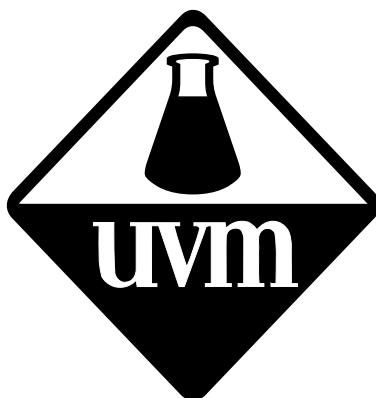


Guide to Managing Chemical Waste in UVM Laboratories



**Environmental Impacts of Laboratory Work
Laboratory Responsibilities
Administrative Responsibilities**

**prepared by the
UVM Environmental Safety Facility
Risk Management Department**

<http://esf.uvm.edu>

656-5400

UVM Policy for Management of Laboratory Waste

The University of Vermont recognizes its institutional responsibility for environmental stewardship. This commitment is described in the UVM Environmental Council's mission statement entitled "*A Vision for a Green UVM*".

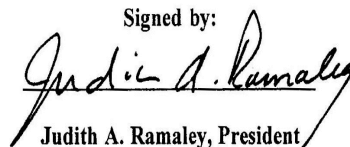
As an integral component of this commitment, the University has developed and implemented an Environmental Management Plan for managing hazardous waste from laboratory activities. This plan will improve our environmental performance by increasing laboratory worker and student awareness of the environmental impact of their laboratory activities, and by promoting the concept of pollution prevention through waste minimization in the conduct of this work.

Therefore, the University of Vermont will:

- *Enhance environmental awareness and training in the laboratory;
- *Prevent pollution in the laboratory by using practices and materials that avoid, reduce, and control hazardous waste generation from laboratories and prevent "cross media transfer" of laboratory wastes;
- *Implement an effective Environmental Management Plan for laboratories with a focus on continuous improvement and a clear assignment of accountability and responsibility;
- *Develop a sensible, efficient and effective system for managing hazardous wastes in laboratories, which can act as a model applicable to institutions across the country and which meets or exceeds legal requirements; and
- *Communicate with interested parties on this issue through the Project XL stakeholder process.

The University of Vermont will continue to comply with all Federal, State, and local environmental laws and regulations not specifically deferred by the Laboratory XL project.

Signed by:



Judith A. Ramaley, President

The Environmental Management Plan and Project XL

The UVM EMP is written to meet the requirements of the Vermont and EPA site specific regulation for the New England Universities Laboratory Project XL. This XL Project was developed because the standard hazardous waste regulations established under the Resource Conservation and Recovery Act were preventing laboratories in higher education from fully developing their pollution prevention programs.

The focus of this project is on the implementation of an institution-wide laboratory **environmental management program** which effectively minimizes, reuses, collects and disposes of waste chemicals from campus teaching and research activities. More information about the EMP and Project XL can be found on the web at <http://esf.uvm.edu/uvtemp>.

The success of the Project will be determined by a set of Environmental Performance Indicators. One of these indicators will be a survey of laboratory workers with regard to their environmental awareness. Bolded text in this document highlights the information included in this survey.

January 2001

Environmental Impacts of Lab Work

Laboratories generally use small amounts of chemicals which reduces, but does not eliminate, the environmental impacts of those chemicals. There are over 500 labs at UVM, and the impact of improper chemical waste handling is multiplied by hundreds campuswide. This could result in noisome odors, require expensive clean up, or pose risks to the health of lab workers, the people who maintain our buildings and the public. Improperly stored chemicals can delay emergency response to fires, medical problems or chemical spills.

For these reasons, UVM is committed to ensuring that its laboratory staff is aware of and complies with proper chemical storage and management practices, as described in both the Environmental Management Plan (EMP) and the Chemical Hygiene Plan (CHP).

Energy Use

In a well managed laboratory **the largest environmental impact** is the energy consumed when interior heated or cooled air is exhausted outside through fume hoods. This energy consumption increases when fume hoods are needlessly left on, sometimes around the clock.

Air Pollution

Fume hoods rely on **dilution** to control the chemical contaminants released. There are usually no air cleaning devices associated with fume hoods, due to the low concentration and uncertain types of chemicals used. Highly odoriferous chemicals or irritants such as acid gases used in the hoods and released at the roof top can cause air quality problems under unfavorable conditions such as temperature changes.

While the state of Vermont has determined that fume hoods qualify as an insignificant source of pollution, state regulations prohibit release of gases and vapors in quantities sufficient to cause nuisance odors. Fume hood emissions are clearly capable of creating these nuisance odors if not managed carefully. It is important to minimize the amount of chemicals used even in the hood, to capture as much of those chemicals as possible, and be aware of exhaust recirculation occurrences. (Procedure 3 of the EMP.)



Water Pollution

Materials disposed of through the UVM building drains are sent to the City of Burlington's **wastewater treatment plants**. These plants are designed to treat simple organic materials associated with household activities. They are not designed to effectively deal with metal solutions or unusual chemicals that might be used in laboratories. These materials are likely to either accumulate in the sludge collected at the treatment plant or pass through the plant to Lake Champlain, the water source for Chittenden County. If left in the sludge waste metals could eventually contaminate ground water or farm fields.



Therefore it is important to carefully consider what is disposed of through UVM's sinks and assure that such disposal is appropriate. Contact the ESF staff for more information with regard to specific chemicals. (Procedure 2 of the EMP.)

Hazardous Waste

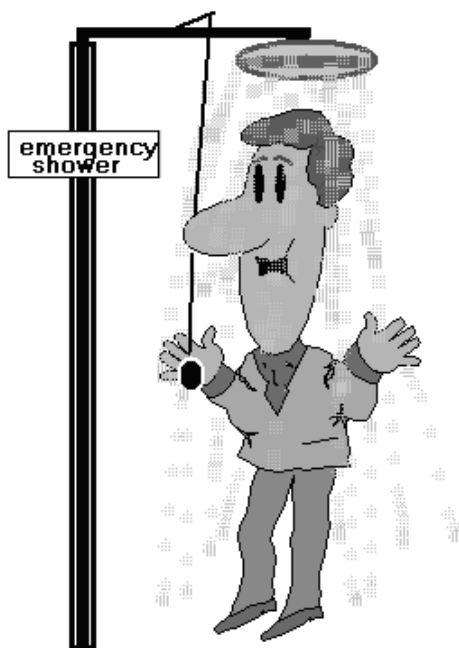
Hazardous waste collected from UVM laboratories is managed at the University's Environmental Safety Facility. Most laboratory chemicals are "bulked" together in 55 gallon drums for shipment to EPA-permitted hazardous waste **incinerators**. Others are sent to waste water treatment plants for neutralization or to secure landfills.

In either case, it is critical that the materials collected are properly identified to protect the safety of the workers handling the chemicals and the effectiveness of the process selected for disposal.

Emergency Response

Response to fires, spills and medical emergencies is significantly complicated by the presence of hazardous chemicals. Emergency responders are aware of and concerned about the potential for personal injury from exposure to such chemicals. Therefore, they can require an accounting of what chemicals are in the laboratory before entering.

UVM staff work with local emergency responders to identify potential problems and provide technical advice about laboratory hazards when necessary. It is the lab workers' responsibility to assure that chemicals are properly labelled and stored at all times.



Emergency Preparedness

No one likes to spend time thinking about accidents that might happen, but when they occur is too late to begin to decide what to do. **Procedure 6** of the EMP outlines emergency preparation and response for laboratory situations. The specific type of emergency planning and equipment required in a particular laboratory depends on the materials used in that laboratory. Certain basic equipment, however, should always be in place, unobstructed and known to all lab personnel:

- * fire extinguishers
- * safety showers
- * eyewashes
- * emergency notification stickers on the laboratory door
- * a spill kit
- * lab coats, gloves and eye protection

Laboratory Self-Inspections

UVM laboratories must be inspected by laboratory personnel who work there at least monthly, using the form shown in **Procedure 7** or equivalent. These self-inspections assure that the labs are in continuing compliance with the Environmental Management Plan and that the quantity limits for stored chemical waste are not exceeded. They also provide documentation that the required environmental safety training and the chemical use planning forms are in place.

Chemical Storage Tips

1. Store chemicals in compatible groups (see Hazardous Chemicals of Concern list in Procedure 9 of the EMP for guidance in developing these groups).
2. Label storage cabinets with appropriate hazard warnings (corrosive, flammable, etc.).
3. Store **liquids** below eye level and hazardous liquids in secondary containment.
4. Store **corrosives** in rust resistant, ventilated cabinets.
5. Store **acids** and **alkalines** in separate cabinets. However, when necessary, they can be stored in the same cabinet (labelled "Corrosives") separated by secondary containment trays.
6. Only cleaning chemicals (bleach, soaps and detergents) should be stored directly under the sink.
7. Assure that all chemicals are identified and properly labelled.

Questions should be directed to your laboratory supervisor
or the Environmental Safety Facility at 656-5400

A more detailed description of all Procedures outlined here
can be found in the EMP at <http://esf.uvm.edu/uvmemp>

Administrative Responsibilities

The UVM Environmental Management Plan (EMP) is based on the Environmental Management System model. This means that the procedures in the plan are specifically linked to campus policies and plans, allowing the value of these policies and plans in meeting campus environmental goals to be assessed. The EMP assigns specific roles and responsibilities for managing each procedure in the EMP. Responsibilities primarily associated with administrative oversight of the EMP are described on this page.

Training

Training is an essential component of any health and safety program. Certain portions of the training can be provided on a University-wide basis by ESF staff. Other safety training is specific to the work of the laboratory and must be delivered by the laboratory supervisor. All training must be documented using **Procedure 8** of the EMP.

Laboratory Inventories

It is necessary to collect information annually about 1) where laboratories are on campus, 2) what chemicals are contained in the labs and 3) who is working in the labs and whether they have been properly trained with regard to health and safety concerns. This information is collected on forms distributed by the Environmental Safety Facility staff and completed by laboratory supervisors (**Procedures 8, 9 and 10**) for purposes of adherence to state and federal regulations.

Annual Laboratory Audits

Annually, the Environmental Safety Facility staff will visit each laboratory on campus to conduct a compliance audit (**Procedure 10**). The purpose of this audit is to identify physical and compliance problems that may have been overlooked during the laboratory self-inspections. The results of the audit will be shared first with the laboratory supervisor. If the problems are not resolved within 30 days, they will be referred to the Department Chair. If the problems persist for 90 days, they will be referred to the University's Chemical and Biological Safety (CBS) Committee. In cases where the problem presents an immediate threat to human safety, the problem will be directed to the CBS Committee immediately. The CBS Committee has the authority to close any laboratory.

Laboratory Decommissioning

When laboratories are renovated, moved or change supervisors, the laboratory should be "decommissioned"; that is, the chemicals being stored there should be reviewed with an eye towards disposal (**Procedure 11**). This will help minimize the number of "orphan" chemicals that accumulate on campus. Orphan chemicals can be hard to identify and thus expensive to dispose of.

Pollution Prevention

Source reduction is the best method for pollution prevention and all hazardous waste generators are required by law to implement hazardous waste minimization opportunities. This means that laboratory workers and ESF staff work in a partnership to identify opportunities for reducing the amount of hazardous materials used in the laboratory, as outlined in **Procedure 13**.

For example, ESF staff organized a "thermometer swap" in which organic based replacements were substituted for over 1500 mercury based thermometers in UVM laboratories. This has prevented many mercury spills associated with broken thermometers. Another pollution prevention initiative at UVM is the ESF's ChemSource program, which allows laboratories to purchase individual chemical containers at case unit pricing. Call the ESF at 656-5400 for more information about these programs or with ideas for reducing the amount of hazardous chemicals you use. We will help you implement worthwhile ideas.

Procedures 12 and 14-16 are the responsibility of the ESF and describe procedures for lab waste pickup and disposition, reviewing regulatory changes, document control and the annual review of the Environmental Performance Indicators.