HELMERICH
ADVANCED TECHNOLOGY RESEARCH CENTER IN TULSA

Helmerich Advanced Technology Research Center

Waste Disposal Plan

January 2010

Important Notices

(1) The information provided in this document pertains solely to procedures of chemical waste collection and disposal within the Helmerich Advanced Technology Research Center (HATRC) at Oklahoma State University located in Tulsa, Oklahoma. It is a supplement to the Chemical Hygiene Plan specific to the HATRC. All users of this supplement must be familiar with both documents.

(2) Procedures presented here are intended to be carried out only by, or under the direct supervision of, trained scientists or technologists who understand the chemistry and hazards involved. Appropriate personal protective equipment should be used.

Introduction

Oklahoma State University (OSU) will conform to applicable regulations of the State of Oklahoma, United States Environmental Protection Agency, United States Department of Transportation, and United States Department of Labor with regard to the safe use, handling, transportation and disposal of chemical substances and waste.

The Department of Environmental Health & Safety (Physical Plant Services) is the Oklahoma State University unit and authority having jurisdiction for program oversight. For specific instructions, contact the Department of Environmental Health & Safety at 405-744-7241.

All work in a laboratory eventually generates chemical waste. The individual laboratory worker carries the legal and ethical responsibility to learn and follow proper procedures for safe disposal of all waste material generated in the course of his or her work.

This document provides guidelines for the proper inactivation of certain chemicals prior to disposal through the waste facility. Additional information on the disposal of other classes of hazardous chemical waste can be found in the *Chemical Hygiene Plan*. Contact the Chemical Hygiene Officer, Dr. Ken Ede, at 918-594-8638 for more information.

Waste Disposal Guidelines

The OSU Environmental Health Services Hazardous Materials Section (OSU HAZMAT) is responsible for coordinating the pickup of surplus and waste chemical substances from generating departments. To assure compliance with regulations, safe handling, and efficiency of operations, OSU HAZMAT has established the following standards applicable to the collection, storing, labeling, and packaging of these substances by departments. Under no circumstances will OSU HAZMAT personnel pickup chemical substances that do not strictly follow the procedures and requirements listed in this section.

OSU HAZMAT has been given the responsibility for determining the status of substances as surplus or hazardous wastes.

- DEPARTMENT PERSONNEL SHALL NOT ACCEPT ANY CHEMICAL, HAZARDOUS SUBSTANCE, OR ITEM(S) CONTAINING HAZARDOUS SUBSTANCES AS GIFTS OR DONATIONS ON THE BEHALF OF THE UNIVERSITY WITHOUT NOTIFYING OSU HAZMAT PRIOR TO THE TRANSFER. THIS IS TO ASSURE THAT NO UNANTICIPATED FUTURE HAZARDOUS WASTE COSTS RESULT FROM SUCH A TRANSFER.

- DEPARTMENT PERSONNEL SHALL NOT GIVE OR SELL UNIVERSITY PROPERTY, INCLUDING HAZARDOUS SUBSTANCES, TO ANY PERSON OR ORGANIZATION OUTSIDE THE UNIVERSITY EXCEPT THROUGH THE LEGALLY ESTABLISHED PROCEDURES OF

THE PURCHASING DEPARTMENT OR IN THE INSTANCE OF HAZARDOUS MATERIALS, THROUGH OSU HAZMAT'S CHEMICAL SURPLUS PROGRAM.

- UNDER NO CIRCUMSTANCES IS ANY PERSON TO DISPOSE OF A HAZARDOUS SUBSTANCE DOWN THE DRAIN OR IN THE REFUSE DISPOSAL SYSTEM WHERE THE APPLICABLE REGULATIONS, PROCEDURES, AND POLICIES REGARDING ITS DISPOSAL AS DESCRIBED IN THIS DOCUMENT OR THE MSDS FOR THE PRODUCT PROHIBIT THIS ACTION OR ARE UNKNOWN. PRIOR TO DISPOSAL OF HAZARDOUS SUBSTANCES (VIA SANITARY SEWER OR AS SOLID WASTE), THE CHEMICAL HYGIENE PLAN, APPLICABLE LOCAL AND FEDERAL REGULATIONS, OR THE MSDS FOR THE PRODUCT SHALL BE CONSULTED. IF ANY OF THE AFOREMENTIONED DOCUMENTS PROHIBIT DRAIN OR TRASH DISPOSAL, THE MATERIAL OR PRODUCT MUST BE HANDLED AS HAZARDOUS WASTE.

- OSU HAZMAT SHALL NOT PICKUP, OR HANDLE, SURPLUS OR HAZARDOUS SUBSTANCES THAT HAVE NOT BEEN PROPERLY IDENTIFIED, CONTAINERIZED, LABELED, PACKAGED, OR MANIFESTED ACCORDING TO THE PROCEDURES DESCRIBED HEREIN.

- OSU HAZMAT CANNOT ACCEPT ANY UNIDENTIFIED SUBSTANCE(S) FOR DISPOSAL. HOWEVER, OSU ENVIRONMENTAL HEALTH & SAFETY HAS MADE ARRANGEMENTS WITH OUR CURRENT WASTE CONTRACTOR TO CONDUCT A HAZARD CHARACTERIZATION FOR CHEMICALS OF UNKNOWN COMPOSITION. THE GENERATING DEPARTMENT SHALL MAKE EVERY EFFORT TO IDENTIFY UNKNOWN CHEMICALS PRIOR TO THE CHARACTERIZATION.

- IN INSTANCES WHERE UNKNOWN CHEMICALS HAVE BEEN GENERATED, THE GENERATING DEPARTMENT SHALL PROVIDE A SEPARATE STORAGE AREA TO HOLD THESE MATERIALS UNTIL CHARACTERIZATION CAN BE CONDUCTED. ALSO, THE GENERATING DEPARTMENT MAY BE REQUIRED TO PROVIDE LAB SPACE AND A FUME HOOD FOR THE CHARACTERIZATION PROCEDURE.

1. BASIC PROCEDURES

A. Collect substances in original or other suitable primary container.

B. Properly label containers as to contents and hazards.

C. Properly store containers until ready for disposal.

D. When accumulation exceeds the available storage limits within the laboratory area, arrange for the transfer of the substances with the Chemical Hygiene Officer who shall coordinate the pickup with OSU HAZMAT section.

E. The generator or CHO shall prepare individual containers with a unique container number and complete the Chemical Surplus Removal Request Form.

F. Individual containers, except in prearranged situations, shall NOT be boxed together.

G. *OSU HAZMAT will pick up surplus substances from the laboratory or collection area upon request only. In certain instances, OSU HAZMAT may request that a department store unwanted chemicals until a chemical pickup by a hazardous waste management firm is arranged.*

H. *OSU HAZMAT will then determine the status of substances as surplus, for reuse, for recycling, or for waste disposal.*

2. CONTAINERS

A CONTAINER REFERS TO ANY OF THE FOLLOWING THAT SERVES AS A PRIMARY CONTAINER; OR AS AN OUTER OR SECONDARY PACKAGING OVER ONE OR MORE PRIMARY CONTAINERS.

- ANY STEEL, PLASTIC, OR FIBERBOARD DRUM
- METAL CANS AND PAILS
- PLASTIC CARBOYS
- STEEL CYLINDERS AND TANKS
- PLASTIC-COATED PAPER BAGS
- PLASTIC BAGGIES
- GLASS AND PLASTIC BOTTLES, JARS, VIALS
- STURDY CARDBOARD BOXES
- MERCURY CONTAINERS

3. CONTAINER CONDITION

A. Where possible, materials should be kept in their original containers.

B. Containers shall be in good condition; leaking or damaged containers are not acceptable. If leaking or damaged, either repackage or call OSU HAZMAT to determine the proper packaging for disposal.

C. Containers shall be equipped with a properly fitting cap or other closure means. Properly secured means with the original device or method provided by the manufacturer, or when unavoidable, with a substitute means of equal or better quality that will prevent leakage or incidental exposure during routine handling or in the event of the container tipping or falling over. Makeshift covers such as tape to hold down a screw cap or a rag stuffed in an opening are unacceptable.

D. Containers shall be compatible with substances contained therein.

E. Plastic bags, where acceptable as containers (double bagging is preferred), shall be without punctures or tears and shall be tightly sealed. Ordinary garbage (2 mil or less) bags shall not be used as a primary or secondary container for hazardous chemical waste.

F. Containers should be inspected weekly for signs of leaks or deterioration.

G. Compressed gas cylinders shall not be handled or transported until the regulating device is removed and the safety cap installed. Every effort should be made to return compressed gas cylinders to the manufacturer or original supplier.

4. CONTAINER VOLUMES AND SIZES

A. Glass containers shall not exceed one gallon (4 liters) in size and shall not be filled into the neck of the fill/pour spout.

B. Where containers have flat tops, the liquid level shall be at least 1 inch from the fill/pour opening. Glass carboys are unacceptable.

C. Due to increased disposal costs, risks of handling larger containers, and restrictions by the University Waste Disposal Contractor, metal or plastic containers greater than 5 gallons (20 liters) in size require special approval by OSU HAZMAT section.

D. Plastic baggies utilized as primary containers shall be packaged in a secondary container such as glass, hard plastic, metal, or cardboard box. Ordinary garbage bags (2 mil or less) shall not be used as a primary or secondary container for hazardous chemical waste.

5. LABELING OF CONTAINERS

PLEASE SEE APPENDIX A FOR AN EXAMPLE HAZARDOUS CHEMICAL SURPLUS TAG.

A. Each container shall bear the Hazardous Chemical Surplus Tag that clearly and neatly indicates the chemical or common name of each substance that is at least 1% by volume of the total contents or mixture. Carcinogens or highly toxic substances that are 0.1% or more by volume must also be listed. Any amount of a heavy metal (e.g. As, Ba, Cd, Cr, Hg, Ni, Se, Ag, Th) greater than 1 part per million (1 ppm) in the container must be listed.

B. Indicate the strength or concentration of the substance where applicable. Example: Hydrochloric Acid may have a strength of 10%, 28%, 38%.

C. Do not use chemical formulas, chemical symbols, chemical equations or abbreviations.

D. Indicate the physical and/or health hazards of the substance, if known.

E. Indicate the name of the building, room, and principal investigator or person responsible for generating the waste (or someone with direct knowledge of the process).

F. In the instances of time sensitive substances such as ethers, the date of container opening or initial accumulation shall be included on the form.

G. Remove or obliterate any other labels or wordings not related to the current substance.

H. Do not allow the creation of "UNKNOWNS" through lack of secure readable labeling.

6. DISPOSAL OF EMPTY CONTAINERS

CONTAINERS THAT ARE EMPTY AND NO LONGER NEEDED MUST BE DISPOSED OF PROPERLY. CONTAINER DISPOSAL SHALL BE AS DIRECTED BY 40 CFR 261.7 "RESIDUES OF HAZARDOUS WASTE IN EMPTY CONTAINERS." CONTAINERS THAT HAVE HELD ACUTE HAZARDOUS MATERIALS AS DEFINED IN 40 CFR 261.31, 261.32, OR 261.33 REQUIRE SPECIAL HANDLING. TO ASSIST YOU IN DETERMINING IF AN EMPTY CONTAINER IS REGULATED, HERE ARE SOME FURTHER GUIDELINES.

A CONTAINER SHALL BE CONSIDERED "EMPTY" IF ALL THE FOLLOWING CONDITIONS EXIST (FOR THIS SECTION, A CONTAINER SHALL BE CONSIDERED TO BE A PRIMARY CONTAINER OR AN INNER LINER):

A. The container contained none of the chemicals that are listed in 40 CFR 261.33(e) [See list in the Chemical Hygiene Plan or at **http://www.ehs.okstate.edu/hazmat/labman/Chap3d4.htm**] or Tri- Tetra- or Penta-phenol, *and*

B. All chemicals have been removed that can be removed using practices commonly employed to remove materials from that type of container e.g. pouring, pumping, aspirating, etc., *and*

C. There is less than one inch of residue left in the bottom of the container, *and*

D. There is less than 3% by weight of residue left in the container (0.3% for >110 gal. containers), *and*

E. For compressed gas cylinders only, when the pressure in the container approaches atmospheric.

If a container does contain P-Waste listed chemicals, or Tri- Tetra- or Penta-phenol, the container shall be considered empty **only** if the container has been triple rinsed using a solvent capable of removing the chemical *or* cleaned by another method that has been shown in the scientific literature to achieve equivalent removal. The rinsate then becomes a hazardous waste. If the container has not been cleaned as stated above, the container shall become hazardous waste.

Once a container has been declared "empty" by the above criteria, it can be placed in the normal refuse.

7. STORAGE OF WASTE CHEMICALS

WASTE CHEMICALS SHALL BE STORED IN THE SAME MANNER AND USING THE SAME PROCEDURES AS OTHER CHEMICALS. IT MAY BE ADVANTAGEOUS TO FURTHER SEGREGATE CHEMICAL WASTE. A TYPICAL SEGREGATION OF WASTE CHEMICALS WOULD BE:

- Acids
- Caustics
- Chlorinated Solvents
- Non-chlorinated Solvents
- Mercury Wastes
- Oxidizing Agents
- PCB Wastes*
- Reactive Chemicals*
- Waste Oil
- Wastes with Heavy Metal Contamination

*CONSULT WITH THE CHEMICAL HYGIENE OFFICER REGARDING PROPER STORAGE AND DISPOSAL REQUIREMENTS.

THESE CHEMICALS SHALL BE ACCUMULATED IN SEPARATE CONTAINERS AND NEED TO BE ISOLATED FROM ONE ANOTHER TO SOME DEGREE, AT LEAST TO THE EXTENT THAT SPILLS OR LEAKS WOULD REMAIN ISOLATED FROM OTHER CONTAINERS. THIS IS PARTICULARLY TRUE OF ACIDS, BASES, AND SOLVENTS.

MINERAL (INORGANIC) ACIDS, STRAIGHT-CHAIN FATTY ACIDS, AND BASES SHOULD BE NEUTRALIZED BY THE LABORATORY GENERATING THESE WASTES. NEUTRALIZATION PROCEDURES MAY BE FOUND IN APPENDIX B - "NEUTRALIZATION OF SPENT ACIDS AND BASES."

8. "BULKING" OR MIXING OF WASTE CHEMICALS

BULKING OR MIXING OF WASTE CHEMICALS SHALL NOT BE DONE WITHOUT PRIOR APPROVAL FROM OSU HAZMAT.

9. OVERPACKING OR "BOXING UP" OF MULTIPLE CHEMICAL CONTAINERS

LABORATORY PERSONNEL SHOULD NOT BE INVOLVED IN "BOXING UP" CHEMICAL CONTAINERS INSIDE OVERPACK OR BOXES FOR TRANSPORT.

10. CHEMICAL SURPLUS REMOVAL REQUEST FORM

EACH CONTAINER MUST BEAR A UNIQUE IDENTIFICATION NUMBER. THE UNIQUE CONTAINER NUMBER CONSISTS OF THE 2 TO 4-LETTER DEPARTMENTAL CODE, THE 6-DIGIT DATE, AND THE SEQUENTIAL NUMERICAL NUMBERING STARTING WITH THE NUMBER "001".

Example of a container identification number: CHEM-010391-001

ALL MATERIALS PICKED UP FROM DEPARTMENTS BY OSU HAZMAT MUST BE ACCOMPANIED BY A COMPLETED CHEMICAL SURPLUS REMOVAL REQUEST FORM. THIS FORM AND HAZARDOUS CHEMICAL SURPLUS TAGS ARE AVAILABLE FROM OSU HAZMAT. PHOTOCOPIES OF THIS FORM ARE ACCEPTABLE IF THE FORM IS STILL LEGIBLE.

THE INSTRUCTIONS FOR COMPLETING THE CHEMICAL SURPLUS REMOVAL REQUEST FORM ARE AS FOLLOWS (SEE APPENDIX A FOR EXAMPLE):

1. *Request made by:*

   Name of the person responsible for making the request for chemical removal.

2. *Phone:*

   Phone or extension number of person responsible for making the request for chemical removal.

3. *Department:*

   Name of department generating the hazardous substance(s).

4. *Date of Request:*

   Today's date. This date should correspond to the 6-digit date on the container ID labels.

5. *Name:*

   Name of departmental contact person responsible for coordination of hazardous substances waste and surplus pickup operations (CHO).

6. *Phone:*

   The telephone number or extension at which the listed contact person may be reached.

7. *Building and Room #:*

   Building and room number where the CHO can be found.

8. *Chemicals for pick-up are located:*

   Where the chemicals are being stored for removal.

9. *Department Head Signature:*

   Signature of department head (or administrative equivalent) or their authorized representative who can attest that all items are properly classified, described, packaged, marked, and labeled, and are in proper condition for transportation according to the applicable requirements of the OSU Environmental Health Services Hazardous Materials Section as described in this document or other information provided to the generating department

concerning hazardous chemicals and chemical waste disposal. Only one signature is needed per request/pick-up (not every page).

10. *6-Digit Date:*

    Use the 6-digit date of the day you start listing chemicals on the Request. Example: July 15, 1990, would be 071590 (do not use hyphens). Continue to use the same 6-digit date as long as container numbering is consecutive or until the manifesting is completed. Do not change the 6-digit date because you are continuing to add chemicals to the list over a period of several days. When the 6-digit date is changed, container numbering starts over with "001".

11. *Departmental Code:*

    List the departmental code on each container.

12. *Container Number:*

    Each container must be assigned a consecutive number starting with the number "001". Any time the 6-digit date category is changed, container numbering starts with "001" again.

13. *Description of Contents:*

    Provide the following information on each container, using as many manifest lines as necessary:

    a. Common name of the substance(s) or chemical abstract name.

    b. Strength (concentration) of individual substance, where applicable.

    c. Percentages of mixed chemicals in container (by volume).

    d. Other information for transporting personnel, as deemed important by the generating department.

14. *Physical State:*

    List the physical state of the material at the time of the manifest utilizing one of the following codes listed on the form.

15. *Volume of Material in Each Container:*

    List the approximate volume of material in each container, not the original container volume.

16. *Hazard Code(s):*

    Check the appropriate hazard code for the material (See "Hazard Identification"). The Hazard codes are listed as on the form.

11. HAZARD IDENTIFICATION

EACH MATERIAL SHALL BE IDENTIFIED WITH A "HAZARD CODE" ABBREVIATION TO BE USED AS A GENERAL DESCRIPTION TO PROVIDE INFORMATION ON HANDLING HAZARDS AND RESPONSIVE ACTION IN THE EVENT OF AN ACCIDENT.

EACH MATERIAL SHALL BE IDENTIFIED ON THE FORM BY THE HAZARD THAT MOST CLOSELY INDICATES THE GREATEST HAZARD PRESENTED BY THE MATERIAL. THE

FOLLOWING IS A LIST OF HAZARDS AND THEIR DEFINITIONS. THE CODES ARE LISTED ON THE FORM:

Flammable: *Any compressed gas, liquid, or any solid material (other than an explosive, heat sensitive or shock sensitive material) that is liable to cause fires through friction, absorption of moisture, spontaneous chemical changes, retained heat from processing, or which can be ignited readily, and when ignited burns so vigorously and persistently as to create a serious transportation hazard.*

Examples: Acetone, methyl alcohol, dimethylamine, propane, sodium dithionite, nitrocellulose.

Corrosive: *Any gas, liquid, or solid that causes destruction of human tissue or a liquid that has a severe corrosion rate on steel or aluminum. Aqueous solutions that have a pH equal to or less than 2 or equal to or greater than 12.5 are corrosive. Other liquids are defined as corrosive if they corrode SAE 1020 steel at a rate greater than 6.35 mm/year at 55^{o}C.*

Examples: Hydrochloric acid, sulfuric acid, acetic acid, sodium hydroxide.

Oxidizer: *A substance such as chlorate, permanganate, inorganic peroxide, nitrocarbonitrate, or a nitrate that yields oxygen readily to stimulate the combustion of organic matter. (Organic peroxides are to be listed under "OTHER", and the hazard listed on the bottom of the form.)*

Examples: Sodium nitrate, potassium permanganate, manganese dioxide.

Toxic: *Substances such as carcinogens, irritants, or poisonous gases, liquids, and solids that are irritating to or affect the health of humans.*

Examples: Phosgene, phenol, 1-naphthylamine, arsenic compounds, mercury.

Water Reactive: *Substances that react violently when in contact with water. They can be either be flammable solids or corrosives. (Mark the label with both Water Reactive and flammable or corrosive).*

Note: In many cases the water reactive material can be chemically treated, thereby removing the reaction characteristic. The material may still contain other hazardous constituents. Please contact OSU HAZMAT for further information and guidance.

Examples: Lithium, potassium or sodium metal, antimony pentachloride, acetic anhydride, calcium carbide.

Carcinogens*: Any substance that causes the development of cancerous growths in living tissue, either those that are known to induce cancer in man or animals or experimental carcinogens that have been found to cause cancer in animals under experimental conditions.*

Examples: 1-Naphthylamine, benzidine, dimethyl sulfate.

Teratogens/Mutagens*: Teratogens are agents that cause growth abnormalities in embryos, genetic modifications in cells, etc. Mutagens are substances that are able to induce mutations in DNA and in living cells.*

Examples: Diethylstilbestrol (DES), diethyl sulfate.

Other*: Special hazards such as shock or heat sensitive, organic peroxides, pyrophorics (reacts with air), peroxide formers.*

Examples: Picric acid, urea nitrate, 2,4-dinitrophenylhydrazine, benzoyl peroxide, phosphorus, isopropyl ether.

12. HAZARDOUS MATERIALS SURPLUS PROGRAM

ONE METHOD OF ASSURING MAXIMUM USE OF NON-RADIOACTIVE CHEMICAL SUBSTANCES THAT ARE READILY USABLE BUT DEEMED OF NO FURTHER USE TO INDIVIDUAL DEPARTMENTS, IS TO ESTABLISH A PROGRAM OF REDISTRIBUTION OR REUSE AMONG OTHER UNIVERSITY DEPARTMENTS OR UNITS. OSU HAZMAT HAS FULL RESPONSIBILITY FOR REGULATING AND COORDINATING THE INTRA-UNIVERSITY SURPLUS PROGRAM. PROCEDURES FOR PARTICIPATING IN THE PROGRAM ARE AS FOLLOWS:

1. *Departments identifying a substance as surplus to their needs shall contact OSU HAZMAT for pickup and transfer to the OSU HAZMAT facility.*

2. *Surplus chemicals reallocated to University departments shall be provided at no charge to the receiving department nor shall there be compensation to the department that originally offered the chemical as surplus. However, departments have the option of requesting the return of previously surplused chemicals, if still available, at no charge.*

3. *When a department transfers the surplus chemical to OSU HAZMAT, the container shall be in good condition and shall be properly labeled with the substance name, hazard(s), date of manufacture if known, and if opened, date opened.*

4. *A report will be sent out to departmental heads, listing the substances available by name, quantity, unit volume, age if known, and whether or not opened.*

5. *Departments may utilize the list to make requests via phone or memo for surplus transfer or may make an appointment to visit the central storage area. In either case, OSU HAZMAT will provide transfer of the substance(s) to the requesting department.*

6. *Departments are encouraged to advise OSU HAZMAT whenever non-University entities are identified that could benefit from the use of our surplus hazardous materials. Such users will be considered when there are no identified users on campus.*

7. *A limited number of chemicals, including (but not limited to) the following will NOT be placed in surplus due to their potentially dangerous nature (the following list of chemicals should be rendered inactive by the user prior to disposal):*

- Alkyl boranes
- Aluminum Alkynes
- Ammonium Nitrate
- Benzoyl Peroxide
- Calcium Carbide
- Chromic Acid
- Cyanides
- Ethers
- Grignard Reagents
- Hydrogen Peroxide
- Iron Sulfide
- Metal Alkyls
- Metal Hydrides
- Peracetic Acid Solution
- Peroxide Forming Compounds
- Picric Acid
- Sulfides
- Water reactive metals (Lithium, Potassium, Sodium, Cesium)

(NOTE: Due to the explosive characteristics inherent to the addition of a carbon source to Ammonium Nitrate, Ammonium Nitrate shall not be placed in surplus.)

Appendix A

HAZARDOUS CHEMICAL SURPLUS TAG
AND CHEMICAL REMOVAL REQUEST FORM INFORMATION

Preparation:

1. Determine if you can neutralize, detoxify or recycle it yourself. If you can, there is no need to fill out this form. Refer to the Chemical Hygiene Plan for guidelines.
2. Separate solids from liquids.
3. Containerize it. Containers shall be compatible with the chemical(s), shall be sturdy, leak-proof, have a tight cap/lid/seal, and clean on the outside. Unless other arrangements have been made, all containers must be 5-gal. or less in volume. Milk jugs or other food containers, thin trash bags, biohazard bags, radioactive bags, 5-gal. thin-walled metal solvent cans, 5-gal. glass carboys are NOT to be used.
4. Label the containers with label **HM-95-2**. {Available from EHS}
    - List ALL the chemical constituents with approximate percentages. Heavy metals should be listed in mg/l or ppm if under 0.1%.
    - Do not use abbreviations or chemical symbols. Use common or IUPAC chemical names.
    - If applicable, list trade name and chemical constituents. If necessary, include a copy of the MSDS.
    - For pesticides, list the common name and the chemical name.
    - Refer to the Chemical Hygiene Plan for guidelines if you do not know what is in the container. (EHS will not pick up unidentified chemicals, i.e., "unknowns.")


HAZARDOUS CHEMICAL SURPLUS TAG
Please PRINT the following:
Container Contents (No Chemical Symbols or Abbreviations):
1. _____ % ____ Bldg. _____
2. _____ % ____ Room _____
3. _____ % ____ Dept. _____
4. _____ % ____
HAZARD(S)
☐ Ignitable ☐ Toxic ☐ Carcinogen
☐ Corrosive ☐ Oxidizer ☐ _____
☐ Reactive _____
Pickup Container No. _____
Principal Investigator _____
Form HM-95-2

5. Number each container. This number contains a departmental abbreviation, (dash), date, (dash), consecutive container number. For example: [CHEM-010293-001 -- Department is Chemistry, date is Jan. 2, 1993, container number is one.]
6. Fill out this form. Mail or deliver completed form to Environmental Health & Safety Department.

Filling Out the Form

1. Generator Information. The responsible faculty/staff person is the person who is in charge of the laboratory/maintenance site. The contact person is the person whom EHS would contact about the chemicals.
2. Identification/Description of the Chemicals.

- List all components and their respective percentages. Do not use chemical symbols or abbreviations.
- List physical state and pH, if applicable. (pH paper is adequate.)
- List number and type of containers.
- List volume (liquids) or weight.
- List any hazards associated with this material, e.g., flammable, oxidizer, organic oxidizer, poison, corrosive, water-reactive, pyrophoric, mutagen/teratogen, carcinogen, shock-sensitive, etc.

Other Information

The chemicals must be prepared for pickup before sending this form to EHS. The request will be processed as it arrives. Chemicals that are improperly packaged, labeled, or identified will not be picked up. Pickup can be expected within two weeks of receipt by EHS. This form must be filled out as completely, specifically and legibly as possible (please print or type). Improperly, inadequately, or illegibly prepared forms will be returned for completion/clarification. If you have questions, a request of special urgency, or if EHS has not picked up your chemicals within two weeks, *please* call EHS at 405-744-7241.

EHS use only
date picked up:_____
picked up by: _____

REQUEST FOR CHEMICAL REMOVAL

[Please print or type]

Environmental Health & Safety Services
120 Physical Plant Services Bldg.
(Ofc: 744-7241) (FAX: 744-7148)
(EMAIL: [illegible])

Date: _____
Dept.: _____
Responsible Faculty/Staff Person:
_____
Pick-up No.:

Contact Person: _____
Phone: _____
Bldg. & Room #: _____
_____

Location of Chemicals:
Bldg. & Room #: _____
_____
Does EHS need to call to schedule pickup?
○Yes ○No

EHS USE ONLY	IDENTIFICATION/DESCRIPTION of CHEMICALS (Do not submit unknowns)	PHYS. STATE	NUMBER, SIZE & TYPE OF CONTAINER	VOLUME or WEIGHT in CONTAINER	pH	HAZARDS
	#____					
	#____					
	#____					
	#____					
	#____					

Special Notes or Handling Instructions:

Certification: "I hereby declare that the identification/description of chemicals is accurate and complete to the best of my knowledge and that I have made a reasonable effort to neutralize, detoxify and/or recycle this material."

(Department Head Signature): Date: (Only one certification is needed per request.)

[This form may be photocopied as needed.]

APPENDIX B

NEUTRALIZATION OF SPENT ACIDS AND BASES

Spent mineral acids, straight-chain fatty acids, and bases (hydroxides) comprise a large portion of the unwanted chemicals being stored in campus laboratories. As a part of regular laboratory procedures, campus labs should neutralize spent inorganic acids, acetic acid, straight-chain fatty acids, and bases (hydroxides) that do not contain metal or organic contaminants. These chemicals will be managed in an "elementary neutralization unit" and, therefore, are not considered a part of the hazardous waste stream for the campus. An "elementary neutralization unit" is a container used for neutralizing corrosive wastes.

Neutralization is a relatively simple procedure that is best done by and in the laboratory that uses inorganic acids, acetic acid, straight-chain fatty acids, and bases (hydroxides) on a regular basis. The laboratory that generates spent corrosives usually has the facilities and expertise to neutralize them, and therefore will be responsible for doing so. The following procedures (see A - D)describe the proper technique for neutralization of spent inorganic acids, acetic acid, straight-chain fatty acids, and bases (hydroxides) as a part of regular laboratory procedures. At the end of this appendix are lists of corrosives to be managed in-house by campus laboratories. Aqueous corrosive wastes shall NOT contain sulfides, cyanides, metals, or other materials that can give off hazardous fumes upon reaction with the acid or base.

Do **NOT** use these procedures for:

- INORGANIC ACIDS THAT CONTAIN HEAVY METALS (E.G., ATOMIC ABSORPTION STANDARDS, ARSENIC, CADMIUM, CHROMIUM, LEAD, MERCURY, NICKEL, SELENIUM, SILVER, THALLIUM. SOLUTIONS CONTAINING SODIUM, POTASSIUM, MAGNESIUM, IRON CAN BE NEUTRALIZED AS LONG AS THE ANION IS ALSO NON-HAZARDOUS.)
- ESTERS OF INORGANIC ACIDS
- CHROMIC ACID
- PERCHLORIC ACID
- HYDROFLUORIC ACID
- ORGANIC ACIDS EXCEPT ACETIC ACID AND STRAIGHT-CHAIN FATTY ACIDS
- LARGE QUANTITIES OF NITRIC ACID

Chemicals shall not be disposed in the sanitary sewer for two reasons. First, Tulsa does not allow the disposal of most chemicals in the wastewater flow. Second, strong reactions can take place if the chemical carries unknown contaminants or contacts an incompatible chemical in the wastewater.

A. EQUIPMENT NEEDED FOR NEUTRALIZING ACIDS AND BASES

1. *Sodium carbonate (Soda ash), baking soda, or diluted inorganic base (hydroxide) for neutralization of an acid, or a diluted inorganic acid for neutralization of a base.*

2. *Polyethylene bucket - 1 or 2 gallon size, as personal preference dictates. Remember that 1 gallon weighs approximately 8 pounds or greater.*

3. *Protective equipment (goggles, apron, gloves).*

4. *500 ml beakers.*

5. *pH Indicator Strips, or other pH test method.*

B. PERSONAL PROTECTIVE EQUIPMENT

READ THE MATERIAL SAFETY DATA SHEET (MSDS) FOR DETAILED INFORMATION. CALL THE ENVIRONMENTAL HEALTH SERVICES DEPARTMENT HAZARD COMMUNICATIONS SECTION IF AN MSDS IS NOT AVAILABLE. THE **MINIMUM** RECOMMENDED PERSONAL PROTECTION NEEDED WHEN PERFORMING THE NEUTRALIZATION PROCEDURE IS:

Ventilation	Work in a fume hood
Gloves	Use neoprene, natural rubber, butyl, polyethylene, nitrile butadiene, or polyvinyl chloride depending on the MSDS information
Clothing	Apron (rubber is preferred), lab coat (or protective suit or coveralls), and closed-toe shoes.
Eye Protection	Splash-proof or dust-proof goggles **AND** a face-shield (8 inch minimum)

HANDS SHALL ALWAYS BE WASHED AFTER WORKING WITH THESE CHEMICALS. AN EYEWASH STATION AND QUICK-DRENCH FACILITY SHALL BE LOCATED IN THE AREA. ALL EMPLOYEES SHALL LOCATE THESE EMERGENCY FACILITIES *BEFORE STARTING TO WORK*.

WARNING: REMEMBER THAT EXTREME HEAT CAN BE PRODUCED BY THIS PROCEDURE UNLESS IT IS DONE VERY SLOWLY AND WELL-DILUTED. CLOSELY MONITOR THE AMOUNT OF HEAT PRODUCED BY TOUCHING THE OUTSIDE OF THE NEUTRALIZATION CONTAINER. USE ICE BATH IF NECESSARY.

C. NEUTRALIZATION PROCEDURE FOR ACID

1. *Make a saturated solution of sodium carbonate (soda ash) in a beaker or use an inorganic base diluted in water (1:10 ratio) - set aside.*

2. *Put tap water into 1 or 2 gallon polyethylene bucket.*

3. *Dilute acid at least 1:10 (1 part acid to 9 parts of water) by slowly pouring and* stirring the acid into the water[1].

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[1] For concentrated acids and bases, neutralization must be done slowly and with vigorous stirring. If there are any questions, or if you are hesitant about attempting this procedure with any spent acid or alkali waste, please call Environmental Health Services, Hazardous Materials Section, at extension 47241. The recommended time for the neutralization procedure is when the wastewater flow is at a peak, e.g., 9:00 a.m.

4. *Slowly add soda ash or other basic solution into diluted acid with stirring, or save diluted acid to neutralize bases as described below.*

5. *Monitor pH with pH meter, pH indicator strips, or other pH test method.*

6. *When pH is between 6 and 9, dispose in a drain followed with excess water. A pH near 7 is preferred to reduce the possibility of plumbing damage.*

   HELPFUL HINT: WHEN NEUTRALIZING AN ACID, THE PH CAN BE TESTED QUICKLY BY THE FOLLOWING METHOD. MAKE A SATURATED SOLUTION OF SODIUM BICARBONATE IN WATER. A SMALL AMOUNT OF SODIUM BICARBONATE SOLUTION POURED INTO THE ACID WILL MAKE A "FIZZ", WHICH IS A RELEASE OF CARBON DIOXIDE. SINCE CARBON DIOXIDE EVOLVES FROM THESE PROCEDURES, INSURE ADEQUATE VENTILATION IS AVAILABLE. THIS "FIZZ" WILL INDICATE THAT THE SOLUTION IS STILL ACIDIC, AND NEEDS MORE BASE TO BE ADDED. ALWAYS STIR THE MIXTURE AND DO A FINAL CHECK OF THE PH BEFORE POURING THE NEUTRALIZED ACID DOWN THE DRAIN.

D. BASE NEUTRALIZATION

1. *Put tap water into a 1 or 2 gallon polyethylene bucket.*

2. *Dilute alkali wastes at least 1:10 (1 part alkali to 9 parts water) by slowly pouring and* stirring the base into the water[2]*.*

3. *Neutralize the diluted alkali solution with a previously diluted inorganic acid.*

4. *Monitor pH with pH meter, pH indicator strips, or other pH test method.*

5. *When pH is between 6 and 9, dispose in a drain followed with excess water. A pH near 7 is preferred to reduce the possibility of plumbing damage.*

2 For concentrated acids and bases, neutralization must be done slowly and with vigorous stirring. If there are any questions, or if you are hesitant about attempting this procedure with any spent acid or alkali waste, please call Environmental Health Services, Hazardous Materials Section, at extension 47241. The recommended time for the neutralization procedure is when the wastewater flow is at a peak, e.g., 9:00 a.m.

INORGANIC ACIDS

NAME/MOLECULAR WT.	FORMULA	SYNONYMS
Sulfuric Acid M.W. - 98.08	H_2SO_4	Dipping Acid Oil of Vitrol Sulphuric Acid Nordhausen Acid
Boric Acid M.W. - 61.84	BH_3O_3	Boracic Acid Orthoboric Acid
Nitric Acid M.W. - 63.02	HNO_3	Aqua Fortis Azotic Acid Hydrogen Nitrate
Hyponitrous Acid	$H_2N_2O_2$	
Hydrochloric Acid M.W. - 36.46	HCl	Chlorohydric Acid Hydrochloride Muriatic Acid
Aqua Regia	HCL/HNO_3 (3:1 mixture)	Nitrohydrochloric Acid Nitromuriatic Acid
Phosphoric Acid M.W. - 98.00	H_3PO_4	Orthophosphoric Acid

INORGANIC BASES

NAME/MOLECULAR WT.	FORMULA	SYNONYMS
Aluminum Hydroxide M.W. - 78.01	$Al(OH)_3$	Alumigel Alumina Hydrate Alumina Trihydrate Aluminum Hydrate Aluminum(III) Hydroxide
Ammonium Hydroxide	NH_4OH	Ammonia Aqueous Aluminum Oxide-$3H_20$ Aluminum Trihydroxide
Calcium Carbonate M.W. - 100.09	$CaCO_3$	Precipitated Chalk Chalk Dolomite Limestone/Marble
Calcium Hydroxide M.W. - 74.10	$Ca(OH)_2$	Slaked Lime Lime Water Hydrated Lime Calcium Hydrate
Calcium Oxide M.W. - 56.08	CaO	Lime Burnt Lime Calcia Calx Lime, Unslaked Quicklime
Magnesium Carbonate M.W. - 84.32	$MgCO_3$	Carbonate Magnesium Magnesia Alba Magnesium Carbonate-(Precipitated)
Magnesium Hydroxide M.W. - 58.33	$Mg(OH)_2$	Magnesia Magma Magnesium Hydrate Milk of Magnesia
Potassium Hydroxide M.W. - 56.11	KOH	Caustic Potash Lye Potassium Hydrate
Sodium Bicarbonate M.W - 85.01	$NaHCO_3$	Baking Soda Bicarbonate of Soda Sodium Acid Carbonate
Sodium Carbonate M.W - 105.99	Na_2CO_3	Soda Ash Crystol Carbonate Carbonic Acid - Disodium Salt
Sodium Hydroxide M.W. - 40.00	NaOH	Lye Caustic Soda Soda Lye Sodium Hydrate