

North Carolina State Crime Laboratory

Safety Manual

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1.0 Authority and Accountability

1.1 Purpose

This Safety Manual supplements the *North Carolina Department of Justice Safety and Health Manual (DOJ Safety Manual)* to meet the special conditions that are unique to the North Carolina State Crime Laboratory (Laboratory) and the requirement for the manual is outlined in Section 2 of the *DOJ Safety Manual - Authority and Accountability*.

1.2 Scope

This Safety Manual applies to all facilities of the State Crime Laboratory. This manual also applies to any unit or Section which may be assigned to the Laboratory buildings in these locations:

North Carolina State Crime Laboratory
121 East Tryon Road
Raleigh, North Carolina 27603

Western Regional Laboratory
9B Walden Ridge Drive
Asheville, North Carolina 28803

Triad Regional Laboratory
Guilford Building
2306 W Meadowview Road Suite 110
Greensboro, North Carolina 27407

1.3 Definitions

The Chemical Hygiene Officer (CHO) is concerned with the Chemical Hygiene Plan (CHP) and the safe use of chemicals. The Safety Officer (SO) is responsible for all other aspects of workplace safety (e.g. emergency evacuation plans, safety audits, accident reporting, and fire safety). The SO and CHO shall be referred to as the Safety and Chemical Hygiene Officer (S&CHO) throughout the rest of this document. These positions shall be occupied by one employee in each Section.

1.4 Accident/Incident Reporting

An accident is an incident which involves safety issues and may or may not include physical injury of some type (e.g., chemical spill, discharge of a firearm, etc.). All accidents shall be reported in accordance with Section VI, Accident Reporting and Investigation of the *DOJ Safety Manual*.

1.5 Laboratory Safety Committee

The Laboratory Safety Committee (Safety Committee) shall be established with a representative

from each unit or section of the State Crime Laboratory and any unit or section which may be assigned to a Laboratory building. The representative shall be the Unit or Section S&CHO. The Safety Committee shall meet no less than quarterly.

The purposes of the Safety Committee shall be to:

- Ensure jobs are planned for the safety of the employees.
- Ensure employees are receiving safety and health training.
- Ensure employees are involved in the promotion of safety and health.
- Ensure the workplace is inspected monthly and hazards are controlled.

The Safety Committee shall have a chairperson (Safety Manager) appointed by the State Crime Laboratory Director (Lab Director). The chairperson shall ensure that a written summary of each meeting is prepared and submitted to the Lab Director. The Lab Director shall serve as an *ex officio member*.

1.6 Lab Director

The Lab Director is responsible for ensuring that the Safety Manual is implemented and maintained. Additional responsibilities include:

- Representing the State Crime Laboratory at the DOJ Central Safety Committee meeting or appointing a designee.
- Serving as an *ex officio member* of the Laboratory Safety Committee.
- Assessing corrective measures involving employees who violate safety program procedures.

1.7 Forensic Scientist Manager

“Each Supervisor is responsible for providing safe working conditions for those being supervised and for following up on reports of violations of safe working conditions. Each supervisor is also responsible for knowing the safety and health guidelines, conducting safety meetings and audits, investigating accidents, reporting of accidents, and properly advising higher management of appropriate situations.” Section II.1 of **Administration and Authority**; subsection **Supervisor** of the *DOJ Safety Manual*

Additional responsibilities include:

- Appointing the Section or Unit S&CHO.
- Ensuring that all members of the Section/Unit adhere to the State Crime Laboratory Safety Manual.

1.8 Section/Unit S&CHO

The responsibilities of this position include:

- Serving as the Section/Unit representative to the Safety Committee.

- Working with administrators and other employees to develop and implement chemical hygiene policies and practices.
- Understanding State Crime Laboratory and NCDOJ safety and health guidelines.
- Determining that facilities and training levels are adequate for the chemicals in use within the Section/Unit.
- Ensuring and documenting that training has been provided to employees and maintaining safety training records for the Section/Unit.
- Performing monthly, formal chemical hygiene and housekeeping inspections including inspections of emergency equipment; documenting and maintaining records of the inspection according to the Record Retention Schedule as set forth by the North Carolina Department of Cultural Resources.
- Reviewing and updating the Chemical Hygiene Plan annually.
- Determining the proper level of personal protective equipment and ensuring that such protective equipment is available and in working order.
- Monitoring the waste disposal program (if applicable).

1.9 Employee

“Each DOJ employee is to place safety and health requirements as first importance in the performance of their work duties. The protection of fellow employees and the public on State property is the shared responsibility of every employee.”

“An employee is responsible for notifying his/her immediate supervisor of a violation or deficiency in a safe and healthful working condition and for recommending corrective measures, if possible. Additionally, the employee=s immediate supervisor is to be notified of every injury or accident regardless of how trivial such accident may appear at that time.”

Section II.1 of **Administration and Authority**; subsection **Employee** of the *DOJ Safety Manual*

2.0 Chemical Hygiene Plan

2.1 Forward

On January 31, 1990, the Occupational Safety and Health Administration (OSHA) promulgated a final rule for occupational exposure to hazardous chemicals in laboratories. Included in the standard, which became effective on May 1, 1990, is a requirement for all employers covered by the standard to develop and carry out the provisions of a CHP.

A CHP is defined as a written program which sets forth procedures, equipment, personal protective equipment and work practices that are capable of protecting employees from the health hazards presented by hazardous chemicals used in that particular workplace. Components of the CHP shall include standard operating procedures for safety and health; criteria for the implementation of control measures; measures to ensure proper operation of engineering controls; provisions for training and information dissemination; permitting requirements; provisions for medical consultation; designation of responsible personnel; and identification of particularly hazardous substances.

The CHP developed for all locations of the Laboratory is maintained and readily available to Laboratory employees, their representatives, and any representative of the Assistant Secretary of Labor in charge of OSHA. All Laboratory personnel shall know and follow the procedures outlined in this plan. All operations performed in the Laboratory shall be planned and executed in accordance with the procedures as provided in the Safety Manual. In addition, each employee is expected to develop safe personal chemical hygiene habits aimed at the reduction of chemical exposures.

This document was developed to comply with paragraph (e) of OSHA 1910.1450 standard. Each Section S&CHO shall maintain the facilities and procedures employed in the section compatible with current knowledge and regulations in laboratory safety.

2.2 Standard Operating Procedures (SOP) for Laboratory Chemicals

2.2.1 Chemical Procurement

- 2.2.1.1** The decision to procure a chemical constitutes a commitment to handle and use the chemical properly from initial receipt to ultimate disposal.
- 2.2.1.2** All chemicals shall be received in a central location. Personnel who receive chemical shipments shall be knowledgeable of the proper procedures for receipt. Chemical containers shall not be accepted without accompanying labels and packaging in accordance with regulations. All chemical shipments shall be dated when received and opened. Material Safety Data Sheets (MSDS) shall be available.

2.2.2 Chemical Storage

- 2.2.2.1** Received chemicals shall be moved to the designated storage area for each Section/Unit. Large glass containers shall be placed in carrying containers or shipping containers during transportation.
- 2.2.2.2** The storage area shall be well illuminated. Large containers shall be stored as close to the floor as possible.
- 2.2.2.3** Chemicals shall be segregated by hazard classification and compatibility in a well identified area with local exhaust ventilation.
- 2.2.2.4** Mineral acids shall be separated from flammable and combustible materials. Separation is defined by National Fire Protection Association 49 as storage within the same fire area, but separated by as much space as practicable or by intervening storage from incompatible materials.
- 2.2.2.5** Acid resistant trays shall be placed under bottles of mineral acids.
- 2.2.2.6** Acid sensitive materials such as cyanides and sulfides shall be separated from

acids or protected from contact with acids.

2.2.2.7 The storage area shall be accessible during normal working hours.

2.2.2.8 When highly toxic, caustic, or flammable chemicals are taken from the storage area, they shall be placed in a container or bucket for transportation.

2.2.2.9 Storage of chemicals at the laboratory bench or other work areas shall be limited to amounts as small as practical. Chemicals in the workplace shall not be exposed to sunlight or heat.

2.2.2.10 Stored chemicals shall be examined at least annually by the Section S&CHO for replacement, deterioration, and container integrity. The inspection shall determine whether any corrosion, deterioration, or damage has occurred to the storage facility as a result of leaking chemicals.

2.2.3 Chemical Handling

Based on the realization that all chemicals inherently present hazards in certain conditions, exposure to all chemicals shall be minimized. Each employee shall develop and implement work habits consistent with this CHP to minimize personal and co-worker exposure to chemicals.

The following general precautions shall be followed:

2.2.3.1 Skin contact with all chemicals shall be avoided.

2.2.3.2 Employees shall wash all areas of exposed skin prior to leaving the work area.

2.2.3.3 Mouth pipetting or starting a siphon is prohibited.

2.2.3.4 Eating, drinking, smoking, gum chewing, or applying cosmetics is prohibited in areas where chemicals are present. Hands shall be washed thoroughly prior to performing these activities.

2.2.3.5 Storing, handling, and consuming food or beverages shall not occur in or near storage areas, refrigerators, glassware or utensils used for Laboratory operations.

2.2.3.6 Risk determinations shall be conservative in nature.

2.2.3.7 Any chemical mixture shall be assumed to be as toxic as its most toxic component.

2.2.3.8 Substances of unknown toxicity shall be assumed to be toxic.

2.2.3.9 Laboratory employees shall read the MSDS of all chemicals being used and

shall be familiar with the symptoms of exposure for the chemicals with which they work and the precautions to prevent exposure.

2.2.3.10 The intent and procedures of this CHP shall be adhered to continuously.

2.2.3.11 In all cases of chemical exposure, neither the Permissible Exposure Limits (PELs) of OSHA nor the Threshold Limit Values (TLVs) of the American Conference of Governmental Industrial Hygienists (ACGIH) shall be exceeded.

2.2.3.12 Specific precautions based on the toxicological characteristics of individual chemicals shall be implemented by the Section S&CHO.

2.2.4 Equipment and Glassware

Each employee shall keep work areas clean and uncluttered. All chemicals and equipment shall be properly labeled. At the completion of each operation, the work area shall be cleaned thoroughly and all equipment properly cleaned and stored. In addition, the following procedures shall apply to the use of laboratory equipment:

2.2.4.1 All laboratory equipment shall be used only for its intended purpose.

2.2.4.2 All glassware shall be handled and stored with care to minimize breakage; all broken glassware shall be placed immediately in a container for broken glass.

2.2.4.3 All evacuated glass apparatus shall be shielded to contain chemicals and glass fragments should implosion occur.

2.2.5 Personal Protective Equipment

2.2.5.1 Chemical goggles and/or a full face shield shall be worn during chemical transfer and handling operations as procedures dictate.

2.2.5.2 Sandals, perforated shoes, cloth sneakers/tennis shoes and bare feet are prohibited when working with hazardous chemicals. Safety shoes are required where employees routinely lift heavy objects.

2.2.5.3 Laboratory coats are provided and shall be worn in the Laboratory when the possibility of contamination exists. Laboratory coats shall be laundered on a periodic basis, at least monthly. Laboratory coats shall be removed immediately upon discovery of contamination and not be used until laundered.

2.2.5.4 Chemical resistant gloves shall be worn at any time there may be skin contact with chemicals. Used gloves shall be inspected and washed prior to re-use. Damaged or deteriorated gloves shall be replaced immediately.

2.2.5.5 Thermal resistant gloves shall be worn for operations involving the handling of heated materials, exothermic reaction vessels, or extremely cold substances.

Thermal resistant gloves shall be non-asbestos and shall be replaced when damaged or deteriorated.

2.2.6 Personal Work Practices

- 2.2.6.1** Laboratory supervisors shall ensure that each employee knows and follows the rules and procedures established in this plan.
- 2.2.6.2** All employees shall remain vigilant to unsafe practices and conditions and shall report immediately such practices and/or conditions to the Forensic Scientist Manager. The Forensic Scientist Manager shall correct unsafe practices and/or conditions promptly.
- 2.2.6.3** Long hair and loose fitting clothing shall be confined close to the body to avoid being caught in moving machine/equipment parts.
- 2.2.6.4** Only chemicals conducted by the ventilation system shall be used.
- 2.2.6.5** Unnecessary exposure to all chemicals shall be avoided.
- 2.2.6.6** No chemical shall be sniffed or tasted.
- 2.2.6.7** Employees shall set a proper example to encourage the safe work practices of co-workers.
- 2.2.6.8** Employees shall seek information and advice from knowledgeable persons, standards, and codes regarding hazards present in the Laboratory. Operations and protective measures shall be planned and equipment selected accordingly.
- 2.2.6.9** Personal protective equipment shall be inspected prior to use and protective equipment shall be worn as procedures dictate to avoid exposure.

2.2.7 Labeling

- 2.2.7.1** All containers in the Laboratory that contain chemicals shall be labeled. The label shall be informative, durable, and shall identify contents, date of acquisition or date prepared, and expiration date.
- 2.2.7.2** Portable containers shall be labeled by the individual using the container.
- 2.2.7.3** Exceptions to labeling requirements shall be made for chemical transfers from a labeled container into a container which is intended only for the immediate use of the employee who performed the transfer.
- 2.2.7.4** Before transferring chemicals for immediate use, the employee shall be trained in the use of MSDS and shall have read the MSDS for the specific chemical being transferred as required by the Hazardous Communication Policy in the

DOJ Safety & Health Manual.

- 2.2.7.5** The labeling of reagents and chemicals within each Section shall be inspected annually by the Section S&CHO (to coincide with annual internal audits of each Section) to ensure labels have not been defaced or removed.

2.3 Criteria for Implementation of Control Measures

2.3.1 Air Sampling

- 2.3.1.1** Upon addition of new chemicals or changes in control procedures, additional air sampling shall be considered to determine the exposure. If there is reason to believe exposure levels for regulated substances that require sampling routinely exceed the action level, or in the absence of an action level, the PEL, air sampling shall be conducted according to the current industry standard.
- 2.3.1.2** The results of air sampling studies performed in the Laboratory shall be maintained and recorded by the Section S&CHO.

2.3.2 Housekeeping

- 2.3.2.1** Each employee is directly responsible for the cleanliness of his or her work space, and jointly responsible for common areas. Laboratory management shall insist on the maintenance of housekeeping standards.
- 2.3.2.2** The following procedures apply to the housekeeping standards of the Laboratory:
- 2.3.2.2.1** All chemical wastes shall be disposed of properly.
 - 2.3.2.2.2** Laboratory benches shall be kept clear of equipment and chemicals except as needed for the work currently being performed.
 - 2.3.2.2.3** If used, the work area shall be cleaned at the end of each operation and each shift.
 - 2.3.2.2.4** All equipment shall be cleaned thoroughly and returned to storage upon completion of use.
 - 2.3.2.2.5** All floors, aisles, exits, fire extinguishing equipment, eye washes, showers, electrical disconnects, and other emergency equipment shall remain unobstructed.
 - 2.3.2.2.6** All labels shall face forward.
 - 2.3.2.2.7** Chemical containers shall be cleaned, properly labeled, and returned to storage upon completion of use.

2.3.3 Safety and Emergency Equipment

- 2.3.3.1** Telephone numbers of emergency personnel, Forensic Scientist Managers and other workers shall be posted in a common and accessible area.
- 2.3.3.2** Employees shall be trained in the proper use of fire extinguishers. Prior to the procurement of new chemicals, the Section S&CHO shall verify that existing extinguishers and other emergency equipment are appropriate for such chemicals.
- 2.3.3.3** All employees who may be exposed to chemical splashes shall be instructed in the location and proper use of emergency showers and eye washes. The eyewash and emergency shower shall be inspected monthly by the Section S&CHO. Safety records shall be maintained according to the Record Retention Schedule as set forth by the North Carolina Department of Cultural Resources.
- 2.3.3.4** Location signs for safety and emergency equipment shall be posted.
- 2.3.3.5** Fire extinguishers and any other fire safety equipment shall be inspected monthly by the Section S&CHO.

2.4 Engineering Controls

2.4.1 Definition

Engineering controls are those architectural features designed to decrease injuries. These include shields, hoods, special ventilation systems, cabinets for the storage of hazardous chemicals/materials, etc.

2.4.2 Intent

Engineering controls are intended to minimize employee exposure to chemical and physical hazards in the workplace and shall be maintained in proper working order.

2.4.3 Modification

No modification of engineering controls shall occur unless testing indicates that employee shall continue to be protected.

2.4.4 Improper Function

Improper function of engineering controls shall be reported to the Section S&CHO immediately. The system shall be taken out of service until proper repairs have been executed.

2.4.5 Use

All employees shall follow proper work practices when using the engineering controls.

2.4.5.1 Local Exhaust Ventilation

- 2.4.5.1.1** Openings of hoods shall be placed as close as possible to sources of air contaminant.
- 2.4.5.1.2** The screen on the face of the hood shall be cleaned prior to use.
- 2.4.5.1.3** Hood fans shall be operated when hoods are being used.
- 2.4.5.1.4** After using hoods, the fan shall be operated for an additional period of time sufficient to clear residual contaminants from the duct work.

2.4.5.2 Laboratory Hoods

Laboratory hoods shall be utilized for all chemical procedures which might result in release of hazardous chemical vapors or dust. As a general rule, the hood shall be used for all chemical procedures involving substances which are volatile or toxic.

- 2.4.5.2.1** Hood ventilation performance shall be confirmed prior to opening chemical containers inside the hood. Note: If the hood does not have adequate ventilation, an alarm will sound.
- 2.4.5.2.2** The sash of the hood shall be lowered at all times except when working within the hood. At these times, the sash height shall be maintained as low as possible.
- 2.4.5.2.3** Storage of chemicals and equipment inside the hood shall be kept to a minimum.
- 2.4.5.2.4** Interference with the inward flow of air into the hood shall be minimized.
- 2.4.5.2.5** The hoods shall be in operation at all times.
- 2.4.5.2.6** The ventilation system shall be certified annually by a designated vendor. The hood face velocity shall be maintained between 75 and 125 feet per minute.
- 2.4.5.2.7** The adequacy of hood ventilation systems shall be determined by the Section S&CHO via annual calibration by an external vendor.

2.4.5.3 Storage Cabinets

Storage cabinets for flammable and hazardous chemicals shall be ventilated in accordance with the local building code for laboratory type buildings.

2.5 Employee Information and Training

2.5.1 Hazard Information

All employees shall be apprised of the hazards presented by chemicals in use. Each employee shall receive training by the Section S&CHO or designee at the time of initial assignment and prior to assignments involving new exposure situations.

2.5.2 Training

Training shall include methods of detecting the presence of a hazardous chemical, physical and health hazards of chemicals, and protective measures. The training shall present the details of the CHP and shall include:

2.5.2.1 Location and availability of the CHP.

2.5.2.2 Signs and symptoms associated with exposure to chemicals.

2.5.2.3 Location and availability of reference materials on chemical hygiene.

2.6 Prior Approval of Laboratory Activities

2.6.1 Special Work Schedules or Conditions

Some activities present specific, foreseeable hazards to employees. These activities include off hours work, sole occupancy of building, hazardous operations, and unattended operations. Permission from the Forensic Scientist Manager shall be required to work under these conditions.

2.6.1.1 Off Hours Work Procedures

Employees shall not be permitted to perform hazardous operations outside normal business hours which are generally 8:00 A.M. to 5:00 P.M., Monday through Friday.

2.6.1.2 Sole Occupancy of Section

Hazardous work shall not be performed when the only employee in the Section is the employee performing the work.

2.6.1.3 Hazardous Work

All hazardous operations shall be performed during a time when at least two

employees are present in the Section. The determination of what constitutes a hazardous operation shall be made by the Forensic Scientist Manager.

2.6.1.4 Unattended Operations: (Except automated and/or robotic operations)

When potentially hazardous operations are performed which shall be unattended by an employee (continuous operations, overnight reactions, etc.), the following procedures shall be used:

2.6.1.4.1 Immediate co-workers shall be informed of the operation.

2.6.1.4.2 The Forensic Scientist Manager shall review work procedures to ensure the safe completion of the operation.

2.6.1.4.3 A sign shall be posted at all section entrances to indicate that unattended operations are in progress.

2.6.1.4.4 The overhead lights in the Section shall be left on.

2.6.1.4.5 Precautions shall be taken against the interruption of utility service during the unattended operation (loss of water pressure, electricity, etc.).

2.6.1.4.6 The employee responsible for the operation shall return at the conclusion of the operation to assist in dismantling the apparatus.

2.7 Medical Consultations and Examinations

2.7.1 Opportunity for Medical Attention

An opportunity to receive medical attention shall be available to all employees who work with hazardous chemicals in the Laboratory. This opportunity for medical attention shall be made available to employees under the following circumstances:

2.7.1.1 Whenever an employee develops signs or symptoms associated with a hazardous chemical to which the employee may have been exposed.

2.7.1.2 Whenever exposure monitoring reveals an exposure level above the action level for an OSHA regulated substance for which there are exposure monitoring and medical surveillance requirements.

2.7.1.3 Whenever an event takes place such as a spill, leak, explosion or other occurrence resulting in the likelihood of a hazardous exposure.

2.7.2 Cost

Medical consultations and examinations shall be provided to employees without cost,

without loss of pay, and at a reasonable time and place.

2.7.3 Supervision

Medical consultations and examinations shall be administered by or under the direct supervision of a licensed physician. A current list of available physicians is maintained by the DOJ Health & Safety Officer. Employees seeking the opportunity for medical consultation shall request the list from the DOJ Health & Safety Officer or check online at the NCDOJ internal website.

2.8 Special Precautions

When procedures change to require the use of additional classifications of chemicals (allergens, embryotoxins, teratogen, carcinogens, etc.), additional special precautions shall be implemented by the Section S&CHO.

2.8.1 Working with Allergens and Embryo toxins

2.8.1.1 Protective gloves shall be worn when there is risk of exposure to allergens or substances of unknown allergen activity.

2.8.1.2 Women of child-bearing age shall handle embryo toxins only in a hood with confirmed satisfactory performance and shall use protective equipment to prevent skin contact as prescribed by the Forensic Scientist Manager and Section S&CHO.

2.8.1.3 Embryotoxins shall be stored in ventilated areas.

2.8.1.4 The Forensic Scientist Manager and S&CHO shall be notified of spills and other exposure incidents. A physician shall be consulted when appropriate.

2.8.2 Working with Chemicals of Moderate Chronic or High Acute Toxicity

2.8.2.1 Areas where these chemicals are stored and used are of restricted access and shall have special warning signs.

2.8.2.2 A chemical fume hood with a minimum face velocity of 60 linear feet per minute or other containment device shall be used.

2.8.2.3 Gloves and long sleeves shall be worn. Hands and arms shall be washed immediately after working with these chemicals.

2.8.2.4 Two employees shall always be present during work with these chemicals.

2.8.3 Working with Chemicals of High Chronic Toxicity

2.8.3.1 Each Section which uses chemicals of high chronic toxicity shall designate a

specific area, such as a restricted access hood or glove box, where work with the chemicals shall be conducted.

2.8.3.2 Approval of the Forensic Scientist Manager shall be obtained before use.

2.8.3.3 Vacuum pumps shall have scrubbers or high efficiency particulate absolute (HEPA) filters.

2.8.3.4 Any contaminated equipment or glassware shall be decontaminated in a hood before being removed from the designated area.

2.8.3.5 For powders, a wet mop or vacuum with a HEPA filter shall be used for cleanup.

2.8.3.6 The designated area shall be marked with warning and restricted access signs.

2.8.3.7 Containers shall be stored in a ventilated, limited access area in labeled, unbreakable, chemically resistant, secondary containers.

2.9 Record Keeping

2.9.1 Accident investigations shall be conducted by the Forensic Scientist Manager with assistance from other Laboratory employees.

2.9.2 Accident reports shall be written and retained according to the Record Retention Schedule as set forth by the North Carolina Department of Cultural Resources.

2.9.3 Exposure records for hazardous chemicals and harmful physical agents shall be maintained by the Department of Justice Safety Officer for 30 years according to 29 CFR 1910.20.

2.9.4 Medical records for employees exposed to hazardous chemicals and harmful physical agents shall be maintained by the Department of Justice Safety Officer for the duration of employment plus 30 years according to 29 CFR 1910.20.

2.9.5 Records of inspections of equipment shall be maintained by the Section S&CHO according to the Record Retention Schedule as set forth by the North Carolina Department of Cultural Resources.

2.9.6 Records of employee training shall be maintained by the Section S&CHO according to the Record Retention Schedule as set forth by the North Carolina Department of Cultural Resources.

2.10 Chemical Spills, Releases and Accidents

2.10.1 Any spill on benches or floors shall be cleaned immediately and the waste shall be disposed of properly. If the employee who causes or notices the spill does not feel capable of cleaning the spill, then the employee shall notify the Section S&CHO and/or the Forensic Scientist Manager who shall determine the best course of action for

addressing the spill.

2.10.2 If the spill or release is too large or the material is too hazardous to be cleaned safely, the Section S&CHO or Forensic Scientist Manager shall order the evacuation of the area and the building dependent upon the severity of the threat. The local Hazardous Material Spill team shall be notified immediately by dialing 911.

2.11 Annual Chemical Hygiene Plan Review

The Safety Committee shall review and update all phases of the CHP annually.

2.12 References and Recommended Reading

Furr, Keith A. *CRC Handbook of Laboratory Safety*. 4th ed., CRC Press, Boca Raton, FL (1995).

Kaufman, James A. *Laboratory Safety Guidelines*. Laboratory Safety Institute, Natick, MA (1999).

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http://ehs.unc.edu/manuals/docs/lab_safety_manual.pdf

Model Chemical Hygiene Plan, Laboratory Safety Institute, Natick, MA, 2000

North Carolina Department of Labor – *Draft Chemical Hygiene Plan*. Rev. 1 June 23, 2005
www.nclabor.com/osh/consult/sampleprograms/ChemicalHygiene.doc

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www.osp.state.nc.us/divinfo/frames/divisions/rcs/hygiene/LABORATZ.pdf

Occupational Exposure to Hazardous Chemicals in Laboratories; Department of Labor, Occupational Safety and Health Administration, 29 CFR Part 1910. 1450, Federal Register, Washington, DC, January 31, 1990.

3.0 Bloodborne Pathogen Compliance Program

3.1 Policy

3.1.1 This policy is designed to eliminate or minimize employee exposure to bloodborne pathogens or other potentially infectious materials. The degree of risk of acquiring bloodborne pathogens on the job is directly related to the frequency of exposure to blood.

3.1.2 The Laboratory shall comply with the OSHA Bloodborne Pathogens Standard (29 CFR 1910.1030); relevant sections of the North Carolina communicable disease law and rules [G.S. 130A-144, 15A NCAC 19A .0201(b)(4)(e) and (f), .0202(4) and (9)], and .0203(b)(3)]; and North Carolina medical waste management laws and rules (G.S.

130A-309.26 and 15A NCAC 13B .1200 to .1207).

3.1.3 This policy outlines steps to prevent occupational exposure and specific procedures to be followed if an inadvertent percutaneous or permucosal exposure occurs.

3.1.4 The Laboratory Safety Committee shall review and update this policy and related procedures annually and when necessary to reflect new job descriptions, modified tasks, and procedures that affect occupational exposure.

3.2 Scope

All employees (including interns) who have occupational exposure to bloodborne pathogens are covered by this policy.

3.3 Definitions

3.3.1 Bloodborne Pathogens: Microorganisms that are present in human blood and can cause disease in humans. These pathogens include, but are not limited to, hepatitis B virus (HBV) and human immunodeficiency virus (HIV).

3.3.2 Potentially Infectious Materials: Body fluids (including but not limited to blood, semen, vaginal secretions, cerebrospinal fluid, synovial fluid, pleural fluid, pericardial fluid, peritoneal fluid, amniotic fluid, and saliva) and any body tissue.

3.3.3 Occupational Exposure: Actual or potential parenteral, skin, eye or mucous membrane contact with blood or other potentially infectious materials that may result from the performance of an employee's duties.

3.4 SOP for Prevention of Disease(s) Caused by Bloodborne Pathogens

3.4.1 The Laboratory has developed written exposure determinations and maintains a list of all job classifications in which employees have occupational exposure to bloodborne pathogens.

3.4.2 All employees who have occupational exposure to bloodborne pathogens shall be provided the hepatitis B vaccination at no charge. This is voluntary.

3.4.2.1 The first dose of vaccine shall be made available to employees within ten working days of initial assignment. Subsequent doses shall be administered according to current recommendations of the Centers for Disease Control.

3.4.2.2 Employees who decline hepatitis B vaccination shall be required to sign the Hepatitis B Vaccine Declination Form available on the DOJ internal network. Employees shall have the option of taking the vaccine at a later date if occupational exposure continues.

3.4.3 The Laboratory shall offer initial, pre-placement, annual, and new or modified procedures

training to all employees. Safety training shall include:

- Explanation of the Bloodborne Pathogens Standard.
- Information about bloodborne diseases and the methods of transmission.
- The exposure control plan.
- Job classifications.
- Information about hepatitis B vaccine.
- Decontamination and disposal procedures.
- Universal blood and body fluid precautions.
- Protective equipment.
- Information and protocols for reporting and treating an inadvertent exposure to bloodborne pathogens.

3.4.4 Universal blood and body fluid precautions shall be used. All human blood, body components including serum, other body fluids (including visible blood, semen, vaginal secretions, tissues and cerebrospinal, synovial, pleural, peritoneal, pericardial, and amniotic fluids) shall be treated as if infectious.

3.4.5 Barrier protection (disposable gloves, lab coat, eye and face protection) shall be worn when handling potentially infectious material.

3.4.5.1 Gloves shall be changed when torn or punctured and the ability to function is compromised.

3.4.5.2 Protective eye glasses and/or face shield shall be worn to protect against splashes, sprays, and spatters when working with liquid infectious materials.

3.4.6 Eating, drinking or applying cosmetics shall be prohibited where human blood, body fluids, or potentially infectious materials are present.

3.4.7 Employees shall remove gloves or other protective equipment in a manner that will not result in the contamination of unprotected skin or clothing. Employees shall wash their hands after removing gloves and other protective equipment.

3.4.8 Employees shall clean and decontaminate equipment and work surfaces immediately after contact with blood or other body fluids using an Environmental Protection Agency (EPA) approved disinfectant, such as 70 percent isopropyl alcohol, phenolic or quaternary ammonium germicidal detergent solution, or a 1:10 dilution of bleach.

3.4.9 The Laboratory shall follow the North Carolina medical waste management laws and rules except when OSHA standards preempt North Carolina rules.

3.4.9.1 North Carolina regulated medical waste includes blood and body fluids in individual containers in volumes greater than 20 ml; microbiological waste, such as laboratory cultures and stocks; and pathological waste such as human tissue, organs or body parts. These three types of waste shall be treated

(rendered nonhazardous by a method such as incineration, steam sterilization, or sanitary sewage disposal for bulk blood of >20 ml per container) prior to disposal with other general solid waste.

3.4.9.2 Sharps or sharp items (including contaminated needles, scalpels, plastic slides and cover slips, broken glass and capillary tubes, ends of dental wires, and other contaminated objects that can penetrate the skin) are regulated medical waste.

3.4.9.2.1 Sharps shall be packaged in a container that is rigid, closable, puncture resistant and leak proof (when in an upright position) and which has a biohazard label (fluorescent orange, red, orange-red with lettering or symbols in contrasting color) affixed.

3.4.9.2.2 Sharps containers shall be located close to the work areas and replaced before overfilled.

3.4.9.2.3 During removal from areas of use, sharps containers shall be closed and placed in another leak proof container with a biohazard label affixed. If there is the possibility of leakage, the sharps container shall be placed in a red plastic bag (160 lb. burst strength polyethylene).

3.4.9.3 To avoid unnecessary employee exposure, small volumes of blood (<20 ml) in individual containers, such as laboratory vacuum tubes, shall not be emptied. Containers of ≤ 20 ml of blood awaiting off-site transport shall be stored either in a secure area restricted to authorized personnel, packaged in a container suitable for sharps, or in a plastic bag (160 lb. burst strength polyethylene) that is placed in a rigid fiberboard box or drum labeled as a biohazard.

3.4.9.3.1 The Laboratory shall contract with a medical waste disposal company which shall incinerate (renders nonhazardous) the agency's regulated medical waste prior to disposal.

3.4.9.3.2 Contaminated disposable items, such as dressings, drapes, etc., that release blood or body fluids in a liquid or semi-liquid state if compressed, or items caked with dried blood, are regulated waste as defined by OSHA. Regulated waste does not require treatment and may be disposed as general solid waste. While onsite, blood-soaked or caked items shall be discarded, stored, and transported in red plastic bags or in closable, leak proof, biohazard labeled containers.

3.4.10 As defined by OSHA, contaminated laundry means laundry that is soiled with blood or body fluids or that may contain sharps.

3.4.10.1 When handling contaminated laundry, employees shall practice universal precautions, including wearing gloves. Contaminated laundry shall be handled

as little as possible, with minimum agitation.

3.4.10.2 Wherever generated, contaminated laundry shall be placed in red plastic bags or biohazard labeled, leak proof containers. Contaminated laundry shall not be sorted or rinsed at the location where it is used.

3.4.10.3 Contaminated laundry may be washed with regular laundry.

3.4.11 The Department of Justice maintains a record keeping system that consists of:

3.4.11.1 Confidential medical records for each employee who performs tasks that involve actual or potential for mucous membrane or skin contact with blood, body fluids or tissues.

3.4.11.2 Training records (including content, faculty, and attendance).

3.5 SOP for Employee Exposure to Bloodborne Pathogens

3.5.1 When an inadvertent percutaneous or permucosal exposure to blood or other potentially infectious materials occurs, an employee shall:

3.5.1.1 Remove contaminated personal protective equipment and place it in a red or biohazard labeled bag.

3.5.1.2 Wash exposed areas with soap and water. Immediately flush exposed mucous membranes with water. Flush eyes, if exposed, with large amounts of water or eye wash solution.

3.5.1.3 Arrange for decontamination of the spill area with an EPA approved disinfectant.

3.5.1.4 Seek medical care if first aid is needed or if signs of infection, such as redness or swelling, occur.

3.5.1.5 Report exposure incident to the Forensic Scientist Manager and/or S&CHO immediately and seek medical attention as needed, adhering to DOJ Safety guidelines. If the exposure occurs after 5:00 P.M. or on a weekend or holiday, seek medical attention from an approved health care provider on an emergency basis.

3.5.1.6 Complete an Accident/Incident Investigation Report and return it to the Forensic Scientist Manager within 24 hours.

3.5.2 When an employee reports an inadvertent percutaneous or permucosal exposure to blood or other potentially infectious material, the Forensic Scientist Manager and/or S&CHO shall:

3.5.2.1 Arrange or conduct a briefing with regard to the exposure.

3.5.2.2 Review SOP and methods to prevent future exposure with the employee.

3.5.2.3 Ensure completion of Accident/Incident Investigation Report by the employee and subsequent filing with the DOJ Safety Director.

4.0 Fire and Emergency Evacuation Plan

4.1 Purpose

The Fire and Emergency Evacuation Plan shall provide a plan for the safe and expedient evacuation of all employees and visitors of Laboratory facilities.

4.2 Requirements for Evacuation

4.2.1 This plan shall be implemented in the event of a fire, explosion, or hazardous incident (e.g., chemical spill and leak, radiation leak, etc.).

4.2.2 All employees and visitors shall follow the Fire and Emergency Evacuation Procedures provided by the Section S&CHO.

4.2.3 Forensic Scientist Managers shall ensure the following: head count of Section employees on the complex and provision of pertinent information to firefighter/rescue personnel (possible employee still in building, type chemicals present, unseen dangers).

4.2.4 The Lab Director or designee shall assign a location for each Section to meet upon evacuation. (Each Section/Unit Policy and Procedure manual shall state the evacuation location.)

4.2.5 Each emergency alarm system shall be tested annually by the Safety Manager or designee.

4.3 Training

4.3.1 A practical evacuation drill shall be conducted at least annually to familiarize employees with the location and safe, efficient use of all exits. The Safety Committee and Forensic Scientist Managers shall review all aspects of the practice evacuation drill to determine if any improvements to the plan are required. The fire alarm system shall be used during all drills. The fire department shall be given prior notice of any fire drill. An Evacuation Drill Evaluation Form shall be completed after each drill (see Appendix A).

4.3.2 No employee shall be exempt from a fire drill.

4.3.3 Employees shall be instructed annually on the location and use of safety equipment (fire extinguishers, fire alarms, fire escapes, etc.). Training records shall be maintained by the Section S&CHO or by the SBI Training Section according to the Record Retention Schedule as set forth by the North Carolina Department of Cultural Resources.

- 4.3.4** Each Section S&CHO shall conduct a monthly safety inspection of all emergency equipment, placards and safety exits and prepare a report. The Forensic Scientist Manager shall review the report to ensure all emergency equipment is being properly maintained and managed by the S&CHO and section employees.

4.4 Procedure for Evacuation

- 4.4.1** Upon activation of a fire alarm, employees shall:

- 4.4.1.1** Turn off all flames and sources of ignition and power down all instruments to the extent possible. If a source of ignition is not turned off, this information shall be relayed to the Forensic Scientist Manager or designee to be reported to the fire fighters/rescue personnel.
- 4.4.1.2** Without using elevators, proceed to the closest fire exit in a safe and orderly manner. Upon exiting the building, proceed to the Section's designated location.
- 4.4.1.3** If possible, the Forensic Scientist Manager or designee shall survey the Section before leaving the building to ensure all employees and visitors have exited safely. A head count of the number of employees present shall be compared to the number of employees who reported for the day. Any discrepancy shall be reported by the Forensic Scientist Manager to the Lab Director or designee. Employees of the regional laboratories shall report to the respective Forensic Scientist Manager who shall then notify the Lab Director or designee.

- 4.4.1.4** Building Re-entry:

- 4.4.1.4.1** No employee shall re-enter the Raleigh facility until the Lab Director or designee or the Fire Department=s Chief or designee has determined the building is safe to re-enter.
- 4.4.1.4.2** No employee shall re-enter a regional Laboratory until the Forensic Scientist Manager of that Laboratory or designee or the Fire Department=s Chief or designee has determined the Laboratory building is safe to re-enter.

- 4.4.2** If a strong storm or tornado is threatening, the Safety Manager or designee shall notify employees (e.g., person to person or via phone) if time allows and employees shall proceed to a designated safe area away from all exterior windows. All employees shall remain in the designated safe area until the Forensic Scientist Manager or designee determines there is no longer a danger.

5.0 Automated External Defibrillator (AED) Program

This policy is for the use of an AED. An AED may be used to treat victims of sudden cardiac arrest

and is only to be applied to victims who are unconscious, not breathing normally and show no signs of effective circulation. When opened, the AED will instruct (through audible voice message and display) the operator how to proceed, analyze the heart rhythm, and deliver a shock if appropriate.

5.1 AED Location

An AED shall be kept in a secure, climate controlled, location. An AED kit shall be attached to the unit and shall include a CPR mask, disposable razor, gloves, towel and scissors.

- Raleigh Lab: an AED shall be kept in the front security office and outside the second floor conference room.
- Western Lab: AED shall be kept in the administrative supply room.
- Triad Lab: AED shall be kept in the administrative area.

5.2 Authorized Users

Any person who has successfully completed CPR and AED training within the past two years is authorized to operate the AED. CPR and AED training shall be made available to State Crime Laboratory employees annually.

5.3 AED Response Procedure

5.3.1 After initial assessment of the victim, the person initiating the response shall attempt, or assign someone, to do the following:

5.3.1.1 Call 911. Communicate the building address and location within the building.

5.3.1.2 Inform the SBI receptionist of the call to 911 and relate the location of the victim so that EMS may be directed properly.

5.3.1.3 If extra responders are present, ensure that one proceeds to the facility entrance to direct EMS to the victim.

5.3.2 Retrieve the AED.

5.3.3 If present, a CPR trained responder shall assess the victim and initiate CPR, if necessary, until the AED unit arrives.

5.3.4 Once the AED unit is retrieved, the lid of the AED shall be opened and the instructions of the AED unit (audible voice message and display) shall be followed. The following procedures may be required before attaching the electrode pads:

5.3.4.1 Removal of clothing from victim's chest area (scissors may be used).

5.3.4.2 Use of towel to wipe away sweat, dirt, or anything that may interfere with the attachment of the AED electrode pads.

5.3.4.3 Use of razor to remove excessive chest hair if it interferes with the attachment of the AED electrode pads.

5.3.5 Once the electrodes have been attached, the AED's instructions shall be followed. Only EMS shall remove the electrodes.

5.4 Post AED Use

After an AED unit has been used, the following shall be performed by the Safety Manager or designee:

5.4.1 Download and save the data stored in the AED memory.

5.4.2 Return the AED to a state of readiness:

5.4.2.1 Clear the AED memory.

5.4.2.2 Disinfect the AED. Bleach shall not be used, as it may damage the metal connectors.

5.4.2.3 Replace the electrode pads and order replacement spare electrodes.

5.4.2.4 Ensure AED indicates a "Ready" state.

5.4.2.5 Replace used items in the AED kit.

5.4.3 Document the incident.

5.4.4 Review the incident with the reviewing physician, EMS, and involved rescuers.

5.5 AED Maintenance

Monthly and annual maintenance, as described in the AED manual, shall be performed and documented by the Safety Manager or designee.

6.0 Hazardous Waste Management Program

6.1 Introduction

Employees who generate hazardous waste are obligated to manage the waste properly in accordance with Resource Conservation and Recovery Act (RCRA) regulations.

6.2 Purpose

This Hazardous Waste Management Program (HWMP) serves as a guide for handling hazardous waste generated by the Laboratory. The goals of the HWMP include handling of hazardous waste in a safe, efficient, and environmentally sound manner and complying with local and federal

regulations. These goals shall be achieved through employee training and through the implementation of pollution prevention, waste minimization, recycling and re-use practices. The HWMP provides the framework for hazardous waste determination, labeling and container management, hazardous waste storage area requirements, contingency planning, employee training, and a clear definition of roles and responsibilities.

6.3 Scope

This HWMP applies to each facility of the State Crime Laboratory. It provides directions for containing, labeling, storage, transportation, inspection, training, and record keeping for hazardous waste activities. Hazardous waste shall not be transported or shipped from one facility to another. The HWMP is available to all employees through the Safety Manual. The HWMP shall be maintained by the Safety Manager.

6.4 S&CHO

In each Section that generates hazardous waste, the S&CHO shall be responsible for ensuring that the Section complies with hazardous waste regulations.

6.5 Generator Status

Under the RCRA, a generator is defined as “any person, by site, whose act or process produces hazardous waste...or whose act first causes a hazardous waste to become subject to regulation.” These generators are subject to standards that govern on-site accumulation and off-site transportation of such material.

The Laboratory is classified as a conditionally exempt small quantity generator (CESQG) under EPA regulations because it generates less than 100 kilograms of hazardous waste in a calendar month. A CESQG is exempt from most provisions of RCRA hazardous waste regulations, provided the waste is characterized; the accumulated waste does not exceed specified limits; and waste is either treated or disposed of in an appropriate hazardous waste facility.

A CESQG is not subject to RCRA accumulation time limits provided the amounts accumulated do not exceed allowable limits (e.g., 1000 of hazardous waste). If this accumulation quantity limit is exceeded, waste shall be regulated as the next generator status level – small quantity generator (SQG), which may accumulate up to 6000 kg of hazardous for only 180 days. The Laboratory shall strive to maintain CESQG status.

6.6 Hazardous Waste Definitions

For a material to be classified as hazardous waste, it shall first meet the definition of solid waste. Under RCRA regulations, solid waste is defined as any material or combination of materials (solid, semi-solid, liquid, or contained gas) that has been discarded (as defined in 40 CFR 261.2) by the generator.

6.6.1 Solid Waste:

Solid waste is material that is no longer used or wanted and is set aside for disposal. Solid waste includes abandoned items, materials that are ready to be disposed, or those that are ready to be recycled. Materials are solid waste if they are abandoned by being disposed of; burned or incinerated; or accumulated, stored, or treated (but not recycled) before or in lieu of being abandoned by being disposed of, burned, or incinerated. Solid waste may be solid, liquid, or gas. EPA regulations on waste automatically exempt certain solid waste from being considered hazardous. Among those subject to exemption are agricultural waste returned to the ground as fertilizer, utility waste from coal combustion, nuclear sources or domestic sewage. The EPA has also adopted a conditional exemption for waste samples to be used for testing.

6.6.2 *Inherently Waste-like Materials:*

Chemicals no longer suitable for use are considered inherently waste-like materials and are subject to hazardous waste regulations. Examples include:

- Chemicals no longer used, e.g., expired date.
- Chemicals with obliterated labels, e.g., corroded, faded, or smeared.
- Chemicals with no labels, e.g., sample vials, jars, or beakers.
- Samples that cannot be identified.

If a substance is not considered to be discarded or solid waste, it shall not be regulated as a solid waste.

The burden of properly identifying or classifying solid waste as hazardous falls on the S&CHO of the Section which generates the waste.

There are two basic categories of hazardous waste: (1) solid waste that is listed as hazardous by EPA or by the North Carolina Department of Environment and Natural Resources (NCDENR), and (2) solid waste which, while not listed, displays one of four hazardous characteristics noted under 7.6.5 below.

6.6.3 *Hazardous Waste:*

RCRA defines hazardous waste as solid waste that because of its quantity, concentration, or physical, chemical, or infectious characteristics may (a) cause, or significantly contribute to, an increase in serious, irreversible, or incapacitating reversible illnesses; or (b) pose a substantial present or potential hazard to human health or the environment when improperly treated, stored, transported, used, or disposed of, or otherwise managed.

6.6.4 *Listed Wastes:*

By definition, EPA has determined that some specific wastes are hazardous. These wastes are incorporated into lists published by the EPA and organized into three categories:

6.6.4.1 The F-list (non-specific source wastes). Because the processes producing these wastes can occur in different sectors of industry, the F-listed wastes are known as

wastes from non-specific sources. Wastes included on the F-list are codified in the regulations in 40 CFR §261.31.

Examples: spent halogenated (such as methylene chloride and chlorobenzene) and non-halogenated solvents (such as xylene, pyridine, acetone, and methanol).

6.6.4.2 The K-list (source-specific wastes). This list includes certain wastes from specific industries, such as petroleum refining or pesticide manufacturing. Wastes included on the K-list are found in the regulations at 40 CFR §261.32.

Examples: not applicable to the State Crime Laboratory.

6.6.4.3 The P-list and the U-list (discarded commercial chemical products). These lists include specific commercial chemical products in an unused form. Wastes included on the P- and U-lists are found in the regulations at 40 CFR §261.33.

Examples: P-list (potassium and sodium cyanides, sodium azide) and U-list (xylene, tetrahydrofuran, acrylamide, methanol).

6.6.5 If the waste is not a listed waste, the S&CHO shall determine if the waste displays a characteristic that shall cause it to be regulated under RCRA. Solid waste is hazardous waste if it is not excluded from regulation and exhibits one or more hazardous waste characteristics (termed a **characteristic** waste): ignitability, corrosivity, reactivity, or toxicity. If there is uncertainty as to whether or not solid waste is hazardous, the waste shall be deemed hazardous and the HWMP shall be applied.

6.6.5.1 Ignitability (EPA Code D001): Solid waste that has any of the following properties displays the characteristic of ignitability and is considered a hazardous waste:

- A liquid, other than an aqueous solution containing less than 24 percent alcohol by volume, with a flash point below 60°C (140°F).
- A non-liquid, capable under standard temperature and pressure, of causing fire through friction, absorption of moisture or spontaneous chemical changes, and which when ignited burns so vigorously and persistently that it creates a hazard.
- An ignitable compressed gas, including gases that form flammable mixtures at a concentration of 13 percent or less in air.
- An oxidizer (such as permanganate, inorganic peroxide, or nitrate) that readily stimulates combustion of organic materials.

6.6.5.2 Corrosivity (EPA Code D002): Solid waste that has any of the following properties displays the characteristic of corrosivity and is considered hazardous waste:

Is aqueous and has a pH less than or equal to 2 or greater than or equal to 12.5, using EPA-specified or approved test methods.

Is a liquid and corrodes steel (SAE 1020) at a rate greater than 6.35 mm (0.25 inch) per year at a test temperature of 55°C (130°F).

6.6.5.3 Reactivity (EPA Code D003): Solid waste that has any of the following properties displays the characteristic of reactivity and is considered hazardous waste:

- Is normally unstable and readily undergoes violent change without detonation;
- Reacts violently with water.
- Forms potentially explosive mixtures with water.
- Generates toxic gases, vapors, or fumes at hazardous levels when exposed to water or under normal waste handling conditions.
- Is cyanide or sulfide bearing waste that generates toxic gases, vapors, or fumes at a pH between 2 and 12.5.
- Is capable of detonation or explosive reaction when subject to a strong initiating source or if heated in confinement.
- Is readily capable of detonation, explosive decomposition, or reaction at standard temperature and pressure.
- Is explosive.

6.6.5.4 Toxicity (EPA Series D): Materials that fail the test because of the presence of certain heavy metals or organic constituents above regulated levels.

6.7 Hazardous Waste Determination

Each Section S&CHO is responsible for conducting a hazardous waste determination for all chemicals used within the Section. This determination shall include a Disposal Guide to assist Section employees in the use, maintenance, and disposal of all chemicals.

The following chemicals may be considered hazardous waste (*waste components shall remain segregated in separate containers*):

- Flammable Solvents.
- Chlorinated Solvents (or other halogenated solvents).
- Corrosives.
- Acids.
- Bases.
- Water Reactives.
- Pyrophorics (materials that react with air).
- Explosives (materials that may detonate).
- Peroxides and chemicals that form peroxides.
- Cyanides and Sulfides (give off toxic gases when mixed with acids).
- Toxics.
- Ignitable liquids (flash points < 140 °F / 60 °C).
- Heavy Metals.

- Carcinogens.
- Mutagens.
- Teratogens and fetotoxins.
- Oil based paint materials (paints, inks, pigments, glazes, dyes).
- Pesticides.
- Solvents used for parts cleaning or degreasing.
- Paint thinners and paint removing compounds.
- Battery acid and other waste acids.
- Phenol wastes.
- Wastes containing metals such as lead, chromium, silver, or cadmium.
- Mercury waste.
- Adhesives, cements or lubricants.
- Photographic film processing waste.
- Ethidium Bromide.
- Water treatment chemicals.
- Residues of spill materials.
- Used oil.
- Pesticides.
- Unknowns.
- Any mixture that includes any of the above.

Employees shall refer to the Section disposal guide prior to disposal of any hazardous waste or containers.

6.8 Wastes Requiring Special Handling

6.8.1 Toner Cartridges: Sections shall ensure that all used toner cartridges are returned to the SBI Logistics Support Section.

6.8.2 Spray paint cans/aerosol cans: Cans shall be used until empty, not punctured and disposed in regular trash. Any discarded can containing aerosol shall be handled as hazardous waste.

6.8.3 Recovered Lead Bullets and Fired Cartridge Casings: The Firearm and Tool Mark Section shall maintain the indoor firing range, including the recovery of lead bullets and spent cartridge casings.

6.8.4 Compressed gas cylinders: Compressed gas cylinders shall be returned to the company from which originally purchased. Compressed gas cylinders shall not be discarded in regular trash.

6.9 Examples of Waste Excluded from HWMP

6.9.1 Biomedical waste:

The Laboratory generates sharps, needles, broken glass, and biohazard material which shall be disposed of by a biomedical waste disposal company.

Red puncture resistant containers shall be used for the collection of sharps. Cardboard boxes with red plastic liners designed for infectious waste shall be used for the disposal of materials contaminated with hazardous biological agents or chemicals including: blood and bloodstained materials, slides, contaminated broken glassware, absorbent pads, and small quantities of chemicals. Infectious waste boxes are available through the DNA Database Unit and, once full, shall be returned to the Unit for weekly collection and disposal by the biomedical waste disposal vendor.

6.9.2 Nuclear/radioactive waste:

The Laboratory does not generate, and is not responsible for collecting or disposing of, radioactive waste.

6.10 Hazardous Waste Handling

Hazardous waste shall be handled in accordance with the HWMP. Hazardous waste shall not be disposed of or recycled with other forms of trash or waste; burned or allowed to evaporate into the air; disposed of or diluted in water (e.g. down a drain); disposed of or buried in the land.

An appropriate container (bottle, jar, etc.) shall be used to collect hazardous waste. It shall be labeled in accordance with "The First Drop Rule" at the time the first drop of waste is added to the container. Hazardous waste containers shall not be open except when adding or transferring waste and the contents of the containers shall be compatible with the container. Hazardous waste containers shall be segregated based on the hazards of the waste. Hazardous waste shall be stored in designated storage areas which shall be equipped with secondary containment in the form of bins or a berm. A **DANGER** sign shall be posted at waste storage areas. The Section S&CHO shall conduct and document monthly inspections of the hazardous waste storage area.

6.11 Labeling Containers

The employee who identifies hazardous waste shall be responsible for labeling the container storing the waste with a hazardous waste sticker or tag supplied by the Safety Manager. If a sticker is too large for the container, a tag shall be attached with a rubber band or string. If a mistake is made on the sticker after it has been attached to the container, a one-line cross out with initial and date to modify and add the correction shall be used. A new sticker shall not be placed on top of an old sticker. The accumulation start date on the label shall not be changed. If a container already has a label that identifies content and hazards (e.g., a manufacturer's label), the sticker shall be placed on a location that does not cover that label, or a tag shall be used.

Each label/sticker shall contain:

- **Contact Person:**
The employee generating the waste shall be written legibly.
- **Section address:**
The Section and Laboratory address shall be identified.
- **EPA ID no./EPA Hazardous Waste no.:**

The hazardous waste number associated with the hazardous waste shall be identified. This can be found at numerous locations online.

<http://www.epa.gov/epaoswer/hazwaste/data/form8700/8700-12.pdf>

<http://www.des.umd.edu/hw/rest/manual/codes.html>

- **Accumulation Start Date:**

The date the chemical is deemed hazardous waste shall be identified.

- **Hazard Class:**

The hazards associated with the waste (according to OSHA Hazard Communication standards - flammable, corrosive, oxidizer, toxic, reactive, carcinogenic) shall be identified.

- **Chemical and % by Volume:**

The contents of the container shall be identified. The container may contain 100% of one chemical or it may contain a variety of chemicals (e.g., from a laboratory in which the jar was used to accumulate different but compatible compounds). Chemical formulas shall not be used to identify the contents; the chemical names shall be written.

- **Manifest Document Number:**

The number on the shipping manifest document shall be identified.

6.12 Waste Storage Areas

6.12.1 The Section S&CHO, in consultation with the Forensic Scientist Manager and other employees, shall designate waste storage areas in locations where waste is generated. The employee who operates the process generating the hazardous waste shall control the waste placed in the storage area.

6.12.2 Waste storage areas may be located in a fume hood, on a countertop, or on the floor (but not in an aisle); however, they shall not be placed in front of or behind doors or windows, blocking means of egress, or suspended from equipment. Aisle space shall be maintained to allow the unobstructed movement of emergency personnel and equipment into all areas where waste is stored. Adequate aisle space is determined based on the types of emergency equipment necessary to respond to fires, spills, releases, or explosions of waste materials on site. The following shall be accessible to the waste storage area:

- A device capable of summoning emergency assistance, e.g., a telephone or a hand-held two-way radio.
- Water at adequate volume and pressure to supply water hose streams, or foam producing equipment, or automatic sprinklers, or water spray systems.
- An internal communications or alarm system capable of providing immediate emergency instruction to personnel who may be affected by an emergency incident.
- Portable fire extinguishers.
- Spill control equipment.

6.12.3 Waste storage areas shall be marked with a “**DANGER**” sign distributed by the Safety Manager. Waste storage areas may be changed based on hazardous waste generation habits.

6.13 Container Management

- 6.13.1** Containers used to collect hazardous waste shall be compatible with the substance collected. Glass or Nalgene jars are appropriate for most waste. Soda bottles, food containers, or other containers that could be confused with consumer products shall not be used.
- 6.13.2** The EPA list (Appendix V of 40 CFR Part 264/265) of potentially incompatible waste components and materials does not include every possible hazardous chemical reaction, but shall be used as a guide in packaging and storing these materials.
- 6.13.3** To avoid a hazardous chemical reaction, incompatible wastes shall not be placed in the same container. Hazardous waste shall not be placed in an unwashed container that previously held an incompatible material. Questions regarding compatibility shall be directed to the Safety Manager.
- 6.13.4** Hazardous waste containers shall only be open when adding or removing waste. A closed container is one whose contents would not spill if the container were overturned. Depending upon the design of the container, it may be properly closed by firmly applying a screw-on cap, bung, drum ring, cork, etc.
- 6.13.5** Containers and chemicals may expand or contract based on temperature; therefore, containers shall not be filled completely.
- 6.13.6** Transfer of hazardous waste is not recommended. If a transfer is necessary, spill response equipment shall be available. Personal protective equipment (PPE) shall be worn and adequate transferring mechanisms shall be used.

6.14 HWMP Inspections

As part of the monthly safety inspection, the Section S&CHOs or designee, shall inspect all section waste storage areas using the Hazardous Waste Storage Area Checklist (see Appendix A). One form per waste storage area shall be used. An inspection shall be conducted regardless of the quantity of waste in the storage area.

6.15 Contingency Plan

Each Section shall maintain equipment on-site to facilitate spill cleanup and protect human health. A list of names and phone numbers (home and cell) of the Safety Manager, Forensic Scientist Manager, Section S&CHO or designees, shall be located in the waste containment area.

6.16 Pick-Up Schedule

- 6.16.1** As a CESQG, the Laboratory is not subject to hazardous waste accumulation time limits provided the amounts accumulated do not exceed allowable limits. However, the Laboratory shall strive to maintain a healthful workplace environment by eliminating hazardous waste as frequently as possible.

6.16.2 The Safety Manager shall coordinate the pick-up of hazardous waste for all Sections that generate hazardous waste. Section S&CHOs shall contact the Safety Manager to arrange a hazardous waste pick-up from Section waste storage areas.

6.17 Recordkeeping

All waste management activities shall be documented.

6.17.1 Monthly inspection forms shall be managed by the S&CHO, filed, and saved according to the Record Retention Schedule as set forth by the North Carolina Department of Cultural Resources.

6.17.2 Hazardous waste documentation relating to shipment, regulatory reports, and land disposal records shall be maintained by the Safety Manager according to the Record Retention Schedule as set forth by the North Carolina Department of Cultural Resources.

6.18 Waste Minimization

Waste minimization techniques include the following:

- Maintaining a limited inventory of chemicals.
- Developing an inventory of chemicals.
- Tracking inventory of unused chemicals for potential use by other Sections.
- Reducing or eliminating the use of highly toxic chemicals.
- Reusing or recycling spent solvents.
- Recovering metals from waste solvents.
- Initiating procedures to reduce mercury use.
- Recycling office equipment.

6.19 References

Title 40 of the Code of Federal Regulations, Parts 260-268, 270, 273, 279.

Environmental Protection Agency, Hazardous Waste Regulation, 40 CFR 260
http://www.access.gpo.gov/nara/cfr/cfrhtml_00/Title_40/40cfr260_00.html

EPA Compatibility Table 40 CFR 264, Appendix V
http://www.access.gpo.gov/nara/cfr/cfrhtml_00/Title_40/40cfr264_00.html

OSHA information on carcinogens:
<http://www.osha-slc.gov/SLTC/carcinogens/index.html>

7.0 Operation and Safety Procedures for X-Ray Producing Equipment

7.1 Forward

The Laboratory shall comply with state rules for radiation control (15A NCAC 11) as enforced by the North Carolina Division of Radiation Protection. The North Carolina Regulations for Protection Against Radiation (NCRFPAR) are available on the North Carolina Department of Environment and Natural Resources (NCDENR) website at www.ncradiation.net. It is required that each X-ray facility be registered with the State of North Carolina and the Notification of Registration is located with the Laboratory Radiation Safety Officer (RSO).

7.2 Purpose

The intent of this document is to establish procedures to minimize exposure of employees to radiation. Operators shall know and understand the procedures and requirements in this document. After reading this document and demonstrating the proper use of X-ray equipment, a Record for the Instruction of Employees in Procedures for the Operation and Safety of X-Ray Equipment (See Appendix A) shall be completed.

7.3 Scope

This procedure shall apply to each employee who operates x-ray machines.

7.4 Responsibilities

Each employee who operates x-ray machines shall follow the radiation safety procedures. The RSO shall have the responsibility for radiation protection. The RSO shall conduct employee training and serve as the contact person with NCDENR. Employees shall submit all radiation questions or concerns to the RSO.

General requirements for radiation safety and employee rights and obligations as a radiation worker are found in the [NCRFPAR, Section .1600](#).

7.5 Posting Requirements

North Carolina "Standards for Protection Against Radiation Notices, Instruction and Reports to Workers, Inspections" shall be posted in all areas where radiation may be emitted.

7.6 Training

7.6.1 Training on these operation and safety procedures for radiation producing equipment shall be performed according to Section training procedures.

7.6.2 Training by the RSO shall include the concept of ALARA (As Low As Reasonably Achievable) which is a radiation safety principle for minimizing radiation doses and release of radioactive materials by employing all reasonable methods. The three major principles to assist with maintaining doses ALARA are:

- Time - Minimizing the time of exposure directly reduces radiation dose.
- Distance – Doubling the distance between the radiation source and operator will divide the radiation exposure by a factor of four.

- Shielding – Using absorber materials (Plexiglas for beta particles and lead for X-rays) is an effective way to reduce radiation exposure.

7.7 Changes in Inventory

The RSO shall be notified when x-ray producing equipment or materials are introduced or removed from the Laboratory. The RSO shall register all new equipment with NCDENR and shall notify NCDENR prior to removal of such equipment from the Laboratory.

7.8 Emergency Procedures

In the event of an emergency, the main power to the Thermo Electrom, QuanX, X-ray Fluorescence Unit in the Raleigh Laboratory shall be turned off by using the key-switch on front panel of unit.

7.9 Excessive Exposure

7.9.1 If an employee suspects radiation exposure of 25 rems (0.25 Sv) or more, the RSO shall be notified. If the RSO confirms exposure to 25 rems, Division of Radiation Protection shall be notified immediately, as required in 15A NCAC 11 .1646. The address is:

Division of Radiation Protection
3825 Barrett Drive
Raleigh, North Carolina 27609-7221
(919) 571-4141

7.9.2 The RSO shall also notify the Lab Director, and the Safety Manager, of the incident in writing immediately.

7.10 Employee Monitoring

7.10.1 Employees shall wear a monitoring badge when working with an x-ray unit. The badge shall be assigned to the employee and shall not be shared.

7.10.2 Employees shall store monitoring badges in a low radiation area. The control badge shall be stored in an area representative of normal background radiation.

7.10.3 The RSO shall evaluate exposure records and ensure exchange of monitoring badges every three months. Records shall be retained for as long as the Laboratory maintains registration with the NC Division of Radiation Protection.

7.11 Operation of an X-Ray Unit

7.11.1 Employees shall minimize radiation exposure and shall not allow a unit's lead shielding to be opened or any lead panels to be removed during operation of an x-ray unit.

7.11.2 Employees shall not alter, tamper with, or remove any filters, collimators, shielding, fail-

safe, or warning system from any unit.

7.12 Irradiation Procedures

7.12.1 Employees shall log every x-ray activity in the unit log book. The log shall include the date, time, and employee initials. The activity logs shall be maintained for at least five years.

7.12.2 The x-ray beam shall be disabled when changing samples.

7.12.3 Employees shall conduct a physical radiation survey to determine that the radiation machine is off prior to each entry into the x-ray exposure area (not required for the x-ray diffraction or x-ray fluorescence units).

7.12.4 Employees shall follow the procedures maintained with each x-ray unit.

7.13 System Security

7.13.1 Radiation warning signs shall be posted adjacent to the x-ray units.

7.14 Surveys

7.14.1 Surveys of the area near an x-ray unit shall be performed annually; after maintenance that may affect the shielding; or after relocation of the unit.

7.14.2 The RSO or designee shall perform the surveys. The RSO or designee shall be notified when maintenance or relocation has occurred.

7.14.3 Records of the surveys must be kept by the RSO for five years (which exceeds 15A NCAC 11 .1637). Survey instruments must be calibrated at intervals not to exceed six months (as required in 15A NCAC 11 .0506).

Revision History		
Effective Date	Version Number	Reason
09/17/2012	1	Original Document
05/03/2013	2	1.7, 1.9, 7.12.3 - corrected A,@ and quotation mark symbol conversion issues
10/31/2013	3	Added issuing authority to header; 1.8 - removed SBI Guidelines; 7.9.2 – removed SBI Director

Appendix A

Forms:

Evaluation of Evacuation Drill
Hazardous Waste Storage Area Checklist
X-Ray Instruction Record

Evaluation of Evacuation Drill

Building: _____

Time: _____

Date of Drill: _____

Location monitored: _____

Time required for occupants to evacuate (minutes): _____

Number of occupants evacuated at this location: _____

During evacuation:

Did occupants evacuate immediately? ☐ YES ☐ NO

Were plans for the mobility-impaired persons implemented? ☐ YES ☐ NO

Did occupants evacuate to the approved meeting location? ☐ YES ☐ NO

Did Section safety reps report any problems to emergency personnel? ☐ YES ☐ NO

Comments:

Reviewer:

Crime Lab Safety Manager Signature: _____

Departments/Sections may receive a rating of:

- Good (no additional training or drills)
- Fair (additional training is required)
- Poor (additional training and another drill is required).

Revised July 2012

Hazardous Waste Storage Area Checklist

Section: _____

Name/Title of Inspector: _____

Date and time of inspection: _____

Area(s) inspected: _____

Number of full containers: _____

Are all containers closed? ☐ Yes ☐ No

Condition of Containers: _____

(Do containers show signs of leaking? Is there deterioration due to rust? Have containers been damaged?)

Condition/Integrity of Containment Area: _____

(Will the area effectively contain a spill or leakage? Has berm or other containment device deteriorated or been damaged?)

Is there sufficient aisle space between rows of containers? ☐ Yes ☐ No

Is there evidence of spilled material? ☐ Yes ☐ No

If there was a spill, list remedial action(s) taken: _____

(Example: Spill was cleaned and leaking drum was replaced.)

Are container labeling requirements satisfied? ☐ Yes ☐ No

(Each container in the hazardous waste storage area shall be labeled with the information below.)

EPA Label

HAZARDOUS WASTE – Federal law prohibits improper disposal. If found, contact the nearest police or public safety authority or the U.S. Environmental Protection Agency.

The Generator's Name and Address: _____

Generic Waste Shipping Name: _____

Hazard: _____

EPA Waste Code: _____

Date of Containerization: _____

Manifest Document Number: _____

Additional remarks or actions to be taken: _____

Revised July 2012

Record for the Instruction of Employees in Procedures for Operation and Safety of X-ray Equipment

Equipment: _____

In accordance with North Carolina Regulations for Protection Against Radiation (NCRFPAR), these procedures have been made available to each employee who operates x-ray equipment. I certify that each employee listed below has demonstrated to me, on the date indicated, that he/she is knowledgeable in the operation and safety procedures and is competent to operate x-ray equipment safely. This was demonstrated by operating the x-ray unit under my supervision.

RSO Printed Name: _____

RSO Signature: _____

Operator Statement:

I have read the Operation and Safety Procedures for X-Ray Producing Equipment and agree to adhere to them.

Print Name	Signature	Date	RSO Initials

Revised July 2012