Shepherd
UNIVERSITY

School of Natural Sciences & Mathematics

Waste Minimization Plan

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INTRODUCTION

Shepherd University is classified as a Small Quantity Generator (SQG) by the United States Environmental Protection Agency (EPA). As an SQG, Shepherd University must certify, when signing a hazardous waste manifest, that a "good faith effort" has been made to reduce the volume and toxicity of the hazardous wastes it generates. Although neither Shepherd nor the School of Natural Sciences & Mathematics (SNS&M) are required to have a written waste minimization plan in place, this plan has been written to provide guidance to SNS&M faculty and staff to help minimize the University's total waste output. Efforts made to minimize waste not only help protect human and environmental health, they also help minimize SNS&M's waste disposal costs.

REGULATORY BACKGROUND

In 1976, Congress passed the Resource Conservation and Recovery Act, authorizing the EPA to set standards for generators and transporters of hazardous wastes and for operators of hazardous waste treatment, storage and disposal facilities. These standards established a manifest system allowing the EPA to track waste "from the cradle to the grave."

In 1984, Congress passed the Hazardous and Solid Waste Amendments to RCRA. In doing so, a national policy was established making waste minimization the preferred hazardous waste management practice: "…the generation of hazardous waste is to be reduced or eliminated as expeditiously as possible. Waste nevertheless generated should be treated, stored, or disposed of as to minimize the present and future threat to human health and the environment." (RCRA Sec. 1003[b], 1984) The amendments also set new requirements for generators of small quantities of hazardous wastes, such as Shepherd University.

In 1990, Congress passed the Pollution Prevention Act (PPA) that expanded the nation's waste prevention policy beyond a RCRA-only framework, to minimize or eliminate toxic releases to all environmental media and natural resources: "The Congress hereby declares it to be the national policy of the United States that pollution should be prevented or reduced at the source whenever feasible; pollution that cannot be prevented should be treated in an environmentally safe manner whenever feasible; and disposal or other release into the environment should be employed only as a last resort and should be conducted in an environmentally safe manner." (PPA, Section 6602[b])

The EPA's preferred hierarchal approach to materials management, in order of preference, is as follows:

1) Source reduction
2) Recycling and reuse
3) Energy Recovery
4) Treatment
5) Disposal

WASTE MINIMIZATION

Waste Minimization refers to the use of source reduction and/or environmentally sound recycling methods prior to energy recovery, treatment, or disposal of RCRA hazardous wastes. Waste minimization does not include waste treatment, that is, any process designed to change the physical, chemical, or biological composition of wastestreams. For example, compacting, neutralizing, diluting, and incineration are not typically considered waste minimization practices. EPA's preferred hierarchical approach to materials management includes source reduction, recycling, energy recovery, treatment, and finally, disposal.

SOURCE REDUCTION

Source reduction, is defined in PPA as any practice which 1) reduces the amount of any hazardous substance, pollutant, or contaminant entering any waste stream or otherwise released into the environment prior to recycling, treatment, or disposal; and 2) reduces the hazards to public health and the environment associated with the release of such substances, pollutants, or contaminants. Source reduction includes equipment or technology modifications, process or procedure modifications, reformulation or redesign of products, substitution of raw materials, and improvements in housekeeping, maintenance, training, or inventory control. Many of these elements can be utilized by SNS&M faculty and staff within laboratories, prep-rooms/storage rooms and classrooms.

Procedural Modifications

Modifications to laboratory experimental procedures can lead to waste minimization. Scaling back the quantity or volume of chemicals used in an experiment is an example of procedural changes that can lead to waste minimization. Another example is replacing one experiment with another experiment that accomplishes the same goals, but produces no hazardous waste or less hazardous waste.

Substitution

SNS&M faculty and staff are encouraged to substitute less hazardous, less toxic or non-hazardous chemicals and materials in experiments and procedures when possible. This will minimize or eliminate the amount of hazardous waste generated, reduce disposal costs and reduce employee and student exposure. The use of alcohol or digital thermometers rather than mercury thermometers and the use of ethanol rather than formaldehyde in biological specimen preservation are two examples of substitution.

Inventory Control

Inventory controls help reduce the disposal of older or expired chemicals, as well as over ordering of chemicals. The Safety Technician maintains a chemical inventory database for SNS&M. The database is

updated annually. All new purchases of chemicals are received in a centralized location which provides for better inventory control. Only a few faculty and staff members are able to make purchases, which helps minimize duplicate orders of chemicals. However, all faculty and staff are encouraged to check with the Safety Technician prior to ordering a chemical to see if the desired chemical is already in stock. First-in, first-out chemical usage is the preferred practice. Using older stock first will help minimize the number of "abandoned" chemicals in storage.

Small quantities of chemicals are encouraged to be purchased rather than bulk quantities. The idea that buying in bulk saves money is not necessarily the case. In fact, purchasing chemicals in bulk can result in higher overall costs due to a number of factors. Purchasing chemicals in bulk can lead to long-term storage requirements, increased human and environmental health risks and the need to dispose of unused chemicals. According to the American Chemical Society, 40% or more of the hazardous waste stream generated in laboratories without a waste minimization program comes from unused chemicals. A good rule of thumb is to purchase quantities that will be used in the near future.

Donations of chemicals should be avoided, especially highly toxic chemicals, unless there is a clear need or use for the chemicals. Donated chemicals can become a future waste problem.

Container labeling is a major component of inventory control. Original chemical container labels should not be removed, covered or altered. Secondary containers, not for immediate use, should always be clearly labeled with the appropriate contents to prevent any confusion. When labels are missing or unclear, the cost of having the unknown containers' contents analyzed prior to disposal is expensive.

Housekeeping

Good housekeeping practices can result in waste minimization. Faculty, staff and students are encouraged to keep their work areas neat and orderly. Poor housekeeping can lead to a number of problems including an increased risk to occupants' health and safety and unnecessary waste generation. Broken containers, spills and "lost" chemicals due to poor housekeeping are examples of this. Faculty and students are encouraged to clean-up after each laboratory session. This may include cleaning glassware, putting away supplies and equipment, and transferring any waste generated to the appropriate waste containers.

Laboratories and prep-rooms are inspected monthly by the Safety Technician. Monthly inspections provide an opportunity to identify housekeeping problems.

RECYCLING, REUSE, AND REDISTRIBUTION

Recycling, reuse and redistribution of unneeded items, including chemicals and waste, is another method to minimize waste. Faculty and staff members are encouraged to periodically check their chemical and supply stocks in order to identify unneeded items. Unneeded equipment and furniture should also be

considered as well. Unneeded items can be redistributed to areas that have a need for them. An exchange of these items may be setup within the department or with other departments. If unneeded items cannot be redistributed, they should be recycled if possible.

Electronic waste, such as monitors, computers and laboratory equipment, should not be discarded in the general waste steam. Many of these items have specific management requirements. Most electronic waste can be recycled and in some cases can even be donated.

Purchase gas cylinders, including lecture bottles, only if the manufacture will accept the return of the cylinders, whether full, partially full or empty. Disposal of abandoned cylinders is very expensive.

Faculty are encouraged to identify if any end products of an experiment can be used as a component of another experiment or in another laboratory.

TREATMENT

Treatment of hazardous waste is mainly performed by licensed Treatment, Storage, and Disposal Facilities which are strictly regulated by EPA. If treatment is not part of the laboratory experiment and is to be done separately, it should not be performed. Treatment methods actually require permits which Shepherd does not have. Anyone interested in treating waste on-site should contact the Safety Technician.

WASTE MANAGEMENT

SNS&M generates a number of different wastes. Having a better understanding of the different types of wastes generated will help faculty and staff better manage waste, consequently minimizing its generation and the risks involved with its management. There are four common wastes generated in SNS&M: 1) hazardous waste, 2) non-hazardous waste, 3) biological hazardous waste, and 4) universal waste.

Hazardous Waste

Before offering wastes for disposal, a waste determination must be made regarding the waste. Waste is considered to be hazardous if it appears on one of four lists or exhibits one or more characteristics as specified in 40 CFR 261. Three of the four lists of wastes can be found in SNS&M (F-listed, P-listed and U-listed wastes). F-listed waste includes spent solvents from non-specific sources, such as laboratory instruments. P-listed wastes (acutely hazardous wastes) and U-listed wastes (toxic hazardous wastes) are discarded commercial chemical products with a sole active ingredient appearing on either list. Wastes not listed may also be classified as hazardous waste if they exhibit one or more of the following characteristics: 1) ignitability; 2) corrosivity; 3) reactivity; and 4) toxicity.

Hazardous waste collection should be done in containers that are compatible with the waste material. All containers of hazardous waste are to be labeled with the appropriate contents and accumulation start date. Hazardous waste containers must also be clearly marked with the words "HAZARDOUS WASTE." Hazardous waste labels can be requested from the Safety Technician. When unsure of the classification of a waste, it is recommended that it be handled as hazardous waste until a waste determination can be made.

When collecting waste, the segregation of incompatible wastes is required. Additionally, hazardous wastes should not be mixed with non-hazardous waste regardless of compatibility. The resulting mixture will be considered hazardous, thus creating a larger volume of hazardous waste.

Non-Hazardous Waste

Chemical wastes from laboratories that are not classified as hazardous waste should still be collected in containers and labeled with the contents and accumulation start date. Although these wastes may not be considered hazardous waste, they still may be subject to specific disposal requirements. Ethidium bromide is an example of a non-hazardous that has special disposal requirements.

Biological Hazardous Waste

Clym Environmental Services is responsible for collecting, manifesting, transporting and disposing of our biological hazardous waste. Biological hazardous waste is to be placed in the lined waste containers specifically for biological waste. The type of waste that is disposed of in the containers includes, but is not limited to:

- Cultures and stocks of etiologic agents
- Human and nonhuman blood, blood products, fluids & tissue
- Lab waste contaminated with human/animal blood, blood products, body fluids, or other potentially infections materials
- All contaminated glass and plastic ware (pipettes, petri dishes, etc.)
- Closed/sealed sharps containers

Faculty, staff and students should refrain from throwing non bio-hazardous wastes in the containers. Non bio-hazardous waste discarded into the containers becomes bio-hazardous and must be managed as such.

Universal Waste

Universal waste is regulated waste that includes waste batteries, pesticides, mercury containing equipment and lamps. Batteries, mercury containing equipment and lamps are commonly found in laboratories and classrooms. Shepherd University is required to manage universal wastes in a way that prevents their

release to the environment. All of these wastes should be collected, and not be discarded in the general waste stream. Most universal wastes generated on campus are managed by Facilities Management. Please contact the Safety Technician or Facilities Management if you have questions regarding universal waste disposal.