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**Columbia College Laboratory Chemical Safety
Chemical Hygiene Plan**

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I. INTRODUCTION: POLICY AND PURPOSE

Policy

It is the policy of Columbia College to provide a safe and healthy workplace. This Chemical Hygiene Plan (CHP) maintains compliance with the Occupational Safety and Health Act (OSHA) of 1970 including 29 CFR 1910.1450 "Occupational Exposure to Hazardous Chemicals in Laboratories," known as the OSHA Laboratory Standard.

Purpose

The Laboratory Standard is a regulation for the protection of employees only. However, the purpose of the Chemical Hygiene Plan is to describe proper practices, procedures, equipment and facilities for faculty, students, staff, and visitors in order to protect them from potential health hazards presented by chemicals used in the laboratory workplace, and to keep exposures below specified limits. It is recommended that students be made aware of this document and be required to adhere to its stipulations. Copies of this plan will be available for employee review in the Business Office and Safety Office. A URL to find the document online will also be posted in the hallway on each floor of science buildings.

II. RESPONSIBILITY AND AUTHORITY

The President

The President of Columbia College has the final responsibility for the safety and health of the faculty, students, and staff working at the College and should provide continuing support for the chemical hygiene program. The President has appointed the Chemical Hygiene Officer in accordance with the Laboratory Standard.

Vice-Presidents, Deans, Department Chairs, Site Directors (ESD)

These managers are responsible for compliance with the College Chemical Hygiene Plan within their areas. This includes ensuring that all employees under their direct supervision are complying with the Chemical Hygiene Plan.

Safety Officer (Contact Information: Appendix C)

The Safety Officer shares the responsibility and the authority to see that the Chemical Hygiene Plan is written, updated, and implemented in coordination with the Chemical Hygiene Officer. The Safety Officer will ensure that all laboratories in science buildings are conducted in a safe manner and that compliance with OSHA, Environmental Protection Agency (EPA), and the state and local fire regulations is maintained.

Duties include but are not limited to the following:

- Annually approve the Chemical Hygiene Plan.
- Conduct safety inspections of the facilities annually.
- Approve purchase and use of hazardous substances in coordination with the Chemical Hygiene Officer.
- Review accidents in laboratories.
- Maintain records of employee exposure for 30 years beyond the time of exposure.
- Conduct an annual reassessment of the Chemical Hygiene Plan.
- Act as a resource for resolving student, faculty, and staff concerns.

Chemical Hygiene Officer (CHO) (Contact Information: Appendix C)

The Chemical Hygiene Officer is an employee designated by the President of the College who is qualified by training or experience to provide technical guidance in the development and implementation of the written Chemical Hygiene Plan.

Duties include but are not limited to the following:

- Work with the faculty and administration to develop and implement the Chemical Hygiene Plan for laboratories with chemical use.
- Approve purchase and use of hazardous substances in coordination with the Safety Officer.
- Work with faculty and administration to monitor safe procurement, use, and disposal of chemicals in accordance with federal, state, and local laws and regulations.
- Advise science faculty members with concerns about adequate facilities and procedures under the regulation.
- Annually update and seek ways to improve the Chemical Hygiene Plan.
- Make Safety Data Sheets (SDS) compliant with the Globally Harmonized System and accessible to employees and students.
- Train science faculty in matters related to laboratory safety.
- Provide for measuring the concentrations of hazardous chemicals if there is reason to believe the action level has been exceeded.
- Ensure that all faculty and staff have access to the Chemical Hygiene Plan. Students may request to view to the CHP from their instructor or the CHO.

In addition, the CHO is responsible for knowing the contents of the relevant laws and regulations (such as Occupational Exposures to Hazardous Chemicals in Laboratories, 29 CFR 1910.1450) as well as the Chemical Hygiene Plan.

Laboratory Instructor

The instructor for each science laboratory course is the person responsible for the laboratory in which the course takes place and the laboratory preparation rooms used for the course. It is the responsibility of these instructors to institute the Chemical Hygiene Plan and ensure compliance with the OSHA Laboratory Standard.

Duties include but are not limited to the following:

- Ensure that all work is conducted in accordance with the Chemical Hygiene Plan.
- Become acquainted with chemical Safety Data Sheets (SDS) database for chemicals: <https://SDSmanagement.SDSonline.com/company/2FDBBA46-4A51-41EB-8B1C-FF3FC12621B1>
- Inform students of database and access SDS for students upon request.
- Define hazardous operations within the work areas, designate safe practices, and select protective equipment.
- Ensure that students receive instructions and training in safe work practices, use of personal protective equipment, and in procedures for dealing with accidents involving hazardous or toxic substances.
- Ensure that students understand the training they have received.
- Conduct formal laboratory inspections, including inspections of emergency equipment, periodically to ensure compliance with the Chemical Hygiene Plan.

- Report accidents to the Safety Officer including ingestion, injection, or inhalation of a chemical; contact of a chemical with the skin or eyes; or any environmental contamination. Include procedures that will minimize the repetition of that type of accident.
- Properly dispose of unwanted and/or hazardous chemicals and materials.

Faculty, Students, Staff and Visitors

All faculty, students, and staff working in laboratories have the following responsibilities:

- Understand and follow the Chemical Hygiene Plan and all training received.
- Students will sign the Columbia College Student Safety Contract (Appendix A) for each term they are enrolled in laboratory courses.
- Understand the function and proper use of all personal protective equipment. Wear personal protective equipment when mandated or necessary.
- Report to the Chemical Hygiene Officer any significant problems arising from the implementation of the Chemical Hygiene Plan.
- Report all facts pertaining to every accident that results in exposure to hazardous or toxic chemicals, and any action or condition that exists which could result in an accident to the Safety Officer and your immediate instructor.
- Contact the Chemical Hygiene Officer if any of the above safety procedures are not clearly understood.
- Do not use laboratories outside of regular science courses unless permission is granted by the Safety Officer.
- Students conducting research in laboratories outside of class must read the Columbia College Science Laboratory Policies, Procedures and Guidelines (Online Policy Library) and sign the Student Research, Waiver and Assumption of the Risk form (Appendix B).

Also responsible for providing continuing support for the College's Chemical Hygiene Plan is the Safety Officer, Physical and Biological Sciences Chairperson, and any other laboratory employees.

Administrative Details

Access to copies of the College Chemical Hygiene Plan will be available in the following locations:

- Campus Safety Office
- Each Laboratory covered by the Chemical Hygiene Plan

Having the Chemical Hygiene Plan available in these locations ensure that employees and students have access to pertinent safety information. It will also provide a template for lab managers when they bring new laboratories on-line and need to complete their own portion of the Chemical Hygiene Plan (coordinated by the Chemical Hygiene Officer for necessary approval).

Currently, Columbia College has no laboratories using radioactive materials. If plans in the future call for the use of radiation, then the College will incorporate a Radiation Safety Plan at that time.

Laboratories where work involving human/primate tissues, recombinant DNA, or pathogenic agents is conducted must also comply with Center for Disease Control and National Institute of Health guidelines. Currently, Columbia College has no laboratories using these materials. If plans in the future call for the use of materials, then the College will incorporate the Hygiene Plan at that time.

III. GENERAL PRINCIPLES & STANDARD OPERATING PROCEDURES

1. Eye protection must be worn at all times except when instructed not to wear it.
2. Learn the location of eye wash fountains, safety showers, fire extinguishers, and exits.
3. No shorts or sandals are allowed in lab. Closed-toe shoes are mandatory.
4. Confine long hair and loose clothing. Do not wear jewelry that can catch on objects or trap chemicals underneath it.
5. Discard cracked or broken glassware in broken glass receptacle.
6. Never heat a graduated cylinder or other thick glass over a Bunsen burner.
7. Never pour water into concentrated acid. The correct order of addition is acid into water, slowly, with stirring.
8. Use pipet bulbs or a loose fitting aspirator hose for suction.
9. If a chemical is spilled onto your skin, immediately wash the area with large quantities of water. If the spill is large, use the emergency shower and disrobe. Clothing can trap chemicals on the skin, which could cause severe burns. If a chemical is in the eye, discard contacts and wash eye for 15 continuous minutes in the eye wash fountain. Have another person summon the Lab Coordinator immediately.
10. Use caution with hot sand in mantles and with Bunsen burners. Never light them in the presence of flammable liquids. Never reach across lighted Bunsen burners. Never push lighted Bunsen burners under the lab shelf. Leave a Bunsen burner lighted only when in use.
11. Never return a chemical to its original container. Put excess chemical in the appropriate waste container provided by the Lab Coordinator to avoid mistaken identity.
12. No unauthorized experiments are allowed.
13. Horseplay, pranks, and other acts of mischief are prohibited. Do not run or push others in the lab. Misconduct may result in disciplinary actions up to and including dismissal from the College as outlined in the Student Behavioral Misconduct Policy.
14. Drinking, eating, or applying make-up or contact lenses is prohibited.
15. Keep aisles free of obstructions such as bags.
16. All accidents and spills (even water) must be reported immediately to the Lab Coordinator. The Lab Coordinator will determine who will and how to clean up the spill and notify the Safety Officer.
17. Never taste chemicals.
18. Never smell a chemical directly.
19. Read labels on reagent bottles carefully.
20. Add reagents slowly.
21. Hazardous operations should be performed underneath a fume hood.
22. Dispose of chemicals in accordance with local, state, and federal laws.
23. Students will never work in the lab alone. Exceptions may apply for research (see Appendix B).
24. Always know the hazards and the physical and chemical properties of the materials in use.
25. Always wash hands thoroughly before leaving the work area, even if you wore gloves.
26. Never remove chemicals from the lab without proper authorization.
27. Do not dispose of paper and other insoluble materials in the sinks.
28. When heating chemicals in a test tube, hold the test tube with a holder and wave it through the flame with caution.
29. Heating contents in a test tube can physically cause the tube to bump or jump when it reaches a high enough temperature. When you sense a "bump," stop heating and do not point the tube in the direction of yourself or another person.
30. Use weighing paper or boats when weighing chemicals; never allow chemicals to come in direct contact with the balance.
31. Never block access to emergency equipment, showers, eyewashes, and exits.

32. When transferring chemicals to unmarked containers, always label the container with the name of the contents and date, and when feasible, the chemical formula and chemical concentration. Do not remove or deface labels of bottles in use.
33. Keep all work areas, especially laboratory benches, free of clutter.
34. Do not store chemicals in aisles, hallways, or stairwells.
35. When setting up apparatus, allow for quick access to gas valves, water faucets, and electrical outlets (without reaching through the apparatus).
36. If you must leave your lab-bench station, walk slowly and carefully.
37. Make certain all gas outlets are turned off before leaving the laboratory.

IV. OTHER STANDARD OPERATING PROCEDURES

The SDS for many of the chemicals used in the laboratory will state recommended limits, OSHA mandated limits, or both, as guidelines for exposure. Typical limits are threshold limit values (TLV), permissible exposure limits (PEL), and action levels. When such limits are stated, they will be used to assist the Chemical Hygiene Officer and laboratory faculty in determining the safety precautions, control measures, and safety apparel that apply when working with toxic chemicals. In addition to the general rules that follow, there are groups of chemicals that mandate specific requirements for handling and use.

Procedures for Toxic Materials

All volatile toxic chemicals should be used in an operating fume hood, glove box, vacuum line, micro-hood or similar device which is equipped with appropriate traps. If none are available no work should be performed using that chemical.

Procedures for Flammable Chemicals

Flammable substances (flashpoint below 200 degrees Fahrenheit) should be handled in areas away from ignition sources. Flammable substances should never be heated by using an open flame. Ventilation is one of the most effective ways to prevent the formation of flammable mixtures. An exhaust hood should be used whenever appreciable quantities of flammable substances are to be handled in any way.

Procedures for Reactive Chemicals

Reactive chemicals must be segregated in storage and should be handled observing all proper safety precautions. Students who plan to mix reactive chemicals with other chemicals (even small quantities) should obtain the prior approval of the lab instructor and wear appropriate personal protection.

Procedures for Corrosive and Contact Hazard Chemicals

When working with significant quantities of corrosive chemicals or allergens, use all proper safety precautions. Wear safety goggles or face-shields. Gloves and a laboratory apron or laboratory coat are also recommended.

Procedures for Other Hazardous Chemicals

It is Columbia College policy to permit work with particularly hazardous chemicals (select carcinogens, reproductive or acute toxins, or chemicals whose toxicity is unknown) only with prior approval by the Safety Officer. When prior approval is obtained, the Chemical Hygiene Officer will advise on the appropriate rules for affected personnel. Chemicals in the following four categories are considered particularly hazardous substances:

- Select carcinogen: any chemical defined as such in 29 CFR 1910.1450.
- Reproductive toxin: any substance described as such in the applicable SDS.

- Substances that have a high degree of acute toxicity: any substance for which the LD50 data in the applicable SDS cause the substance to be classified as a “highly toxic chemical” as defined in the OSHA Hazard Communication Standard.
- Chemical whose toxic properties are unknown: chemical for which there is no known statistically significant study conducted in accordance with established scientific principles that establishes its toxicity.

When approval is given for work with a particularly hazardous chemical, a Designated Area must be used. Designated Areas shall be posted and their boundaries clearly marked. A Designated Area is a hood, glove box, portion of a laboratory, or an entire laboratory room designated for work with particularly hazardous substances in excess of a specified limit. Only those persons trained to work with those chemicals will be allowed in a Designated Area. All such people will:

- Use the smallest amount of chemical that is consistent with the requirements of the work to be done.
- Use high efficiency particulate air (HEPA) filters to protect vacuum lines and pumps when materials are in solid form or generated as an aerosol.
- Decontaminate a Designated Area when work is complete. Check SDS, and with the laboratory instructor, or the Chemical Hygiene Officer, for decontamination procedures.
- Prepare wastes for disposal in accordance with specific disposal procedures as designated by the Chemical Hygiene Plan.
- Store all chemicals in locked and enclosed spaces with a slight negative pressure compared to the rest of the building.
- Wear long sleeved disposable clothing and gloves known to resist permeation by the chemicals when working in Designated Areas. A glove selection guide is available on the Science Lab [SharePoint site](#) or from the Chemical Hygiene Officer.

Procedures for Handling Hazardous Waste

All generators of hazardous waste are required to follow specific rules and regulations regarding labeling, storage, and disposal of laboratory chemical waste. Columbia College is a Conditionally Exempt Small Quantity Generator (CESQG) in that we generate less than 100 kg of hazardous waste on site at any time. All hazardous waste must be identified and properly disposed according to EPA requirements. The EPA requirements differ for acutely hazardous waste.

All waste containers must be labeled with the name of all constituents of the waste and the hazards of the material (flammable, corrosive, poison, or reactive), and the words “Hazardous Waste” in one-inch high letters. Complete unknowns will need to be analyzed by the disposal company before they can be removed. Unlabeled or incompletely labeled material cannot be taken. In addition, all waste containers must be securely capped except when adding materials to the bottle. Store waste by hazard class in a closed container within a secure area. Do not combine different kinds of waste unless you know they are compatible and acceptable for disposal in the combined form. Install and maintain emergency equipment nearby in case of a spill. Keep complete records of all hazardous waste including generation date, quantities, and types of materials.

Notify the Campus Safety Office prior to accumulation of 100 kg of waste on site or once annually regardless of amount accumulated for proper disposal to ensure the College maintains CESQG status.

Procedures for Formaldehyde

Formaldehyde and formalins are suspected carcinogens. The OSHA Permissible Exposure Limit (PEL) is 1 ppm in an eight-hour time weighted average. Approximately 1.5 grams of vaporized formaldehyde will achieve this concentration in a typical laboratory (not accounting for airflow). The odor threshold of formaldehyde is reported to be as low as 0.1 ppm. Since formaldehyde and formalins are suspected carcinogens, they must be used in a Designated Area. Formaldehyde and formalins are also strong eye, nose, throat, skin, and upper respiratory system irritants, and they react severely with strong oxidizing agents, strong acids, strong bases, alkali metals, amines and ammonia, phenol, and strong reducing agents.

When working with formaldehyde or formalins, wear goggles or face shield, lab coat or vinyl apron and neoprene gloves. Place all breakable containers in an approved bottle carrier for transport. Always work inside a fume hood. Transfer the required amount of formaldehyde into a secondary measuring beaker, and immediately close the container. Return the formaldehyde container to the flammable cabinet. Hot solutions of formaldehyde should be handled in the chemical fume hood; gels should be poured and allowed to set in the hood.

Procedures for Bodily Fluid Handling

Human bodily fluid samples including urine, saliva, and finger pricks for blood, are sometimes used in the laboratory. The following minimum precautions must be followed for safe handling:

- Students must only handle their personal samples.
- All procedures must be conducted using gloves and splash goggles.
- Clean up and disposal are done so there is no contamination to the students or environment.

Procedures for Smokeless and Black Powder

Available from Forensic Science Instructor

Procedures for Air/Water Reactive Chemicals

Available from Organic Chemistry Instructor

V. RECORDKEEPING

The laboratory standard requires that records of air concentration monitoring results, exposure assessments, medical consultation, and examinations be maintained for at least 30 years and that they be accessible to employees or their representatives. If an incident occurs as a result of exposure, medical records must be retained for a period of 30 years from the last date of employment of the affected employee(s). Specific records may be required in the event of lost work time resulting from exposure or accident on the job. Reports should be filed in the Plant & Facilities Office. In addition to required records, it is necessary to document employee exposure complaints and suspected exposures, regardless of the outcome of an exposure assessment.

VI. CONTROL MEASURES/LABORATORY FACILITIES

Chemical safety is achieved by continual awareness of chemical hazards and by keeping the chemicals under control by using precautions, including safeguards such as hoods. Faculty, students, and staff should be familiar with the precautions to be taken. Laboratory instructors should be alert to detect the malfunction of safeguards. All safeguards and controls must be properly maintained and inspected on a regular basis, and not be overloaded beyond their design limits.

The laboratory facility should have:

- appropriate general ventilation system with air intakes and exhausts located to avoid intake of contaminated air
- adequate and well-ventilated storerooms
- laboratory sinks and fume hoods
- readily accessible emergency equipment including:
 - safety showers
 - eyewash fountains
 - first aid kits
 - fire extinguishers
 - fire alarm system
- arrangements for waste disposal
- personal protective equipment

Ventilation

Always work in a hood when working with hazardous chemicals that have low air concentration limits or have high vapor pressures. Low velocity fume hoods should provide a minimum of 60 linear feet per minute of airflow. There should be a label on each hood verifying that the airflow has been checked within the last six months. If there is any doubt that a hood is working properly call maintenance and mark on the hood "Out of Order." Laboratory personnel should understand and comply with the following:

- A fume hood is a safety backup for condensers, traps, or other devices that collect vapors and fumes.
- The apparatus inside the hood should be placed on the floor of the hood at least six inches away from the front edge, and as centrally located as possible, leaving adequate space between the back and sides of the hood. Large apparatus should be placed on "legs" at least two inches off the work surface to allow for adequate airflow through the hood.
- The Low Velocity Fume Hoods installed in Brouder Science Center require air withdrawal at the back of the work surface. Do not block this air flow with bottles, apparatus, etc. Work and place materials as central as possible on the floor of the hood.
- In the event of hood failure, personnel should remove materials if necessary and consult the lab instructor for any other steps to be taken.
- Fume hood sashes should be lowered to an appropriate position when in use. The hood will withdraw fumes from the ceiling area when nearly closed.
- The hood interior should never be used as a permanent storage area for chemicals, apparatus, or other materials.

Chemical Purchase

For safety and to minimize disposal costs, order the smallest practical amounts of hazardous chemicals. The decision to obtain a chemical is a commitment to store, handle, and use the material properly from receipt through disposal.

Requests for new chemicals will be submitted through the Chemical Hygiene Officer to the Department Chair. Once approved, the individual making the request will process the submission. Those ordering chemicals are, for waste minimization purposes, obligated to look at existing stocks of chemical to determine local availability prior to bringing new chemicals on campus. Information on proper handling, storage, and disposal, as well as any special shipping considerations, must be known to all involved

personnel prior to procurement of a chemical. A current SDS sheet must be submitted with the respective request for a new chemical. SDS sheets may be obtained from the manufacturer, the Internet, or from the SDS notebook containing previously received chemical information. Chemicals utilized in the laboratory will be limited to those which are appropriate for the ventilation system and other facilities.

Where possible, all chemicals will be received in a secured location. Personnel who receive chemical shipments will be knowledgeable of the proper procedures for receipt including special handling requirements (i.e. refrigeration, reduced light exposure, no water exposure, etc.). Chemical containers will not be accepted without accompanying labels and packaging in accordance with appropriate regulations.

The Chemical Hygiene Officer will be responsible for providing the online SDS database to Science faculty and staff. <https://SDSmanagement.SDSonline.com/company/2FDBBA46-4A51-41EB-8B1C-FF3FC12621B1>. Science faculty members will familiarize themselves with the database, and provide SDS to any students upon request.

All chemical containers will be dated to indicate when the containers are received and when they are opened. Those chemicals known to form potentially explosive peroxides will carry a peroxide former label. This label should be completed appropriately and affixed by laboratory personnel upon receipt of peroxide formers; a list of potential peroxide formers and recommended shelf life may be found in Prudent Practices in the Laboratory.

Chemical Storage

A current chemical inventory will be kept at all times, and it will be updated each time a chemical is received or consumed. Received chemicals will be immediately moved to an appropriately ventilated storage area, or in cases where centralized storage is not available, to the laboratory requesting the chemical.

When chemicals are taken to/from the storage area, they will be placed in unbreakable outside containers or buckets capable of containing the chemicals in case of inner container breakage.

Storage areas will be well-illuminated. Large bottles will be stored no more than three feet from floor level. Storage shelves will be structurally sound, level, secured to the wall or other source of mass to prevent toppling, have lips to prevent containers from slipping off the edge, and be constructed of material appropriate for the chemicals stored. Acids will be separated from flammable and combustible materials; mineral and organic acids must be stored separately. Concentrated acids will be stored in glass containers. For short-term dispensing of concentrated acids, the smallest volume reasonable for a given lab will be dispensed into compatible plastic containers. The plastic containers will be checked for integrity before use, and once the labs using the concentrated acid are complete, all acid will be transferred back into glass containers for storage, and the plastic bottles thoroughly rinsed. Storage within the same fire area is acceptable. The storage area will not be used as a preparation or repackaging area. The storage area will be accessible during normal working hours and will be under the control of the Chemical Hygiene Officer.

Storage of chemicals at lab benches or other work areas will be limited to amount necessary for one week's laboratory work. The container size will be the minimum convenient, and the amounts of chemicals at the lab bench will be as small as practical. SDS sheets for chemicals will be accessible to all employees via the online database and to students via their instructor.

Chemicals in storage should not be exposed to sunlight, heat, or extreme cold. The caps of all bottles that have been opened may be wrapped with parafilm or Teflon tape to minimize exposure to air while in storage.

Chemicals will be examined at least annually by laboratory personnel for deterioration and container integrity: the inspection should also determine whether corrosion or other damage has occurred to the storage facility as a result of leaking chemicals. Unneeded items will be held for proper disposal or redistribution to other labs that have an immediate use for them.

Peroxide formers stored for the recommended shelf life will be withdrawn for disposal or tested for peroxides and re-dated if peroxidation is not evident. Under no circumstances will peroxide formers be stored or used after the manufacturer's expiration date or when the container shows rust or other signs of deterioration.

Flammable liquids will not be placed in refrigerators or cold rooms which are not designed and functioning as flammables storage units or explosion proof units. Regular refrigerators will not be used for flammable storage.

Toxins will be segregated in a well-identified area with local exhaust ventilation where possible. Highly toxic chemicals whose containers have been opened should be stored in unbreakable secondary containers.

All cylinders of compressed gases will be stored in well ventilated areas, with protective caps securely in place when not in use, and secured with chains or straps to minimize the probability of falling. Cylinders will be segregated by hazard class (e.g. flammables separate from oxidizers).

Safety Data Sheets (SDS)

A master file of SDS will be kept by the Chemical Hygiene Officer. Anyone may request a SDS sheet for any chemical in the science buildings at any time. All requests will be fulfilled. SDS for chemicals in use in the lab at any given time will be provided by the instructors upon request. All SDS may be attained from the online database at <https://SDSmanagement.SDSonline.com/company/2FDBBA46-4A51-41EB-8B1C-FF3FC12621B1>.

Labeling and Signage

Identity labels written in full (the chemical formula is also recommended) which show the contents of each container and waste receptacle as well as the associated hazards, will be intact and readable. Signs will be posted for locations of safety showers, eye-wash fountains, and other safety and first aid equipment. Exits will be marked. Regular refrigerators will have labels affixed indicating that flammable liquids are not permitted and that food for human consumption is not permitted. Explosion proof refrigerators will have labels indicating that storage of food for human consumption is not permitted. Doors to labs and chemical storage areas will be appropriately marked with hazard warnings. Warning signs will be posted at areas where special or unusual hazards exist, such as Designated Areas.

Chemical Waste Disposal

Hazardous wastes are addressed in Section IV of this document. It is the responsibility of the generating lab instructor to determine if a waste is hazardous before disposal. No chemical will be disposed of in the trash cans or down the drain unless it has been determined to be non-hazardous and acceptable for disposal through these means. In addition, liquids will not be placed in trash cans with solid waste to

prevent migration into groundwater on delivery to landfills. Indiscriminate disposal by pouring waste down the drain or in the trash can is unacceptable.

Do not discharge down the drain any concentrated acids (pH<5.5) or bases (pH>10); any highly toxic, malodorous, or lachrymatory substances; or anything which could interfere with the biological activity of wastewater treatment plants, create fire or explosion hazards, cause structural damage, or obstruct flow. If unsure whether a chemical may be disposed in the sink, consult the city ordinances or the water company. Neutralize corrosives to acceptable levels before disposal down the drain; be aware of contaminants that would make the neutralized solution unacceptable for drain disposal.

Unlabeled containers of chemicals, or empty containers, will be identified before use or disposal. Schedule removal of waste by notifying the Chemical Hygiene Officer. Do not combine different kinds of waste unless you know they are compatible and acceptable for disposal in the combined form.

All empty containers should be triple rinsed with labels removed before disposal in the trash or sharps disposal container. Rinsing should be properly handled and disposed as appropriate for the chemical.

Flammable Liquid Storage

Large volumes of flammable liquids should be stored in an approved flammable liquid storage cabinet. All flammable materials should be ordered in plastic coated bottles when available.

Eye Wash Fountains and Safety Showers

All laboratories must have quick and easy access to safety showers and eyewashes. Be sure that access to eyewashes and safety showers is not restricted or blocked by objects. Personnel in the laboratory must be aware of the location of these devices. Eyewash fountain and safety shower compliance inspections are performed each year by the Chemical Hygiene Officer. Promptly report any unit that is not functioning properly to the Lab Coordinator or maintenance.

Personal Protective Equipment

Eye protection must be worn in the lab at all times during laboratory operation unless otherwise instructed. Once all chemicals have been removed from the lab to the proper storage area, staff entering the lab in order to clean the floors, repair the drains, etc., may work in the lab without wearing eye protection. The use of protective clothing, including gloves, will be determined by the laboratory instructor. Contaminated protective clothing will be decontaminated if possible or disposed of properly. Contaminated lab coats should not be worn. Training is required before the use of a respirator.

VII. PROCEDURES FOR INSPECTIONS

The following inspections will be coordinated and recorded by the Safety Officer, Chemical Hygiene Officer and Director of Facilities. Copies of all records will be given to the Safety Officer and kept on file in the Plant & Facilities Office.

Annual inspection: including, but not limited to, the following tasks, completed by the indicated party:

Companies on contract with Columbia College inspect:

- Fire extinguishers are fully charged (monthly).
- Low velocity fume hood recertification with minimum face velocity of 60 feet per minute.

Safety Officer/Director of Facilities inspects:

- Safety shower ANSI/ISEA Z358.1 compliance inspection.
- Eyewash fountains supply a continuous, gentle flow of 60-100°F (15-38°C) water.
- Smoke detectors are in working order.
- Fire sprinkler systems are in working order.
- Gas cylinders are firmly secured.
- Exit routes are not blocked and exit signs are lit.
- Electrical outlets and cords are in good condition.
- Natural gas lines and connections do not leak.
- Laboratories are well lit.
- Sink drains do not leak and allow for the proper flow of water.
- Fume hood airflow is 60fpm. Date and fpm recorded on each hood (every six months).

Chemical Hygiene Officer inspects:

- Chemicals are properly stored.
- First aid kits are stocked.
- Safety shower activation no less than four months from compliance inspection.
- Eyewash fountain ANSI/ISEA Z358.1 compliance inspection.

Weekly inspection: Faculty and staff will be assigned eyewash fountains in their area for weekly activation inspection and documentation in accordance with ANSI/ISEA Z358.1. The Lab Coordinator will assign these each term as appropriate.

VIII. MONITORING AND EMPLOYEE EXAMINATIONS

The Chemical Hygiene Officer will perform exposure monitoring in accordance with the Laboratory Standard. Other qualified consultants may be employed to perform exposure monitoring. Results must be sent to the Chemical Hygiene Officer who will file them in the Plant & Facilities Office. Employee exposure determination will be done in accordance with the laboratory standard as follows:

- Initial monitoring will be performed if there is a reason to believe that exposure levels for a substance routinely exceed the action level (or in the absence of an action level, the PEL).
- If the initial monitoring discloses employee exposure over the action level (or in the absence of an action level, the PEL), the employer will immediately comply with the exposure monitoring provision of the relevant standard.
- Monitoring may be terminated in accordance with the relevant standard.
- Within 15 working days after the receipt of any monitoring results, the employee will be notified of these results in writing either individually or by posting results in an appropriate location that is accessible to employees.

Anyone with a reason to believe that exposure levels for a substance routinely exceed the action level or the PEL may initiate the monitoring process. Requests for monitoring can be made to the Chemical Hygiene Officer or lab instructor. The Chemical Hygiene Officer must be notified of monitoring requests. Monitoring may be requested at any time. The Chemical Hygiene Officer is responsible for ensuring that periodic monitoring requirements are satisfied when necessary. The Chemical Hygiene Officer will file records in the Business Office. The Safety Officer or designee will establish and maintain for each employee an accurate record of any measurements taken to monitor employee exposures and any medical consultation and examinations including tests or written opinions required by this standard. The

Safety Officer will assure that such records are kept, transferred, and made available in accordance with the Laboratory Standard.

An opportunity to receive medical attention is available to all employees who work with hazardous chemicals in the laboratory. Medical consultations and examinations will be provided to qualifying employees without cost, without loss of pay, and at a reasonable time and place.

Employees will be offered the opportunity for medical attention under the following circumstances:

- Whenever an employee develops signs or symptoms associated with a hazardous chemical to which the employee may have been exposed to in the laboratory.
- Whenever an event takes place in the laboratory such as a spill, leak, explosion, or other occurrence resulting in the likelihood of a hazardous exposure.
- Where exposure monitoring reveals an exposure level routinely above the action level (or PEL) for an OSHA regulated substance for which there are exposure monitoring and medical surveillance requirements.

In the case of a spill, leak, etc. of a hazardous chemical, medical attention will, at a minimum, be in the form of a medical consultation for the purpose of determining the need for a medical examination. Where exposure levels exceed the action level, medical attention will, at a minimum, be in the form of medical examinations. These medical consultations and examinations will be administered by, or under the direct supervision of, a licensed physician.

To arrange for a medical consultation after exposure to a chemical agent, call the Safety Officer/Director of Plant and Facility Operations.

In the case of an emergency, dial 911.

IX. EMPLOYEE INFORMATION AND TRAINING

The Columbia College Chemical Hygiene Plan is an OSHA mandated program to ensure that all faculty and staff in the science buildings will be trained in working with and around hazardous chemicals in the workplace and laboratories. This program and training are mandatory for employees located in the same building with a science laboratory. It is the responsibility of Columbia College to provide a safe working environment; and it is the responsibility of students and employees to adhere to the rules and regulations of the College so that the laboratories are as safe as possible.

The components of the training program are as follows:

- All students using a science lab course should read and understand the Student Safety Contract which encompasses the general safety principles of the CHP (Section III).
- Laboratory instructors give initial general safety information to each class, and they give specific precautions that need to be followed for each experiment.
- All Science Laboratory faculty should read and understand the Chemical Hygiene Plan.
- General awareness training is conducted at least annually including the physical and health hazards of laboratory chemicals.
- All new faculty and staff are given a safety orientation by the CHO before work in any laboratory can be started.
- The Chemical Hygiene Plan is available to any College employee or student upon request.

X. EMERGENCY PROCEDURES

- For fire, evacuate the area in accordance with diagrams posted in hallways, move upwind of the fire and call the fire department and Campus Security immediately.
- For a chemical spill that cannot be handled by the instructor in the laboratory, evacuate the area just as a fire drill, locate upwind of chemical, and call the Lab Coordinator. If the Safety Officer cannot be reached, call the fire department.
- For chemical exposure and accidents requiring medical assistance, first call 911 and then consult the SDS for the appropriate emergency response.

APPENDIX A

Columbia College Student Safety Contract

Name _____ Semester _____

Students: You are required to read, understand and implement the safety precautions indicated in your laboratory manual and handouts, which are summarized below. Your signature indicates your absolute willingness to abide by these precautions. You may request to view Columbia College's Chemical Hygiene Plan through your instructor.

Basics:

1. Work in the lab only as authorized by your instructor and never work in the lab alone. Carefully read all instructions and thoroughly plan your work.
2. Wear appropriate clothing (no shorts or short skirts) and closed-toe shoes in the lab. Confine long hair and loose clothing. Do not wear jewelry, etc. that can catch on objects or trap chemicals underneath them.
3. Do not eat or drink in the lab. Applying make-up or contact lenses is prohibited. Never taste chemicals. Smell chemicals cautiously by wafting the vapors toward you.
4. Use the cubbies provided in lab to keep all aisles and work areas free of bags and clutter.
5. You may be required to purchase safety goggles. Wear them as directed during laboratory.
6. Horseplay, pranks, and other acts of mischief are prohibited. Do not run or push others in the lab. Misconduct may result in disciplinary actions up to and including dismissal from the College as outlined in the Student Behavioral Misconduct Policy.
7. If you must leave your lab-bench station, walk slowly and carefully.

Incidents and Emergencies:

1. Learn emergency procedures and know the locations of the nearest eye wash, shower, fire extinguisher, and fire blanket (where available). Never block access to emergency equipment, showers, eyewashes, and exits.
2. All injuries, accidents & spills (even water) must be reported IMMEDIATELY to the Lab Coordinator. The Lab Coordinator will determine who will and how to clean up the spill and notify the Safety Officer.
3. For chemical exposure and accidents requiring medical assistance, call 911. All students must cease work and evacuate the lab as for a fire drill.

Chemical use:

1. Use lab reagents as directed in the instructions for specific laboratory exercises.
2. Carefully read all labels on chemical bottles and familiarize yourself with the hazard codes. Do not put a pipet or dropper directly into a stock reagent bottle. Instead, pour an aliquot of the reagent from the stock bottle into a labeled beaker. When transferring chemicals to unmarked containers, label the container with the name of the contents, chemical formula, concentration, and date. Do not remove or deface labels of bottles in use. Never return excess chemicals to stock bottles.

3. Dispose of chemicals as directed by your instructor and in a manner consistent with federal, state and local hazardous waste disposal regulations. Organic solvents are **never** to be disposed of down the sink; receptacles will be provided as needed for collection.
4. Always add reagents slowly and perform hazardous operations underneath a fume hood.
5. Never remove chemicals from the lab without proper authorization. Do not store chemicals in aisles, hallways, or stairwells.
6. Use weighing paper or boats when weighing chemicals; never allow chemicals to come in direct contact with a balance.

Procedures of note:

1. When heating or mixing in a test tube, point it away from people. If you sense a “bump,” stop heating.
2. When setting up apparatus, allow for quick access to gas valves, water faucets, and electrical outlets without reaching through the apparatus.
3. Use caution with Bunsen burners, hot sand in mantles and other sources of spark or flame. Never light them in the presence of flammable liquids. *Note that most organic solvents are flammable.* Never reach across lighted Bunsen burners and only keep them lighted while in use.
4. Never heat a graduated cylinder or other thick glass over a Bunsen burner.
5. Discard broken or cracked glassware.
6. While mixing acid and water, always slowly add the acid to the water, and not vice-versa.
7. Only fill a pipet by using a pipet bulb or mechanical pipettor; never pipet by mouth.

Before leaving lab:

1. Do not dispose of paper and other insoluble materials in sinks.
2. Make certain all gas outlets, water faucets, and electrical equipment are turned off.
3. Tidy up your bench and check with your instructor for special instructions about putting items away.
4. Wipe bench area with disinfectant spray and paper towels so the area is safe and clean for the next class.
5. Always wash hands thoroughly before leaving the work area, even if you wore gloves.

I have read carefully and understand all of the safety rules contained on this sheet. I also agree to read all rules for specific exercises contained in the laboratory manual or handouts. I recognize that it is my responsibility to obey them faithfully.

I realize that all chemicals are potentially dangerous; therefore I will exercise care in handling them. If I am unsure of the potential hazards of any chemical, I will discuss it with my instructor prior to using the chemical in question.

I understand that I am required to wear safety goggles at all times unless otherwise instructed. I also understand that there are dangers involved in wearing all types of contact lenses in laboratory situations where reactive chemical agents, biological fixatives, or volatile organics are in use. I am aware that even when safety goggles are worn, the Science Department strongly discourages wearing contact lenses in these situations. If I do elect to wear contact lenses in the laboratory, I will inform my instructor **and** I will assume all responsibility for damages caused by wearing them in the lab.

If I have a medical condition such as, but not limited to, hypo- or hyperglycemia, diabetes, epilepsy, pregnancy, heart ailments, or **any other medical condition** which may cause sudden loss of consciousness, I certify that I am under a doctor's care and that my doctor has given me explicit permission to participate in this laboratory course.

I FURTHER UNDERSTAND THAT I AM PERMITTED TO WORK IN THE LABORATORY ONLY WHEN IT IS UNDER THE SUPERVISION OF A LABORATORY INSTRUCTOR, UNLESS SPECIFICALLY INFORMED OTHERWISE.

Sign both copies of this form, retain one in your laboratory notebook and your instructor will retain the other. Students under the age of 18 must have a parent or legal guardian sign the form.

Signature of Student _____

Signature of Parent or Legal Guardian of Minor Student _____

Printed Name of Parent or Legal Guardian _____

Date _____

Course Number _____ Lab Instructor Name (print) _____

APPENDIX B

COLUMBIA COLLEGE STUDENT RESEARCH RELEASE, WAIVER AND ASSUMPTION OF THE RISK

In consideration for my (undersigned) (hereinafter referred to as the “Participant”) participation in the student research activity (hereinafter referred to as the “Activity”), which is sanctioned by Columbia College (hereinafter referred to as the “College”), I hereby agree to the following:

1. I hereby forever release, waive, discharge, covenant not to sue, and agree to indemnify and hold harmless the College, its Board of Trustees, officers, agents, employees, and volunteers (collectively referred to herein as the “Releasees”) from any and all liabilities, claims, demands, losses, damages and/or injury, that may be sustained during participation in the Activity and/or while on premises owned, leased or controlled by the College, including injuries that are a result of a negligent act(s) or omission(s) of Releasees.

2. There are risks, including inherent risks, associated with participation in the Activity and being fully aware of the risks, Participant decides to nonetheless voluntarily participate in the Activity and Participant states they are able to fully participate in the Activity and there is no medical, physical, mental or other reason that would limit or otherwise prohibit their participation in the Activity.

3. College staff and other medical personnel may take any action deemed reasonable and necessary in case of emergency medical situations. Releasees may not maintain insurance covering circumstances arising from participation in the Activity, and in the event of reasonably necessary medical treatment is required, Participant’s personal insurance coverage shall serve as the primary insurance.

4. This Release, Waiver and Assumption of the Risk document is intended to be as broad and inclusive as permitted by the laws of the State of Missouri, and that if any portion of this document is determined to be invalid by a court of competent jurisdiction, the balance of this document shall – notwithstanding the invalid term – continue in full legal force and effect.

5. I understand and intend that this document may be plead as a complete defense and bar to any claim, action, lawsuit, or other proceeding I may institute against the College and/or Releasees, or that may be instituted, related to the subject matter hereof and the terms hereof shall be binding upon Participant’s heirs, estate, executor, administrator, assignees, and all family members.

6. This Agreement is governed by and constructed in accordance with the laws of the State of Missouri, without regard to any conflict of laws provision and Participant consents to exclusive jurisdiction in the State and Federal Courts in which Boone County, Missouri is located.

[Signature Page to Follow]

BY SIGNING BELOW, I ACKNOWLEDGE THAT I HAVE HAD TIME TO READ, AND HAVE READ AND UNDERSTAND THE FOREGOING PROVISIONS AND THAT SUCH PROVISIONS ARE REASONABLE AND ENFORCEABLE. I ACKNOWLEDGE THAT I HAVE SIGNED THIS DOCUMENT AS MY OWN FREE AND VOLUNTARY ACT INTENDING TO BE BOUND BY THE SAME, NOW AND IN THE FUTURE, AND ACKNOWLEDGE THAT THIS IS AN IMPORTANT AND BINDING LEGAL DOCUMENT THAT I HAVE CAPACITY TO SIGN AND THAT SHOULD BE REVIEWED BY AN ATTORNEY. NO ORAL REPRESENTATIONS, STATEMENTS, OR INDUCEMENTS APART FROM THE FOREGOING HAVE BEEN MADE.

Signature

Date

Printed Name

APPENDIX C

CAMPUS CONTACTS

Chemical Hygiene Officer

Alexandra (Lexi) Thomas
Science Lab Coordinator
Brouder Science Center 110
(573) 875-7867
amthomas7@ccis.edu

Safety Officer

Brian Wager
Interim Director of Campus Safety
Hulett Family Campus Safety Office
(573) 875-73015
bewager@ccis.edu

SCIENCE LABORATORY SAFETY POLICY

The Science Laboratory Safety Policy can be found in the Online Policy Library:
<https://www.ccis.edu/policies/science-laboratory-safety-policy.aspx>