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CHEMICAL HYGIENE PLAN

Kaiser Permanente

[This document complies with the requirements of the “Occupational Exposure to Hazardous Chemicals in the Laboratory” (29 CFR §1910.1450 and 8 CCR §5191) and “Formaldehyde” (29 CFR §1910.1048 and 8 CCR §5217) occupational health and safety standards.]

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FOREWARD

The Occupational Safety and Health Administration (OSHA) disseminated a final rule on January 31, 1990 and updated it on February 9, 1994, relating to occupational exposure to hazardous chemicals in the laboratory (Lab Standard). The basis for this standard is that laboratories typically differ from industrial operations in their use and handling of hazardous chemicals and that a different approach from the Hazard Communication Standard of 1987 is warranted. OSHA proposed the Standard, "Occupational Exposures to Hazardous Chemicals in Laboratories", commonly called the Laboratory Standard. The Standard was originally published in the Federal Register on January 31, 1990 as [29 CFR Part 1910.1450 of the Federal Register \(29 CFR 1910.1450\)](#). State plans had a year to adopt regulations at least as restrictive as the federal standard.

The final rule applies to all laboratories that use hazardous chemicals in accordance with the definition of laboratory use and laboratory scale (see Glossary, Section III) provided in the standard.

FORMAL POLICY STATEMENT

The Kaiser Foundation Health Plan and Hospitals and its laboratories are committed to providing a safe working environment for employees and believe that employees have the right to know about health and safety hazards associated with their work. So that employees can make knowledgeable decisions about risks and hazards of their workplace, this Chemical Hygiene Plan (CHP) includes a policy statement, procedures, and responsibilities designed to develop in employees the awareness of potential hazardous chemicals in the workplace and to inform employees regarding appropriate and safe work practices. The CHP will be readily available to employees, employee representatives and, upon request, the Assistant Secretary of Labor.

It is important that both employers and employees assume responsibility for laboratory safety. All employees will have access to pertinent safety information through their manager, training programs, the CHP and other documents which discuss laboratory safety. When safety concerns arise, employees are encouraged to contact their supervisor/manager and/or Safety/Environmental, Health and Safety.

PURPOSE

The purpose of the Chemical Hygiene Plan (CHP) is to provide employees with information and training necessary for the safe handling, use and storage of hazardous chemicals in the laboratory including formaldehyde. The CHP is designed and implemented in accordance with the following OSHA standards: "Occupational Exposure to Hazardous Chemicals in the Laboratory" (29 CFR §1910.1450) and "Formaldehyde" (29 CFR §1910.1048), as well as with the state regulatory equivalents of the federal standards.

SCOPE

This plan applies to all Kaiser Permanente laboratory employees and to those employees who are exposed or potentially exposed to formaldehyde gas, its solutions, and materials that release formaldehyde at levels of 0.1 parts per million (ppm) or above.

AVAILABILITY

The Chemical Hygiene Plan (CHP) is available to all employees, employee representatives, contractors and, upon request, to regulatory agencies.

RESPONSIBILITIES

1. **Regional Reference Laboratory Director and Medical Office Laboratory Director** are responsible for implementation of the CHP in each facility laboratory and are involved in the selection and appointment of personnel who support the implementation of the CHP.
2. **Laboratory QA and Compliance Manager** are responsible for ensuring the CHP is reviewed every two years, updated as appropriate, posted to the laboratory website and provide communication to all laboratory staff once the CHP is updated.
3. **Laboratory Managers and Supervisors** are responsible for overseeing implementation of the CHP in the facility laboratory they manage.
4. **Chemical Hygiene Officer** is assigned by the Laboratory Director. This individual must have sufficient training and experience to provide technical guidance in the development and implementation of the provisions of the Chemical Hygiene Plan.
5. **Clinical Managers/Supervisors** are responsible for implementing, monitoring and enforcing the CHP within their designated area. Their responsibilities include the following:
 - a. Ensure safety training is provided to employees when new chemicals, existing chemicals with new/more severe hazards and/or new equipment utilizing chemicals are introduced into the laboratory within their designated area;
 - b. Ensure that training is provided to each employee upon hire and at least annually thereafter within their designated area; Assures that the plan is available and that changes/additions/corrections to the CHP are made and communicated in a timely manner;
 - c. Provide technical assistance in complying with the CHP; Monitors procurement of new chemicals (each lab area responsible for this);
 - d. Monitor collection and disposal of chemical wastes (each lab area responsible for this);
 - e. Remain current on new policies, procedures and related safety information as presented in meetings, in memoranda and other formal communication process;
 - f. Ensure that appropriate personal protection equipment (PPE) is available as needed;
 - g. Ensure protective equipment, e.g., biological safety cabinets and grossing stations, are properly maintained;
 - h. Ensure employees receive proper chemical hygiene and housekeeping instructions including department specific information;

- i. Ensure the location/department Chemical Inventory is updated whenever a new chemical or reagent is added;
 - j. Ensure that a current Chemical Inventory and Safety Data Sheets (SDS) are maintained and available for each work area. OSHA inspection guidelines consider “available” to mean accessible within four hours of request.
 - k. Directs concerns and potential overexposure complaints to Environmental, Health and Safety (EH&S). Conditions indicative of a potential employee overexposure include, but are not limited to, the following:
 - i. Appearance of signs/symptoms consistent with potential overexposure to a particular hazardous chemical used in the laboratory;
 - ii. Results of monitoring which indicate exposures greater than the Permissible Exposure Limit (PEL);
 - iii. The occurrence of a spill or other uncontrolled release of a hazardous chemical within the laboratory.
6. **Environmental, Health and Safety/Safety Operations Leader** is responsible for communicating new federal/state regulations and policies pertaining to hazardous materials to the Laboratory. In addition EH&S will:
- a. Help managers/supervisors maintain a current Safety Data Sheet (SDS) file by providing assistance with identifying hazardous chemicals to include in the department chemical inventory and obtaining appropriate SDS;
 - b. Assist the purchasing department with efforts to:
 - i. Decrease the current stock of hazardous chemicals through the substitution of less hazardous products when appropriate;
 - ii. Evaluate new hazardous chemical purchases for approval;
 - c. Investigate hazardous material incidents / potential overexposure / engineering controls / administrative controls;
 - d. Assist managers/supervisors in determining the appropriate level of Personal Protective Equipment (PPE) to be worn, and procedures for chemical spills; and
 - e. Assess compliance with individual requirements of the CHP.
7. **Material Management/Purchasing** routinely places product orders for the region. The Purchasing department will train facility buyers/receiving clerks on the current requirements for receiving chemicals into Kaiser Permanente facilities. Kaiser Permanente continues to minimize the assortment and volumes of hazardous chemicals kept on hand. A current SDS must accompany all first-time chemical shipments.
8. **The Facility Buyer** will place orders, receive and distribute product deliveries. To meet current requirements, the facility buyer will:
- a. Check for the Safety Data Sheets with each initial shipment of chemical product and distribute copies to the appropriate manager/supervisors;
 - b. Notify the manager/supervisor that receives the chemical when an SDS is NOT included with the chemical shipment;
 - c. Immediately notify the manager/supervisor which ordered the chemical and Safety/EH&S whenever there is any concern that a chemical is leaking or that a chemical is improperly packaged.
9. **Laboratory employees and Permanente Medical Group pathologists** are responsible for adhering to the CHP, thereby ensuring their own safety and the safety of others within the laboratory. Employees and physicians are responsible for the following:
- a. Reviewing the CHP initially upon hire and annually thereafter;
 - b. Complying with safety policies;
 - c. Implementing appropriate chemical hygiene habits;
 - d. Completing national/regional, facility and laboratory safety training programs as required;
 - e. Reporting safety issues to the Laboratory Manager/Supervisor;

- f. Reporting potential chemical spills and/or potential overexposure issues to the manager/supervisor;
- g. Completing the online Spill Report

EMERGENCY CONTACTS

Chemical Hygiene Officer	Janice Wolf, pager (310) 797-0282
Safety/Environmental, Health & Safety Manager	Judy Powelson, pager (310) 719-0661
Laboratory Director	Sony Wirio, MD, pager (310) 797-1181
Administrator-On-Call	Consult Amcom Intelliweb On-call Calendar

GENERAL LAB SAFETY OPERATING PROCEDURES

Because few laboratory chemicals are without hazards, general precautions, which minimize exposure, should be adopted for all laboratory chemicals. General principles for working with chemicals include:

Avoid skin contact with chemicals.
Few chemicals are without hazard, handle all with care; follow specific precautions where they exist.
Assume that any mixture will be more toxic than its most toxic component and that all substances of unknown toxicity are toxic.
Employ safe work practices at all times.
Wear a lab coat at all times and other PPE such as gloves or goggles as necessary. Remove lab coat and other PPE when leaving the laboratory work area.
Avoid unnecessary exposure to chemicals.
Do not smell or taste chemicals. Apparatus that can discharge toxic chemicals (vacuum pumps, distillation columns, etc.) should be vented into the local exhaust devices.
Use only those chemicals for which the quality of the available ventilation system is appropriate.
Eating, drinking, smoking, gum chewing or applying cosmetics or lip balm is prohibited in the laboratory. Do not chew fingernails or put writing tools (pens and/or pencils) in the mouth. Keep hands away from mouth, nose eyes, and face.
Remove PPE and wash hands when leaving the laboratory and before eating, drinking, or engaging in any non-laboratory activity.
Avoid storing, handling or consuming food or beverages in storage areas; do not place food or drink in refrigerators, glassware, or utensils that are also used for laboratory operations.
Handle and store laboratory glassware with care to avoid damage; do not use damaged glassware. Use equipment only for its designed purpose.
Wash areas of exposed skin thoroughly (with mild soap and water) before leaving the laboratory.
Use a bulb or pipetting device. Never mouth pipette under any circumstances.
Wear hair in such a manner that it does not interfere with vision, is not contaminated by laboratory surfaces, and will not be caught in instruments or machines. Long neck chains are not safe or permitted. Do not wear loose clothing.
Wear shoes that protect the feet from spills or slips. No open toed shoes or sandals are permitted in the laboratory.
Keep the work area clean and uncluttered, properly label and store chemicals and equipment; clean up the work area on completion of an operation/process and at the end of each day.

Wear gloves when working with specimens, drawing patient's blood, handling reagents and handling instruments potentially exposed to chemical and/or biological hazards.
Select the appropriate glove for protection against specific chemical/biological hazards in your area. After removing gloves, wash hands with soap and water.
Wear appropriate gloves when the potential for contact with chemicals exists; inspect the gloves before each use, and replace them periodically.
Use PPE and emergency apparel and equipment as appropriate.
Wearing contact lenses is discouraged. Contact lenses are not to be worn when handling chemicals which can damage the eye either through splashing or by contact with vapors. Soft contact lenses absorb chemicals, especially vapors, and cause injury to the eye.
Wear eye protection appropriate for the activity as in areas where chemicals are being used, stored or handled.
Remove laboratory coats and other PPE immediately upon contamination.
Seek information and advice about hazards, plan appropriate protective procedures, and plan positioning of equipment before beginning any new operation.
Leave light on, place an appropriate sign on the door, and provide for containment of chemicals in the event of failure of a utility service (such as cooling water) in an unattended operation.
Use a hood for all operations involving chemicals, which may present health hazards due to airborne contamination. Confirm and document adequate hood performance before use. Do not use hoods with sash open wider than certified. Keep hood closed at all times except when using the hood. Keep materials stored in hoods to a minimum, and do not allow materials to block vents airflow. Ensure proper personal protection equipment is used in addition to the hood.
Leave hood "on" if chemicals are stored in it or if it is uncertain whether adequate general laboratory ventilation will be maintained when it is "off."
If using open flame, use only in area where there is no danger of contact with flammable chemicals.
Be alert for the presence of unsafe conditions and ensure they are reported immediately with a plan for correction appropriate to the level of hazard. Document any unusual occurrences with the CHO or designee in your area.
Do not combine chemicals without knowing their compatibility.

GENERAL CHEMICAL SAFETY










Chemical Hazards are often classified on SDS as ignitable, corrosive, toxic, carcinogenic or explosive. Acids or alkalis may have more than one of these characteristics. Safety rules for the use of the chemical may vary depending on its classification. Information on hazards for each chemical may be found in the Safety Data Sheets.

HAZARDOUS MATERIAL CLASSIFICATION

1. **Chemical Inventory** The responsibility for determining whether a chemical is hazardous lies with the chemical manufacturer or importer of a chemical. As a user of chemicals, the Lab may rely on the evaluation received from these suppliers through labels on containers and the SDS. At least annually, the department supervisor arranges for someone with knowledge to walk through and write down the names of chemicals in their department that have a label indicating a potential hazard. At this time chemicals that are no longer needed or used can be eliminated from the previous list. Contact the Safety/EH&S department for assistance with chemical disposal. **Keep this list current.** Whenever a chemical is added to or removed from the department, make the appropriate changes to the location/department chemical inventory list and Safety Data Sheet. **Review the chemical inventory list annually** with appropriate notations if no changes have been made.
 - a. Chemicals considered to be hazardous include, but are not limited to those chemicals:
 - i. Regulated by OSHA in [29 CFR 1910.1000, Air Contaminants](#), Table Z-1;

- ii. Found to be suspected or confirmed carcinogens by the National Toxicology Program or by the International Agency for Research on Cancer ;
 - iii. Listed on the California Safe Drinking Water and Toxic Enforcement Act of 1986 (Prop 65) list of carcinogens and reproductive health hazards: http://www.oehha.ca.gov/prop65/prop65_list/Newlist.html
2. **Primary Container Labeling (Original Containers)** [29 CFR 1910.1450](#) and [29 CFR 1910.1200](#) contains specific labeling requirements and the State plan equivalents. Original containers received directly from the manufacturer must include a container label indicating the following information:
- a. **Identity** of the hazardous chemical(s);
 - b. **Name, address and telephone number** of the chemical manufacturer, importer, or other responsible party. The original label on a container should never be removed or defaced. Materials that are received, delivered, used, and disposed of in the original containers usually pose no labeling problems and meet OSHA's labeling requirements;
 - c. The label for each hazardous chemical that is classified shall include the **signal word**, **hazard statement(s)**, **pictogram(s)**, and **precautionary statement(s)** for each hazard class and associated hazard category. NOTE: Primary containers require a secondary label if the original label is damaged, absent, inadequate and/or unreadable.

Pictograms

<p>Health Hazard</p>  <ul style="list-style-type: none"> ▪ Carcinogen ▪ Mutagenicity ▪ Reproductive Toxicity ▪ Respiratory Sensitizer ▪ Target Organ Toxicity ▪ Aspiration Toxicity 	<p>Flame</p>  <ul style="list-style-type: none"> ▪ Flammables ▪ Pyrophorics ▪ Self-Heating ▪ Emits Flammable Gas ▪ Self-Reactives ▪ Organic Peroxides 	<p>Exclamation Mark</p>  <ul style="list-style-type: none"> ▪ Irritant (skin and eye) ▪ Skin Sensitizer ▪ Acute Toxicity ▪ Narcotic Effects ▪ Respiratory Tract Irritant ▪ Hazardous to Ozone Layer (Non-Mandatory)
<p>Gas Cylinder</p>  <ul style="list-style-type: none"> ▪ Gases Under Pressure 	<p>Corrosion</p>  <ul style="list-style-type: none"> ▪ Skin Corrosion/Burns ▪ Eye Damage ▪ Corrosive to Metals 	<p>Exploding Bomb</p>  <ul style="list-style-type: none"> ▪ Explosives ▪ Self-Reactives ▪ Organic Peroxides
<p>Flame Over Circle</p>  <ul style="list-style-type: none"> ▪ Oxidizers 	<p>Environment (Non-Mandatory)</p>  <ul style="list-style-type: none"> ▪ Aquatic Toxicity 	<p>Skull and Crossbones</p>  <ul style="list-style-type: none"> ▪ Acute Toxicity (fatal or toxic)

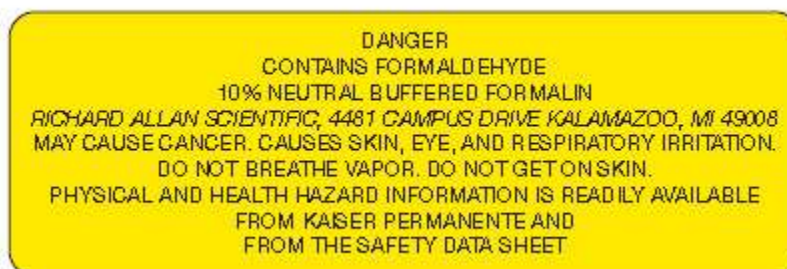
3. **Secondary Container Labeling (Employer Containers)**

- a. A container must indicate the appropriate hazard warnings when a chemical is transferred from a primary container to a secondary container. The label on the secondary container must contain either:
 - i. All the items required for the labels on the original containers, as listed above; or
 - ii. Product identifier and words, pictures, symbols, or combination thereof, which provide at least general information regarding the hazards of the chemicals, and which, in conjunction with the immediately available hazard communication program, provide specific physical and health hazards information of the hazardous chemical.
- b. The secondary container label may provide a space to write in the chemical name and indicate the specific health hazard/s, physical hazard/s and target organs and effects. The label may also include special waste handling information. An example of a completed secondary container label is shown below.
- c. An alternative labeling system is the National Fire Protection Association's (NFPA) 704M Hazard Identification System which uses color, numbers and other information to convey the hazards of a chemical.

- i. An example of a completed NFPA label is shown below. The NFPA labeling system assigns a hazard rating of 0-4 for:
 1. health (blue)
 2. flammability (red)
 3. reactivity (yellow)
 4. special category (white)
- ii. A health hazard rating of:
 1. 3 or 4 can cause permanent damage
 2. 1 or 2 can cause temporary effects
 3. 0 presents no danger



4. **Portable Container Labeling** Working solutions in containers such as flasks or beakers may have a general label only provided the contents are for the single use of the person transferring the chemical into it and the contents are discarded at the conclusion of the operations. The user is responsible for the contents of the containers and it must be under the control of the user at all times.
5. **Formaldehyde Label** Specific label information is required for mixtures or solutions of formaldehyde containing greater than 0.1 percent formaldehyde and any other material capable of releasing formaldehyde into the air at concentrations of 0.1 ppm or greater. The label must include the following information:



6. **Signage** Prominent signs must be posted for the following services and equipment:
 - a. Location of fire alarm boxes, emergency eye wash stations, fire extinguishers, spill kits, and other safety equipment.

- b. Exit signs.
- c. Emergency escape routes.
- d. Cabinets with flammable or caustic chemicals.
- e. Emergency telephone numbers and information can be found in on page 6 of this plan.
- f. Refrigerators and freezers should be labeled stating that food and beverages cannot be stored within.
- g. Contents of containers, including waste receptacles and associated hazards.
- h. Required types of PPE for work area
- i. Formaldehyde Regulated Areas must be established where the concentration of airborne formaldehyde exceeds the PEL or STEL. Signs shall be posted at all entrances and access ways with the following information:

**DANGER FORMALDEHYDE
MAY CAUSE CANCER
CAUSES SKIN, EYE AND RESPIRATORY IRRITATION
AUTHORIZED PERSONNEL ONLY**

7. **Safety Data Sheets (SDS)** The safety data sheet (SDS, formerly known as Material Safety Data Sheet or MSDS) is used to communicate chemical hazard information on a chemical product from the manufacturer to the employee. The SDS contains information for identifying hazardous ingredients, recognizing hazards of a material, precautions for safe handling and emergency procedures. The employer is required to have an SDS for each hazardous chemical product used in the workplace and ensure SDSs are readily accessible to employees during their work shift. The SDS sheets are available online, <https://kaisersouthbay.ellucid.com/documents/view/6107>. A SDS is required for the following chemicals:
- a. For any hazardous chemical known to be present in the workplace to which employees may be exposed.
 - b. Chemicals listed as physical hazards – corrosive, ignitable, reactive, etc. (example: glacial acetic acid, potassium hydroxide, trichloroacetic acid).
 - c. Chemicals listed as health hazards – toxics, carcinogens, sensitizers, skin absorbers (example: methanol, formaldehyde, phenol, chloroform).

Manufacturers may withhold the specific chemical identity and other specific identification, including the chemical name under certain specific conditions. In medical emergencies the information shall ***immediately*** disclose the identity of the chemical. In non-emergency situations a written request may be needed. See [29 CFR Part 1910.1200 \(i\)](#) for specific information. Incoming hazardous chemicals for which an SDS is not available ***should not*** be placed in service until obtained by the laboratory.

Chemicals manufactured by the laboratory for the laboratory's exclusive use must be evaluated for hazard and appropriate records and documentation. Generally, reagents are purchased from vendors. Therefore, compounding should be limited to any reagents not commercially available.

CHEMICAL EXPOSURE MONITORING, INCLUDING FORMALDEHYDE

Exposure monitoring will be performed for those personnel engaged in functions using formaldehyde and other chemicals identified as hazardous through inhalation and when it is determined potential exposure exceeding regulatory levels is possible. Monitoring results determine the need and extent of employee training, hygiene measures, personal protective equipment, follow-up monitoring and medical surveillance. The "Formaldehyde Requirements Matrix" (Appendix A) summarizes responsibilities for employees based on exposure results. Monitoring will occur based on the likelihood of exposure:

1. Routine monitoring will be task-specific using personal monitoring devices that meet Federal and State OSHA requirements for precision and accuracy.
2. A representative number of individuals will be sampled who are engaged in the specific exposure-related task. When there are different processes where employees may be exposed, EH&S or the Chemical Hygiene Officer will select a maximum risk employee. Monitoring is not required if it can be documented that the presence of a chemical, e.g., xylenes, cannot result in airborne concentrations that would cause an employee exposure at or above the Action Level (if one is established) or the short term exposure limit (STEL), or the permissible exposure limit (PEL) if neither an Action Level (AL) or STEL is established.
3. Initial monitoring will be conducted to determine actual employee exposures if it is likely that airborne exposures exceed the AL, STEL or PEL. Those employees whose exposure to formaldehyde exceeds 0.1 ppm must take part in a formaldehyde training program; exposures below 0.1 ppm require no additional actions.
4. Periodic monitoring will be conducted for those employees with initial monitoring results at or above the AL or STEL. If exposures exceed the AL or STEL, the following actions are necessary:
 - a. Employees must participate in an information and training session
 - b. Engineering and work practice controls must be instituted to reduce exposures to below the AL or STEL
 - c. Respiratory protection may be required in the interim until engineering controls are successfully implemented
 - d. Repeat air sampling must be conducted within six months if exposures exceed the AL; repeat sampling must be conducted within a year if exposures exceed the STEL
 - e. In California formaldehyde exposures exceeding the STEL or PEL must be reported to the Director of Industrial Relations (8 CCR §5203) and a Regulated Area must be established.
5. Employees will be notified in writing of the results of exposure monitoring within 15 working days of receiving the results. Monitoring results will also be discussed at the staff meeting following the receipt of results and will be made available to any interested employee(s).

CHEMICAL EXPOSURE CONTROLS AND EMERGENCY SAFETY EQUIPMENT

Control of exposure to chemicals within laboratories is accomplished through engineering and administrative controls and personal protective equipment (PPE).

1. **Engineering controls** within Kaiser Permanente include biological safety cabinets and grossing stations. These are required to undergo annual certification to ensure that they are functioning properly. Any hood that does not pass inspection is taken out of service immediately and will not be used until the hood has passed inspection. It is the responsibility of the employer to purchase the parts or to replace the unit in a timely fashion so as not to endanger the health and well-being of an employee or place the facility at risk.

2. **Administrative controls** include general chemical safety handling as described in this plan, proper training, and periodic self-audits. Additionally, the **manager/supervisor** obtains and reviews **SDS** prior to the purchase of new chemicals. The Regional Laboratory Managers or designee, Safety/EH&S, Infection Prevention Coordinator or a facility or regional safety committee should review any new or changed safety procedures. Changes instituted in one laboratory should be instituted in all laboratories where they apply to provide the same level of safety to all laboratory workers.
3. **Personal hygiene practices** include prohibiting food and drink from clinical and anatomic pathology and histocytology laboratories. Employees who are required to change from work clothing into protective clothing to prevent skin contact with formaldehyde shall be provided change rooms
4. **Housekeeping and Preventive Maintenance**, including surveys for chemical leaks, shall be undertaken at regular intervals. In work areas where spillage may occur, spill containment supplies, decontamination facilities and waste disposal materials shall be provided.
5. **PPE** used in laboratories includes splash proof eye protection and/or face shields, gloves and lab coats appropriate for the types of chemicals being handled. Respiratory protection is not required provided the existing engineering controls are being properly utilized. The laboratory **manager/supervisor** is responsible for ensuring that all PPE is being properly maintained and available for staff.
6. **Selection of PPE** is determined by the recommendations contained in the SDS and by prudent laboratory practice. PPE must be compatible with the properties of each hazardous substance being handled.
 - a. **Gloves** are required to be worn by employees when there is a potential for direct skin contact with blood, hazardous chemicals and/or biohazardous materials. Nitrile exam gloves are made available throughout the laboratory; additional glove materials are available for special applications.
 - b. **Laboratory coats** are to be worn at all times when the employee is engaged in laboratory work and specimen handling. Coats should have long sleeves, cover the employee to approximately to the knees, and button to the neck. Coats are required to be buttoned at all times to provide desired protection. Coats are to be worn in the laboratory area only. A clean laboratory coat can be worn outside the laboratory. Used laboratory coats are placed in the laundry hamper supplied by the linen vendor and picked up weekly to be cleaned or repaired.
 - c. **Impermeable aprons** should be worn when working with extremely toxic or caustic materials, i.e. when adding acid into urine specimens.
 - d. **Masks and eye protection or fluid shield surgical mask** is worn to prevent splashes or sprays of blood, infectious materials if there is a potential for eye, nose or mouth contamination.
 - e. **Indirect-vent tight-fitting chemical splash goggles** should be worn when handling corrosives or skin toxins. A face shield is not protective against corrosive splashes since liquid can splash underneath or over the top; if a face shield is worn, chemical splash goggles must also be worn.
7. **Maintenance of PPE and Clothing** If PPE or clothing become contaminated with formaldehyde, they should be placed in a sealed container with the following sign. The contaminated items should either be laundered before use or disposed of as hazardous waste.

DANGER
FORMALDEHYDE-CONTAMINATED CLOTHING / EQUIPMENT
MAY CAUSE CANCER
CAUSES SKIN, EYE AND RESPIRATORY IRRITATION
DO NOT BREATHE THE VAPOR DO NOT GET ON SKIN

8. **Signs and Symptoms Associated with Potential Chemical Overexposure** Employees are required to understand symptoms associated with potential overexposure to hazardous chemicals. These symptoms are described in the SDS for a particular chemical. The employee is responsible for notifying his/her manager if he/she has reason to believe that he/she has been overexposed. Once notified, the supervisor or manager is then responsible for notifying Employee Health and EH&S within 24 hours.
9. The Formaldehyde standard requires both an **eyewash and deluge shower** where solutions containing one percent or greater formaldehyde are handled; 10% neutral buffered formalin contains four percent formaldehyde. Other laboratory locations may require eyewash stations and deluge showers, depending on the amounts of corrosives or skin toxins handled (See "Emergency Face/Eyewash and Shower Guidance Document" for more information: http://kpnet.kp.org/ehs/eyewash/eesgd_2011_rev5.pdf). Equipment should meet ANSI Z358.1 and should be capable of delivering a continuous flow of clean and tempered water for no less than 15 minutes. Eyewash and shower equipment are activated weekly and the check is documented by the Chemical Hygiene Officer, or designated employee at each facility. Improperly functioning stations are taken out of service, are clearly labeled as such and immediately repaired or replaced.
10. **Fire Extinguishers** should be easily accessible in each laboratory work area. Fire extinguishers are checked to ensure that inspection has been completed annually. If the change level indicator is low or if the pin has been removed the extinguisher will be replaced with serviceable unit. In addition, all extinguishers are inspected annually by an outside inspection company.
11. **Fire Alarms and Detectors** - inspection and monitoring of these systems are under the direction of the facility engineer.
12. **Ventilated Storage Cabinets** for volatile chemicals are available as needed. The cabinets should have a separate exhaust duct.

CHEMICAL STORAGE

All laboratory chemicals should be stored according to the manufacturers' instructions and in accordance with standard laboratory practices. Chemicals shall be segregated according to their classes and compatibility and shall be stored in well ventilated areas with appropriate exhaust systems. Chemical compatibility information is generally available on the SDS.

1. Flammable liquids are stored in flammable storage cabinets with proper ventilation according to NFPA standards unless the volume is small. Flammable chemicals should not be stored in conventional refrigerators or freezers.
2. Since corrosive chemicals can cause damage to the eyes in an accidental spill, **all acids with a pH below 5.0 and all bases with a pH above 9.0 should be stored below eye level as a common practice.**

3. The total volume of flammable and combustible liquids being stored outside the approved storage cabinets and safety shall not exceed 1 gallon (3.78 L) per 100 square feet. Flammable and combustible liquids exceeding this limit must be stored in approved safety cabinets. If the refrigerator is not approved for storage of flammable chemicals, signage must be present which prohibits all storage of flammable chemicals in refrigerators, freezers or coolers.
4. Chemical amounts stored should be the least amount needed to maintain laboratory operations. Hoods should not be used for routine chemical storage. Ventilated cabinets and specially monitored refrigerators may be needed when large amounts of chemicals are needed for operations.
5. Toxic chemicals, including carcinogens, are stored in ventilated storage areas in breakable chemical resistant containers. These containers, if relabeled, are labeled "**CAUTION: HIGH CHRONIC TOXICITY OR CANCER-SUSPECT AGENT**". Toxic chemicals received in breakable containers are stored in acid carriers or an unbreakable secondary container. The laboratory, according to federal and state regulations, maintains a separate inventory list of carcinogens and suspected carcinogens.
 - a. Cylinders of compressed gases are strapped or chained to a wall or bench top or secured in a floor stand constructed for this purpose. Cylinders not in use must be capped. The valve assembly should be one specifically for the cylinder and gas in use. No more than one cylinder should be in the work area. Supplies should be stored away from the work area.
 - b. No food or drink is permitted in the same refrigerators or cabinets where chemicals are stored.
6. Formaldehyde storage containers must have tight-fitting lids. To minimize the severity of spills, individual containers shall not exceed five gallons for 10% neutral buffered formalin (four percent formaldehyde) and no more than one gallon for concentrated formalin (37% formaldehyde).

CHEMICAL WASTE DISPOSAL

To assure that minimal harm to people, other organisms, and the environment will result from the disposal of waste laboratory chemicals, the [SafetyNet Waste](#) page specifies how waste is to be collected, segregated, stored, and transported and includes consideration of what materials can be incinerated.

1. All wastes are to be disposed of in accordance with all local, state and federal regulations. The laboratory must evaluate each type of hazardous waste generated by the laboratory prior to disposing of the waste.
2. Clean up of infectious waste and spill should occur according to the Bloodborne Pathogen Exposure Plan and Spill Procedure. Refer to the Hazardous Waste Program for management of chemical waste.
3. Indiscriminate disposal by pouring waste chemicals down the drain or adding them to mixed refuse for landfill burial is unacceptable. Hoods are not to be used as a means of disposal for volatile chemicals. Disposal by recycling or chemical decontamination is used when possible.

PRIOR APPROVAL FOR NON-ROUTINE LABORATORY PROCEDURES

New procedures, processes, tests, or experiments require planning to ensure safe work practices. This planning includes determining the hazards of the chemicals involved, obtaining the correct personal protective devices needed, forethought as to the placement of the equipment and documented employee training.

Therefore, an employee must obtain approval from his/her supervisor/manager to begin the procedure, process test or experiment when any of the following conditions prevail:

1. If a new procedure, piece of equipment, process, test or experiment is planned, even when it is similar to current practices;
2. If there is a substitution of a chemical ingredient in a procedure;
3. If there is a substantial increase in the amount of chemical used. In general, safety practices should be reviewed if the amount of chemical or reagent is to be increased by 20%;
4. When failure of any of the equipment has occurred especially safeguards such as fume hoods or clamp apparatus;
5. When a test or procedure result is different than is expected and the employee suspects a problem;
6. When a staff member becomes ill, suspects potential overexposure, smells chemicals, or otherwise suspects a failure of the laboratory safeguards;
7. If an unattended operation is planned.

HIGH-HAZARD CHEMICAL OPERATIONS

The use of particularly hazardous chemicals including “select carcinogens,” reproductive toxins and substances with a high degree of acute toxicity, require additional provision for employee protection. Supervisor/manager approval is required before operations start for any procedure, process or test. This provision includes, as necessary:

1. Establishment of designated use areas.
2. Use of containment devices, including fume hoods and glove boxes.
3. Procedure for safe removal of contaminated waste.
4. Decontamination procedures.

Note: Formaldehyde and OSHA-designated carcinogens in use in Kaiser Permanente laboratories are handled in accordance with the requirements of 29 CFR 1910.1048 and 29 CFR 1910.1003.

FORMALDEHYDE HAZARDS

The following information is provided in the informative appendix of the OSHA regulation. Specific information about commercial mixtures or formulations may be obtained from the manufacturer’s SDS.

1. Acute Effects of Exposure
 - a. **Ingestion** (swallowing): Liquids containing 10-40% formaldehyde can cause severe irritation and inflammation of the mouth, throat, and stomach. Severe stomach pains will follow ingestion with possible loss of consciousness and death. Ingestion of dilute formaldehyde solutions (0.03-0.04%) may cause discomfort in the stomach and pharynx.
 - b. **Inhalation** (breathing): Formaldehyde is highly irritating to the upper respiratory tract and eyes.

Concentration	Health Effect
0.5 to 2.0 ppm	May irritate the eyes, nose and throat
3.0 to 5.0 ppm	May also cause tearing of the eyes
10 to 20 ppm	May cause difficulty breathing, burning of the nose and throat, coughing, and heavy tearing of the eyes
25 to 30 ppm	May cause severe respiratory tract injury leading to pulmonary edema and pneumonitis
100 ppm and above	Immediately Dangerous to Live and Health (IDLH)

Note: The perception of formaldehyde by odor and eye irritation becomes less sensitive with time as one adapts to formaldehyde exposure. This can lead to overexposure if a worker is relying on formaldehyde's warning properties to alert him or her to the potential for exposure.

- c. **Skin** (dermal): Concentrated formalin (37% formaldehyde) is a severe skin irritant and sensitizer. Contact with formalin causes white discoloration, smarting, drying, cracking and scaling. Prolonged and repeated contact can cause numbness and a hardening or tanning of the skin. Previously exposed persons may react to future exposures with an allergic eczematous dermatitis or hives.
- d. **Eye:** Formaldehyde solutions splashed in the eye can cause injuries ranging from transient discomfort to severe, permanent corneal clouding and loss of vision. The severity of the effect depends on the concentration of formaldehyde in the solution and whether or not the eyes are flushed with water immediately after the accident.

2. Chronic Effects of Exposure

- a. **Carcinogenicity:** Formaldehyde has the potential to cause cancer in humans. Repeated and prolonged exposure increases the risk. Various animal experiments have conclusively shown formaldehyde to be a carcinogen in rats. In humans, formaldehyde exposure has been associated with cancers of the lung, nasopharynx and/or pharynx, and nasal passages, and to cause leukemia.
- b. **Mutagenicity:** Formaldehyde is genotoxic, as shown by *in-vitro* test systems, as both an inhibitor and promoter.
- c. **Toxicity:** Prolonged or repeated exposure to formaldehyde may result in respiratory impairment. Rats exposed to formaldehyde at 2 ppm developed benign nasal tumors and changes of the cell structure in the nose as well as inflamed mucous membranes of the nose. Structural changes in the epithelial cells of the human nose have also been observed. Some persons have developed asthma or bronchitis following exposure to formaldehyde, most often as the result of an accidental spill involving a single exposure to a high concentration of formaldehyde.

SPILLS AND ACCIDENTS

Spills of hazardous chemicals shall be addressed in the manner specified in the laboratory's policy and procedures. [SafetyNet Spills](#) contains additional informative guidance documents.

Consult the SDS and label before undertaking work with hazardous chemicals to ensure proper precautions are undertaken to reduce the chance of accidents. If an accident occurs, the Supervisor should be notified immediately. Additional reporting may be required.

RESPIRATORY PROTECTION

Whenever feasible work practice and engineering controls (e.g., local exhaust venation) cannot reduce employee exposures below the STEL or PEL, until such time as effective controls are put in place, respiratory protection must supplement those controls on an interim basis. Respiratory protection is not to be used as a primary control unless work practice or engineering controls are infeasible, such as during infrequent, short duration maintenance operations. The use of respiratory protection shall be in accordance with the OSHA "Respiratory Protection Standard" (29 CFR §1910.134). All workers must be medically evaluated by Employee Health to determine the ability of the worker to perform the work while wearing a respirator. Any worker who is not authorized will be prohibited from engaging in activities which may expose the worker at or above the PEL.

1. Respirator must be used when exposures are at or above the STEL or PEL:
 - a. During temporary, interim periods necessary to install or implement feasible engineering and work practice controls;
 - b. When engineering or work practices are not feasible, such as during maintenance and repair activities or vessel cleaning;
 - c. During work operations for which feasible engineering and work practice controls are not yet sufficient to reduce exposures to or below the STEL or PEL; and
 - d. During emergencies
2. Appropriate respirators must be selected based upon employee exposure levels. Consult EH&S for selection of the appropriate type.

MEDICAL CONSULTATION AND EXAMINATION

1. **Types of Exposures.**
 - a. **Needle sticks and Sharps Injuries.** Employees should clean the wound and notify supervisor immediately. A red Exposure Packet must be obtained before being seen by Employee Health during work hours, or Urgent Care/Emergency after hours. Follow all instructions in the red Exposure Packet and return the forms to EH&S.
 - b. **Formaldehyde.** If exposure is to formaldehyde in an emergency, the medical examination shall be provided as soon as possible to all employees exposed.
 - c. **Non-acute employee and/or employee overexposure** discovered as a result of monitoring should be reported to the Employee Health Coordinator who will evaluate and refer the employee to the appropriate physician. The Workplace Health and Safety Specialist should be consulted regarding general management of the situation.
2. **Medical Examinations and Consultations** are performed by, or under the direct supervision of a licensed physician without cost to the employee, without loss of pay, and at a reasonable time and place. The employee is sent for medical evaluation:
 - a. Whenever signs and symptoms associated with a hazardous chemical develop;
 - b. When environmental monitoring reveals an exposure level routinely above the action level or STEL;
 - c. Whenever an event takes place in the work area such as a spill, leak or exposure resulting in hazardous chemical exposure.
3. **Information provided to the physician:**
 - a. Identify the hazardous chemical(s) to which the employee may have been exposed
 - b. A description of the affected employee's job duties
 - c. If practical, supply the physician with a copy of the SDS(s)

- d. A description of the conditions under which the exposure occurred - including quantitative exposure data (if available)
 - e. A description of the sign and symptoms of exposure
 - f. The PPE or respiratory equipment used by the employee
 - g. Any previous medical examination results, if within Kaiser Permanente's control
 - h. In the event of an emergency resulting in exposure, a description of the incident and exposure the victim may have received.
- 4. Written Opinion.** The physician provides a written opinion that will not reveal specific findings of a diagnosis unrelated to the exposure but will include:
- a. Any recommendations for further medical follow-up
 - b. Results of the medical examination
 - c. Any medical conditions that may be revealed in the course of the examination that may place the employee at increased risk as a result of exposure to a hazardous chemical found in the workplace
 - d. A statement by the physician that the employee has been informed of the consultation / examination results and any medical condition that may require further examination or treatment
 - e. A physician may recommend medical removal from exposure when an employee reports significant irritation or sensitization attributed to occupational exposure.
 - f. An employee may request a second opinion.
- 5. Reporting exposure incidents.** Complete an Employee Incident and Accident Report found in the Red Exposure Packet. Notify Employee Health Coordinator of all exposure incidents.

TRAINING

Training is a necessary part of the Chemical Hygiene Plan. All employees are required to complete Chemical Hygiene Training for Laboratory Employees computer-based training (KPLearn course SAF:NEHS 14 1120) upon initial hire and annually thereafter. If exposure to formaldehyde exceed 0.1 ppm as an 8-hour time-weighted average, additional training specific to formaldehyde is also required. (KPLearn course SAF:NEHS 14 11218). In addition, employees must complete department-specific training upon initial assignment to a work area where hazardous chemicals are present and before assignments involving new exposure situations.

Refresher information and retraining sessions are held periodically, whenever unsafe behaviors are observed and no less than annually. Training is conducted by the employee's supervisor, or by a trainer authorized by the EH&S. All training is documented in writing.

Upon the completion of the Chemical Hygiene Training Program, the employee should be able to:

Locate the Chemical Hygiene Plan; Hazard Communication and Spill Response Manual.
Determine correct disposal procedures for each hazardous chemical.
Locate the Chemical Inventory/MSDS/SDS book in the workplace.
Locate the health hazard, physical hazard, environmental protection, and special protection sections of the MSDS/SDS and explain their use.
Identify the department Chemical Hygiene Officer(s) by name and title.
Discuss the major components of the facility's standard labeling system.
Identify the appropriate PPE for the area and describe its use.
Locate spill kits.
Locate the eyewash and shower stations.

Describe emergency procedures in the event of a hazardous chemical spill.
Describe the environmental monitoring protocol including identifying chemical hazards by visual inspection, odor, etc. and monitoring devices.
Locate the potentially hazardous chemicals in the workplace.
Locate and be informed of permissible limits of OSHA regulated substances and limits for hazardous chemicals for which there are no OSHA limits.

Upon the completion of the Formaldehyde Training Program, the employee should be able to:

Discuss the contents of 29 CFR 1910.1048 (and the State plan equivalent)
Locate the applicable SDS
Describe the potential health hazards associated with exposure to formaldehyde and their associated signs and symptoms of adverse health effects
Know to immediately report any signs and symptoms of exposure to the Laboratory Supervisor or Chemical Hygiene Officer
Describe the operations in the laboratory where formaldehyde is present
Describe safe work practices to limit exposure in those operations
Understand the purpose of, proper use of, and limitations of personal protective equipment and clothing
How to clean up spills and what to do in an emergency
Explain the importance of engineering and work practice controls for employee protection and how to use them
Know where to go to get more information, including training materials and fact sheets

HOUSEKEEPING

1. **Frequency.** Floors are cleaned regularly by contracted housekeeping services. All employees of the housekeeping department are formally trained in the risks associated with working in the laboratory prior to starting work.
2. **Oversight.** The laboratory supervisor/manager, and/or safety committee randomly inspects and documents the inspection of the laboratory areas to assess whether:
 - a. Stairwells and hallways are free of obstruction.
 - b. Waste is deposited in appropriate receptacles and properly removed from the laboratory.
 - c. Chemical spills are cleaned according to established protocol.
 - d. Proper storage is accomplished to minimize clutter and is correct for the chemicals being stored.
 - e. Cleanliness of all work area, equipment, hood, refrigerators and freezers, sinks and general laboratory area.

RECORD KEEPING

1. **Responsibilities.** The laboratory supervisor/manager will establish and maintain an accurate record for each employee of environmental monitoring, medical consultation and examination referrals (actual reports will not generally be available to the supervisor/manager). Medical consultation records are maintained in the Employee Health files.
2. **Timelines**
 - a. Exposure records and determinations will be kept for 30 years

- b. Medical records will be kept for the duration of employment plus 30 years
- c. Respirator fit test records will be kept until replaced by a more recent record

3. Information to Include

- a. Exposure Measurements:
 - i. Date of measurement
 - ii. Operation being monitored
 - iii. Methods of sampling and analysis, and their associated precision and accuracy
 - iv. Number of samples, duration of sampling, time of sampling and results of samples taken
 - v. Types of control equipment and protective devices worn
 - vi. Names and job titles of the employees whose exposures are represented by the actual monitoring results
 - vii. For formaldehyde results, a table of the highest STEL and 8-hour TWA samples by exposure group
 - b. Exposure Determinations. When EH&S has determined that no monitoring is required, the department will maintain a record of the objective data relied on to support the determination that no employee is exposed at or above the AL or STEL.
 - c. Medical Surveillance:
 - i. Name and social security of the employee
 - ii. Physician's Written Opinion
 - iii. A list of any employee health complaints related to chemical exposures in the laboratory
 - iv. A copy of the medical examination results, including medical disease questionnaires and results of any medical tests required by regulation or mandated by the examining physician and the physician's Written Opinion.
 - d. Respiratory Protection:
 - i. A copy of the protocol selected for respiratory fit testing
 - ii. The results of any fit testing performed
 - iii. The size and manufacturer of respirators available for selection
 - iv. The date of the fit test, name and social security number of the employee undergoing the fit test, and the type and facepiece of the respirator that was tested
4. **Availability.** EH&S will make all records available to the Assistant Secretary of Labor and the Director of NIOSH upon request. Employee exposure and medical records, including estimates made from representative monitoring data, will be made available to employees, former employees and employee representatives within 15 days of request, as required by the "Access to Employee Exposure and Medical Records" standard (29 CFR §1910.1020).

REFERENCES

- CLAM. A Model Chemical Hygiene Plan for Laboratories, Terry Jo Gile, MT (ASCP) MA ED, Sept. 1990.
- International Agency for Research on Cancer. Chemical Agents and Related Occupations IARC Monographs 100F, 2012.
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U.S. Department of Labor, final rule. Federal Register 29 CFR 1910.1200, Hazard Communication (Global Harmonization System), April 13, 1994 and March 26, 2012.

U.S. Department of Labor, final rule. Federal Register 29 CFR 1910.1048, Formaldehyde, March 12, 1991.

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APPENDIX A

FORMALDEHYDE REQUIREMENTS MATRIX

	< 0.1 ppm	0.1 ppm	0.5 ppm	.75 ppm	2 ppm STEL	> 100 ppm or unknown	>1% vol	>0.1% vol	Symptoms of Exposure ²	Eye hazard	At any conc.
Awareness Training ³	x								x		
Comprehensive Training		x	x	x	x	X					
Respirator ³				x	x	X					
Med. Survey			x	x	x	X			x		
Signs				x	x	X					
Regulated Area				x	x	X					
Waste Disposal ¹	x	x	x	x	x	X	x	x			x
Record keeping	x	x	x	x	x	X					
Work Practices		x	x	x	x	X					
Hygiene Practices				x	x	X					
Engineering Controls			x	x	x	x					
Protective Clothing							x				
Contaminated PPE & clothing signage											x
Full body protection						x					
Chemical goggles						x				x	
Emergency Eyewash								x		x	
Emergency Shower							x				
Labels ⁵		x	x	x	x						
SDS	x	x	x	x	x		x	x			x
Initial monitoring ⁶											x
Periodic monitoring ⁷			x	x	x	x					
Preventative maintenance and leak											x
Housekeeping & leak detection inspections											x
Spill containment & contamination											x
Medical Removal ⁴							x		x		
Written Hazcom Plan ⁸											x

1. Waste from spills shall be placed in sealed containers and labeled. Preserved tissue may be incinerated. Contact Workplace Health and Safety Department for specific information.
2. Only if airborne exposure is more than 0.1 ppm and formaldehyde concentration is more than 0.1 %.
3. Includes medical surveillance, training, and fit testing.
4. Does not apply in cases of dermal irritation or sensitization when less than 0.05 % formaldehyde.
5. For materials capable of releasing formaldehyde above 0.5 ppm, labels shall address all hazards as defined in 29 CFR §1910.1200 (d) and Appendices A and B, including respiratory sensitization, and contain the words "May Cause Cancer". Does not apply if the laboratory falls under 29 CFR §1910.1450.
6. Unless it can be shown by objective data that there will be no exposure at or above the action level or STEL under foreseeable conditions of use.
7. Repeat every 6 months if at or above the action level. If above STEL, repeat every year. Monitoring may be discontinued if results from 2 consecutive samples taken at least 7 days apart are below the action level and the STEL.
8. For laboratories falling under 29 CFR §1910.1450, they shall use the Chemical Hygiene Plan for compliance.

APPENDIX B

DOT CLASSIFICATION LIST

DOT Hazard Classification	KP Laboratory Examples
Class 1: Explosives	
Division 1.1: Explosives with a mass explosion hazard	None
Division 1.2: Explosives with a projection hazard	None
Division 1.3: Explosives with predominantly a fire hazard	None
Division 1.4: Explosives with no significant blast hazard	None
Division 1.5: Very insensitive explosives	None
Division 1.6: Extremely insensitive explosive articles	None
Class 2: Gases	
Division 2.1: Flammable gases	Butane, propane, acetylene
Division 2.2: Non-flammable gases	Oxygen, CO ₂ , Nitrogen
Division 2.3: Poison gases	Ethylene Oxide
Division 2.4: Corrosive gases	Nitric Oxide
Class 3: Flammable liquids	
Division 3.1: Flashpoint below -18°C(0°F)	Methanol, Acetone
Division 3.2: Flashpoint below -18°C and above, but less than 23°C(73°F)	Alcohols, xylenes
Division 3.3: Flashpoint 23°C and up to 61°C(141°F)	Gasoline
Class 4: Flammable solids, spontaneously combustible materials, and materials that are dangerous when wet	
Division 4.1: Flammable solids	Matches, Naphthalene, Sulfur, Picric Acid
Division 4.2: Spontaneously combustible materials	None
Division 4.3: Materials that are dangerous when wet	None
Class 5: Oxidizers and organic peroxides	
Division 5.1: Oxidizers	Oxygen, Silver Nitrate Sticks,
Division 5.2: Organic peroxides	None
Class 6: Poisons and etiologic materials	
Division 6.1: Poisonous materials	Mercury Solutions, Phenol, Sodium Azide, Pesticides
Division 6.2: Etiologic(infectious) materials	Category A infectious Substances (i.e. Ebola), Category B Infections Substances, Medical Waste
Class 7: Radioactive material	
Any material, or combination of materials, that spontaneously gives off ionizing radiation. It has a specific activity greater than 0.002 microCuries per gram.	Specimens that come from nuclear medicine

DOT Hazard Classification**KP Laboratory Examples****Class 8: Corrosives**

A material, liquid or solid, that causes visible destruction or irreversible alteration to human skin or a liquid that has a severe corrosion rate on steel or aluminum.

Bleach, Formalin Solution, Acids, Bases

Class 9: Miscellaneous dangerous substances and articles

A material that presents a hazard during transport, but which is not included in another hazardous freight classification.

Special Buffers for automatic processing equipment, Dry Ice

ORM-D: Other regulated material

A material that, although otherwise subjected to regulations, presents a limited hazard during transportation due to its form, quantity and packaging.

Small Volumes of chemical samples, cleaning chemicals packaged for consumer use

APPENDIX C

EPA HAZARD CLASSIFICATION LIST

Hazardous waste is a waste with properties that make it dangerous or potentially harmful to human health or the environment. The universe of hazardous wastes is large and diverse. Hazardous wastes can be liquids, solids, contained gases, or sludges. They can be the by-products of operational processes or simply discarded commercial products, like cleaning fluids or pesticides.

1. Ignitability – Ignitable wastes can create fires under certain conditions, are spontaneously combustible, or have a flash point less than 60 °C (140 °F). Examples include waste oils and used solvents.
2. Corrosivity – Corrosive wastes are acids or bases (pH less than or equal to 2, or greater than or equal to 12.5) that are capable of corroding metal containers, such as storage tanks, drums, and barrels. Battery acid is an example.
3. Reactivity – Reactive wastes are unstable under "normal" conditions. They can cause explosions, toxic fumes, gases, or vapors when heated, compressed, or mixed with water.
4. Toxicity – Toxic wastes are harmful or fatal when ingested or absorbed (e.g., containing mercury, lead, etc.). When toxic wastes are land disposed, contaminated liquid may leach from the waste and pollute ground water
5. Listed waste--any waste name appearing in the list in (40 CFR 261.30, Subpart D and 261.33).
Lab listed wastes are Acetone, Methanol, Formalin,

APPENDIX D

TARGET ORGAN LIST

A list of target organ effects shall be available in a central location for access by all employees. Chemicals listed are representative examples and not a complete listing of substances in each category.

HEPATOTOXINS—Chemicals that produce liver damage

Signs & Symptoms: jaundice; enlarged liver

Chemicals: Carbon tetrachloride, nitrosamines

NEPHROTOXINS—Chemicals that produce kidney damage

Signs & Symptoms: edema, proteinuria

Chemicals: halogenated hydrocarbons, uranium

NEUROTOXINS—Chemicals that produce their primary toxic effects on the nervous system

Signs & Symptoms: narcosis, behavioral changes, decreases in motor functions

Chemicals: mercury, carbon disulfide

AGENTS THAT ACT ON THE BLOOD OR HEMATOPOIETIC SYSTEM – Decrease hemoglobin function; deprive body tissue of oxygen

Signs & Symptoms: cyanosis, loss of consciousness

Chemicals: carbon monoxide cyanides

AGENTS THAT DAMAGE THE LUNGS—Chemicals that irritate or damage the pulmonary tissue

Signs & Symptoms: cough, tightness in chest, shortness of breath

Chemicals: silica, asbestos

REPRODUCTIVE TOXINS—Chemicals that affect the reproductive capabilities including the chromosomal damage - mutations and effects on fetuses (teratogenesis)

Signs & Symptoms: birth defects, sterility

Chemicals: lead

CUTANEOUS HAZARDS—Chemicals that affect the dermal layer of the body

Signs & Symptoms: defatting of the skin, rashes, and irritation

Chemicals: ketones chlorinated compounds

EYE HAZARDS—Chemicals that affect the eye or visual capacity

Signs & Symptoms: conjunctivitis; corneal damage

Chemicals: organic solvents, acids

APPENDIX E

TARGET ORGAN EFFECTS

The following is a target organ categorization of effects that may occur. These examples are presented to illustrate the range and diversity of effects and hazards found in the workplace, and the broad scope employers must consider in this area, but they are not intended to be all inclusive.

(a) Hepatotoxins	Chemicals that produce liver damage.
Signs and Symptoms	Jaundice; liver enlargement.
Chemicals	Carbon tetrachloride; nitrosamines.
(b) Nephrotoxins	Chemicals that produce kidney damage.
Signs and Symptoms	Edema; proteinuria.
Chemicals	Halogenated hydrocarbons; uranium.
(c) Neurotoxins	Chemicals that produce their primary toxic effects on the nervous system.
Signs and Symptoms	Narcosis; behavioral changes; decrease in motor functions.
Chemicals	Mercury; carbon disulfide.
(d) Agents that act on blood hematopoietic system	Decrease in hemoglobin function; deprive the body tissues of oxygen.
Signs and Symptoms	Cyanosis; loss of consciousness.
Chemicals	Carbon monoxide; cyanides.
(e) Agents that damage the lung	Chemicals that irritate or damage the pulmonary tissue.
Signs and Symptoms	Cough; tightness in chest; shortness of breath.
Chemicals	Silica; asbestos.
(f) Reproductive toxins	Chemicals that adversely affect the reproductive capabilities including chromosomal damage (mutations) and effects on fetuses (teratogenesis).
Signs and Symptoms	Birth defects; sterility.
Chemicals	Lead; DBCP.
(g) Cutaneous hazards	Chemicals that affect the dermal layer of the body.
Signs and Symptoms	Defatting of the skin; rashes, irritation
Chemicals	Ketones; chlorinated compounds.
(h) Eye hazards	Chemicals that effect the eye or visual capacity.
Signs and Symptoms	Conjunctivitis; corneal damage.
Chemicals	Organic solvents; acids.

APPENDIX G

INCOMPATIBLE STORAGE LIST

There are nine recommended storage groups for incompatible chemicals. Seven of the nine are for the storage of liquids because of the hazards posed by these chemicals. For reactivities and solids there are specific instructions that may apply depending on the chemical. Work with your EH&S professional and chemical hygiene officer to ensure proper segregation is in place for your incompatible materials.

Many of the liquid chemicals may fall under more than one group, the chemical should be stored in the lowest number group. 1 being the lowest number and 9 being the highest number.

Group 1 Flammable and Combustible Liquids

Flammable liquids are liquids that have a flash point of less than 100 F. Examples are all alcohols, acetone, ether, histoclad, xylene

Store flammable liquids in cabinets. Combustible liquids and Volatile Poisons are known to be compatible and can be stored next to flammable liquids. Combustible liquids are those with a flashpoint greater than 100 F but less than 200 F. Examples are Motor oil, fuel oil, diesel oil, oil based paints, and formalin with methanol.

Store stock in flammable storage cabinets, keep unprotected in-use containers and quantity to a minimum.

See NEH&S Flammable and Combustible Liquids Storage document.

Group 2 Poisons – Volatile

These are chemicals that are poisons, toxics, and suspected carcinogens with strong odors and or evaporation rate greater than 1. Examples, Chloroform, Mercaptoethanol, methylene choride, phenol.

Primary storage concern is to prevent inhalation hazards.

Recommended storage: flammable storage cabinet.

Group 3 Acids – Oxidizing Liquid

All oxidizing acids are highly reactive with most substances and each other. Examples nitric, sulfuric, perchloric, phosphoric and chromic acids.

Primary storage concern: preventing contact and reaction with each other and other substances and corrosive action on surfaces.

Recommended storage: in an acid safety cabinet and each acid in secondary containment.

Compatible storage groups: Oxidizing Acids must be double contained and should be segregated in their own compartment in an acid safety cabinet. Store oxidizing acids on the bottom shelf. Organic and Mineral Acids may be stored in the same cabinet as long as segregation is maintained.

Group 4 Acids – Organic and Mineral Liquid

Examples: Acetic, formic, glacial acetic and hydrochloric acids.

Primary Storage Concern: To prevent contact and reaction with bases and oxidizing acids and corrosive action on surfaces.

Recommended Storage: Acid Safety Cabinet.

Compatible Storage Groups: Store on top shelves if Oxidizing acids are stored in the same cabinet. Store acids in secondary containment. These acids are very reactive with other acids and acids that are corrosive such as acetic anhydride should be isolated. It is best to store corrosive acids with group 7 non-volatile liquid poisons.

Group 5 Bases – Liquid

Examples: sodium hydroxide, ammonium hydroxide, calcium hydroxide, glutaraldehyde, Cidex OPA.

Primary Storage Concern: preventing contact and reaction with acids.

Recommendations: store in secondary containment or in isolated areas.

Compatible storage groups: may be stored with flammable in the flammable cabinet if volatile poisons are not stored in the flammable cabinet.

Group 6 Oxidizer – Liquid

Oxidizing liquids react with everything potentially causing explosions or corrosion of surfaces.
Examples: Hydrogen Peroxide (if greater than or equal to 30%).

Primary Storage Concern: isolate from other chemicals.

Recommendations store quantities greater than 3 liters in secondary containment.

Compatible Storage Groups: None

Group 7 Poisons – Non-Volatile Liquid Poisons

Includes Highly Toxic and toxic chemicals, known carcinogens, suspected carcinogens, and mutagens.
Examples Chemo Drugs, acrylamine solutions.

Primary storage concerns: to prevent contact and reaction with other chemicals

Recommended Storage: In second containment in a controlled environment

Compatible Storage Groups: non-hazardous liquids (buffer solutions)

Group 8 Reactives - Metal Hydrides and Pyrophorics

Most metal hydrides react violently with water, some ignite spontaneously in air.
Examples: Lithium

Primary Storage Concern: prevent contact with liquid and sometimes air.

Compatible Storage Groups: If stored in secondary containment, may store where Group 9 Dry solids are stored.

Group 9 Solids (Includes all powders, hazardous and non-hazardous)

Primary storage concern to prevent contact with liquids.

Recommended storage: Store in cabinets, store above liquids ensure warning labels are visible.

Signature Manifest

Document Number: SBMC-PPP-0615

Revision: 02

Title: Chemical Hygiene Plan

Effective Date: 31 Jan 2022

All dates and times are in Pacific Standard Time.

Chemical Hygiene Plan

Laboratory Manager Approval

Name/Signature	Title	Date	Meaning/Reason
Janice Wolf (K119893)	Director Operations Area Lab	14 Jan 2022, 12:56:03 PM	Approved

Operations Director Approval

Name/Signature	Title	Date	Meaning/Reason
Janice Wolf (K119893)	Director Operations Area Lab	14 Jan 2022, 12:56:19 PM	Approved

Medical Director Approval

Name/Signature	Title	Date	Meaning/Reason
Sony Wirio (A478893)	Pathologist, Medical Director	30 Jan 2022, 08:06:35 PM	Approved

Review: SBMC-PPP-0615 02 Chemical Hygiene Plan

Review

Name/Signature	Title	Date	Meaning/Reason
Jay Raymund Castaneto (K258559)	Assistant Lab Director	02 Jan 2023, 10:37:41 PM	Reviewed
Janice Wolf (K119893)	Director Operations Area Lab	10 Jan 2023, 02:21:16 PM	Reviewed