liquids in quantities greater than 250 milliliters must be stored in cabinets, below bench level.
n. Highly toxic chemical liquids, such as carcinogens, cyanides, hydrofluoric acid and perchloric acid must be double-contained. The outer container must be properly labeled.
o. Flammable liquids requiring cold storage must be stored only in approved explosion-safe refrigerators or freezers. Do not refrigerate chemicals unnecessarily.
p. Volatile chemicals must be tightly closed when not in use.
q. Date bottles of chemicals when they are opened.
r. Peroxidizable chemicals, such as ethyl ether and tetrahydrofuran, should be discarded within six months of opening the container.
s. Storage areas should be inspected periodically for damaged containers, such as cracked bottles or caps, or rusted metal containers. Loose or deteriorated labels must be replaced.
t. Plan chemical storage with personal safety in mind. Make certain all personnel will be able to exit the laboratory, workshop, and studio, should there be a spill or fire.

SECONDARY CONTAINMENT

Secondary containment is required in circumstances where there is a possibility that the chemicals may spill and contaminate the area. This containment can be achieved in a variety of ways, such as:

a. Use of chemical resistant trays, or other containers, placed under the chemical container.
b. Using storage cabinets which are designed to contain spilled chemicals.

As a general rule hazardous chemicals should be stored with secondary containment. However, the following require mandatory secondary containment:

i. Waste storage containers.
ii. Chemicals which are being poured into other containers.
iii. Operations which require handling of large quantities of liquids.

COMPATIBILITY OF STORED CHEMICALS

a. General Guidelines:

i. Do not store all chemicals in one area. Segregate chemicals according to the chemical and physical properties of the chemicals. Consult the MSDS for reactivity information. Do not store hazardous chemicals alphabetically.
ii. Provide separate storage areas for corrosives, solvents, oxidizing agents, pyrophoric materials, and air - or water-reactive chemicals.
iii. Acids should be stored separately from bases.
iv. Organic acids should be stored separately from inorganic acids.
v. Solvents should be stored separately from acids.
vi. Store ammonium hydroxide in a separate cabinet, preferably vented.
vii. Store oxidizers, including oxidizing acids such as nitric and perchloric acids separate from oxidizable compounds, such as acetic acid.
viii. Perchloric acid must be stored where it cannot come in contact with organic material.
ix. Cyanides and sulfides must be kept safe from any contact with acids. Store cyanides in closed cabinets, away from easy reach.
x. Dispose of cyanides which have no current use.
xi. Store pyrophoric materials separate from flammable materials in a dry inert atmosphere (for example, a nitrogen-filled desiccator).
xii. Store highly toxic chemicals in unbreakable secondary containers prominently labeled with a description of contents.

STORAGE OF SPECIFIC CLASSES OF CHEMICALS

1. FLAMMABLE LIQUID STORAGE

a. Definitions

i. Flammable Liquid: A liquid with a flash point below 1000F (370C) (NFPA Class I liquids).
ii. Combustible liquid: A liquid with a flash point at or above 1000 F (600 C) (NFPA Class II, Class IIIA and Class IIIB)

b. General Guidelines

Class IA solvents, such as ethyl ether, should be purchased only in one gallon (4 liter) or smaller containers. If a larger quantity is required, purchase an additional one gallon container. Because of the extreme flammability of the Class I liquids, only quantities needed for immediate use should be stored.

Solvents such as acetone and ethanol that are stored in spigoted plastic carboys for dispensing should be positioned with the spigot over a tray (secondary container) large enough to contain the entire contents of the carboy in the event of leakage from the spigot.

The *hazardous nature* of each chemical in this category must be considered individually with respect to reactivity and flammability, and in relation to other flammable chemicals which may be stored in the same area.

The *quantity* of chemicals stored is a consideration in fire prevention. T he current fire control approach is directed toward limiting the quantity of unprotected chemicals. Amounts and types of chemicals to be stored are related to the structure of the facility, the availability of sprinklers and other fire protection, and the rated occupancy of the building.

2. CONDITIONS FOR STORAGE AND USE OF FLAMMABLE CHEMICALS

a. General Guidelines:

i. Dispensing of flammable liquids from a shipping container greater than one gallon is not permitted.
ii. Dispensing of flammable liquids should be performed in a fume hood.
iii. Dispensing of flammable liquids near open fire or flame is prohibited.
iv. Refrigerators which are used for storage of flammable liquids must be approved as laboratory safe and so labeled.
v. Flammable liquids will be stored in containers no larger than the following:

Glass Containers

- 1 pint of Class IA flammable liquids (flash point <73 degree F, boiling point <100 degree F)
- 1 quart of Class IB flammable liquids (flash point <73 degree F; boiling point >100 degree F)
- 1 gallon of Class IC flammable liquids (flash point >73 degree F, boiling point <100 degree F)

Metal Containers

- 1 gallon of all Class I and Class II liquids
- > 1 gallon of all Class I and Class II liquids must be stored in approved safety containers.

Storage Volume

- No more than 10 gallons in aggregate of flammable liquids will be stored outside of an approved and labeled storage cabinet.
- No more than 60 gallons of flammable liquids may be stored inside of an approved flammable liquid storage cabinet.

Flammable Liquid Storage Cabinets

- Flammable liquid storage cabinets must meet approval requirements of Factory Mutual or Underwriters Laboratories. Such cabinets may be vented, but this is not required. If the cabinet is not to be vented, the vent openings should be sealed with the bungs supplied with the cabinet.
- Storage of flammable and combustible liquids is regulated by fire codes.

- Storage of flammable and combustible liquids must be in an approved flammable liquid storage cabinet.
- The total volume of flammable and combustible liquids stored in the cabinet should not exceed the maximum quantities recommended by the manufacturer of the cabinet, or 60 gallons, whichever is less.
- Quantities of flammable liquids greater than one liter should be stored in approved safety cans. Glass containers no larger than 1 gallon (4 L) are acceptable if purity would be adversely affected by storage in metal.

3. STORAGE OF CORROSIVE CHEMICALS

a. General Guidelines:

i. Storage areas should be constructed of materials that are resistant to the corrosive chemicals used.
ii. Corrosive chemicals may be stored under a fume hood; the fume hood should have vertical separations to provide for incompatible storage.
iii. Consult the MSDS for information on incompatible storage.
iv. All corrosive compressed gases will be stored in a chemical fume hood or approved ventilated cabinet.
v. v. Water sensitive corrosives should not be stored under sinks.

4. STORAGE AND HANDLING OF COMPRESSED GASES

a. General Guidelines

i. Mechanical failure of the cylinder, cylinder valve, or regulator can result in rapid dispersion of the pressurized contents into the atmosphere.
ii. Unsecured cylinders can be knocked over very easily, causing serious injury and damage.
iii. Impact can shear the valve from an uncapped cylinder, especially if a regulator is attached, causing a rocking or rocket action leading to personal injury.
iv. Gas cylinders containing flammable, toxic or corrosive gases, asphyxiant, or oxidizers must only be handled by trained personnel.
v. A label identifying the contents of the cylinder must be attached. Alternatively, the identification may be etched or printed on the cylinder.

vi. Do not accept a cylinder if the contents are not clearly identified.
vii. Do not rely on color coding to identify the contents of a gas cylinder; for a given gas the color coding is not standardized.
viii. Open cylinder valves slowly to prevent damage to the pressure regulator.
ix. Always use the proper regulator for the gas in the cylinder.
x. To transport a cylinder, use a hand truck equipped with a chain or belt for securing the cylinder.
xi. Make sure the protective cap covers the cylinder valve. Never move a cylinder while a regulator is attached.
xii. Do not move cylinders by carrying, rolling, sliding, or dragging them across the floor.
xiii. Do not transport oxygen and combustible gases at the same time.

b. Secure gas cylinders to prevent them from falling over:

i. Two chains or straps must be used to secure cylinders - one across the lower third and one across the upper third of the cylinder.
ii. Attach the chain(s) to a holding plate or rack which is securely fixed to structural membrane.
iii. Do not use bench side clamps.
iv. Base plates may be used for securing the cylinders.
v. Do not store incompatible gases together. Store cylinders of oxygen at least 20 feet away from cylinders of hydrogen or other flammable gases.
vi. Store cylinders away from heat (never in areas above 125 degree C). Heat sources may include steam or hot water pipes.
vii. Store cylinders away from areas where they might be subjected to mechanical damage. Store full and empty tanks separately, place “Empty” sign around the top of the empty tanks to avoid accidental connection of an empty cylinder to a pressurized system, causing backflow into the tank.
viii. Electrically ground cylinders of combustible gases (e.g., to a water pipe) to prevent buildup of static electricity.
ix. Keep cylinders away from locations where they might form part of an electrical circuit.
x. Keep the protective cap on the cylinder when the cylinder is not in use. The cap prevents the cylinder valve from being damaged or broken.

xi. National Fire Protection Association (NFPA) codes specify maximum quantities and sizes of hazardous gas cylinders in laboratory, workshop, and studio areas. A typical laboratory, workshop, and studio should have no more than:
    - Three standard cylinders of flammable gases and/or oxygen
    - Two standard cylinders of liquefied flammable gases
    - Three 4'X1 5" cylinders (or volume equivalent) of gases with high Health Hazard Ratings). Gases with Health Hazard Ratings of 3 or 4, or a rating of 2 with no physiological warning properties, MUST be kept in a ventilated enclosure. No more than three cylinders with ratings of 3 or 4 may be kept in one enclosure.

xii. Corrosive or unstable gases should be ordered in the minimum quantities necessary and stored in a hood or other safe, dry area.

xiii. Corrosive gases, if stored for long periods, will corrode the valve internally and may be impossible to open, or if opened, may not close.

xiv. Cylinders not needed for current use should not be stored in laboratories. Recommended maximum retention periods for gases are:
    - 36 months for liquefied flammable gases, flammable gases, and oxygen;
    - 6 months for corrosive or unstable gases or those with a Health Hazard Rating of 3 or 4.

xv. When a cylinder is empty (preferably not less than 25 psi residual pressure):
    - Close the valve to prevent air and moisture from entering the tank,
    - Remove the regulator (purging it if necessary to safely remove toxic or corrosive gases),
    - Replace the cylinder cap, and label the tank "EMPTY."

Use a hand truck to return the cylinder to the gas cylinder storage area and secure it until is removed.

xvi. Always use manufacturer-supplied valves and regulators. Do not mix-and-match valves and regulators from different units.

xvii. Use manufacturer recommended techniques and tools for installation and removal of valves, regulators, etc.

DEFINITIONS

Action level: a concentration designated in 29 CFR part 1910 for a specific substance, calculated as an eight (8)-hour time-weighted average, which initiates certain required activities such as exposure monitoring and medical surveillance.

Chemical Hygiene Office: an employee who is designated by the employer, and who is qualified by training or experience, to provide technical guidance in the development and implementation of the provisions of the Chemical Hygiene Plan.

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

Combustible liquid: any liquid having a flashpoint at or above 100 degrees Fahrenheit (F) (37.8 degrees Celsius [C]), but below 200 degrees F (93.3 degrees C), except any **mixture** having components with flashpoints of 200 degrees F (93.3 degrees C), or higher, the total volume of which make up 99 percent or more of the total volume of the mixture.

Compressed gas:

(i) A gas or mixture of gases having, in a container, an absolute pressure exceeding 40 pounds per square inch (psi) at 70 degrees F (21.1 degrees C); or

(ii) A gas or mixture of gases having, in a container, an absolute pressure exceeding 104 psi at 130 degrees F (54.4 degrees C) regardless of the pressure at 70 degrees F (21.1 deg. C); or

(iii) A liquid having a vapor pressure exceeding 40 psi at 100 degrees F (37.8 degrees C) as determined by ASTM D-323-72.

Designated area: an area which may be used for work with "select carcinogens," reproductive toxins or substances which 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 hood.

Emergency: any occurrence such as, but not limited to, equipment failure, rupture of containers or failure of control equipment which results in an uncontrolled release of a hazardous chemical into the workplace.

Employee: an individual employed in a laboratory workplace who may be exposed to hazardous chemicals in the course of his or her assignments.

Explosive: a chemical that causes a sudden, almost instantaneous release of pressure, gas, and heat when subjected to sudden shock, pressure, or high temperature.

Flammable: a chemical that falls into one of the following categories:

(i) Aerosol, flammable: an aerosol that, when tested by the method described in 16 CFR 1500.45, yields a flame protection exceeding 18 inches at full valve opening, or a flashback (a flame extending back to the valve) at any degree of valve opening;

(ii) Gas, flammable:

(a) A gas that, at ambient temperature and pressure, forms a flammable mixture with air at a concentration of 13 percent by volume or less; or

(b) A gas that, at ambient temperature and pressure, forms a range of flammable mixtures with air wider than 12 percent by volume, regardless of the lower limit.

(iii) Liquid, flammable: any liquid having a flashpoint below 100 degrees F (37.8 degrees C), except any mixture having components with flashpoints of 100 degrees C) or higher, the total of which make up 99 percent or more of the total volume of the mixture.

(iv) Solid, flammable: a solid, other than a blasting agent or explosive as defined

in § 1910.109(a), that is liable to cause fire through friction, absorption of moisture, spontaneous chemical change, or retained heat from manufacturing or processing, or which can be ignited readily and when ignited burns so vigorously and persistently as to create a serious hazard. A chemical shall be considered to be a flammable solid if, when tested by the method described in 16 CFR 1500.44, it ignites and burns with a self-sustained flame at a rate greater than one-tenth of an inch per second along its major axis.

Flashpoint: the minimum temperature at which a liquid gives off a vapor in sufficient concentration to ignite when tested.

Hazardous chemical: a chemical for which there is statistically significant evidence based on at least one study conducted in accordance with established scientific principles that acute or chronic health effects may occur in exposed employees. The term "health hazard" includes chemicals which are carcinogens, toxic or highly toxic agents, reproductive toxins, irritants, corrosives, sensitizers, hepatotoxins, nephrotoxins, neurotoxins, agents which act on the hematopoietic systems, and agents which damage the lungs, skin, eyes, or mucous membranes.

Laboratory: a facility where the "laboratory use of hazardous chemicals" occurs. It is a workplace where relatively small quantities of hazardous chemicals are used on a non-production basis.

Laboratory scale: work with substances in which the containers used for reactions, transfers, and other handling of substances are designed to be easily and safety manipulated by one person.

Laboratory-type hood: a device located in a laboratory, enclosure on five sides with a movable sash or fixed partial enclosed on the remaining side; constructed and maintained to draw air from the laboratory and to prevent or minimize the escape of air contaminants into the laboratory; and allows chemical manipulations to be conducted in the enclosure without insertion of any portion of the employee's body other than hands and arms.

Laboratory use of hazardous chemicals: handling or use of such chemicals in which all of the following conditions are met:

(i) Chemical manipulations are carried out on a "laboratory scale;"

(ii) Multiple chemical procedures or chemicals are used;

(iii) The procedures involved are not part of a production process, nor in any way simulate a production process; and

(iv) "Protective laboratory practices and equipment" are available and in common use to minimize the potential for employee exposure to hazardous chemicals.

Medical consultation: a consultation which takes place between an employee and a licensed physician for the purpose of determining what medical examinations or procedures, if any, are appropriate in cases where a significant exposure to a hazardous chemical may have taken place.

Organic peroxide: an organic compound that contains the bivalent -O-O- structure and which may be considered to be a structural derivative of hydrogen peroxide where one or both of the hydrogen atoms has been replaced by an organic radical.

Oxidizer: a chemical other than a blasting agent or explosive as defined in § 1910.109(a), that initiates or promotes combustion in other materials, thereby causing fire either of itself or through the release of oxygen or other gases.

Physical hazard: a chemical 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.

Protective laboratory practices and equipment: those laboratory procedures, practices and equipment accepted by laboratory health and safety experts as effective, or that the employer can show to be effective, in minimizing the potential for employee exposure to hazardous chemicals.

Reproductive toxins: chemicals which affect the reproductive chemicals which affect the reproductive capabilities including chromosomal damage (mutations) and effects on fetuses (teratogenesis).

Select carcinogen: any substance which meets one of the following criteria:

(i) It is regulated by Occupational Safety and Health Administration as a carcinogen; or

(ii) It is listed under the category, "known to be carcinogens," in the Annual Report on Carcinogens published by the National Toxicology Program (NTP) (latest edition); or

(iii) It is listed under Group 1 ("carcinogenic to humans") by the International Agency for research on Cancer Monographs (IARC)(latest editions); or

(iv) It is listed in either Group 2A or 2B by IARC or under the category, "reasonably anticipated to be carcinogens" by NTP, and causes statistically significant tumor incidence in experimental animals in accordance with any of the following criteria:

(a) After inhalation exposure of 6-7 hours per day, 5 days per week, for a significant portion of a lifetime to dosages of less than 10 milligrams per cubic meter;

(b) After repeated skin application of less than 300 (milligrams per kilogram [mg/kg] of body weight) per week; or

(c) After oral dosages of less than 50 mg/kg of body weight per day.

Unstable (reactive): a chemical which is the pure state, or as produced or transported, will vigorously polymerize, decompose, condense, or will become self-reactive under conditions of shocks, pressure or temperature.

Water-reactive: a chemical that reacts with water to release a gas that is either flammable or presents a health hazard.

Industrial Toxicology Overview

Chemical Toxicology

Toxicology is the study of the nature and action of poisons.

Toxicity is the ability of a chemical molecule or compound to produce injury once it reaches a susceptible site in or on the body.

Toxicity hazard is the probability that injury will occur considering the manner in which the substance is used.

Dose-Response Relationships

The potential toxicity (harmful action) inherent in a substance is manifest only when that substance comes in contact with a living biological system. A chemical normally thought of as "harmless" will evoke a toxic response if added to a biological system in sufficient amount. The toxic potency of a chemical is thus ultimately defined by the relationship that is produced in a biological system.

Routes of Entry into the Body

There are four main routes by which hazardous chemicals enter the body:

- Inhalation: Absorption through the respiratory tract. Most important in terms of severity.
- Skin absorption.
- Ingestion: Absorption through the digestive tract. Can occur through eating or smoking with contaminated hands or in contaminated work areas.
- Injection. Can occur by accidental needle stick or puncture of skin with a sharp object.

Most exposure standards, Threshold Limit Values (TLVs) and Permissible Exposure Limits (PELs), are based on the inhalation route of exposure. They are normally expressed in terms of either parts per million (ppm) or milligrams per cubic meter (mg/m3) concentration in air.

If a significant route of exposure for a substance is through skin contact, the TLV or PEL will have a "skin" notation. Examples are pesticides, carbon disulfide, carbon tetrachloride, dioxane, mercury, thallium compounds, xylene, and hydrogen cyanide.

Types of Effects

Acute poisoning is characterized by rapid absorption of the substance and the exposure is sudden and severe. Normally, a single large exposure is involved. Examples are carbon monoxide or cyanide poisoning.

Chronic poisoning is characterized by prolonged or repeated exposures of a duration measured in days, months or years. Symptoms may not be immediately apparent. Examples are lead or mercury poisoning, pesticide exposure.

Local refers to the site of action of an agent and means the action takes place at the point or area of contact. The site may be skin, mucous membranes, the respiratory tract, gastrointestinal system, eyes, etc. Absorption does not necessarily occur. Examples are strong acids or alkalis and war gases.

Systemic refers to a site of action other than the point of contact and presupposes absorption has taken place. For example, an inhaled material may act on the liver. Examples are arsenic affects the blood, nervous system, liver, kidneys and skin; benzene affects bone marrow.

Cumulative poisons are characterized by materials that tend to build up in the body as a result of numerous chronic exposures. The effects are not seen until a critical body burden is reached. Examples are heavy metals.

Substances in combination, meaning two or more hazardous materials present at the same time whose resulting effect is greater than the effect predicted based on the individual substances. This combined effect is called a **synergistic** or **potentiating** effect. An example is exposure to alcohol and chlorinated solvents.

Other Factors Affecting Toxicity

- Rate of entry and route of exposure; that is, how fast the toxic dose is delivered and by what means.
- Age can affect the capacity to repair tissue damaged.
- Previous exposure can lead to tolerance, increased sensitivity, or make no difference.

- State of health, medications, physical condition, and life style can affect the toxic response. Pre-existing disease can result in increased sensitivity.
- Environmental factors, such as temperature and pressure.
- Host factors, including genetic predisposition and the sex of the exposed individual.

Physical Classifications of Toxic Materials

Gas applies to a substance which is in the gaseous state at room temperature and pressure.

A **vapor** is the gaseous phase of a material which is ordinarily a solid or a liquid at room temperature and pressure.

When considering the toxicity of gases and vapors, the **solubility** of the substance is a key factor. Highly soluble materials like ammonia irritate the upper respiratory tract. On the other hand, relatively insoluble materials like nitrogen dioxide penetrate deep into the lung. Fat soluble materials, like pesticides, tend to have longer residence times in the body.

An **aerosol** is composed of solid or liquid particles of microscopic size dispersed in a gaseous medium. The toxic potential of an aerosol is only partially described by its concentration in milligrams per cubic meter (mg/m^3). For a proper assessment of the toxic hazard, the size of the aerosol's particles is important. Particles above 1 micrometer tend to deposit in the upper respiratory tract. Below 1 micrometer particles enter the lung. Very small particles (< 0.2 micrometer) are generally not deposited.

Physiological Classifications of Toxic Materials

Irritants are materials that cause inflammation of mucous membranes with which they come in contact. Inflammation of tissue results from concentrations far below those needed to cause corrosion. Examples include:

- ammonia
- hydrogen chloride
- halogens
- phosgene
- nitrogen dioxide
- arsenic trichloride
- phosphorus chlorides
- alkaline dusts and mists
- diethyl/dimethyl sulfate
- hydrogen fluoride
- ozone

Irritants can also cause changes in the mechanics of respiration and lung function. Examples include:

- sulfur dioxide
- formaldehyde
- sulfuric acid
- iodine
- acetic acid
- formic acid
- acrolein

Long term exposure to irritants can result in increased mucous secretions and chronic bronchitis.

A **primary irritant** exerts no systemic toxic action either because the products formed on the tissue of the respiratory tract are non-toxic or because the irritant action is far in excess of any systemic toxic action. Example: hydrogen chloride.

A **secondary irritant's** effect on mucous membranes is over-shadowed by a systemic effect resulting from absorption. Examples include hydrogen sulfide and aromatic hydrocarbons.

Exposure to a secondary irritant can result in pulmonary edema, hemorrhage, and tissue necrosis.

Corrosives are chemicals which may cause visible destruction of or irreversible alterations in living tissue by chemical action at the site of contact. Examples include sulfuric acid, potassium hydroxide, chromic acid, and sodium hydroxide

Asphyxiants have the ability to deprive tissue of oxygen.

Simple asphyxiants are inert gases that displace oxygen. Examples include, nitrogen, nitrous oxide, carbon dioxide, hydrogen, and helium.

Chemical asphyxiants render the body incapable of utilizing an adequate oxygen supply. They are toxic at very low concentrations (few ppm). Examples include carbon monoxide and hydrogen cyanide.

Primary anesthetics have a depressant effect upon the central nervous system, particularly the brain. Examples include halogenated hydrocarbons, ether, and alcohols.

Hepatotoxic agents cause damage to the liver. Examples include carbon tetrachloride, nitrosamines, and tetrachloroethane.

Nephrotoxic agents damage the kidneys. Examples include halogenated hydrocarbons and uranium compounds.

Neurotoxic agents damage the nervous system. The nervous system is especially sensitive to organometallic compounds and certain sulfide compounds. Examples include:

- trialkyl tin compounds
- methyl mercury
- organic phosphorus
- insecticides
- tetraethyl lead
- carbon disulfide
- thallium
- manganese

Some toxic agents act on the blood or hematopoietic system. The blood cells can be directly affected or bone marrow can be damaged. Examples include:

- nitrites
- toluidine
- benzene
- aniline
- nitrobenzene

There are toxic agents that produce damage of the pulmonary tissue (lungs) but not by immediate irritant action. Fibrotic changes can be caused by free crystalline silica and asbestos. Other dusts can cause a restrictive disease called pneumoconiosis. Examples include coal dust, cotton dust and wood dusts.

A **carcinogen** commonly describes any agent or mixture which contains an agent that can initiate or speed the development of malignant or potentially malignant tumors or malignant neoplastic proliferation of cells. Known human carcinogens include:

- asbestos
- alpha-napthylamine
- 3,3'-dichlorobenzidine
- vinyl chloride
- ethylene oxide
- N-nitrosodimethylamine
- inorganic arsenic
- 1,2-dibromo-3-chloropropane (DBCP)
- coal tar pitch volatiles
- 4-nitrobiphenyl
- methyl chloromethyl ether
- bis-chloromethyl ether

A **mutagen** affects the chromosome chains of exposed cells. The effect is hereditary and becomes part of the genetic pool passed on to future generations.

A **teratogen** (embryotoxic or fetotoxic agent) is an agent which interferes with normal embryonic development without damage to the mother or lethal effect on the fetus. Effects are not hereditary. Examples include lead and dibromodichloropropane.

A **sensitizer** causes a substantial proportion of exposed people to develop an allergic reaction in normal tissue after repeated exposure to the chemical. The reaction may be as mild as a rash (contact dermatitis) or as serious as anaphylactic shock. Examples include:

- epoxides
- amines
- poison ivy
- toluene diisocyanate
- chromium compounds
- chlorinated hydrocarbons
- formaldehyde
- nickel compounds

Target Organ Effects

The following is a target organ categorization of effects which may occur, including examples of signs and symptoms and chemicals which have been found to cause such effects.

- **Hepatotoxics cause liver damage**
  Signs and symptoms: jaundice, liver enlargement
  Example chemicals: carbon tetrachloride, nitrosamines, chloroform, toluene, perchloroethylene, cresol, dimethylsulfate

- **Nephrotoxics produce kidney damage**
  Signs and symptoms: edema, proteinuria
  Example chemicals: halogenated hydrocarbons, uranium, chloroform, mercury, dimethyl sulfate

- **Neurotoxins affect the nervous system**
  Signs and symptoms: narcosis, behavioral changes, decreased muscle coordination
  Example chemicals: mercury, carbon disulfide, benzene, carbon tetrachloride, lead, mercury, nitrobenzene

- **Hematopoietic agents decrease blood functions**
  Signs and symptoms: cyanosis, loss of consciousness.
  Example chemicals: carbon monoxide, cyanides, nitrobenzene, aniline, arsenic, benzene, toluene

- **Pulmonary agents irritate or damage the lungs**
  Signs and symptoms: cough, tightness in chest, shortness of breath.

Example chemicals: silica, asbestos, nitrogen dioxide, ozone, hydrogen sulfide, chromium, nickel, alcohol.

- **Reproductive toxins affect the reproductive system (mutations and teratogenesis)**

  Signs and symptoms: birth defects, sterility.

  Example chemicals: lead, dibromodichloropropane.

- **Skin hazards affect the dermal layer of the body**

  Signs and symptoms: defatting of skin, rashes, irritation.

  Example chemicals: ketones, chlorinated compounds, alcohols, nickel, phenol, trichloroethylene.

- **Eye hazards affect the eye or vision**

  Signs and symptoms: conjunctivitis, corneal damage.

  Example chemicals: organic solvents, acids, cresol, quinone, hydroquinone, benzyl chloride, butyl alcohol, bases.

STATE OF CALIFORNIA
ENVIRONMENTAL PROTECTION AGENCY
OFFICE OF ENVIRONMENTAL HEALTH HAZARD ASSESSMENT
SAFE DRINKING WATER AND TOXIC ENFORCEMENT ACT OF 1986

CHEMICALS KNOWN TO THE STATE TO CAUSE CANCER OR REPRODUCTIVE TOXICITY
DECEMBER 8, 2006

The Safe Drinking Water and Toxic Enforcement Act of 1986 requires that the Governor revise and republish at least once per year the list of chemicals known to the State to cause cancer or reproductive toxicity. The identification number indicated in the following list is the Chemical Abstracts Service (CAS) Registry Number. No CAS number is given when several substances are presented as a single listing. The date refers to the initial appearance of the chemical on the list. For easy reference, chemicals which are shown underlined are newly added. Chemicals or endpoints shown in strikeout were placed on the Proposition 65 list on the date noted, and have subsequently been removed.

Chemical	Type of Toxicity	CAS No.	Date Listed
A-alpha-C (2-Amino-9H-pyrido [2,3-b]indole)	cancer	26148-68-5	January 1, 1990
Acetaldehyde	cancer	75-07-0	April 1, 1988
Acetamide	cancer	60-35-5	January 1, 1990
Acetazolamide	developmental	59-66-5	August 20, 1999
Acetochlor	cancer	34256-82-1	January 1, 1989
Acetohydroxamic acid	developmental	546-88-3	April 1, 1990
2-Acetylaminofluorene	cancer	53-96-3	July 1, 1987
Acifluorfen	cancer	62476-59-9	January 1, 1990
Acrylamide	cancer	79-06-1	January 1, 1990
Acrylonitrile	cancer	107-13-1	July 1, 1987
Actinomycin D	cancer developmental	50-76-0	October 1, 1989 October 1, 1992
AF-2;[2-(2-furyl)-3-(5-nitro-2-furyl)] acrylamide	cancer	3688-53-7	July 1, 1987
Aflatoxins	cancer	---	January 1, 1988
Alachlor	cancer	15972-60-8	January 1, 1989
Alcoholic beverages, when associated with alcohol abuse	cancer	---	July 1, 1988
Aldrin	cancer	309-00-2	July 1, 1988
All-trans retinoic acid	developmental	302-79-4	January 1, 1989
~~Allyl chloride~~ Delisted October 29, 1999	~~cancer~~	~~107-05-1~~	~~January 1, 1990~~
Alprazolam	developmental	28981-97-7	July 1, 1990
Altretamine	developmental, male	645-05-6	August 20, 1999
Amantadine hydrochloride	developmental	665-66-7	February 27, 2001
Amikacin sulfate	developmental	39831-55-5	July 1, 1990
2-Aminoanthraquinone	cancer	117-79-3	October 1, 1989
p-Aminoazobenzene	cancer	60-09-3	January 1, 1990
o-Aminoazotoluene	cancer	97-56-3	July 1, 1987
4-Aminobiphenyl (4-amino-diphenyl)	cancer	92-67-1	February 27, 1987
1-Amino-2,4-dibromo-anthraquinone	cancer	81-49-2	August 26, 1997
3-Amino-9-ethylcarbazole hydrochloride	cancer	6109-97-3	July 1, 1989

2-Aminofluorene	cancer	153-78-6	January 29, 1999
Aminoglutethimide	developmental	125-84-8	July 1, 1990
Aminoglycosides	developmental	---	October 1, 1992
1-Amino-2-methylanthraquinone	cancer	82-28-0	October 1, 1989
2-Amino-5-(5-nitro-2-furyl)-1,3,4-thiadiazole	cancer	712-68-5	July 1, 1987
4-Amino-2-nitrophenol	cancer	119-34-6	January 29, 1999
Aminopterin	developmental, female	54-62-6	July 1, 1987
Amiodarone hydrochloride	developmental, female, male	19774-82-4	August 26, 1997
Amitraz	developmental	33089-61-1	March 30, 1999
Amitrole	cancer	61-82-5	July 1, 1987
Amoxapine	developmental	14028-44-5	May 15, 1998
Anabolic steroids	female, male	---	April 1, 1990
Analgesic mixtures containing phenacetin	cancer	---	February 27, 1987
Angiotensin converting enzyme (ACE) inhibitors	developmental	---	October 1, 1992
Aniline	cancer	62-53-3	January 1, 1990
Aniline hydrochloride	cancer	142-04-1	May 15, 1998
o-Anisidine	cancer	90-04-0	July 1, 1987
o-Anisidine hydrochloride	cancer	134-29-2	July 1, 1987
Anisindione	developmental	117-37-3	October 1, 1992
Antimony oxide (Antimony trioxide)	cancer	1309-64-4	October 1, 1990
Aramite	cancer	140-57-8	July 1, 1987
Areca nut	cancer	---	February 3, 2006
Aristolochic acids	cancer	---	July 9, 2004
Arsenic (inorganic arsenic compounds)	cancer	--	February 27, 1987
Arsenic (inorganic oxides)	developmental	---	May 1, 1997
Asbestos	cancer	1332-21-4	February 27, 1987
Aspirin (NOTE: It is especially important not to use aspirin during the last three months of pregnancy, unless specifically directed to do so by a physician because it may cause problems in the unborn child or complications during delivery.)	developmental, female	50-78-2	July 1, 1990
Atenolol	developmental	29122-68-7	August 26, 1997
Auramine	cancer	492-80-8	July 1, 1987
Auranofin	developmental	34031-32-8	January 29, 1999
Azacitidine	cancer	320-67-2	January 1, 1992
Azaserine	cancer	115-02-6	July 1, 1987
Azathioprine	cancer developmental	446-86-6	February 27, 1987 September 1, 1996
Azobenzene	cancer	103-33-3	January 1, 1990
Barbiturates	developmental	---	October 1, 1992
Beclomethasone dipropionate	developmental	5534-09-8	May 15, 1998
Benomyl	developmental, male	17804-35-2	July 1, 1991
Benz[a]anthracene	cancer	56-55-3	July 1, 1987
Benzene	cancer developmental, male	71-43-2	February 27, 1987 December 26, 1997
Benzidine [and its salts]	cancer	92-87-5	February 27, 1987
Benzidine-based dyes	cancer	---	October 1, 1992
Benzodiazepines	developmental	---	October 1, 1992

Benzo[b]fluoranthene	cancer	205-99-2	July 1, 1987
Benzo[j]fluoranthene	cancer	205-82-3	July 1, 1987
Benzo[k]fluoranthene	cancer	207-08-9	July 1, 1987
Benzofuran	cancer	271-89-6	October 1, 1990
Benzo[a]pyrene	cancer	50-32-8	July 1, 1987
Benzotrichloride	cancer	98-07-7	July 1, 1987
Benzphetamine hydrochloride	developmental	5411-22-3	April 1, 1990
Benzyl chloride	cancer	100-44-7	January 1, 1990
Benzyl violet 4B	cancer	1694-09-3	July 1, 1987
Beryllium and beryllium compounds	cancer	---	October 1, 1987
Betel quid with tobacco	cancer	---	January 1, 1990
Betel quid without tobacco	cancer	---	February 3, 2006
2,2-Bis(bromomethyl)-1,3-propanediol	cancer	3296-90-0	May 1, 1996
Bis(2-chloroethyl)ether	cancer	111-44-4	April 1, 1988
N,N-Bis(2-chloroethyl)-2-naphthylamine (Chlornapazine)	cancer	494-03-1	February 27, 1987
Bischloroethyl nitrosourea (BCNU) (Carmustine)	cancer developmental	154-93-8	July 1, 1987 July 1, 1990
Bis(chloromethyl)ether	cancer	542-88-1	February 27, 1987
Bis(2-chloro-1-methylethyl)ether, technical grade	cancer	---	October 29, 1999
Bitumens, extracts of steam-refined and air refined	cancer	---	January 1, 1990
Bracken fern	cancer	---	January 1, 1990
Bromacil lithium salt	developmental male	53404-19-6	May 18, 1999 January 17, 2003
Bromate	cancer	15541-45-4	May 31, 2002
Bromodichloromethane	cancer	75-27-4	January 1, 1990
Bromoethane	cancer	74-96-4	December 22, 2000
Bromoform	cancer	75-25-2	April 1, 1991
1-Bromopropane (1-BP)	developmental, female, male	106-94-5	December 7, 2004
2-Bromopropane (2-BP)	female, male	75-26-3	May 31, 2005
Bromoxynil	developmental	1689-84-5	October 1, 1990
Bromoxynil octanoate	developmental	1689-99-2	May 18, 1999
Butabarbital sodium	developmental	143-81-7	October 1, 1992
1,3-Butadiene	cancer	106-99-0	April 1, 1988
1,3-Butadiene	developmental, female, male	106-99-0	April 16, 2004
1,4-Butanediol dimethanesulfonate (Busulfan)	cancer developmental	55-98-1	February 27, 1987 January 1, 1989
Butylated hydroxyanisole	cancer	25013-16-5	January 1, 1990
Butyl benzyl phthalate (BBP)	developmental	85-68-7	December 2, 2005
beta-Butyrolactone	cancer	3068-88-0	July 1, 1987
Cacodylic acid	cancer	75-60-5	May 1, 1996
Cadmium	developmental, male	---	May 1, 1997
Cadmium and cadmium compounds	cancer	---	October 1, 1987
Caffeic acid	cancer	331-39-5	October 1, 1994
Captafol	cancer	2425-06-1	October 1, 1988
Captan	cancer	133-06-2	January 1, 1990
Carbamazepine	developmental	298-46-4	January 29, 1999
Carbazole	cancer	86-74-8	May 1, 1996

Carbon black (airborne, unbound particles of respirable size)	cancer	1333-86-4	February 21, 2003
Carbon disulfide	developmental, female, male	75-15-0	July 1, 1989
Carbon monoxide	developmental	630-08-0	July 1, 1989
Carbon tetrachloride	cancer	56-23-5	October 1, 1987
Carbon-black extracts	cancer	---	January 1, 1990
Carboplatin	developmental	41575-94-4	July 1, 1990
N-Carboxymethyl-N-nitrosourea	cancer	60391-92-6	January 25, 2002
Catechol	cancer	120-80-9	July 15, 2003
Ceramic fibers (airborne particles of respirable size)	cancer	---	July 1, 1990
Certain combined chemotherapy for lymphomas	cancer	---	February 27, 1987
Chenodiol	developmental	474-25-9	April 1, 1990
Chlorambucil	cancer developmental	305-03-3	February 27, 1987 January 1, 1989
Chloramphenicol	cancer	56-75-7	October 1, 1989
Chlorcyclizine hydrochloride	developmental	1620-21-9	July 1, 1987
Chlordane	cancer	57-74-9	July 1, 1988
Chlordecone (Kepone)	cancer developmental	143-50-0	January 1, 1988 January 1, 1989
Chlordiazepoxide	developmental	58-25-3	January 1, 1992
Chlordiazepoxide hydrochloride	developmental	438-41-5	January 1, 1992
Chlordimeform	cancer	6164-98-3	January 1, 1989
Chlorendic acid	cancer	115-28-6	July 1, 1989
Chlorinated paraffins (Average chain length, C12;approximately 60 percent chlorine by weight)	cancer	108171-26-2	July 1, 1989
p-Chloroaniline	cancer	106-47-8	October 1, 1994
p-Chloroaniline hydrochloride	cancer	20265-96-7	May 15, 1998
~~Chlorodibromomethane~~ Delisted October 29, 1999	~~cancer~~	~~124-48-1~~	~~January 1, 1990~~
Chloroethane (Ethyl chloride)	cancer	75-00-3	July 1, 1990
1-(2-Chloroethyl)-3-cyclohexyl-1-nitrosourea (CCNU) (Lomustine)	cancer developmental	13010-47-4	January 1, 1988 July 1, 1990
1-(2-Chloroethyl)-3-(4-methylcyclohexyl) -1-nitrosourea (Methyl-CCNU)	cancer	13909-09-6	October 1, 1988
Chloroform	cancer	67-66-3	October 1, 1987
Chloromethyl methyl ether (technical grade)	cancer	107-30-2	February 27, 1987
3-Chloro-2-methylpropene	cancer	563-47-3	July 1, 1989
1-Chloro-4-nitrobenzene	cancer	100-00-5	October 29, 1999
4-Chloro-*o*-phenylenediamine	cancer	95-83-0	January 1, 1988
Chloroprene	cancer	126-99-8	June 2, 2000
Chlorothalonil	cancer	1897-45-6	January 1, 1989
p-Chloro-*o*-toluidine	cancer	95-69-2	January 1, 1990
p-Chloro-*o*-toluidine, strong acid salts of	cancer	---	May 15, 1998
5-Chloro-*o*-toluidine and its strong acid salts	cancer	---	October 24, 1997
Chlorotrianisene	cancer	569-57-3	September 1, 1996
Chlorozotocin	cancer	54749-90-5	January 1, 1992
Chlorsulfuron	developmental, female, male	64902-72-3	May 14, 1999
Chromium (hexavalent compounds)	cancer	---	February 27, 1987
Chrysene	cancer	218-01-9	January 1, 1990

C.I. Acid Red 114	cancer	6459-94-5	July 1, 1992
C.I. Basic Red 9 monohydrochloride	cancer	569-61-9	July 1, 1989
C.I. Direct Blue 15	cancer	2429-74-5	August 26, 1997
C.I. Direct Blue 218	cancer	28407-37-6	August 26, 1997
C.I. Solvent Yellow 14	cancer	842-07-9	May 15, 1998
Ciclosporin (Cyclosporin A; Cyclosporine)	cancer	59865-13-3 79217-60-0	January 1, 1992
Cidofovir	cancer, developmental, female, male	113852-37-2	January 29, 1999
Cinnamyl anthranilate	cancer	87-29-6	July 1, 1989
Cisplatin	cancer	15663-27-1	October 1, 1988
Citrus Red No. 2	cancer	6358-53-8	October 1, 1989
Cladribine	developmental	4291-63-8	September 1, 1996
Clarithromycin	developmental	81103-11-9	May 1, 1997
Clobetasol propionate	developmental, female	25122-46-7	May 15, 1998
Clofibrate	cancer	637-07-0	September 1, 1996
Clomiphene citrate	developmental	50-41-9	April 1, 1990
Clorazepate dipotassium	developmental	57109-90-7	October 1, 1992
Cobalt metal powder	cancer	7440-48-4	July 1, 1992
Cobalt [II] oxide	cancer	1307-96-6	July 1, 1992
Cobalt sulfate	cancer	10124-43-3	May 20, 2005
Cobalt sulfate heptahydrate	cancer	10026-24-1	June 2, 2000
Cocaine	developmental, female	50-36-2	July 1, 1989
Codeine phosphate	developmental	52-28-8	May 15, 1998
Coke oven emissions	cancer	---	February 27, 1987
Colchicine	developmental, male	64-86-8	October 1, 1992
Conjugated estrogens	cancer developmental	---	February 27, 1987 April 1, 1990
Creosotes	cancer	---	October 1, 1988
p-Cresidine	cancer	120-71-8	January 1, 1988
Cupferron	cancer	135-20-6	January 1, 1988
Cyanazine	developmental	21725-46-2	April 1, 1990
Cycasin	cancer	14901-08-7	January 1, 1988
Cycloate	developmental	1134-23-2	March 19, 1999
~~Cyclohexanol~~ Delisted January 25, 2002	~~male~~	~~108-93-0~~	~~November 6, 1998~~
Cycloheximide	developmental	66-81-9	January 1, 1989
Cyclophosphamide (anhydrous)	cancer developmental, female, male	50-18-0	February 27, 1987 January 1, 1989
Cyclophosphamide (hydrated)	cancer developmental, female, male	6055-19-2	February 27, 1987 January 1, 1989
Cyhexatin	developmental	13121-70-5	January 1, 1989
Cytarabine	developmental	147-94-4	January 1, 1989
Cytembena	cancer	21739-91-3	May 15, 1998
D&C Orange No. 17	cancer	3468-63-1	July 1, 1990
D&C Red No. 8	cancer	2092-56-0	October 1, 1990
D&C Red No. 9	cancer	5160-02-1	July 1, 1990
D&C Red No. 19	cancer	81-88-9	July 1, 1990
Dacarbazine	cancer developmental	4342-03-4	January 1, 1988 January 29, 1999
Daminozide	cancer	1596-84-5	January 1, 1990
Danazol	developmental	17230-88-5	April 1, 1990

Dantron (Chrysazin; 1,8-Dihydroxy-anthraquinone)	cancer	117-10-2	January 1, 1992
Daunomycin	cancer	20830-81-3	January 1, 1988
Daunorubicin hydrochloride	developmental	23541-50-6	July 1, 1990
2,4-D butyric acid	~~developmental~~, male	94-82-6	June 18, 1999
DDD (Dichlorodiphenyldichloroethane)	cancer	72-54-8	January 1, 1989
DDE (Dichlorodiphenyldichloroethylene)	cancer	72-55-9	January 1, 1989
DDT (Dichlorodiphenyltrichloroethane)	cancer	50-29-3	October 1 , 1987
o,p'-DDT	developmental, female, male	789-02-6	May 15, 1998
p,p'-DDT	developmental, female, male	50-29-3	May 15, 1998
DDVP (Dichlorvos)	cancer	62-73-7	January 1, 1989
~~2,4-DP (dichloroprop)~~ Delisted January 25, 2002	~~developmental~~	~~120-36-5~~	~~April 27, 1999~~
N,N'-Diacetylbenzidine	cancer	613-35-4	October 1, 1989
2,4-Diaminoanisole	cancer	615-05-4	October 1, 1990
2,4-Diaminoanisole sulfate	cancer	39156-41-7	January 1, 1988
4,4'-Diaminodiphenyl ether (4,4'-Oxydianiline)	cancer	101-80-4	January 1, 1988
2,4-Diaminotoluene	cancer	95-80-7	January 1, 1988
Demeclocycline hydrochloride (internal use)	developmental	64-73-3	January 1, 1992
Diaminotoluene (mixed)	cancer	---	January 1, 1990
Diazepam	developmental	439-14-5	January 1, 1992
Diazoaminobenzene	cancer	136-35-6	May 20, 2005
Diazoxide	developmental	364-98-7	February 27, 2001
Dibenz[a,h]acridine	cancer	226-36-8	January 1, 1988
Dibenz[a,j]acridine	cancer	224-42-0	January 1, 1988
Dibenz[a,h]anthracene	cancer	53-70-3	January 1, 1988
7H-Dibenzo[c,g]carbazole	cancer	194-59-2	January 1, 1988
Dibenzo[a,e]pyrene	cancer	192-65-4	January 1, 1988
Dibenzo[a,h]pyrene	cancer	189-64-0	January 1, 1988
Dibenzo[a,i]pyrene	cancer	189-55-9	January 1, 1988
Dibenzo[a,l]pyrene	cancer	191-30-0	January 1, 1988
1,2-Dibromo-3-chloropropane (DBCP)	cancer male	96-12-8	July 1, 1987 February 27, 1987
2,3-Dibromo-1-propanol	cancer	96-13-9	October 1, 1994
Dichloroacetic acid	cancer	79-43-6	May 1, 1996
p-Dichlorobenzene	cancer	106-46-7	January 1, 1989
3,3'-Dichlorobenzidine	cancer	91-94-1	October 1, 1987
3,3'-Dichlorobenzidine dihydrochloride	cancer	612-83-9	May 15, 1998
1,4-Dichloro-2-butene	cancer	764-41-0	January 1, 1990
3,3'-Dichloro-4,4'-diaminodiphenyl ether	cancer	28434-86-8	January 1, 1988
1,1-Dichloroethane	cancer	75-34-3	January 1, 1990
Dichloromethane (Methylene chloride)	cancer	75-09-2	April 1, 1988
Dichlorophene	developmental	97-23-4	April 27, 1999
Dichlorphenamide	developmental	120-97-8	February 27, 2001
Diclofop methyl	developmental	51338-27-3	March 5, 1999
1,2-Dichloropropane	cancer	78-87-5	January 1, 1990
1,3-Dichloropropene	cancer	542-75-6	January 1, 1989
Dicumarol	developmental	66-76-2	October 1, 1992
Dieldrin	cancer	60-57-1	July 1, 1988
Dienestrol	cancer	84-17-3	January 1, 1990
Diepoxybutane	cancer	1464-53-5	January 1, 1988

Diesel engine exhaust	cancer	---	October 1, 1990
Di(2-ethylhexyl)phthalate (DEHP)	cancer	117-81-7	January 1, 1988
	developmental, male		October 24, 2003
1,2-Diethylhydrazine	cancer	1615-80-1	January 1, 1988
Diethylstilbestrol (DES)	cancer	56-53-1	February 27, 1987
	developmental		July 1, 1987
Diethyl sulfate	cancer	64-67-5	January 1, 1988
Diflunisal	developmental, female	22494-42-4	January 29, 1999
Diglycidyl resorcinol ether (DGRE)	cancer	101-90-6	July 1, 1989
Dihydroergotamine mesylate	developmental	6190-39-2	May 1, 1997
Dihydrosafrole	cancer	94-58-6	January 1, 1988
Di-*n*-butyl phthalate (DBP)	developmental, female, male	84-74-2	December 2, 2005
Di-*n*-hexyl phthalate (DnHP)	female, male	84-75-3	December 2, 2005
Diisopropyl sulfate	cancer	2973-10-6	April 1, 1993
Diltiazem hydrochloride	developmental	33286-22-5	February 27, 2001
3,3'-Dimethoxybenzidine (*o*-Dianisidine)	cancer	119-90-4	January 1, 1988
3,3'-Dimethoxybenzidine dihydrochloride (*o*-Dianisidine dihydrochloride)	cancer	20325-40-0	October 1, 1990
3,3'-Dimethoxybenzidine-based dyes metabolized to 3,3'-dimethoxybenzidine	cancer	---	June 11, 2004
3,3'-Dimethylbenzidine-based dyes metabolized to 3,3'-dimethylbenzidine	cancer	---	June 11, 2004
4-Dimethylaminoazobenzene	cancer	60-11-7	January 1, 1988
trans-2-[(Dimethylamino)methyl-imino]-5-[2-(5-nitro-2-furyl)vinyl]-1,3,4-oxadiazole	cancer	55738-54-0	January 1, 1988
7,12-Dimethylbenz(a)anthracene	cancer	57-97-6	January 1, 1990
3,3'-Dimethylbenzidine (ortho-Tolidine)	cancer	119-93-7	January 1, 1988
3,3'-Dimethylbenzidine dihydrochloride	cancer	612-82-8	April 1, 1992
Dimethylcarbamoyl chloride	cancer	79-44-7	January 1, 1988
1,1-Dimethylhydrazine (UDMH)	cancer	57-14-7	October 1, 1989
1,2-Dimethylhydrazine	cancer	540-73-8	January 1, 1988
Dimethyl sulfate	cancer	77-78-1	January 1, 1988
Dimethylvinylchloride	cancer	513-37-1	July 1, 1989
m-Dinitrobenzene	male	99-65-0	July 1, 1990
o-Dinitrobenzene	male	528-29-0	July 1, 1990
p-Dinitrobenzene	male	100-25-4	July 1, 1990
3,7-Dinitrofluoranthene	cancer	105735-71-5	August 26, 1997
3,9-Dinitrofluoranthene	cancer	22506-53-2	August 26, 1997
1,6-Dinitropyrene	cancer	42397-64-8	October 1, 1990
1,8-Dinitropyrene	cancer	42397-65-9	October 1, 1990
Dinitrotoluene (technical grade)	female, male	---	August 20, 1999
Dinitrotoluene mixture, 2,4-/2,6-	cancer	---	May 1, 1996
2,4-Dinitrotoluene	cancer	121-14-2	July 1, 1988
	male		August 20, 1999
2,6-Dinitrotoluene	cancer	606-20-2	July 1, 1995
	male		August 20, 1999
Dinocap	developmental	39300-45-3	April 1, 1990
Dinoseb	developmental, male	88-85-7	January 1, 1989
1,4-Dioxane	cancer	123-91-1	January 1, 1988
Diphenylhydantoin (Phenytoin)	cancer	57-41-0	January 1, 1988
	developmental		July 1, 1987
Diphenylhydantoin (Phenytoin), sodium salt	cancer	630-93-3	January 1, 1988

Di-*n*-propyl isocinchomeronate (MGK Repellent 326)	cancer	136-45-8	May 1, 1996
Direct Black 38 (technical grade)	cancer	1937-37-7	January 1, 1988
Direct Blue 6 (technical grade)	cancer	2602-46-2	January 1, 1988
Direct Brown 95 (technical grade)	cancer	16071-86-6	October 1, 1988
Disodium cyanodithioimidocarbonate	developmental	138-93-2	March 30, 1999
Disperse Blue 1	cancer	2475-45-8	October 1, 1990
Diuron	cancer	330-54-1	May 31, 2002
Doxorubicin hydrochloride (Adriamycin)	cancer	23214-92-8	July 1, 1987
Doxorubicin hydrochloride (Adriamycin)	developmental, male	23214-92-8	January 29, 1999
Doxycycline (internal use)	developmental	564-25-0	July 1, 1990
Doxycycline calcium (internal use)	developmental	94088-85-4	January 1, 1992
Doxycycline hyclate (internal use)	developmental	24390-14-5	October 1, 1991
Doxycycline monohydrate (internal use)	developmental	17086-28-1	October 1, 1991
Endrin	developmental	72-20-8	May 15, 1998
Environmental tobacco smoke (ETS)	developmental	---	June 9, 2006
Epichlorohydrin	cancer	106-89-8	October 1, 1987
	male		September 1, 1996
Ergotamine tartrate	developmental	379-79-3	April 1, 1990
Erionite	cancer	12510-42-8/ 66733-21-9	October 1, 1988
Estradiol 17B	cancer	50-28-2	January 1, 1988
Estragole	cancer	140-67-0	October 29, 1999
Estrogens, steroidal	cancer	---	August 19, 2005
Estrone	cancer	53-16-7	January 1, 1988
Estropipate	cancer, developmental	7280-37-7	August 26, 1997
Ethinylestradiol	cancer	57-63-6	January 1, 1988
Ethionamide	developmental	536-33-4	August 26, 1997
Ethoprop	cancer	13194-48-4	February 27, 2001
Ethyl acrylate	cancer	140-88-5	July 1, 1989
Ethyl alcohol in alcoholic beverages	developmental	---	October 1, 1987
Ethylbenzene	cancer	100-41-4	June 11, 2004
Ethyl dipropylthiocarbamate	developmental	759-94-4	April 27, 1999
Ethyl-4,4'-dichlorobenzilate	cancer	510-15-6	January 1, 1990
Ethylene dibromide	cancer	106-93-4	July 1, 1987
	developmental, male		May 15, 1998
Ethylene dichloride (1,2-Dichloroethane)	cancer	107-06-2	October 1, 1987
Ethylene glycol monoethyl ether	developmental, male	110-80-5	January 1, 1989
Ethylene glycol monoethyl ether acetate	developmental, male	111-15-9	January 1, 1993
Ethylene glycol monomethyl ether	developmental, male	109-86-4	January 1, 1989
Ethylene glycol monomethyl ether acetate	developmental, male	110-49-6	January 1, 1993
Ethyleneimine	cancer	151-56-4	January 1, 1988
Ethylene oxide	cancer	75-21-8	July 1, 1987
	female		February 27, 1987
Ethylene thiourea	cancer	96-45-7	January 1, 1988
	developmental		January 1, 1993
Ethyl methanesulfonate	cancer	62-50-0	January 1, 1988
Etodolac	developmental, female	41340-25-4	August 20, 1999
Etoposide	developmental	33419-42-0	July 1, 1990
Etretinate	developmental	54350-48-0	July 1, 1987

Fenoxaprop ethyl	developmental	66441-23-4	March 26, 1999
Fenoxycarb	cancer	72490-01-8	June 2, 2000
Filgrastim	developmental	121181-53-1	February 27, 2001
Fluazifop butyl	developmental	69806-50-4	November 6, 1998
Flunisolide	developmental, female	3385-03-3	May 15, 1998
Fluorouracil	developmental	51-21-8	January 1, 1989
Fluoxymesterone	developmental	76-43-7	April 1, 1990
Flurazepam hydrochloride	developmental	1172-18-5	October 1, 1992
Flurbiprofen	developmental, female	5104-49-4	August 20, 1999
Flutamide	developmental	13311-84-7	July 1, 1990
Fluticasone propionate	developmental	80474-14-2	May 15, 1998
Fluvalinate	developmental	69409-94-5	November 6, 1998
Folpet	cancer	133-07-3	January 1, 1989
Formaldehyde (gas)	cancer	50-00-0	January 1, 1988
2-(2-Formylhydrazino)-4-(5-nitro-2-furyl) thiazole	cancer	3570-75-0	January 1, 1988
Fumonisin B_1	cancer	116355-83-0	November 14, 2003
Furan	cancer	110-00-9	October 1, 1993
Furazolidone	cancer	67-45-8	January 1, 1990
Furmecyclox	cancer	60568-05-0	January 1, 1990
Fusarin C	cancer	79748-81-5	July 1, 1995
Ganciclovir sodium	cancer, developmental, male	82410-32-0	August 26, 1997
Gasoline engine exhaust (condensates/extracts)	cancer	---	October 1, 1990
Gemfibrozil	cancer female, male	25812-30-0	December 22, 2000 August 20, 1999
Glasswool fibers (airborne particles of respirable size)	cancer	---	July 1, 1990
Glu-P-1 (2-Amino-6-methyldipyrido [1,2- a:3',2'-d]imidazole)	cancer	67730-11-4	January 1, 1990
Glu-P-2 (2-Aminodipyrido [1,2-a:3',2'-d]imidazole)	cancer	67730-10-3	January 1, 1990
Glycidaldehyde	cancer	765-34-4	January 1, 1988
Glycidol	cancer	556-52-5	July 1, 1990
Goserelin acetate	developmental, female, male	65807-02-5	August 26, 1997
Griseofulvin	cancer	126-07-8	January 1, 1990
Gyromitrin (Acetaldehyde methylformylhydrazone)	cancer	16568-02-8	January 1, 1988
Halazepam	developmental	23092-17-3	July 1, 1990
Halobetasol propionate	developmental	66852-54-8	August 20, 1999
Haloperidol	developmental, female	52-86-8	January 29, 1999
Halothane	developmental	151-67-7	September 1, 1996
HC Blue 1	cancer	2784-94-3	July 1, 1989
Heptachlor	cancer developmental	76-44-8	July 1, 1988 August 20, 1999
Heptachlor epoxide	cancer	1024-57-3	July 1, 1988
Herbal remedies containing plant species of the genus Aristolochia	cancer	---	July 9, 2004

Hexachlorobenzene	cancer developmental	118-74-1	October 1, 1987 January 1, 1989
Hexachlorocyclohexane (technical grade)	cancer	---	October 1, 1987
Hexachlorodibenzodioxin	cancer	34465-46-8	April 1, 1988
Hexachloroethane	cancer	67-72-1	July 1, 1990
2,4-Hexadienal (89% trans, trans isomer; 11% cis, trans isomer)	cancer	---	March 4, 2005
Hexamethylphosphoramide	cancer male	680-31-9	January 1, 1988 October 1, 1994
Histrelin acetate	developmental	---	May 15, 1998
Hydramethylnon	developmental, male	67485-29-4	March 5, 1999
Hydrazine	cancer	302-01-2	January 1, 1988
Hydrazine sulfate	cancer	10034-93-2	January 1, 1988
Hydrazobenzene (1,2-Diphenylhydrazine)	cancer	122-66-7	January 1, 1988
1-Hydroxyanthraquinone	cancer	129-43-1	May 27, 2005
Hydroxyurea	developmental	127-07-1	May 1, 1997
Idarubicin hydrochloride	developmental, male	57852-57-0	August 20, 1999
Ifosfamide	developmental	3778-73-2	July 1, 1990
Iodine-131	developmental	10043-66-0	January 1, 1989
Indeno[1,2,3-cd]pyrene	cancer	193-39-5	January 1, 1988
Indium phosphide	cancer	22398-80-7	February 27, 2001
IQ (2-Amino-3-methylimidazo [4,5-f] quinoline)	cancer	76180-96-6	April 1, 1990
Iprodione	cancer	36734-19-7	May 1, 1996
Iron dextran complex	cancer	9004-66-4	January 1, 1988
Isobutyl nitrite	cancer	542-56-3	May 1, 1996
Isoprene	cancer	78-79-5	May 1, 1996
~~Isosafrole~~ Delisted December 8, 2006	~~cancer~~	~~120-58-1~~	~~October 1, 1989~~
Isotretinoin	developmental	4759-48-2	July 1, 1987
Isoxaflutole	cancer	141112-29-0	December 22, 2000
Lactofen	cancer	77501-63-4	January 1, 1989
Lasiocarpine	cancer	303-34-4	April 1, 1988
Lead	developmental, female, male	---	February 27, 1987
Lead and lead compounds	cancer	---	October 1, 1992
Lead acetate	cancer	301-04-2	January 1, 1988
Lead phosphate	cancer	7446-27-7	April 1, 1988
Lead subacetate	cancer	1335-32-6	October 1, 1989
Leuprolide acetate	developmental, female, male	74381-53-6	August 26, 1997
Levodopa	developmental	59-92-7	January 29, 1999
Levonorgestrel implants	female	797-63-7	May 15, 1998
Lindane and other hexachloro-cyclohexane isomers	cancer	---	October 1, 1989
Linuron	developmental	330-55-2	March 19, 1999
Lithium carbonate	developmental	554-13-2	January 1, 1991
Lithium citrate	developmental	919-16-4	January 1, 1991
Lorazepam	developmental	846-49-1	July 1, 1990
Lovastatin	developmental	75330-75-5	October 1, 1992

Lynestrenol	cancer	52-76-6	February 27, 2001
Mancozeb	cancer	8018-01-7	January 1, 1990
Maneb	cancer	12427-38-2	January 1, 1990
Me-A-alpha-C (2-Amino-3-methyl-9H-pyrido[2,3-b]indole)	cancer	68006-83-7	January 1, 1990
Mebendazole	developmental	31431-39-7	August 20, 1999
Medroxyprogesterone acetate	cancer	71-58-9	January 1, 1990
	developmental		April 1, 1990
Megestrol acetate	developmental	595-33-5	January 1, 1991
MeIQ (2-Amino-3,4-dimethyl-imidazo[4,5-f]quinoline)	cancer	77094-11-2	October 1, 1994
MeIQx (2-Amino-3,8-dimethyl-imidazo[4,5-f]quinoxaline)	cancer	77500-04-0	October 1, 1994
Melphalan	cancer	148-82-3	February 27, 1987
	developmental		July 1, 1990
Menotropins	developmental	9002-68-0	April 1, 1990
Meprobamate	developmental	57-53-4	January 1, 1992
Mercaptopurine	developmental	6112-76-1	July 1, 1990
Mercury and mercury compounds	developmental	---	July 1, 1990
Merphalan	cancer	531-76-0	April 1, 1988
Mestranol	cancer	72-33-3	April 1, 1988
Methacycline hydrochloride	developmental	3963-95-9	January 1, 1991
Metham sodium	cancer	137-42-8	November 6, 1998
	developmental		May 15, 1998
Methazole	developmental	20354-26-1	December 1, 1999
Methimazole	developmental	60-56-0	July 1, 1990
Methotrexate	developmental	59-05-2	January 1, 1989
Methotrexate sodium	developmental	15475-56-6	April 1, 1990
5-Methoxypsoralen with ultraviolet A therapy	cancer	484-20-8	October 1, 1988
8-Methoxypsoralen with ultraviolet A therapy	cancer	298-81-7	February 27, 1987
2-Methylaziridine (Propyleneimine)	cancer	75-55-8	January 1, 1988
Methylazoxymethanol	cancer	590-96-5	April 1, 1988
Methylazoxymethanol acetate	cancer	592-62-1	April 1, 1988
Methyl bromide, as a structural fumigant	developmental	74-83-9	January 1, 1993
Methyl carbamate	cancer	598-55-0	May 15, 1998
Methyl chloride	developmental	74-87-3	March 10, 2000
3-Methylcholanthrene	cancer	56-49-5	January 1, 1990
5-Methylchrysene	cancer	3697-24-3	April 1, 1988
4,4'-Methylene bis(2-chloroaniline)	cancer	101-14-4	July 1, 1987
4,4'-Methylene bis(N,N-dimethyl) benzenamine	cancer	101-61-1	October 1, 1989
4,4'-Methylene bis(2-methylaniline)	cancer	838-88-0	April 1, 1988
4,4'-Methylenedianiline	cancer	101-77-9	January 1, 1988
4,4'-Methylenedianiline dihydrochloride	cancer	13552-44-8	January 1, 1988
Methyleugenol	cancer	93-15-2	November 16, 2001
Methylhydrazine and its salts	cancer	---	July 1, 1992
Methyl iodide	cancer	74-88-4	April 1, 1988
Methyl mercury	developmental	---	July 1, 1987
Methylmercury compounds	cancer	---	May 1, 1996
Methyl methanesulfonate	cancer	66-27-3	April 1, 1988

2-Methyl-1-nitroanthraquinone (of uncertain purity)	cancer	129-15-7	April 1, 1988
N-Methyl-N'-nitro-N-nitrosoguanidine	cancer	70-25-7	April 1, 1988
N-Methylolacrylamide	cancer	924-42-5	July 1, 1990
N-Methylpyrrolidone	developmental	872-50-4	June 15, 2001
Methyltestosterone	developmental	58-18-4	April 1, 1990
Methylthiouracil	cancer	56-04-2	October 1, 1989
Metiram	cancer	9006-42-2	January 1, 1990
	developmental		March 30, 1999
Metronidazole	cancer	443-48-1	January 1, 1988
Michler's ketone	cancer	90-94-8	January 1, 1988
Midazolam hydrochloride	developmental	59467-96-8	July 1, 1990
Minocycline hydrochloride (internal use)	developmental	13614-98-7	January 1, 1992
Mirex	cancer	2385-85-5	January 1, 1988
Misoprostol	developmental	59122-46-2	April 1, 1990
Mitomycin C	cancer	50-07-7	April 1, 1988
Mitoxantrone hydrochloride	developmental	70476-82-3	July 1, 1990
Monocrotaline	cancer	315-22-0	April 1, 1988
5-(Morpholinomethyl)-3-[(5-nitrofurfuryl-idene)-amino]-2-oxazolidinone	cancer	139-91-3	April 1, 1988
Mustard Gas	cancer	505-60-2	February 27, 1987
MX (3-chloro-4-(dichloromethyl)-5-hydroxy-2(5H)-furanone)	cancer	77439-76-0	December 22, 2000
Myclobutanil	developmental, male	88671-89-0	April 16, 1999
Nabam	developmental	142-59-6	March 30, 1999
Nafarelin acetate	developmental	86220-42-0	April 1, 1990
Nafenopin	cancer	3771-19-5	April 1, 1988
Nalidixic acid	cancer	389-08-2	May 15, 1998
Naphthalene	cancer	91-20-3	April 19, 2002
1-Naphthylamine	cancer	134-32-7	October 1, 1989
2-Naphthylamine	cancer	91-59-8	February 27, 1987
Neomycin sulfate (internal use)	developmental	1405-10-3	October 1, 1992
Netilmicin sulfate	developmental	56391-57-2	July 1, 1990
Nickel (Metallic)	cancer	7440-02-0	October 1, 1989
Nickel acetate	cancer	373-02-4	October 1, 1989
Nickel carbonate	cancer	3333-67-3	October 1, 1989
Nickel carbonyl	cancer	13463-39-3	October 1, 1987
	developmental		September 1, 1996
Nickel compounds	cancer	---	May 7, 2004
Nickel hydroxide	cancer	12054-48-7; 12125-56-3	October 1, 1989
Nickelocene	cancer	1271-28-9	October 1, 1989
Nickel oxide	cancer	1313-99-1	October 1, 1989
Nickel refinery dust from the pyrometallurgical process	cancer	---	October 1, 1987
Nickel subsulfide	cancer	12035-72-2	October 1, 1987
Nicotine	developmental	54-11-5	April 1, 1990
Nifedipine	developmental, female, male	21829-25-4	January 29, 1999
Nimodipine	developmental	66085-59-4	April 24, 2001
Niridazole	cancer	61-57-4	April 1, 1988

Nitrapyrin	cancer developmental	1929-82-4	October 5, 2005 March 30, 1999
Nitrilotriacetic acid	cancer	139-13-9	January 1, 1988
Nitrilotriacetic acid, trisodium salt monohydrate	cancer	18662-53-8	April 1, 1989
5-Nitroacenaphthene	cancer	602-87-9	April 1, 1988
~~5-Nitro-*o*-anisidine~~ Delisted December 8, 2006	~~cancer~~	~~99-59-2~~	~~October 1, 1989~~
o-Nitroanisole	cancer	91-23-6	October 1, 1992
Nitrobenzene	cancer	98-95-3	August 26, 1997
4-Nitrobiphenyl	cancer	92-93-3	April 1, 1988
6-Nitrochrysene	cancer	7496-02-8	October 1, 1990
Nitrofen (technical grade)	cancer	1836-75-5	January 1, 1988
2-Nitrofluorene	cancer	607-57-8	October 1, 1990
Nitrofurantoin	male	67-20-9	April 1, 1991
Nitrofurazone	cancer	59-87-0	January 1, 1990
1-[(5-Nitrofurfurylidene)-amino]-2-imidazolidinone	cancer	555-84-0	April 1, 1988
N-[4-(5-Nitro-2-furyl)-2-thiazolyl] acetamide	cancer	531-82-8	April 1, 1988
Nitrogen mustard (Mechlorethamine)	cancer developmental	51-75-2	January 1, 1988 January 1, 1989
Nitrogen mustard hydrochloride (Mechlorethamine hydrochloride)	cancer developmental	55-86-7	April 1, 1988 July 1, 1990
Nitrogen mustard N-oxide	cancer	126-85-2	April 1, 1988
Nitrogen mustard N-oxide hydrochloride	cancer	302-70-5	April 1, 1988
Nitromethane	cancer	75-52-5	May 1, 1997
2-Nitropropane	cancer	79-46-9	January 1, 1988
1-Nitropyrene	cancer	5522-43-0	October 1, 1990
4-Nitropyrene	cancer	57835-92-4	October 1, 1990
N-Nitrosodi-*n*-butylamine	cancer	924-16-3	October 1, 1987
N-Nitrosodiethanolamine	cancer	1116-54-7	January 1, 1988
N-Nitrosodiethylamine	cancer	55-18-5	October 1, 1987
N-Nitrosodimethylamine	cancer	62-75-9	October 1, 1987
p-Nitrosodiphenylamine	cancer	156-10-5	January 1, 1988
N-Nitrosodiphenylamine	cancer	86-30-6	April 1, 1988
N-Nitrosodi-*n*-propylamine	cancer	621-64-7	January 1, 1988
N-Nitroso-N-ethylurea	cancer	759-73-9	October 1, 1987
3-(N-Nitrosomethylamino)propionitrile	cancer	60153-49-3	April 1, 1990
4-(N-Nitrosomethylamino)-1-(3-pyridyl)1-butanone	cancer	64091-91-4	April 1, 1990
N-Nitrosomethylethylamine	cancer	10595-95-6	October 1, 1989
N-Nitroso-N-methylurea	cancer	684-93-5	October 1, 1987
N-Nitroso-N-methylurethane	cancer	615-53-2	April 1, 1988
N-Nitrosomethylvinylamine	cancer	4549-40-0	January 1, 1988
N-Nitrosomorpholine	cancer	59-89-2	January 1, 1988
N-Nitrosonornicotine	cancer	16543-55-8	January 1, 1988
N-Nitrosopiperidine	cancer	100-75-4	January 1, 1988
N-Nitrosopyrrolidine	cancer	930-55-2	October 1, 1987
N-Nitrososarcosine	cancer	13256-22-9	January 1, 1988
o-Nitrotoluene	cancer	88722	May 15, 1998
Norethisterone (Norethindrone)	cancer	68-22-4	October 1, 1989

	developmental		April 1, 1990
Norethisterone acetate (Norethindrone acetate)	developmental	51-98-9	October 1, 1991
Norethisterone (Norethindrone) /Ethinyl estradiol	developmental	68-22-4/ 57-63-6	April 1, 1990
Norethisterone (Norethindrone)/Mestranol	developmental	68-22-4/ 72-33-3	April 1, 1990
Norethynodrel	cancer	68-23-5	February 27, 2001
Norgestrel	developmental	6533-00-2	April 1, 1990
Ochratoxin A	cancer	303-47-9	July 1, 1990
Oil Orange SS	cancer	2646-17-5	April 1, 1988
Oral contraceptives, combined	cancer	---	October 1, 1989
Oral contraceptives, sequential	cancer	---	October 1, 1989
Oxadiazon	cancer	19666-30-9	July 1, 1991
	developmental		May 15, 1998
Oxazepam	cancer	604-75-1	October 1, 1994
	developmental		October 1, 1992
Oxydemeton methyl	female, male	301-12-2	November 6, 1998
Oxymetholone	cancer	434-07-1	January 1, 1988
	developmental		May 1, 1997
Oxytetracycline (internal use)	developmental	79-57-2	January 1, 1991
Oxytetracycline hydrochloride (internal use)	developmental	2058-46-0	October 1, 1991
Oxythioquinox (Chinomethionat)	cancer	2439-01-2	August 20, 1999
Oxythioquinox (Chinomethionat)	developmental	2439-01-2	November 6, 1998
Paclitaxel	developmental, female, male	33069-62-4	August 26, 1997
Palygorskite fibers (> 5µm in length)	cancer	12174-11-7	December 28, 1999
Panfuran S	cancer	794-93-4	January 1, 1988
Paramethadione	developmental	115-67-3	July 1, 1990
Penicillamine	developmental	52-67-5	January 1, 1991
Pentachlorophenol	cancer	87-86-5	January 1, 1990
Pentobarbital sodium	developmental	57-33-0	July 1, 1990
Pentostatin	developmental	53910-25-1	September 1, 1996
Phenacemide	developmental	63-98-9	July 1, 1990
Phenacetin	cancer	62-44-2	October 1, 1989
Phenazopyridine	cancer	94-78-0	January 1, 1988
Phenazopyridine hydrochloride	cancer	136-40-3	January 1, 1988
Phenesterin	cancer	3546-10-9	July 1, 1989
Phenobarbital	cancer	50-06-6	January 1, 1990
Phenolphthalein	cancer	77-09-8	May 15, 1998
Phenoxybenzamine	cancer	59-96-1	April 1, 1988
Phenoxybenzamine hydrochloride	cancer	63-92-3	April 1, 1988
Phenprocoumon	developmental	435-97-2	October 1, 1992
o-Phenylenediamine and its salts	cancer	95-54-5	May 15, 1998
Phenyl glycidyl ether	cancer	122-60-1	October 1, 1990
Phenylhydrazine and its salts	cancer	---	July 1, 1992
o-Phenylphenate, sodium	cancer	132-27-4	January 1, 1990
o-Phenylphenol	cancer	90-43-7	August 4, 2000
PhiP(2-Amino-1-methyl-6-phenylimidazol[4,5-b]pyridine)	cancer	105650-23-5	October 1, 1994

Pimozide	developmental, female	2062-78-4	August 20, 1999
Pipobroman	developmental	54-91-1	July 1, 1990
Plicamycin	developmental	18378-89-7	April 1, 1990
Polybrominated biphenyls	cancer	---	January 1, 1988
	developmental		October 1, 1994
Polychlorinated biphenyls	cancer	---	October 1, 1989
	developmental		January 1, 1991
Polychlorinated biphenyls (containing 60 or more percent chlorine by molecular weight)	cancer	---	January 1, 1988
Polychlorinated dibenzo-*p*-dioxins	cancer	---	October 1, 1992
Polychlorinated dibenzofurans	cancer	---	October 1, 1992
Polygeenan	cancer	53973-98-1	January 1, 1988
Ponceau MX	cancer	3761-53-3	April 1, 1988
Ponceau 3R	cancer	3564-09-8	April 1, 1988
Potassium bromate	cancer	7758-01-2	January 1, 1990
Potassium dimethyldithiocarbamate	developmental	128-03-0	March 30 1999
Pravastatin sodium	developmental	81131-70-6	March 3, 2000
Prednisolone sodium phosphate	developmental	125-02-0	August 20, 1999
Primidone	cancer	125-33-7	August 20, 1999
Procarbazine	cancer	671-16-9	January 1, 1988
Procarbazine hydrochloride	cancer	366-70-1	January 1, 1988
	developmental		July 1, 1990
Procymidone	cancer	32809-16-8	October 1, 1994
Progesterone	cancer	57-83-0	January 1, 1988
Pronamide	cancer	23950-58-5	May 1, 1996
Propachlor	cancer	1918-16-7	February 27, 2001
1,3-Propane sultone	cancer	1120-71-4	January 1, 1988
Propargite	cancer	2312-35-8	October 1, 1994
	developmental		June 15, 1999
beta-Propiolactone	cancer	57-57-8	January 1, 1988
Propoxur	cancer	114-26-1	August 11, 2006
Propylene glycol mono-*t*-butyl ether	cancer	57018-52-7	June 11, 2004
Propylene oxide	cancer	75-56-9	October 1, 1988
Propylthiouracil	cancer	51-52-5	January 1, 1988
	developmental		July 1, 1990
Pyridine	cancer	110-86-1	May 17, 2002
Pyrimethamine	developmental	58-14-0	January 29, 1999
Quazepam	developmental	36735-22-5	August 26, 1997
Quinoline and its strong acid salts	cancer	---	October 24, 1997
Quizalofop-ethyl	male	76578-14-8	December 24, 1999
Radionuclides	cancer	---	July 1, 1989
Reserpine	cancer	50-55-5	October 1, 1989
Residual (heavy) fuel oils	cancer	---	October 1, 1990
Resmethrin	developmental	10453-86-8	November 6, 1998

Retinol/retinyl esters, when in daily dosages in excess of 10,000 IU, or 3,000 retinol equivalents. (NOTE: Retinol/retinyl esters are required and essential for maintenance of normal reproductive function. The recommended daily level during pregnancy is 8,000 IU.)	developmental	---	July 1, 1989
Ribavirin	developmental male	36791-04-5	April 1, 1990 February 27, 2001
Riddelliine	cancer	23246-96-0	December 3, 2004
Rifampin	developmental, female	13292-46-1	February 27, 2001
~~Saccharin~~ Delisted April 6, 2001	~~cancer~~	~~81-07-2~~	~~October 1, 1989~~
~~Saccharin, sodium~~ Delisted January 17, 2003	~~cancer~~	~~128-44-9~~	~~January 1, 1988~~
Safrole	cancer	94-59-7	January 1, 1988
Secobarbital sodium	developmental	309-43-3	October 1, 1992
Selenium sulfide	cancer	7446-34-6	October 1, 1989
Sermorelin acetate	developmental	---	August 20, 1999
Shale-oils	cancer	68308-34-9	April 1, 1990
Silica, crystalline (airborne particles of respirable size)	cancer	---	October 1, 1988
Sodium dimethyldithiocarbamate	developmental	128-04-1	March 30 1999
Sodium fluoroacetate	male	62-74-8	November 6, 1998
Soots, tars, and mineral oils (untreated and mildly treated oils and used engine oils)	cancer	---	February 27, 1987
Spironolactone	cancer	52-01-7	May 1, 1997
Stanozolol	cancer	10418-03-8	May 1, 1997
Sterigmatocystin	cancer	10048-13-2	April 1, 1988
Streptomycin sulfate	developmental	3810-74-0	January 1, 1991
Streptozocin (streptozotocin)	developmental, female, male	18883-66-4	August 20, 1999
Streptozotocin (streptozocin)	cancer	18883-66-4	January 1, 1988
Strong inorganic acid mists containing sulfuric acid	cancer	---	March 14, 2003
Styrene oxide	cancer	96-09-3	October 1, 1988
Sulfallate	cancer	95-06-7	January 1, 1988
Sulfasalazine (salicylazosulfapyridine)	cancer	599-79-1	May 15, 1998
Sulfasalazine (salicylazosulfapyridine)	male	599-79-1	January 29, 1999
Sulindac	developmental, female	38194-50-2	January 29, 1999
Talc containing asbestiform fibers	cancer	---	April 1, 1990
Tamoxifen and its salts	cancer	10540-29-1	September 1, 1996
Tamoxifen citrate	developmental	54965-24-1	July 1, 1990
Temazepam	developmental	846-50-4	April 1, 1990
Teniposide	developmental	29767-20-2	September 1, 1996
Terbacil	developmental	5902-51-2	May 18, 1999
Terrazole	cancer	2593-15-9	October 1, 1994
Testosterone and its esters	cancer	58-22-0	April 1, 1988
Testosterone cypionate	developmental	58-20-8	October 1, 1991

Testosterone enanthate	developmental	315-37-7	April 1, 1990
2,3,7,8-Tetrachlorodibenzo-*p*-dioxin (TCDD)	cancer developmental	1746-01-6	January 1, 1988 April 1, 1991
1,1,2,2-Tetrachloroethane	cancer	79-34-5	July 1, 1990
Tetrachloroethylene (Perchloroethylene)	cancer	127-18-4	April 1, 1988
p-*a*,*a*,*a*-Tetrachlorotoluene	cancer	5216-25-1	January 1, 1990
Tetracycline (internal use)	developmental	60-54-8	October 1, 1991
Tetracyclines (internal use)	developmental	---	October 1, 1992
Tetracycline hydrochloride (internal use)	developmental	64-75-5	January 1, 1991
Tetrafluoroethylene	cancer	116-14-3	May 1, 1997
Tetranitromethane	cancer	509-14-8	July 1, 1990
Thalidomide	developmental	50-35-1	July 1, 1987
Thioacetamide	cancer	62-55-5	January 1, 1988
4,4'-Thiodianiline	cancer	139-65-1	April 1, 1988
Thiodicarb	cancer	59669-26-0	August 20, 1999
Thioguanine	developmental	154-42-7	July 1, 1990
Thiophanate methyl	female, male	23564-05-8	May 18, 1999
Thiouracil	cancer	141-90-2	June 11, 2004
Thiourea	cancer	62-56-6	January 1, 1988
Thorium dioxide	cancer	1314-20-1	February 27, 1987
Tobacco, oral use of smokeless products	cancer	---	April 1, 1988
Tobacco smoke	cancer	---	April 1, 1988
Tobacco smoke (primary)	developmental, female, male	---	April 1, 1988
Tobramycin sulfate	developmental	49842-07-1	July 1, 1990
Toluene	developmental	108-88-3	January 1, 1991
Toluene diisocyanate	cancer	26471-62-5	October 1, 1989
o-Toluidine	cancer	95-53-4	January 1, 1988
o-Toluidine hydrochloride	cancer	636-21-5	January 1, 1988
~~para-Toluidine~~ Delisted October 29, 1999	~~cancer~~	~~106-49-0~~	~~January 1, 1990~~
Toxaphene (Polychlorinated camphenes)	cancer	8001-35-2	January 1, 1988
Treosulfan	cancer	299-75-2	February 27, 1987
Triadimefon	developmental, female, male	43121-43-3	March 30, 1999
Triazolam	developmental	28911-01-5	April 1, 1990
Tributyltin methacrylate	developmental	2155-70-6	December 1, 1999
Trichlormethine (Trimustine hydrochloride)	cancer	817-09-4	January 1, 1992
Trichloroethylene	cancer	79-01-6	April 1, 1988
2,4,6-Trichlorophenol	cancer	88-06-2	January 1, 1988
1,2,3-Trichloropropane	cancer	96-18-4	October 1,1992
Trientine hydrochloride	developmental	38260-01-4	February 27, 2001
Triforine	developmental	26644-46-2	June 18, 1999
Trilostane	developmental	13647-35-3	April 1, 1990
Trimethadione	developmental	127-48-0	January 1, 1991
2,4,5-Trimethylaniline and its strong acid salts	cancer	---	October 24, 1997
Trimethyl phosphate	cancer	512-56-1	May 1, 1996
Trimetrexate glucuronate	developmental	82952-64-5	August 26, 1997
Triphenyltin hydroxide	cancer developmental	76-87-9	July 1, 1992 March 18, 2002
~~Tris(aziridinyl) *p*-benzoquinone (Triaziquone)~~ Delisted December 8, 2006	~~cancer~~	~~68-76-8~~	~~October 1, 1989~~
Tris(1-aziridinyl)phosphine sulfide (Thiotepa)	cancer	52-24-4	January 1, 1988

Tris(2-chloroethyl) phosphate	cancer	115-96-8	April 1, 1992
Tris(2,3-dibromopropyl)phosphate	cancer	126-72-7	January 1, 1988
Trp-P-1 (Tryptophan-P-1)	cancer	62450-06-0	April 1, 1988
Trp-P-2 (Tryptophan-P-2)	cancer	62450-07-1	April 1, 1988
Trypan blue (commercial grade)	cancer	72-57-1	October 1, 1989
Unleaded gasoline (wholly vaporized)	cancer	---	April 1, 1988
Uracil mustard	cancer	66-75-1	April 1, 1988
	developmental, female, male		January 1, 1992
Urethane (Ethyl carbamate)	cancer	51-79-6	January 1, 1988
	developmental		October 1, 1994
Urofollitropin	developmental	97048-13-0	April 1, 1990
Valproate (Valproic acid)	developmental	99-66-1	July 1, 1987
Vanadium pentoxide (orthorhombic crystalline form)	cancer	1314-62-1	February 11, 2005
Vinblastine sulfate	developmental	143-67-9	July 1, 1990
Vinclozolin	cancer	50471-44-8	August 20, 1999
	developmental		May 15, 1998
Vincristine sulfate	developmental	2068-78-2	July 1, 1990
Vinyl bromide	cancer	593-60-2	October 1, 1988
Vinyl chloride	cancer	75-01-4	February 27, 1987
4-Vinylcyclohexene	cancer	100-40-3	May 1, 1996
4-Vinyl-1-cyclohexene diepoxide (Vinyl cyclohexene dioxide)	cancer	106-87-6	July 1, 1990
Vinyl fluoride	cancer	75-02-5	May 1, 1997
Vinyl trichloride (1,1,2-Trichloroethane)	cancer	79-00-5	October 1, 1990
Warfarin	developmental	81-81-2	July 1, 1987
2,6-Xylidine (2,6-Dimethylaniline)	cancer	87-62-7	January 1, 1991
Zileuton	cancer, developmental, female	111406-87-2	December 22, 2000
~~Zineb~~ Delisted October 29, 1999	~~cancer~~	~~12122-67-7~~	~~January 1, 1990~~

Date: December 8, 2006

Chemicals Requiring Designated Areas
Select Carcinogens, Reproductive Toxins, and
Substances Which Have a High Degree of Acute Toxicity

SMCCCD would like to eliminate or at least minimize the use of these chemicals.

This list is revised periodically to reflect changes in the publications used as references (National Toxicology Program, OSHA regulations, and International Agency for Research on Cancer).

1-(2-Chloroethyl)-3-(4-methylcyclohexyl)-1-nitrosourea	[13909-09-6]
1-(2-Chloroethyl)-3-cyclohexyl-1-nitrosourea (CCNU,	[13010-47-4]
1,1,2,2-Tetrachloroethane	[79-34-5]
1,1,2-trichloroethane (vinyl trichloride)	[79-00-5]
1,1-Dichloroethane	[75-34-3]
1,1-Dichloroethylene (vinylidene chloride)	[75-35-4]
1,1-dimethylhydrazine (UDMH)	[57-14-7]
1,2,3-Trichloropropane	[96-18-4]
1,2-dibromo-3-chloropropane (DBCP, Fumazone)	[96-12-8]
1,2-Dichloropropane	[78-87-5]
1,2-Diethylhydrazine	[1615-80-1]
1,2-Dimethylhydrazine	[540-73-8]
1,3-Butadiene	[106-99-0]
1,3-Dichloropropene	[542-75-6]
1,3-Propane sultone	[1120-71-4]
1,4-butanediol dimethanesulfonate (Busulphan, Myleran)	[55-98-1]
1,4-Dichloro-2-butene	[764-41-0]
1,4-Dioxane	[123-91-1]
1,6-Dinitropyrene	[42397-64-8]
1,8-Dihydroxyanthraquinone (Danthron, Chrysazin)	[117-10-2]
1,8-Dinitropyrene	[42397-65-9]
1-[(5-nitrofurfurylidene)-amino]-2-imidazolidinone (Nifuradene)	[555-84-0]
1-Amino-2,4-dibromoanthraquinone	[81-49-2]
1-Amino-2-methylanthraquinone	[82-28-0]
1-Chloro-1-nitroethane	[598-92-5]
1-Chloro-2,4-Dinitrobenzene	[97-00-7]
1-Nitropyrene	[5522-43-0]
2-(2-Formylhydrazino)-4-(5-nitro-2-furyl)thiazole	[3570-75-0]
2, 4, 5-Trichlorophenol	[95-95-4]
2,2-Bis(bromomethyl)-1,3-propanediol	[3296-90-0]
2,3,7,8-tetrachlorodibenzo-p-dioxin (TCDD)	[1746-01-6]
2,3-Dibromo-1-propanol	[96-13-9]
2,4,5-Trimethylaniline	[137-17-7]
2,4,5-Trimethylaniline and its strong acid salts	
2,4,6-Trichlorophenol	[88-06-2]
2,4-Diaminoanisole	[615-05-4]
2,4-Diaminotoluene	[95-80-7]
2,4-Dichlorophenoxyacetic acid (2,4-D)	[94-75-7]
2,4-Dichlorophenyl-p-nitrophenyl ether (nitrofen)	[1836-75-5]
2,4-Dinitroaniline	[97-02-9]
2,4-Dinitrotoluene	[121-14-2]
2,6-Dimethylaniline (2,6-Xylidine)	[87-62-7]
2,6-Dinitrotoluene	[606-20-2]
2-Acetylaminofluorene	[53-96-3]
2-Amino-1-methyl-6-phenylimidazol[4,5-b]pyridine (PhIP)	[105650-23-5]
2-Amino-3,4-dimethylimidazo[4,5-f]quinoline (MeIQ)	[77094-11-2]
2-Amino-5-(5-nitro-2 furyl)-1,3,4-thiadiazole	[59716-87-9]
2-Amino-5-(5-nitro-2-furyl)-1,3,4-thiadiazole	[712-68-5]
2-Aminoanthraquinone	[117-79-3]
2-Aminofluorene	[153-78-6]
2-Aminopyridine	[504-29-0]
2-Methyl-1-nitroanthraquinone	[129-15-7]
2-Nitrofluorene	[607-57-8]
2-Nitropropane	[79-46-9]
3-(N-Nitrosomethylamino)propionitrile	[60153-49-3]
3,3'-Dichloro-4,4'-diaminodiphenyl ether	[28434-86-8]
3,3'-Dichlorobenzidine	[91-94-1]
3,3'-Dichlorobenzidine dihydrochloride	[612-83-9]
3,3'-Dimethoxybenzidine (o-dianisidine)	[119-90-4]
3,3'-dimethoxybenzidine dihydrochloride (o-dianisidine	[20325-40-0]
3,3'-dimethylbenzidine (o-tolidine)	[119-93-7]
3,3'-Dimethylbenzidine dihydrochloride	[612-82-8]
3,7-Dinitrofluoranthene	[105735-71-5]
3,9-Dinitrofluoranthene	[22506-53-2]
3-Amino-9-ethylcarbazole hydrochloride	[6109-97-3]
3-Bromopropyne (Propargyl Bromide)	[106-96-7]
3-Methylcholanthrene	[56-49-5]

4-(N-Nitrosomethylamino)-1-(3-pyridyl)-1-butanone (NNK)	[64091-91-4]
4,4'-diaminodiphenyl ether (4,4'-oxydianiline)	[101-80-4]
4,4'-Methylene bis(2-methylaniline)	[838-88-0]
4,4'-Methylenebis(2-chloraniline) (MBOCA)	[101-14-4]
4,4'-methylenebis(N,N-dimethylaniline)	[101-61-1]
4,4'-Methylenedianiline (4,4'-diaminodiphenylmethane)	[101-77-9]
4,4'-Methylenedianiline Dihydrochloride	[13552-44-8]
4,4'-Thiodianiline	[139-65-1]
4-Amino-2-nitrophenol	[119-34-6]
4-aminodiphenyl (4-aminobiphenyl)	[92-67-1]
4-Chloro-o-phenylenediamine	[95-83-0]
4-dimethylaminoazobenzene (p-dimethylaminoazobenzene)	[60-11-7]
4-Nitrobiphenyl (4-Nitrodiphenyl)	[92-93-3]
4-Nitropyrene	[57835-92-4]
4-vinyl-1-cyclohexene diepoxide (vinyl cyclohexenedioxide)	[106-87-6]
4-Vinylcyclohexene	[100-40-3]
5-(Morpholinomethyl)-3-[(5-nitro-furfurylidene)-amino]-2-	[139-91-3]
5-(Morpholinomethyl)-3-[(5-nitrofurfurylidene)amino]-2-	[3795-88-8]
5-Chloro-o-toluidine	[94-79-4]
5-chloro-o-toluidine, strong acid salts	
5-Fluorouracil	[51-21-8]
5-Methoxypsoralen (bergapten, heraclin, majudin)	[484-20-8]
5-Methylchrysene	[3697-24-3]
5-Nitroacenaphthene	[602-87-9]
5-Nitro-o-anisidine	[99-59-2]
6-methyl-2-thiouracil (methylthiouracil)	[56-04-2]
6-Nitrochrysene	[7496-02-8]
7,12-Dimethylbenz(a)anthracene	[57-97-6]
7H-Dibenzo[c,g]carbazole	[194-59-2]
A-alpha-C (2-Amino-9H-pyrido[2,3-b]indole)	[26148-68-5]
Acetaldehyde	[75-07-0]
Acetamide	[60-35-5]
Acetochlor	[34256-82-1]
Acetohydroxamic acid	[546-88-3]
Acetylene tetrabromide	[79-27-6]
Acifluorfen	[62476-59-9]
Acrolein (2-Propenal)	[107-02-8]
Acrylamide	[79-06-1]
Acrylonitrile	[107-13-1]
Acrylyl Chloride	[814-68-6]
Actinomycin D	[50-76-0]
Adriamycin (Doxorubicin hydrochloride)	[23214-92-8]
Aflatoxin	[7220-81-7]
Aflatoxin M1	[6795-23-9]
Aflatoxins	[1402-68-2]
Alachlor	[15972-60-8]
Aldrin	[309-00-2]
Alkylaluminums	
all-trans retinoic acid	[302-79-4]
Allyl alcohol [2-Propen-l-ol]	[107-18-61]
Allyl chloride	[107-05-1]
Allylamine	[107-11-9]
alpha-Hexachlorocyclohexane	[319-84-6]
alpha-Naphthylamine (1-napthylamine)	[134-32-7]
Alprazolam	[28981-97-7]
Amikacin sulfate	[39831-55-5]
Aminoglutethimide	[125-84-8]
Aminoglycosides	
Aminopterin	[54-62-6]
Amiodarone hydrochloride	[19774-82-4]
Amitrole (3-amino-1,2,4-triazole)	[61-82-5]
ammonia (gas, liquified)	[7664-41-7]
Ammonium Perchlorate	[7790-98-9]
Ammonium Permanganate	[7787-36-2]
Amoxapine	[14028-44-5]
Anabolic steroids (androgenic steroids)	
Analgesic mixtures containing phenacetin	

Angiotensin converting enzyme (ACE) inhibitors	
Aniline	[62-53-3]
Aniline hydrochloride	[142-04-1]
Anisindione	[117-37-3]
Antimony oxide (Antimony trioxide)	[1309-64-4]
Aramite (butylphenoxyisopropyl chloroethyl sulfite)	[140-57-8]
Aroclor	[12767-79-2]
Aroclor 1254	[11097-69-1]
Aroclor 1260	[11096-82-5]
arsenic and all its compounds	
Asbestos (amosite)	[12172-73-5]
Asbestos (ascarite, tremolite)	[1332-21-4]
Asbestos (crocidolite)	[12001-28-4]
Asbestos (serpentine chrysotile)	[12001-29-5]
Aspirin	[50-78-2]
Atenolol	[29122-68-7]
Atrazine	[1912-24-9]
Auramine O	[2465-27-2]
Azacytidine (Azacitidine, Mylosar, 5-azacytidine)	[320-67-2]
Azaserine	[115-02-6]
Azathioprine	[446-86-6]
Azobenzene	[103-33-3]
Barbiturates	
Beclomethasone dipropionate	[5534-09-8]
Benomyl	[17804-35-2]
benz[a]anthracene (benzo[a]anthracene)	[56-55-3]
benzal chloride (benzylidine chloride, alpha, alpha-	[98-87-3]
Benzene	[71-43-2]
Benzidine	[92-87-5]
benzidine salts	
Benzidine-based dyes	
Benzo[a]pyrene	[50-32-8]
Benzo[b]fluoranthene	[205-99-2]
Benzo[j]fluoranthene	[205-82-3]
Benzo[k]fluoranthene	[207-08-9]
Benzodiazepines	
Benzofuran	[271-89-6]
Benzotrichloride (alpha,alpha,alpha-trichlorotoluene)	[98-07-7]
Benzphetamine hydrochloride	[5411-22-3]
benzyl chloride (alpha-chlorotoluene)	[100-44-7]
Beryl Ore	[1302-52-9]
beryllium	[7440-41-7]
Beryllium Aluminum Alloy	[12770-50-2]
beryllium chloride	[7787-47-5]
beryllium and all of its compounds	
Beryllium Phosphate	[13598-15-7]
Beryllium sulfate tetrahydrate	[7787-56-6]
beryllium zinc silicate (zinc beryllium silicate)	[39413-47-3]
beta-Butyrolactone	[3068-88-0]
beta-Hexachlorocyclohexane	[319-85-7]
beta-naphthylamine (C.I. 37270, 2-aminonaphthalene)	[91-59-8]
beta-Propiolactone	[57-57-8]
Betel quid with tobacco	
Bis(2-chloroethyl)ether	[111-44-4]
Bis(2-ethylhexyl) Phthalate (Dioctyl phthalate , Di-sec-octyl	[117-81-7]
bis(chloromethyl) ether	[542-88-1]
bischloroethyl nitrosourea (BCNU, Carmustine)	[154-93-8]
Bitumens , extracts of steam-refined and air-refined	[8052-42-4]
Bitumens, extracts of steam-refined and air refined	
Bleomycins	[11056-06-7]
Boron Trichloride	[10294-34-5]
Boron trifluoride	[7637-07-2]
Boron trifluoride compound with methyl ether	[353-42-4]
Bracken fern	
Bromine	[7726-95-6]
Bromine Chloride	[13863-41-7]
Bromine Pentafluoride	[7789-30-2]
Bromine Trifluoride	[7787-71-5]
Bromodichloromethane	[75-27-4]
Bromoform	[75-25-2]
Bromoxynil	[1689-84-5]
Butabarbital sodium	[143-81-7]
Butyl Hydroperoxide (Tertiary)	[75-91-2]
Butyl Perbenzoate (Tertiary)	[614-45-9]
Butylated Hydroxyanisole (BHA)	[25013-16-5]
C.I. 12055 (C.I. Solvent Yellow 14, Sudan I)	[842-07-9]
C.I. 12075 (D&C Orange No. 17, Permanent Orange)	[3468-63-1]
C.I. 12100 (Oil Orange SS)	[2646-17-5]
C.I. 12156 (C.I. solvent red 80, Citrus Red No. 2)	[6358-53-8]
C.I. 15585 (D&C Red No. 8)	[2092-56-0]
C.I. 15585:1 (D&C Red No. 9)	[5160-02-1]
C.I. 16150 (Xylidine Ponceau 2R, Ponceau MX, D&C Red No.	[3761-53-3]
C.I. 16155 (Ponceau 3R, D&C Red No. 15)	[3564-09-8]
C.I. 22610 (Direct Blue 6)	[2602-46-2]
C.I. 23635 (C. I. Acid Red 114)	[6459-94-5]
C.I. 23850 (C.I. Direct blue 14, Trypan blue)	[72-57-1]
C.I. 24400 (C.I. Direct Blue 15)	[2429-74-5]
C.I. 24401 (C.I. Direct Blue 218)	[28407-37-6]
C.I. 41000B (C.I. Basic Yellow 2, Auramine, (Brilliant Oil	[492-80-8]
C.I. 42500 (Basic Red 9 monohydrochloride, pararosanilin)	[569-61-9]
C.I. 42640 (Benzyl violet 4B)	[1694-09-3]
C.I. 45170 (D&C Red No. 19, Rhodamine B, Basic Violet 10))	[81-88-9]
C.I. 64500 (Disperse Blue 1)	[2475-45-8]
Cacodylic acid	[75-60-5]
Cadmium	[7440-43-9]
Cadmium Chloride	[10108-64-2]
cadmium compounds	
Cadmium Oxide	[1306-19-0]
Cadmium Sulfate	[10124-36-4]
Cadmium Sulfide	[1306-23-6]
Caffeic acid	[331-39-5]
Calcium arsenate	[7778-44-1]
Captafol	[2425-06-1]
Captafol (Crisfolatan, Difolatan, Folcid)	[2939-80-2]
Captan	[133-06-2]
Carbaryl (Sevin)	[63-25-2]
Carbazole	[86-74-8]
Carbon black	[1333-86-4]
Carbon disulfide	[75-15-0]
Carbon monoxide	[630-08-0]
Carbon tetrachloride	[56-23-5]
Carbon-black extracts	
Carbonyl Fluoride	[353-50-4]
Carboplatin	[41575-94-4]
Carrageenan, degraded	[9000-07-1]
Cellulose Nitrate (concentration greater than 12.6% nitrogen	[9004-70-0]
Ceramic fibers (airborne particles of respirable size)	
Chenodiol	[474-25-9]
Chinomethionat (Oxythioquinox)	[2439-01-2]
Chlorambucil	[305-03-3]
Chloramphenicol (chloromycetin)	[56-75-7]
Chlorcyclizine hydrochloride	[1620-21-9]
Chlordane	[57-74-9]
Chlordecone (Kepone)	[143-50-0]
Chlordiazepoxide	[58-25-3]
Chlordiazepoxide hydrochloride	[438-41-5]
Chlordimeform	[6164-98-3]
Chlorendic acid	[115-28-6]
Chlorinated Paraffins (avg C12 , 60% Chlorine)	[108171-26-2]
Chlorine	[7782-50-5]
Chlorine dioxide	[10049-04-4]
Chlorine Pentrafluoride	[13637-63-3]
Chlorine Trifluoride	[7790-91-2]
Chlornaphazine (N,N-bis(2-chloroethyl)-2-naphthylamine)	[494-03-1]
Chlorodibromomethane	[124-48-1]
Chlorodiethylaluminum (also called Diethylaluminum Chloride)	[96-10-6]
Chloroethane (Ethyl chloride)	[75-00-3]
Chlorofluoromethane (fluorocarbon 31)	[593-70-4]
Chloroform	[67-66-3]
chloromethyl methyl ether (methyl chloromethyl ether)	[107-30-2]
Chlorophenols	
Chlorophenoxy herbicides	
Chloropicrin	[76-06-2]
Chloropicrin and Methyl Bromide mixture	
Chloropicrin and Methyl Chloride mixture	
Chloroprene (2-chloro-1,3-butadiene)	[126-99-8]
Chlorothalonil	[1897-45-6]
Chlorotrianisene	[569-57-3]
Chlorozotocin	[54749-90-5]
Chromium Hexavalent Compounds	
Chrysene	[218-01-9]
Ciclosporin (Cyclosporine, Sandimmune, Neoral)	[79217-60-0]
Cinnamyl anthranilate	[87-29-6]
Cisplatin	[15663-27-1]
Cladribine	[4291-63-8]
Clarithromycin	[81103-11-9]
Clobetasol propionate	[25122-46-7]
Clofibrate	[637-07-0]
Clomiphene citrate	[50-41-9]
Clorazepate dipotassium	[57109-90-7]

Coal tars (coke oven emissions)	[8007-45-2]
Coal-tar pitches	[65996-93-2]
Cobalt (powder)	[7440-48-4]
Cobalt [II] oxide	[1307-96-6]
cobalt compounds	
Cocaine	[50-36-2]
Codeine phosphate	[52-28-8]
Coke Oven Emissions	
Coke oven emissions	
Colchicine	[64-86-8]
Commune Hydroperoxide	[80-15-9]
creosote (coal tar creosote, creosote oil, liquid pitch oil)	[8001-58-9]
creosote (wood creosote)	[8021-39-4]
cresols	
Crotonaldehyde (E)- [2-Butenal, (E)-]	[123-73-9]
Crotonaldehyde [2-Butenal]	[4170-30-3]
Cupferron (ammonium N-nitrosophenylhydroxylamine)	[135-20-6]
Cyanazine	[21725-46-2]
Cyanogen (oxalonitrile, oxalic acid dinitrile)	[460-19-5]
cyanogen chloride	[506-77-4]
cyanuric fluoride	[675-14-9]
Cycasin	[14901-08-7]
Cyclohexanol	[108-93-0]
Cycloheximide	[66-81-9]
Cyclohexylamine [Cyclohexanamine]	[108-91-8]
Cyclophosphamide	[50-18-0]
cyclophosphamide hydrate	[6055-19-2]
Cyclosporin A (Cyclosporine A; Ciclosporin)	[59865-13-3]
Cyhexatin	[13121-70-5]
Cytarabine	[147-94-4]
Cytembena	[21739-91-3]
Dacarbazine	[4342-03-4]
Daminozide	[1596-84-5]
Danazol	[17230-88-5]
Daunomycin	[20830-81-3]
Daunorubicin hydrochloride	[23541-50-6]
DDD (Dichlorodiphenyldichloroethane)	[72-54-8]
DDE (Dichlorodiphenyldichloroethylene)	[72-55-9]
DDT (dichlorodiphenyltrichloroethane, 1,1,1-trichloro-2,2-bis(p-	[50-29-3]
Decaborane	[17702-41-9]
Decabromobiphenyl	[13654-09-6]
Demeclocycline hydrochloride (internal use)	[64-73-3]
Diacetyl Peroxide	[110-22-5]
Diaminotoluene (any isomer or mixed)	
Diazepam	[439-14-5]
Diazomethane	[334-88-3]
Dibenz[a,h]acridine	[226-36-8]
Dibenz[a,h]anthracene	[53-70-3]
Dibenz[a,j]acridine	[224-42-0]
Dibenzo[a,e]pyrene	[192-65-4]
Dibenzo[a,h]pyrene	[189-64-0]
Dibenzo[a,i]pyrene	[189-55-9]
Dibenzo[a,l]pyrene	[191-30-0]
Dibenzoyl Peroxide	[94-36-0]
Diborane	[19287-45-7]
Dichloroacetic acid	[79-43-6]
Dichloroacetylene	[7572-29-4]
Dichloromethane (Methylene Chloride)	[75-09-2]
Dichlorosilane	[4109-96-0]
Dichlorvos (No-Pest Strip, 2,2-dichloroethenyl dimethyl	[62-73-7]
Dicumarol	[66-76-2]
Dieldrin	[60-57-1]
Dienestrol	[84-17-3]
Diepoxybutane	[1464-53-5]
Diesel engine exhaust	
Diethyl sulfate	[64-67-5]
Diethylstilbestrol (DES)	[56-53-1]
Diethylzinc	[557-20-0]
Diglycidyl ether (di(2,3-epoxypropyl) ether)	[2238-07-5]
diglycidyl resorcinol ether (DGRE)	[101-90-6]
Dihydroergotamine mesylate	[6190-39-2]
Dihydrosafrole	[94-58-6]
Diisopropyl Peroxydicarbonate	[105-64-6]
Diisopropyl sulfate	[2973-10-6]
Dilauroyl Peroxide	[105-74-8]
Dimethyl sulfate (methyl sulfate)	[77-78-1]
Dimethylamine, Anhydrous	[124-40-3]
Dimethyldichlorosilane	[75-78-5]
Dimethyldisulfide	[624-92-0]
Dimethylformamide	[68-12-2]
Dimethylsulfide (methyl sulfide)	[75-18-3]
dimethylvinyl chloride (1-chloro-2-methylpropene)	[513-37-1]
Dinitrotoluene	[25321-14-6]
Dinitrotoluene mixture, 2,4-/2,6-	
Dinocap	[39300-45-3]
Dinoseb	[88-85-7]
Di-n-propyl isocinchomeronate (MGK Repellent 326)	[136-45-8]
Dioxathion	[78-34-2]
diphenylhydantoin (phenytoin)	[57-41-0]
Diphenylhydantoin (Phenytoin), sodium salt	[630-93-3]
Direct Black 38	[1937-37-7]
Direct Brown 95 (technical grade)	[16071-86-6]
Di-t-butyl Peroxide	[110-05-4]
Doxorubicin hydrochloride (Adriamycin)	[25316-40-9]
Doxycycline (internal use)	[564-25-0]
Doxycycline calcium (internal use)	[94088-85-4]
Doxycycline hyclate (internal use)	[24390-14-5]
Doxycycline monohydrate (internal use)	[17086-28-1]
Endrin	[72-20-8]
Epichlorohydrin	[106-89-8]
Ergotamine tartrate	[379-79-3]
Erionite	[12510-42-8]
Erionite	[66733-21-9]
Estradiol 17B	[50-28-2]
estrogens, conjugated	
estrogens, nonsteroidal	
estrogens, steroidal	
Estrone (1,3,5(10)-estratrien-3-ol-17-one, beta-Estrone)	[53-16-7]
Ethidium bromide	[1239-45-8]
ethinyl estradiol	[57-63-6]
Ethionamide	[536-33-4]
Ethyl acrylate	[140-88-5]
Ethyl methanesulfonate	[62-50-0]
Ethyl Nitrite	[109-95-5]
Ethyl-4,4'-dichlorobenzilate	[510-15-6]
Ethylamine	[75-04-7]
Ethylene chlorohydrin	[107-07-3]
Ethylene Dibromide [1,2-Dibromoethane (EDB)]	[106-93-4]
Ethylene Dichloride (1,2-Dichloroethane)	[107-06-2]
Ethylene fluorohydrin	[371-62-0]
Ethylene glycol monoethyl ether	[110-80-5]
Ethylene glycol monoethyl ether acetate	[111-15-9]
Ethylene glycol monomethyl ether	[109-86-4]
Ethylene glycol monomethyl ether acetate	[110-49-6]
Ethylene oxide	[75-21-8]
Ethylene thiourea	[96-45-7]
Ethylenediamine [1,2-Ethanediamine]	[107-15-3]
Ethyleneimine (aziridine)	[151-56-4]
Etoposide	[33419-42-0]
Etretinate	[54350-48-0]
FireMaster BP-0	
Fluazifop butyl	[69806-50-4]
Flunisolide	[3385-03-3]
Fluorine	[7782-41-4]
Fluoxymesterone	[76-43-7]
Flurazepam hydrochloride	[1172-18-5]
Flutamide	[13311-84-7]
Fluticasone propionate	[80474-14-2]
Fluvalinate	[69409-94-5]
Folpet	[133-07-3]
Formaldehyde (gas or mixture of any concentration)	[50-00-0]
Furan	[110-00-9]
Furazolidone	[67-45-8]
Furmecyclox	[60568-05-0]
furylfuramide (2-(2-furyl)-3-(5-nitro-2-furyl)acrylamide, AF-2)	[3688-53-7]
Fusarin C	[79748-81-5]
gamma-Butyrolactone	[96-48-0]
Ganciclovir sodium	[82410-32-0]
Gasoline engine exhaust (condensates/extracts)	
Germane	[7782-65-2]
Glasswool fibers (airborne particles of respirable size)	
Glu-P-1 (2-Amino-6-methyldipyrido[1,2-a:3',2'-d]imidazole)	[67730-11-4]
Glu-P-2 (2-Aminodipyrido[1,2-a:3',2'-d]imidazole)	[67730-10-3]
Glycidaldehyde	[765-34-4]
Glycidol	[556-52-5]
Glycol ethers	
Goserelin acetate	[65807-02-5]
Griseofulvin	[126-07-8]
Gyromitrin (Acetaldehyde methylformylhydrazone)	[16568-02-8]
Halazepam	[23092-17-3]

Halothane	[151-67-7]
HC Blue No. 1	[2784-94-3]
Heptachlor	[76-44-8]
Heptachlor epoxide	[1024-57-3]
Hexachlorobenzene (benzene hexachloride, C6Cl6)	[118-74-1]
Hexachlorobutadiene	[87-68-3]
Hexachlorocyclohexanes	[608-73-1]
Hexachlorodibenzodioxin	[34465-46-8]
Hexachloroethane	[67-72-1]
Hexafluoroacetone	[684-16-2]
Hexamethyl phosphoramide (HMPA)	[680-31-9]
Hexamethylene diisocyanate	[822-06-0]
Histrelin acetate	
Hydrazine Sulfate	[10034-93-2]
Hydrazine, anhydrous	[302-01-2]
hydrazobenzene (1,2-diphenylhydrazine)	[122-66-7]
Hydrogen	[1333-74-0]
Hydrogen Bromide	[10035-10-6]
hydrogen chloride (gas only)	[7647-01-0]
Hydrogen cyanide	[74-90-8]
hydrogen fluoride (gas or any mixture)	[7664-39-3]
Hydrogen Peroxide (52% by weight or greater)	[7722-84-1]
Hydrogen Selenide	[7783-07-5]
Hydrogen sulfide	[7783-06-4]
Hydroxylamine	[7803-49-8]
Hydroxyurea	[127-07-1]
Ifosfamide	[3778-73-2]
Indeno[1,2,3-cd]pyrene	[193-39-5]
Iodine	[7553-56-2]
Iodine-131	[10043-66-0]
Iprodione	[36734-19-7]
IQ (2-Amino-3-methylimidazo[4,5-f]quinoline)	[76180-96-6]
Iron dextran complex	[9004-66-4]
Iron pentacarbonyl	[13463-40-6]
Isobutyl nitrite	[542-56-3]
Isobutyronitrile [Propanenitrile,2-methyl-]	[78-82-0]
Isoprene	[78-79-5]
Isopropyl chloroformate [Carbonochloridic acid, 1-	[108-23-6]
Isopropyl formate	[625-55-8]
Isopropylamine	[75-31-0]
Isosafrole	[120-58-1]
Isotretinoin	[4759-48-2]
Kanechlor 500 (under Polychlorinated Biphenyls)	[37317-41-2]
Ketene	[463-51-4]
L-5-Morpholinomethyl)-3-[(5-nitro-furfurylidene)amino]-2-	[3031-51-4]
Lactofen	[77501-63-4]
Lasiocarpine	[303-34-4]
Lead	[7439-92-1]
Lead acetate	[301-04-2]
Lead arsenate	[7784-40-9]
Lead Chromate (under Chromium and Certain Chromium	[7758-97-6]
lead compounds	
lead compounds, inorganic	
Lead Phosphate	[7446-27-7]
Lead subacetate	[1335-32-6]
Leuprolide acetate	[74381-53-6]
Levonorgestrel implants	[797-63-7]
Lindane (gamma hexachlorocyclohexane, BHC gamma)	[58-89-9]
Lithium carbonate	[554-13-2]
Lithium citrate	[919-16-4]
Lorazepam	[846-49-1]
Lovastatin	[75330-75-5]
Magenta	[632-99-5]
Mancozeb	[8018-01-7]
Maneb	[12427-38-2]
m-Chlorophenol	[108-43-0]
m-diaminoanisole sulfate (2,4-diaminoanisole sulfate)	[39156-41-7]
m-Dinitrobenzene	[99-65-0]
Me-A-alpha-C (2-Amino-3-methyl-9H-pyrido[2,3-b]indole, MeA-	[68006-83-7]
Medroxyprogesterone acetate	[71-58-9]
Megestrol acetate	[595-33-5]
MeIQx (2-Amino-3,8-dimethylimidazo[4,5-f]quinoxaline)	[77500-04-0]
MeIQx(2-Amino-3,8-dimethylimidazo[4,5-f]quinoxaline)	[7500-04-1]
Melphalan	[148-82-3]
Menotropins	[9002-68-0]
Meprobamate	[57-53-4]
Mercaptopurine	[6112-76-1]
Mercury	[7439-97-6]
mercury compounds	
Mercury, organic cmpds	

Merphalan	[531-76-0]
Mestranol	[72-33-3]
Methacrylaldehyde	[78-85-3]
Methacryloyl chloride	[920-46-7]
Methacryloyloxyethyl isocyanate	[30674-80-7]
Methacycline hydrochloride	[3963-95-9]
Metham sodium	[137-42-8]
Methimazole	[60-56-0]
Methotrexate	[59-05-2]
Methotrexate sodium	[15475-56-6]
Methoxsalen (8-Methoxsypsoralen)	[298-81-7]
Methoxyflurane	[76-38-0]
Methyl acrylonitrile	[126-98-7]
methyl allyl chloride (3-chloro-2-methylpropene)	[563-47-3]
methyl bromide	[74-83-9]
methyl carbamate	[598-55-0]
methyl chloride	[74-87-3]
methyl chloroformate	[79-22-1]
Methyl Ethyl Ketone Peroxide	[1338-23-4]
Methyl fluoroacetate	[453-18-9]
Methyl Fluorosulfate (Methyl fluorosulfonate)	[421-20-5]
methyl hydrazine (monomethylhydrazine)	[60-34-4]
methyl iodide	[74-88-4]
Methyl isocyanate	[624-83-9]
methyl mercaptan	[74-93-1]
methyl mercury compounds	
methyl methanesulfonate (methyl mesylate)	[66-27-3]
Methyl thiocyanate [Thiocyanic acid, methylester]	[555-64-9]
methyl vinyl ketone	[78-94-4]
methylamine, anhydrous	[74-89-5]
methylazoxymethanol	[590-96-5]
Methylazoxymethanol acetate	[592-62-1]
Methylene biphenyl isocyanate	[101-68-8]
Methylhydrazine salts	
Methylmercury compounds	
Methyltestosterone	[58-18-4]
Methyltrichlorosilane	[75-79-6]
Metiram	[9006-42-2]
Metronidazole	[443-48-1]
Michler's Ketone [4,4'-(Dimethylamino)benzophenone]	[90-94-8]
Midazolam hydrochloride	[59467-96-8]
Mineral Oils	
Minocycline hydrochloride (internal use)	[13614-98-7]
Mirex (Dechlorane)	[2385-85-5]
Misoprostol	[59122-46-2]
Mitomycin C	[50-07-7]
Mitoxantrone hydrochloride	[70476-82-3]
Monocrotaline	[315-22-0]
MOPP and other combined chemotherapy including alkylating	
Mustard gas (2,2'-dichlorodiethyl sulfide, Sulfur mustard)	[505-60-2]
N,N'-Diacetylbenzidine	[613-35-4]
N,N-dimethylcarbamoyl chloride (dimethylcarbamoyl chloride)	[79-44-7]
N-[4-(5-Nitro-2-furyl)-2-thiazolyl] acetamide	[531-82-8]
Nafarelin acetate	[86220-42-0]
Nafenopin	[3771-19-5]
Nalidixic acid	[389-08-2]
Naphtha (coal tar naphtha, coal tar, petroleum benzine)	[8030-30-6]
Neomycin sulfate (internal use)	[1405-10-3]
N-ethyl-N-nitrosourea	[759-73-9]
N-Ethyl-N-nitrosovinylamine	[13256-13-8]
Netilmicin sulfate	[56391-57-2]
nickel	[7440-02-0]
Nickel [II] Hydroxide	[12054-48-7]
Nickel Acetate	[373-02-4]
nickel alloys	
Nickel Carbonate	[3333-67-3]
Nickel Carbonyl (Nickel Tetracarbonyl)	[13463-39-3]
nickel compounds	
Nickel Hydroxide	[11113-74-9]
Nickel II Oxide	[1313-99-1]
Nickel refinery dust from the pyrometallurgical process	
Nickel subsulfide	[12035-72-2]
Nickelocene	[1271-28-9]
Nicotine	[54-11-5]
Niridazole	[61-57-4]
Nitric Acid (94.5% by weight or greater)	[7697-37-2]
nitric oxide (nitrogen monoxide)	[10102-43-9]
nitriloacetic acid	[139-13-9]
Nitrilotriacetic acid salts	
Nitrilotriacetic acid, trisodium salt monohydrate	[18662-53-8]

Nitrobenzene	[98-95-3]
Nitrofurantoin	[67-20-9]
Nitrofurazone	[59-87-0]
Nitrogen Dioxide	[10102-44-0]
Nitrogen mustard (N,N-bis(2-chloroethyl)methylamine,	[51-75-2]
nitrogen mustard hydrochloride (Mechloroethamine	[55-86-7]
Nitrogen mustard N-oxide	[126-85-2]
Nitrogen mustard N-oxide hydrochloride (2-chloro-N-(2-	[302-70-5]
Nitrogen Oxides (NO; NO(2); N2O4; N2O3)	
Nitrogen tetroxide	[101022-44-0]
Nitrogen Tetroxide (Nitrogen Peroxide)	[10544-72-6]
Nitrogen Trifluoride	[7783-54-2]
nitrogen trioxide (dinitrogen trioxide)	[10544-73-7]
Nitromethane	[75-52-5]
Nitrous oxide	[10024-97-2]
N-methyl-N'-nitro-N-nitrosoguanidine	[70-25-7]
N-methyl-N-nitrosourea (N-nitroso-N-methylurea)	[684-93-5]
N-Methyl-N-nitrosourethane (N-Nitroso-N-methylurethane)	[615-53-2]
N-Methylolacrylamide	[924-42-5]
N-Nitroso- n-butyl- N-(3-carboxypropyl)amine	[38252-74-3]
N-Nitroso- n-butyl- N-(4-hydroxybutyl)amine	[3817-11-6]
N-Nitrosodiethanolamine	[1116-54-7]
N-nitrosodiethylamine (diethylnitrosamine; DEN)	[55-18-5]
N-Nitrosodimethylamine (Dimethylnitrosamine)	[62-75-9]
N-nitrosodi-n-butylamine (N-butyl-N-nitroso-1-butylamine)	[924-16-3]
N-Nitrosodiphenylamine	[86-30-6]
N-Nitrosomethylethylamine	[10595-95-6]
N-Nitrosomethylvinylamine	[4549-40-0]
N-Nitrosomorpholine	[59-89-2]
N-nitroso-N-dipropylamine (N-nitroso-N-di-n-propylamine, N-	[621-64-7]
N-Nitrosonornicotine	[16543-55-8]
N-Nitrosopiperidine	[100-75-4]
n-nitrosopyrrolidine	[930-55-2]
N-Nitrososarcosine	[13256-22-9]
Norethisterone (Norethindrone)	[68-22-4]
Norethisterone acetate (Norethindrone acetate)	[51-98-9]
Norgestrel	[6533-00-2]
N-Phenyl beta-naphthylamine	[135-88-6]
o,p'-DDT	[789-02-6]
o-Aminoazotoluene	[97-56-3]
o-Anisidine	[90-04-0]
o-Anisidine hydrochloride	[134-29-2]
o-Chlorophenol	[95-57-8]
Ochratoxin A	[303-47-9]
Octabromobiphenyl	[61288-13-9]
o-Dichlorobenzene	[95-50-1]
o-Dinitrobenzene	[528-29-0]
Oleum (65% to 80% by weight; also called Fuming Sulfuric	[8014-94-6]
Oleum (Fuming Sulfuric acid) [Sulfuric acid, mixture with sulfur	[8014-95-7]
o-Nitroanisole (2-Nitroanisole)	[91-23-6]
o-Nitrotoluene	[88-72-2]
o-Phenylenediamine and its salts	[95-54-5]
Oral contraceptives, combined	
Oral contraceptives, sequential	
Organo tin compounds	
Osmium tetroxide	[20816-12-0]
o-Toluidine	[95-53-4]
o-Toluidine Hydrochloride	[636-21-5]
Oxadiazon	[19666-30-9]
Oxazepam	[604-75-1]
Oxydemeton methyl	[301-12-2]
Oxygen Difluoride (Fluorine Monoxide)	[7783-41-7]
Oxymetholone	[434-07-1]
Oxytetracycline (internal use)	[79-57-2]
Oxytetracycline hydrochloride (internal use)	[2058-46-0]
Ozone	[10028-15-6]
p-a,a,a-Tetrachlorotoluene	[5216-25-1]
Paclitaxel	[33069-62-4]
Palygorskite (attapulgite) (long fibres, > 5 micrometers)	[12174-11-7]
p-Aminoazobenzene	[60-09-3]
Panfuran S	[794-93-4]
p-Anisidine	[104-94-9]
Paramethadione	[115-67-3]
p-Chloro -o-toluidine Hydrochloride	[3165-93-3]
p-Chloroaniline	[106-47-8]
p-Chloroaniline hydrochloride	[20265-96-7]
p-Chloro-o-toluidine	[95-69-2]
p-Chloro-o-toluidine strong acid salts	
p-Chlorophenol	[106-48-9]
p-cresidine (5-methyl-o-anisidine)	[120-71-8]

p-dichlorobenzene (1,4-dichlorobenzene)	[106-46-7]
p-Dinitrobenzene	[100-25-4]
Penicillamine	[52-67-5]
Pentaborane	[19624-22-7]
Pentachlorophenol	[87-86-5]
Pentobarbital sodium	[57-33-0]
Pentostatin	[53910-25-1]
peracetic acid (peroxyacetic acid)	[79-21-0]
Perchloric Acid (concentration greater than 60% by weight)	[7601-90-3]
Perchloroethylene (tetrachloroethylene)	[127-18-4]
Perchloromethyl Mercaptan	[594-42-3]
Perchloryl Fluoride	[7616-94-6]
Phenacemide	[63-98-9]
Phenacetin (p-acetophenetidide, p-ethoxyacetanilide)	[62-44-2]
Phenazopyridine	[94-78-0]
Phenazopyridine hydrochloride	[136-40-3]
Phenesterin	[3546-10-9]
Phenobarbital	[50-06-6]
Phenolphthalein	[77-09-8]
Phenoxybenzamine	[59-96-1]
Phenoxybenzamine hydrochloride	[63-92-3]
Phenprocoumon	[435-97-2]
Phenyl glycidyl ether	[122-60-1]
Phenylhydrazine	[100-63-0]
Phenylhydrazine salts	
phosgene (carbonyl chloride)	[75-44-5]
Phosphine (Hydrogen Phosphide)	[7803-51-2]
phosphorus oxychloride (phosphoryl chloride)	[10025-87-3]
Phosphorus pentafluoride	[7647-19-0]
Phosphorus trichloride	[7719-12-2]
piperazine estrone sulfate (Estropipate)	[7280-37-7]
Piperidine	[110-89-4]
Pipobroman	[54-91-1]
Plicamycin	[18378-89-7]
p-Nitroaniline	[100-01-6]
p-nitrosodiphenylamine (4-nitrosodiphenylamine)	[156-10-5]
Polybrominated biphenyls (PBBs)	
Polybrominated biphenyls (PBBs)	[59536-65-1]
Polybrominated Biphenyls (PBBs)	[67774-32-7]
Polychlorinated biphenyls (PCBs)	
Polychlorinated Biphenyls (PCBs)	[1336-36-3]
Polychlorinated dibenzofurans	
Polychlorinated dibenzo-p-dioxins	
Polycyclic Aromatic Hydrocarbons (PAHs)	
Polygeenan	[53973-98-1]
Potassium bromate	[7758-01-2]
Procarbazine	[671-16-9]
Procarbazine Hydrochloride	[366-70-1]
Procymidone	[32809-16-8]
Progesterone	[57-83-0]
Progestins	
Pronamide	[23950-58-5]
Propargite	[2312-35-8]
Propionitrile [Propanenitrile]	[107-12-0]
Propyl chloroformate [Carbonochloridic acid, propylester]	[109-61-5]
Propyl Nitrate	[627-3-5]
Propylene oxide	[75-56-9]
Propylenimine (2-Methylaziridine)	[75-55-8]
Propylthiouracil	[51-52-5]
p-Toluidine	[106-49-0]
Quazepam	[36735-22-5]
Quinoline	[91-22-5]
Quinoline strong acid salts	
Radionuclides	
Radon	[10043-92-2]
Radon decay products	
Reserpine (Regroton)	[50-55-5]
Residual (heavy) fuel oils	
Resmethrin	[10453-86-8]
Resorcinol	[108-46-3]
Retinol/retinyl esters	
Ribavirin	[36791-04-5]
Rockwool	
saccharin (benzisothiazol-3(2H)-one-1,1-dioxide)	[81-07-2]
Saccharin, sodium	[128-44-9]
Safrole	[94-59-7]
Salicylazosulfapyridine	[599-79-1]
Sarin (isopropyl methanefluorophosphonate)	[107-44-8]
Secobarbital sodium	[309-43-3]
Selenium	[7782-49-2]

Selenium hexafluoride	[7783-79-1]
Selenium sulfide	[7446-34-6]
Selenium, and all cmpds	
Shale-oils	[68308-34-9]
Silica - amorphous	[7699-41-4]
Silica - amorphous, fused	[60676-86-0]
Silica - crystalline, tripoli	[1317-95-9]
Silica - Tridymite (respirable)	[15468-32-3]
silica (quartz, respirable)	[14808-60-7]
Silica, crystalline (airborne particles of respirable size)	
Silica, crystalline, cristobalite	[14464-46-1]
Silicon tetrafluoride	[7783-61-1]
Slagwool	
Sodium Equilin Sulfate (under Conjugated Estrogens)	[16680-47-0]
Sodium Estrone Sulfate (under Conjugated Estrogens)	[438-67-5]
Sodium fluoroacetate	[62-74-8]
Sodium o-phenylphenate	[132-27-4]
Soots, tars, and mineral oils (untreated and mildly treated oils	
Spironolactone	[52-01-7]
Stanozolol	[10418-03-8]
Sterigmatocystin	[10048-13-2]
Stibine (antimony trihydride)	[7803-52-3]
Streptomycin sulfate	[3810-74-0]
Streptozotocin	[18883-66-4]
Strontium Chromate (under Chromium and Certain Chromium	[7789-06-2]
Styrene (phenylethylene, vinyl benzene)	[100-42-5]
styrene oxide (styrene-7,8-oxide)	[96-09-3]
Sulfallate (diethyldithiocarbamic acid 2-chlorallyl ester)	[95-06-7]
sulfur dioxide	[7446-09-5]
sulfur monochloride (sulfur chloride, disulfur dichloride)	[10025-67-9]
sulfur pentafluoride (disulfur decafluoride)	[5714-22-7]
sulfur pentafluoride (radical)	[10546-01-7]
sulfur tetrafluoride	[7783-60-0]
sulfur trioxide (sulfuric anhydride)	[7446-11-9]
sulfuryl chloride	[7791-25-5]
Talc (fibrous)	[14807-96-6]
Talc containing asbestiform fibers	
Tamoxifen	[10540-29-1]
Tamoxifen citrate	[54965-24-1]
Tamoxifen salts	
Tellurium hexafluoride	[7783-80-4]
Temazepam	[846-50-4]
Teniposide	[29767-20-2]
Terrazole	[2593-15-9]
Testosterone and its esters	[58-22-0]
Testosterone cypionate	[58-20-8]
Testosterone enanthate	[315-37-7]
Tetracycline (internal use)	[60-54-8]
Tetracycline hydrochloride (internal use)	[64-75-5]
Tetrafluoroethylene	[116-14-3]
Tetrafluorohydrazine	[10036-47-2]
Tetramethyl Lead	[75-74-1]
Tetramethyl succinonitrile	[3333-52-6]
Tetranitromethane	[509-14-8]
Thalidomide	[50-35-1]
Thioacetamide	[62-55-5]
Thioguanine	[154-42-7]
Thionyl chloride	[7719-09-7]
Thiotepa (tris(1-aziridinyl)phosphine sulfide)	[52-24-4]
Thiourea	[62-56-6]
Thorium Dioxide	[1314-20-1]
Titanium tetrachloride [Titanium chloride (TiCl4) (T-4)-]	[7550-45-0]
Tobramycin sulfate	[49842-07-1]
Toluene	[108-88-3]
Toluene 2, 6- diisocyanate [Benzene, 1,3- diisocyanato-2-	[91-08-7]
Toluene diisocyanates (any isomer or mixed)	[26471-62-5]
Toluene-2,4-diisocyanate	[584-84-9]
Toxaphene (chlorinated camphene)	[8001-35-2]
trans-2-[(Dimethylamino)methylimino]-5-[2-(5-nitro-2-furyl)-	[25962-77-0]
trans-2-[(Dimethylamino)methylimino]-5-[2-(5-nitro-2-	[55738-54-0]
Treosulfan (Treosulphan)	[299-75-2]
Triazolam	[28911-01-5]
Trichlormethine (trimustine hydrochloride, 2,2',2"-	[817-09-4]
trichloro (chloromethyl) silane	[1558-25-4]
Trichloro (dichlorophenyl) Silane	[27137-85-5]
Trichloroethylene	[79-01-6]
Trichlorosilane	[10025-78-2]
Triethylamine (TEA)	[121-44-8]
Trifluorochloroethylene	[79-38-9]
Trilostane	[13647-35-3]
Trimethadione	[127-48-0]
Trimethlchlorosilane [Silane, chlorotrimethyl-]	[75-77-4]
Trimethyl phosphate	[512-56-1]
Trimethylamine	[75-50-3]
Trimethyoxysilane	[2487-90-3]
Trimetrexate glucuronate	[82952-64-5]
Triphenyltin hydroxide	[76-87-9]
Tris(2,3-dibromopropyl) phosphate	[126-72-7]
Tris(2-chloroethyl) phosphate	[115-96-8]
Tris(aziridinyl)-p-benzoquinone (Triaziquone)	[68-76-8]
Tryptophan-P-1 (3-Amino-1,4-dimethyl-5H-pyrido[4,3-b]indole,	[62450-06-0]
Tryptophan-P-2 (3-Amino-1-methyl-5H-pyrido[4,3-b]indole, Trp-	[62450-07-1]
Uracil mustard	[66-75-1]
Uranium, all cmpds	
Uranium, natural	[7440-61-1]
Urethane (Urethan; Ethyl carbamate)	[51-79-6]
Urofollitropin	[26995-91-5]
Valproate (Valproic acid)	[99-66-1]
Vinblastine sulfate	[143-67-9]
Vinclozolin	[50471-44-8]
Vincristine	[57-22-7]
Vincristine sulfate	[2068-78-2]
Vinyl acetate	[108-05-4]
Vinyl bromide	[593-60-2]
Vinyl chloride	[75-01-4]
Vinyl fluoride	[75-02-5]
Vinylidene fluoride (1,1-difluoroethylene)	[75-38-7]
Warfarin (in any quantity or concentration)	[81-81-2]
Wood dusts (hardwoods)	
Zinc Chromate	[13530-65-9]
Zineb	[12122-67-7]

RESPIRATORS

A. USE OF RESPIRATORS

Where the use of respirators is necessary to maintain exposure below permissible exposure limits, the employee is provided, at no cost, with the proper respiratory equipment. Respirators are selected and used in accordance with the requirements of 1910-134.

B. REQUIREMENTS

1. Written Standard Operating Procedure governing the selection and use of respirators. A written standard can be found at the end of this chapter.

2. Respirators are selected on the basis of hazards to which the worker is exposed.

3. The user is instructed and trained in the proper use of respirators and their limitations.

4. Where practicable, the respirators are assigned to individual workers for their exclusive use.

5. Respirators are regularly cleaned and disinfected. Those issued for use by more than one worker are thoroughly cleaned and disinfected after each use.

6. Respirators are stored in a convenient, clean and sanitary location.

7. Respirators used routinely are inspected during cleaning and worn or deteriorated parts are replaced.

8. Only approved or accepted respirators are used. The respirator furnished will provide adequate respiratory protection against the particular hazard for which it is designed in accordance with standards established by competent authorities.

The person responsible for developing and implementing the respiratory protection program is:

_____

Name Title Department

The written standard operating procedures and all documentation related to the respiratory protection program are maintained at the following location:

_____

Name Title Department

C. STANDARD OPERATING PROCEDURE

1. Use of Respirators

a. In areas where the wearer, with failure of respirator, could be overcome by a toxic or oxygen-deficient atmosphere, at least one additional person shall be present. Communication (visual, voice, or signal line) shall be maintained between both or all individuals present.

b. Every respirator wearer receives fitting instructions including demonstrations and practice in how the respirator should be worn, how to adjust it, and how to determine if it fits properly. Respirators are not to be worn when conditions prevent a good face seal. Such conditions may be a growth of beard, sideburns, a skull cap that projects under the face piece, or temple pieces on glasses. The worker's diligence in observing these factors is evaluated by periodic check. Ensuring good face piece fit may be done by following the manufacturer's face piece fitting instructions.

c. When corrective spectacles or goggles are required, they shall be worn so as not to affect the fit of the face piece. Wearing of contact lenses in contaminated atmospheres with a respirator is not allowed. A system for mounting corrective lenses inside full face piece is to be used.

2. Maintenance and Care of Respirators

a. The equipment is properly maintained to retain its original effectiveness. This includes:

- Inspection for defects (including a leak check)
- Cleaning disinfecting
- Repair
- Storage

b. A routine inspection before and after each use is performed. A respirator that is not routinely used but is kept ready for emergency use is inspected after each use and at least monthly to assure that it is in a satisfactory working condition.

c. Respirator inspection includes a check of the tightness of connections and condition of the face piece, headbands, valves, connecting tubes, and canisters. Rubber or elastomer parts are inspected for pliability and signs of deterioration. Stretching manipulating rubber or elastomer parts with a massaging action will keep them pliable and flexible and prevent them from taking a set during storage.

d. A record of inspection dates and findings is kept for respirators maintained for emergency use.

e. Routinely used respirators are collected, cleaned, and disinfected as frequently as necessary to insure that proper protection is provided for the wearer. Respirators maintained for emergency use are cleaned and disinfected after each use.

f. No attempt is made to replace components or to make adjustment or repairs beyond the manufacturer's recommendations.

g. After inspection, cleaning and necessary repair, respirators are stored to protect against dust, sunlight, heat, extreme cold, excessive moisture and damaging chemicals. Respirators placed at stations and work areas for emergency use are quickly accessible at all times.

h. Respirators are packed and stored so that the face piece and exhalation valve will rest in a normal position and function will not be impaired by the elastomer setting in an abnormal position.

i. Instructions for proper storage of emergency respirators are found in "use and care" instructions mounted inside the carrying case lid.

3. Identification of Gas Mask Canister

a. Gas mask canister is identified by two means:

- Properly worded labels
- Color- coded

b. Laboratory supervisor sees that all gas mask canisters purchased are properly labeled and colored before they are placed in service, and that the labels and colors are properly maintained at all times thereafter until the canisters have completely served their purpose.

c. Canisters are labeled with the following warning:

"Gas masks should be used only in atmospheres containing sufficient oxygen to support life (at least 16 percent by volume), since gas mask canisters are only designed to neutralize or remove contaminants from the air."'

d. Gas mask canisters are coated with distinctive colors or combination of colors, such that they are clearly identifiable by the user and clearly distinguishable from one another. The color coding is listed in the following table:

	ATMOSPHERIC CONTAMINANTS to be PROTECTED AGAINST	COLORS ASSIGNED
1.	Acid Gases	White
2.	Hydrocyanic Acid Gas	White with 1/2" green stripe completely around the canister near the bottom.
3.	Chlorine Gas	White with 1/2" yellow stripe completely around the canister near the bottom.
4.	Organic Vapors	Black
5.	Ammonia Gas	Green
6.	Acid Gas & Ammonia Gas	Green with 1/2" white stripe completely around the canister near the bottom.
7.	Carbon Monoxide	Blue
8.	Acid Gases & Organic Vapors	Yellow
9.	Acid Gases, Organic Vapors & Ammonia Gases	Brown
10.	Particulates (dusts, fumes, mists, fogs, or smokes) in combination with any of the above gases or vapors	Canister color for contaminants as designated above, with 1/2" gray stripe completely around the canister near the top.
11.	All of the above atmospheric contaminants	Red with 1/2" gray stripe completely around the canister near the top.

SAMPLE LABORATORY, WORKSHOP, AND STUDIO TRAINING PROGRAM

I. Occupational Exposure to Hazardous Chemicals in Laboratories Standard (29 CFR 1910.1450)

A. Content of the standard and appendices.
B. Location and explanation of the chemical hygiene plan.
C. Location of reference materials and material safety data sheets (MSDS).
D. Details of access to medical consultation and management system.

II. Physical Hazards

A. Combustible liquids
B. Compressed gases
C. Explosive liquids and solids
E. Organic peroxides
F. Pyrophoric chemicals
G. Unstable (reactive) chemicals
H. Water-reactive materials

III. Health Hazards

A. Local
   1. Irritants
   2. Corrosives

B. Systematic
   1. Toxics
      a. Acute toxicity vs chronic toxicity
      b. Nervous system effects
      c. Respiratory system effects
      d. Reproductive system effects
   2. Sensitizers
   3. Carcinogens

IV. Route of Exposure

A. Inhalation
B. Skin absorption
C. Ingestion
D. Injection

V. Physical State and Amount of Absorption

A. Gases/vapors
B. Particulates
   1. Dust
   2. Mist
   3. Fume

VI. Methods to Reduce Exposure

A. Work practices
B. Personal hygiene
C. Personal protective equipment
D. Environmental controls
E. Administrative controls

VII. Dose-Response Relationship

A. Age
B. Gender
C. Body size
D. Health status
E. Personal habits
F. Other exposures

VIII. Duration of Exposure

IX. Exposure Limits Including PELs and TLVs

A. Definition
B. Interpretation
C. Use of collected data

X. Air Sampling

A. Personal sampling required by OSHA
B. Area monitoring
C. Employee reports of illness
D. Confined space work
E. Emergency response
F. Other

XI. Employee Concerns

A. Symptoms -exposures
B. Requirements for documentation

C. Referrals
D. Refusal to work

XII. Specific Standard Operating Procedures

A.
B.
C.
D.

****

(NOTE: See attachments for specific Academic Departments. Select, revise and use as appropriate).

Appendix G-1
Door Poster

Building: _____ **Room:** _____

Post on **outside** of primary lab exit door(s)*

A. Staff Member in charge of room:

Name: _____
Work phone: _____ Emergency phone: _____

B. Faculty Member(s) associated with work in room (if different from A)

Name: _____
Work phone: _____ Emergency phone: _____
Name: _____
Work phone: _____ Emergency phone: _____

C. Other emergency staff contacts:

Name: _____
Work phone: _____ Emergency phone: _____
Name: _____
Work phone: _____ Emergency phone: _____

D. Locations of:

MSDSs: _____
Acronym key: _____
Hazard Assessment Certification: _____
Chemical Hygiene Plan: _____

E. Other special instructions:

* This form may be used to meet the requirement that all rooms which fall under the definition of "laboratory use of hazardous chemicals", should be posted, on the outside of the primary exit door(s), with the name of the faculty or administrative staff member having responsibility for the area and with emergency contact name(s) and telephone number(s) of responsible persons.

APPENDIX G-2
CHEMICAL HYGIENE PLAN
TRAINING DOCUMENTATION FORM

NAME: _____ **DATE:** _____
DEPARTMENT: _____
TRAINER: _____

EMPLOYEE NAME _____
EMPLOYEE NAME _____
EMPLOYEE NAME _____
EMPLOYEE NAME _____
EMPLOYEE NAME _____
EMPLOYEE NAME _____
EMPLOYEE NAME _____
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EMPLOYEE NAME _____
EMPLOYEE NAME _____
EMPLOYEE NAME _____

APPENDIX G-3
LABORATORY, WORKSHOP, AND STUDIO SAFETY CHECK-LIST

_____

_____

_____

(Installation, Address and Date)

	Yes	No
1. Fire Extinguisher Access		
2. Fire Extinguisher Inspection		
3. Exit Pathways		
4. Exit Signs & Lighting		
5. Exit Doors		
6. First Aid Supplies		
7. Fire Blanket		
8. Fire Alarms		
9. Respirator Use & Storage		
10. Emergency Equipment		
11. Housekeeping / Sanitation		
12. Tripping Hazards		
13. Spills & Leaks		
14. Material Storage		
15. Flammable Storage Cabinets		
16. Compressed Gas Cylinders		
17. Material Labeling		
18. Container Labeling		
19. MSDSs		
21. Eye Wash Stations		
22. Drench Showers		
23. Safety Glasses		
24. Safety Goggles		
25. Face Shields		
26. Lab Coats / Aprons		
27. Appropriate Gloves		
28. Warning & Safety Signs		

	Yes	No
29. General Ventilation		
30. Fume Hood Ventilation		
31. Chemical Segregation		
32. Stock Rotation		
33. Secondary Containers		
34. Broken Glassware		
35. Waste Disposal Containers		
36. Electrical Grounding		
37. Elec. Panel Access		
38. Elec. Labeling & I.D.		
39. Elec. Cord Strain Relief		
40. Elec. Wiring / Device Defects		
41. Elec. Classification Hazards		
42. Elec. Fail Safe Conditions		
43. Elec. Extension Cords		
44. Training Deficiencies		
45. Procedural Deficiencies		
46. Defective Equipment Tags		
47. Personal/Area Monitoring		
48. Signs & Posters		
49. OSHA 300 (February)		
50. Emergency Phone Nos.		
CORRECTIVE ACTIONS & DATES:		

APPENDIX G-4
LABORATORY, WORKSHOP, OR STUDIO
SAFETY AUDIT FORM (Annual)

Building & Room # _____**Date:** _____

I. Housekeeping:

Yes	No	
☐	☐	Is the laboratory, workshop, studio in a disorderly condition?
☐	☐	Is there evidence of chemical spills?
☐	☐	Are floors in need of a cleaning?
☐	☐	Are bench tops cluttered with unused equipment or glass ware?
☐	☐	Are the emergency shower/eyewash stations blocked?
☐	☐	Is there evidence of eating or drinking in the laboratory, workshop, and studio?
☐	☐	Are tripping hazards present?

Comments:

_____

_____

_____

II. Chemical Use and storage

Yes	No	
☐	☐	Have employees received Right-to-Know training for the chemicals in use?
☐	☐	Are chemicals stored according to hazard class?
☐	☐	Are secondary containers labeled with identity & hazard class information?
☐	☐	Are copies of the MSDSs readily available for the chemicals in use?
☐	☐	Are outdated chemicals kept beyond their usefulness?
☐	☐	Are refrigerators/freezers properly labeled/used for the storage of flammables
☐	☐	Are shelves/cabinets for chemical storage in good condition?
☐	☐	Are flammables stored in the flammable storage cabinet?
☐	☐	Are acids and bases stored properly?
☐	☐	Are volatile chemicals with Permissible Exposure Levels < 100 parts per million restricted to use in the hood?
☐	☐	Are compressed gas cylinders properly secured and labeled?

Comments:

_____

_____

List the type and the number of gallons of flammable solvents stored outside of a flammable solvent cabinet:

Acetone (1A) _____ Ethyl Ether (1A) _____
Hexane (1A) _____Pentane (1A) _____
Methanol (1A) _____ Toluene (1B) _____

Note any instances of incompatible storage:

_____
_____

III. Hazardous wastes

A. Hazardous Waste generated in this area:

Waste Description	Generation Rate (units)

Yes	No	
☐	☐	Have all process been evaluated for proper waste disposal procedures?
☐	☐	Do procedures indicate a proper route of disposal for all products?
☐	☐	Are wastes transferred to the proper containers?
☐	☐	Are waste containers properly labeled as to their contents and hazards?
☐	☐	Are containers of wastes properly stored in the satellite area?

Comments:

_____
_____
_____

IV. Personal Protective equipment

Are staff using/wearing the following personal protective equipment?

Yes	No	
☐	☐	Laboratory Coat
☐	☐	Safety Glasses
☐	☐	Safety Goggles when necessary
☐	☐	Gloves compatible with the chemicals in use
☐	☐	Apron
☐	☐	Respirator
☐	☐	Are laboratory coats/gloves removed before leaving the laboratory, workship, and studio?

Comments:

_____

_____

V. HOODS

Yes	No	
☐	☐	Are hoods cluttered with material or equipment?
☐	☐	Are hoods being used to store chemicals that are not in use?
☐	☐	Have the hoods been recently calibrated (face velocity)?
☐	☐	Are the hoods being used properly by staff?
☐	☐	Are the slots/baffles blocked by equipment or chemicals?
☐	☐	Are equipment/processes placed 6 inches behind the face of the hood?

Comments:

_____

_____

VI. Emergency Procedures

Yes	No	
☐	☐	Have staff been trained in emergency procedures?
☐	☐	Are emergency procedures posted?
☐	☐	Are emergency response phone numbers displayed near the phone?
☐	☐	Are exits marked?
☐	☐	Are spill cleanup procedures and kits available for all materials in use?

Yes	No	
☐	☐	Solvents
☐	☐	Acids/Bases
☐	☐	Broken Glass/sharps
☐	☐	Other (list)_____

☐	☐	Are emergency shower/eyewash stations readily available?
☐	☐	Are appropriate fire extinguishers readily available?
☐	☐	Has the fire extinguisher been recently maintained?
☐	☐	Is there a first aid kit available in the room?
☐	☐	Is there a fire blanket in the area?

Comments:

_____

_____

VII. Equipment

Yes	No	
☐	☐	Is equipment used within its designed purpose?
☐	☐	Is apparatus properly secured/supported?
☐	☐	Are fail safes in use when possible?
☐	☐	Are all water/glassware connections secured?
☐	☐	Do electrical plugs or cords show evidence of:

Yes	No	
☐	☐	frayed cords
☐	☐	overloaded cords (warm to the touch)
☐	☐	altered or damaged plugs (ground removed)
☐	☐	extension cords in use

Comments:

_____

_____

VIII. Standard Operating Procedures (SOPs)

Yes	No	
☐	☐	Are SOPs available for the process(s) being conducted in the laboratory, workshop, and studio?
☐	☐	Are the SOPs reviewed or updated with new information?
☐	☐	Are the staff following the SOPs as written?

Comments:

_____

_____

IX. BIOSAFETY

Source(s) of infectious waste: _____

Yes	No	
☐	☐	Are used needles are bent, not broken?
☐	☐	Are all sharps are placed in labeled puncture-resistant containers?
☐	☐	Are hands washed after glove removal/hand contact with infectious agents?
☐	☐	Is Personal Protective Equipment (PPE) removed before leaving the work area?
☐	☐	Is aerosolation, splashing or spraying kept to a minimum?
☐	☐	Is eating, smoking or drinking prohibited in the laboratory, workshop, and studio?
☐	☐	Is the appropriate PPE available and in use?
☐	☐	Is the area posted with a BIOHAZARD symbol & name of the infectious agent?

☐ ☐ Are warning labels affixed to containers of infectious waste?
☐ ☐ Have staff received training to work with infectious waste?
☐ ☐ Are work surfaces decontaminated after procedures, spills and at the end of the shift?

How is the infectious waste disposed of?_____

SAN MATEO COUNTY
COMMUNITY COLLEGE DISTRICT

HAZARDOUS WASTE DISPOSAL PROCEDURE

Process

The purpose of this form is to enable the user to document the waste types in a manner in which Purchasing can gather competitive quotes. It will also help us gather useful date that we can use for reporting purposes and bid submittal. Once you complete this form and submit it, Purchasing will contact the suppliers for competitive quotes and provide this information to the requestor. The requestor will generate a requisition from which Purchasing will provide the P.O. to the supplier and coordinate the pickup with the supplier. Purchasing will inform the requestor via email of the date of service.

Requestor Date

Phone Number Email

Date of pickup

Location of Item

1. Campus 2. Bldg

3. Department 4. Room

5. Contact Person 6. Phone Number

7. Email

Product Identification

Item #	Waste Type	PH	Pkg	Condition	UM	#of Cont.	Qty. Per Pkg	Total Qty.
			Select One	Select One	Liter	Sel One		
			Select One	Waste	Liter	Sel One		
			Select One	Waste	Liter	Sel One		
			Select One	Waste	Liter	Sel One		

Product Identification

Item #	Waste Type	PH	Pkg	Condition	UM	# Of Cont.	Qty. Per Pkg	Total Qty.
			Select one	Select One	Pint	Sel one		
			Select one	Select One	Pint	Sel one		
			Select one	Select One	Pint	Sel one		
			Select one	Select One	Pint	Sel one		
			Select one	Select One	Pint	Sel one		
			Select one	Select One	Pint	Sel one		
			Select one	Select One	Pint	Sel one		
			Select one	Select One	Pint	Sel one		
			Select one	Select One	Pint	Sel one		

Comments:_____

_____

_____

_____

_____

Instructions

1. College department will enter wate information, up to thirteen waste types per form.
2. Purchasing will contact the suppliers for competitive quotes.
3. Purchasing will contact the college requestor and provide them with the supplier and price.
4. The requestor will complete a requisition for this service.
5. Purchasing will generate a PO and coordinate the pickup with the supplier and the requestor.

RESET PRINT

APPENDIX G-6
FUME HOOD PERFORMANCE EVALUATION

Hood Location: Bldg. & Room_____ Hood Number _____
List any dedicated uses of the hood: _____

CURRENT PHYSICAL CONDITION

Yes	No	
☐	☐	Is the hood used for storage of equipment or chemicals?
☐	☐	Are the slots blocked by objects?
☐	☐	Are processes/equipment located within 6 inches of the sash or rear slots?
☐	☐	Is the bench area inside the hood suffering from poor housekeeping?
☐	☐	Is large equipment in use in the hood that is blocking air flow?
☐	☐	Are open chemical containers (not in use) present?
☐	☐	Do any large heated processes/equipment affect the air flow in the hood?
☐	☐	Is the hood monitor inoperative or inaccurate?
☐	☐	Does the sash move with any difficulty?
☐	☐	Is the sash glass cracked, fogged, or in need of repairs?
☐	☐	Is the light/fixture in need of repairs?
☐	☐	Are hood fixtures (gas, water, air, etc.) corroded, dirty or in need of repair?

Description/Comments:

_____

_____

Any of the above conditions answered with a “yes” should be corrected immediately.

SUMMARY OF INSPECTION

Are repairs needed to the system? If so, list: _____

Repair Date Required

_____

_____

Does the hood monitor readout correspond with the measured face velocity? __

Does the face velocity meet health and safety requirements? _____

Has the face velocity changed ± 10% since the last evaluation? _____

If so, explain _____

Recommendations:

_____

_____

APPENDIX G-6
HOOD PERFORMANCE EVALUATION
FACE VELOCITY MEASUREMENTS

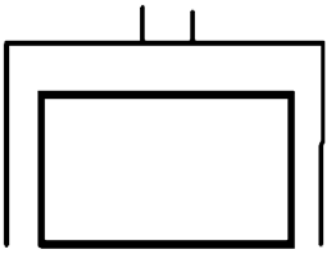
Hood Location: Bldg. and Room _____ Hood Number _____

Date of Evaluation _____Date of Last Evaluation _____

Name of Evaluator _____

Instrument: _____ S/N _____ Calib. date: _____

Indicate the position of any fixed equipment in the hood:



Full Face

1. Divide the hood face (sash wide open) into a grid with 9-12 equal sections.
2. Measure the air velocity in the center of each grid. Record in the grid diagram labeled as "full face".
3. Determine the mean face velocity and report in the space below.
4. Use smoke tubes to determine air flow direction at the hood face and air flow patterns within the hood. Record unusual flow patterns in the grid diagram.

Operating Sash Height

If it is necessary to operate the hood with the sash at a lower height to achieve the required face velocity of 100 feet per minute, adjust the sash to the appropriate height and repeat steps 1-4 above. Record the face velocities on the grid marked "operating height". Indicate the operating point on the hood face.

Full Face					Operating Height			

RESULTS:	"Full Face"	"Operating Height"
Hood Face dimensions (W X H):		
Grid dimensions (W X H)		
Mean Face Velocity (fpm):		
Record the Hood Monitor Set Point:		
Was a hood performance report posted on the hood? Yes/No		

Recommendations:

_____

_____

_____