University of Saskatchewan
Department of Mechanical Engineering
SOP BioM-01

Procedure Title: General Lab SOP for Fatigue Testing Lab (2C50)

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SOP BIOM-01

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1. VERSION HISTORY

Version #: .1
Supersedes: N/A

Handwritten amendments to the official procedures can be made by a single line through the text, along with the date, and initialed by the authorized individual making the correction. Changes are to be noted below. Formal changes to this SOP are made on the date of revision or sooner, where required.

Section	Changes Made to Official Copy	Date	Initials

2. INTRODUCTION

It is a privilege **not a right** to use this lab. Persons who do not follow this and other standard operating procedures outlined by the Department of Mechanical Engineering will lose their lab privileges—**this may mean the inability to conclude research that is required for your degree**.

2C50 is a Biosafety Level 2 laboratory and therefore the proper degree of protection is of the utmost importance and cannot be emphasized enough! Being a Biosafety Level 2 lab, we are capable of working with non-preserved tissues. In other words, the tissues we use in this lab may contain pathogenic or infectious organisms and thereby pose a hazard. Therefore, because of their potential to cause human disease, great care is used to prevent this from occurring. Protection for laboratory personnel, the college, the university, the environment, and the local community must be considered and ensured. All users of this lab must be cognizant of these factors and exercise due diligence.

All users of this lab MUST be vaccinated for Hepatitis B and Tetanus!

This SOP provides general laboratory practices for the following:

- Safety.
- Proper use of the lab and its segmented spaces:
    a. Wet material preparation area,
    b. Clean areas, and
    c. Mechanical testing areas.
- Proper use, cleaning, and storage of laboratory equipment and instrumentation.
- Labeling, storing, and disposing of *biological* materials (including sharps).
- Labeling, storing, and disposing of *chemicals and solvents*.

This SOP does not address specific procedures pertaining to equipment operation. Please see the specific Operations Manuals and SOPs that are provided BEFORE performing any task in this lab.

This SOP does not address specific hazards of substances, the applicable MSDS's **MUST** be consulted prior to their use. MSDS's are available in the MSDS binder (bottom shelf of clean orange cabinet), and on the department safety webpage.

Relevant safety information can be found on the Department of Mechanical Engineering's Safety Webpage located at: http://www.engr.usask.ca/safety-me/. You must log in with your NSID and password. All users of 2C50 (and their supervisors) **MUST** be familiar with the expectations listed on the safety website.

All users of 2C50 (and their supervisors) **MUST** be familiar with the hazards, safe handling practices and PPE required to work with the substance. It is the user's responsibility to follow laboratory rules.

3. DEFINITIONS

SOP	Standard Operating Procedure
MSDS	Material Safety Data Sheet
WHMIS	Workplace Hazardous Materials Information System
PPE	Personal Protective Equipment
WSEP	Workplace Safety and Environmental Protection
BSC	Biological Safety Cabinet
PMMA	Polymethylmethacrylate
WMF	Waste Management Facility

4. PERSONNEL

Persons authorized to conduct activities in 2C50:

By signing this form I acknowledge that I have read and understand this SOP, have been vaccinated for Hepatitis B and Tetanus, and that I will conduct myself in accordance with this SOP and the general laboratory rules.

NOTE: ALL SIGNATURES MUST BE PRESENT ON THE SOP LOCATED IN THE YELLOW BINDER IN ROOM 2C50—Mechanical Engineering, digital copies of SOP's are made available for reference and convenience only. Printed SOP's are valid for 24 hours only, after that time their accuracy must be verified with the **OFFICIAL HARDCOPY VERSION**.

Name (Print)	NSID	Department	Signature	Date

Name (Print)	NSID	Department	Signature	Date

5. SAFETY

5.1 SOPs and Manual Locations:

All manuals and SOPs will be located on the bottom shelf in the orange cabinet in the clean section of the lab (unless otherwise stated).

1. **Standard Operating Procedures** *(Yellow Binder)*
    - General Lab SOP
    - Specific Operations Manuals and Procedures

2. **MSDS** *(Black Binder)*
    - Complete MSDS binder
    - Quick Reference MSDS – Plastic protected sheets in grey bind (labelled)

    - NOTE: MSDS's are valid for only 3 years, if the MSDS in the binder has expired, refer to the vendor's online and up to date version, links can be found in the online Chemical Inventory on the department safety page.

3. **Biosafety Manual** *(Green Binder)*

4. **Exposure Control Plan; WHMIS Substance Usage; Glassware Usage; and Hazardous Waste Disposal** *(Black Binder)*

All users of 2C50 (and their supervisors) **MUST** consult the above manuals and procedures **PRIOR** to using the lab. It is the users' and their supervisor's responsibility to be aware of the hazards involved in the use of this research laboratory.

5.2 Known Safety Issues Surrounding the Use of 2C50:

1. All individuals using this lab are to wear long pants and close toed shoes. It is unacceptable to wear clothing where your skin is exposed (e.g., shorts, dresses, sandals, etc.).

2. Lab jackets are to remain in 2C50. There is no acceptable reason to remove lab jackets from this lab (other than to have them sterilized).
    - 'Travelling' lab jackets are not exposed to the level 2 biocontainment
    - 'Travelling' lab jackets are labelled with a "T" on their tag.
    - 'Travelling' lab jackets are found along the north wall by the door of 2C50. **These jackets are NOT to enter further into 2C50.**

3. **A GLOVED HAND SHOULD NEVER** touch a:
    - Door handle,
    - Light switch,
    - Computer,
    - Clean workspace,
    - Clean lab materials or storage unit

    For your convenience, these surfaces are labelled.

5. Gloves are for your protection and should be worn when required; however, they **MUST NOT** be worn in non-hazardous or clean areas and must **NEVER** be worn outside of the lab.

6. Hazardous chemical use:
    - All hazardous chemicals including organic solvents (i.e., Acetone, PMMA, etc.) MUST be used inside a fume hood.
    - Ethanol in any quantity may be used outside of a fume hood.
    - Isopropyl alcohol in small quantities can be used outside of a fume hood in a WELL VENTILATED AREA.

7. All chemicals must be labelled according to the directions indicated below.
    - **ANY UNLABELLED CONTAINERS** (with a WHMIS or non-WHMIS substance) must be disposed of as unknown hazardous waste resulting in a service charge for **EACH** container. This service charge will **be billed to the researcher's supervisor**.

8. The Mechanical Engineering facilities are **NOT EQUIPPED** to handle substances that require the following:
    - **Storage under inert gas.**
    - **Storage in a flammables or explosion proof refrigerator.**
    - **Radioactive materials.**

10. Prior to beginning any procedure, a waste container of suitable size (**max 10 L with a screw lid**) must be labeled appropriately (**with a NEW Chemical Waste Disposal Label**; *see Figures 6 and 8*). **Percentage of EACH Constituent MUST** be indicated on the label. *Labels can be found in the grey containers labelled "MSDS and Labels".*

11. All carcass waste (i.e., arms, knees, hooves, etc.) are to be deposited in the yellow bag inside the yellow bin (Appendix A).
    - The yellow bin is to be stored in the freezer until ¾ full and then the trained biological waste disposal personnel must arrange for waste disposal.

12. The grey bin (with the yellow lid) is for sharps and other biological waste. Inside the yellow bag in the grey bin, deposit: soiled gloves, contaminated paper towel, and other non-combustible waste. Inside the grey bin (**NOT** in the yellow bag) place the full sharps container (Appendix A).

6. PROCEDURE

6.1 Proper Use of Lab Space

6.1.1 General

1. **Keep the lab locked at all times!** Once you enter the lab, the lab door should be locked behind you. DO NOT leave the lab door unlocked while you are using it. **Only authorized personnel should be admitted into the lab**.

2. **Do NOT wear clothing that reveals skin (i.e., shorts, skirts, dresses) or open toed shoes!** If you are wearing inappropriate clothing, you will be removed from the lab. If this happens 3 times, your lab privileges will be revoked for an amount of time defined by your supervisor and the lab manager.

3. **Make sure you are wearing the proper PPE for the job** PRIOR to starting any wet material preparation or mechanical. If you are unsure of what PPE you should be wearing, consult with your supervisor. There are signs in the lab that will ask you to STOP! and check your attire prior to entering sensitive areas.

4. **Before you leave the lab, make sure it is <u>lab neutral</u>!** Lab neutral means:
    i. All equipment you are using is to be cleaned, decontaminated, and stored in its appropriate location—*nothing should be left out*!
    ii. Clean protective eye wear (i.e., safety glasses and face shields). There is sodium dichloroisocyanurate spray on the protective eye wear storage shelf to decontaminate them.
    iii. All used surfaces (including the fume hood and BSC) must be cleaned and decontaminated with disinfectant spray (sodium dichloroisocyanurate)—**NOT** THE CLEAN BOTTLE.
    iv. Small garbage's are to be emptied into the large garbage.
        - If the large garbage is full, then you **MUST** remove the bag from the bin, tie it up, and leave the tied bag in the hallway for the custodians.
    v. The floors are swept AND washed (with 10% concentration of Clorox bleach in water).

    The next person to use the lab should **NOT** have to clean up your mess and store the equipment you were using.

6.1.2 Wet Material Preparation Area

1. **Read and understand the appropriate wet preparation manual.** Make sure you know what you are doing prior to beginning your dissection.

2. **Ensure you are in appropriate lab PPE.** There are signs around the lab (prior to entering sensitive areas) that will indicate what designates appropriate PPE, however this can vary by task.

3. **Get necessary equipment for dissection.**
    i. Remove a tray from the shelf, line it with moist paper towel.
    ii. Equip tray with tools (Figure 1 shows an example).

Figure 1. Sample tray with minimal tools required for dissection.

    iii. Set up the remainder preparation area with other materials necessary for dissection and potting.

    iv. **Do NOT contaminate the drawers, shelves, and storage racks.** If you require additional materials from the drawers and shelves, then discard soiled gloves, acquire and don clean gloves, then proceed to obtain the necessary materials.

4. **Get specimen.** Only once you are set up and ready to dissect the specimen should you obtain it from the storage unit (e.g., fridge, freezer, and bin). **All exposed specimens MUST remain in the wet material preparation area!**

6.1.3 Clean Areas

1. **Clean areas MUST remain free of contaminants.** Clean areas are marked with labels and tape on the floor. Specifically, these areas include:
    - Door handles,
    - Light switches,
    - Computers,
    - Clean workspaces (desks and trolleys),
    - Clean lab materials in storage units,
    - The entire front room that is boarded by tape indicator (signifies that you are about to enter/ or leave a contamination zone).

2. **Do NOT contaminate clean areas of the lab.**
    - If you are unclean (from handling biological material) then remove unclean gloves and wash/ decontaminate your hands prior to entering these areas (indicated by tape on the floor and labeling).
    - Do not walk around the lab with unsealed biological material (i.e., cadaveric specimen not enclosed in sealed plastic).

6.1.4 Mechanical Testing Areas

- **Make sure you know how to operate the equipment PRIOR to beginning your work.** There are separate operations manuals and SOPs for the DAQ, MTS, and Zwick in the **CLEAN** orange storage unit.
    - If you are unable to operate the equipment, then ensure you have someone who is able to operate the equipment with you at all times.
- **Ensure you are in appropriate lab PPE.**
- The orange shelf in the mechanical testing area is a storage unit for materials that you may need to set up the MTS or Zwick for mechanical testing.
- Old projects are stored in 2C50.1.1.

6.2 Proper Use, Cleaning, and Storage of Laboratory Equipment.

6.2.1 Proper Use of Lab Equipment

1. **Use lab equipment for the intended and designed purpose**! For example, a knife is meant for cutting; it is not used to tighten screws. If you want to tighten or loosen screws, then use a screwdriver.
2. **Use Water during dissections!** The use of water during dissection or surgical procedures keeps the blood and body fluids (which lead to corrosion) from drying on the instrument(s).
3. **Keep instruments clear during a dissection or surgical procedure**!
    - Paper towels moistened with water should be used during the dissection or surgical procedure to wipe the instruments and remove organic debris and blood.
    - Once the procedure has ended, hinged instruments should be opened and placed in a splash basin of water to soak.
    - Instruments that are too large to be contained in a basin may be covered with a towel soaked in water to keep the organic debris and blood from drying on the instrument surface.

Why is debris removal important?

i. Reduces the number of micro-organisms on the device.

ii. Reduces the nutrient material that might support pathogenic growth.

iii. Minimizes the risk of environmental exposure from aerosolization or spillage.

iv. Decreases the possibility of instrumentation damage from organic debris.
   - The majority of surgical instruments are made from stainless steel. Surgical stainless steel alloys have specific properties that make them resistant to corrosion. Regardless, these instruments are still susceptible to corrosion as their exposure to bodily fluids/tissues and corrosive chemicals can contribute to pitting, staining and discoloration over time. Washing instruments with inappropriate solutions, laundry soap, and disinfectants can further contribute to metal corrosion. So take care of the lab equipment!

v. Cancels the need to vigorously clean the instrument(s) to remove encrusted debris.

In general, to minimize organic build-up or reduce bioburden on the instruments, keep instruments as free as possible of blood and organic debris during the dissection.

6.2.2 Cleaning/ Decontamination and Storage of Lab Equipment

1. **Cleaning is the single most important step in making a medical device ready for reuse!** Without adequate cleaning, many decontamination and sterilization processes are ineffective. Cleaning is critical in removal of gross debris, prevention of cross contamination, and user protection. Cleaning is considered to be the removal of visible dirt, soil, organic matter or other foreign material from an instrument or lab equipment.
   - Cleaning generally means the removal of, rather than the killing of, microorganisms. Decontamination and sterilization refer to the killing of microorganisms.

2. **Instrument cleaning procedure.** This process is also provided by the sink in 2C50 as well as described below:

   NOTE: Personnel should wear protective attire (gown, gloves, and splash mask). Aerosolization of contaminants, splashing of infectious material, and injury from sharp objects is possible when manual cleaning is performed.

   i. Disassemble applicable equipment prior to cleaning to do a thorough job.

   ii. Use a cool-water rinse to remove gross debris. Gross debris dried to the instrument surface may require soaking prior to cleaning and disinfecting—Don't let debris harden!

iii. Instruments (with the exception of powered equipment) should be submerged in warm water with bleach/disinfectant tablets (sodium dichloroisocyanurate—use 1 (0.5 g) tablet per 500 mL) and cleaned while completely submerged.

- Soak instruments for 15 minutes in bleach/disinfectant tablets (sodium dichloroisocyanurate) for decontamination.
- Prolonged soaking of instruments may damage instrument surfaces and decrease instrument life (i.e., more than 25).

iv. All tissue must be removed from the external surface and internal parts of the instrument.

v. Rinse the instruments with water.

vi. Let the equipment dry thoroughly after decontamination/ sterilization. Thoroughly drying instruments helps prevent rust formation.

vii. Water-soluble lubricants (i.e., WD-40) should be applied to those instruments that require lubrication. *Instruments should be cleaned before the lubricant is applied.*

viii. If necessary, reassemble the equipment.

ix. Inspect equipment to ensure that it is still functioning appropriately.

x. Store lab equipment in correct storage location ONLY after the equipment is thoroughly dried. Please ensure you are storing equipment in the correct location! The disinfectant solution should be stored on the counter by the sink.

Lab Equipment Use and Cleaning Checklist:

- ☐ Minimize gross debris during dissection
- ☐ Keep instruments moist
- ☐ Disassemble equipment (if necessary)
- ☐ Clean / Decontaminate / Rinse
- ☐ Dry thoroughly
- ☐ Reassembly (if necessary)
- ☐ Inspection for function
- ☐ Replace/return instruments

6.3 Labeling, Storing, and Disposing of <u>Biological</u> Materials

- Biological material is any material that originates from living organisms, which may be infectious or non-infectious.
  - This includes SHARPS!

- A biohazardous material is any infectious agent or hazardous biological material that presents a risk or potential risk to the health of humans, animals, plants, or the environment.

- Safety Resources services in support of Hazardous Waste Disposal are provided at no charge to the client provided the Hazardous Waste Disposal Standard is followed. The college/division/department/unit/faculty will be responsible for all costs associated with the disposal of hazardous waste where required processes have not been adhered to.
    - Contact Safety Resources: (306) 966-4675 or safetyresources@usask.ca

6.3.1 Labeling Biological Material/ Specimens

All incoming specimens should have an ID associated with them. All users are required to track the inventory for moving and alterations (i.e., dissections). User's **MUST** adhere to the following instructions:

- Specimens **MUST** be bagged with a seal and labelled with a specimen ID card (*ID cards are provided in the CLEAN grey bins labelled "MSDS and labels"*).
    - See Figure 2 for ID card sample.

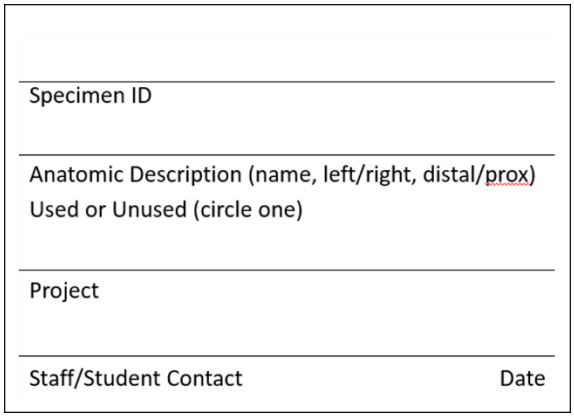

Figure 2. Specimen ID card.

Do **NOT** label the specimen by writing directly on the bag! Permanent ink is not so permanent and it comes off with time, handling, and solvents.

- All dissected components **MUST** be bagged and tagged with corresponding ID.
    - For example, if your specimen is the entire arm from fingers to shoulder blade but you only require the forearm, then you will separate the region you need (i.e., forearm) from the rest of the arm. However, you will bag both with the same Specimen ID.

6.3.2 Storage of Biological Material/ Specimens

- The storage of specimens pertains to storage prior to the onset of the project, during the project duration, and while awaiting waste disposal.
    - **Fixed or preserved specimens** can be stored in a bin with preservative solution in the bottom and wet paper towels. This will prevent drying out of the specimens.

- **Fresh or non-preserved specimens MUST** be stored in the freezer. There is no exception to this!

- All dissected specimens **MUST** be stored in a plastic bag with a heat seal and labelled with a specimen ID card (provided above). Figure 3 illustrates the proper method to bag and tag specimens and large dissected portions.

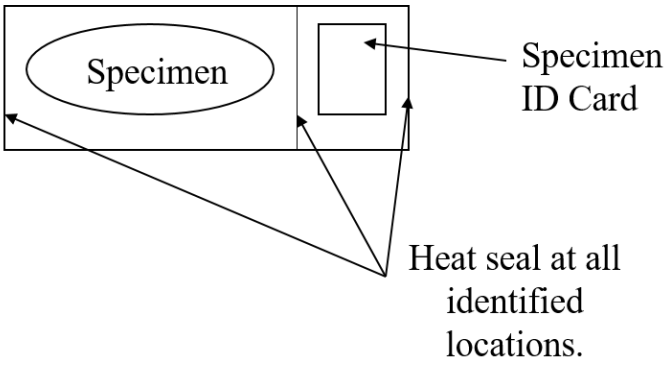

Figure 3. Proper bagging and identification of specimen.

- See the Biological Waste Disposal section on how to prepare your samples for disposal and properly store them until pick-up.

6.3.3 Disposal of Biological Waste

The method of biological waste disposal is determined based on its classification (i.e., non-infectious, biohazardous, special precaution waste). In 2C50 we do not deal with special precaution waste. Table 1 will identify how to contain and dispose of biological waste used in 2C50.

It is the responsibility of the biosafety permit holder and person generating the waste to properly manage the biohazardous and non-infectious biological waste to ensure safe and environmentally responsible disposal and to be in accordance with their biosafety plan, and applicable regulatory requirements.

Table 1. Biological waste disposal method for materials used in 2C50

Category of Waste	Hazard Type	Collection Container Type	Method of Disposal
Animal Anatomical (fixed or unfixed)	Biohazardous	*Yellow Bag Inside Yellow Incineration Pail*: Carcass waste (i.e., legs, knees, hooves, etc.).	Biomed Recovery & Disposal Ltd.
	Non-infectious	1. Two plastic bags sealed and placed in cardboard box; or 2. If animal is fixed, collect decant as chemical waste and place animal into two plastic bags and place into a cardboard box.	1. Waste Management Facility (WMF). 2. Fixed animal – decant the preservative and classify as chemical waste. Ship the animal to Biomed Recovery & Disposal.
Human Anatomical (fixed or unfixed)	Biohazardous	*Yellow Bag Inside Yellow Incineration Pail*: Carcass waste (i.e., arms, knees, etc.). *Yellow Bag Inside Grey Bio-Waste Bin*: Soiled gloves, Contaminated paper towel, non-combustible waste.	Biomed Recovery & Disposal Ltd.
Sharps	Biohazardous/ Non-infectious	Sharps container to be placed directly in the grey waste bin.	Biomed Recovery & Disposal Ltd.

6.3.3.1 WMF Procedure

- To ensure waste is removed from the workplace by the WMF personnel, the following procedures shall be adhered:
    1. Ensure the container is structurally capable of withstanding the total weight of its contents;
    2. Containers should not weigh more than 20 kg;
    3. Ensure all plastic bags are sealed or tied shut;
    4. Ensure boxes are taped shut with packing tape;
    5. Sharps waste shall only be collected in approved sharps containers.
    6. These sharps containers may be shipped on its own as biological waste or added to the chemical waste shipments.
    7. WMF personnel must receive a completed Hazardous Waste Disposal Form by 1600 hours Wednesday to ensure waste removal for the next week;
    8. Store waste in a secure cool place (e.g. refrigerator, freezer) to prevent decomposition prior to pick up;
    9. Containers shall be ready for pick up and at the designated pick up location Thursday morning.

6.3.3.2 Labeling Biological Waste for Disposal by WMF

- Biological waste that is to be disposed of by WMF **MUST** have a Biological Waste label affixed to the outside of the waste container (Figure 4).

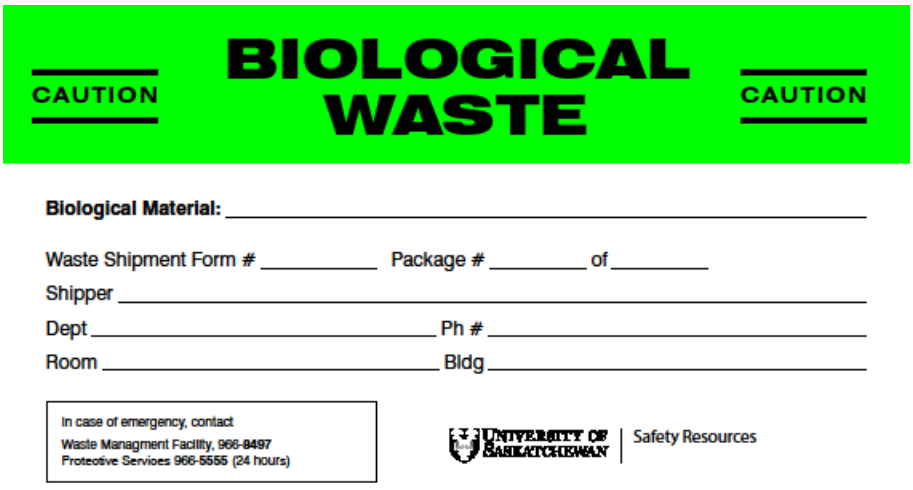

Figure 4. Safety Resources label for biological waste to be disposed of by WMF.

- All fields on the above label **MUST** be completed in full as follows:
    1. **Biological Material:** Record the category of non-infectious biological material;

2. **Waste Shipment Form #:** Corresponds to the number on the Hazardous Waste Disposal Form;
3. **Package #:** Number of the container within the shipment (i.e. 1 of 4); and
4. **Shipper:** Record the name, department, building, room number and telephone number of the person who completed the Hazardous Waste Disposal Form. This will be the contact person if WMF personnel require more information about the contents of the package.

If you require hazardous waste labels, print them off from the Safety Resources website, visit the Safety Resources general office, or contact WMF staff to request more

6.3.3.3 Hazardous Waste Disposal Form Biological (non-human or pathogenic) or Chemical (see section 6.4.5.2) for WMF

1. Hazardous Waste Disposal Forms are filled out online at: http://safetyresources.usask.ca/

2. Complete all fields then click Submit to send your form (Figure 5).

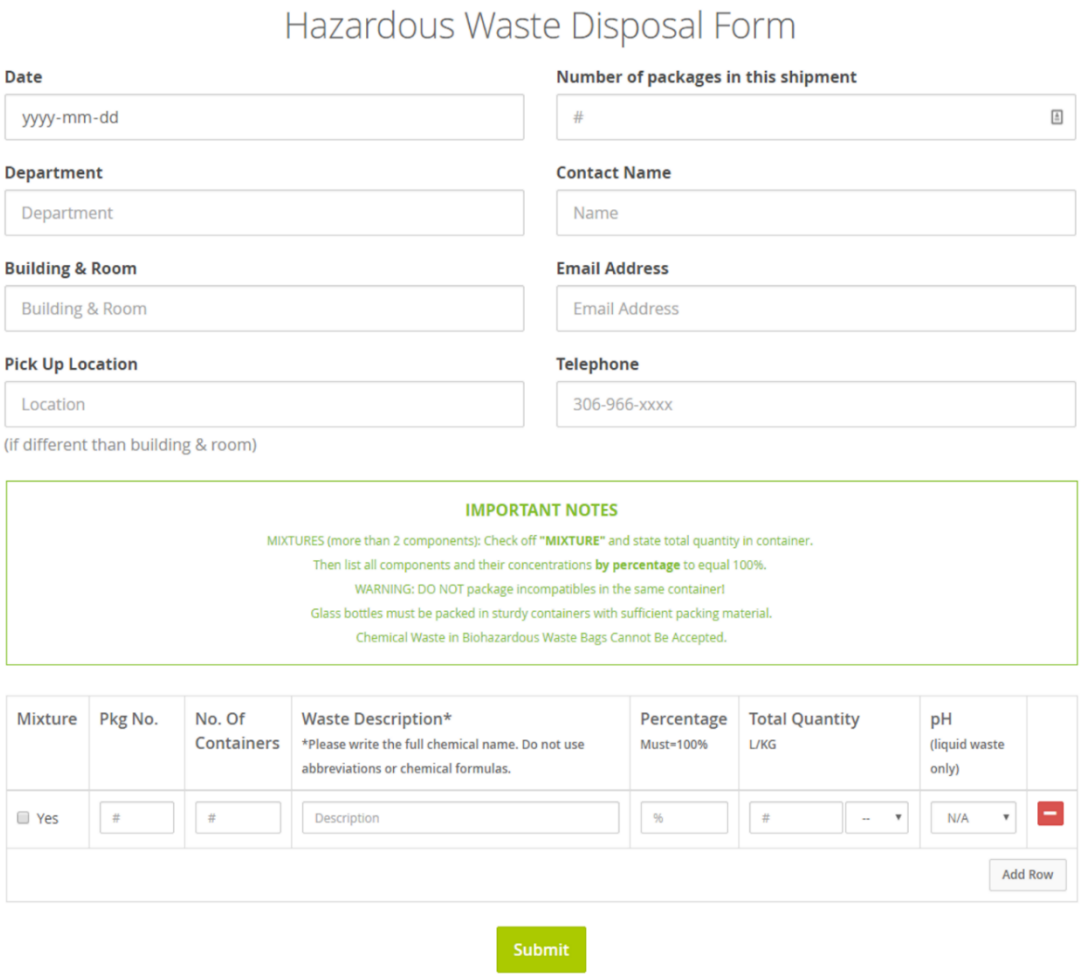

Figure 5. Hazardous Waste Disposal Form.

- Once you click "Submit", your waste form will **automatically** be sent to WMF staff. ***There is no need to email or fax a copy of the form.***
- A waste shipment number will be automatically assigned to your request.
- If you want to prepare a new shipment, exit and complete a new Hazardous Waste Disposal Form

3. Check your email! A confirmation email with a copy of your completed form will be sent to the email address you provided. You should keep this copy for your records.

4. Ensure all waste is properly labelled and ready for transport (as defined above).

5. Contact Safety Resources if you have questions:
   - Email: safetyresources@usask.ca
   - Phone: WMF staff at (306) 966-8497

6.3.3.4 Disposal through Biomed Recovery and Disposal Ltd.

- To request removal of biohazardous waste by Biomed, contact them at: (306) 253-4476 to schedule a time for removal.
  - Ensure waste is at the designated pick up location on the day of their visit.

- The following procedures **MUST** be adhered to when packing waste into Biomed containers and prepping for shipping:
  - Collect biological waste in a yellow Biomed bin lined with a durable biohazard labelled bag (yellow). When the bag is ¾ full seal the bag with a zip or twist tie.
  - Place labelled sharps containers on top of the sealed biohazard labelled bag or directly into the grey bin with no bag. **Never** empty the SHARPs container into the Biomed bin.
  - Close the bin lid and secure the lid (hammer secure) to the bin with ties.
  - Clean and decontaminate the exterior walls of all containers with the appropriate disinfectant prior to shipping.
  - Containers with visible signs of external contamination will **NOT** be accepted.
  - Containers **MUST NOT** weigh more than 50 lb (~22.7 kg)

- Biomed Recovery and Disposal Ltd. (Biomed) uses either a hydroclave sterilization process or incineration to destroy the biological waste.

- Waste collected in the yellow or red pails, and blue barrels are destined for incineration. We use the yellow pails. **ALWAYS ensure these items are labelled with an "Incinerate" sticker**.

- Waste collected in sharps containers and grey bins with a yellow lid are destined for hydroclaving.

Waste **MUST** be stored in a secure cool place (e.g. refrigerator, freezer) to prevent decomposition prior to pick up.

- **Labelling of Waste Destined for Biomed Recovery and Disposal Ltd.**
  - Waste that is destined for disposal to Biomed is transported off campus and therefore **MUST** be packaged in accordance with the *Transportation of Dangerous Goods (TDG) Regulations* and the person offering the waste container for transport **MUST** be TDG certified in Biowaste Disposal.
    - Biowaste Disposal Courses are available through Safety Resources upon request. Contact Safety Resources to schedule a course.

  - The following is required for all Biomed Disposal bins, pails and barrels:
    1. Proper shipping name "Biohazard" with Biohazard symbol (*should be already marked on package*);
    2. Bar code label specific to your department **placed on the lid** of the container.
    3. If a container is missing the appropriate markings on the package, contact Safety Resources to obtain the correct labels (e.g. Biohazard symbols)—otherwise the package will not be accepted.

- Contact Biomed at (306) 253-4476 to obtain more bins, SHARPS containers, and bar code labels.

6.4 Labeling, Storing, and Disposing of <u>Chemicals and Solvents</u> (Substances)

6.4.1 Allowed Substances

- No substance is to be brought into the laboratory without prior approval by a **faculty member AND the departmental assistant** supervising the area.

6.4.2 Labeling of WHMIS Substances

- Prior to re-packaging or mixing any WHMIS substance out of the original supplier labeled container the container **MUST** be labeled with a WHMIS workplace label and a storage classification sticker.
  - **ANY UNLABELLED CONTAINERS** (with a WHMIS or non-WHMIS substance) must be disposed of as unknown hazardous waste resulting in a service charge for **EACH** container. This service charge will **be billed to the researcher's supervisor**.

- All **Mixtures** must have their entire contents labeled with the percent composition indicated (i.e. 2% Nitric Acid in 98% Methanol), **ALL CONSTITUENTS MUST** be indicated along with their concentrations.

- **Temporary Labels** are allowable if a substance/mixture is not going to be stored, and is going to be used in less than one day. A temporary can be labeled with masking tape and a pen.

- **Waste Containers** must be appropriately labeled with either a WHIMIS label or a **Waste Disposal Label** (orange label from the University).

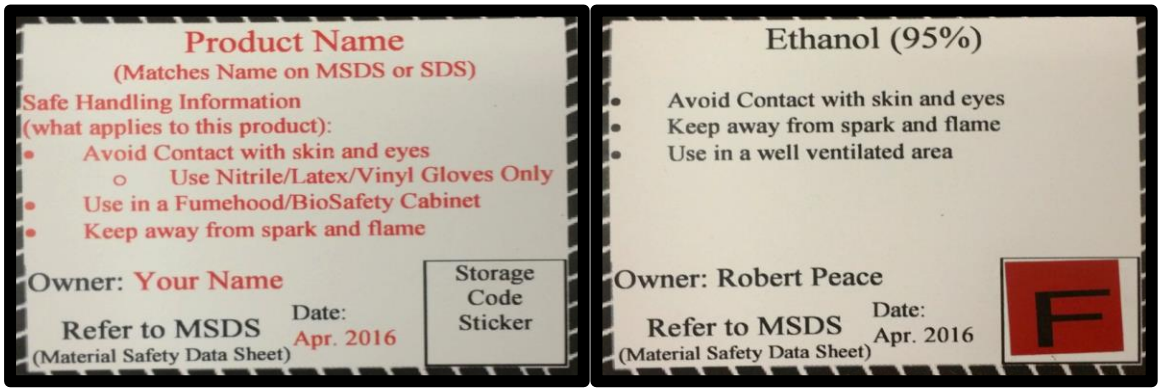

Figure 6. Features of a proper WHMIS workplace label (right) and an example of a completed WHMIS label (left).

6.4.3 Labeling of Non-WHMIS Substances

- Prior to re-packaging or mixing any non-WHMIS substance, the container **MUST** be labeled as described below.

- Substances such as soap, distilled water, tap water, oil samples, etc. are not WHMIS regulated; however, a label is still required. A WHMIS label can be used and is encouraged, however masking tape with pen or permanent marker (with masking tape or directly on the bottle) is acceptable.

- **ALL CONSTITUENTS MUST** be indicated along with their concentrations, regardless of its status as a WHMIS substance.

6.4.4 Storage of Substances

- **All substances must be stored with compatible substances!** The MSDS will have a list of incompatible substances, and the 'Hazardous Storage Groups' table (Table 2, *below*) provides a general guide to chemical storage. In addition, each substance will have a small colored dot on it (a sticker) indicating its storage code. **Substances with different colored stickers MUST NOT BE STORED TOGETHER**.
    - Always store likes with likes! For example, store all flammable materials together.

- **NO** hazardous substances can be stored under a sink.

- **NO** flammable substances can be stored in the fridge(s) or freezer(s).
- WHMIS substances **MUST NOT** be stored above eye level.

Table 2. Hazardous Storage Groups.

F	Flammables	**OA**	Organic Acids
G	General	**A**	Acids
NA	Nitric Acid	**O**	Oxidizers
UIG	Under Inert Gas	**B**	Bases

6.4.5 Disposal of Chemical Waste

It is the responsibility of the supervisor and person generating the chemical waste to properly manage the chemical waste to ensure safe and environmentally responsible disposal in accordance with the Saskatchewan Hazardous Substances and Waste Dangerous Goods Regulations, and City of Saskatoon Sewage Works and Waste and Dumping bylaws.

Note: Under **NO** circumstances can chemical waste be washed down the **sink** or contaminated waste placed in the **garbage**! Chemical waste shall not be released to the environment, but collected and forwarded to the Waste Management Facility (WMF) for proper disposal. Any questions, refer to the Waste Disposal Standard or call WMF at (306) 966-8497.

6.4.5.1 General Procedure

- At the end of each experiment all waste must be collected, along with the rinse waste and decant biological waste in the appropriately labeled container. All waste containers must be placed in the designated areas in the plastic secondary containment trays.

- Flammable waste **must be** stored in a container of **5 L or less** (for mixtures if the volume is 40% or more flammable waste then the entire container is considered flammable).

- All chemical waste must be collected in accordance with University of Saskatchewan regulations. These regulations can be found in the Hazardous Waste

Disposal Manual, which is located with the MSDS binders in room 2C50, and is also available from the Safety Resources website.

- Labeled waste can be disposed of for no fee; **unlabeled waste will result in a fee of $250.00 *per container* being charged to the researcher's supervisor.**

- **Empty Containers** of highly hazardous materials must be disposed of as hazardous waste; less hazardous material containers can be disposed of as follows:
    1. Triple rinse container and then label as rinsed (all other labeling must be defaced).

    2. The containers should then be broken (for glass containers) or punctured (for plastic containers) and disposed of through the regular garbage.
        - Glass cannot go directly into the garbage; it must be in a plastic lined cardboard box labeled as "sharps" or in a sharps container.

    3. Solvent bottles (acetone, methanol, etc.) can be left open in a fume hood overnight and do not need to be triple rinsed before being disposed of as indicated above.

- The exterior of any waste container should be clean enough that you are comfortable touching it with a bare hand (although gloves should always be worn when handling waste disposal containers).

- WMF personnel have the right to refuse pick up of any improperly packaged or labelled waste to ensure their safety. Containers with visible signs of external contamination will not be accepted.

- Plastic hazardous waste containers can be purchased from Facilities Management Stores (306- 966-4501) or college/department central stores.

- To ensure the safety of the individuals working in the area, custodians, and WMF personnel it is important to adhere to the following instructions:
    1. Refer to the MSDS for hazards associated with each chemical;
    2. Do not pack incompatible chemical waste in the same package;
    3. Use an appropriate size and compatible container for collecting that particular waste;
    4. During filling, use a funnel to avoid contaminating the outside of the container;
    5. Do not overfill containers. Leave head space to allow for expansion and to prevent spills when the container is opened by WMF personnel;
    6. Ensure lids on containers are secured tightly to prevent leakage;
    7. Packages shall not weigh more than 20 kg (except in the case of drums);

8. Ensure sufficient packing material (e.g. packing paper, vermiculite) is used to prevent containers enclosed in a package from damage during transport;
9. Ensure that all packages are structurally capable of withstanding the aggregate weight of all containers within;
10. Once full, tape shut with packaging tape the tops and bottoms of packages; and
11. If reusing an empty container for waste collection, ensure the original label is defaced.

6.4.5.2 Labeling of Liquid Hazardous Waste

- This includes both chemical waste and liquid decant from biological waste (e.g., preservative).
- All **Mixtures** must have their entire contents labeled with the percent composition indicated (i.e. 2% Nitric Acid in 98% Methanol), **ALL CONSTITUENTS MUST** be indicated along with their concentrations.
- Use only proper chemical names on the label. Acronyms, trade names, or chemical formulas are NOT acceptable.
- All waste must be labelled with correct labels—Chemical Waste (Figure 7) and Hazardous Waste labels (depending on if shipping through WMF or Biomed Recovery & Disposal) for each shipping container.
- A shipping container is either a PLASTIC 10 L waste container or a cardboard box filled with smaller screw type containers or solid waste bags.

Note: It is required that the waste shipment number be filled in along with the number of containers in a shipment on the ORANGE waste disposal labels. . *Labels can be found in the grey containers labelled "MSDS and Labels".*

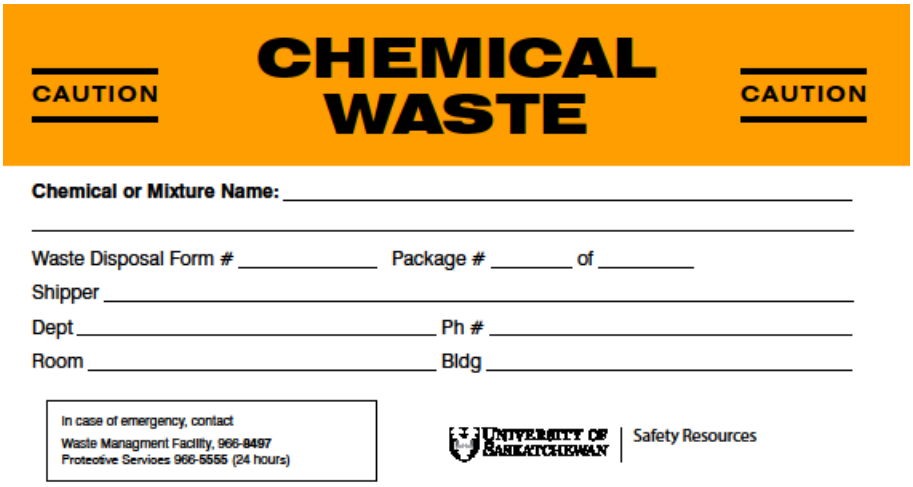

Figure 7. Chemical Waste Disposal Label.

- All fields on the label shall be completed in full as follows:
    1. **Chemical or Mixture Name:** Record the most abundant chemical name shipped in the package;
    2. **Waste Disposal Form #:** Corresponds to the number on the Hazardous Waste Disposal Form;
    3. **Package #:** Number of the package within the shipment (e.g. 1 of 4); and
    4. **Shipper:** Record the name, department, telephone number, room number and building of the person who completed the Hazardous Waste Disposal Form. This will be the Hazardous Waste Disposal Standard October 22, 2015 Safety Resources Page 18 of 29 contact person if WMF personnel require more information about the contents of the package.

DO NOT COMBINE INCOMPATIBLE SUBSTANCES IN A WASTE CONTAINER, IF YOU ARE UNSURE OF COMPATIBILITY CHECK THE MSDS OR USE SEPARATE CONTAINERS.

6.4.5.3 Labeling of Contaminated Solid Waste

- **NO CONTAMINATED SUBSTANCES CAN BE PLACED IN THE GARBAGE**. Any substance that contains even trace amounts of a hazardous substance cannot be disposed of in the general garbage.

- Only place **COMPATIBLE** chemical waste in the same container, if you are unsure ask for assistance or use separate containers.

- Place the **labeled sealed** plastic bag in the secondary containment chemical waste trays provided in the lab.

- If the outside of the bag becomes contaminated place it inside a non-contaminated bag and label the exterior bag.

- You should feel comfortable touching a waste disposal bag on the outside with a bare hand, if you are not then the outside is not sufficiently clean, however gloves should always be worn when touching waste disposal containers.

- Solid waste bags must be labeled individually, however for shipping purposes many bags can be placed in a cardboard box.

6.4.5.4 Storage of Hazardous Waste Containers until Disposal

Each laboratory shall establish a location for the consolidation of chemical waste in consideration of the following requirements:

1. Store chemical waste in a location that does not obstruct any pathways;
2. Never store incompatible chemical waste in a manner that will allow reactions to occur in the event of a spill or release;
3. Do not stockpile chemical waste;
4. Store liquid chemical waste in containment trays or on sufficient absorbent material to absorb a spill;
5. Ensure WMF personnel are familiar with the waste storage location; and
6. Maximum volume for flammable liquid waste that may be stored outside a flammable storage cabinet is 50 litres.

6.4.5.5 Waste Disposal Forms

Go to the website: http://safetyresources.usask.ca/ and fill out the Hazardous Waste Disposal form as described in Section 6.3.3.3.

7. REGULATORY / STANDARDS

University of Saskatchewan Hazardous Waste Disposal Manual: Hazardous Waste Disposal: http://safetyresources.usask.ca/?id=3&view=1

2016 University of Saskatchewan Biosafety Manual.

8. REFERENCES

University of Saskatchewan WSEP Documents/ Hazardous Waste Disposal/ Laboratory Safety Manual: http://safetyresources.usask.ca/?id=3&view=1

Canadian Centre for Occupational Health and Safety (MSDS reference): http://ccinfoweb.ccohs.ca/msds/search.html

2016 University of Saskatchewan Biosafety Manual.

Recommended Practices for Cleaning and Caring for Surgical Instruments and Powered Equipment. (2002). *AORN Journal, 75*(3): 633-636. DOI: http://dx.doi.org/10.1016/S0001-2092(06)61186-1

University of Saskatchewan Hazardous Waste Disposal Standard (2015).

9. APPENDIX A

Incineration Pail (Red or Yellow)

Hammer seal container prior to pickup

- Carcass waste
  a. Arms,
  b. Knees,
  c. Hooves, etc.

Placed in the yellow bag within the pail.

BioMed Bar Code (MUST be placed on the bin LID)

Zip tie to seal bin prior to pickup

Biohazard symbol and the word "BIOHAZARD"

Grey Bin

Zip tie to seal bin prior to pickup

- SHARPS container placed directly in grey bin → **NOT** in the yellow bag in the bin.

- In yellow bag within the grey bin, dispose of non-combustible waste:
  a. Contaminated gloves,
  b. Contaminated paper towel.

Biological Waste Labels

Add the follow labels to the BioMed Container:

1) **Grey Bin ONLY**
    - Place the Unit/Department specific Barcode label on the LID of the grey bin.

2) **Incineration Pail (Red or Yellow) ONLY**
    - Place the Unit/Department specific Barcode label on the LID of the pail.
    - No incineration sticker is required

NOTE: To order more bar codes, contact BioMed at (306) 253-4476.