Chemical Hygiene Plan
Standard Operating Procedures

Aerospace Engineering and Mechanics
University of Minnesota
130C Akerman Laboratory

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Standard Operating Procedures
130C 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 130C 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 130C 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

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

Do not block escape routes.

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.

Metals must be locked in cabinet and recorded when used.

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

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.

Chemicals

All chemicals should be used under the hood in 19 Akerman. Only small amounts of chemicals which do not produce fumes should be used in 130C Akerman.

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 a locked flammable cabinet. 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.

Wash your hands thoroughly before you leave the lab.

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 Lab 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 used to flush the affected area for a minimum of 15 minutes. Seek medical attention immediately.
- **Eye Contact:** The eye wash station 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 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.

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.

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 (one is found 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.

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

Argon Tank Procedure

- Order new tank from University Stores.
- Pick up new tank at ME loading dock - securing the tank to the cart with bungee cords.
- Secure tank to the wall with chain and attach valve.
- REPLACE CAP ON USED TANK!!!
- Call University Stores at 58361 and tell them you have an empty tank to get picked up. You will need to give them the order #, part #, and cylinder # (all found on the tank).
- Return empty tank (secured to cart with bungee cords) to the ME loading dock (secure to the wall with the chain).

Liquid Nitrogen

Liquid nitrogen is considered a cryogenic liquid (boiling point less than -73C) and caution should be used when handling it. A special risk is skin or eye contact with a cryogenic liquid. Liquid nitrogen is prone to splash in use because of the large volume expansion ratio when the liquid warms up. Pouring liquid nitrogen should be done very slowly to minimize boiling and splashing. Unprotected parts of the body should not be in contact with the liquid, or an uninsulated container of the liquid. Gloves for the liquid nitrogen are in the top left drawer of the cabinet with the argon tanks. Liquid nitrogen may only be carried and stored in the Dewar.

Working with the crystal grower

Reference the Crystal Growing Procedure for operation instructions. Full training and certification is required before the crystal grower may be used.

Schedule time with Pam Schumacher for growing a crystal.

Complete the crystal growing log found in the procedure notebook.

Working with the Lindberg 1700°C furnace

The Lindberg furnace is used for heat treating samples.

- Open window and put gas out hose through the window.
- Turn wheel on furnace until the stage is at the bottom of the furnace.
- Place sample(s) on stage.
- Raise stage until at highest level.
- Plug in furnace and turn on.
- Open argon tank and open toggle switch so that argon is going to the furnace.
- Open flowmeter on furnace all the way for maximum flow (some oxidation will still occur since the furnace is not completely sealed).
- Set to desired temperature using the arrow keys on the controller.
- If solution treating the specimen, lower the stage after the desired time of heating and immediately quench specimen in bucket of water.
- After heat treating, set temperature on controller to room temperature (~25°C) and wait until temperature is within 50°C to turn the furnace off.
- Be sure to unplug the furnace, turn argon off and close the window before leaving.

Working with the Electric Arc Furnace

Read the *Operating and Maintenance Instructions* from Thermal Technology and the *Operator's Manual* for the IDEALARC DC-1000 (Lincoln Electric) for potentially hazardous conditions.

Reference the Alloying Procedure for detailed operation instructions. Full training and certification is required before the arc furnace may be used.

Never look at the arc without the shield over the viewport!!

Furnace power electrodes are at low voltage with respect to each other. Care should be taken not to short between the electrodes with gas tubing or tools, or between the hot electrode plate and ground (furnace shell and bulkhead). The voltage is low, but the current capability is high. The electrodes should be treated with the same caution given to automobile battery terminals.

The furnace is equipped with a water flow interlock switch which should automatically shut down power to the furnace in the case of interruption of water flow. If the water system fails, check that the power switches off, the vent valve should be fully opened and a flow of inert gas continued.

Schedule time with Pam Schumacher for melting an alloy.

Laboratory Safety Coordinator Duties

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

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

- Laboratory Audit Checklist completed on a monthly 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
130C Akerman Laboratory

User Name _____

E-Mail Address _____

Office Location _____ Office Phone _____

Lab Location _____ Lab Phone _____

Home Phone _____

Type of Worked Expected:

_____
_____
_____
_____
_____

I have read and understood the Safety Procedures and Hazardous Waste Management Plan for 130C 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
130C 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		