ENVIRONMENT, HEALTH, & SAFETY

Laboratory Standard Operating Procedure for:

Vacuum Pumps

Description

This standard operating procedure outlines the handling and use of vacuum pumps. Review this document and supply the information required in order to make it specific to your laboratory. In accordance with this document, laboratories should use appropriate controls, personal protective equipment, and disposal techniques when working with vacuum pumps.

Vacuum pumps are commonly used in a variety of experimental setups to remove air and other vapors from a vessel or system. Applications that use vacuum pumps include rotary evaporators, vacuum ovens, drying manifolds, freeze-dryers, aspirators, desiccators, and filtration equipment. Many vacuum pumps use oil which can be easily contaminated and result in pump damage and hazards.

Potential Hazards

Vacuum pumps can pose chemical, mechanical, electrical, and fire hazards. Chemical exposure can occur from improper installing, trapping, and exhausting or from off gassing of contaminated pump oil. Mechanical hazards can occur from the moving parts of the vacuum pump. Fire can result if the pump malfunctions or overheats and ignites nearby combustible materials. Electrocution can occur from faulty or defective switches and wiring.

Engineering Controls

Vacuum pumps used to evacuate systems containing toxic, volatile, or corrosive substances must be vented to the building exhaust ventilation system. Whenever possible locate pump in vacuum pump cabinet or a ventilated cabinet. Ensure that pumps have belt guards. Traps such as a *cold trap* should be used in line with high vapor loads to minimize the amount of volatile chemicals being evacuated and reaching the pump oil. Ensure the cold trap is appropriate for situation and follows all manufacturer and safety guidelines.

Work Practice Controls

General:

- Place pump on spill tray to contain oil spills if the equipment fails.
- Shield any glassware under vacuum.

Physical:

- Ensure all vacuum pump belt systems are guarded.
- Electrical cords and switches must be free from defects.
- Avoid placing pumps in an unventilated and enclosed receptacle.
- Do not operate pumps near combustible materials.
- Use correct vacuum tubing and replace old tubing.

Chemical:

- Use engineering controls to avoid exposure.
- Ensure pump oil is compatible with vapors that will pass through the pump (i.e. avoid hydrocarbon pump oil and oxidizing gases/vapors).
- Close valve between vessel and pump before turning off pump to avoid introducing oil into system.
- Ensure gases or vapors will not damage the pump.

- If cold traps are used, check for blockage.
- Check oil levels and change oil when necessary. Change oil when it begins to turn a dark brown color.
- An oil mist separator can be used to prevent oil loss.

Personal Protective Equipment (PPE)

Wear safety glasses, lab coat, long pants, close-toed shoes and gloves when performing all vacuum operations.

Transportation and Storage

Vacuum pumps must be stored on spill trays to prevent oil spills. Vacuum pump areas may be insulated for noise, if necessary.

Waste Disposal

All used vacuum pump oils must be dispose of through EHS.

Do not dispose of chemical wastes by dumping them down a sink, flushing in a toilet or discarding in regular trash containers, unless authorized by UM Flint EHS. Contact Environment, Health and Safety (EHS) at (810) 766-6763 for waste containers, labels, manifests, waste collection and for any questions regarding proper waste disposal. Also refer to UM-Flint Hazardous Waste Management Program and EHS webpage http://www.umflint.edu/ehs/environment-health-and-safety for more information.

Exposures/Unintended Contact

 ***If the employee is in need of emergency medical attention, call 911 immediately.*** 

Contact EHS for advice on symptoms of chemical exposure, or assistance in performing an exposure assessment.

Report all work related accidents, injuries, illnesses or exposures to UM-Flint DPS. Additionally, employees and supervisors must be sure to report the injury to EHS and complete and submit the Illness and Injury Report Form to WorkConnections within 24 hours. Follow the directions on the WorkConnections website Forms Instructions to obtain proper medical treatment and follow-up.

If you were involved in or observed an incident or near miss, please complete the EHS Laboratory Incident and Near-Miss Report Form. This will be valuable in improving laboratory safety on UM-Flint campus.

TREATMENT FACILITIES:

MAJOR INJURIES	MINOR INJURIES –During Business Hours	MINOR INJURIES –After Business Hours
Genesys Hospital One Genesys Parkway Grand Blanc, MI 48439 (810) 606-5710 **Hurley Medical Center** One Hurley Plaza Flint, MI 48503 (810) 262-9000 **McLaren Hospital Flint** 401 South Ballenger Hwy Flint, MI 48532 (810) 342-2000	**Genesys Occupational Health Network** 1460 Center Rd. Burton, MI 48509 (810) 715-4620 Mon. to Fri. 7:30 am to 10 pm Sat. & Sun. Noon to 8 pm **McLaren Flint-Burton OCC Center** 1459 S. Center Rd. Burton, MI 48509 (810) 496-0900 Mon. - Fri. 8 am to 8 pm Sat & Sun 10 am to 2 pm	**Downtown Flint** 420 S. Saginaw St. Flint, MI 48502 (810) 762-1550 **Genesys East** 1096 S. Belsay Rd, Suite F Burton, MI 48509 (810) 743-3351 **Genesys North** 4154 W. Vienna Rd Clio, MI 48420 (810) 686-7397 **Genesys South** 8447 N. Holly Rd Grand Blanc, MI 48439 (810) 603-0856 Mon. - Fri. 6 to 10pm / Sat. & Sun. 1-10pm

Click here for more information on the UM – Flint Emergency Preparedness and Response Plan.

Spill Procedure

A **minor (small) chemical spill** is one of a known chemical that the laboratory staff is capable of handling safely without the assistance of safety and emergency personnel, i.e., less than 1 Gallon or 3.5 Liters. A **major/large chemical spill** requires active assistance from emergency personnel.

For small oil spills, treat the oil as a hazardous chemical spill. Use appropriate absorbent and dispose of as hazardous waste. For large oil spills contact EHS at (810) 766-6763.

- When a spill occurs, ***personal safety should always come first***.
- Alert and clear everyone in the immediate area where the spill occurred.

Additional Spill Response Steps:

MINOR CHEMICAL SPILL

- Alert people in immediate area of spill.
- If spilled material is flammable, turn off ignition and heat sources. Don't light Bunsen burners or turn on other switches.
- Open outside windows, if possible.
- Wear protective equipment, including safety goggles, gloves and long-sleeve lab coat.
- Avoid breathing vapors from spill.
- Confine spill to as small an area as possible.

- **Do not wash spill down the drain**.
- Use appropriate spill kits/sorbents to absorb spill. Collect contaminated materials and residues and place in container. Contact EHS at (810) 766-6763 for proper disposal.
- Clean spill area with water.

MAJOR CHEMICAL SPILL

- Attend to injured or contaminated persons and remove them from exposure.
- Alert people in the laboratory to evacuate.
- If spilled material is flammable, turn off ignition and heat sources. Don't light Bunsen burners or turn on other switches.
- **Call University of Michigan-Flint Department of Public Safety (DPS) at 911 immediately for assistance.**
- Close doors to affected area.
- Post warnings to keep people from entering the area.
- Have person available that has knowledge of incident and laboratory to assist emergency personnel.

Additional Spill Links:

- www.oseh.umich.edu/pdf/chemspil.pdf
- http://www.oseh.umich.edu/emer-chemical.shtml.

Report all emergencies, suspicious activity, injuries, spills, and fires to the UM-Flint Department of Public Safety (DPS) at 911 from any university telephone or (810) 762-3333 from cell phone or non-university telephone. Register with the University of Michigan Emergency Alert System via Wolverine Access. Also, preprogram the UM-Flint DPS telephone number (810) 762-3333 into your cell phone for quick, easy use.

Training of Personnel

All personnel are required to complete Laboratory Safety Training. Documentation of the training is required. This training can be accomplished by completing the ***Comprehensive Laboratory Safety*** session (**BLS009** *or equivalent*) via MyLINC, or UM-Flint EHS on-line training or other equivalent approved by EHS. Furthermore, all personnel shall read and fully adhere to this SOP when working with vacuum pumps.

Certification

I have read and understand the above SOP. I agree to contact my Supervisor or Lab Manager if I plan to modify this procedure.

Name	Signature	UM ID #	Date

Prior Approval required – Is this procedure hazardous enough to warrant prior approval from the Principal Investigator? ☐ **YES** ☐ **NO**

Principal Investigator _____ **Revision Date** _____