City of Hendersonville, NC
Chemical Hygiene Plan – Water Treatment Facility
In compliance with 29 CFR 1910.1450

I. General Principles of Work

1. Individual employees shall be familiar with the chemical and physical hazards of the materials being used prior to the initiation of work with these substances. A current SDS for materials in use must be readily available to these employees.

2. Careful planning and execution of work with hazardous chemicals shall precede use. Personal protective equipment must be carefully selected in this planning stage. Selection shall be based on the potential for exposure. Familiarity with specific procedures shall not exempt any individual from recommended procedures.

3. Workspaces shall be kept in an orderly condition, with bench surfaces free from spills or other items, which present a hazard.

4. Flammable materials shall be stored in approved storage cabinets. Flammables in the work area shall be minimized.

5. Eye protection - eye goggles or face shields must be worn if the possibility of splashing exists additional eye and face protection shall be used as determined by supervision.

6. The storage and/or consumption of food in laboratories are prohibited unless an area is specifically designated as approved. Food may not be stored in areas where hazardous materials are stored or used.

7. Hazardous activities should generally not be done alone. Exceptions are permitted only by supervisory directive, and with a back-up communication plan in case of emergencies.

8. Chemicals of unknown toxicity should be handled as though highly toxic.

9. Laboratory practices which could easily lead to catastrophic chemical exposures are strictly forbidden (i.e., pipetting by mouth, carrying chemicals in pockets).

10. Safety showers and eyewashes must be readily accessible to all personnel and evaluated for appropriate function at least a weekly schedule.

11. A current SDS and appropriate label shall accompany materials provided to other employees at other locations.

II. Chemical Hygiene Responsibilities

1. The Laboratory Supervisor has responsibility for the safety and chemical hygiene within the City of Hendersonville Water Treatment Facility Laboratory. They will serve as the Chemical Hygiene Officer. They must, with other administrators, provide continuing support for laboratory safety and health.

2. The Laboratory Supervisor is responsible for ensuring that trained laboratory staff is in place and that they have safe facilities in which to operate. They are also responsible for ensuring that this plan is implemented and is kept up to date.

3. The Chemical Hygiene Officer is responsible for ensuring that laboratory personnel know and follow laboratory safety rules, that protective equipment is available and is in working order and that appropriate training has been provided. They must also perform regular laboratory safety and housekeeping inspections. These inspections must be documented and distributed to appropriate management personnel.

4. The Chemical Hygiene Officer is responsible for coordinating safety-related activities for the laboratory. These activities include:

   a. Working with other employees to develop and implement appropriates safety procedures.

   B. Monitoring, procurement, use, and disposal of chemicals and hazardous materials used in the laboratory.

   C. Overseeing required chemical hygiene audits and protective equipment.

   d. Assisting in the development of precautions and adequate facilities.

   e. Knowing the current legal requirements concerning regulated substances.

   f. Continuing to improve the Chemical. Hygiene Plan.

   g. Insuring that affected personnel have been trained in the use of any material purchased and that the rules of the Chemical Hygiene Plan are strictly followed.

   h. Follow-up on chemical hygiene and housekeeping inspections and ensuring that corrective action is taken.

   i. Determine required safety levels of protective apparel and equipment.

   j. Ensure that Safety Data Sheets (SDS) are available for all materials used in the laboratory.

5. The Laboratory Supervisor is responsible for ensuring that employee safety and health meet or exceed regulatory requirements. He must monitor procurement practices and use, and disposal of chemicals used in the laboratory; and ensure that appropriate audits, safety and health practices, and proper disposal methods are maintained.

6. The Chemical Hygiene Officer is responsible for ensuring those laboratory operations for given processes or projects are safe and that proper equipment, precautions, and instructions have been provided.

7. Laboratory Personnel must plan and conduct each operation in accordance with the prescribed safety plan. They must demonstrate adequate knowledge of safety procedures and practices and know the appropriate safety level of protective apparel and equipment.

III. The Laboratory Facility

Laboratory Quality Assurance Procedures

1. GENERAL
   - The laboratory will be kept clean and uncluttered, temperature and humidity controlled.
   - All bacteriological media will be purchased as sterile, ready to use. (media will not be prepared and sterilized in this laboratory)
   - All needed supplies and equipment will be maintained.
   - Performance evaluation samples for total Coliforms, E. coli, alkalinity, pH, and low-level total residual chlorine analysis will be obtained from an EPA approved vendor and analyzed within the first and/or third quarter of each year with the results reported to the North Carolina Drinking Water Laboratory and the North Carolina Wastewater/Groundwater Laboratory Certification Program
   - Technical assistance may be obtained from the NC Drinking Water Laboratory Certification program personnel at 919-807-8879 and the North Carolina Wastewater/Groundwater Laboratory Certification Program at 919-745-4360
   - All data and reports will be kept on file for at least five years.
   - This quality assurance manual will be kept up-to-date and readily available to the analysts.

2. THERMOMETERS
   - Thermometer calibrations are certified annually in the temperature range of use against an NIST thermometer and data recorded in QA records.
   - NIST thermometers will be recertified at least every 5 years.
   - Thermometers are tagged with calibration date and correction factor.

3. REFRIGERATORS
   - Thermometer(s) graduated in 1°C increments or less.
   - Thermometer bulb(s) immersed in liquid.
   - Temperature recorded daily along with analyst's initials.

4. pH METER
   - Accuracy of meter to ± 0.1 pH units.
   - Scale graduations of 0.1 units.
   - Electrodes maintained according to manufacturer's recommendations.
   - pH buffer aliquot used only once for calibration of the meter.
   - Commercial buffer solutions discarded upon expiration.
   - A pH meter standardized with each use period with pH 7.0 ,pH 4.0 and 10.01 buffers and the calibrating is documented with analyst's initials.
   - Slope is recorded at each 8-hour use period and corrective action is taken when the slope exceeds 95-105%.

5. AUTOCLAVE
   - A maximum registering thermometer is used in each load and the temperature is recorded.
   - A bio indicator is used in the autoclave at least monthly, and the results recorded.
   - The automatic timing mechanism accuracy is checked monthly using a stopwatch and the results recorded.

6. ULTRAVIOLET LAMP
   - Wavelength 365 nm, 6 watts.
   - Lamp is checked for appropriate function using a certified Colilert Comparitor monthly.
   - Lamp bulb is changed annually.

7. INCUBATOR UNIT(S)

- Thermometers are graduated at 0.50C increments and placed on top and bottom shelves in area of use.
- Thermometer bulbs in liquid.
- Temperature of 350 ± 0.5°C maintained.
- Temperature recorded twice daily with readings separated by at least 4 hours and time temperatures read also documented along with analyst's initials.

8. SAMPLE CONTAINERS
- Minimum capacity 150 mL (4 oz.) bottles and Quanti-Tray 2000 vessels are purchased sterile, ready - to -use.
- Sample bottles contain sodium thiosulfate.
- Sterility of 2% of 150 mL sample containers and Quanti-Tray vessels (per batch lot) is determined by adding sterile nutrient broth, incubating at 35 ± 0.50 C for 48 hours and checking for bacterial growth as indicated by turbidity. Results recorded.

9. MEDIA RECORDS
- Dehydrated or liquid media that has exceeded the manufacturer's expiration date is discarded.
- Broth media is discarded if evaporation exceeds 10% of original volume.
- Lot number and expiration date is recorded for each batch of media received in the laboratory.
- Commercially prepared media records include Date received, Type of media, Lot number, pH verification, Expiration date.
- Each new lot of commercially prepared media is checked for sterility and with positive control culture before use and every 90 days thereafter. If commercially prepared media is not used within 90 days, sterility must be re-evaluated before use.
  - Media is protected from light.
  - Each lot of Colilert@ and Colilert 18 is tested for performance initially and every 90 days thereafter using four bottles of sterile, de-chlorinated tap water, deionized water or distilled water. Three are inoculated with E. coli, Klebsiela pneumoniae, and Pseudomonas aeruginosa and the fourth is a sterility check to which only Colert is added. Records are maintained on performance testing.
  - The Colilert@ /Colilert 18 and Quanti-Tray 2000 reference color comparators will be replaced before they expire.

10. SAMPLE COLLECTION AND HANDLING
- Date and time of sample collection is recorded.
- Samples are warmed to room temperature before beginning analysis.
- Date and time of sample analysis is recorded.
- Analysis of total Coliforms samples are initiated within 30 hours of collection time.
- Samples will be collected, and testing conducted by trained analysts only.
- Each sample will have a complete record of its history.

11. REPORTING OF DISTRIBUTION SYSTEM SAMPLES
- Date and time of completion of sample incubation is recorded.
- Appropriate state reporting forms are used.
- Unsatisfactory or invalidated results reported to public water system within 48 hours.
- Total Coliform positive results reported to North Carolina Public Water Supply Section and to the public water system within 48 hours by phone or fax.
- Positive E. coli results reported to North Carolina Public Water Supply Section and to the public water system the same day as completed by phone or fax.
- Written notification sent to NC Public Water Supply within 48 hours.

12. QC REQUIREMENTS FOR E. COLI DETERMINATION USING QUANTITRAY

- Dye test will be performed monthly to determine the effectiveness of the sealer unit. Sealed trays containing 100 mL dyed water incubated for 24 hours to check for slow leaks between wells. Results will be recorded,
- Successful analysis of required Proficiency Evaluation (PE) samples annually.

13. Fire Protection

Dry chemical and carbon dioxide portable fire extinguishers are supplied throughout the Water Facility. There is also one Halon fire extinguisher in the Laboratory. Dry chemical extinguishers can be used on all types of fires (A, B, or C), while carbon dioxide extinguishers are limited to type B or C fires. Laboratory employees shall be trained in the safe and proper operation of portable fire extinguishers.

Fire extinguishers are to be utilized for small fires only. If a fire is too large to be extinguished by one (1) portable fire extinguisher, the Laboratory shall be evacuated, and the Mills River Fire Department called.

Fire extinguishers are placed in each building at the Water Treatment Facility.

14. Eyewash and Shower. Stations

A combination emergency eyewash and shower station is provided at a central location. This station shall be maintained and inspected monthly by a trained technician assigned by the Laboratory Supervisor. This eyewash and shower station shall not be blocked at any time. All laboratory personnel shall be trained in emergency procedures.

IV. Components of the Chemical Hygiene Plan

1. Exposure controls

a. Volatile and other hazardous chemicals shall be used in a controlled situation. Where applicable, use must be confined to the interior of laboratory hoods.

b. Operations not confined to hoods which release volatile or hazardous decomposition products must be supplied with local exhaust ventilation.

c. Personal protective equipment must be chosen and used based on the potential hazards of the materials used and/or the operation.

2. Chemical Procurement, Distribution and Storage

a. Procurement. -- When a substance is received, information on proper handling, storage, and disposal should be distributed to the Chemical Hygiene Officer. No container should be accepted without an adequate identifying label. The user of any toxic material must ensure that the appropriate SDS is in the lab and master file and must understand the SDS directions before opening the container.

b. Storerooms -- Toxic substances should be segregated in a well - identified area with local exhaust ventilation. Highly toxic chemicals or harmful chemicals whose containers have been opened should be in unbreakable secondary containers. Stored containers should be inspected at least annually and replaced if deterioration or other container integrity defects are present. Chemicals should be kept in a central storage and brought to the work area as needed. Chemicals identified as acids and bases will be stored in separate areas.

c. Distribution -- When chemicals stored in glass containers are hand-carried, the container should be placed in an outside container or bucket.

a. Lab Storage -- Amounts permitted should be as small as practical. Periodic inventories should be taken, with unneeded items properly disposed. Storage on tabletops is not acceptable.

3. Exposure Monitoring/Assessment

Routine exposure monitoring shall NOT be necessary in controlled laboratory work areas. Exceptions include:

a. Monitoring required by specific OSHA or state requirement.

b. Monitoring to evaluate exposures compared to an extremely stringent health standard, whether internal or external.

c. Monitoring to evaluate the control effectiveness of a newly implemented system.

4. Housekeeping, Maintenance, and Inspections

Housekeeping is a measure of safety awareness as well as a basic part of job procedures. Good housekeeping combined with the use of proper working procedures promotes job safety. Clean orderly areas and equipment promote safe working habits. Open, unobstructed walkways, aisles, stairs, doors, exits, firefighting equipment, and fire doors must be maintained to insure safe passage.

a. Cleaning -- Floors should be cleaned on a regular basis, and Water Treatment Facility Operators should empty wastebaskets when full. Countertops should not be cluttered and should be cleaned on a periodic basis and following laboratory tests. Compressed air should not be used for cleaning countertops or other surfaces and must never be used for cleaning clothing or skin. Equipment not being used on an ongoing basis should be moved to a storeroom or crib until needed. Semi-annual evaluation of unused equipment should be made with unneeded or obsolete items properly disposed. No storage should be allowed in labs above shoulder height except in specifically designed shelves or cabinets.

b. Inspections -- Formal housekeeping and chemical hygiene inspections should be held at least annually, and informal inspections should be made monthly with records kept. An inspection checklist should be utilized but should not limit inspected items or criteria.

c. Maintenance -- Eyewash fountains and safety showers should be checked and flushed weekly. Fire extinguishers and other safety equipment should be inspected on a regular basis, at least monthly. An annual certification of fire extinguishers will be performed by a certified company annually.

d. Passageways -- Aisles must be kept as clean as possible and should not be used as storage areas. Access to exits, emergency equipment, and utility controls should never be blocked.

5. Medical Programs

a. Laboratory personnel should be trained in the correct procedures to follow in the event of an accident requiring first aid.

b. All accidental exposures resulting in irritation or injury must be immediately reported to the Laboratory Supervisor. Standard site injury reporting, accident investigation, and communication procedures shall apply.

c. The City of Hendersonville Human Resource Department will maintain records of exposure. Employees will have access to their own records per 29 CFR 1910.120.

6. Personal Protection

a. Personal protective apparel and equipment are critical to minimize the risk of a chemical accident or spill. Protective apparel compatible with the requirements recommended in the SDS for a given material shall be utilized when working with that material.

b. An eyewash station is provided in the laboratory to reduce the potential of chemical exposure. Eyewashes should be used when any chemical enters the eyes. The eyes should be rinsed with water for 15 to 20 minutes and checked by trained medical personnel if necessary.

c. A safety shower is provided outside to reduce the potential of chemical exposure. Any chemical exposure covering large parts of the body should be initially rinsed with water in the safety shower, while removing contaminated clothing, and followed by thorough showering with warm water and soap to remove any residue of the contaminant.

d. Any chemical contact requiring the use of safety showers or eyewashes should be documented and reported to the Laboratory Supervisor.

7. Records

a. Records for each laboratory accident (chemical spill, personal injury, fire, etc.) should be written and given to the Laboratory Supervisor. Spills that pose a potential hazard are spelled out in the SDS.

b. Inventory records for the Laboratory Supervisor maintain Hazardous Materials. The Laboratory Supervisor must be notified when hazardous materials, including gases, are brought on site. The City of Hendersonville Human Resources Department maintains employee injury records.

8. Signs and Labels

Labels provide a general idea of the potential for hazard of chemicals, but they are not a substitute for SDS.

Safety showers and eyewash stations shall be prominently labeled. All unnecessary signs shall be removed from walls to make safety postings more prominent.

Warnings at the entrance of areas or on equipment where special or unusual hazards exist shall be posted.

Emergency telephone numbers shall be posted at each appropriate phone location.

9. Spills and Accidents

Laboratory personnel should call the Laboratory Supervisor, Water Treatment Facility Manager and any agency specified by our Emergency Response Action Plan in the event of a fire or chemical spill. The caller should specify the area in which the emergencies are occurring and stay near the accident location unless conditions dictate otherwise. He should also specify if an evacuation is in order. The reporting person should be prepared to give the Emergency Response Team specific information regarding the emergency when it arrives on the scene: chemicals involved type of injury, and other technical data such as SDS. The caller should keep a safe distance from the hazard and notify others to evacuate if needed.

Laboratory personnel should be familiar with the hazards of the chemicals being used (SDS) and be able to communicate this information to the Emergency Team if it is needed. Measures should be taken to minimize the likelihood of a spill, including:

a. Visual inspection of all pumps, hoses, and storage containers, prior to each use for signs of wear or corrosion.

b. Stringent housekeeping to avoid cluttered work areas and minimizes the likelihood of an accident. All unnecessary equipment, bottles, and other articles should be properly stored in a cabinet.

c. A preventive action plan for a spill before beginning a task. Work should be done a safe distance from sanitary drains. Also, a reaction plan must be considered, i.e., proper equipment to contain a spill.

Action should be taken to contain or stop a spill, such as up righting a container or diking off a sanitary drain, unless the severity warrants immediate evacuation.

10. Training and Information

a. Employees must receive a general site safety orientation at the time of initial assignment.

b. Safety training must occasionally be provided prior to assignment to specific tasks. For example, process reviews, to include safety and health hazards of materials, should be conducted prior to the start of a new program. Physical hazards of laboratory equipment must also be reviewed prior to initial use.

c. Health Hazard Information: The specific health hazards of materials in use shall be reviewed by consulting the SDS. Permissible exposure limits, personal protective equipment requirements, signs and symptoms associated with excessive exposure, and emergency treatment procedures should be reviewed. Questions should be referred to the Laboratory Supervisor/Chemical Hygiene Officer.

d. Identification of Hazardous Materials: Labels on incoming hazardous chemicals may not be defaced or removed. Additional labeling schemes in the laboratory must be devised so all users can readily identify the material.

e. Pre -Operational Evaluation and Approval: Specific laboratory operations may require management approval before they commence. In general, any extensive new program must receive a safety review prior to start-up. The following information shall generally be collected and reviewed:

1. Information on all materials to be used SDS and conditions of use.
2. All physical equipment, safety devise, controls, etc. to be used in the setup.
3. Emergency procedures pertinent to the experiment and location.
4. Waste materials produced and disposal methods thereof.
5. Personal protective equipment decisions.
6. Employees must have access to the specific requirements of the OSHA laboratory standard and must have access to the SDS.

11. Waste Disposal

a. Lubricating Oil -- Waste oil shall be placed in 55 -gallon steel drums for recycling.

b. Chemicals -- Waste chemicals shall be carefully collected in suitable containers for individual disposal in accordance with SDS instructions.

c. Biological Waste -- All Laboratory waste known to be or suspected of being contaminated by biological organisms is to be autoclaved before disposal.

d. Miscellaneous -- The existence of the Chemical Hygiene Plan for this site does not exempt laboratory employees from following other established site rules pertaining to medical, hygiene, safety, environmental, or emergency procedures. Examples include established procedures for lockout/tagout, waste disposal requirements, and emergency protocols.

V. Procedures for Working with Chemicals

Always add acid to water never water to acid.

Before beginning a laboratory operation, each person is required to be familiar with one of the standard compilations (such as the SDS) that list toxic properties of known substances, and to learn what is known about the substances that will be used.

Hazardous properties of some substances may not yet be known. Therefore, procedures for chemical handling begin with observation of prudent laboratory practices to minimize exposure, such as working in an exhaust hood, wearing eye and hand protection, and wearing a laboratory coat or apron as appropriate.

Emergency Plan for Accidents and Spills

a. The SDS will contain specific instructions for handling spills. Personnel should be familiar with these instructions prior to beginning work. Use the following guidelines if a situation is deemed serious:

(1) Eye Contact: Promptly flush eyes with water for a prolonged period (at least 15 minutes) and seek medical attention.
(2) Skin Contact: Promptly flush the affected area with water and remove any contaminated clothing. If symptoms persist after washing, seek medical attention.
(3) Ingestion: Encourage the victim to drink large amounts of water. Attempt to learn exactly what substance and quantities were ingested and promptly seek medical attention.

b. When working with chemicals in the lab, have a pre-plan for dealing with the possibility of spills. There should be supplies and equipment on hand to deal with a spill, consistent with the hazards and quantities of the spill. Promptly clean up spills using appropriate protective equipment and proper disposal methods. With large spills, call the Emergency Response contacts listed in the ERAP.

As well in the case of large spills, isolate the area with barrier tape and a sign stating, "DANGER. DO NOT ENTER." The person responsible for the spill must coordinate cleanup with other personnel if the material is not hazardous. Minor spills should be cleaned up immediately and the floor wiped with a cleaning agent and water if the spill leaves a residue. The floor should be dried up to avoid causing a slipping hazard and use appropriate signage.

Work Procedures and Practices

a. Controlled Exposure – Develop and encourage safe habits. Avoid unnecessary exposure to chemicals by all routes. Do not smell or taste chemicals. Inspect gloves before use. Do not allow release of toxic substances in controlled atmosphere rooms, which have air-recirculating systems.

Safety Data Sheets

(1) A current inventory of all chemicals and toxic substances must be maintained in the lab.
(2) SDS for each chemical and hazardous substance must be maintained in a readily accessible file in the lab.
(3) An SDS must be requested for each new chemical or other hazardous substance. The Laboratory Supervisor must approve the purchase request for the first purchase of any chemical or hazardous substance not already in the lab and SDS file system.
(4) Lab audits must verify the accuracy and completeness of the SDS file system to the chemical lab inventory of chemical and other toxic and hazardous materials at least annually.
(5) Periodic training sessions must be held for all chemical lab personnel on how to read and interpret SDS information.

Eating and Smoking

Eating, drinking, and smoking are not allowed in the Laboratory area. Personnel should wash hands and any other affected areas thoroughly before leaving the lab area to engage in such activities. Storage of food or beverages in laboratory storage areas or equipment is prohibited. Laboratory utensils are to be used only for laboratory purposes and not for purposes of human consumption.

Correct Glassware and Containers

Use only the appropriate containers and glassware for laboratory chemicals. Use the equipment only for its intended purpose. Handle and store laboratory glassware carefully to avoid damage. Glassware and containers should be cleaned after use before storing. Dedicated equipment should be marked appropriately. Never use damaged equipment or glassware. Inspect all equipment prior to use for damage.

Equipment and Maintenance

Use the appropriate equipment for each job. When using corrosive gas or liquid, use equipment that is corrosion resistant. Do not use equipment where oil could encounter an oxidizing chemical. Make sure that all equipment is in good working order. Clean all equipment before and after use where appropriate.

Pipetting

Do not use mouth suction for pipetting or starting a siphon.

Ventilation

When using a ventilation hood, an emergency plan should always be prepared for the event of ventilation failure (power failure, for example) or other unexpected occurrence, such as a fire. As a rule of thumb, use a hood or other local ventilation device when working with any appreciable volatile substance or with significant particulate. Confirm adequate hood performance before use; keep hood closed except when adjustments within the hood are being made; and keep

materials stored in hood area to a minimum, and do not allow them to block vents or air flow. Leave the hood "on" when it is in active use if toxic substances are stored in it.

Horseplay

Avoid practical jokes or other behavior, which might confuse, startle, or distract another employee.

Vigilance

Be alert to unsafe conditions and see that they are corrected when detected. Over familiarity with a particular lab operation often results in overlooking or underrating an unsafe condition. And not recognizing it for what it is.

Personal Protection

Protective Gear. Assure that all persons, including visitors, where chemicals are stored or handled, wear appropriate eye protection. Wear appropriate gloves when the potential for contact with toxic materials exists, inspect gloves before each use, wash them before removal, and replace them periodically. Use other protective and emergency apparel and equipment as appropriate. Remove lab coats immediately upon significant contamination.

Personal Hygiene

Wash areas of exposed skin well before leaving the laboratory area. Avoid the use of solvents on skin.

Personal Apparel

Confine long or loose hair, ties, or torn clothing when in the laboratory. Wear substantial work shoes in the laboratory and Water Treatment Facility. Do not wear sandals or perforated shoes. Appropriate protective apparel, such as lab coats and aprons are advisable.

Work Plan and Scope

Planning

Seek information and advice about hazards, plan appropriate protective procedures, and know the safety rules and procedures that apply to the work that is being done. Include a plan for the safe disposal of all chemical waste.

Working Alone

Individuals working alone should make plans to crosscheck periodically with other personnel. An employee who is alone in a laboratory should not undertake experiments known to be hazardous.

Waste Disposal Program

Disposal

The plan for safe disposal of the substances used is as much a part of the plan for the experiment as is the experimental procedure itself. Waste disposal should have a minimal effect on people,

the environment, and living organisms. Ensure that the job scope includes plans and training for waste disposal. Deposit waste in appropriately labeled receptacles and follow all other waste disposal procedures. Materials potentially contaminated by biological organisms must be autoclaved before disposal. Do not discharge any of the following into the sanitary or industrial sewer: concentrated neither acids or bases; highly toxic, malodorous, or lachrymatory substances; nor any substances which might interfere with the biological activity of wastewater treatment plants, create fire or explosion hazards, cause structural damage, or obstruct flow.

Storage

Waste from individual experiments or processes should be removed at intervals of no longer than 1 (one) week to a central waste disposal storage area, and then removed from that area at regular intervals. Laboratory personnel should be aware of the hazards that may be involved in disposing of all chemical waste and the importance of segregating incompatible materials. All disposal of hazardous wastes must be in accordance with the Federal Law -- THE RESOURCE CONSERVATION AND RECOVERY ACT OF 1980. Appropriate disposal containers must be used, and all containers must be properly labeled. All personnel handling hazardous waste disposal must have proper training. Designated plant sites for accumulation and storage of hazardous wastes must be used. Waste should be removed from laboratories to the designated storage areas at least once per week. Hoods should not be used as a means of disposal for volatile chemicals. ALL CONTAINERS MUST BE CORRECTLY IDENTIFIED AND LABELED.

Work Area Housekeeping

General Housekeeping

There is a definite relationship between safety performance and orderliness in the laboratory. Keep the work area clean and uncluttered, with chemicals and equipment being properly labeled and stored. Clean up the work area upon completion of an operation or at the end of each day.

Working with Allergens, Embryotoxins, and Corrosive Chemicals

Allergens

Allergens are substances that can produce skin and lung hypersensitivity. Examples include relatively common substances, such as chromium, nickel, diazomethane, isocyanates, bichromates, formaldehyde, and certain phenols. Wear suitable gloves whenever handling substances of unknown allergenic activity.

Embryotoxins

Embryotoxins are substances that either kill or damage a fetus. Examples include organomercurials, lead compounds, and formamide. Since the period of greatest susceptibility to embryotoxins is the first 8 - 12 weeks of pregnancy, which includes a period when a woman may not know she is pregnant, women of childbearing potential should take care to avoid skin contact with all chemicals. Handle known embryotoxins in a hood whose required performance has been confirmed and wear appropriate protective apparel to prevent skin contact. Pregnancies should be reported to the Laboratory Supervisor for an evaluation of work activities and environmental concerns.

Review each use of these materials with the Laboratory Supervisor.

Review continuing uses annually or whenever a procedural change is made.

Store these substances in an adequately ventilated area in an unbreakable secondary container having sufficient capacity to retain the material. should the primary container accidentally break. The container should be labeled in a clear manner, such as: EMBRYOTOXIN: READ SPECIFIC PROCEDURES FOR USE.

Notify the Laboratory Supervisor of all incidents of exposure or spills.

Corrosive Chemicals

The major classes of corrosive chemicals are strong acids and bases, dehydrating agents, and oxidizing agents. Inhalation of vapors or mist of these substances can cause severe bronchial irritation. These chemicals erode the skin and the respiratory epithelium (tissue covering the lining of the respiratory tract) and are particularly damaging to the eyes.

All concentrated strong acids can damage the skin and eyes. Exposed areas should be flushed promptly with water for 15 minutes. Nitric, chromic, and hydrofluoric acids are especially damaging because of the types of burns they inflict. Hydrofluoric acid, which produces slow-healing, painful burns, should be used only after thorough familiarization with recommended handling procedures.

Strong bases include lithium hydroxide, potassium hydroxide, sodium hydroxide, and ammonia. Ammonia is a severe bronchial irritant and should always be used in a well -ventilated area. The metal hydroxides listed above are extremely damaging to the eyes. Should exposure occur, the affected areas should be washed at once with large quantities of water for at least 15 minutes. Consult a physician to determine if further treatment should be pursued.

Dehydrating agents include concentrated sulfuric acid, sodium hydroxide, phosphorus pentoxide, and calcium oxide. Because much heat is produced when mixing these substances with water, adding the agent to water to avoid violent reaction and spattering should always do mixing. Because of their affinity for water, these substances cause severe burns on contact with the skin. Affected areas should be washed promptly with large volumes of water.

Strong oxidizing agents are not only corrosive but also present fire and explosion hazards on contact with organic compounds and other oxidizable substances. Examples include perchloric and chromic acids, sometimes used as cleaning solutions. Perchloric acid is especially harmful and should be handled only after thorough familiarization with recommended procedures. Strong oxidizing agents should be stored and used in glass or other inert (preferably unbreakable) containers, and corks and rubber stoppers should not be used. Reaction vessels containing significant quantities of these reagents should be heated by using fiberglass mantles or sand baths rather than oil baths.

Working with Chemicals of Moderate Chronic or High Acute

Toxicity

These precautions are appropriate for substances with moderate toxicity having prolonged regular use or for substances with high toxicity when used in high concentrations for short periods of time. Definitions for "moderate" and "high" can be found in OSHA literature. Examples: Hydrogen cyanide, hydrofluoric acid, Diisopropyl fluorophosphate (DFP, a biochemical reagent), carbon monoxide, hydrogen sulfide, and bromine.

The overall objective of this procedure is to minimize exposure of the laboratory worker to toxic substances, by any route of exposure, by taking all reasonable precautions.

a. Protect the hands and forearms by wearing either gloves or a laboratory coat or suitable long gloves (gauntlets) and whatever other protective apparel is appropriate to avoid contact of toxic material with the skin.

b. Procedures involving volatile toxic substances and those involving solid or liquid toxic substances that may result in the generation of gases should be conducted in a hood or other suitable containment device. Use suitable traps or filters to contain released vapors and to prevent their discharge with the hood exhaust. Use special warning signs.

c. After working with toxic materials, wash the hands and arms immediately. Never eat, drink, smoke, chew gum, take medicine, or store food in areas where toxic substances are being used.

d. To minimize hazards from accidental breakage of apparatus or spills, containers of toxic materials should be stored in pans or trays made of polyethylene or other chemical -resistant material, and apparatus of the same type of material should be mounted above the trays.

e. Ensure that at least two people are always present if a compound in use is highly toxic or of unknown toxicity.

Working with Chemicals of High Chronic Toxicity

These are materials, which are hazardous upon prolonged regular use in certain quantities (marked by long duration or frequent recurrence). Examples in this category include heavy metal compounds (e.g., dimethylmercury and nickel carbonyl) and strongly carcinogenic substances. Consult the Chemical Hygiene Officer or Laboratory Supervisor if carcinogen data on a material is unknown.

VI. Safety Recommendations

1. Develop a training plan for new employees.
2. Train all laboratory employees in the following:
    a. Fire extinguisher usage.
    b. Lab safety equipment usage.
    c. Access to SDS files.
    d. Waste disposal program.

3. The Chemical Hygiene Officer shall provide for safety meetings, safety plan updates, a safety reference library, and other safety-related issues.
4. Establish a library for safety references.
5. Hold monthly Safety and Housekeeping Inspections. Have a "Housekeeping Day" to correct any deficiencies.
6. Implement stringent housekeeping rules, including that items not used daily are to be stored in a cabinet.
7. Test showers and eyewash stations once every month. Provide for safe, unobstructed movement where chemicals are used.
8. Notify the Laboratory Supervisor when new hazardous materials, including gases, are brought on site. Safety measures should be reviewed at this point.
9. Store or discard unused equipment.
10. Review all mechanical equipment for adequacy of safety systems and compliance with OSHA standards.

11. Review the electrical distribution system for the laboratory. The Laboratory Supervisor should review new equipment additions.
12. Check gas cylinder regulators for defects. Evaluate transport and storage practices for gas cylinders.
13. Store safety equipment in designated areas in the lab. Evaluate adequacy of safety equipment, correct deficiencies as appropriate.
14. Eating, drinking, and smoking should be limited to designated areas.
15. Clearly label all rooms, doors, etc.
16. Label all phones with emergency phone numbers.

VII. Safety Data Sheets

Before any work is initiated involving any chemical or hazardous material, a complete and up-to-date Safety Data Sheet (SDS) must be available in the laboratory for reference in establishing safe working procedures with that material. The Laboratory Supervisor shall ensure that SDS's will be provided and utilized for safety planning purposes prior to any use of said material.

VIII. Standard Safety Practices

Laboratory Equipment

Guards, protective coverings, and safety devices are provided to protect individuals working in locally hazardous areas. These devices are not to be removed without proper authorization and notification of those in the area. No equipment will be operated without all the safety devices, which have been provided in place and properly functioning.

Special guards or devices may be needed in especially hazardous situations. The Chemical Hygiene Officer will be responsible for ensuring that such equipment is located properly and in good condition.

a. Each person assigned to operate laboratory equipment must be properly trained.
b. Any laboratory -powered equipment with safety doors must have an electrical interlock to ensure that equipment cannot be operated with doors open.
c. Before operating any equipment, a visual inspection is to be made to check for any obvious unsafe conditions, which must be corrected before that equipment is operated.
d. Safety glasses and any required safety gear must be worn where appropriate.

Electrical Safety in the Laboratory

Electricity can be very hazardous; however, some simple measures can improve the safety of the working environment. The following are required procedures and warnings for using electrical equipment or appliances:

a. All electrical equipment must be grounded and the electrical lines to equipment or appliances must have good insulation without worn or frayed surfaces.
b. All electrical wiring leading into outlets must have the outlets properly covered, and no exposed terminals are permitted.
c. There must be adequate electrical power to meet the needs of all laboratory equipment, appliances, and tools.
d. Electrical control panels and circuit breakers must be identified with markers indicating the equipment they service. WARNING - do not perform work on electrical

circuits or equipment unless you are qualified and have been authorized by your supervisor.
e. Do not touch electrical switches with hands that are wet (with water or perspiration). Ground fault interrupters should be used where wet conditions may exist.
f. Fuses in electrical panels may be changed only by qualified technician or qualified personnel.
g. If work on electrical equipment in the Laboratory is to be performed, the circuit breaker must be locked out and tagged.
h. Only qualified and authorized personnel shall repair or adjust electrical equipment.

Laboratory Power Tools

Power tools can pose hazards including flying fragments and debris, entangled clothing and body extremities, cuts and lacerations, embedded objects in the body, crush injuries, and electrical shock.

a. Each person assigned to operate power tools in the laboratory must be properly trained in the safe use of the tools.
b. Do not use defective tools. Inspect tools prior to use for defects, remove any defective tool from service, and have the tool repaired by authorized personnel.
c. All power tools must be properly grounded.
d. Repairs, adjustments, and lubrication of power tools are to be made by qualified personnel only.
e. When using power tools, safety glasses must be worn.
f. Firmly secure the work piece before using power tools to drill, cut, or sand.
g. When finished with power tools, they are to be cleaned and put in proper storage.
h. Do not wear loose -fitting clothing when operating power tools.
i. Allow sufficient clearance for any projectile debris from the work piece.

Compressed Gases in the Laboratory

Hazards associated with the usage, storage, and transportation of compressed gas cylinders are not immediately obvious. Therefore, specific guidelines for safety are essential for safe use of compressed gases in the laboratory. Most accidents are caused by improper application of the gas; abuse of the container; or inadequacies in the regulators, valving or piping used with the gas. The compressed gas manufacturer is a good source of safety-related information if needed.

a. Don't use, operate, or handle compressed gas equipment unless you have been properly trained on the equipment to be used, safety procedures, and the hazards associated with its use.
b. Never use compressed gas to clean work areas or skin, or to cool the body.
c. All systems are to be periodically tested, and any defects are to be reported and repaired immediately.
d. Consult the SDS before using compressed gas and become familiar with how to work with the gas.
e. Any system taken out of service must be tagged at each supply and each use point.
f. Oxygen and oxidizer systems must be cleaned of all combustible materials, such as oils and greases, prior to use.
g. Follow the manufacturer's instructions exactly.
h. Never use a cylinder that is not properly labeled as to content.
i. Do not transfer gases from one cylinder to another.

j. Never trans fill gas from one cylinder to another. Before removing a regulator from a cylinder, the cylinder valve must be closed and the line pressure relieved. Do not use valve adapters. Carefully inspect valves and threads for damage, dirt, and debris prior to connecting. DO NOT USE cylinders with valves that do not work freely or that show signs of damage. Tag the defective cylinders and return them to the supplier. Keep all body parts out of the path of valve outlet flow. Regulators, gauges, and hoses specified for use with a certain gas must be used with that gas only. Defective regulators should be returned to the cylinder vendor.
k. Ropes, chains, or slings are not to be used to suspend or lift a cylinder into place unless specific provisions for lifting attachments have been designed and manufactured into the cylinder.
Storage
l. Keep a minimum number of compressed gas cylinders on hand. When cylinders are empty, tag as empty, close valve, replace cap, and return to supplier.
m. Do not drain all pressure from cylinders. Cylinders must be individually strapped, chained, or otherwise secured except when being moved.
n. Cylinders must be stored upright in a well -ventilated, isolated, dry area or rack, and shielded from direct sunlight. Cylinders should be chained or otherwise secured in storage and in use.
0. Cylinders containing toxic gases must be used only in ventilated areas. Storage should meet the requirements of the SDS.
p. Cylinder protective valve caps MUST be always kept securely on, unless in use.
q. Cylinders containing combustible gases must be stored separately from oxidizing gases.
Transportation
r. Cylinders must be moved with a cylinder hand truck only. All cylinders are to have protective valve caps firmly in place BEFORE being moved. Care must be taken to prevent mishandling of cylinders or allowing them to strike each other or other objects.
s. Do not store or use cylinders in a wet environment or near other corrosive materials. Restrict smoking, cutting, welding, grinding, and open flames near flammable gas storage and use.

Use of Ladders

Ladders can pose hazards that are not immediately apparent. Some specific rules for uses of ladders are:

a. Inspect ladders for damage before use. Defective ladders are not to be used but tagged for repair.
b. Ladders must not be placed in doorways unless safety precautions have been -taken. Always stand on ladders facing the steps or rungs. Keep your hands free for climbing. Do not use a metal ladder for electrical work.
c. Safety requirements for straight or extension ladders are:
    (1) Ladders must be equipped with non-skid pads if used on concrete or other hard floor surfaces.
    (2) Ladders are to be positioned one foot away from the wall for every four feet of ladder length.
d. Safety requirements for stepladders are:
    (1) Ladders must not be used in folded position.
    (2) Ladders must be placed such that all four legs are firmly set on a level surface.
    (3) Do not step or stand on the top step.
    (4) Ladders must not exceed 20 feet in height.

General Laboratory Safety

a. The floor surface must be uniformly even and free of holes and slippery areas.
b. There must be no projection of items, such as cords or pipes, across the aisles.
c. The width of the aisles must be a minimum of 28 inches.
d. Emergency exits must be marked and free of access restrictions.
e. Stools used in the laboratory must be slip -proof and the stools must be in good repair.
f. Laboratory storage:
(1) Shelves must not be top heavy.
(2) Materials must be stored in a stable manner.
(3) Tall shelving must be bolted to the wall.
(4) Excessive storage of combustibles must be avoided.
(5) There must be no storage of materials in aisle ways.
(6) Materials must be stored in an organized manner, so as not to contribute to hazardous conditions.
g. Torch cutting, welding, and similar hot work can present hazardous conditions. No such work -is to be done by unauthorized personnel.
h. Emergency phone numbers must be near all applicable phones.
i. The Laboratory must have allocated space for safety equipment, such as face shields, rubber gloves, etc.
j. The laboratory must meet these physical conditions:
(1) Noise level does not exceed 85 decibels.
(2) Room temperature is to be within 65 - 75 F.
(3) Fluids must not be under pressure if not in use.
(4) Usage of such things as microwaves, ultraviolet light, infrared light, or high voltage must not pose a hazardous condition.
k. Equipment which generates any dust must have a proper dust collection system to collect and dispose of dust.
l. Equipment that generates toxic fumes and/or gases is to be properly ventilated to the outside of the building.
m. Fire extinguishers in the laboratory must:
(1) Be the correct type of extinguisher.
(2) Not be in the discharged state.
(3) Have up-to-date inspection tags.
(4) Be properly located for easy and quick access.
n. Warning signs must be posted in the laboratory for:
(1) Electrical hazards.
(2) Mechanical hazards.
(3) Radiation hazards.
(4) Use of safety equipment.
(5) Exits that are not safety exits.
o. Access to safety equipment such as the eyewash station, safety shower, fire extinguishers, and other equipment, must not be obstructed.
p. All emergency equipment must be in operating condition.

Chemicals

a. Solvents or flammable liquids should never be poured into sewers or drains. Personnel assigned this specific responsibility should handle proper disposal.
b. In handling chemicals or equipment containing chemicals, safe handling, or removal, must be considered before operating, repairing, or testing such equipment. The

Chemical Hygiene Officer will provide answers to any questions regarding techniques for handling or disposing of such chemicals.

John F. Connet

12-30-25
Date of Approval

Reviewed by the Water Treatment Facility Manager Ricky Levi on 2/23/2024
Reviewed by Steve Alverson Risk and Safety Officer and the Water Treatment Facility Laboratory Supervisor, Stephen Bell 12/29/2025