

Section B - 4

UNO WASTE MINIMIZATION PLAN

A. Introduction

The basic idea of promoting waste minimization is simply that it makes more sense not to produce hazardous waste rather than develop extensive and expensive treatment schemes to ensure the safe management of the waste once it has been produced. Hazardous waste is extremely expensive to dispose of and the cost is continually rising. The funds needed to pay these costs come from research and operating budgets.

Waste minimization is not only a good idea but it is a regulatory requirement of the EPA. The 1984 Congress passed the Hazardous and Solid Waste Amendments (HSWA) to the Resource Conservation and Recovery Act (RCRA). This policy states: "The Congress hereby declares it to be the national policy of the United States that, wherever feasible, 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 so as to minimize the present and future threat to human health and the environment."

The requirements of HSWA include the following:

1. As part of any generator's biennial report to the EPA, the generator must describe the efforts undertaken during the year to reduce the volume and toxicity of waste generated. It is also required to report changes with previous years.
2. Waste generators must certify on their waste manifests that they have in place a program to reduce the volume or quantity and toxicity of such waste to the degree determined by the generator to be economically practical.

In 1990, Congress further clarified the role of pollution prevention in the nation's environmental protection scheme by passing the Pollution Prevention Act. Thus, Congress set up a hierarchy of management options in descending order of preference:

1. prevention (source reduction)
2. environmentally-sound recycling
3. environmentally-sound treatment
4. environmentally-sound disposal

The EPA believes that waste minimization includes: 1) prevention or source reduction, and 2) environmentally-sound recycling.

B. Prevention or Source Reduction

This is the most desirable management option. The following describes common waste minimization techniques to prevent or minimize the generation of hazardous waste:

1. Product Substitution (also known as Source Reduction)

Substitute non-hazardous or less toxic materials in your chemical processes and experiments. Some examples to consider are:

- a. The substitution of citric acid-based AmeriClear for xylene, benzene and toluene containing reagents in histology laboratories.
- b. The substitution of non-hazardous proprietary liquid scintillation cocktails for standard xylene or toluene-based cocktails in radioactive tracer studies.

NOTE: *The University of Nebraska at Omaha mandated that only biodegradable, non-hazardous scintillation cocktail be utilized.*

- c. The use of water-based inks instead of solvent-based inks in printing operations.
- d. The use of non-halogenated solvents in parts washers or other solvent processes.
- e. Detergents and enzymatic cleaners can be substituted for sulfuric acid/potassium dichromate (chromerge) cleaning solutions and ethanol/potassium hydroxide cleaning solutions.

2. Process Modification

To the extent that it does not affect vital research, teaching or service, laboratories and service areas (such as printing and graphics) can modify experimental or standard processes to decrease the quantity of hazardous chemicals used and generated. In labs, microanalysis techniques can greatly reduce the amount of waste generated. Examples of this are the use of micro rather than macro Kjeldahl apparatus in nitrogen determinations (Kjeldahl waste is considered hazardous waste due to the selenium or mercury compounds used as catalysts) as the use of micro chemical oxygen demand analyzers (which generate a sulfuric acid - dichromate - silver waste).

3. Segregation and Characterization

- a. Do not mix wastes. Especially do not mix the following without EHS prior approval:
 - 1) hazardous wastes with non-hazardous waste
 - 2) radioactive isotopes and hazardous waste
- b. Accurately label the waste bottles as to their exact content.

Segregation and characterization allow chemicals to be either redistributed to someone else in the University system who can use the chemicals; or if not redistributed, it simplifies waste treatment and minimizes costs.

4. Management and Micro scale Purchasing (Source Control)

Audit chemical supplies and use inventory control:

- a. Survey all the chemicals in your labs, shops and storerooms and consider for disposal those chemicals that have not been used within the past year or two.
- b. Purchase only the quantity of chemical required for specific projects. Excess chemical purchases are major contributors to the generation of hazardous waste where chemicals are not used by the expiration date.
- c. **Chemical purchases in excess of 40 liters (5 gallons) and Acutely Toxic (P-Listed) chemicals require EHS approval.** (Water treatment chemicals and automobile/power plant fuels excluded).
- d. If you have chemicals stored in a "shared" storeroom, take responsibility to recycle or contact EHS for the disposal of old chemicals left by personnel or students no longer with the University.
- e. When purchasing automated equipment, use the type and amount of hazardous waste generated by the machine as one of the purchasing criteria.

5. Training

Authorized Users (AUs) and Supervisors shall instruct employees in waste minimization concepts and their value to the UNO system. Motivated employees will suggest new and better methods to reduce hazardous waste in their own areas. Waste minimization techniques learned in one area of UNO may be reviewed and implemented in other areas.

Waste reduction at the source is an economically sensible approach whereby UNO can lower waste management and regulatory compliance costs, liabilities and risks.

C. Environmentally-Sound Recycling

Environmentally-sound recycling is the second preferred alternative for managing those materials which cannot be reduced at the source.

1. Recycling

A recycled material is one which is used, reused, or reclaimed. Recycling promotes waste minimization by reusing or reclaiming a material that would have otherwise been a waste product. Many materials treated as chemical waste are actually surplus chemicals which are reusable. To assist waste reduction, the Chemical Recycling Program accepts both opened and unopened containers of unwanted chemicals and redistributes them to other University laboratories. Recycled chemicals are provided free of charge to any interested University department or research laboratory.

An effective recycling program is dependent on a constant influx of materials. When arranging for a chemical waste pickup, keep in mind that certain chemicals are potentially recyclable. Inform EHS of any usable, unwanted chemicals which have accumulated in the laboratory and, in particular, the scheduling of laboratory clean-outs. EHS maintains a list of all unused chemicals that are available for use by other laboratories or facilities.

2. Reclamation

The University reclaims some precious metals and valuable chemicals to reduce waste treatment volumes. Some examples of this are:

- a. Photo fixer waste is processed to reclaim silver.
- b. Mercury is collected and can be sold to a vendor for redistillation.
- c. Fuel grade solvents and used motor and pump oil are reclaimed by an EPA-permitted facility for use as an energy source.

D. Environmentally-Sound Treatment

Since UNO does not possess a Treatment, Storage or Disposal Facility (TSDF) permit, hazardous waste may not be treated on-site.

Some laboratories however, generate a simple, pure chemical stream (such as a dilute acid or base) that can be rendered non-hazardous by simple neutralization as part of their experimental protocol. Other labs may generate a dilute aqueous stream that contains a metal which can be easily precipitated as part of experimental protocol. In these cases, labs are encouraged to call the EHS Office at extension 4-3921 to determine if they can process these materials to render them non-hazardous.

E. Environmentally-Sound Disposal

This is the least desirable form of pollution prevention. UNO may not dispose of hazardous waste on-site because it is not a permitted TSDF. All hazardous waste is shipped to an EPA-permitted TSDF off-site. By shipping to a permitted facility, UNO is assured that the best available technology is used to dispose of hazardous waste.

F. Summary

A comprehensive management approach is essential for a successful waste minimization plan. Figure 8 summarizes the methods UNO has employed to prevent or minimize the generation of hazardous waste.

WASTE MINIMIZATION PLAN

FIGURE 8

