

**Bigelow Laboratory**

**Chemical Hygiene Plan**

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**Table of Contents**

**Getting Started** Contains basic information laboratory personnel should know before using chemicals. This section contains the purpose, policy, and scope of the chemical hygiene plan, requirements for training and chemical information available to personnel are also detailed here.

Introduction

Glossary

Duties of Safety Officer, Supervisors, Employees, & Safety Committee

Training (General) and Lab-Specific Training Requirements

Other general information

**Standard Operating Procedures & General Chemical Hygiene Practices**

Contains the minimum required precautions and standard operating procedures for working with chemicals at Bigelow. This part contains general procedures for safe chemical management, including the purchase, use, labeling, storage, and disposal of chemicals.

Introduction

Safety Data Sheets

Protective and Safety Equipment

Chemicals and Food

Chemical Purchasing and Inventory

Labeling

Working in multiple lab spaces

Chemical Storage

Handling of Hazardous Materials by Type

Hazardous Wastes, Sharps, and Universal Wastes

Hazardous Waste Emergency Controls, Accidents & Spills

Medical Attention Guidelines

Housekeeping

Monitoring and Record Keeping

Pollution Control Plan

**Getting Started**

Introduction

Bigelow Laboratory for Ocean Sciences is committed to providing a safe working environment for all employees and making available the information regarding hazards associated with their work. This chemical hygiene plan has been prepared to inform employees of Bigelow’s policies, procedures, and responsibilities. It’s designed to provide employees with an awareness of the potential hazards in working with chemicals and to train employees in appropriate, safe working conditions.

While this plan establishes work practices to promote laboratory safety, each individual has the first responsibility to ensure that good health and safety practices are implemented in the lab.

Bigelow is committed to complying with all applicable laws and responsibilities regarding safe working conditions in the laboratory. This document constitutes the chemical hygiene plan required by OSHA 29CFR1910.1450, known as the Laboratory Standard. The full OSHA Laboratory Standard can be found in appendix 2.

President/CEO Deborah Bronk

Safety Officer/Chemical Hygiene Officer Jay Wheeler

Human Resources Officer Margaret McDiarmid

**Glossary**

The following terms are used as part of the chemical hygiene plan, in regulations and in laboratory safety standards:

**Acute** A single dose or short exposure to a substance

**Carcinogen** A substance capable of causing cancer

**Chemical** Any substance or mixture of substances used in a laboratory setting

**Chronic** Repeated doses or exposures to a substance over a relatively prolonged period of time

**Combustible** Able to catch fire and burn

**DOT** Department of Transportation, agency that regulates transportation of hazardous and non-hazardous substances.

**EPA** Environmental Protection Agency, agency whose mission is to protect human and environmental health

**Flammable** A material which is easily ignited and burns extremely rapidly

**GHS** Global harmonization system, international system established in 2012 for defining and classifying chemical hazards

**Infectious agent** Sources that can cause infection by inhalation, ingestion, or direct contact

**Laboratory use** Workplace where relatively small quantities of hazardous chemicals are used on a non-production basis

**LC50** The concentration in air that causes death in 50% of the animals exposed by inhalation; a measure of acute toxicity.

**LD50** The dose that causes death in 50% of the animals exposed by swallowing a substance; a measure of acute toxicity.

**Mutagen** Substance capable of altering the genetic material in a living cell

**NFPA** National Fire Protection Association, organization promotes fire protection and prevention

**OSHA** Occupational Safety and Health Administration, The regulatory branch of the Department of Labor concerned with worker safety and health.

**PEL** Permissible Exposure Limit, the legally enforceable occupational exposure limit established by OSHA

**pH** A measure of how acidic or basic a substance is on a scale of 1 to 14. A pH of 1 indicates high acidity, 7 is neutral, and 14 is highly basic.

**Physical agent** Workplace sources recognized for their potential effects on the body. Heat or excessive noise levels are examples of this risk group.

**SDS** Safety Data Sheets, documents that provide information about a chemical’s hazards and exposure limits. They provide information about first aid, emergency procedures, and waste disposal.

**Sensitizer** Agents which, with repeated exposure over time, create an allergic reaction

**Sterility** Changes in the reproductive system resulting in an inability to reproduce

**Tetratogen** Substance that can cause alterations in the appearance or function of a developing embryo

**TLV** Threshold Limit Value, the amount of exposure allowable for an employee

**Duties of Safety Officer, Supervisors, Employees, & Safety Committee**

The duties and responsibilities of the safety officer/chemical hygiene officer include:

* Work with administration and employees to develop and implement appropriate chemical hygiene policies and practices.
* Monitor procurement, use, and disposal of chemicals for the laboratory.
* Maintain appropriate audits.
* Help investigators develop precautions and adequate facilities.
* Be familiar with current legal requirements concerning regulated substances.
* Seek ways to improve the chemical hygiene program.

An employee's immediate supervisor has the duty to:

* Ensure that workers know and follow chemical hygiene rules, that protective equipment is available and in working order, and that appropriate training for all lab work has been provided. This can be accomplished by reviewing the Job Hazard Analyses completed by the employee.
* Provide regular, formal chemical hygiene and housekeeping inspections including inspection of emergency equipment and of individual lab SDS files.
* Be familiar with current legal requirements concerning regulated substances.
* Determine the required levels of protective apparel and equipment.
* Ensure that facilities and training for the handling of any chemicals they plan to use are adequate before bringing the material on-site.
* Each Senior Research Scientist is responsible for safe operation in all lab areas under their supervision.

The laboratory employee is responsible for:

* Planning and conducting research in accordance with Bigelow’s chemical hygiene plan.
* Completing a Job Hazard Analysis before beginning any new procedures in the laboratory.
* Developing good personal chemical hygiene habits to protect him/herself and co-workers.

The Safety Committee exists to provide a forum for safety issues and concerns of employees. The committee can make specific recommendations to the President/CEO, business administration, and the safety officer. The committee meets at least 4 times per year and as necessary.

Any violation of this plan or any regulatory standard should be brought to the immediate attention of the safety officer and/or President or Vice President to remedy any unsafe situation.

**Training**

Training is a necessary and important part of the chemical hygiene plan. All employees hired to work in a lab area are to be trained at the time of initial assignment and before assignments involving new chemical exposure situations.

New employees are given initial general training in chemical hygiene by the safety officer. Training supervised by the safety officer will consist of an explanation of Bigelow safety policies and procedures, identification of area-specific safety equipment, and discussion. This training will be documented. Refresher training is held annually.

Topics to be covered:

* Location and content of the Chemical Hygiene Plan and Hazard Communication Plan
* Location of SDSs (Safety Data Sheets) and how to use them
* Location and use of safety and protective equipment
* Introduction to Job Hazard Analyses
* Procedures for handling hazardous chemicals, including
  + Purchasing procedures
  + Labeling requirements
  + Waste handling, accumulation and disposal procedures
* Emergency procedures, including chemical spill

Training in actual lab-work safety practices and specific procedures shall be conducted by the employees' immediate supervisor, who should also be appropriately trained and familiar with safety precautions related to the tasks involved. Job Hazard Analyses (JHAs) must be completed or reviewed for each task, along with the training. JHAs must be submitted to the safety officer for review. Training shall be documented in writing and is mandatory for each employee.

Safety Officer will provide annual retraining for people working with extremely hazardous chemicals (as defined by the EPA).

**Lab Specific Chemical Hygiene Training**

Lab specific chemical hygiene training should be provided to an employee by his or her direct supervisor. This training is required before beginning work with hazardous chemicals.

Job Hazard Analysis (JHA)

A job hazard analysis is a technique used to identify the dangers of specific tasks to reduce the risk of accidents, spills, or injuries. It’s a way to plan protective and emergency procedures specific to each lab procedure.

It enables the employee to:

* Determine the toxicity and warning properties of chemicals that will be used
* Determine required control measures, PPE, and practices to minimize exposure
* Prepare for an emergency by informing them of first aid, spill controls, and accidental release measures.

An employee is required to review or fill out a JHA form before conducting any lab procedure new to them. The JHA form can be found appendices.

**General Information found in appendices**

A copy of the OSHA Laboratory Standard and its appendices. The Laboratory Standard can be found in Appendix 2.

Summary and explanation of information contained on a SDS (safety data sheet), as well an explanation of GHS pictograms and labels can be found in Appendix 3.

The Permissible Exposure Limits(PELs) for OSHA-regulated substances and Threshold Limit Values (TLVs) for hazardous substances not given OSHA PELs can be found at https://www.osha.gov/dsg/annotated-pels/

Lists of EPA classified extremely hazardous substances and acute hazardous wastes can be found in Appendix 5.

In addition, your supervisor and/or safety officer are available to provide any safety information.

**Standard Operating Procedures & General Chemical Hygiene Practices**

This part of the chemical hygiene plan contains required precautions and standard operation procedures for working with chemicals at Bigelow. This section addresses chemicals in general, and is not intended to replace training about specific chemicals or hazards specific to one laboratory area.

This section contains chemical hazard and risk assessment information, and general procedures for safe chemical management addressing the purchase, use, labeling, storage, and disposal of chemicals. This part also discusses stand operating procedures Bigelow has adopted for the safe use of chemicals.

**Safety Data Sheets**

There must be an SDS for every chemical present. It is the responsibility of the owner or purchaser of the chemical to make sure that the SDS is on file. SDS's should be requested and submitted to the safety officer at the time of purchase.

SDSs for all chemicals present at Bigelow are kept in a collection of 3-ring binders in the café area. They are filed alphabetically and are available to all employees.

Labs with hazardous chemicals (NFPA 3 or higher) are required to keep copies of the pertinent SDSs available within the lab area. These copies should be filed in a binder for easy access and kept in an obvious location. It is the responsibility of the SRS to ensure these files are up to date.

It is highly recommended that workers read the SDS before using any chemical so as to be aware of associated hazards.

**Protective and Safety Equipment**

Fume hoods and biosafety hoods

Fume hoods and biosafety hoods are inspected and certified annually by licensed technicians to ASHRAE 110, OSHA, and NSF standards. Any hood that is not operating properly will be taken out of service and may not be used until it has been repaired and passed inspection. It is the responsibility of lab supervisors to notify the safety officer and facilities manager of any problems.

General rules:

Use toxic chemicals, including those that could release hazardous vapors or dust, in fume hoods, biosafety hoods, or under a snorkel.

Be familiar with operation of Bigelow hoods before beginning lab work.

Do not clutter hood with bottles or equipment.

Keep hood sash closed when not in use.

Vent apparatus that discharge toxic fumes into proper exhaust systems. Drain toxic liquid chemicals from apparatus into proper containers.

Other safety equipment

Eyewash/Drench units are inspected monthly by the safety officer and should be tested by workers in the labs they work in, to assure familiarity with their operation.

Safety showers are inspected, tested, and flushed annually by the safety officer and facilities staff.

Fire extinguishers are visually inspected monthly by the safety officer, and are serviced annually by professionals.

Personal Protective Equipment (PPE)

Closed-toed footwear and adequate clothing is required for all planned lab work.

It is the responsibility of the lab supervisor to provide proper PPE for each employee working in their laboratory, to make sure the equipment is adequate, fits properly and is in good working condition, and is replaced when needed. Back-up and replacement equipment always be available.

Gloves must be worn when there is potential for hand contact with any hazardous material.

Lab coats are to be worn only in lab areas and should be closed to protect clothing from contamination.

Closed-toed footwear is required in all lab areas.

Impervious aprons, gloves, and goggles or face shields should be worn where there is danger of chemical splashing.

Eye protection and/or face shields should be worn where there is any danger of contamination to the eyes or face by any hazardous material that may be splashed, sprayed, or projected in any manner toward the face.

PPE (including lab coats) should never be worn in office or areas where food is consumed. They should be properly stored, and cleaned or disposed of after use. Bigelow Laboratory provides lab-coat laundering service on a monthly schedule.

**Chemicals and Food**

All laboratory spaces at Bigelow house chemicals and most laboratory chemicals have some degree of hazard. This includes areas such as the seawater suite and greenhouse.

• Do not eat, drink, apply cosmetics (e.g lip-balm, skin cream) or contact lenses in laboratories or where chemicals are present

• Do not store food or beverages in laboratory areas or in any refrigerator or storage area that has been used in a laboratory

• Do not smell or taste chemicals.

**Chemical Purchasing, Receiving, and Inventory**

Scientists purchase chemicals for research at their own discretion. The safety officer must be notified when a chemical or gas new to a specific lab space is purchased. Consultation with the safety officer is required before any materials that are new to the facility are brought in, in case any special controls will be needed.

Hazardous materials will be purchased and shipped to BLOS only by vendor-approved shipping companies. Items will only be signed for and accepted by BLOS employees after contents have been checked for accuracy and package integrity

An inventory of all chemicals is performed annually. It is required by the regulatory agencies that we keep an inventory of all chemicals classified as hazardous by EPA and DOT, or displaying a number 3 or greater in any section of the National Fire Protection Association (NFPA) diamond used to label chemicals. DOT and EPA lists are in HazCom Appendix 5.

It is the responsibility of each scientist to provide an updated inventory of their laboratory areas on an annual basis. Compressed gases and chemicals in all storage areas must be included.

The inventory list shall include the following information for each chemical:

• Chemical name: common name for laboratory use

• Chemical CAS# (Chemical Abstracts Service #) a standardized ID for all chemicals

• Quantity: The closest estimate in liters or grams. Compressed gases should be listed in pounds or tank size

• Physical State: Solid, liquid, gas

• NFPA Hazard Code, if available

• Location: Building, Room#, and any special storage (hood, freezer, etc)

• Whose: Identity of person responsible for chemical

• SDS year: A check to be sure that the chemical's most recent SDS is on file

A Bigelow-wide chemical inventory will be compiled by the safety officer and submitted to state and federal agencies, as required. The updated chemical inventory will be maintained electronically by the safety officer, and a current list may be found in Appendix 1. Lists may be requested by lab employees to facilitate the keeping of individual lab inventories.

**Labeling**

There shall be no unlabeled containers of any hazardous or non-hazardous chemicals.

It is the responsibility of the person using the chemical to make sure that it is properly labeled.

The 29 CFR 1919.1450 contains specific labeling requirements. There must be labels on all chemicals that are used in the workplace or are shipped. Labels should not be removed or defaced until and if the container is emptied and cleaned.

Chemicals received from suppliers or manufacturers should have a manufacturer's label containing the following information:

* Name and address of the chemical company
* Identity of the chemical
* Appropriate hazard warnings (see GHS, Appendix 3)

Each chemical used in or transported outside the workplace that is not in its original container must also be labeled with the following information

* Identity of chemical.
* NFPA hazard label. Any specific hazard and protective equipment requirements should be clearly indicated.
  + Always refer to SDS for proper labeling information. (see Appendices 3 & 7)
* The owner of the chemical
* The date it was put into the container

**Working in multiple lab spaces**

Transport of Hazardous Materials Between Labs

Work at Bigelow often involves the transport of hazardous and non-hazardous materials between lab spaces. Be mindful when transporting science in public spaces.

* Lab coats can be worn in public spaces when transporting chemicals.
* Transport all chemicals using protective carrying containers and carts which are available in the chemical storage room.
* Do not transport chemicals through offices, cafe or where food is present.
* Un-glove one hand for doors, etc, to avoid contaminating public surfaces

Shared equipment and space

Notify co-workers and post appropriate signs if active lab work involving hazardous materials must be left unattended for any period of time.

**Chemical Storage**

Proper storage of chemicals in the laboratory is one of the most important ongoing safety concerns.

* Chemicals should be grouped by common type to avoid dangerous reactions in case of spills. Do not store chemicals alphabetically. (See Appendix 6: Chemical Compatibility)
* Avoid purchasing unnecessarily large volumes of hazardous chemicals. Keep chemical storage amounts as small as possible.
* Excess hazardous chemicals may be stored in the Chemical Storage Room. This room is locked and open to authorized users only. It is also engineered to prevent and contain spills.
* No amounts should be stored that are beyond the capability to safely clean up in case of a spill.
* Do not store chemicals on bench tops, in hoods, on the floor, or in work spaces where the potential for an accident is increased.
* Chemicals should be stored in labeled cabinets, shelf units, refrigerators and freezers set aside for such storage. Many of these units are engineered to contain spills if one occurs.
* Flammable liquids should be stored only in flammable storage cabinets specifically designed for this purpose to NFPA standards. Safety cans should be used to transport flammable liquids.
* Extremely hazardous substances including toxic or carcinogenic chemicals should be stored in unbreakable containers, in properly ventilated areas, and must be properly labeled.
* Caustic substances should be kept in cabinets designed for storage of these chemicals.

**Handling of Hazardous Materials by Type**

**Household**

Description: Janitorial and cleaning products including, but limited to general purpose cleaners, glass cleaner, floor cleaners and waxes. These items are encouraged to be environmentally friendly and biodegradable when available.

Shipping/Receiving: All janitorial products will be shipped to BLOS by a vendor-approved shipping company. All products will be received by BLOS staff within the Shipping/Receiving Bay of the “A” building. Any products that appear damaged or leaking, will not be accepted and will remain the responsibility of the shipping company.

Storage: Bulk quantities will be stored within the stockroom located in the basement. Usable quantities will be stored in janitorial closets located on each floor. All shelving containing liquid products will include deep lipped trays to prevent and contain any spills or leaks.

Usage: All cleaning products are to be used and/or diluted as recommended by the manufacturer. Excessive use is discouraged

Disposal: All cleaning products shall be disposed of as per manufacturer recommendations.

**Flammable/Solvent**

Description: Any liquid having a flashpoint below 100˚F (37.8˚C)

Shipping and Receiving: All flammable liquids will be shipped to BLOS by a vendor-approved shipping company. All products will be received by BLOS staff within the Shipping/Receiving Bay of the “A” building. Any products that appear damaged or leaking, will not be accepted and will remain the responsibility of the shipping company.

Storage: All bulk volumes will be stored in secure flammable cabinets located in the basement stockroom. The flammable cabinets meet OSHA requirements and conform to National Fire Protection Association (NFPA) Code 30 requirements.

Usage: Only working volumes of flammables or solvents shall be kept in lab spaces. These materials must be stored within approved cabinets and be returned to that space after every use.

Disposal: All solvent/flammable wastes must be collected and stored in DOT-approved containers appropriate to the materials and held within the secured chemical storage area prior to shipment with a licensed carrier to an approved disposal facility. Consult with the Safety Officer before generating these wastes.

**Acid**

Description: An acid is any chemical compound that gives a solution with a hydrogen ion activity greater than in pure water, i.e. a pH less than 7.0.

Shipping and Receiving: All acids will be shipped to BLOS by a vendor approved-shipping company. All products will be received by BLOS staff within the Shipping/Receiving Bay of the “A” building. Any products that appear damaged or leaking, will not be accepted and will remain the responsibility of the shipping company.

Storage: All bulk volumes will be stored in secure steel cabinets. They include polyethylene shelf-liner trays. Strong acids such as hydrochloric, nitric, hydrofluoric, or sulfuric acids are stored in an internal polyethylene cabinet. Door sills are raised 2" to contain spills. Storage cabinets NFPA Code 30 and OSHA requirements.

Usage: Only working containers of acids shall be kept in lab spaces. These materials must be stored within approved spill-proof containers and be returned to that space after every use. Containers of concentrated acid should only be opened within a fume hood.

Disposal: Liquids with a pH <7 must be collected for neutralization and appropriate disposal. Solutions containing additional hazardous materials will be collected and stored in DOT-approved containers appropriate to the materials and held within the secured chemical storage area prior to shipment with a licensed carrier to an approved disposal facility. Consult with the Safety Officer before generating these wastes.

**Base**

Description: A base is any chemical compound that gives a solution with a hydrogen ion activity less than in pure water, i.e. a pH greater than 7.0.

Shipping and Receiving: All bases will be shipped to BLOS by a vendor approved-shipping company. All products will be received by BLOS staff within the Shipping/Receiving Bay of the “A” building. Any products that appear damaged or leaking, will not be accepted and will remain the responsibility of the shipping company.

Storage: All bulk volumes will be stored in locked steel cabinets. They include polyethylene shelf-liner trays. Strong bases are stored in an internal polyethylene cabinet. Door sills are raised 2" to contain spills. Storage cabinets NFPA Code 30 and OSHA requirements.

Usage: Only working containers of these materials shall be kept in the lab spaces and will be kept separate from acids.

Disposal: Liquids with a pH >8 must be collected for neutralization and appropriate disposal. Solutions containing additional hazardous materials will be collected and be stored in DOT-approved containers appropriate to the materials and held within the secured chemical storage area prior to shipment with a licensed carrier to approved disposal facilities. Dry solids will also be collected for shipment to approved disposal facilities. Consult with the Safety Officer before generating these wastes.

**Toxin/Toxicant**

Description: Poisonous substances, whether man-made or produced through the metabolic actions of organisms.

Shipping and Receiving: All bases will be shipped to BLOS by a vendor approved-shipping company. All products will be received by BLOS staff within the Shipping/Receiving Bay of the “A” building. Any products that appear damaged or leaking, will not be accepted and will remain the responsibility of the shipping company.

Storage: All toxins will be stored in secured areas under conditions appropriate to the material (e.g. desiccated, room temperature, refrigeration, frozen).

Usage: All solutions containing toxins must be clearly labeled as such. Minimal volumes of toxic solutions should be made to avoid creating waste.

Disposal: All toxic solutions must be accumulated in clearly labeled containers for shipment off-site with licensed carriers to approved disposal facilities. Consult with the Safety Officer before generating these wastes.

**Reactive**

Description: Reactive materials are those with a tendency to undergo chemical change under the right conditions such as heat, shock, friction, contact with water or air or another chemical. Materials which have an NFPA reactivity rating of 3 or greater.

Shipping and Receiving: All reactive chemicals will be shipped to BLOS by a vendor-approved shipping company. All products will be received by BLOS staff within the Shipping/Receiving Bay of the “A” building. Any products that appear damaged or leaking, will not be accepted and will remain the responsibility of the shipping company.

Storage: Reactive materials will be stored under conditions appropriate to the material within a secured chemical storage area. They will not be stored in combination with other chemicals with which they might react.

Usage: Minimal volumes of reactive chemicals should be kept in the research space (labs) and must be kept segregated from incompatibles.

Disposal: Reactive materials require special care when preparing for disposal. These chemicals must be kept segregated from possible interaction with other chemicals. Consult the safety officer and Safety Data Sheets for appropriate handling and disposal practices

**Radioactive**

Description: Radioactive materials are those capable of releasing energy in the form of particles. BLOS has been granted a Limited Radioactive Materials License by the State of Maine (Department of Human Services Radiation Control Program).

Shipping and Receiving: All radioactive compounds will be shipped to BLOS by a vendor-approved shipping company. All products will be received by the BLOS Radiation Safety Officer within the Shipping/Receiving Bay of the “A” building. Any products that appear damaged will not be accepted and will remain the responsibility of the shipping company. All products will be tested for leakage immediately upon receipt and stored exclusively in secure areas approved for radioactive materials.

Storage: All radioactive materials will be stored in designated, secured (locked) areas, accessible only to those individuals trained in their use and authorized by the BLOS Radiation Safety Officer.

Usage: The use of radioactive materials is detailed in the BLOS Radiation Safety Policy and Procedures, approved by the Maine State Dept of Human Services Radiation Control Program. Only those individuals who have been trained in the use of radioactive materials and authorized by the BLOS Radiation Safety Officer will be allowed to work with these materials. Annual training is required for all authorized users, for review of safety procedures and requirements to reduce or eliminate any possible contamination.

Disposal: All aqueous and solid wastes are collected for shipment to approved disposal facilities via a licensed carrier. Specifics are detailed in the BLOS Radiation Safety Policy and Procedures document.

**Compressed Gases**

Description: Any material or mixture in a container with an absolute pressure of 40 psi (pounds per square inch) at 70⁰F is considered a compressed gas.

Note that there are restrictions on the use of some gases indoors: Bigelow Laboratory requests that no hydrogentank be larger than 80 cubic feet. Oxygen must be less than 5000 cubic feet.

Shipping and Receiving: All compressed gases will be shipped to BLOS by a vendor-approved shipping company. Products will be received by BLOS staff at several locations, depending on the gas type: cryogenic liquids will be received in the cryo lab A012, hydrogen gas will be received in A007, all other compressed gases will be received in chemical storage, A010. Any products that appear damaged or leaking, will not be accepted and will remain the responsibility of the shipping company. Additionally, if the neck label is missing or unreadable or the tank valve cannot be easily opened, the supplier should be called for a replacement.

Storage: All gas cylinders must be properly secured to a wall or other immoveable object. Compressed gases will be stored under conditions appropriate to the gas and will not be stored in proximity to other gases/chemicals with which they might react. There must be at least 20 feet between oxidizing, flammable, and/or combustible gases and an ignition source. Do not store hydrogen and oxygen tanks in close proximity.

Usage: Transport cylinders using a cylinder hand truck and with caps on. Never move cylinders with regulators on. Remove cylinder caps only with your hands or a strap wrench. Avoid using adaptors to fit regulators to tanks. Stand behind the valve when opening a tank to protect from possible regulator rupturing. Always shut off the tank before loosening fittings and regulators. If you suspect a flammable gas leak do not use phones, switches or other spark hazards nearby.

Disposal: When empty, properly transport cylinders to the cryo lab (A012), A007, or A010 (chemical storage) for pick up.

**Hazardous Wastes, Sharps, and Universal Waste**

There is only one method of hazardous waste disposal at Bigelow Laboratory: waste must be sealed into properly labeled containers and given to the safety officer for storage. At appropriate times waste will be removed by a licensed hazardous waste handler for proper disposal.

• No hazardous materials may be dumped down the drains.

• Do not use fume hoods to dispose of volatile chemicals.

• No hazardous waste shall be put in any waste basket, dumpster, or other trash receptacle, nor may any be transported off-site in any manner except as described above.

Proper disposal of hazardous waste should adhere to the following procedure:

1. Consult with the safety officer before generating any wastes.

2. The safety officer will provide suitable containers for collection of waste.

3. There must never be any unlabeled waste containers. It is the responsibility of the waste generator to label the container. Waste labels may be completed electronically. The label must contain the following information:

* The words ‘Hazardous Waste’
* Bigelow Laboratory and our EPA ID #
* Lab group generating the waste
* Identification and composition of the waste. Do not abbreviate.
* Date in which collection of the waste was begun.
* Hazard rating, description (corrosive, flammable etc), and special handling precautions

4. When a container is nearly full, contact the safety officer for removal of the waste to storage. Never completely fill a waste container; always allow room for expansion.

5. If a space has a waste container it is a Satellite Accumulation Area (SAA) and the containers must be monitored. A log must be maintained for each area documenting container conditions. It is the responsibility of the lab group to monitor waste containers and fill out the SAA log *at least* once a week. This must be done regardless of lab activities, or waste generation that particular week. SAA logs must be returned to the safety officer monthly.

6. Treat waste as you would any other chemical. Limit accumulation. Do not store full waste containers in the lab.

Bigelow is classified as a small quantity generator by the DEP/EPA: we generate no more than 2,200 pounds of waste per year. When this level is exceeded, storage is limited to 90 days. Only licensed hazmat handlers may remove our hazardous wastes.

The safety officer shall maintain a log of all hazardous wastes stored at this facility, including the volumes, identification of the materials, and inspection records. These records must be retained for at least 10 years from the date of collection.

Hazardous wastes shall be stored only in secured areas with controlled access in appropriate, sealed containers.

Sharps Waste

Sharps fall into several categories for handling:

* Metal sharps (needles, blades, etc) go into labeled hard-sided containers for commercial disposal.
* Glass sharps (Pasteur pipets, slides, etc) go into special plastic bins for recycling.
* Broken glass goes into special broken glass cartons in each corridor.
* Note that unbroken glass bottles, etc, may be carefully placed in the recycle containers.

Contact the Safety and/or Facilities departments for necessary containers.

Universal Waste (Maine State Regulation)

Universal waste is collected for recycling in the following manners:

Batteries: Heavy metal/rechargeable batteries are accumulated in a container in the chemical storage room. Terminals must be protected before being deposited. A log is maintained of all batteries collected and they are transported to the municipal transfer station for recycling. This is not suitable for disposal of alkaline batteries.

Mercury-containing lamps: All bulbs containing mercury are collected for shipment to recycling facilities. Boxes for containment of various size lamps are located in the Chemical Storage room, along with a log which must be completed for each addition.

Cathode Ray Tubes: These are predominantly found in the big, old computer monitors, but some older pieces of equipment still contain them. Cathode ray tubes are collected for recycling via the municipal transfer station. Contact the safety officer or facilities for removal of this type of item.

Reporting Requirements

Bigelow Laboratory hazardous wastes shall be disposed of exclusively via shipment to licensed disposal facilities by licensed hazardous waste transporters. Records of shipments (manifests) must be submitted to Maine DEP within 7 days of removal, and maintained for at least 10 years by the safety officer.**Hazardous Waste Emergency Controls, Accidents & Spills**

Bigelow strives to prevent accidents and spills from happening. Follow standard operating procedures and be mindful when in the laboratory: use small containers, avoid placing them where they could fall or be knocked over, use break-resistant containers, and keep chemicals in places where a spill could be easily contained and cleaned.

All laboratories and the chemical storage room have no floor drains. This will aid in containing spills if one occurs. Spill containment kits are located at the beginning and end of each corridor and in all out-buildings.

Employees should know how to safely address a spill before one occurs:

• Complete a JHA (Job Hazard Analysis) prior to any new lab work.

• Read through the SDS for any new chemicals.

If a person accidently comes into contact with a chemical consult the SDS for proper course of action, but generally the following procedures are a good start:

**Eye contact**: Immediately flush eyes with water for a prolonged period of time (15 minutes) and seek medical attention.

**Ingestion**: Drink large amounts of water unless stated otherwise in SDS for that chemical, or induce vomiting if recommended in SDS. Seek medical attention.

**Skin contact**: Immediately flush affected area with water and remove contaminated clothing. Use safety shower when contact is extensive. If symptoms persist after washing, or if recommended in SDS, seek medical attention.

**Clean-up**: Promptly clean up any spills using appropriate protective equipment and apparel and proper disposal techniques.

**Notification**: In case of any accident, spill or injury, notify the safety officer.

**In case of a spill:**

1. Identify chemical(s) involved in the spill as well as amount of release and the source.
2. Assess any potential threat to human health

3. Get help, notify others in area of the spill, the safety officer, and facilities.

4. Have persons not assisting evacuate the area and close off the area to workers. If necessary, follow Emergency Evacuation Procedures documented in the HazCom Emergency Action Plan.

5. Take all reasonable measures to ensure that any fires, explosions, or releases to not spread or recur. Increase ventilation in area (open fume hoods/snorkels, if available).

6. Refer to SDS for proper precautions.

7. Contain the spill using proper equipment.

8. If able, clean spill using proper protective equipment, clean-up equipment and procedures, and dispose of the material properly. Maintenance personnel are not responsible for cleaning up chemical spills.

**In case of a spill that may be too large or hazardous to clean:**

1. Follow procedures above.

2. Do not attempt to clean up a spill if there is any doubt that it can be done safely or if it is too large to manage. If the spill is beyond the capabilities of Bigelow personnel, dial 9-1-1 for assistance and to mobilize emergency services. Then alert DEP (800-452-4664). Local fire and police as well as the DEP receive a list and information about the hazardous chemicals at Bigelow annually. Emergency Notice requires the following information:

• Your name and phone #

• Location: Bigelow Laboratory at 60 Bigelow Drive, East Boothbay

• Type and time of incident (spill, fire, explosion?)

• Materials involved: what chemicals and quantities, if known.

• Injuries, if any

• Possible hazards to human health and the environment

3. Note the date, time, and details of any incident that requires the implementation of the above plan. A written report shall be prepared within 15 days of the incident for the safety files. The report shall contain:

• Name and phone # of reporting person

• Name and address of facility

• Type of incident and when it began

• Identity and quantity of the materials involved

• List injuries incurred, if any

• Note of possible hazards to human health or the environment

• An estimate of the quantity and disposition of recovered materials resulting from the incident.

If a spill is noticed after normal hours, personnel should increase ventilation (open fume hoods, activate snorkels), close off the area, put up a warning sign, and call the safety officer and the person responsible for the work area. Personnel should not attempt clean-up by themselves.

**Environmental Impact**

In the event of a release (spill), all hazardous waste materials will be contained within the storage facility and be unable to leak into the surrounding area. Maine DEP assessments prior to construction at the site found no aquifers and no flood hazard at this site.

**Medical Consultations and Examinations**

Any employee needing emergency medical treatment should report to Saint Andrews Urgent Care facility in Boothbay Harbor or Miles Memorial Hospital in Damariscotta.

Employees of Bigelow Laboratory are not required to have annual physical examinations.

All work-related physical examinations and consultations are performed by or under the direct supervision of a licensed physician without cost to the employee, without loss of pay, and at a reasonable time and place. A board-certified physician in occupational health and medicine will be used whenever possible.

The employee will be sent for medical evaluation:

* If signs and symptoms associated with a work-place activity develop.
* If environmental monitoring reveals an exposure level routinely above the action level for a chemical or condition.
* If an event takes place in the work area resulting in hazardous chemical exposure.

The Laboratory will provide the following information to the physician:

* Identity of the hazardous chemical(s) or conditions to which the employee has been exposed.
* A description of the conditions under which the exposure occurred, including the quantitative exposure data, if available.
* A description of the signs and symptoms of exposure.
* A copy of the SDS of the chemical(s) involved.

The physician will provide a written opinion that will not reveal specific findings of diagnosis unrelated to the exposure, but will include:

* Any recommendations for further medical follow-up.
* Results of the medical examination and any associated tests.
* Any medical conditions that may be revealed in the course of the examination that may place the employee at risk as a result of exposure to a chemical found in the workplace.
* A statement by the physician that the employee has been informed of the consultation/examination results and any medical condition that may require further examination or treatment.

**Housekeeping**

Floor cleaning and janitorial service is done regularly by Bigelow employees who have been specifically trained in working safely in laboratory areas.

The building and physical plant are otherwise maintained by contractors employed at the discretion of the Bigelow facilities team.

All other cleaning of laboratories and equipment must be performed by laboratory personnel. Everyone should pay attention to the following rules of housekeeping:

1. Stairs, halls and passageways must be kept free of obstruction.

2. Waste must be deposited in proper receptacles and for removal from the lab.

3. Chemical spills should be promptly and properly cleaned up.

4. Clutter should be minimized by proper storage.

5. Clean up after yourself before you leave the facility.

Remember to inform the safety officer after any use of spill kits or first aid kits, so materials can be replaced.

**Monitoring and Recordkeeping**

Monitoring should be requested by any employee or supervisor when exposure to chemicals or physical conditions (such as noise, for example) are suspected to be near or above allowable levels.

Bigelow shall maintain a record for each employee of environmental monitoring and medical consultations and examinations, including test results or written opinions required.

Records regarding individual employees are kept by the business office in personnel files.

Records kept by the safety officer include the following:

* Chemical inventories
* Environmental monitoring records
* Waste disposal manifests
* Training records
* Hazard communication training records
* Job Hazard Analysis records

**Pollution Prevention Plan**

Bigelow Laboratory for Ocean Sciences (BLOS) is committed to protecting the environment. Our goal is to fulfill our mission as a research facility with the minimum impact practical on the air, water, and land of the State of Maine. By adhering to responsible chemical management, pollution prevention, and hazardous waste handling practices BLOS can achieve cost savings, improve the quality of our programs, maintain a safe and healthy workplace, and protect the environment.

Environmental protection is both a management and employee responsibility. BLOS Staff, Senior Research Scientists (SRS), and laboratory personnel are expected to incorporate BLOS's goals of pollution prevention, and waste handling into individual laboratory goals, and to provide support and impetus toward achieving those goals. All BLOS employees, regardless of job function, are responsible for environmental protection in the conduct of their own work.

To assist and guide BLOS in attaining these objectives, the safety officer and safety committee, are hereby delegated the authority to seek and obtain the assistance and participation of all affected scientific and administrative departments in fulfilling their mission of minimizing the use of toxic substances and their consequent release or disposal.

Introduction

The Bigelow Laboratory for Ocean Sciences Pollution Prevention Program has been developed by the BLOS safety committee as an effective and ongoing waste handling program.

Under the Pollution Prevention Plan, waste handling strategies are divided in to four categories:

1. Reduce the use of toxic substances whenever possible.
2. Prevent the release of environmentally toxic and/or bioacumulative substances into the environment.
3. Minimize the quantity and toxicity of hazardous wastes produced.
4. Manage hazardous wastes in the safest manner possible.

It is fortunate that minimization can and often does save money, however, that is a supplementary benefit, not the goal of minimization. Waste minimization should not be confused with cost minimization. This plan is designed to provide a system for preventing the release of environmentally hazardous materials and minimizing the generation of hazardous waste whenever practicable.

Our commitment to reduction requires the concern, effort, and expertise of every employee of BLOS. Whenever an employee uses a hazardous material or generates a hazardous waste, it is imperative that they demonstrate a concern for and an awareness of the ultimate fate of those chemicals. This plan is designed to provide the necessary guidance for employees to assess their use of toxic substances and to responsibly consider the impact of those chemicals on the environment.

Responsibilities

President/CEO

* Provide the legally required statement of facility-wide management commitment regarding toxics use, toxics release, and hazardous waste reduction.
* Review for approval the Pollution Prevention Plan and procedural recommendations for reduction of the use of toxic substances and the generation of hazardous waste at BLOS.
* Encourage proposals for alternate processes where practical and feasible to reduce the use and subsequent disposal of toxic materials.

Safety Officer

* Work with the Safety Committee to develop policies to minimize the use of toxic substances and the generation of hazardous waste.
* Manage the waste handling program.
* Assess the use of toxic substance and propose alternative processes, where possible
* Suggest strategies for pollution prevention
* Annually review the BLOS Pollution Prevention Plan to ensure most up to date information and methods available

Facilities Manager

* Work with the safety officer to provide adequate systems to ensure the safe handling and storage of hazardous materials.
* Maintain the facilities required to safely contain and hold hazardous wastes until they can be removed by contracted services.
* Encourage the use of environmentally friendly chemicals and products, when available, for the use of upkeep and maintenance of the facility.

Senior Research Scientists

* Are directly responsible for all activities within their laboratories.
* Work to select those methods which use less hazardous materials and minimize volumes of toxins when possible.
* Encourage the complete consumption of chemicals and reagents, reducing excess waste and unnecessary storage of unused hazardous materials within the laboratories.

Employees

Employees, regardless of job function, are responsible for environmental protection in the conduct of their work. In fact, the greatest potential for reduction exists at this level since this is where decisions to use, purchase, or discard chemicals are made.

Handling of Hazardous Materials

Care should be taken in the receiving, storage, use, and disposal of hazardous materials. Proper handling of these materials minimizes the risk of harm to employees, the facility, and the environment. Specific protocols for handling hazardous materials can be found elsewhere in this document.

Hazardous Waste

Bigelow’s goal is to prevent the release of environmentally hazardous materials and minimize the generation of hazardous waste when practical. Specific protocols for handling hazardous waste can be found on pages 20-21 of this document and procedures in the event of an accident or spill involving a hazardous material can be found on pages 22-23 of this document.