



The Office of Environmental Health and Safety  
Boston College  
Chestnut Hill, MA

# **Boston College**

# **Environmental Management Plan**

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### ***Preface***

On September 28, 1999, the Environmental Protection Agency (EPA) published the final rule “University Laboratories XL Project - Laboratory Environmental Management Standard,” 40 CFR 262.100. (Appendix A.) This new standard, which applies to laboratories meeting the definition of laboratory use of hazardous chemicals, is effective on September 1, 2000 for Boston College Laboratories.

The Massachusetts Department of Environmental Protection (MADEP) will promulgate its own state rule within 18 months of the final federal rule. Prior to this, MADEP will implement the project through the use of a letter of enforcement forbearance dated March 1, 2000 and a letter of extension dated April 12, 2001.

The guidelines specified in this Environmental Management Plan (EMP) identify standards and procedures, responsibilities, pollution control measures, performance criteria, resources and work practices that protect human health and the environment from the hazards presented by laboratory wastes. The management of laboratory waste must not result in the release of hazardous constituents into the land, air and water where such release is prohibited under federal law. Many of the standards and procedures recommended in this plan are referred to in Boston College’s Chemical Hygiene Plan (CHP).

Copies of the EMP and CHP are:

- available on line at <http://www.bc.edu/ehs>
- situated in the Office of Environmental Health and Safety
- situated in each department administrator’s office
- 

Requests for additional copies and questions regarding the EMP should be addressed to:

Gail Hall  
Office of Environmental Health and Safety  
St. Clements Hall  
Boston College  
140 Commonwealth Avenue  
Chestnut Hill, MA 02467  
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## **1.0 Administration**

### **1.1 Policy**

Boston College's Policies and Procedures Manual documents the function and responsibility of Environmental Health and Safety. This policy can be found on line at:

[http://www.bc.edu/bc\\_org/evp/polpr/I/1-310-001.html](http://www.bc.edu/bc_org/evp/polpr/I/1-310-001.html)

Boston College is committed to following the policies and procedures outlined in this EMP, as well as to regulatory compliance, waste minimization, risk reduction and continual improvement of the Environmental Management System. Implementation of this program will be through the Office of Environmental Health and Safety. However, compliance and safe laboratory practices are the responsibility of every worker. Section 1.3 outlines specific responsibilities for members of the college community.

The Administration of Boston College commits to providing the necessary resources for environmental protection while fostering intellectual development for its students, promoting insight and understanding for its research activities, and providing a safe, effective and efficient workplace for its faculty, staff, students and visitors.

John J. Neuhauser, Academic Vice President and Dean of Faculties

Date: 9/22/00

### **1.2 Coverage**

The policies set forth in this EMP are applicable to all laboratory workers generating laboratory chemical waste. Laboratory workers are *persons who are assigned to handle hazardous chemicals in the laboratory, including researchers, students and technicians*. These policies cover only duties and tasks performed by laboratory workers while physically situated in Boston College laboratory facilities. This plan does not include radiological wastes, biological wastes, and photographic wastes that are managed under separate programs.

The departments covered under this Plan are:

- Chemistry, situated in Merkert Chemistry Center
- Physics and Biology situated in Higgins Hall
- Psychology situated in McGuinn and Higgins Halls
- Geology & Geophysics situated in Devlin Hall.

Each department will maintain a list of the faculty and their laboratories (identified by room number). In this EMP all of the lab rooms under the administration of one faculty member located in one building may be considered "one laboratory" and will be so identified on the list developed by each department (Appendix B). EH&S will annually request a list of laboratory space assignments from each department. Shared laboratory spaces are those rooms which are used for multiple research and/or teaching interests, and are not under the control of a single PI. EH&S maintains a list of common spaces. No one may store laboratory waste in a shared space except as approved by the Office of Environmental Health and Safety. Waste generated in shared spaces where storage has not been approved must be brought back to the respective researcher's laboratory.

### **1.3 Administration of Responsibility**

To fully implement policies, the assistance and cooperation of all Boston College faculty, staff and students are necessary. The following descriptions outline key roles and responsibilities involved in implementation and maintenance of this plan.

#### **1.3.1 Environmental Health and Safety Oversight Panel**

The EH&S Oversight Panel is comprised of senior level administrators: the Financial Vice President and Treasurer; the Associate Vice President of Facilities Management; the Director of Research Administration; the General Counsel; the Director of Health Services; the Director of Risk Management; the Associate Director of University Housing; the Associate Vice President of State and Community Relations; science department faculty; and the Director of Environmental Health and Safety. The Panel's mission is to review and assist the Office of EH&S in developing, recommending and approving safety and environmental policies and management systems. The Panel will serve as an umbrella committee for other EH&S related committees on campus to ensure the University's

compliance with federal, state and local regulations and best practices to safeguard members of the community and protect the environment.

The Panel will annually review the activities and issues regarding the administration of this EMP.

### **1.3.2 Office of Environmental Health and Safety**

The Office of EH&S reports to the Director of Facilities Services at Boston College. The organizational chart for the Boston College Administration is in Appendix C. The Office of EH&S will oversee the Environmental Management Plan for the College and will:

- periodically inspect laboratory facilities to ensure compliance with the provisions of the EMP and assist departments in complying
- investigate environmental releases
- coordinate training and maintain training records
- update the EMP as necessary
- ensure that safety equipment, including emergency response equipment, is inspected and working properly and is appropriate to the hazards in the lab
- remain current with regulatory and legal requirements associated with laboratory waste
- assist departments with the annual Hazardous Chemicals of Concern (HCOC) inventory
- annually request a list of faculty covered under the EMP
- serve as Emergency Coordinator for Boston College laboratories
- oversee the details outlined in the Final Project Agreement signed with EPA on September 28, 1999.

### **1.3.3 Science Departments**

Each department where laboratory waste is generated is responsible for the implementation of the EMP within the laboratories under its administrative control. Each department will designate an individual or committee (department representative) to work with the Office of EH&S to:

- ensure that department workers know and follow policies and practices
- ensure that department workers have been properly trained in regards to this EMP, and that training activities have been properly documented
- ensure that control measures are employed
- ensure that appropriate personal protective equipment is utilized
- ensure that each laboratory is inspected annually for compliance with the EMP
- inform the EH&S Office of environmental releases, provide recommendations concerning these incidents, and ensure that corrective action is taken
- coordinate the annual hazardous chemicals of concern inventory
- ensure that evacuation procedures are followed as outlined in Section 3.3 of this Plan

### **1.3.4 Laboratory Supervisors/Faculty**

The immediate supervisor of laboratory workers is responsible for coordinating with the designated departmental representative to implement the policies and procedures of the EMP. It is the responsibility of each laboratory supervisor to:

- ensure that workers know and follow policies and practices
- ensure that workers have been properly trained in regards to this EMP, and that training activities in the lab are documented
- ensure that control measures selected for use are adequate and protective equipment is readily available
- follow recommendations made by the University to correct any unsafe laboratory conditions
- maintain a copy of the Hazardous Chemicals of Concern (HCOC) inventory
- coordinate with department designee
- ensure that visitors receive information and training as required in this EMP

### **1.3.5 Laboratory Workers**

Laboratory workers are expected to:

- conform to good standard practices and procedures for chemicals with which they work by reviewing current literature, available Material Safety Data Sheets and applicable Boston College policies
- wear appropriate personal protective equipment
- use engineering controls and safety equipment properly
- participate in all required training programs
- report to the appropriate supervisor all facts pertaining to incidents resulting in releases of hazardous chemicals, and any action or condition that may cause an incident with hazardous chemicals
- comply with minimum performance criteria outlined in Section 1.4 of this Plan
- follow emergency response notification procedures
- learn, understand, and observe all policies and practices listed herein
- 

### **1.3.6 Hazardous Waste Contractor**

The hazardous waste contractor servicing Boston College will perform the following duties in regards to this EMP:

- alert EH&S staff of non-compliance issues noted in laboratories
- perform follow-up lab inspections as requested
- remove laboratory waste from the lab directly to main accumulation areas
- participate in University training and observe BC's policies and procedures
- ensure that their personnel have appropriate training in managing hazardous chemicals and wastes
- The hazardous waste contractor will inspect chemicals in the recycling area on a monthly basis for container integrity, labels, etc. If any chemicals are noted to have deteriorated or are past a reasonable shelf-life for the material, they will be moved to the MAA following all of the requirements for managing a RCRA waste.

### **1.3.7 Visitors and Contractors**

Visitors to laboratories at Boston College who generate hazardous waste and contractors who perform activities related to laboratory waste must be informed of this EMP and must observe University policies and procedures.

## **1.4 Performance Measures**

Section 262.104 of the final rule lists the Minimum Performance Criteria that each University must meet in managing its waste. Compliance with these standards will be checked during laboratory inspections. The criteria include the following and will be discussed in relevant sections of this plan:

- Labeling (2.3) [262.104 (a)]
- Accumulation (2.4) [262.104 (b)(d)]
- Removal of Waste from Labs (2.5) [262.104 (c)(d)]
- Container Management (2.4) [262.104 (e)]
- Emergency Response (3.3) [262.104 (g)]
- Incident Investigation (3.3) [262.104 (h)]
- Transfer of Waste (3.2) [262.104 (I)]
- Information & Training (6.0). [262.104 (j)]

## **1.5 Environmental Goals**

The University, through the Office of Environmental Health and Safety and departments covered under this plan, will review and update environmental objectives and targets important to the goals of the University, to student education and in support of research.

On an annual basis, the Director of EH&S or a designee will review legal requirements, lab inspection reports, reportable laboratory incidents, and other appropriate information (identified in Section 1.6) in order to set the goals for the upcoming year. (Goal Setting, Appendix D) Once completed, this form will be sent to departments covered

under this plan for comment. The EH&S Oversight Panel will also review these goals for comment. The Director of EH&S or designee will then develop these goals into implementation strategies and disseminate information to the community accordingly.

Some of the objectives may include:

- sustaining compliance with the EMP
- increasing awareness of the impact of laboratories on the environment
- developing pollution prevention opportunities
- reducing the amount of waste generated and disposed of by labs on campus
- sharing information on successes and failures with laboratories at other institutions
- 

For the first year of the pilot study, the goal is to implement this EMP in laboratories at Boston College.

### **1.6 Identification & Tracking of Legal Requirements**

The Office of EH&S will actively identify and track legal requirements applicable to the management of laboratory waste through a variety of means, including:

- Journals (e.g. *Chemical Health and Safety*, published by the American Chemical Society)
- Newsletters (may include *Laboratory Safety & Environmental Management* published by PRIZIM, Inc.)
- Internet and World Wide Web (may include EPA Web Site, DEP Web Site, mail lists)
- Professional organizations such as the Campus Safety Health and Environmental Management Association (CSHEMA) and the College and University Hazardous Waste Management Association (CUHWMA).
- EPA Compliance Assistance Program.

At least once a month the EH&S staff will perform a search of one or more of these resources in order to determine if there have been any changes in regulatory requirements. Any changes found that are applicable to the EMP will be taken into account in the review process as outlined in Section 1.10, EMP Updates.

In addition, lab workers may be updated with new information via one of the following means:

- *Boston College Laboratory Safety Newsletter*: published by the Office of EH&S on a quarterly basis and sent to faculty, staff and students in all the science departments.
- Boston College Office of EH&S Web Site, <http://www.bc.edu/ehs>.
- Memos periodically sent to faculty and staff in the science departments
- Meetings with affected departments, or other University meetings related to laboratory issues (such as the University Research Council)
- Laboratory worker training (see Section 6.0 in this Plan).

### **1.7 Lab Inspections & Nonconformance**

Waste containers and the waste storage areas in the laboratory should be inspected weekly by laboratory personnel and these inspections documented on the posted Waste Inspection Form (Appendix F). Boston College's hazardous waste contractor is instructed to alert lab workers if there are areas of concern about compliance. Additionally, the contractor will notify the Office of EH&S in writing. The Office of EH&S will follow up as needed to determine if there is further need for corrective action.

Periodic inspections will be performed by staff of the Office of EH&S. These will consist of formal reviews of each laboratory's conformance with policies and procedures stated in this document. ("EMP Laboratory Checklist," Appendix E) EMP inspections may also occur during annual Chemical Hygiene Plan Inspections. Inspections may be unannounced; however, the Office of EH&S will attempt to include faculty members during inspections of their work areas. A copy of the completed "EMP Laboratory Checklist" will be sent to the Laboratory Supervisor or designee. Upon receipt, the supervisor will address any issues, sign-off on the checklist and send a copy back to the Office of EH&S. All laboratories are also expected to perform annual self-reviews, using the EMP Checklist as a guideline, to ensure compliance with this Plan.

If it is determined that there are issues of non-conformance with the EMP in the lab, corrective action may be taken immediately by the laboratory workers. Laboratory workers are expected to make necessary corrections as soon as

possible after notification. A signed copy of the nonconformance notification and the actions taken must be returned to EH&S within 30 days of receipt. The Office of EH&S will then follow up as necessary

If the same non-compliance issue is noted in a laboratory after a second inspection, and is considered to be significant in the professional judgement of EH&S staff or designee, the head of the department will also be notified in writing within 30 days after the second inspection. If, after three inspections of a laboratory, the same significant issue exists, a report will be sent to the Dean of Arts and Sciences for further action, and to members of the University Chemical Hygiene Committee for notification, within 30 days of the most recent inspection.

**In cases of imminent and substantial danger to life, health or the environment, the Director of EH&S or designee is authorized to order the cessation of hazardous activity in the laboratory until the danger from such a condition is abated or adequate protective measures have been taken.**

### **1.8 Record-keeping Requirements**

Records to be maintained in the Office of EH&S applicable to this program include:

- training records
- laboratory inspection reports
- reports summarizing performance against annual objectives and targets
- records of non-conformance and corrective action
- applicable regulations
- Environmental Management Plan
- a list of the Hazardous Chemicals of Concern, and minutes of ad-hoc committee meetings addressing annual survey of HCOC's
- list of faculty and laboratories identified by room number
- incident reports
- record of safety equipment inspections
- Chemical Hygiene Plan
- Laboratory Guide for Renovations, Remodels, Moves and Terminations.
- Waste pickup records

Records to be maintained in Department Offices and/or individual laboratories include:

- chemical or HCOC inventory
- Environmental Management Plan
- list of faculty and their laboratories identified by room number
- weekly laboratory waste container inspections (should be posted near accumulation areas)
- laboratory inspection reports and corrective actions taken
- Material Safety Data Sheets (or web access)

Records will be kept for three years or in accordance with other legal requirements as they apply.

### **1.9 Review of the EMP**

The EMP will be reviewed at least annually by the Office of EH&S to ensure its continued accuracy, suitability, adequacy, and effectiveness in promoting continual improvement in the university's efforts regarding the environment.. This review may include, but not be limited to, examination of monitoring and measuring information, performance data, assessment and audit results, and other relevant information and data. In addition, the science departments will be given the opportunity to review and comment. The Director of EH&S or designee will bring proposed major revisions (e.g. significant content or program changes) to the University Chemical Hygiene Committee for review. Minor editorial changes to the EMP can be made as necessary by the Office of EH&S at any time. The updated version of the EMP will be maintained on the EH&S web page. Laboratories will be advised of changes through the Lab Safety Newsletter or via interoffice communications.

## 2.0 Laboratory Wastes

This section describes the process of determining a laboratory waste, labeling containers, storage of waste containers, accumulation limits, and removal of waste containers from a laboratory.

Definitions:

*Laboratory Waste:* A hazardous chemical that results from laboratory scale activities and includes the following: excess or unused hazardous chemicals that may or may not be reused; hazardous chemicals determined to be RCRA hazardous waste (see below); and hazardous chemicals that are not RCRA hazardous wastes.

**Management of laboratory waste must not result in the release of hazardous constituents into the land, air and water where such release is prohibited under federal law.**

*Chemical Hazardous Waste:* Under RCRA, a hazardous waste is defined as a “solid waste or combination of solid wastes, which because of its quantity, concentration, or chemical, or infectious characteristics may (1) cause or significantly contribute to an increase in mortality or an increase in serious irreversible or incapacitating reversible illness or (2) pose a substantial present or potential hazard to human health or the environment when improperly treated, stored, transported, disposed of or otherwise managed.” EPA also states that a waste is hazardous if it is “ignitable, corrosive, reactive or toxic” or fits one of these lists: (1) Non-Specific Source Wastes (F Codes); (2) Discarded Commercial Chemical Products, Off-Specification Species, Container Residues and Spill Residues (K Codes); (3) Acute Discarded Waste [in its original form](P Codes); (4) Toxic Discarded Waste [in its original form] (U Codes). Contact the Office of EH&S for lists of hazardous wastes. See Appendix G for the listing of acute hazardous waste.

### 2.1 Waste Determination

A chemical becomes a Laboratory Waste when it is 1) used or produced in laboratory scale activities; 2) is an unused chemical no longer needed in the laboratory, or 3) clean up material from a chemical spill.

Individuals who may determine when a chemical becomes a hazardous waste, include EH&S staff, and the hazardous waste contractor.

### 2.2 Labeling Waste Containers

All laboratory waste containers must be labeled as follows:

- Contains the words “Laboratory Waste”
- chemical name(s) of all hazardous components
- room number and generator name
- date when storage limit is reached (see 2.4)
- general hazard class (i.e. ignitable, corrosive, oxidant, toxic)

If the waste container is too small to hold a label, the label can be placed on a larger secondary container such as packaging, bottles or test tube racks. If a laboratory requires the use of any special containers or labeling, EH&S will provide information and an evaluation to ensure they are in conformance with this EMP. Printed labels can be obtained from the Office of EH&S, the department office or the hazardous waste contractor. (See sample label, Appendix G)

### **2.3 Identifying Acutely Hazardous Waste**

Acutely Hazardous Waste (or P-listed waste) is defined in 40 CFR 261.33 and 310 CMR 30.136. In the laboratory setting, this type of waste could be an unused commercial chemical product, remains from a spill, or the residue and the container of a P-listed waste commercial product. (See Appendix H, Acutely Hazardous Wastes)

Laboratory workers must ensure that no more than 1 liter (one quart) or 1 kg (2.2 lbs) of acutely hazardous laboratory waste is accumulated in the lab at one time. This should be checked during the weekly waste inspection. In the event that a quantity exceeding 1 L or 1 Kg is generated due to a lab clean out or a spill, contact the Office of EH&S immediately to arrange for a pick up.

### **2.4 Accumulation and Storage of Waste**

Each lab may temporarily hold an aggregate of 208 liters (55 gallons) of laboratory waste or 1 liter (one quart) of acute hazardous laboratory waste. Once this limit is reached, the containers must be dated and removed from the lab within 30 days. Continued accumulation of waste in the lab may occur, but at no time should the total amount of waste in the laboratory exceed 416 liters (110 gallons of laboratory waste, or 2 liters (2 quarts) of acute hazardous waste.

In addition the following guidelines should be observed:

- Use appropriately sized containers for routine generation of the waste streams.
- Use containers that are compatible with the chemical.
- Segregate hazardous chemical waste in containers according to chart in Appendix I. (Also refer to reference material such as *Prudent Practices in the Laboratory*, available in each department office.)
- Use adequate secondary containment for the amount of waste accumulated. If this is not possible, consult with EH&S to develop an appropriate procedure for container management.
- Containers of waste must be securely closed with a cap, lid or funnel (with attached lid), etc. at all times except when wastes are being added to or removed from the container.

Special consideration is required if waste is collected automatically from certain processes or instruments. This is called "in-line waste collection." The following standards apply:

- The collection system must be constructed to prevent the release of laboratory waste into the environment.
- Fail-safe mechanisms must be put in place by the laboratory to prevent a release of waste.
- If the collection is manual, the laboratory worker responsible for the activity must be present in the lab at all times during waste collection.
- If the collection is through an automatic system, secondary containment and appropriately timed periodic inspections are required to ensure that the system does not leak and the containers do not over-flow.
- Failures of in-line waste collection processes that result in an environmental release must be immediately reported to EH&S. Corrective action must be taken immediately.
- The processes at Boston College that currently have in-line collection are: Liquid Chromatography, Peptide Synthesizers, DNA Synthesizers, and Inductively Coupled Plasma Atomic Emission Spectrometry. If a laboratory introduces a new process with in-line collection, the Office of EH&S must be notified.

### **2.5 Removal of Waste from Labs**

Waste must be removed when the lab has reached its waste accumulation limits as described in Section 2.4 of this Plan. The laboratory can also request removal at any time such as when containers are full or when a particular waste will no longer be generated.

Boston College retains the services of one or more hazardous waste disposal companies to assist in the collection and disposal of hazardous wastes from laboratories, transport to Main Accumulation Areas (MAAs), removal from MAAs, and ultimate disposal. EH&S has arranged for the contractor to come on campus weekly to remove waste from the laboratories. No laboratory workers may take laboratory waste to the main accumulation area unless authorized to do so by EH&S. In some extreme cases, laboratory waste may be directly transferred to a TSD for disposal.

Use the following steps to have laboratory wastes removed:

- Attach a laboratory waste label to a container when first adding waste
- Fill out label as indicated (see 2.4)
- Situate waste in designated waste pick up area in the lab when container is full.
- Inventory the waste on the Hazardous Waste Collection Form
- There are three ways to make a notification of a need for waste pick-up: sign up to have an automatic pick up; drop off the Hazardous Waste Collection Form (Appendix J) in the department office; or call the Office of EH&S at 2-0308 for a pick up. The hazardous waste service company will pick up the inventory forms to determine which labs to collect waste from. Call EH&S if you want to arrange for auto pick-up.
- If the laboratory has generated a large amount of waste due to a clean-out, contact the EH&S Office for disposal procedures. DO NOT include waste clean outs in the regular weekly pick-ups.

#### *Chemical Recycling Program*

Boston College is developing a chemical recycling program as part of this EMP. If any laboratory has chemicals that are no longer needed but are still of a usable quality:

- Check with other laboratories in the department to determine if the material can be used. Then, transfer the material according to standard health and safety practices, or notify EH&S of the need for a transfer.
- If there is no laboratory who will accept the material, list the material on the Waste Pick Up form and notify the Office of EH&S. The waste contractor will pick up the chemical during weekly waste collection and move to the Higgins Waste Room.
- EH&S will maintain an inventory of chemicals available for recycling and will make that list available to researchers and course instructors.
- The hazardous waste contractor will inspect chemicals in the recycling area on a monthly basis for container integrity, labels, etc. If any chemicals are noted to have deteriorated or are past a reasonable shelf-life for the material, they will be moved to the MAA following all of the requirements for managing a RCRA waste.

### **2.6 Laboratory Clean-outs**

*Refer to BC's 'Laboratory Guide for Renovations, Remodels, Moves, and Terminations' on the Office of Environmental Health and Safety Web Page at <http://www.bc.edu/ehs>.*

## **3.0 Standard Operating Procedures for Lab Wastes**

### **3.1 Physical and Chemical Hazards/Control Measures**

Standard operating procedures for control measures are found at the following sections of the Boston College Chemical Hygiene Plan. Appendix O of this document contains the appropriate sections (or appropriate web links)

- Engineering Controls such as fume hoods, (CHP 3.5.3)
- Personal Protective Equipment, (CHP 3.6)
- Hygiene Practices, (CHP 2.5.6)
- Containment strategies (CHP 2.6.1, 2.6.2)

### **3.2 Transferring and Moving Laboratory Wastes**

All laboratory chemicals, including laboratory wastes, will be transferred and moved in accordance with procedures described below.

- Whenever chemicals are transported outside the laboratory, the primary container should be placed in a secondary, non-breakable carrier.

- Carts should be used when possible and provide secondary containment. Spill containment should also be immediately available.
- Before moving containers, check and tighten caps, or other enclosures.

Only personnel who have received RCRA training will remove laboratory wastes to the main accumulation areas.

### **3.3 Emergency Preparedness and Response Procedures**

An emergency is any occurrence such as, but not limited to, equipment failure, rupture of containers or failure of control equipment, which results in the potential uncontrolled release of a hazardous chemical into the environment and which requires agency or fire department notification and/or reporting. Procedures for laboratory workers to follow for hazardous material emergency preparedness and response are covered in Boston College's Chemical Hygiene Plan, Section 2.6 "Emergency/Contingency Planning". (See Appendix O of this document.) Emergency contact information is posted near main phones in laboratories and in science department offices.

Emergency spill response equipment to manage incidental spills will be situated in each laboratory, labeled and stored with other safety equipment. Replenishment material is available in each department (contact Department Administrator), or in the Office of EH&S.

**Spills of laboratory wastes, chemical exposures and other incidents that trigger a reportable emergency to external agencies or that require reporting under institutional policy will be investigated and documented using BC's Incident Report Form (Appendix L). The release of one gallon (4 liters) or more of a moderately hazardous substance is immediately reportable to the Office of Environmental Health and Safety. Smaller incidental spills should be reported to the Office of EH&S by phone, email or in writing within 24 hours. Trained staff members in the Office of EH&S will determine if the released material is reportable under applicable regulatory guidelines. Corrective actions to prevent future incidents will be recommended by the individual(s) investigating the incident to the appropriate department head and laboratory supervisors.**

Evacuation procedures are also outlined in the CHP, and are included in CHP training. In the event that an incident poses an actual or potential threat to human health or safety, the immediate evacuation of personnel in the affected area is required. This may be the laboratory, the floor, or the building. If evacuation of the area around campus is deemed necessary, Boston College's Emergency Coordinator will advise local authorities (i.e. fire, police) of the potential threat to human health and/or the environment following applicable regulations. Specific evacuation routes are posted in each laboratory.

The Emergency Coordinator or any person who discovers a release to the environment or a fire involving hazardous chemicals should activate the facility fire alarm and contact Boston College Police Department at their emergency number, 2-4444.

## **4.0 Pollution Prevention**

EPA's definition of pollution prevention, or P2, includes the following: source reduction and other practices that reduce the volume or eliminate the creation of pollutants through the increased efficiency in the use of raw materials, energy, water or other resources, or the protection of natural resources by conservation.

The Office of EH&S will work with science departments to promote pollution prevention activities. The goal is to decrease the amount of laboratory waste generated or reduce the toxicity of the waste generated in laboratories. Waste minimization ultimately lowers disposal costs, reduces hazards, reduces long-term liability and promotes a cleaner and healthier environment. BC's hazardous waste contractor will inform both EH&S and the faculty of these opportunities. Pollution prevention opportunities will also be evaluated during annual laboratory inspections conducted by EH&S. Successful P2 activities in labs will be noted on the EMP checklist.

With the assistance of hazardous waste vendors, EH&S will look at the waste streams generated by labs in order to determine which methods, as described below, can be used. The P2 Form in Appendix N will be used to track these activities. At least one evaluation for pollution prevention will occur annually at the institution.

Success of P2 activities will be promoted to other laboratories and information disseminated via the EH&S website and the EH&S quarterly laboratory newsletter.

## Methods:

### *Chemical Redistribution*

Unopened or unused portions of chemicals can be redistributed to other laboratories. (See Section 2.5 of this EMP.)

### *End of Process*

Running experiments to their least toxic endpoints is strongly encouraged. This can include neutralization procedures or other standard practices outlined in *Hazardous Laboratory Chemicals Disposal Guide, 2<sup>nd</sup> ed.*, (M.A. Armour, CRC Press, 1996) and other reference materials. Results of this type of process can change a hazardous material to one that is less hazardous or non-hazardous.

### *Gas Cylinders*

In order to prevent the need for disposal of gas cylinders, all gas cylinders should be rented. If rental is not possible (e.g. for lecture bottles), purchase from a company that accepts return of its cylinders.

### *Inventory Management*

Having smaller amounts of chemicals on hand is another way to accomplish waste minimization. To that end, purchase smaller amounts, use chemicals up before they expire, and maintain a written inventory of chemicals in the lab to determine if a purchase is necessary. In addition to waste minimization, decreasing chemical inventories saves space and money and lowers the risk should a spill or fire occur.

### *Process Modification*

Use of micro-scale techniques or a decrease in the use of hazardous materials in teaching and research will reduce the amount of waste generated.

### *Product Substitution*

Hazardous chemicals can be replaced in many procedures by less hazardous substitutes (e.g. non-flammable liquid scintillation cocktails, or limonene-based solvents for histology).

### *Recycling*

Boston College has a silver recovery program for photographic fixers.

### *Segregation and Characterization*

Hazardous and non-hazardous waste should not be mixed because addition of a hazardous waste makes the entire mass hazardous. Follow guidelines in Appendix K on the proper segregation of hazardous waste to minimize costs and ensure best disposal practices.

### *Training*

Training for laboratory workers will include discussion of waste reduction strategies. The Office of EH&S will be available to consult with any laboratory that wishes to pursue this option. Laboratory workers may also request a copy of ACS's Task Force on Laboratory Waste Management publication, "Less is Better". Copies are available from the EH&S Office or directly from ACS.<sup>12</sup>

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<sup>1</sup> ACS, Dept. of Government Relations & Science Policy, 1155 16<sup>th</sup> St NW, Washington, DC 20036

<sup>2</sup> Two other excellent references are:

*Laboratory Waste Management, A Guidebook* written by the American Chemical Society's Task Force of Laboratory Waste Management

and

Pollution prevention will be an environmental goal for the EMP as described in section 1.5. The targeted decrease of waste generated is 10% over the life of the XL pilot study.

## 5.0 Surveys of Hazardous Chemicals of Concern (HCOC)

*Hazardous Chemical of Concern* (HCOC) means a chemical that the organization has identified as having the potential to be of significant risk to human health or the environment if not managed in accordance with procedures or practices defined by the organization.<sup>3</sup>

As part of this pilot project, a full inventory of all chemicals has been completed for the first year. The Office of EH&S will review the inventories and make note of quantities and locations of HCOC's. Copies of the inventories will remain in the lab and copies will be kept in the EH&S office.

Annually thereafter, an ad-hoc committee comprised of representatives from each of the affected science departments and the Office of EH&S will review the status of the inventories and determine if a lab must do a full inventory or a survey of HCOC's. This risk-based assessment will consider the number of chemicals in the inventory, their hazards, ages, quantities, rates of use, and proper management practices. The laboratory will have 60 days to complete and submit their inventory to the Office of EH&S. Lab personnel are expected to conduct these inventories but if a lab needs assistance, they may contact EH&S for support.

Some items to be taken into consideration in conducting and reviewing surveys will be:

- the professional judgement of trained personnel to determine inclusion or exclusion of chemicals in the list of HCOC's
- container and material integrity
- chemical expiration dates as specified by Boston Fire Department regulations
- expiration dates specified by the chemical manufacturer for chemicals which deteriorate over time

If an issue is found with a chemical or its container during a survey, the laboratory will contact the Office of EH&S as soon as possible to determine what, if any, further action is warranted. EH&S staff will base their determination on best practices, professional expertise, the assistance of the hazardous waste contractor and local officials.

## 6.0 Information and Training

### 6.1 Applicability

Boston College will provide laboratory workers with information and training so that they understand and can implement the elements of the Environmental Management Plan relevant to their responsibilities. A laboratory worker "means a person who is assigned to handle hazardous chemicals in the laboratory and may include researchers, students or technicians".

### 6.2 Frequency

*Information* will be provided when a laboratory worker is first assigned to a work area where laboratory waste is being generated.

*Training* for laboratory workers will occur within six months of being assigned to a work area where laboratory wastes are being generated. Retraining will occur when a laboratory waste poses a new or unique hazard for which they have not received prior training, and to maintain knowledge of EMP procedures.

EMP training will typically be conducted along with Chemical Hygiene Plan training. Currently this training is provided by the Office of EH&S several times throughout the year, covering both semesters and the summer. Other information will be provided on an on-going basis through informational pamphlets for new employees, informal discussions, newsletters, memorandums and publication of material on the EH&S web page.

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*Pollution Prevention and Waste Minimization in Laboratories* by Peter A. Reinhardt, K.L. Leonard and P.C. Ashbrook, CRC Press. Both of these books are available in the Office of EH&S in St. Clements Hall.

<sup>3</sup> Federal Register

### **6.3 Contents**

Information provided to laboratory workers will cover:

- contents of the rule
- contents of the University's EMP
- location and availability of the EMP
- emergency response measures
- signs and indicators of a hazardous substance release
- relevant reference material
- other applicable training requirements

Training for laboratory workers will cover the above information and the following:

- methods and observations used to detect the presence or release of a hazardous substance
- chemical and physical hazards associated with laboratory wastes in their work area
- relevant measures one can take to protect human health and the environment
- details of this EMP to ensure laboratory wastes are managed in accordance with this rule
- pollution prevention opportunities

### **6.4 Visitors**

Laboratory visitors, such as on-site contractors, visiting scientists, or environmental vendors that require information and training under this EMP should be informed of the availability of this standard. Individuals responsible for a lab will provide this information to visitors. EH&S is available to conduct more intensive training for these groups.

Visitors will require information if they generate or handle waste chemical in a Boston College laboratory. This includes the current hazardous waste contractor that services BC laboratories.

### **6.5 Recordkeeping**

Training materials are kept on file in the Office of Environmental Health and Safety. This includes training records (i.e. the name of laboratory worker, department, and position), the agenda, materials used in training, the name of the instructor, the date and the location.