Chemical Hygiene Plan
Standard Operating Procedures

Aerospace Engineering and Mechanics
University of Minnesota
24 Akerman Laboratory

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Standard Operating Procedures
24 Akerman Laboratory

These procedures are intended to augment the *University of Minnesota Hazardous Chemical Waste Management* notebook available in the *Right-To-Know* rack on the door of 24 Akerman. That notebook contains detailed information on safety and hazardous waste handling.

Safety Training

Persons using the laboratory facilities must receive safety training prior to working with any chemicals. Contact Laboratory Safety Coordinators or Department Safety Coordinator for training information.

Material Safety Data Sheets

Prior to working with any chemical read its Material Safety Data Sheet (MSDS).

The MSDS for chemicals in 24 Akerman is available in MSDS notebook in the *Right-To-Know* rack. If you bring a new chemical into the lab, you are responsible for providing three copies of its MSDS and notifying the Laboratory Safety Coordinator so that it can be added to the Chemical Inventory for the lab. MSDS information can be obtained from three sources: the manufacturer, the Department of Environmental Health and Saftety World Wide Web site at http://www.dehs.umn.edu/msds.html, or the on-line MSDS system using the instructions available in the MSDS notebook.

Miscellaneous

Do not block escape routes.

If you have any questions contact the Laboratory Safety Coordinators at the phone numbers listed above.

All specimens must be logged in and out of the dry cabinet before using. Before cutting any part of the specimen, check with all laboratory users. Details of the cuts or any testing done on the specimen should be written in the specimen log book.

Statement of Compliance

All laboratory users must sign the attached form in order obtain laboratory privileges. Any Laboratory user not complying with these rules will lose laboratory privileges.

All etching chemicals should be used under the hood in 19 Akerman.

No food or drink allowed in the lab. Do not use lab glassware in place of cups and plates for food.

Do not leave a hot plate unattended when it is in operation.

Label all flasks, beakers and containers with contents, date and owner name.

Label and store chemicals properly in cabinets. All containers should be labeled with contents, date and owner name. Use proper waste containers and store waste in waste cabinet.

Chemicals must be stored in separate bins according to compatibility. Flammable chemicals such as alcohol and acetone must be kept in the locked flammable cabinet in 19 Akerman. Storage compatibility of chemicals is indicated by the chemical's DDC number. DDC numbers are listed in *Appendix 6: Chemical Waste Registry* of the *Hazardous Chemical Waste Management* notebook. Different chemicals may only be stored together if they have the same DDC numbers. Storage bins are labeled with DDC numbers. If there is no bin available for your chemical notify the Laboratory Safety Coordinator immediately.

Clean all glassware and instruments after you are finished with your experiment.

Use common sense and never take short cuts.

Chemical Emergencies

Do not abandon spilled chemicals:

- Follow the RESCUE, CONFINE, REPORT, SECURE, CLEANUP procedures outlined on p. 17 of the *Hazardous Chemical Waste Management* notebook.
- Spill kits for acidic, caustic and solvent spills are available next to the fume hood in 19 Akerman for neutralization and containment of large spills. Follow the instructions on the spill kit container.
- Protective equipment must be worn when dealing with a spill
- If you are unsure about the proper use of the spill kit or the quantity of spilled chemical is too large to handle with the spill kit available, notify Environmental Health and Safety or call 911.
- Notify the Laboratory Safety Coordinator when any portion of a spill kit is used.

If you are exposed to a chemical, seek medical assistance immediately:

- If you think you may have exposed yourself to a hazardous chemical, assume that you have indeed been exposed and follow emergency procedures immediately.
- Call 911 immediately.
- Notify the Laboratory Safety Coordinator, Department Safety Coordinator, or Principal Investigator.
- Consult the Material Safety Data Sheet on the chemical for emergency procedures.
- **Skin Contact:** Clothing should be removed immediately and the safety shower in 19 Akerman should be used to flush the affected area for a minimum of 15 minutes. Seek medical attention immediately.
- **Eye Contact:** The eye wash station in 19 Akerman should be used to flush the eyes for a minimum of 15 minutes. Seek medical attention immediately.
- **Inhaling Fumes**: Seek medical attention immediately.
- **Ingestion:** Each chemical requires different remedies. Seek medical attention immediately.

Waste Handling

Do not dispose of chemicals in the drain - especially heavy metals, alcohol, and organic solvents. Rinse water from containing traces of Cr, Ni, Cu must be disposed of as hazardous waste.

The following is an e-mail message from the Environmental Health and Safety concerning disposal of metal particles in solution.

Date: Mon, 07 Nov 94 12:36:00 PST
From: ``Wentworth, Jon" < jwentworth@cassandra.dehs.umn.edu >
To: Wendy Grebner < Wendy@aem.umn.edu >
Subject: MWCC discharge limits

The following is a list of local discharge limitations into the Metro Disposal System (MDS). Waste pollutants containing metal concentrations in excess of the maximum limitations should be collected for disposal by the University's Chemical Waste Program or treated onsite prior to discharge.

A.	Cadmium	2 mg/L\cr
B.	Chromium total	8 mg/L\cr
C.	Copper	6 mg/L\cr
D.	Cyanide total	4 mg/L\cr
E.	Lead	1 mg/L\cr
F.	Mercury	0.1 mg/L\cr
G.	Nickel	6 mg/L\cr
H.	Zinc	8 mg/L\cr

The pH range for discharge to the MDS is limited to equal or greater than 5 and less than or equal to 10.

When polishing waste buckets are full (alarm will sound when full) remove the full bucket and record the fill date. If you have polished any material not already on the label, add it to the label. Send e-mail to pam@aem.umn.edu when bucket is full so it can be packaged and sent out. Label a new bucket and test the flood alarm (immerse in water). Replace with the new bucket with the flood alarm and ensure that the drain tubes empty into the bucket.

Waste other than the settling bucket of polishing waste must only be stored in the green waste cabinet in 19 Akerman.

Mixed and old chemicals can be kept in a compatible or their original bottle. When adding waste to a container, ensure that the chemicals being added are compatible with chemicals already contained in the bottle. If in doubt, start a new bottle. ***It is very dangerous to mix incompatible chemicals.***

Only yellow hazardous waste labels may be used to label waste bottles. Label waste bottle with date, chemicals added (including any suspended particles), approximate amounts, and your name.

Plastic bottle must be used for waste containing water unless other contents are incompatible with plastic (in case of freezing).

Solid hazardous waste disposal:

- Solid hazardous waste containing hazardous chemicals of more than trace amounts must be disposed of in a plastic bag inside a metal container labeled for solid waste disposal (available in 19 Akerman).
- Examples of solid hazardous waste include: used paper towels, wipes, gloves, and neutralized waste after spill clean up.
- Waste bags must be labeled with contents.
- Any waste containing HF or other highly hazardous substances must be double bagged.

The Laboratory Safety Coordinators will handle disposal of labeled waste containers.

Polishing Procedure

Some polishing suspensions may be handled only with gloves (Mastermet silica solution, etc.). Check label on the bottle to be sure.

All polishing waste is gathered in buckets underneath the bench. Before polishing, make sure the drain hoses are in the bucket and the bucket is not full. If it is full, follow the previous procedure for changing the bucket.

Minimet

Reference Buehler Minimet Operations Manual Vol. 20 No. 1 for detailed procedure. Each bowl is designated for a particular polishing medium (grit). Clean and label bowl if medium is changed. The plastic bowls are used for room temperature polishing and the metal bowls are for heated polishing.

Heated Polishing or Heated Microscope Stage - Four metal polishing bowls and one microscope stage are available for heat system. The bowls attach with quick disconnects to allow easy changeover. To use the heat system use the following procedure:

1) Fill heating reservoir to within 1 inch from the top before use.
2) Plug in and turn on heating element and use the thermometer to monitor temperature.
3) Plug in and turn on pump, ensure water is circulating (if there are air bubbles in the line, lower the bowl near the floor to allow all the air to escape)
4) **After done, unplug both the pump and the heating element!!**

Ecomet

Reference Beuhler Operations Manual for details regarding the Ecomet. Reference Metals Digest for suggested polishing steps.

If using water, turn on wall valves (hot and cold water is available) to lowest flow necessary for polishing to minimize waste water produced.

Platens are designated for a particular polishing medium (grit). Clean and label bowl if medium is changed. When the paper on the platen is obviously worn it may be changed for a new one. The polishing cloths are expensive, so use them as much as possible before changing.

Using Ecomet and Automet (head) - After turning on Ecomet and Automet, attach the platen. Then, use the specimen holder alignment fixture to place specimens in holder. If only polishing one sample, two dummy samples must be used to keep the holder balanced. Sometimes it is helpful to draw and *X* with a permanent

marker on the samples. After first polishing cycle, check the *X*'s and realign if necessary. Select *water on/off* (water is not used with polishing suspension - only with carbimet paper), select speed, time, force and direction. Lock arm in place to hold the Automet head slightly off centered and overlapping the wheel. To begin operation, simultaneously press both green buttons while waiting for head to descend. Release after green *run* light stops flashing. Timer will automatically end the cycle.

Using Ecomet only - Attach platen and turn *on* Ecomet. Press *off* when done.

Remember to turn off power and water values when finished polishing.

Working with the Magnet

Reference *Lakeshore Electromagnet Power Supply (637) Users Manual and Lakeshore Model LS-4005 Electromagnet Users Manual* for operation instructions.

- Be sure to turn on the water cooling supply to magnet. Coils will be cold to the touch with a moderate flow rate (0.5 GPM or more).

- Maximum power supply current is 72 amps. Monitors and TV's in close vicinity to the magnet will experience some distortion from stray magnetic fields at high currents.

Working with the High Temperature Resistivity Furnace

Working with the DSC

Reference the *DSC notebook* for operation instructions for low and high temperature testing with Labview.

The documentation from *Mettler* is a green notebook on the bookshelf. We have an FP80 Central Processor with an FP84HT microscopy cell. Labview manuals are also on the bookshelf for reference.

Laboratory Safety Coordinator Duties

Laboratory Safety Coordinators are responsible for enforcing safety procedures and maintaining chemical waste logs.

To remove polishing waste, allow full bucket to settle for more than 2 weeks. When settled, siphon off up to 3/4 of the clear water from the bucket. Empty waste remains into bottle and prepare to disposal.

Laboratory Safety Coordinator will ensure that the following tasks are performed in timely manner:

- Laboratory Audit Checklist completed on a bi-weekly basis.
- Safety Procedures and Hazardous Waste Management procedures will be kept up to date (minimum of annual review).
- Periodic review (minimum of weekly) of the Chemical Inventory and MSDS inventory. Provide Department Safety Coordinator with two copies af all MSDS pages.

Statement of Compliance
Aerospace Engineering and Mechanics
University of Minnesota
24 Akerman Laboratory

User Name _____

E-Mail Address _____

Office Location _____ Office Phone _____

Lab Location _____ Lab Phone _____

Home Phone _____

Type of Worked Expected:

_____
_____
_____
_____
_____

Safety Training Completed:

_____
_____
_____
_____
_____

I have read and understood the Safety Procedures and Hazardous Waste Management Plan for 24 Akerman. I agree to comply with these rules and the practices outlined in the University of Minnesota Hazardous Chemical Waste Management notebook. I agree to follow instructions provided by Safety Coordinators. I will act in a responsible manner concerning my own safety and the safety of others.

I understand that if I do not comply with these rules, I will lose my laboratory privileges.

User Name _____ Signature _____

Advisor _____ Signature _____

Aerospace Engineering and Mechanics
24 Akerman
Laboratory Users as of 7/18/96

Laboratory User	Last Training	SOC On File
Tom Shield		
Richard James		
Wendy Grebner	Lab Safety Coord.	
Pam Schumacher	Lab Safety Coord.	
Valerie Maher		
Rob Tickle		
Tatiana Wilensky		
Jian Li		
Qiang Guo		