SUBJECT: CHEMICAL DISPOSAL STANDARD OPERATING PROCEDURES (SOP)

1. PURPOSE: To communicate the proper disposal procedures for various chemicals, chemical products, and other materials.

2. DEFINITIONS:

CSO	Controlled Substance Officer
EMS	Environmental Management Service
GEMS	Green Environmental Management System
IHO	Industrial Hygiene Officer
RAM	Radioactive Materials
RSO	Radiation Safety Officer
RSC	Research Safety Coordinator
SDS	Safety Data Sheet
SRS	Subcommittee on Research Safety
VMU	Veterinary Medical Unit

3. ACTIONS: Evaluate your chemical

a) Three good sources for evaluation are:

i) The Safety Data Sheet (SDS) for your chemical of interest (available at http://vaww.hefp.va.gov/occupational-safety-health-gems/safety-data-sheetchemical-inventory-service or in the electronic chemical inventory).

ii) Hazardous waste identification and management site from the Minnesota Pollution Control Agency (state.mn.us) has a waste evaluation guide and lists of regulated wastes.

iii) The Minneapolis Veterans Affairs Health Care System's "Training Manual for Hazardous Waste." You may request a copy by contacting the Green Environmental Management System (GEMS) Program Director or the Industrial Hygiene Officer (IHO) or find it at R:\All_Staff\Safety\Hazardous Waste Training.

b) Categories of chemical waste:

i) **Non-hazardous solid chemical waste** such as glucose or table salt may be disposed of in the regular trash unless the chemical is contained in glass in which case it must be placed in a sharps container. Alternatively, the non-hazardous chemical can be transferred to a plastic bag that is closed/tied, labeled "non-hazardous" and disposed of in the regular trash; the empty glass container is disposed of in a sharps container.

ii) **Non-hazardous water-soluble liquid waste** such as saline/sugar solutions may be sewered after they have been evaluated and entered in the Sewer Discharge Log or at R:\All_Staff\Safety\Sewer Evaluations. Companies that supply chemicals do not recommend recycling chemical containers.

iii) Recyclable materials

1) **Oil waste** must be placed in Room 3N-101 for disposal/recycling. Place a "USED OIL" label on the container. On the label include the date, name of the Principal Investigator,

and laboratory room number. Place the labeled container in the "flammable" cabinet. (Oil is not flammable but is combustible.) If needed, containers for used oil are available from the GEMS Coordinator.

2) **Computer discs, CDs, etc.,** can be placed into the floor model Shred-N-Go containers if disposal is limited to only a few, otherwise, Environmental Management Services (EMS) must be contacted for disposal.
3) **Batteries** are to be sorted by type (alkaline, lithium ion, etc.) and disposed of in the appropriate box located by the printer in the Research Office (3M-112).
4) **Glass bottle** recycling containers are located in the break room. Only recycle bottles that are visibly clean, previously contained non-hazardous or water soluble materials, and with labels removed or no longer legible. Certain types of glass are currently not recyclable such as Pyrex. Do not recycle containers that had previously contained a P-listed chemical. A complete listing of P-listed compounds is given on the following MPCA website: Hazardous waste identification and management site from the Minnesota Pollution Control Agency (state.mn.us)

iv) **Hazardous solid or liquid waste** i.e., listed (P, U, F), characteristic (flammable, oxidizer, corrosive, reactive or MN Lethal), and/or waste that contains toxic contaminants in greater concentrations than those listed in Minnesota's Characteristic Waste table in Part 7045.0131 Subpart 8 (https://www.revisor.mn.gov/rules/7045.0131/#rule.7045.0131.8, *Note*: VA computers may flag "revisor.mn.gov" website as unsecure) must be placed in compatible, closed containers.

1) Label with:
    1) The words "hazardous waste"
    2) The complete chemical name(s) and concentration
    3) The Principal Investigator's (PI) name and laboratory room number
    4) The type of hazard, e.g., flammable, corrosive, oxidizer, and/or toxic/MN01
    5) The disposal date
2) Place the hazardous chemical in the secondary containers on the shelves in 3N-101.
3) Hazardous waste collected and held in your work area requires a hazardous waste label as described above. In addition, the label must have the words "**Satellite Collection**" and "**Accumulation Start Date**" (or "Date Disposed"). The start date for the waste collection in your area may be written on the corner of the label. It is recommended that the period of such local storage should not exceed one year. Note: P-substance waste in quantities >1 quart cannot be stored as satellite waste.
4) Disposing of **empty bottles** that contained hazardous chemicals.
    a. A bottle is considered empty when no more contents can be poured/drained or scraped **and** it contains less than 3% of its original contents.
    b. The empty bottle can be reused to collect hazardous waste. Suggestion: Only reuse the container for collecting waste compatible with its original contents, e.g., if the bottle originally contained a flammable, it should be used for flammable waste.
        i. A bottle saved for reuse should be labeled "empty" until used for waste collection; then it needs to be relabeled "hazardous waste."
        ii. An "empty" bottle that originally contained a volatile chemical should be placed in the fume hood over night to dissipate any remaining vapors.

iii. An "empty" bottle that originally contained an oxidizer or corrosive should be rinsed at least three times before reuse. Do not reuse bottles that are not visibly clean after rinsing.

iv. An "empty" bottle that originally contained a reactive, MN Lethal (MN01), toxic, P or U-waste should not be reused. They should be labeled "empty" and disposed of as described below.

For disposal, the label on the bottle should be completely defaced and relabeled "empty." Empty P-waste containers are disposed of as P-waste. Other plastic bottles go into the regular trash. Glass bottles that cannot be recycled go into the sharps container. Although chemical companies discourage the recycling of containers that originally contained hazardous materials, certain glass containers may be recycled.

5) P-Waste shall be collected separately from other hazardous waste. Some common chemicals found in the laboratory classified as P-listed compounds include arsenic acid, sodium azide [see also section 11. e)], potassium cyanide, epinephrine, and vanadium compounds. A complete listing of P-listed compounds is given on the following MPCA website: https://www.pca.state.mn.us/sites/default/files/w-hw2-02.pdf

a. A waste is only regulated under the P list if it is disposed of without being used for its intended purpose. Dilution is not considered use.

b. For example, sodium azide added to an incubation mix would be considered "use," but the stock solution would be considered a P-waste. However, the incubation mix containing the added sodium azide must still be evaluated as a MN01 lethal hazardous waste.

c) Radioactive waste

i) Dispose of waste using a compatible closed container and contact the Radiation Safety Officer (RSO) for disposal; the container must have an attached radioactive label that contains:

1) The name and amount of isotope
2) The date
3) Initials of person labeling the waste and their contact information
4) PI name and laboratory room number

ii) Water soluble and/or biodegradable non-hazardous radioactive waste (< 10 µCi/day) may be sewered after being evaluated and entered in the Sink Disposal Log for Water Soluble Radioactive Waste. Contact the RSO for proper disposal.

iii) Sharps contaminated with radioactive materials (RAM) shall be packaged for disposal, e.g., in an enclosed sharps container to prevent any sharps injury to persons handling them, labeled as above, and contact the RSO for disposal.

d) **Pharmaceutical and chemotherapy waste** (liquid and/or solid) shall be collected in a black pharmaceutical/chemotherapy waste container.

i) Containers can be obtained from the GEMS Program Director or Environmental Management Service (EMS).

ii) All material that contacts a pharmaceutical compound shall be disposed of in the black boxes (i.e., pipettes, tubes, plates, gloves, wipes).

iii) For substantial amounts of liquid waste, collect the waste in a sturdy container and place the sealed container in the black waste container.
iv) For pharmaceuticals used in tissue culture or another biohazard assay, dispose of the dual waste in the black container; however, a biohazard waste label (available in 3N-101) must also be attached to the container.
v) Call the GEMS Program Director at 31-4501 for disposal of full black boxes.

e) **Controlled substance waste** cannot be placed in 3N-101. Sewer non-hazardous controlled substance waste (i.e., Buprenorphine, Ketamine, Pentobarbital) and document in Sewer Discharge Log and on the green sheet (with two witnesses). Return the green sheet to the Veterinary Medical Unit (VMU). If the controlled substance waste is considered hazardous waste (i.e., testosterone powder, Fenfluramine), notify the Controlled Substance Officer (CSO) or GEMS Program Director to arrange disposal. If you do not know whether the controlled substance is hazardous, contact the GEMS Program Director or IHO.
f) **Biohazardous waste and sharps** (pipette tips, needles, and other sharp objects) shall be disposed of as follows:

i) Place needles or sharp objects (i.e., pipette tips, broken glass) in hospital supplied sharps containers. Needles shall not be bent, separated from syringes, or recapped prior to disposal. Full sharps containers (filled to line) are disposed of and new containers are acquired as follows:

1) In Bldg. 70 a full, closed sharps container is placed in or near the biohazard barrel in Room 4Q-127. Replacement containers are available in room 3N-101.
2) In Bldg. 49 a full, closed sharps container is placed in the hallway for pickup by EMS personnel. Replacement containers are available in rooms 11 and 119.

ii) Non-sharp, solid biohazardous waste (i.e., bacterial plates and flasks, contained liquids) shall be placed in biohazard (red or orange) bags. Biohazard bags shall be placed in the designated biohazard-labeled barrels in the autoclave rooms in Bldg. 49 Room 122 or in 4Q-127 for subsequent disposal. All biohazard waste disposed in these common service barrels must be contained in biohazard bags, i.e., unbagged solid waste cannot simply be tossed into the lined biohazard barrel. Further, biohazard bags must not go into regular trash. [See also 8. e).]
iii) Liquids in which potentially infectious microorganisms have been cultured:

1) Place in a closed container and dispose of materials using biohazard bags as described in b) above, OR
2) Chemically decontaminate (i.e., bleach) and then sewer decontaminated liquid. The container should still be disposed of as solid biohazard waste [see b) above] or may be decontaminated for future use (i.e., washed).

iv) Biological liquids without cultured organisms including blood and other liquid body substances:

1) Place in a closed container and dispose of in biohazard bags as described in b) above, OR
2) Directly sewer liquid. The container should still be disposed of as solid biohazard waste [see b) above] or may be decontaminated for future use (i.e., washed).

v) Satellite biohazard waste collection: Biohazard waste collected in satellite containers in the lab must be leak-proof, lined with a red biohazard bag, covered, and labeled "biohazard waste." The cover must remain in place except during active use. The preferred method of transporting biohazard materials from the lab to the large biohazard barrels [see a) above] is the use of a closed leak-proof container lined with a red biohazard bag. For light-weight biohazardous materials without sharp edges or protrusions that could puncture through plastic, the practice of double bagging (red biohazard bags) for transport from the laboratory to the collection site remains an acceptable alternative.

vi) Dual waste (combination of hazardous chemical and biohazard waste):

1) Apply labels for both hazardous waste and biohazardous waste.
2) Place in appropriate chemical waste cabinet Room 3N-101 or contact the GEMS Program Director or IHO for further assistance, if needed.

vii) **Compressed gas tanks/cylinders** that are handled by the warehouse (Material Handlers at ext. 31-2520 or ext. 31-4366) shall be placed in 4P-106 in Building 70 or in room 102 in Building 49. Contact the GEMS Program Director for disposal of other gas containers (i.e., lecture bottles).

viii) Specific chemicals

1) **Peroxide formers:** Look for the word explosive, peroxide-former, or the explosion icon on the label and/or SDS and consult the SDS for special requirements for storage and handling. Some agents that are peroxide formers include tetrahydrafuran, collodion, dioxane, some oxidizers, and certain ethers. These chemicals cannot be kept past their expiration date. If a date is not given, the researcher MUST contact the manufacturer and write the expiration date on the container label. It is important to turn it in BEFORE the expiration date or the PI will be back charged for the cost of disposal.
2) **Ethidium bromide (EtBr):**
   a. Aqueous stock solutions of EtBr are disposed of in the EtBr drum in 3N-101.
   b. Solid EtBr in a tightly sealed container shall be labeled "Ethidium Bromide Waste" and place on the waste shelf in Room 3N-101 for disposal. See also 2.b.4)a) above for labeling.
   c. Gels containing EtBr shall be air dried in the fume hood and placed in the EtBr solid waste container.
   d. Sharps contaminated with EtBr are disposed of in a red, sharps container.
   e. Trace dry solid EtBr waste, i.e., gloves, paper towels, wipes, plastic pipettes, etc., shall be collected, placed in a plastic bag or bucket, and disposed of in the EtBr solid waste container in Room 3N-101.

ix) Mercaptans

1) Small quantities of 2-mercaptoethanol and other mercaptans in aqueous solution can be deodorized/oxidized by treatment with 10% bleach.
   a. Treat mercaptan solution with excess bleach and allow treated solution to stand for a minimum of 4 hours in the fume hood.
   b. When mercaptan odor is no longer detectable, the solution may sewered with copious amounts of water.

2) Contact the GEMS Coordinator or IHO for disposal of pure reagent and concentrated solutions.
3) **RNA stabilizing reagents** (RNAlater ™, Quizol ™, RNeasy ™, RNA protect ™, Mag Attract™, Oligotex ™, and RNA/DNA kits containing these reagents)
   a. Unused kits may be placed in Room 3N-101 for disposal.
   b. Aqueous stock solutions may be diluted with water and sewered with copious amounts of water.
   c. Contaminated solutions of these reagents must be treated with a proper sterilant (e.g., 70% isopropyl alcohol; NOT bleach) before disposal. After a disinfecting period, place the labeled container in Room 3N-101 for disposal.
4) **P-waste disposal (using Sodium azide as an example):** Sodium azide that has been contaminated by a metal spatula may harden (form clumps) at which point there is a risk for explosion and must not be moved; contact Safety for disposal (see Contacts below).
   a. Everything that contacts the solution or powder must be collected as "P-waste". This includes weigh papers, tubes, pipettes, and other transfer materials. Liquid wastes are to be contained in a bottle and solid waste placed in a closed bag; both should be placed in a quart or two-gallon black container available from Safety (see Contacts below).
   b. Re-usable equipment must be triple rinsed and the rinsates collected as "P-waste". For example, weigh spoons should be wiped with wet Kimwipes three times and the wipes collected or the beaker used to make solutions should be triple rinsed with water and the rinsates collected.
   c. All Sodium azide "P-waste" should be placed in Room 3N-101 with containers labeled as described above under 2.b.4) with the addition of "P-Waste" on the label.
   d. An empty container that once contained Sodium azide should be disposed of as P-Waste or triple rinsed with rinsates collected as P-waste.
   e. All Sodium azide stock bottles (from the company and lab-prepared solutions) should be labeled with a pink "P-Chemical" sticker, available in Bldg. 49 Room 239.
   f. **N-Nitroso compounds:** if disposal methods are not defined in your SRS-approved protocol, contact the GEMS Program Director or the IHO for disposal instructions.

4. **CONTACTS:** If you have any questions concerning chemical disposal, please contact Chemical and Environmental Safety (ext. 31-4501), or the Research Safety Coordinator (ext. 31-5180).

5. REFERENCES:

1) Safety Data Sheet/Chemical Inventory Guidebook. Healthcare Environment and Facilities Programs (HEFP) Organization. http://vaww.hefp.va.gov/guidebooks/safety-data-sheetchemical-inventory-guidebook
2) Research Laboratory Safety Guidebook. VHA Center for Engineering and Occupational Safety and Health (CEOSH), St. Louis, Missouri. http://vaww.hefp.va.gov/guidebooks/research-laboratory-safety-guidebook
3) Guidelines for Handling Biological Hazards. R:\All_Staff\Training\Training Material\Checklist and Materials
4) Code of Federal Regulations 29: Bloodborne Pathogen Standard Part 1910.1030. http://www.osha.gov/pls/oshaweb/owadisp.show_document?p_table=STANDARDS&p_id=10051
5) Minnesota Pollution Control Agency's "Hazardous waste identification and management." https://www.pca.state.mn.us/business-with-us/hazardous-waste-identification-and-management

6. SRS APPROVED: August 29, 2023

7. RESCISSIONS: Chemical Disposal Standard Operating Procedures dated October 29, 2019.

8. EXPIRATION DATE: N/A

9. FOLLOW-UP RESPONSIBILITY: Subcommittee on Research Safety (SRS)