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Pollution Prevention Plan

University of Maine System

THE UNIVERSITY OF MAINE

POLLUTION PREVENTION PLAN

Prepared by
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1. Statement of Management Commitment

The University of Maine is committed to protecting the environment. Our goal is to fulfill our mission as a flagship academic and research university with the minimum impact practical on the air, water, and land of the State of Maine. By adhering to responsible chemical management, pollution prevention, and hazardous waste minimization practices the university can achieve cost savings, improve the quality of our programs, maintain a safe and healthy workplace, and protect the environment.

Environmental protection is both a management and employee responsibility. Deans, directors, and department heads are expected to incorporate the university's goals of toxics use reduction, pollution prevention, and waste minimization into individual organizational goals, and to provide support and impetus toward achieving those goals. All faculty, staff, and others compensated by the university, regardless of job function, are responsible for environmental protection in the conduct of their own work, in the same manner that they are responsible for productivity, service, safety, and academic excellence.

To assist and guide the university in attaining these objectives, the Department of Safety and Environmental Management and the Safety and Environmental Management (SEM) Committee, are hereby delegated the authority to seek and obtain the assistance and participation of all affected academic and administrative departments in fulfilling their mission of minimizing the use of toxic substances and their consequent release or disposal.

Janet Waldron, Vice President for Administration and Finance — Date 12/16/11

Wayne Maines, Director of Safety and Environmental Management (SEM) — Date 12/16/11

2. Background

The concept of toxics use reduction and waste minimization are not new ideas. Waste minimization was first mandated in 1984 by the Hazardous and Solid Waste amendments to the Resource Conservation and Recovery Act. In 1990 the Maine legislature passed Maine's Toxic Use Reduction Act (TURA). TURA required the University to develop a plan to reduce the use of toxic substances and to reduce the quantity of hazardous wastes produced.

The University of Maine's Pollution Prevention Program (established in 1994 under the title Toxics Use and Hazardous Waste Minimization) requires all university personnel to participate in reducing the university's environmental impact. The program is designed to progressively and systematically reduce the total amount of toxic substances used and hazardous wastes produced throughout the University.

3. Introduction

The University of Maine Pollution Prevention Program has been developed by the Toxics Use and Hazardous Waste Minimization Planning and Implementation Team at the Department of Safety and Environmental Management as an effective and ongoing minimization program. During the development of the plan, members of the university and surrounding community were invited to participate. Both Chemical Safety Subcommittee and SEM committee approval were sought and received. In 1997 the Plan was signed by President Frederic Hutchinson making it official University Policy.

Under the Pollution Prevention Plan, minimization strategies are divided in to three categories:

1) Reduce the use of toxic substances whenever possible.

2) Prevent the release of environmentally toxic and/or bioacumulative substances into the environment.

3) Minimize the quantity and toxicity of hazardous wastes produced.

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

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

4. Responsibilities

University of Maine President

- Provide the legally required statement of facility-wide management commitment regarding toxics use, toxics release, and hazardous waste reduction.
- Review for approval the Environmental Health and Safety Committee policy and procedural recommendations for reduction of the use of toxic substances and the generation of hazardous waste at the University of Maine and all of its remote sites.

Vice President for Administration and Finance

- Ensure funding for environmentally responsible hazardous waste disposal.
- Encourage proposals for alternate processes where practical and feasible to reduce the use and subsequent disposal of toxic materials.

Department of Safety and Environmental Management

- Work with the Environmental Health and Safety Committee to develop policies to minimize the use of toxic substances and the generation of hazardous waste.
- Manage the chemical redistribution program.
- Assess the use of toxic substance and propose alternative processes, where possible.
- Coordinate the efforts of the Planning Team in identifying reduction objectives and suggesting strategies for pollution prevention.

Deans, Directors, and Department Heads

- Assimilate the University's goals of toxics use reduction, pollution prevention, and waste minimization into individual organizational goals, and provide support and impetus toward achieving those goals.
- Support the reuse program within their departments, encourage responsible local management, and promote the use of less toxic materials or reduced quantities where feasible.

Employees

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

5. Goals

5.1 Statewide Goals

During the 1999 reauthorization of the Toxics Use Reduction Act, statewide reduction goals were set and each industry was tasked with setting their own reduction goals.

Category	Base Years	Goal 2002	Goal 2004	Goal 2006
Toxics Use	1990	40%	50%	60%
Toxics Release	90/91	40%	50%	60%
Hazardous Waste	87/89	40%	50%	60%

5.2 Facility Goals

The 1999 TURA amendments allow each facility to set their own individualized reduction goals. The only required reduction category to be set for the University is Use Reduction. However, reduction is encouraged wherever practicable in all categories.

Category	Description	Base Years	Goal 2002, 04, 06, 08, 10 & 12
Toxics Use	SARA Title III, Section 312 EHS>TPQ	1990	SEM usage has already been reduced to the minimum practical.
Toxics Release	SARA Title III, Section 313 Releases [1]	N/A	Reduce mercury in effluent to below 50ppt.
Hazardous Waste	Hazardous Wastes Generated [2]	87/89	Reduce hazardous waste generation where practical with focus on reducing unused chemical wastes.

The University, because of the nature of research, is unable to further reduce Toxics Use. Great efforts have been made to reduce Toxics storage and several Extremely Hazardous Substances have been reduced to below the reporting thresholds. Unfortunately, at this time any further reductions are not considered practicable and would likely interfere with research efforts. However, reductions at the individual laboratory level are strongly encouraged.

6. Production Units

The University of Maine is a research and teaching institution. Over the last ten years, teaching laboratories have made considerable efforts to reduce their use of hazardous materials, thus making the research laboratories our primary chemical users and waste producers.

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[1] The University is not required to report releases under SARA Title III Section 313, therefore reduction goals for releases are not required, and however, mercury has been targeted for release reduction.

[2] Research process waste is exempt from planning, reporting and fee requirements under the TURA Pilot Plant Exemption. (*q.v.*, §2304-A(2)(H) and § 2301(10)).

6.1 Research Process

The Process Flow Diagram in Appendix A describes the path of a hazardous material through the campus "Research Process." Hazardous materials controls, such as annual chemical inventories and regular waste pickups, are used to facilitate responsible chemical management and timely hazardous waste disposal.

The "Research Process" is complicated and has a propensity for taking unpredicted turns, often resulting in unused and outdated chemicals. In studying the "worst" environmental problems the "worst" environmental pollutants are needed, yielding unrewarding use reduction results. Rigid laboratory standards must be maintained; chemicals must be discarded at the least suspicion of contamination.

Because the "Research Process" is so often incompatible with reduction efforts, the legislature provided the Pilot Plant Exemption for small-scale processes undertaken to test or develop new technologies.

6.2 Selection of Production Unit

The uncertainty of the research process and the lack of a measurable result severely limit the selection of a production unit. In fact it is unlikely that any of the original research projects running during the baseline years are still functioning at all; and certainly none of the same experiments are being conducted. In actuality the University Production Unit changes from year to year as each older process is replaced by new processes.

Further the University contains hundreds of small laboratories with relatively small amounts of chemicals, each carrying out different individual experiments. In addition within a laboratory the experiments tend to change depending on the results of each preceding experiment. All of these facts make it difficult for us to devise a production unit.

In order to simplify the selection of a production unit, the University has adopted the DEP's recommended production unit for Universities – student enrollment. Student enrollment is consistent from year to year and provides a convenient baseline to measure the University's growth or decline. Student enrollment is measured in Full Time Equivalents (FTE).

7. Minimization Methods

Each minimization strategy targets one or more of the following objectives: use reduction, waste minimization, or release reduction. Use reduction is always considered first when dealing with environmental pollutants. Waste minimization is appropriate whenever a toxic chemical cannot be eliminated and must not result in an increase in the release of hazardous materials to the environment.

In some cases further reduction is impractical or impossible. In which case, chemicals may be recovered for reuse or recycled by commercial waste processing companies. Unused chemicals from one lab can often be reused in another instead of being discarded, provided that they do not require any special processing before reuse. Waste metallic mercury, mercury lamps, and used degreasing solvents are easily recycled at commercial recycling facilities.

Many programs have some area where hazardous materials can be eliminated or waste can be reduced without adversely impacting our mission. All programs must consider pollution prevention whenever hazardous materials are used or wastes are generated. The University's fundamental minimization strategy is to encourage all personnel to take whatever actions are needed to ultimately reduce pollution. Communication is key to changing wasteful trends.

7.1 Input Substitution

Input substitution replaces a hazardous chemical constituent with a non-hazardous or less toxic materials in a procedure or experiment. The goal of input substitution is to reduce the use of hazardous chemicals. However, when planning experiments, consider the leftover materials, products, and by-products that will be generated as well.

Consider the following questions. Each no answer indicates a good candidate for input substitution. If none of these options are feasible then input substitution may be your only minimization option.

1) Will hazardous chemicals be ordered only in needed quantities?

2) Can the experiment be conducted without the generation of any disposal products?

3) Will the experimental products be neutralized as part of the experiment?

4) Can any material be recovered for reuse?

5) Can the process be modified to make the products less hazardous or easier to dispose of?

7.2 Targeting Specific Chemicals

Specific chemicals, procedures, or equipment are targeted for reduction analysis as feasible. Many chemicals are used in such small quantities that they are not likely to provide much savings in proportion to the time investment required in the detailed analysis.

Any chemical used or waste produced in large quantity, wastes that are expensive to dispose of, or chemicals for which substitutes are known may be targeted for reduction.

Prime candidates for targeting are chemicals, which require reporting under the SARA Title III Community Right to Know regulations. In fact some of these chemicals have been reduced to below the Threshold Planning Quantity since the inception of this program (e.g. Formaldehyde and Anhydrous Ammonia).

Other materials targeted include mercury compounds and mercury containing chemicals.

7.3 Process Modification

To the extent that it does not affect vital research, teaching, or service; experimental or standard processes may be modified to decrease the quantity of hazardous chemicals used or wastes generated. Process modifications include reduction in scale, chemical process changes, or improved efficiency resulting in the reduction on the use of hazardous materials or the generation of hazardous wastes.

Microscale experimental techniques are becoming increasingly popular in research and teaching labs. Reducing the scale of experiments and procedures reduces the quantity of hazardous waste products. Microanalysis techniques also greatly reduce the amount of waste generated in labs.

Chemical process changes include product reformulation and changes in protocols to decrease the use of hazardous chemicals and the generation of hazardous wastes.

Other modifications may improve the efficiency of the reaction or the equipment used. These may include improved maintenance, mechanical adjustments, improved housekeeping practices, updated equipment. Standard processes used in laboratories and service operations are should be periodically reviewed for potential modifications.

7.4 Equipment Modification and Upgrade

The University conducted a retrofit project to replace T-12 fluorescent lights with T-8. High efficiency ballasts were added at the same time. While there is no direct reduction in mercury wastes from this project on campus, the actual environmental impact is significant due to the mercury from energy generation.

Mercury thermometers were replaced in the major use chemistry labs.

When purchasing automated equipment, the use, type, and amount of hazardous waste generated by the machine should be included in the purchasing criteria.

7.5 Purchasing System

The University uses a centralized purchasing program that routes all hazardous materials purchases to the Purchasing Department for approval. Purchases are examined for the wasteful practices such as excessive orders (ordering more than actually needed) especially involving SARA Title III, Extremely Hazardous Substances. Questionable orders are routed to the Chemical Hygiene Officer for follow up.

It is common for the disposal cost of a chemical to exceed the initial purchase price. Hence it is strongly encouraged that chemicals be ordered in quantities no larger than will be used.

7.6 Inventory Control

A good chemical inventory is essential to effective ordering and restocking. Inventory control saves money by eliminating unnecessary chemical orders and reduces risk by minimizing chemical stockpiles (Note that keeping an inventory of all chemicals is also a legal requirement under the OSHA Hazard Communication regulations and a campus-wide inventory is completed on an annual basis).

Employees are encouraged to survey the chemicals in the work area and submit for redistribution those that are not needed or have not been used recently.

Laboratories having excess chemicals are encouraged to share with laboratories that are without (Under supervised dispensing), and only order what they can use in a year or less.

Rotating stocks of chemicals with expiration dates is encouraged to minimize chemical waste due to deterioration with age, or exposure to light or air.

Proper labeling of chemical containers is required eliminating the generation of unknown wastes.

7.7 Waste Management

Waste management is not a minimization technique, however, improper management can greatly increase the quantity of wastes produced. Additionally, potentially reusable or recyclable materials can be rendered useless by careless handling.

A substantial portion of the hazardous waste produced consists of unused, outdated chemicals. Careful planning of quantities of chemicals required can reduce costs to the laboratory and reduce waste volumes due to discards. When wastes cannot be avoided, proper segregation and characterization allow wastes to be redistributed for reuse if someone else in the University system can use the chemicals or sent off site for reuse or recycling.

- Do not mix wastes of different types.
- Do not mix hazardous wastes with non-hazardous waste.
- Label waste bottles as to their exact contents including all hazardous constituents.

Since some waste minimization options are cost effective only when viewed from a wider perspective, EH&S analyzes waste management options and cost savings measures from a University wide perspective.

7.8 Chemical Reuse Program

The Department of Safety and Environmental Management sponsors a University-wide Chemical Reuse Program. The intent of this program is to reduce the volume of unused chemicals currently being disposed of as hazardous waste, by making them available to researchers and others who can

use them. Chemicals must be uncontaminated and must be in their original containers to be considered for reuse. Unopened chemicals can usually be placed more easily because researchers don't have to worry as much about grade or purity.

Chemicals are placed into the Reuse Program by completing either a Chemical Pickup Form or a Chemical Reuse Form. The information on the form is used to enable someone who has a question about the age, origin or purity of the chemical to contact the original owner. Items for reuse are added to the University Surplus equipment list located on First Class

Materials submitted for chemical exchange remain on the inventory list for a minimum of 90 days. If unclaimed, chemicals are transferred to the hazardous waste inventory.

Small quantities (5 to 20 grams) of chemicals may be obtained through the Reuse Program. Chemicals, which an individual researcher indicates they are willing to supply to others at nominal, or no cost in small quantities (the chemical equivalent of "borrowing a cup of sugar from your neighbor") are also listed on the inventory.

7.9 Recycling

As a final step in minimizing the environmental impact of the University's operation, off site recycling of hazardous materials is possible in many cases. The most predominant off site recycling option is the reuse of solvents by off site recycling or reuse as a fuel substitute. Other recycling programs utilized are those used for mercury containing lamps or devices and rechargeable battery recycling.

7.10 Laboratory Neutralization

Some laboratories generate a simple, pure chemical stream, such as dilute acid or base that can be rendered non-hazardous by simple neutralization.

Permits are not required for neutralization of corrosive wastes. This is because neutralization of corrosive wastes has been specifically exempted by the DEP. Chemicals which can be neutralized, include those which are hazardous only due to pH or because they are corrosive to the skin. Acids or bases should be neutralized to $5.5 < pH > 9.0$ before drain disposal.

When the product is a hazardous waste for a reason other than corrosivity, state permits must be obtained before treatment. The expenses involved in obtaining these permits make other treatment methods cost prohibitive.

8. Employee Involvement and Training

All personnel are educated on the benefits of pollution prevention during their Basic Safety Training. Information on chemical management and minimization strategies is included as part of the required annual Basic Safety training conducted by Safety and Environmental Management and is included in the guidance for Chemical Hygiene Plans.

The Director of Safety and Environmental Management periodically distributes an email flier on pollution prevention to the campus community. This flyer encourages employees to research new

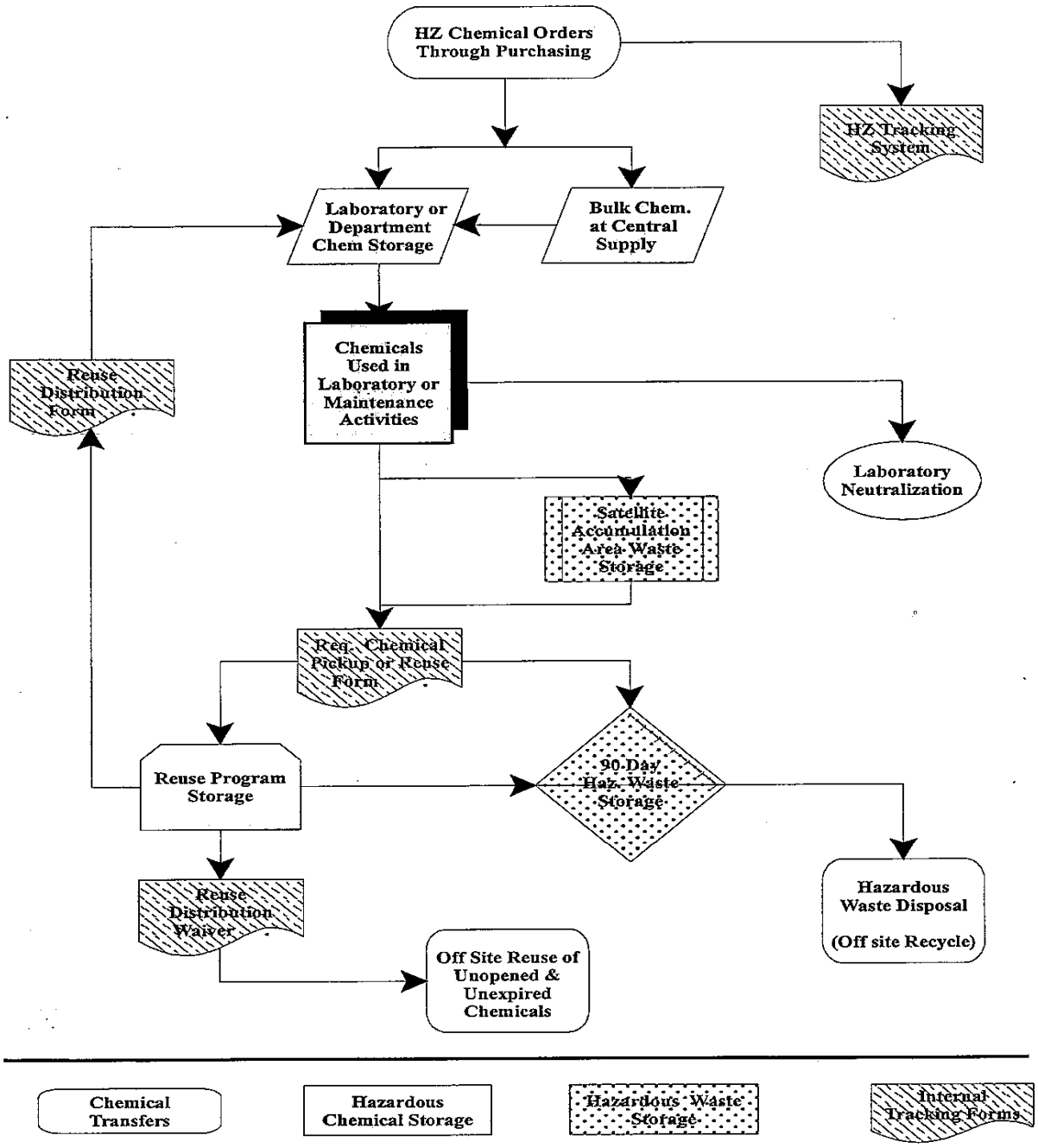
and innovative reduction techniques, to provide feedback on reduction techniques, and to participate in the pollution prevention planning process.

9. Progress Reports and Records Retention

Progress reports are generated every two years (in even numbered years) and are submitted to the Maine Department of Environmental Protection and the Town of Orono. The progress reports include our goals, progress achieved, methods used, explanation of progress, how employees are involved, future plans and a certification by a senior official. Copies of this plan and data to implement this plan are retained for five years and will be made available to the Maine Department of Environmental Protection upon request.

Appendix A

Process Flow Diagram



Appendix B

Request for Chemical Pickup Form

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Request for Chemical Pickup Form - MF11012

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Appendix C

Chemical Reuse Form

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Chemical Reuse Form – MF09036

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