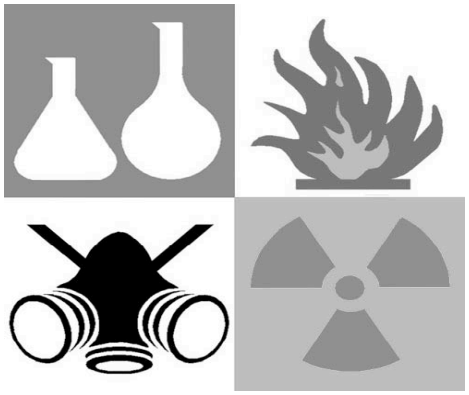
Hazardous & Regulated

Waste Management Guide

Larry Page/Laura Tomlin

WKU Environmental Health and Safety



April 2015

Western Kentucky University
Hazardous & Regulated Waste Manual

Table of Contents

Table of Contents (cont.)

Chapter 1 - Introduction

Western Kentucky University is committed to managing all hazardous materials used and stored at its facilities in a safe and environmentally responsible manner. The University is also committed to maintaining a safe work environment for its faculty, staff, students, and guests. This manual contains the proper, safe and environmentally responsible procedures for managing and disposing of wastes, thus reducing or eliminating the potential for accidents and releases of hazardous materials.

With the enactment on November 19, 1980 of the Resource Conservation and Recovery Act (RCRA), the handling, storage, and disposal of hazardous wastes became strictly regulated under Federal, State, and Local laws. Failure to comply with these regulations could lead to closure of facilities, as well as civil and criminal penalties against both the University and the individuals generating the wastes.

Western Kentucky University has assigned the management of hazardous, regulated, universal and medical wastes to the Department of Environmental, Health & Safety (EH&S). This Department has personnel who have the technical training and experience to handle the wide variety of wastes produced by the University.

All persons in supervisory or management positions are responsible for the proper handling and management of wastes in their individual units and insuring that employees understand the waste handling procedures in their individual laboratory or work area.

Ultimately it is the individual using these materials who is responsible for following the guidelines contained in this manual. With your cooperation, knowledge, professionalism and responsible actions, Western Kentucky University can continue to safely and responsibly manage its hazardous wastes.

Chapter 2 - Hazardous Waste Determination

The initial step in the safe management of hazardous or potentially hazardous waste is determining if it is necessary to use the hazardous constituents or if there is a less hazardous or a non-hazardous material that can be substituted. If you must use a hazardous material, and it in turn becomes a waste, you must determine if it is a “Hazardous Waste”. Federal and State regulations contain lists of specific chemicals and chemical characteristics that determine if a waste will or will not be regulated as hazardous. This chapter identifies those chemicals which are classified as hazardous and require disposal by EH&S. For the purposes of this program, chemicals that should be considered wastes are those which are spent or can no longer be used. Contaminated chemicals, chemicals in deteriorating containers and any other chemicals, which are no longer “used and useful”, should be considered waste. Chemicals, which can be beneficially reused, are not considered wastes and should be collected by the Department of Environment, Health, and Safety for redistribution (see Chapter 5).

Listed Hazardous Wastes

Federal and State regulations reference several categories of substances, which have toxic, carcinogenic, mutagenic, or teratogenic effects in humans or adverse impact on the environment. Currently there are over 700 listed hazardous wastes. This list is available on the EH&S webpage. Many other chemicals do not appear on these lists but are still considered hazardous (e.g. ethidium bromide and Malathion). In general, any chemical suspected of having toxic or hazardous properties should be handled by EH&S. You should refer to the Material Safety Data Sheets (MSDS) or other competent reference manuals, such as the Merck Index, to make determinations about toxicity. For guidance about whether a waste is a regulated or hazardous waste, call the EH&S staff at (270) 745-2395.

Characteristic Hazardous Wastes

Certain wastes, which are not specifically listed by name, are regulated as hazardous because they exhibit one or more of the following characteristics: ignitability, reactivity, corrosivity, or toxicity. If the wastes exhibit any of these characteristics they must be handled as hazardous wastes and disposed of by EH&S. Material Safety Data Sheets, manufacturer's container labels, and reference books can be used to identify whether one or more of these characteristics are present.

Ignitable: A waste exhibits the characteristic of ignitability if it is a liquid with a flash point of less than 140 degrees Fahrenheit (60 degrees Celsius). This includes most non-halogenated solvents such as methanol, acetonitrile, ethanol, gasoline, and ethyl ether. The University also treats chemicals which are flammable solids (e.g. magnesium dust, solid naphthalene and nitrocellulose) as hazardous wastes.

Corrosive: A waste exhibits the corrosive characteristic if it is a liquid with a pH of less than 2 or more than 12.5 and must be treated as a hazardous waste. It cannot be disposed of in a sanitary sewer without first being neutralized (provided it has no other dangerous properties such as toxicity). Examples include hydrochloric acid, photographic chemicals, sodium hydroxide, and corrosive cleaning agents. Dilution of acids and bases with water is not an acceptable practice. It is recommended that acids and bases be neutralized as part of the experimental procedure to reduce the amount of hazardous wastes generated.

Reactive: A waste exhibits the reactive characteristic if it is unstable, explosive, water or air reactive, a strong oxidizer, an organic peroxide, or contains cyanide or sulfide bearing materials that release toxic gases in contact with acids. Examples include picric acid, potassium metal, metallic picrates, trinitrotoluene, and old ethers.

Toxic: A waste exhibits the toxicity characteristic if an extract from the waste contains any of the contaminants in Table 1 at a concentration greater than or equal to the value in that table. The extraction procedure, known as the Toxic Characteristic Leaching Procedure (TCLP) is an EPA specified test method and is quite costly to perform. In the absence of concentration data, waste containing any of these constituents should be considered hazardous.

Many of the chemical wastes produced at the University are not on this list but are still considered hazardous for our program purposes. A more detailed discussion of these materials is found elsewhere in this chapter and in Chapter 4.

Table One

Maximum Concentration of Contaminants for the Toxicity Characteristic (TCLP) Procedure

EPA Waste Number	Contaminant	Regulatory Level (mg/L)
D004	Arsenic	5.0
D005	Barium	100.0
D018	Benzene	0.5
D006	Cadmium	1.0
D019	Carbon Tetrachloride	0.5
D020	Chlordane	0.03
D021	Chlorobenzene	100.0
D022	Chromium	6.0
D023	o-Cresol	200.0
D024	m-Cresol	200.0
D025	p-Cresol	200.0
D026	Cresol	200.0
D016	2,4 .D	10.0
D027	1,4 .Dichlorobenzene	7.5
D028	1,2 .Dichloroethane	0.5
D029	1,1 .Dichloroethylene	0.7
D030	2,4 .Dinitrotoluene	0.13
D012	Endrin	0.02
D031	Heptachlor (and its hydroxide)	0.008
D032	Hexachlorobenzene	0.13
D033	Hexachlorobutadiene	0.5
D034	Hexachloroethane	3.0
D008	Lead	5.0
D013	Lindane	0.4
D009	Mercury	0.2
D014	Methoxychlor	10.0
D035	Methyl Ethyl Ketone	200.0
D036	Nitrobenzene	2.0
D037	Pentachlorophenol	100.0
D038	Pyridine	5.0
D010	Selenium	1.0
D011	Silver	5.0
D039	Tetrachloroethylene	0.7
D015	Toxaphene	0.5
D040	Trichloroethylene	0.5
D041	2,4,5 .Tnichlorophenol	400.0

EPA Waste Number	Contaminant	Regulatory Level (mg/L)
D042	2,4,6 Trichlorophenol	2.0
D017	2,4,5 TP (Silver)	1.0
D043	Vinyl Chloride	0.2

Non-RCRA Regulated Wastes

As a rule persons who generate chemical wastes should not pour them down the sink or dispose of them in the regular trash unless they are certain that the wastes are Non-RCRA regulated and non-hazardous to humans or the environment. University personnel should consult Material Safety Data Sheets, the manufacturer's container labels, reference materials, or call EH&S for guidance on how to dispose of these materials. In general, only non-hazardous solids should be disposed of in the regular domestic trash. Non-hazardous free liquids that are water soluble can at times be disposed of down the sink, however it is necessary to remember that waste water discharge parameters imposed by the Bowling Green Municipal Utilities Wastewater Pretreatment Program can be considerably more stringent than the parameters for hazardous waste. (See Appendix 1).

Unknown Wastes/Chemicals

All waste materials picked up by EH&S must be completely and accurately identified. Materials that are not identified are referred to as "unknowns". When an unknown is discovered, an attempt must be made to identify its contents immediately. Usually the contents can be identified by consulting persons who work in the area where the material was used. If this fails to positively identify the material then some elementary analysis on the material must be performed. Elements of this analysis may include:

*pH on liquids
*Flash point
*Reactivity with water (small scale)
* Specific gravity
*Flammability (small scale)
*Water solubility

If the persons or unit with the unknown cannot or chose not to perform analysis of the unknown, then the University's hazardous waste contractor will perform the analysis for a substantial fee. Maintenance of labels, periodic inspections of chemical stocks, and good chemical hygiene practices will help prevent the occurrence of unknowns. The University's Chemical Hygiene Plan also has specific requirements for labeling of chemical containers. Persons should consult the Chemical Hygiene Plan located in their Department or call EH&S for specific information on these labels.

Chapter 3 - Hazardous Waste Handling and Disposal

Requirements

Western Kentucky University is inspected periodically by State and Federal agencies for compliance with hazardous waste regulations. Failure to meet all of these regulations can lead to a Notice of Violation and fines brought on the University by these agencies. **The most commonly cited violations at universities involve failure to properly label hazardous waste containers, failure to properly identify the contents of waste containers, and failure to maintain closed containers in laboratories and work areas.**

Labeling

All hazardous waste containers must have a label that states HAZARDOUS WASTE, and must list the constituents of the waste. This labeling must be done the first time waste is placed in the container. When naming the waste be specific (e.g. xylene instead of non-halogenated solvents and ethanol instead of alcohol). Do not use abbreviations or chemical formulas. Hazardous waste labels are available from the EH&S office, or laboratory tape or other labels may be used, as long as it states HAZARDOUS WASTE, has the specific names of the waste constituents, and the date that waste was first added to the container.

Proper Containers and Storage

Proper containers for accumulating hazardous wastes must be provided by the person or department that generates the waste. Generally the best containers for hazardous waste are the ones that the material came in. Other containers, such as 5 gallon jugs or carboys are acceptable as long as the container and remaining residue are compatible with the waste. All containers must be in good condition and have approved tight fitting lids to be acceptable for pickup.

Corks, ground-glass stoppers, aluminum foil and parafilm are not proper substitutes for a tight fitting lid. Unacceptable containers or containers without tight fitting lids or closures will not be picked up by EH&S personnel and it will be the responsibility of the waste generator to transfer the material into a proper container for pickup. EH&S personnel can provide guidance in selecting proper containers. When not actually transferring waste into an accumulation container the lid or closure must be securely fastened. Funnels must not be left sitting in the container. The only exception to this rule is for processes, such as HPLC, which run and add waste to the container continuously. However, when such a process is not running, the top must be on the container.

By State and Federal regulations, at no time can more than 55 gallons of waste be allowed to accumulate in any lab or accumulation area prior to pickup by EH&S. When the generator has a full container of waste, a Request for Disposal of Regulated Materials should be filled out and submitted to EH&S as soon as possible. Waste must not be accumulated over drains, in sinks, or in any area where a spill could contaminate any soils or outside areas. Waste must be stored in a secure location where it is always under the control of the generator. (See rules for Satellite Accumulation, Appendix 2)

Incompatible materials, whether waste mixtures or unused chemicals, should never be mixed together. Incompatible materials, when mixed may cause explosions, fires, or may generate

flammable or toxic gases resulting in serious health hazards. **If in doubt, do not mix!**

Caution must be exercised in any area where chemicals or wastes are stored or accumulated to insure that incompatible materials are segregated appropriately. Segregate by hazard class, not in alphabetical order. If possible, do not accumulate wastes with "good" chemicals. Flammable waste should be kept away from heating sources and should be stored in accordance with NFPA recommendations. EH&S can provide information on the proper storage of flammable and combustible materials. Listed below are examples of incompatible materials:

Oxidizers	and	Flammables
Elemental Metals	and	Hydrides
Acids	and	Cyanides, Sulfides, Bases, Flammables, Chlorine Compounds, Alcohols, and Elemental Metals
Amines	and	Chlorine Compounds
Water or Air Reactives	and	Anything
Organic Peroxides	and	Anything
Phenol	and	Formaldehyde
Sodium Azide	and	Aqueous Lead

This list is not all-inclusive. For a more detailed list, see "Incompatible Chemicals" in Appendix 6. You should always consult a Material Safety Data Sheet (MSDS) or other chemical information such as Bretherick's Handbook or the Merck Index for compatibility information.
Halogenated waste materials (those containing halogen compounds such as chlorine or fluorine) should be separated from non-halogenated compounds. This is both for safety and economic reasons. The halogenated wastes, while much less flammable, are generally more toxic than non-halogenated wastes. The disposal costs of non-halogenated solvent waste is significantly less than that of halogenated solvent wastes.

Where possible, mercury compounds should be eliminated from the laboratory. It is very important not to mix mercury with other materials due to the difficulty and cost of disposing of mercury and mercury compounds. EH&S will not pick up containers with dangerous or incompatible materials. These situations will be handled on a case by case basis by the Director of EH&S.

Crystallized chemical: if you find crystallization has occurred in a container, evacuate the area immediately and call EH&S for emergency removal.

Request for Disposal Forms

To dispose of any hazardous or regulated wastes, you must completely fill out a Request for Disposal of Regulated Materials form for each container. These forms can be obtained from the EH&S website at
http://www.wku.edu/ehs/envprograms/pickup_request/hazdisp.phpm (See Appendix 3)

Request for Disposal forms must be filled out by the individual who generates the waste, and should be filled out as completely as possible.

- Do not use formulas or abbreviations
- Use chemical names for waste constituents
- All liquids should have a pH performed and recorded on the Request for Disposal form

One Request for Disposal form should be filled out for each container. If you have a box of vials or small containers (less than *5* gallons) that are all the same chemicals, then only one form is needed. For different chemicals, one form will be needed for each container.

Submit the completed Request for Disposal form to the Department of Environmental, Health and Safety office. Attach a copy of the form to the corresponding container. Once the Request Form is received it will be entered into the tracking database, and EH&S personnel will **come to your area** and pickup the materials to be disposed of **No Waste will be picked up without a properly completed Request for Disposal form.**

Pharmaceuticals and Controlled Medications

Pharmaceuticals and other controlled medications should be managed in the same manner as any other hazardous waste. When filling out the Request for Disposal form, be sure to list both the common trade name and the more definitive trade name. Any additional information available about the substance should be attached to the Request for Disposal form.

Ethers and Peroxide-forming Materials

Some chemicals such as old ethers, picric acid, and organic peroxides tend to form unstable (explosive) compounds. Over time they can become extremely unstable. If peroxide formation is suspected, the containers should be isolated and EH&S immediately notified. Under no circumstances should an attempt be made to open the containers if crystal formations are visible in the container or around the cap. Most of these substances have expiration dates on the container label. It is recommended that peroxide forming materials that will not be used up by the expiration date or are not wanted/needed, be disposed of 6 months prior to reaching their expiration date.

Chapter 4--Other Waste Requirements

Regulated Medical and Bio-hazardous Wastes

Bio-hazardous wastes are human, animal or plant tissue or fluids that are contaminated with pathogenic organisms. All Bio-hazardous wastes must be clearly marked with the universal biohazard label. Bio-hazardous materials for disposal should be placed in leak-proof **Red Bags** that bear the biohazard label, and securely sealed. Sharps material (needles, syringes, scalpels, etc) must be placed in properly marked **Sharps Containers.** Bio-hazardous waste is picked up for disposal by EH&S. Submit a completed Request for Disposal form to EH&S for pickup of these wastes. Bio-hazardous waste bags that have been autoclaved to destroy the pathogenic organisms may be placed in the building dumpster by department personnel after the biohazard symbol and wording is defaced/taped over. Never place biohazard bags in a trash can inside a building (even those that have been autoclaved to destroy pathogens).

Radioactive Wastes

Requests for disposal of radioactive wastes should be directed to the campus Radiation Safety Officer.

PCB Materials

Polychlorinated biphenyls (PCBs) are a highly regulated material that are difficult and costly to dispose of Please contact EH&S for special instructions on handling this type of material. Any gloves, personal protective equipment, or other materials that have been used with PCBs will also require disposal as PCB waste.

Used light ballasts from fluorescent light fixtures that were manufactured prior to 1978 or that are not clearly marked as being non-PCB are managed by EH&S as PCB waste. See Appendix 4 for the policy concerning collection and disposal of Lighting Wastes.

Mercury Containing Light Bulbs and Tubes

Spent fluorescent light tubes, mercury vapor bulbs, metal halide bulbs, and other mercury containing lamps are handled as hazardous waste and are collected by EH&S for recycling. If you have mercury containing lighting waste to dispose of, submit a Request for Disposal form to the EH&S office. See Appendix 4 for the policy concerning packaging, collection, and disposal of Lighting Waste.

Batteries

Used batteries, with the exception of common alkaline batteries, should not be disposed of in the regular trash. Used batteries can contain a wide variety of materials that would cause them to be considered hazardous waste. These include acids, mercury, lithium nickel and cadmium. If you have used batteries for disposal, utilize the recycling containers that are located in various buildings on campus. A list of battery recycling container locations is provided on the EH&S webpage. Should you have a large number of batteries, or batteries too large for the recycling containers, forward a properly completed Request for Disposal form to EH&S.

Used Oils and Lubricants

Used oils and petroleum lubricants that are managed in a responsible manner are not considered hazardous waste, and are picked up for recycling by EH&S on a regular basis. Submit a Request for Disposal form to EH&S to schedule a pickup. Do not mix any other chemicals or materials with used oil. If you have reason to believe that your used oil is mixed with solvents or contains PCBs, indicate that fact on the request form so that the material can be disposed of properly.

Gas Cylinders

Rental and return of gas cylinders to gas vendors is the recommended practice for the management of gas cylinders. This eliminates the creation of hazardous waste. The purchase of lecture bottles or other non-returnable pressurized gas cylinders is strongly discouraged because of the difficulty and extreme cost of disposal. Disposal of empty or partially empty cylinders is handled by EH&S. The normal Request for Disposal procedures apply.

Chapter 5 - Waste Minimization

Western Kentucky University is committed to reducing both the amount and the toxicity of hazardous wastes generated by University operations. The University is required to develop strategies to reduce its hazardous waste generation. Listed below are a few strategies that you should consider in order to meet the goal of reducing hazardous wastes.

Minimization

Use smaller quantities of hazardous chemicals when feasible. Try to avoid mistakes. Order only the smallest quantity of materials needed to complete the task.

Substitution

Replace the toxic or hazardous materials you now use with an acceptable substitute which is less hazardous or non-hazardous. This is the best method for reducing hazardous wastes.

Recycling and Redistribution

Chemicals that are unused and unopened can often be redistributed to other laboratories or departments for reuse, saving both disposal costs and new product costs for someone else. EH&S is currently collecting and redistributing unopened and unused chemicals for reuse. Contact EH&S if you would like to be placed on the e-mail distribution list that shows what is currently available for redistribution. There is no charge for this service.

Chapter 6--Emergency and Spill Response

The purpose of this section is to provide information for persons working with chemicals on the proper steps to take when chemicals are spilled or released. The Department of Environment, Health and Safety is the primary University contact for responding to releases and accidents involving hazardous materials. Emergency action plans for individual University buildings, that include procedures for chemical spill response and evacuation are located on the EH&S webpage at http://www.wku.edu/ehs/beap/

Minor spills of known materials should be cleaned up immediately by properly trained personnel in that area. Appropriate personal protective equipment; such as chemical protective gloves, safety glasses, aprons, and lab coats should be sufficient to handle minor spills of known materials.

Spill and Release Reporting

Spills and releases of hazardous materials in other than insignificant amounts should be reported to the EH&S office as soon as possible so that any required reports to EPA or other regulatory agencies can be submitted. If the release involves a radioactive material, the University Radiation Safety Officer should also be notified.

Spill Response Equipment

Each area storing or using hazardous materials should have absorbent materials in sufficient amounts capable of at least stopping the spread of spilled chemicals to drains or other areas. Examples of absorbent materials would be towels, pads, vermiculite and adsorbent booms. Most areas with only small amounts of chemicals could utilize lab towels or paper towels when compatible with the materials on hand. Other areas, such as large labs, chemical storerooms and maintenance areas will require a more extensive supply of absorbent material. Other protective equipment, such as gloves and eye protection, can be worn for spill cleanup as well as normal chemical usage.

Management of Materials from Spill Cleanups

Materials that are generated as a result of spill cleanup are considered to be hazardous waste if the original material when disposed of would be classified as a hazardous waste. These materials must be placed into appropriate sealed containers, and will be managed as any other hazardous waste, i.e. requiring proper labeling and submission of Request for Disposal forms.

Appendix 1

Bowling Green Municipal Utilities Sewer Discharge Limits

Parameter	*Maximum Concentration in mg/L*
Ammonium Nitrogen	25.0
Arsenic	0.84
Barium	2.5
Beryllium	0.004
Biochemical Oxygen Demand	300.0
Cadmium	0.02
Chemical Oxygen Demand	450.0
Chlorides	1600.0
Chromium VI	0.08
Chromium (Total)	2.77
Copper	0.65
Cyanide	0.15
Iron	15.0
Lead	0.2
Mercury	0.001
Nickel	1.5
Oil & Grease	50.0
pH	6-11 s.u.
Pentachlorophenol	0.29
Selenium	0.04
Silver	0.106
Sulfides	5.0
Total Suspended Solids	300.0
Zinc	2.50

Appendix 2

Hazardous Waste Satellite Accumulation Guidelines for Laboratories

A generator of hazardous laboratory wastes may accumulate up to 55 gallons of waste, or up to one quart of acutely hazardous waste at or near the point of generation in accordance with the requirements of the Federal and State Environmental regulations (40 CFR 262.34 and 401 KAR 32:030 respectively) by following the guidelines listed below. An exception is the accumulation of flammable or combustible liquids in laboratories, which is regulated by the Occupational Health and Safety Administration (QSHA). which has adopted the guidelines set forth by the National Fire Protection Association (NFPA). The NFPA table and applicable definitions are located at the end of this document.
**Note... At or near the point of generation is interpreted by the EPA to mean at the end of the process line that generates the waste, or in the laboratory that the waste has been generated in.

1. **The waste must be under the control of the operator of the process which generates the waste.**
   The operator generating the waste is responsible for properly maintaining the satellite container. In most cases, the person with responsibility for operations within the individual laboratories will be considered to be the generator of the waste.

2. **Reactive or ignitable wastes must be protected from any source of ignition and NO SMOKING signs must be conspicuously posted.**
   Reactive or ignitable wastes should be accumulated in areas safe from ignition sources, such as a flammable liquid storage cabinet. All containers used for the accumulation of hazardous waste should be provided with some type of secondary spill protection when the accumulation occurs near sinks or drains, and ignitables stored in metal containers should have static grounding devices attached to the container.

3. **The accumulation of waste must not generate heat, gases, etc., nor produce a reaction that would cause damage to the accumulation container.**
   Care must be exercised to insure that the accumulated waste is compatible with the container used, and that incompatible wastes are not mixed. Accumulation containers of non-compatible wastes must be physically separated to avoid mixing in the event of a container failure.

4. **The accumulation container must be marked with the words "Hazardous Waste" . The container must also indicate the composition of the contained waste. Container contents are to be listed using proper chemical names. Do not use chemical formulas or abbreviations.**
   The Department of Environmental, Health & Safety has pre-printed tags available for satellite collection containers. All fields must be filled in completely. These fields include container usage start date, 90 day accumulation start date (to be completed by EHS when

the container is picked up and placed in the Central 90 day facility), container contents, and contact person/generator information.

5. **The container must be kept tightly closed at all times except when adding waste to the container.**
   Satellite accumulation containers are to be kept tightly closed at all times except when waste is being transferred to the container. The closure device must be of a type that is compatible with the container and designed so that waste will not spill in the event the container is overturned. Parafilm or foil is not an acceptable substitute for a tight fitting closure, and containers with ground glass stoppers are not to be used for satellite accumulation containers.

Maximum Allowable Container Capacities for Flammable and Combustible Liquids in Laboratory Hazardous Waste Satellite Accumulation Areas.

*extracted from table 4-2.3 of NFPA3O, Flammable and Combustible Liquid Code

Container Type	**Flammable Liquids**			**Combustible Liquids**	
	1A	**2B**	**1C**	**II**	**IIIA**
Glass	500mL	IL	4L	4L	4L
Metal (non-DOT approved)	4L	4L	4L	4L	4L
Metal (DOT approved)	N/A	4L	4L	4L	4L
Polyethylene (DOT approved)	4L	4L	4L	4L	4L

Class I Flammable liquids are defined as any liquid that has a closed-cup flash point below 100 degrees F (37.8 degrees C) and a Reid vapor pressure not exceeding 40 psia (2068.6 mm Hg) at 100 degrees F (37.8 degrees C) as determined by ASTM D 323, Standard Methods of Test for Vapor Pressure of Petroleum Products (Reid Method). Class 1 liquids shall be further classified as follows:

1. Class 1A liquids shall include those liquids that have flash points below 73 degrees F (22.8 C) and boiling points below 100 degrees F (37.8C).

2. Class 1B liquids shall include those liquids that have flash points below 73 degrees F (22.8C) and boiling points at or above 100 degrees F (37.8C).

3. Class 1C liquids shall include those liquids that have flash points at or above 73 degrees F (22.8C), but below 100 degrees F.

Combustible liquids are defined as any liquid that has a closed-cup flash point at or above 100 degrees F (37.8C). Combustible liquids shall be defined as follows:

1. Class II liquid, any liquid that has a flash point at or above 100 degrees F (37.8C) and below 140 degrees F (60C).

2. Class IIIA liquid, any liquid that was a flash point at or above 140 degrees F (60C), but below 200 degrees F (93C).

Hazardous Waste Satellite Accumulation

Guidelines for Areas other than Laboratories

Guidelines for General Area Hazardous Waste Satellite Accumulation are identical to the Hazardous Waste Accumulation Guidelines for Laboratories, with the exception of NFPA Table 4-2.3. Please refer to the Hazardous Waste Satellite Accumulation Guidelines for Laboratories located in this appendix.

Satellite Collection Area Posting

Hazardous Waste
Satellite Accumulation Area

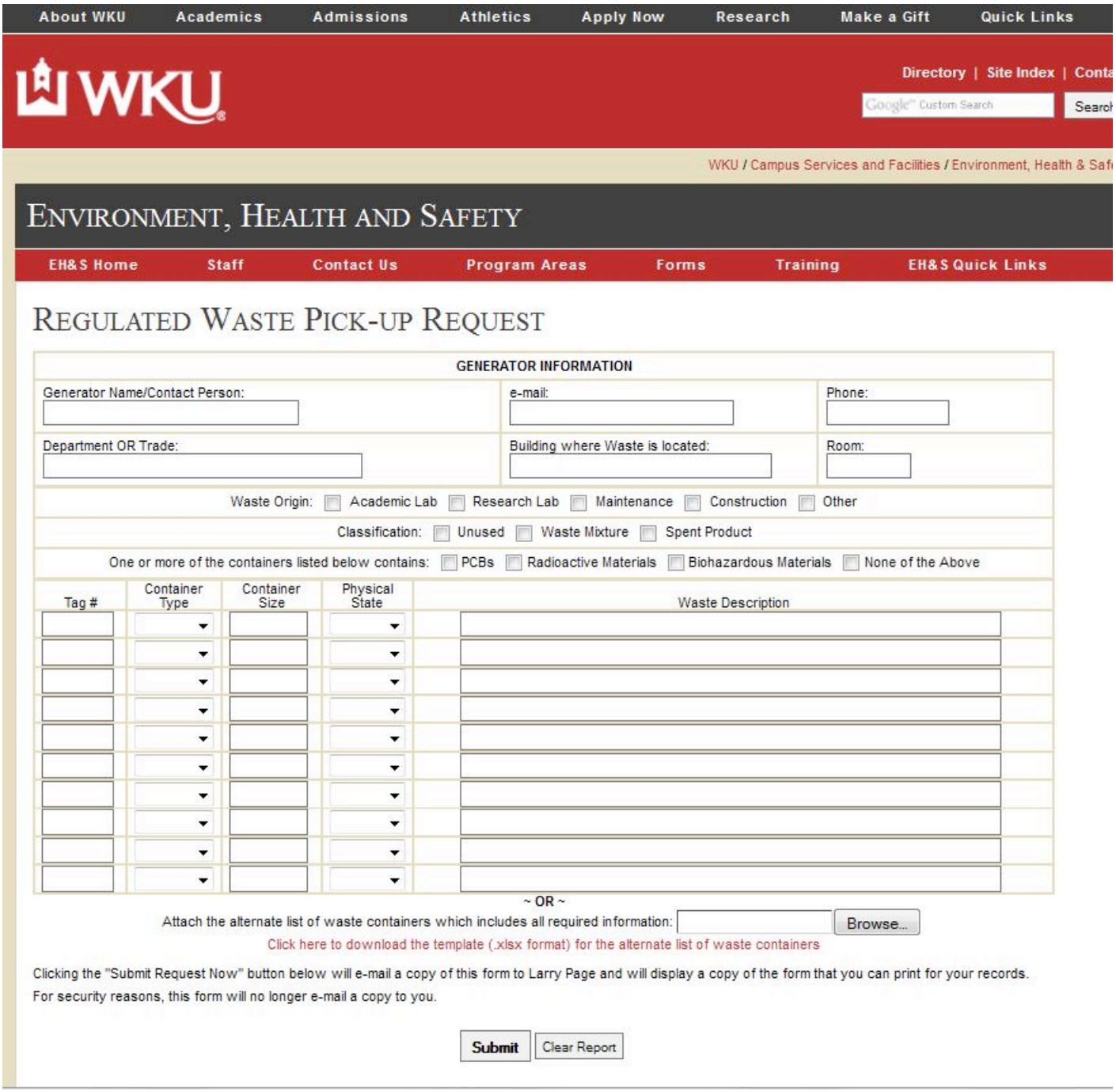
Hazardous Waste Satellite Accumulation Area Guidelines

- No Smoking or open flames near accumulation area
- Hazardous waste containers must be in good condition
- Wastes added must be compatible with the container and each other
- Use properly fitting screw-type caps (no corks, rubber stoppers or foils)
- Hazardous waste containers must be tightly closed when not adding waste
  Do not fill to the top; leave 10% space for expansion
- Clearly label containers with the words “Hazardous Waste”, indicating the contents (chemical name) and the date waste was first added to the container
  EH&S has pre-printed labels available
- Remove or deface manufacturers labels
- Keep hazardous waste containers in secondary containment when near sinks and/or floor drains
- When utilized, secondary containment must be chemically resistant and able to contain the contents of the largest container placed within
- Once container is filled, mark the date it was filled on the label, and submit a on-line Request for Pickup to Environment, Health & Safety (available on the EH&S website)
- Call Environment, Health & Safety at 745-6366 for more information

Appendix 3

EHS Requests for Disposal Forms

Department of Environmental, Health & Safety Request for Disposal Forms are available for on-line submission at http://www.wku.edu/ehs/envprograms/pickup_request/hazdisp.php



About WKU | Academics | Admissions | Athletics | Apply Now | Research | Make a Gift | Quick Links

WKU

Directory | Site Index | Conta

Google™ Custom Search | Search

WKU / Campus Services and Facilities / Environment, Health & Saf

ENVIRONMENT, HEALTH AND SAFETY

EH&S Home | Staff | Contact Us | Program Areas | Forms | Training | EH&S Quick Links

REGULATED WASTE PICK-UP REQUEST

GENERATOR INFORMATION

Generator Name/Contact Person: | e-mail: | Phone:

Department OR Trade: | Building where Waste is located: | Room:

Waste Origin: ☐ Academic Lab ☐ Research Lab ☐ Maintenance ☐ Construction ☐ Other

Classification: ☐ Unused ☐ Waste Mixture ☐ Spent Product

One or more of the containers listed below contains: ☐ PCBs ☐ Radioactive Materials ☐ Biohazardous Materials ☐ None of the Above

Tag #	Container Type	Container Size	Physical State	Waste Description

~ OR ~

Attach the alternate list of waste containers which includes all required information: Browse...

Click here to download the template (.xlsx format) for the alternate list of waste containers

Clicking the "Submit Request Now" button below will e-mail a copy of this form to Larry Page and will display a copy of the form that you can print for your records. For security reasons, this form will no longer e-mail a copy to you.

Submit | Clear Report

Appendix 4

WKU Lighting Waste Procedures

Guidance for the Disposal of Universal Waste Mercury-Containing Lamps
(Revised December 10, 2010)

(1) Place unbroken lamps and tubes to be recycled into the original container from which **ALL** packaging has been removed, and tape securely closed. Lamps eligible for recycling are all fluorescent, HID, and high-pressure sodium units. (Environment Health & Safety can furnish boxes for straight 4-foot lamps only, when they are available.)

(2) Mark the words **"UNIVERSAL WASTE"** clearly on the outside of the container, along with the **DATE THE FIRST LAMP** was added to the container, **THE NUMBER OF LAMPS IN THE CONTAINER,** and your name. For ease of counting, EH&S suggests keeping a running total marked on the box/container each time lamps are added.

(3) Place broken lamps in a sealed, rigid container or trash bag, and label with the words **"Hazardous Waste Broken Lamps"**, and the date that the first broken lamp was added to the container.

(4) Place containers of properly packaged lamps into the designated collection area. When several containers have been accumulated, the Generator should complete an on-line "Request for Disposal of Regulated Materials" form, available on the EH&S website under on-line forms, or at: http://www.wku.edu/ehs/envprograms/pickup_request/hazdisp.php

(5) Containers of Universal Waste Lamps should not be allowed to remain in the designated collection area in excess of 6 months without requesting a pick-up from EH&S. **Designated collection areas must be approved by EH&S in advance of beginning collection.**

(6) **Loose bulbs, tubes and lamps, or those not properly packaged and labeled for shipment/recycling will not be picked up by EH&S until such deficiencies are corrected.** Failure to properly manage Universal Waste Lamps or broken lamps will result in their being classified as hazardous waste by regulatory agencies, subjecting the Generator and the University to corrective actions and/or fines. Lamps should be packaged in the same manner as if preparing for shipment by a commercial carrier, such as Fed-Ex or UPS.

Key Points for Successful Management of Universal Waste Lamps

Remove packing materials from containers

Mark the number of lamps, the words **"Universal Waste Lamps"** (any other wording is unacceptable), the date that the first lamp was added to the container, and your name on each container, and seal securely with tape. Place broken lamps in a separate container labeled with the words **"Hazardous Waste Broken Lamps"** and the date the first broken lamp was added to the container.

Guidance for the Disposal of Spent PCB Containing Lamp Ballasts
(Revised December 10, 2010)

(1) Examine the ballast to be replaced prior to removal from the lighting fixture. Ballasts that are electronic or are marked "No PCBs" may be disposed of in regular trash or recycled. Ballast that are not electronic or do not have the "No PCBs" marking are considered to contain PCBs and must be disposed of through EH&S.

(2) Remove spent PCB lamp ballast from the lamp fixture utilizing proper personal protective equipment (PPE) including disposable gloves and safety glasses/goggles. Do not allow PCB containing ballasts to come into contact with furnishings, carpets, or other surfaces.

(3) Place the removed lamp ballast in a rigid container labeled "Contains PCBs, along with any contaminated PPE**.** EH&S can furnish labeled containers for buildings that still contain a large number of PCB ballasts. Buildings that were part of the 2010 Energy Savings Performance retro-fit are largely PCB free. Do not put trash, empty ballast boxes, etc. in the collection container!

(4) Lamp ballasts which are leaking should be placed in a plastic bag before they are added to the collection container, along with any PPE that has come into contact with the ballast

(5) When the ballast collection container is filled, complete a "Request for Disposal of Regulated Materials" form to have the container removed by Environmental, Health & Safety. These forms are available on the EH&S web page at http://www.wku.edu/ehs/envprograms/pickup_request/hazdisp.php

(6) Call Environmental, Health & Safety at (270) 745-2395 for questions or assistance.

Appendix 5

Properly Managing Used Shop Towels

Issue

Depending on the manner in which used shop towels are handled, they may or may not become a hazardous waste. Towels which are sent to a commercial laundry service for cleaning and re-use may be excluded from hazardous waste regulation.

Towels that are disposed of after use are considered potentially hazardous waste by EPA regulation due to their possible exposure to oils, solvents, inks and other hazardous materials. Used towels should be managed as follows:

Do

Keep soiled shop towels in a closed container that is clearly labeled "used shop towels".

Empty your shop's container into the central collection container regularly.

Inform Environment, Health & Safety when the central collection container is filled by submitting a "Regulated Waste Disposal Request" form, available on the EH&S website for on-line submission.

Don't

Do not throw used shop towels in the trash cans or dumpster.

Do not saturate towels, free liquids should be wrung from towels and disposed of properly.

Do not dispose of solvents or chemicals by pouring into the containers of used shop towels.

Address questions concerning used shop towel management to Environmental, Health & Safety at 745-6366 or 745-2395.

Appendix 6

Incompatible Chemicals (Reactive Hazards)

Substances in the left-hand column should be stored and handled so that they cannot accidentally contact corresponding substances in the right hand column under uncontrolled conditions.

Acetic Acid	Chromic acid, nitric acid, peroxides, permanganates
Acetic Anhydride	Hydroxyl-containing compounds such as ethylene glycol, perchloric acid
Acetone	Concentrated nitric and sulfuric acid mixtures, hydrogen peroxide
Acetylene	Chlorine, bromine, copper, silver, fluorine, mercury
Alkali and alkaline earth metals,(e.g., sodium, potassium, lithium, magnesium, calcium, powdered aluminum)	Carbon dioxide, Carbon tetrachloride, other polychlorinated hydrocarbons (Do not use water, foam or dry chemical extinguishers on fires involving these metals. Use the appropriate Class D fire extinguisher.)
Ammonium (anhydrous)	Mercury, chlorine, calcium hypochlorite, iodine, bromine, hydrogen fluoride
Ammonium nitrate	Acids, metal powders, flammable liquids, chlorates, nitrates, sulfur, finely divided organics, combustible
Aniline	Nitric acid, hydrogen peroxide
Arsenic materials	Any reducing agent
Azides	Acids
Bromine	Ammonia, butadiene, butane, other petroleum sodium carbide, turpentine, benzene, finely divided metals
Calcium oxide	Water
Carbon, activated	Calcium hypochlorite, other oxidants
Chlorates	Ammonium salts, acids, metal powders, sulfur, finely divided organics, combustible
Chromic acid and chromium trioxide	Acetic acid, napthalene, camphor, glycerol, turpentine, alcohol, other flammable liquids
Chlorine	Ammonia, acetylene, butadiene, butane, other petroleum gases, hydrogen, sodium carbide, turpentine, benzene, finely divided metals
Chlorine dioxide	Ammonia, methane, phosphine, hydrogen sulfide
Copper	Acetylene, hydrogen peroxide
Cumene hydroperoxide	Acids (organic or inorganic)

Cyanides	Acids
Flammable liquids	Ammonium nitrate, chromic acid, hydrogen peroxide, nitric acid, sodium peroxide, halogens
Hydrazine	Hydrogen peroxide, nitric acid, any other oxidant
Hydrocarbons (benzene, butane, propane gasoline, turpentine, etc.)	Fluorine, chlorine, bromine, chromic acid, peroxides
Hydrocyanic acid	Nitric acid, alkalis
Hydrofluoric acid (anhydrous), Hydrogen fluoride	Ammonia (aqueous or anhydrous)
Hydrogen peroxide	Copper, chromium, iron, most metals or their salts, any flammable liquid, combustible materials, aniline, nitromethane
Hydrogen sulfide	Fuming nitric acid, oxidizing gases
Hypochlorites	Acids, activated carbon
Iodine	Acetylene, ammonia (aqueous or anhydrous)
Mercury	Acetylene, fulminic acid, ammonia
Nitrates	Acids
Nitric acid (concentrated)	Acetic acid, acetone, alcohol, aniline, chromic acid, hydrocyanic acid, hydrogen sulfide, flammable gases, nitratable substances
Nitrites	Acids
Nitroparaffins	Inorganic bases amines
Oxalic acid	Silver, mercury and their salts
Oxygen	Oils, grease, hydrogen, flammable liquids, solids and gases
Perchloric acid	Acetic anhydride, bismuth and its alloys, alcohol, paper, wood, grease, oil (all organics)
Peroxides, organic	Acids (organic or mineral), also avoid friction, store cold
Phosphorus (white)	Air, oxygen, alkalis, reducing agents
Phosphorus pentoxide	Alcohols, strong bases, water

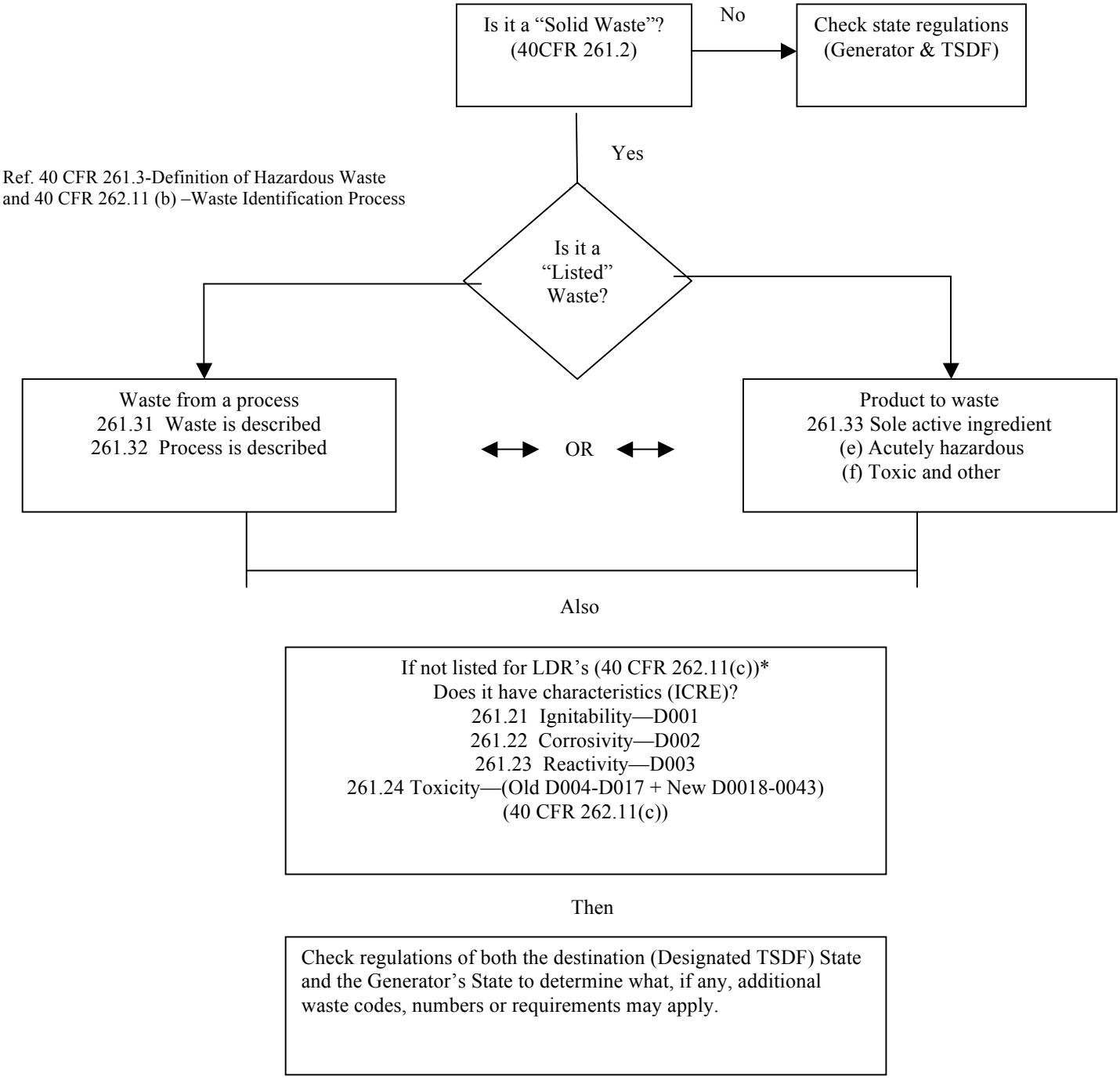
Potassium	Carbon tetrachloride, carbon dioxide, water
Potassium chlorate	Acids (see also chlorates)
Potassium perchlorate	Acids (see also perchloric acid)
Potassium permanganate	Glycerol ethylene glycol, benzaldehyde, sulfuric acid
Selenides	Reducing agents
Silver and silver salts	Acetylene, oxalic acid, tartaric acid, fulminic acid[8], ammonium compounds
Sodium	See- alkali metals
Sodium nitrite	Ammonium nitrate and other ammonium salts
Sodium peroxide	Any oxidizable substance, such as ethanol, methanol, glacial acetic acid, acetic anhydride, benzaldehyde, carbon disulfide, glycerol, ethylene glycol, ethyl acetate, methyl acetate, furfural
Sulfides	Acids
Sulfuric acid	Chlorates, perchlorates, permanganates

[8]produced in nitric acid-ethanol mixtures

From - Hazards in the Chemical Laboratory, 4th edition. 1986. Bretherick

Appendix 7

Waste Identification Flowchart



*Refer to 40 CFR 262.11 © to determine when characteristic codes apply to your waste.

Appendix 8

Comprehensive List of Peroxide Forming Chemicals
and
Common Di-, Tri-, and Multi-Nitro Compounds

Peroxide Forming

Chemicals

Comments:

This List is comprehensive, yet is not all-inclusive. Chemicals with similar names to the ones on this list should be given consideration when assessing the potential for peroxide formations.

The peroxide list does not address the broad range of chemical-specific hazards and properties that are associated with individual chemicals. For instance, 2-Butanol, Diethyl ether, and Tetrahydrofuran, among many others, form explosive levels of peroxides on concentration. Furthermore, Isopropyl ether, Tetrafluoroethylene, and Butadiene form explosive levels of peroxides without being concentrated. It should be clearly noted that some chemicals present much greater hazards than others with respect to the formation of peroxides.

A Comprehensive List of Peroxide Forming Chemicals

Acetal
Acetaldehyde
Acrolein
Acrylic acid
Acrylonitrile
Allyl ether
Allyl ethyl ether
Allyl phenyl ether
n-Amyl ether
p-(n-Amyloxy) benzoyl chloride
Benzyl alcohol
Benzyl n-butyl ether
Benzyl ether
Benzyl ethyl ether
Benzyl methyl ether
Benzyl 1-napthyl ether
I $_1$2-Bis(2-chloroethoxy) ethane
Bis(2-ethoxyethyl) ether
Bis[2-(methoxyethoxy)ethyl] ether
Bis(2-chloroethyl) ether
Bis(2-ethoxyethyl) adipate
Bis(2-ethoxyethyl) phthalate
Bis(2-methoxyethyl) carbonate
Bis(2-inethoxyethyl) ether
Bis(2-methoxyethyl) phthalate
Bis(2-methoxymethyl) adipate
Bis(2-n-butoxyethyl) phthalate
Bis(2-phenoxyethyl) ether
Bis(4-chlorobutyl) ether
Bis(chloromethyl) ether
2-Bromomethyl ethyl ether
b-Bromophenetole
o-Bromophenetole
p-Bromophenetole
3-Bromopropyl phenyl ether
Butadiene
I ,3-Butadiyne
2-Butanol *(syn.* Butyl alcohol)
Buten-3-yne
tert-Butyl ethyl ether
tert-Butyl methyl ether
n-Butyl phenyl ether
n-Butyl vinyl ether
Chloroacetaldehyde diethylacetal
2-Chlorobutadiene *(syn.* Chloroprene)
1-(2-Chloroethoxy)-2-phenoxyethane
Chloroethylene
Chloromethyl methyl ether
b-Chlorophenetole
o-Chlorophenetole
p-Chlorophenetole
Chloroprene *(syn.* 2-Chlorobutadiene)
Chlorotrifluoroethylene
Cumene
Cyclohexanoi
2-Cyclohexen-I -ol
Cyclohexene
Cyclooctene
Cyclopropyl methyl ether
Decahydronaphthalene
Diacetylene
Diallyl ether
p-Di-n-butoxybenzene
1,2-Dibenzyloxyethane
p-Dibenzyoxybenzene
Dibenzocyclopentadiene
1,2-Dichloroethyl ethyl ether
2, 4-Dichlorophenetole
Dicyciopentadiene
Diethoxymethane
2,2-Diethoxypropane
Diethyl ether
Diethylene glycol dimethyl ether (diglyme)
Diethyl ethoxymethylenemalonate
Diethyl fumarate
Diethyl acetal

Diethylketene

m, o, p-Diethoxybenzene
1 ,2-Diethoxyethane
9,1 0-Dihydroanthracene lndene

A Comprehensive List of Peroxide Forming Chemicals

Dimethoxymethane
1,1 -Dimethoxyethane
Dimethylketene
3, 3-Dimethoxypropene
2,4-Dinitrophenetole
Dioxanes
1 ,3-Dioxepane
Di(1-propynyl) ether
Di(2-propynyl) ether
Di-n-propoxymethane
Divinylacetylene
1,2-Epoxy-3-isopropoxypropane
1,2-Epoxy-3-phenoxypropane
p-Ethoxyacetophenone
I -(2-Ethoxyethoxy) ethyl acetate
2-Ethoxyethyl acetate
(2-Ethoxyethyl)-o-benzoyl benzoate
1 -Ethoxynaphthalene
o,p-Ethoxyphenyl isocyanate
1-Ethoxy-2-propyne
3-Ethoxyopropionitrile
2-Ethylacryfaldehyde oxime
2-Ethylbutanol
Ethyl ether
Ethylene glycol dimethyl ether
Ethyl b-ethoxypropionate
2-Ethylhexanal
Ethyl vinyl ether
Furan
4-Heptanol
2,5-Hexadiyn-1 -of
4,5-Hexadien-2-yn-1 -ol
2-Hexanol
n-Hexyl ether
o, p-Iodophenetole
Isoamyl benzyl ether
Isoamyl ether
Isobutyl vinyl ether
Isophorone
b-Isopropoxypropionitrile
lsopropyl ether
Isopropyl 2,4, 5-trichlorophenoxyacetate
Limonene
1,5-p-Methadiene
Methyl acetylene
Methyl p-(n-amyloxy) benzoate
3-Methyl-I -butanol
Methylcyclopentane
Methyl isobutyl ketone
Methyl Methacrylate 4-Methyl-2-pentanol
4-Methyl-2-pentanone
n-Methylphenetole
2-Methyltetrahydrofuran
3-Methoxy I -butyl acetate
2-Methoxyethanol
3-Methoxyethyl acetate
2-Methoxyethyl vinyl ether
Methoxy-1,3,5,7-cyclooctatetraene
b-Methoxypropionitrile
m-Nitrophenetoie
1-Octene
Oxybis(2-ethyl acetate)
Oxybis(2-ethyl benzoate)
b, b-Oxydipropionitrite
2-Pentanol
1-Pentene
4-Penten-I -ol
1-Phenylethanol 2-Phenylethanol
Phenoxyacetyl chloride
a-Pehnoxypropionyl chloride
Phenyl o-propyl ether
p-Phenylphenetone
Potassium metal
2-Propanol (syn. lsopropyl alcohol)
n-Propyl ether
n-Propyl isopropyl ether
Sodium 8,1 I,14-eicosatetraenoate
Sodium ethoxyacetylide

A Comprehensive List of Peroxide Forming Chemicals

Sodium amide
Styrene
Tetrafluoroethylerie
Tetrahydrofuran
Tetrahydropyran
Tetrahydronaphthalene
Triethylerie gtycol diacetate
Triethylene glycol dipropionate
1,3, 3-Trimethoxypropene
111 ,2,3-Tetrachloro-1 ,3-butadiene
Vinyl acetate
Vinyl acetylene
Vinyl chloride
4-Vinyl cyclohexene
Vinyl ethers
Vinyl pyridine
Vinylene carbonate
Vinylidene chloride
Vinyladiene chloride
Other secondary alcohols

Common Di-, Tri-, and Multi-Nitro Compounds

Common Di-, Tri-, and Multi-Nitro Compounds

Dinitrophenol
Di nitroresorcinol
Diphentlpicryl hydrazyl dipycrylamine
Hexanitrobibenzyl
Hexanitrosti lbene
Lead styphnate
Picraminc acid, dry
Picric acid, dry
Picryl fluoride
Tertranitrophenol
Trinitroaniline
Trinitrobenzene, dry
Trinitrochlorobenzene
Trinitrofluorenone
Trinitrophenetol
Trinitrophloroglucinol
Trinitrotoluene
Diriitroethylene urea
Dinitropropylene glycof
Ethyl-4,4-din itropentoate
Glycerol-I ,3-dinitrate
Methyl-4, 4-din itropentoate
Nitroglycerine
Nitrostarch, dry
Tetranitromethane
Dinitrophenyl hydrazine
D initrosobenzene
Dipicryl sulfide
Hexanitrodiphenylamine
Lead picrate
Nitroceliulose, dry
Picramide
Picryl chloride
Tetranitroani line
Tetranitroresorci no I
Trinitroanisole
Trinitrobenzenesulfon ic acid, dry
Trinitro-m-cresol
Trinitronapthelene
Trinitrophenoi, dry
Trinitroresorcinol
Diethyleneglycol dinitrate
Dinitroglycerine
Ethanolamine dinitrate
Ethyleneglycol dinitrate
Mannitol hexanitrate
Methylene hexanitrate
Nitroguanidine, dry
Nitro urea

Appendix 9

Definitions and Terms

Container - A waste receptacle that is capable of being securely sealed, and transported. The container must be compatible with the waste stored in it.

EPA – United States Environmental Protection Agency

Generator - A person or institution that creates hazardous waste.

Hazardous Waste - A material that meets one or more of the characteristics identified in Federal and State regulations and this manual.

KYDEP - The Kentucky Department for Environmental Protection.

Label - Required wording on each container of hazardous waste. It must contain the words "hazardous waste", the name of the chemicals contained within, and the date accumulation in the container began.

Mixed Waste - Waste that is both Hazardous and Radioactive.

RCRA - The Resource Conservation and Recovery Act, a Federal Act that regulates hazardous waste.

Request for Disposal of Regulated Materials Form - An internal University form that must be completed and forwarded to the Department of Environmental, Health and Safety for each container of hazardous or regulated waste generated in order for the waste to be tracked and disposed of properly.

Satellite Accumulation Point - The location in the lab or work area where hazardous wastes are accumulated until ready for pickup. There must be less than 55 gallons at any one time (less than 1 quart for acutely hazardous wastes) at any individual satellite accumulation point.