POLLUTION PREVENTION PLAN

Bates College
Campus Avenue
Lewiston, Maine

PREPARED BY

St.Germain & Associates, Inc.

Updated: September 2006

BATES COLLEGE'S IMPLEMENTATION POLICY

This Pollution Prevention Plan was developed in accordance with Section 2305 of Chapter 38 of the Maine Revised Statutes Annotated. This plan and the associated policies (specified within the plan) have been approved and implemented at the Bates College campus in Lewiston, Maine. The Environmental, Health and Safety Coordinator of Bates College has been assigned the role of TUR Coordinator, and responsible for ensuring the policies and mandates within the plan will be implemented and maintained. The plan will be reviewed and updated periodically, and at least every two years. A copy of the plan and backup data will be kept at the campus for at least five years and will be made available to the Commissioner of the Maine Department of Environmental Protection or designee upon request.

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Environmental, Health and Safety Coordinator

TABLE OF CONTENTS

LIST OF FIGURES

LIST OF APPENDICES

1.0 INTRODUCTION

St.Germain & Associates, Inc. (St.Germain) of Westbrook, Maine was retained by Bates College, located in Lewiston, Maine, to update its Pollution Prevention Plan (herein referred to as the "The Plan"). The Plan was originally developed in 2003 to meet the requirements of Maine's Toxic Use and Hazardous Waste Reduction Law (herein referred to as the "TUR Law"), which is found in Title 38, Sections 2301 through 2313 of the Maine Revised Statutes Annotated (MRSA). The Plan was developed in accordance with the Maine Department of Environmental Protection's (MEDEP) "Toxics and Hazardous Waste Reduction Pollution Prevention (P2) Planning Guidebook" (May, 2006)," herein referred to as "MEDEP's Reduction Guidelines."

The Maine TUR Law (see Appendix A) requires facilities that are subject to the reporting of Extremely Hazardous Substances (EHS) and releases of Toxic Chemicals under the Superfund Amendments and Reauthorization Act (SARA) Title III, Section 312 and 313, respectively, and facilities that generate 2,640 pounds or more of hazardous waste per calendar year, to set voluntary two-year numeric reduction goals. These voluntary goals consist of reducing the aggregate amount of each of the above chemical categories by a predetermined amount, established by the campus, by January 1st of 2002, 2004 and 2006. Reductions are calculated from the established baseline years. Baseline years can vary for each campus and are typically the amount of EHS used during 1990 for EHS, the average Toxic Chemical released during 1990 and 1991 for Toxic Chemicals, and the average quantity of hazardous waste generated during 1987 and 1989 for hazardous waste. A campus can use alternate years if those years represent the first years of full operation and reporting thresholds were exceeded for each of those years. The original TUR Law required mandatory reduction goals of 10, 20 and 30 percent of EHS usage and hazardous waste generation by January 1st of 1994, 1996 and 1998.

The campus has 750 pounds of anhydrous ammonia, an EHS, on site which is in excess of the 500 pounds threshold and therefore, has been subject to the EHS reduction requirements of the TUR Law. In accordance with the definition of Toxic User (38 MRSA, Section 2301 (19)), **Bates College is required to report EHS under SARA Title III, Section 312, and therefore is not exempt from the TUR Law reduction requirements (38 MRSA Section 2304-A(1)(A)). Bates is required to develop The Plan, set voluntary 2-year numeric goals for reducing the amount of anhydrous ammonia used on campus by January 1st of calendar years 2002, 2004, and 2006, and file biennial pollution prevention progress reports**. In order to become exempt from this reduction requirement, Bates would be required to reduce the amount

of anhydrous ammonia that is present on site below 500 pounds.

Bates College is exempt from reporting Toxic Chemical releases because their Standard Industrial Classification (SIC) code is not included in the types of facilities that are required to report Toxic Chemicals under the Toxic Chemical Release Inventory Report (Form R Report). Therefore, in accordance with the definition of Toxic Releaser (38 MRSA Section 2301(17)), **Bates College is not required to report Toxic Chemical releases under SARA Title III, Section 313, and therefore is exempt from the TUR Law toxic release reduction requirements (38 MRSA, Section 2304-A(1)(B)).**

Bates College is currently a Large Quantity Generator (LQG) of hazardous waste but only shipped off-site 2,457 pounds of hazardous waste during 2005. This is below the 2,640 pound per calendar year hazardous waste threshold for the TUR Law. The MEDEP would like a facility to consistently demonstrate for at least a year or more a hazardous waste generation rate of less than 2,640 pounds before removing it from the requirements of the TUR Law. **Unless hazardous waste is generated in quantities greater than what is anticipated during 2006, Bates College will no longer be required to meet the hazardous waste reduction requirements established in the TUR Law.** This Plan will discuss the hazardous waste reduction efforts conducted to date and the progress that Bates College has made in exceeding its hazardous waste reduction goals.

The Plan has been designed to be used as a planning tool for reducing ammonia and hazardous waste on site. It describes the operations and equipment that are involved in their use and generation as well as the reduction options that have and will be evaluated and implemented to achieve the Bates College's reduction goals. The actual reduction progress is reported biennially in the MEDEP Pollution Prevention Progress Reports (Progress Reports).

2.0 SUMMARY AND CONCLUSIONS

Bates College has directed its efforts on reducing the quantity of hazardous waste generated at the campus in order to reach its voluntary reduction goals of 30, 40 and 50 percent by the years 2002, 2004, and 2006, respectfully. Bates College continues to evaluate reduction options for the usage of ammonia in the refrigeration system of the Underhill Ice Arena located on the Lewiston Campus. Since the track record of these refrigeration systems have been proven to be safe, few cost-effective alternatives could be found in today's market.

Bates College has been successful in reducing its hazardous waste generation by an overall average of 68% from its 1988 and 1989 average baseline years, exceeding the 2006 reduction goal by 18%. During 2005, Bates College reduced its hazardous waste generation below the 2,640 pounds TUR Law threshold by shipping offsite only 2,457 pounds of hazardous waste. The majority of reductions have occurred in laboratory wastes, identified in the Progress Report as "Biopacks" and "Chempacks." These reductions were achieved through the implementation of improved inventory control, waste segregation, improved waste characterization and improved waste packaging techniques. Training employees directly involved in these operations play a major role in the success of the program. Other reductions were realized by installing a licensed silver recovery unit, which has totally eliminated the spent fixer waste stream. Other significant reductions occurred with ignitable solvent degreasing wastes. A solvent degreaser located in the Motor Pool Garage and one in the Plumbing Department were replaced with bacteria-based degreasing units. During 2001, hazardous waste generated from these two units represented 11% of the total hazardous waste generated that year. Substitution of another solvent degreaser located in Olin Arts with a non hazardous waste solvent degreaser is scheduled to be evaluated in the Fall of 2006.

3.0 CAMPUS MANAGEMENT POLICY

The Plan is an integral part of the Bates College's policy, product development, operational procedures, and training. Bates College is committed to excellence and leadership in protecting the environment and improving the workplace. In keeping with this policy, Bates College's objective is to reduce toxic chemical use and hazardous waste generation and to minimize their adverse impacts on air, water, and land. By successfully implementing source reduction, cost savings can be achieved and a safe and healthy workplace for Bates College's employees and student body can be maintained resulting in an overall improvement in the environment. Bates College environmental guidelines include the following:

- Environmental protection is everyone's responsibility. It is valued and displayed as a commitment by Bates College
- Bates College is committed to toxic use reduction and energy conservation in the design of all new services
- Reducing the use of toxics and the generation of hazardous by-products at the source is a prime consideration in research, process design, and operations. Bates College is committed to identifying and implementing reduction opportunities through encouraging and involving every employee
- Technologies and methods that substitute non hazardous materials and utilize other source reduction approaches will be given top priority in addressing all

environmental issues
- Bates College seeks to demonstrate its responsible citizenship by adhering to all environmental regulations. Bates College promotes cooperation and coordination among industry, government, and the public toward the shared goal of preventing pollution at its source.

4.0 EMPLOYEE AWARENESS, TRAINING, AND NOTIFICATION

Section 2305 (4) of Title 38 MRSA states: "An employee awareness and training program consistent with the requirements of section 2306 is to involve employees in toxics use, toxics release, and hazardous-waste reduction planning and implementation to the maximum amount feasible." The objectives of Bates College are to make every employee aware of (1) the TUR Law and how it impacts Bates College; (2) the targeted usage of EHS and hazardous waste generation requiring reductions; (3) the benefits of employee health that can be experienced from reducing the releases of these chemicals to the environment; (4) the processes that use EHS and generate hazardous waste; (5) the members of the Pollution Prevention Planning Team (PPP Team); and (6) the notification method of any ideas, substitutes, or process redesign that could assist in the reduction of EHS usage and hazardous waste generation. The Environmental Health and Safety Coordinator of Bates College is the TUR Coordinator. The PPP Team consists of the following employees:

- Environmental Health and Safety Coordinator
- Environmental Health and Safety Assistant
- Biology Lab Coordinator for Animal and Plant Care in Carnegie Science Department
- Assistant in Instruction for Chemistry Department
- Manager of Facilities.

4.1 Employee Awareness

Bates College's TUR Coordinator, will be responsible for implementing the six employee awareness and training requirements stated previously. The tasks to be undertaken by the TUR Coordinator to publicize the EHS usage and hazardous waste generation reduction project are as follows:

- a posted notice will appear on the Bates College web site outlining their commitment to their EHS Usage and Hazardous Waste Reduction Goals
- semiannual updates of reduction progress will be provided by the PPP Team and to all departments by email
- the PPP Team will oversee the reduction goals of the program within each of their departments and report any problem (that would require extra attention) in meeting these goals to the TUR Coordinator. The PPP Team represents areas on the campus where anhydrous ammonia is used and hazardous waste is

generated.

4.2 Employee Training

The TUR Coordinator will meet with the PPP Team semiannually to discuss the reduction goals of Bates College. During these meetings the TUR Coordinator will inform the PPP Team of the current status of each reduction goal and solicit any reduction ideas or recommendations. The PPP Team Members will then discuss the assigned reduction goals with employees and solicit comments on ways of achieving or maintaining these reduction goals. Opportunity for employee communication, comment and input, to planning and revision of the program, is afforded by the PPP Team and Department heads. Biennial training of employees by the PPP Team will be established by describing contents of The Plan and associated reduction goals in Bates College's "Communicator", the monthly newspaper published on campus. The article will describe the following:

- the requirements of the TUR Law (i.e., 38 MRSA, Sections 2301 through 2313) and how it impacts Bates College
- identify the targeted usage of EHS and hazardous waste streams, the processes that use EHS and generate waste streams, the characteristics or chemicals within each waste stream that cause it to be classified as a hazardous waste and efforts that have been made to reduce usage of the EHS and generation of hazardous wastes
- the safety, health, and environmental benefits that can be realized from reduction of EHS usage and generation of hazardous waste
- the reduction goals for the targeted EHS usage and hazardous waste streams and the current strategies that have been developed to help maintain these reductions and to be aware of possible future reductions.

4.3 Employee Notification

In accordance with 38 MRSA, Section 2306, Bates College will utilize the employee awareness techniques described in Section 4.1, and:

- notify its employees six months before The Plan is scheduled to be updated, of the requirements of The Plan, the targeted EHS usage and hazardous waste streams, and the associated production units for which the plan must be maintained
- solicit comments or suggestions from employees on EHS usage and hazardous waste generation reduction options
- once a year, the PPP Team will describe the progress achieved in meeting the voluntary reduction goals of The Plan.

4.4 Municipality Notification

In accordance with 38 MRSA, Section 2306, Bates College will notify the municipal officers of

the City of Lewiston, Maine of its pollution prevention efforts and will send a copy of the biennial Progress Reports to the City of Lewiston. A cover letter will accompany each copy of the biennial reports.

The Progress Reports will include:

- reduction goals set by Bates College
- progress achieved in reaching these goals
- reduction techniques implemented to meet these goals
- description of employee involvement
- list of pollution prevention methods to be used during the following two years
- a certification statement with the reports signed by a senior management official.

5.0 PRODUCTION UNIT ANALYSES

The Production Unit Analyses represents the heart of the reduction planning process. It incorporates process flow diagrams, chemical pathway analyses and descriptions of operations utilizing targeted toxic chemicals and generating hazardous wastes. It provides the PPP Team with an in-depth understanding of each operation that contributes to the use and generation of ammonia and hazardous waste.

5.1 Process Flow Diagrams and Chemical Pathways

Process flow diagrams for the operations at Bates College are illustrated in Figures 1, 2, 3 and 4. The diagrams include the major operations that use EHS or generate hazardous waste except for the generation of universal waste. Whenever possible, these diagrams illustrate the chemical pathway of the targeted chemicals. Universal waste has not been included in this Pollution Prevention Plan because it is managed and recycled under the MEDEP Universal Waste regulations and not included in the campus's hazardous waste generation that is targeted for reduction.

5.1.1 Ammonia Refrigeration System

Figure 1 is a process flow diagram of the ammonia refrigeration system used in the Underhill Ice Arena. The figure represents a simple illustration of the ammonia refrigeration system and the chemical pathway of anhydrous ammonia through the system. The refrigeration system is based on the principle that absorption of heat of a fluid (refrigerant) will take place when it changes from the liquid phase to a vapor phase. This absorption of heat by the fluid lowers the temperature of the surrounding objects. The mechanical refrigeration system employs a compressor which exerts pressure on vaporized ammonia forcing it to pass through a

condenser located in the cooling tower of the ice arena, where it loses heat and liquefies. The liquefied refrigerant is then pumped through the coils of the refrigeration compartment and vaporizes, drawing heat from the brine solution circulating through the pipes within the refrigeration compartment. The vaporized refrigerant is then pumped to the compressor and the cycle is repeated. The pipes containing brine solution extend through the refrigeration compartment and under the ice surface in the arena. The brine solution is cooled in the refrigeration compartment and flows through the pipes under the ice rink, releasing cooler air to the ice surface. The brine solution flows from the ice rink and returns to the refrigeration compartment where the cycle is repeated. Since the refrigeration is an indirect system, the anhydrous ammonia never comes in contact with the brine solution and is fully contained within the refrigeration compartment and pipes leading to the compressor and condenser. No releases to the air or water were included in the diagram because there are no significant discharges to either of these mediums.

5.1.2 Academic Laboratories

A large percentage of hazardous waste generated at Bates College is from the Carnegie Science building, where the Physics, Astronomy, Biology, Geology and Environmental Studies Departments are located, and Dana Chemistry Building that houses the Chemistry Department. The majority of hazardous waste streams generated in these departments are generated in small amounts (less than one liter per student) during student laboratory classes (herein referred to as student labs). The type of chemical waste generated varies depending on the type of experiment being performed. Figure 2 is a procedural flow diagram that illustrates the typical procedures involving the procurement and management of chemicals and resultant chemical wastes that take place prior to, during and upon completion of a student lab. A procedural flow chart was developed in place of a process flow chart due to the variety of chemicals used during a student lab and the larger reductions of waste that can be achieved when analyzing the procedures instead of the types of chemicals in the process. By analyzing the path of chemicals used in a student lab from design to procurement to use and collection of waste, significant reductions of expired and overstock chemicals and unsafe supplies of highly reactive chemicals can be avoided, thereby increasing the level of safety in student labs and reducing the quantity of waste being generated. The waste disposal contractor combines compatible wastes in bulk containers (i.e., 55 gallon drums) prior to shipment. Each waste is generally packaged in accordance with compatibility and disposal characteristics. Whenever

Figure 1

Process Flow Diagram for Ammonia Refrigeration System

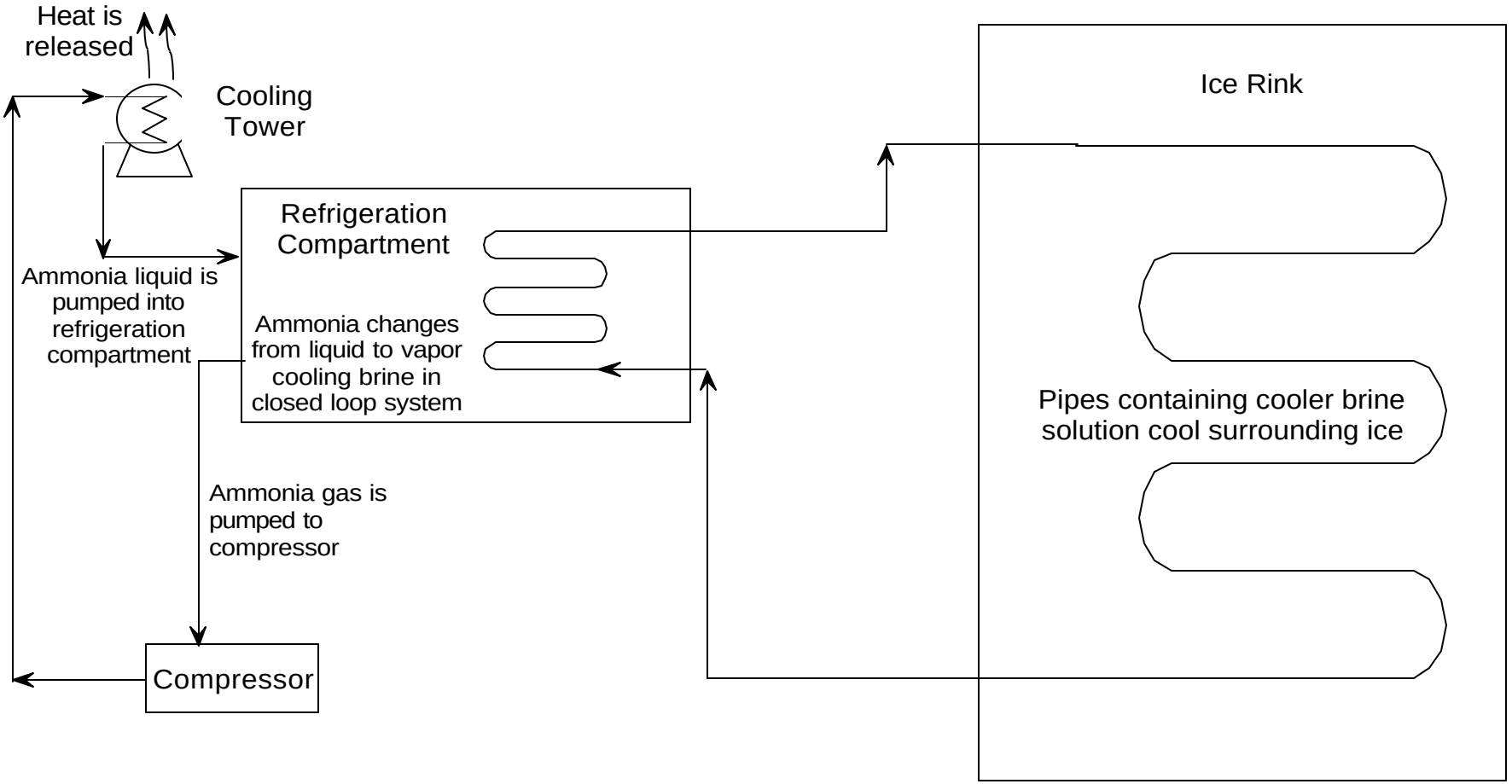
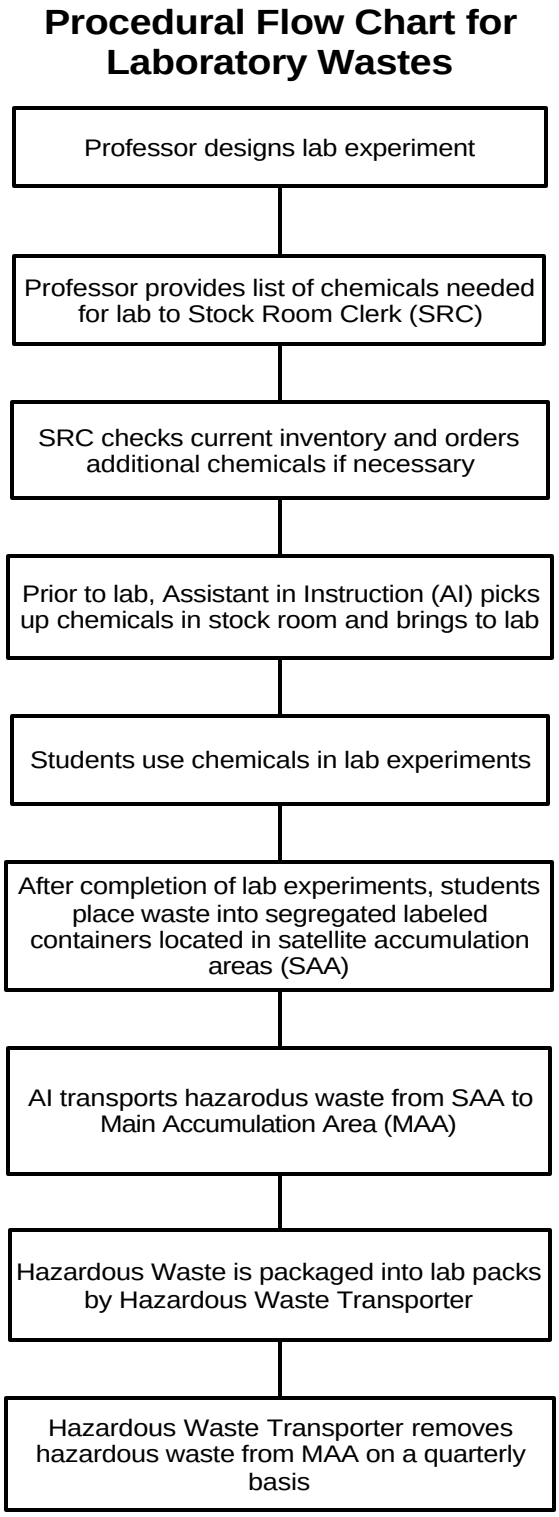


Figure 2


Procedural Flow Chart for Laboratory Wastes
Professor designs lab experiment
Professor provides list of chemicals needed for lab to Stock Room Clerk (SRC)
SRC checks current inventory and orders additional chemicals if necessary
Prior to lab, Assistant in Instruction (AI) picks up chemicals in stock room and brings to lab
Students use chemicals in lab experiments
After completion of lab experiments, students place waste into segregated labeled containers located in satellite accumulation areas (SAA)
AI transports hazarodus waste from SAA to Main Accumulation Area (MAA)
Hazardous Waste is packaged into lab packs by Hazardous Waste Transporter
Hazardous Waste Transporter removes hazardous waste from MAA on a quarterly basis

possible , the disposal contractor tries to avoid packaging the waste in labpacks. This reduces disposal costs significantly due to the extra labor involved in packaging and unpackaging the labpack waste (at the disposal facility).

5.1.3 Physical Plant, Mail & Print and Olin Arts

Hazardous waste is generated in smaller quantities in Physical Plant, Olin Arts and at Mail & Print. Typical wastes include spent ignitable paints and solvents (D001) generated from painting and cleaning activities in Physical Plant, solvent degreaser (D039) used in Olin Arts and spent photographic fixer (D011) generated in Olin Arts and Mail & Print. Figure 3 illustrates the typical process flow of photographic developing that takes place in the Olin Arts building. Photographic developers are also located in Chase Hall and Carnegie Science building. In these buildings, student photography clubs and science classes also utilize photographic developers and dark rooms with photographic developing chemicals but at a much less frequency. A solvent degreaser is also used in the Olin Arts building for the cleaning of etching plates.

The following is a basic description of the film developing process that takes place in the Olin Arts building and the types of chemicals used in the process. Photographic paper is coated with a light sensitive emulsion containing silver halide. Once the paper is exposed to an image and ready for developing, it is placed in a developer solution that converts the silver halide crystals (within the emulsion) that have been exposed to light into metallic silver. The print is then transferred to a chemical stop that halts the conversion process. The print is then moved into a fixer solution that removes the undeveloped and unexposed silver crystals. The spent stop bath is disposed as a non hazardous waste. The spent fixer solution is poured into a licensed silver recovery unit (MEDEP License #O-000223-HT-A-N) that discharges into the municipal sewer system. The effluent from the silver recovery unit meets the effluent limits of the College's Industrial User Wastewater Permit. The silver recovery unit captures the silver in the spent fixer solution in its filter cartridge, which is transported to the vendor's facility for silver recovery. The spent filter cartridge is transported off-site as a non hazardous waste because it does not exceed the Toxicity Characteristic Leachate Procedure (TCLP) hazardous waste limits. Figure 4 is a process flow diagram that illustrates the solvent degreasing of metal parts that takes place in the Olin Arts building. Petroleum-based solvent contaminated with tetrachloroethylene (during the off-site recycling process) having a flashpoint of greater than 140^{o}F is placed in the solvent degreasing unit. This solvent is pumped from a storage reservoir within the degreasing

Figure 3

Process Flow Diagram for Photographic Developing in the Olin Arts Building

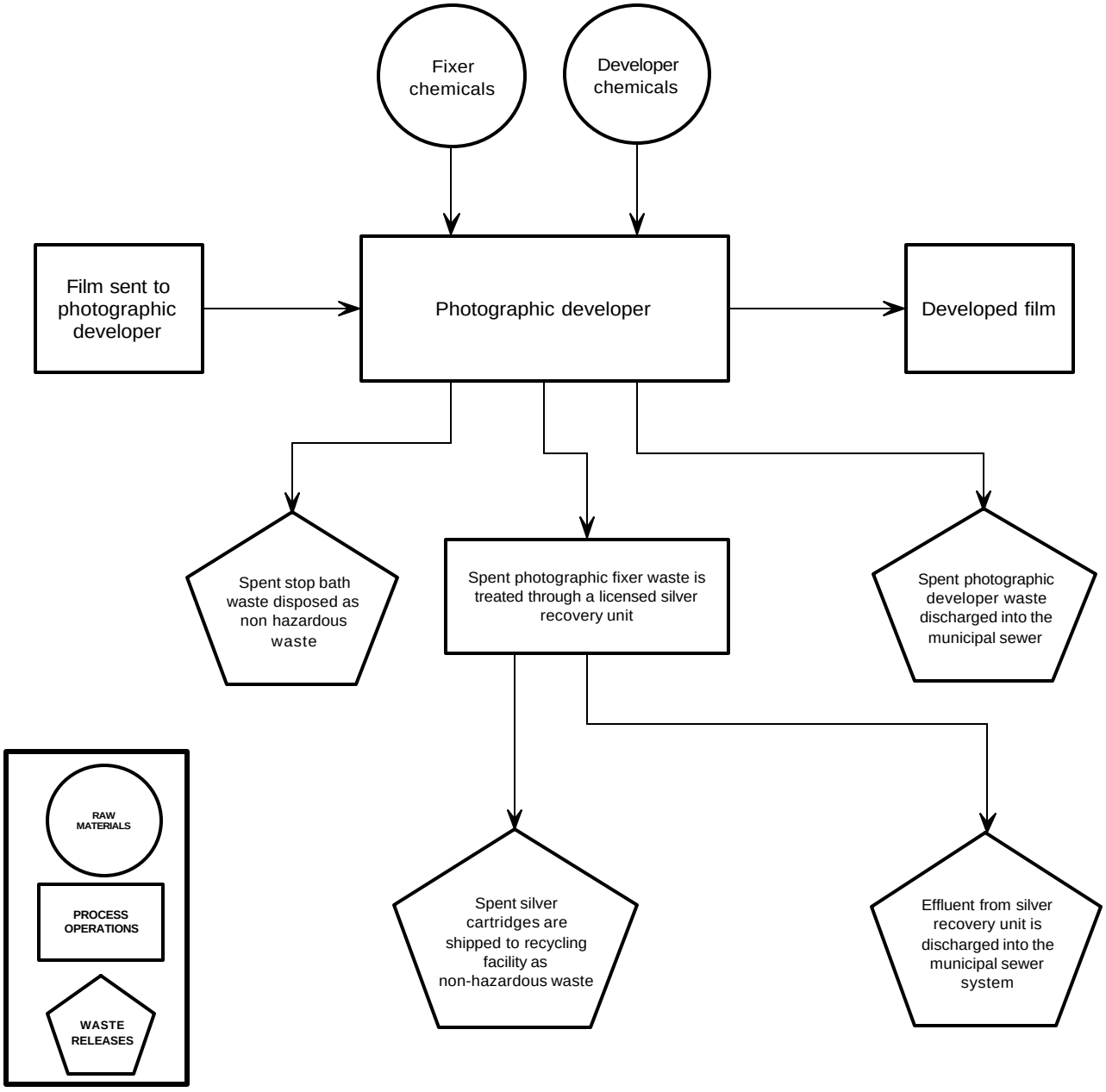
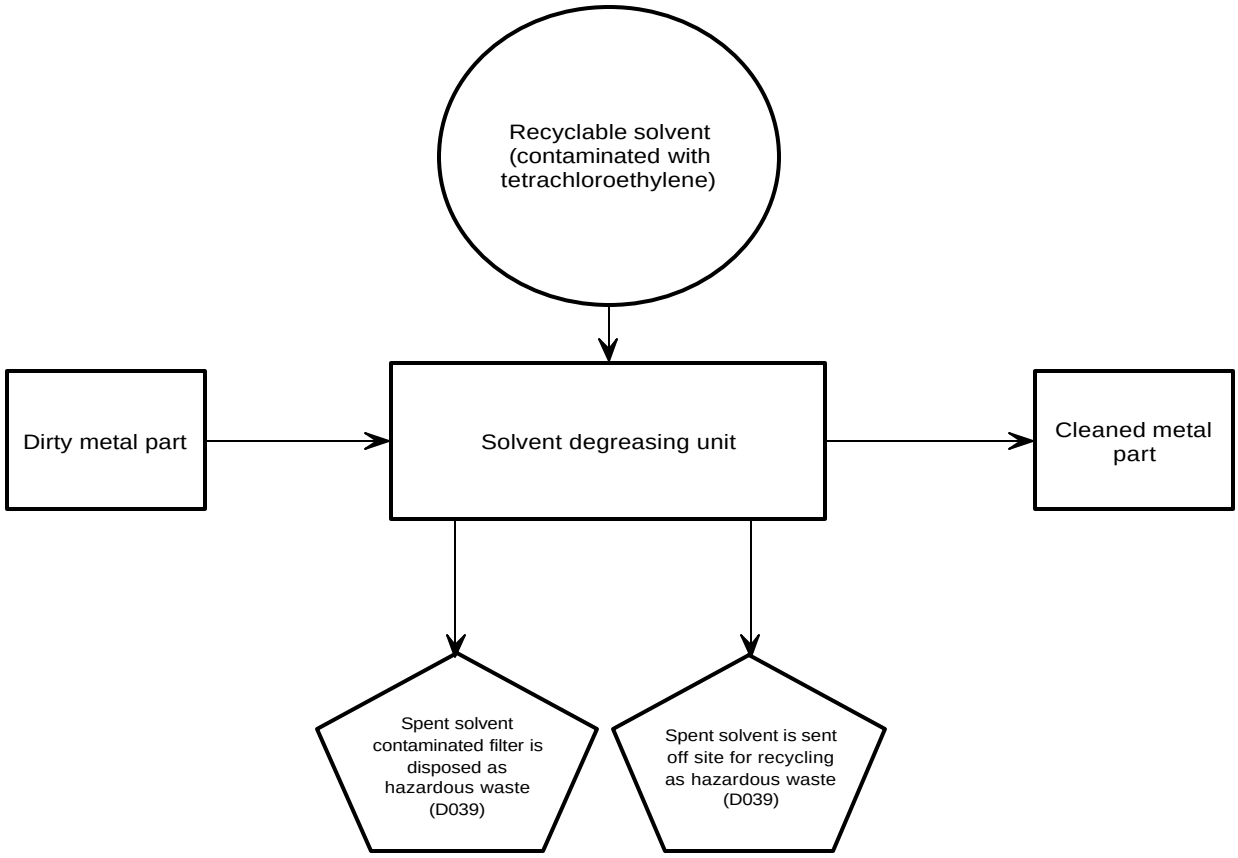
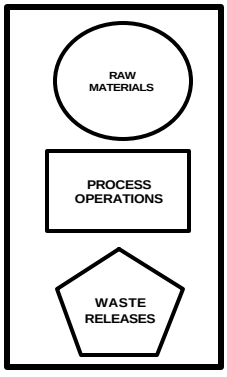


Figure 4

Process Flow Diagram for Solvent Degreaser in Olin Arts Building





unit onto the dirty metal part where it removes oils, grease, and dirt. After making contact with the metal part, the solvent drains through a filter and flows back into a reservoir where the process is repeated. Once the solvent is contaminated to a point where it is no longer usable, it is removed from the degreasing unit by a recycling contractor and sent offsite as hazardous waste (D039) to an offsite facility where it is recycled. The degreasing unit is refilled with recycled solvent and the process is repeated.

Figures 1 through 4 will be used by the TUR Coordinator and PPP Team members to assist them in meeting the requirements of Section 4.0, Employee Awareness, Training, and Notification and during their quarterly reduction meetings.

5.2 Identification of Unit of Product

As defined in the MEDEP's Reduction Guidelines, a unit of product is "a measure that reflects the level of production or activity associated with the use of a toxic or the generation of a hazardous waste". Since Bates College is an educational institution, the level of its activities and operations are dependent upon the number of students attending Bates College each year. For example, in the Photography Department, the number of times photographic developers are used are directly proportional to the number of students attending class during that year. The quantity of wastes generated during each of these operations is dependent upon the number of times the photographic developers are utilized. Therefore, the unit of product that has been chosen is the number of students attending Bates College.

5.3 Identification of Production Units

In accordance with the TUR Law, a production unit is defined as "a process, line, method, activity or combination thereof to make a product." Production units have been developed in accordance with the MEDEP's Reduction Guidelines in order to define the amount of reduction that has occurred, future reduction planning that may be necessary, and to be used to meet the "Employee Awareness, Training and Notification" requirements specified in Section 4 above. Figures 1 through 4 will aid the employees and the PPP Team to clearly identify the operations that are involved in the usage of EHS and the generation of hazardous waste within Bates College's operations. The name given to each production unit is identical to the names of production units used in the MEDEP's Pollution Prevention Progress Report.

5.3.1 Production Unit Ice Rink

The production unit for ammonia is identified as "Ice Rink" and consists of the ammonia

refrigeration system including the brine-filled piping that lies under the ice rink surface within the Underhill Ice Arena. Figure 1 illustrates the process flow diagram and chemical pathway of ammonia. This is the only location at Bates College that uses ammonia.

5.3.2 Production Unit C

Production Unit C consists of the student labs and chemical stockrooms located in the Carnegie Science Building which include the Biology, Geology, and Environmental Studies Departments. These operations were included in this production unit because the majority of hazardous waste is generated in student labs and in chemical stock rooms having outdated or expired chemicals.

5.3.3 Production Unit D

Production Unit D consists of the student labs and chemical stockrooms located in the Dana Chemistry Building which houses the Chemistry Department. Similar to Production Unit C, these operations were included in this production unit because the majority of hazardous waste is generated in student labs, and in chemical stock rooms having outdated or expired chemicals.

5.3.4 Production Unit P

Production Unit P consists of operations in the Physical Plant, Mail & Print Department and Olin Arts Building. Operations in these areas generate ignitable, toxic, and silver-containing hazardous wastes. Ignitable paints and solvents and ignitable compressed gases (aerosol cans) are generated in small quantities at Physical Plant. With the exception of a student-run Photography Club that generates spent fixer on a periodic basis, spent fixer wastes are generated from the operation of photographic developing machines located in the Olin Arts Building and Mail & Print Department. These wastes are now being processed in a licensed silver recovery unit located in the Olin Arts Building. Small quantities of spent toxic petroleum naphtha are generated in the solvent degreaser located in the Olin Arts Building.

6.0 TRACKING AND REPORTING REDUCTIONS

It is imperative that any campus involved in reductions of EHS usage and hazardous waste generation maintain effective and thorough record keeping in order to track the status of all reduction efforts and to produce accurate biennial Pollution Prevention Progress Reports. The TUR Coordinator will be responsible for obtaining the reduction information from the annual Maine Chemical Inventory Reports and Hazardous Waste Manifests. Through the use of tracking forms discussed in this section, the TUR Coordinator will keep the Pollution Prevention Planning Team informed of the reduction levels for each production unit.

6.1 EHS Usage Baseline

For a baseline value, the TUR Law requires a campus to use the average usage of the EHS that was reported on the Maine Chemical Inventory Report during the years 1990 and 1991 or during the first year reporting is required, whichever is earlier. Bates College first reported an average of 750 pounds of ammonia used in the ammonia refrigeration system on the 1995 Maine Chemical Inventory Report. Therefore, 750 pounds represents the baseline amount of which all future reductions of ammonia will be based on. Since the ammonia refrigeration system is a closed loop the average amount used in the system has been reported each year as 750 pounds.

6.2 Hazardous Waste Generation Baseline

MEDEP's Reduction Guidelines allows Large Quantity Generators of hazardous waste to use as a baseline year either the average amount of hazardous waste generated during 1987 and 1989 or a baseline year that is more representative of the hazardous waste generation activity. Bates College selected 1988 and 1989 as the most representative baseline years for hazardous waste generation. The average amount of hazardous waste generated during these two years is used in the reduction formula to calculate past and present reductions. Hazardous waste generated in the three production units above can be broken down into the following four categories:

- Biopacks; laboratory waste generated from operations within Production Unit C
- Chempacks; laboratory waste generated from operations within Production Unit D
- Waste ignitable paints and solvents and toxic-based solvent degreaser liquids; generated from operations within Production Unit P; and
- Waste fixer solutions are also generated from operations within Production Unit P.

The baseline quantities of each of these categories are listed in Table 1. These quantities were taken from the Hazardous Waste Manifests that accompanied each shipment of hazardous waste during 1988 and 1989.

Table 1.0 – Baseline Quantities of Average Hazardous Waste Generated in 1988/89

Waste Category	Production Unit	Waste Code(s)	Quantity (Pounds)
Biopacks	C	Various	2,040
Chempacks	D	Various	2,349
Waste Ignitable Paints and Solvents	P	D001	1,190
Waste Corrosive and Toxic Liquids	P	D002, D011	1,600

6.3 Current Distribution of Hazardous Waste Generation

Table 2.0 illustrates the distribution of hazardous waste generated during 2003 and 2005 from operations within Production Units C, D and P. This table is used to perform the employee training and notification requirements specified in Section 4.0 and to assist the PPP Team in current and future reduction strategies.

Table 2.0 – Hazardous Waste Generation Distribution During 2003 and 2005

Waste Category	Prod. Unit	Waste Code(s)	2003 Quantity (Pounds)	2003 % of Total	2005 Quantity (Pounds)	2005 % of Total
Biopacks	C	Various	663	20	588	23
Chempacks	D	Various	1,424	42	1,283	50
Waste Flammable and Combustible Liquids	P	D001, D039	277	8	228	9
Waste Corrosive and Toxic Liquids	P	D001, D002, D011	1,000	30	450	18
		Total:	**3,364**	**100**	**2,549**	**100**

6.4 Hazardous Waste Disposal Costs

During 2005 Bates College expended approximately $21,570 for the disposal of hazardous waste (including universal waste). In the future the amount is expected to be even less due to the implementation of the reduction options listed in Section 7.3.3.

6.5 Reduction Goals

No reduction goals for ammonia have been established since there is no known, safer, cost-effective alternative for ammonia in the refrigeration system of the ice arena. The ammonia is in

a closed-loop system and is typically not released during normal operations. The PPP Team will continue to evaluate other options as they become available. Bates College established 30%, 40% and 50% hazardous waste generation reduction goals for January 1st of 2002, 2004 and 2006, respectively.

The percent reduction of hazardous waste generation is calculated by computing the Activity Production Index (API) and using that index to normalize the production unit figures over the course of the reporting year. The API is equal to the campus's Unit of Product for each production unit during the reporting year divided by the Unit of Product during the baseline year. The baseline year hazardous waste Unit of Product for Bates College is the average number of students attending during 1988 and 1989, which was 1,525. The API accounts for years where the Bates College enrollment may be below or above the typical level. It is used to adjust the hazardous waste generation in relation to the typical enrollment. In the 2004 Pollution Prevention Reports (for waste generated in 2003), a different API was calculated for each waste stream based on student enrollment in the classes. For example, the number of chemistry students was used for Production Unit C. However, Bates concluded that this level of production unit analysis was difficult to track and did not provide additional accuracy. With approval from the MEDEP, this resulted in Bates College submitting a revised 2004 Hazardous Waste Reduction Report during July of 2006. Therefore, Bates College has used the complete student populations for the API calculations for 2004 and 2006 reduction reports.

The student population in 2003 and 2005 was 1,720 and 1,726, respectively. These values result in a 2003 and 2005 API of 1.13. The Adjusted Amount (AU) calculation is the normalization of the campus's hazardous waste generation with its API. The Percent Reduction formula utilizes these normalized amounts in the calculation of the final reduction figures. A negative reduction number indicates a decrease in the amount of hazardous waste generated, where a positive number indicates an increase. The formulas used to calculate the API and percent reductions achieved are listed in Figure 5 for EHS usage and hazardous waste generation.

Figure 5

Toxic Use Reduction Formulas

$$API = \frac{\text{Reporting year production}}{\text{Baseline year production}}$$

(AU) Adjusted Amount of Toxic Used

$$AU = \frac{\text{Pounds of toxic used in report year}}{\text{API report year}}$$

(% Tox Red) Percent Reduction of Toxic Used

$$\%\ \text{Tox Red} = \frac{\text{AU - Pounds of toxic used in base year}}{\text{Pounds of toxic used in base year}} \times 100$$

Hazardous Waste Reduction Formulas

(API) Hazardous Waste Generated

$$API = \frac{\text{Reporting year production}}{\text{Baseline year production}}$$

(AU) Adjusted Amount of Hazardous Waste Generated

$$AU = \frac{\text{Pounds of waste generated in report year}}{\text{API report year}}$$

(% HW Red) Percent Reduction of Hazardous Waste Generated

$$\%\ \text{HW Red} = \frac{\text{AU - Pounds of waste generated in base year}}{\text{Pounds of waste generated in base year}} \times 100$$

6.5.1 Reductions Realized

By January 1st of 2002, Bates College was successful in reducing its hazardous waste generation by -47% from its baseline years of 1988 and 1989, surpassing the -30% reduction goal that was established by the Campus for 2002.

During 2003 Bates College reduced hazardous waste generation between -45 and -79% with an overall average of -58%, which exceeded the voluntary goal for January 2004 of -40%. The largest reduction was in flammable and combustible liquids in Production Unit P. This reduction was due to the replacement of metal parts cleaners that used ignitable solvents with metal parts cleaners that used bacteria-based liquid that once spent, were disposed as non hazardous waste. Table 3 summarizes the reduction in hazardous waste generation achieved in 2003.

Table 3.0—Hazardous Waste Generation Reduction in 2003

Waste Category / Production Unit	Waste Code(s)	1988/1989 Baseline (pounds)	2003 Quantity (pounds)	2003 API	2003 AU (pounds)	2003 % Reduction
Biopacks (C)	Various	2,040	663	1.13	587	-71
Chempacks (D)	Various	2,349	1,424	1.13	1,260	-46
Waste Flammable and Combustible Liquids (P)	D001, D039	1,190	277	1.13	245	-79
Waste Corrosive and Toxic Liquids (P)	D002, D005, D007, D011, D008	1,600	1,000	1.13	885	-45
	Total:	**7,179**	**3,364**		**3,021**	**-58**

During 2005, Bates College experienced between -52 and -83% reduction in hazardous waste generation with an overall average of -68%, which exceeded the voluntary goal set for January 2006 of -50%. As was the case in 2003, the largest reductions were in Production Unit P. This was due to the purchase of water-based paints and environmentally-friendly solvents and cleaning products in Physical Plant, and the installation of a licensed silver recovery unit in the Olin Arts Building. Table 4 summarizes the reduction in hazardous waste generation achieved in 2005. From 2003 to 2005, the annual cost for disposing of hazardous waste (including universal waste) was reduced from $71,474 to $21, 577 or by 69.8%.

Table 4.0—Hazardous Waste Generation Reduction in 2005

Waste Category/Production Unit	Waste Code(s)	1988/1989 Baseline (pounds)	2005 Quantity (pounds)	2005 API	2005 AU (pounds)	2005 % Reduction
Biopacks (C)	Various	2,040	588	1.13	535	-73
Chempacks (D)	Various	2,349	1,283	1.13	1,135	-52
Waste Flammable and Combustible Liquids (P)	D001, D039	1,190	228	1.13	202	-83
Waste Corrosive and Toxic Liquids (P)	D002, D005, D007, D011, D008	1,600	450	1.13	398	-75
	Total:	**7,179**	**2,549**		**2,270**	**-68**

6.6 Record Keeping

Information from the Maine Chemical Inventory Report and the Hazardous Waste Manifests are tracked each year and used to complete the Progress Reports. The average amount of ammonia that is reported in the Maine Chemical Inventory Report is not expected to change from year to year and should not be difficult to track.

Due to the large number and various types of hazardous waste streams generated in the three production units, each hazardous waste shipment is recorded in an Access database. The database is designed to record the following information from each shipment: Manifest Tracking Number, Department of Transportation (DOT) Shipping Name, DOT Hazard Class, DOT Packing Group, Waste Codes, and the source generating the waste. At the end of every six months, the four hazardous waste categories (listed in Table 2.0) are analyzed by the PPP Team in order to determine the reduction status of each waste category. At the end of years 2003 and 2005, the information from this database was used to complete the biennial Pollution Prevention Progress Reports. The TUR Coordinator will be responsible for ensuring the database is kept up to date.

6.7 Reporting

The MEDEP requires facilities that are subject to the TUR Law to report its reduction progress in the Progress Reports. Bates College is required to submit a Progress Report for reductions in EHS usage and for reductions in hazardous waste generation. Bates College completes the report in an electronic file that is supplied by the MEDEP. Copies of past reports are included in

Appendix B.

The TUR Coordinator is responsible for completing the Progress Reports and sending them along with the associated fees to the MEDEP. The TUR Coordinator is also responsible for sending a copy of these reports to the City Clerk at the City of Lewiston, Maine.

7.0 IDENTIFICATION, ANALYSIS, AND EVALUATION OF REDUCTION OPTIONS

In accordance with Section 2305 (2) of the TUR Law, Bates College identifies, analyzes, and evaluates any technology, process, procedure or equipment change necessary to achieve reductions with the following hierarchy of reduction options:

- improved operation controls
- input substitution
- process redesign
- reuse and on-site recycling of hazardous waste
- waste minimization
- waste segregation
- improved waste characterization
- treatment of hazardous waste to reduce volume and/or toxicity, and
- off-site recycling of hazardous waste.

Typically, Bates College attempts to utilize those reduction options that provided the greatest amount of reduction with the smallest amount of impact to academic activities. Each of the above reduction options is described below.

Improved Operation Controls

Improved operation controls can include many reduction techniques, ranging from better purchasing and inventory controls to the adoption of good-housekeeping techniques. This is the first and one of the easier reduction options implemented by Bates College because many times it involves little additional effort to implement and does not reduce the efficiency of Bates College. Training is key in the success of this chosen reduction option.

Input Substitution

Input substitution is the substitution of a hazardous chemical with a less hazardous chemical. The PPP Team is continually searching for less hazardous chemicals that can be substituted in their chemical laboratories, solvent degreaser and maintenance operations. Input substitution not only reduces the risks associated with exposure to chemicals, it also can be attributed to reducing the quantity of hazardous waste being generated.

Process Redesign

Process redesign consists of changing the way the product (or laboratory experiment) is produced to achieve an overall reduction in the use, release, and waste generation during the process. Due to the sometimes complex operations involved in a laboratory activity at Bates College and the amount of money that has already been invested in present equipment, this option can be difficult to implement. Bates College will be evaluating several types of this reduction option including the implementation of microchemistry, changing to digital photography and the treatment of hazardous chemicals or waste in laboratory experiments to a less hazardous state.

Reuse and On-site Recycling

Reuse and on-site recycling of extremely hazardous substances and hazardous materials can be a cost-effective reduction option because it can increase the life of these materials, thereby reducing the amount of raw material purchased for the process or activity as well as decreasing the quantity of extremely hazardous substances and hazardous materials requiring disposal. The recycling of ammonia in the closed-loop refrigeration system is an example of a toxic chemical being reused within a process.

Waste Minimization

The reduction option of waste minimization was and continues to be scrutinized closely by Bates College because it sometimes is not difficult or expensive to implement. Waste minimization is the process by which all processes generating a waste stream are examined closely for excess waste generation. Improved procedures, more efficient equipment, and training are implemented in the operation to minimize the amount of waste being generated. During the early years of the MEDEP TUR Program, it was clearly evident that waste minimization was an area where significant reductions in waste generation could occur.

Waste Segregation

Waste segregation is the process of separating different waste streams to avoid the commingling of incompatible wastes or wastes of different disposal destinations. It is a reduction option that can be applied to most facilities generating more than one waste stream. Proper segregation of incompatible wastes results in the avoidance of any potentially dangerous chemical reactions that could cause human injury or damage to the environment. Whenever wastes of different disposal destinations become commingled in a container, Bates College will

pay the disposal cost for the most expensive component of the wastes. A higher degree of waste recycling can be achieved when waste is properly segregated.

Improved Waste Characterization

This reduction option, which involves the proper disposal characterization of each waste stream, minimizes the occurrence of hazardous waste becoming mixed with non hazardous waste and improperly shipped to a disposal facility that is not licensed to receive it. Proper waste characterization identifies the correct classification of a waste stream based on its source of generation, chemical composition and characteristics, and MEDEP and EPA solid and hazardous waste disposal regulations.

Significant penalties and long-term liabilities can result from the improper characterization of hazardous waste. Not only could a campus be subject to significant environmental fines for the illegal labeling, shipping, and disposal of hazardous waste, it also could experience third-party lawsuits if the final destination location of the waste caused damage to human health or the environment.

Treatment of Hazardous Waste to Reduce Volume and/or Toxicity

The Environmental Protection Agency defines "treatment of Hazardous Waste" as:

> *"Treatment means any method, technique, or process, including neutralization, designed to change the physical, chemical, or biological character or composition of any hazardous waste so as to neutralize such waste, or so as to recover energy or material resources from the waste, or so as to render such waste non hazardous, or less hazardous; safer to transport, store, or dispose of; or amenable for recovery, amenable for storage, or reduced in volume."*

The definition of treatment is very broad and general and can apply to many process activities that are associated with hazardous waste. Some forms of treatment are not allowed by the MEDEP, such as evaporation of hazardous waste. For most treatment activities, licenses or abbreviated permits are required by the MEDEP prior to the initiation of treatment. Some of these can be very time consuming and expensive to acquire. In some cases, the amount of reductions achieved and cost savings realized far out weigh the effort and cost expended. Examples of treatment include: solvent distillation, elementary neutralization, aerosol can depressurization, and chemical precipitation.

Off-site Recycling of Hazardous Waste

Recycling of hazardous waste is considered low on the hierarchy of reduction techniques because the waste is still generated on-site and must be shipped offsite to be recycled. More efficient recovery of hazardous waste is more likely to occur at the point of generation rather than off-site. Off-site recycling increases the amount of waste handling and costs of waste management. Off-site recycling of hazardous waste is currently being implemented with the spent solvent generated from the metal degreasing unit located in the Olin Arts Department.

7.1 Reduction Options Evaluated

Bates College has spent considerable time and money evaluating reduction options in an attempt to decrease the quantity of hazardous waste generated on campus. Several options are currently being evaluated, some have been found to be feasible and cost effective and are waiting to be implemented. The PPP Team evaluates reduction options every six months and solicits ideas and suggestions from its employees. This section includes reduction options that have been evaluated by the PPP Team.

7.1.1 Improved Inventory Control

Due to the large quantities of hazardous waste being generated in student labs (a total of 3,471 pounds or 75% of total hazardous waste generated during 2003; this has been reduced to 1,871 pounds or 73% of the total hazardous waste generated during 2005), the PPP Team evaluated the process by which laboratory chemicals are purchased, stored, inventoried, distributed and discarded (once expired). Significant numbers of chemicals were being discarded due to their expiration in shelf-life or because of no longer being needed. Due to lack of inventory and distribution control, many chemicals were found to be over bought and later discarded from lack of use. The PPP Team implemented a new inventory control system for chemical stock rooms located within Production Units C and D. The purchase, inventory and distribution of chemicals is currently being controlled by a Stock Room Clerk that has been assigned to each stock room. All student lab professors, AIs, and students must order, request and pickup chemicals through the Stock Room Clerk. This has created the following benefits:

- greater utilization of chemical inventories prior to the purchase of new chemicals, which has resulted in fewer expired or off-spec chemicals being discarded as hazardous waste
- fewer chemicals being stored in stock room resulting in safer working conditions
- disposal of expired highly reactive chemicals
- reduced hazardous waste disposal costs

- fewer unknown chemicals being discarded resulting in a reduction in analytical costs and easier waste stream characterization.

The implementation of this reduction option is difficult to quantify but has played a role in reducing laboratory waste from its baseline years (average 1988 & 1989).

7.1.2 Waste Segregation

Students working in student labs have been trained by student lab professors and AIs in the proper segregation of laboratory waste. This has caused a reduction in the commingling of hazardous and nonhazardous wastes resulting in an overall reduction of student lab hazardous waste generation. In accordance with the MEDEP Hazardous Waste Regulations, whenever hazardous and nonhazardous wastes are combined in one container, the total contents of the container must be managed as a hazardous waste.

7.1.3 Improved Waste Characterization

The TUR Coordinator has implemented a campus-wide review of the characterization of all waste streams. Each waste stream is reviewed for its proper waste characterization and waste codes. This and additional information of the source(s) generating each waste stream are documented. Each continual waste stream is reviewed on an annual basis in order to determine if its characterization has changed. All new waste streams are reviewed by the EH&S Technician and are properly characterized for disposal. Spent photographic developing solutions (D002) generated in Carnegie Science, Dana Chemistry and Mail & Print have been reevaluated and were found to not meet the corrosivity characteristic (D002). This resulted in the spent developing solutions being disposed as non hazardous waste resulting in a reduction of hazardous waste generation.

7.1.4 Substitution of Solvent Degreasers

The PPP Team evaluated the substitution of solvent degreasers used in Production Unit P with a bacteria-based degreaser. After several trial runs in the Motor Pool Garage and Plumbing Department, the bacteria-based degreasers were found to be just as effective as the solvent degreaser. The advantages of the bacteria-based degreaser are the total elimination of hazardous ignitable solvents and emissions of volatile organic compounds.

This substitution resulted in a reduction of 640 pounds of waste ignitable degreasing solvent (D001, D018, D039), which represented 11% of the total hazardous waste generated on campus during 2002. In addition, this substitution also eliminated emissions of volatile organic

compounds from each degreasing unit which resulted in the units being delisted from Bates College's Air Emission License. Prior to the substitution of these two degreasing units in the fall of 2002, this waste stream represented approximately 30% of the total hazardous wastes generated on campus.

During 2005, one of the two bacteria-based degreasers was removed in the Plumbing Department because it was no longer needed. The other bacteria-based degreaser was replaced with a petroleum-based degreaser, named Zep Dyna 143. This degreaser has a flash point of greater than 140^{o}F and a vapor pressure of less than 1 mm of mercury. The flash point allows the spent solvent to be disposed as non hazardous waste while the low vapor pressure allows the degreasing unit to meet the requirements of a cold cleaning machine as specified under Section 3E of Chapter 130 of the MEDEP Air Regulations.

7.1.5 Installation of Silver Recovery Unit

The TUR Coordinator has obtained an abbreviated permit (#O-000223-HT-A-N) from the MEDEP to operate a silver recovery unit in the Photography Department of the Olin Arts Building. The silver recovery unit processes the spent fixer (typically a hazardous waste due to silver (D011)) generated from photography developing operations occurring in the Photography Department, Mail & Print and in the various dark rooms utilized by the student Photography Club in Dana Chemistry and Carnegie Science buildings. The silver recovery unit captures the silver in the spent fixer onto the silver recovery cartridge and discharges the non hazardous waste effluent into the municipal sewer system. Prior to the silver recovery cartridge becoming saturated, it is removed by the recycling vendor, Evolve Technologies of Salem, New Hampshire, and replaced with a new cartridge. The spent cartridge does not exceed the TCLP limit for silver and therefore is shipped offsite as non hazardous waste to a silver-recovery facility. Periodic testing of the silver recovery cartridge and effluent of the silver recovery unit is conducted to ensure proper characterization of the spent cartridge and the effluent limitation (for silver) of Bates College's Industrial User Permit is not exceeded. This silver recovery unit will result in the total elimination of spent fixer solution being shipped offsite as hazardous waste. During 2003 and 2005, a total of 800 and 450 pounds, respectively, were shipped offsite as hazardous waste.

7.1.6 Installation of Microchemistry Equipment

Bates College Chemistry Department has evaluated the reduction option of installing

microchemistry equipment in place of the existing chemistry equipment. During 2002, lab pack waste represented 75% of the total hazardous waste generated. Microchemistry equipment allows student lab experiments and research to be carried out on a micro scale as compared to existing methodologies. Significant reductions in chemicals stored and used at Bates College would be realized with microchemistry resulting in safer chemical stock rooms and significant reductions in laboratory wastes. The evaluation concluded that the changeover to micro scale equipment would need to occur on a department-wide or campus-wide basis in order to be feasible. The costs to convert the present laboratory equipment are currently prohibitive and are not expected to be reduced in the near future. Based upon these reasons, the Chemistry Department decided to not implement this reduction option at this time.

7.1.7 Improved Packaging of Hazardous Waste

Until November of 2004, Bates College had most of its laboratory hazardous waste packaged in lab packs by its waste disposal contractor. Bates College changed waste disposal contractors and hired Environmental Projects, Inc. (EPI) of Gray, Maine during the Fall of 2004. EPI offered a more economical method for disposing of laboratory wastes. Instead of packaging the waste in lab packs, EPI showed the college that the laboratory waste could be combined safely in bulk packaging (i.e., 55 gallon drums). For this change in waste packaging to take place safely, close communication with the laboratory professors and EPI was required. This resulted in the waste disposal contractor removing hazardous waste from the college every 3 months as opposed to every month. The quantity of laboratory hazardous waste shipped offsite was reduced by 48% within one year's time contributing to an approximate 69% reduction in overall hazardous waste disposal costs.

7.1.8 Substitution of Hazardous Chemicals with Less Hazardous Chemicals

Department chairpersons, research students and student lab professors of Dana Chemistry and Carnegie Science have worked together to substitute hazardous chemicals with less hazardous chemicals whenever possible while developing student lab experiments. Although difficult to quantify, this practice will result in long term reduction of hazardous waste generated in laboratories.

The Biology Department has found a less toxic substitution for formaldehyde called Foralternate and has integrated it into its operation. The Facilities Department within Physical Plant is responsible for substituting oil-based paints with water-based paints, petroleum-based solvents

and cleaners with environmentally friendly solvents and cleaners. This has resulted in a reduction from 262 pounds of hazardous waste generated during 2003 to no hazardous waste generated during 2005.

7.2 Reduction Options Implemented

As described in the previous section, the following reduction options have been implemented at Bates College:

- Improved inventory control in the Carnegie Science and Dana Chemistry Buildings
- Waste segregation in laboratories generating hazardous wastes
- Improved waste characterization throughout the campus
- Substitution of solvent degreasers in the Motor Pool and Plumbing Department.
- Installation of licensed silver recovery unit to treat spent fixer generated from photographic developing operations
- Improved packaging of hazardous waste
- Substitution of hazardous chemicals with less hazardous chemicals.

7.3 Reduction Options Currently Being Evaluated

The PPP Team is constantly evaluating reduction options that are suggested by faculty, students and employees. During semiannual reduction meetings the PPP Team discusses each reduction option and the progress made in the evaluations. Not only are the potential hazardous waste reductions evaluated but the cost-effectiveness, degree of difficulty implementing the option in the current operation(s) and its overall impact on the safety and health of employees and students as well as to the environment, are also evaluated.

7.3.1 Incorporating Waste Destruction Techniques in Student Lab Experiments

The student lab professors and AIs continue to evaluate the reduction option of incorporating waste destruction procedures in student lab experiments. The object of this option is to reduce the amount of hazardous waste generated from student lab experiments. The PPP Team is working close with student lab professors and AIs to incorporate neutralization of wastes, precipitation of heavy metals from wastes and other forms of treatment into each student lab experiment. This will teach students the importance of breaking down the toxicity and hazards associated with student lab wastes prior to discarding it into waste containers. Special attention is being given to the Environmental Protection Agency's definition of "treatment" and "process." If successful, significant reductions in the quantities and toxicity of laboratory wastes can be realized.

7.3.2 Substitution of Hazardous Chemicals and EHS with Less Hazardous Chemicals

The PPP Team continues to work closely with student lab professors and AIs in substituting less hazardous chemicals for hazardous chemicals that are currently being used. For some wastes, this will result in the characterization of laboratory wastes being changed from hazardous waste to non hazardous waste. The PPP Team is continuing to evaluate the substitution of ammonia gas used in the ammonia refrigeration system in Underhill Arena for a non-EHS chemical. The use of ammonia gas in these types of systems has a proven safety record and no substitute for ammonia that is feasible and cost effective has been found to date.

7.3.3 Replacing Solvent Degreaser with a Non Hazardous Waste Solvent Degreaser

The PPP Team is planning to meet with professors in the Olin Arts building where a solvent degreaser is used in the metal etching operations. The PPP Team will encourage the substitution of the current solvent degreaser (which is shipped offsite for recycling as hazardous waste (D039)) with Zep Dyna 143, a non hazardous solvent. If successful, this hazardous waste stream, which represents the only remaining hazardous waste stream shipped offsite from Olin Arts and 9% of the total hazardous waste generated on campus, will be eliminated.

7.3.4 Investigating Recycling Markets for Hazardous Waste

Due to the wide variety and small quantities of hazardous waste generated in the laboratories, no commercially viable markets have been found to date. The PPP Team will continue to search for such markets at trade shows, trade magazines, vendors and peers from other educational institutions.

8.0 SCHEDULE FOR POTENTIAL IMPLEMENTATION OF REDUCTION OPTIONS

Since Bates College has been successful in reducing its hazardous waste generation to below 2,640 pounds, it is exempt from the hazardous waste reduction requirements specified in the TUR Law. However, through the implementation of some or all of the above reduction options, Bates College anticipates that it can achieved an additional 5 percent reduction in hazardous waste generation by the end of 2007. The schedule below for the potential implementation of the existing and proposed reduction options is totally voluntary and may be updated periodically by the TUR Coordinator.

Reduction Option	**Referenced in Section**	**Proposed Date Reduction Option Will be Evaluated**
Incorporating waste destruction techniques in student lab experiments	7.3.1	In progress
Substitution of hazardous chemicals and EHS with less hazardous chemicals	7.3.2	In progress
Replacing solvent degreaser with a non hazardous waste solvent degreaser	7.3.3	September, 2006
Investigating recycling markets for hazardous waste	7.3.4	In progress

APPENDIX A

Maine's Toxic Use and Hazardous Waste Reduction Law

APPENDIX B

MEDEP Biennial Pollution Prevention Progress Reports