SOUTHERN ILLINOIS UNIVERSITY
CARBONDALE

CHEMICAL WASTE MANAGEMENT GUIDE

Approved by: Hazardous Waste Oversight Advisory Committee, March, 1992
Hazardous Waste Division, SIUC 1992

revised: 11/1994
revised: 3/2008
revised: 4/2013

EMERGENCY PHONE LIST

Environmental Health & Safety
Chemical Waste Manager 453-5187
Center for Environmental Health & Safety 453-7180
Biological Safety 453-5187
Radiological Control.....536-2015

Police/Security
SIUC Police (Emergency).....911
SIUC Police (Non-Emergency) 453-3771

Medical
Health Service 453-3311
Student Transit 453-2212
Ambulance.....684-5678
Carbondale Memorial Hospital.....549-0721
Poison Control Center .....(800) 222-1222

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I. Introduction and Overview of Chemical Waste Laws and Regulations

The Chemical Waste Management Guide establishes policies and procedures for the handling, storage and disposal of hazardous chemical waste at Southern Illinois Univeristy Carbondale. The University is committed to maintaining compliance with all applicable laws concerning hazardous waste.

The Center for Environmental Health and Safety (CEHS) is the service unit of the University which is responsible for transportation, storage and disposal of hazardous waste. Questions regarding the classification, storage and disposal of chemical waste should be directed to the Chemical Hygiene Officer at CEHS. Policies and procedures for handling hazardous chemicals are supervised by the Chemical Oversight Advisory Committee.

LAWS:

There are many different laws and regulations which govern the management of chemical waste at Southern Illinois University. Various laws have been passed at the federal, state and local governmental levels. It should be remembered that *any* applicable laws and regulations can be the basis for a regulatory citation. The purchase and use of any hazardous chemical carries with it the responsibility to be aware of the regulations governing its use and disposal.

RCRA:

The Resource Conservation and Recovery Act (RCRA), also known as the "Solid Waste" Disposal Act, was passed in 1976. This law empowered the Environmental Protection Agency (EPA) to regulate the disposal of solid and hazardous waste in the United States. In Illinois, the enforcing agencies are both the Illinois and the United States Environmental Protection Agency.

A solid waste is defined by EPA as any solid, liquid or gas which is disposed of, abandoned or discarded.

The main purpose of RCRA was to address the problem of how to safely dispose the large volumes of waste, including hazardous waste, generated by our society.

RCRA was established to accomplish three goals:

1. To protect human health and the environment.
2. To reduce waste and conserve energy and natural resources.
3. To reduce the generation of hazardous waste as expeditiously as possible.

CERCLA

The Comprehensive Environmental Responsibility, Compensation and Liability Act, commonly referred to as Superfund, was enacted in 1980. This was

established to cleanup sites of hazardous waste contamination. The most important effect of this law is the establishment of a liability system which ***makes the original generator of a waste responsible for that material forever***.

Of the various regulations that the generator must follow, the generator must also share in the responsibilities for the safe management and ultimate disposal of all wastes. If the transporter or disposal facility fails to take proper care of waste or does not prevent the wastes from being released into the environment, the generator can and will be held responsible.

HSWA

In 1984, Congress passed the Hazardous and Solid Waste Amendments which reauthorized RCRA. The main feature of this law is the land ban which mandated that all hazardous waste must be treated and made nonhazardous before disposal in landfill.

SIUC is classified as a "large quantity generator" under RCRA; the Univeristy generates more than 1,000 kg per month of regulated waste. Generator status determines certain requirements, such as time limits for storage of waste.

REGULATIONS:

The actual legal requirements associated with a particular law, and the way it is enforced, are determined by the regulations written for it.

Regulations dealing with the disposal of waste in Illinois are a combination of local, state and federal requirements. Hazardous waste is defined as materials which are ignitable, reactive, corrosive, toxic, (see section III., Hazardous Chemical Waste Definition) radioactive, or appears on a list of specific waste materials as "special waste." The special waste list is established by the Illinois Environmental Protection Agency (IEPA). It is a felony to knowingly and willfully dispose of material which meets these criteria in the normal trash or sewer.

In accordance with federal regulations, the State maintains a waste manifest system which tracks all hazardous waste generated in the state from the generator's site until it reaches it final disposal site. The manifest is uniform across the country, so it is possible to track waste anywhere in the United States.

Other RCRA regulations require that large quantity generators of hazardous waste, such as SIUC, maintain contingency plans for hazardous waste spills and inspect waste accumulation areas. Employees whose work generates hazardous waste must be trained in proper disposal procedures. In addition, generators must keep records of, and annually report to IEPA, the amounts and types of waste generated. A special area of emphasis of these regulations is the development of a waste minimization program, to reduce the amount of waste the generator produces.

All of the laws and regulations described above make compliance the responsibility of the employer. Ignorance of these laws or regulations is no defense against citations or fines. At Southern Illinois University Carbondale, the user of a hazardous chemical is ultimately responsible for compliance with regulations applicable to a particular chemical. The Center for Environmental Health and Safety was established to assist the University community in compliance with these requirements.

RCRA Enforcement

EPA is authorized to seek civil and criminal penalties for RCRA violations. Educational institutions have not been excluded. Several universities have been found guilty of RCRA violations and have had to pay substantial penalties. **Under revisions applicable in October 1990, the individuals guilty of RCRA violations can be personally brought to court and face mandatory penalties as well as imprisonment**. One substantial penalty for violation of EPA regulations is that the institution - and, in consequence, its faculty, staff and researchers - may not receive federal funds.

Due to these developments, universities must ensure that staff, faculty, and students understand waste management practices.

II. WASTE MINIMIZATION

Southern Illinois University Carbondale is committed to the protection of human health and the environment. To meet these commitments, the University strongly encourages its employees to utilize chemical waste minimization (waste reduction) techniques to reduce the volume and toxicity of chemical wastes produced at the University. An important benefit from waste minimization is that it will help reduce the University's escalating chemical disposal costs.

The following describes common waste minimization techniques:

End of Process Treatment

Write end of process treatment procedures into your standard operating procedures and use them. An example would be to neutralize an acid with a base and flush the solution to the local sewer with excess water.

Please contact the Chemical Hygiene Officer if you are interested in this program.

Management

It is important to audit chemical supplies and use inventory control. Purchase only the quantity of chemical required. If you have chemicals stored in a "shared" storeroom, take responsibility for disposal of old chemicals left by personnel or students no longer with the University.

Process Modification

To the extent that it does not compromise vital research, teaching or service, laboratories are encouraged to modify experimental or standard processes to decrease the quantity of hazardous chemicals used and generated. Where possible, micro and semi-micro techniques should be used to reduce the amount of waste generated.

Product Substitution

Substitute non-hazardous or less toxic materials in your chemical processes and experiments. Some examples of this are:

- Using water-based inks instead of solvent-based inks in printing operations.
- Substituting detergents and enzymatic cleaners for sulfuric acid/potassium dichromate (chromerge) cleaning solutions and ethanol/potassium hydroxide cleaning solutions.

- Avoiding the use of known carcinogens, mutagens, or extremely hazardous chemicals where possible.
- SYBR Safe DNA gel stain, instead of ethidium bromide.
- Alcohol or glycol thermometers instead of mercury thermometers
- For isolation and purification of DNA, replace chloroform/phenol extractions with new techniques developed by Promega (Wizard Preps, 800-356-9526) or Stratagene (Lambda DNA Purification Kit, 800-424-5444).
- For fixing tissue, using a modified Davidson's fixative in place of Bouin's solution, which contains picric acid.

Purchasing

Purchase only the quantity of chemical required for specific projects. Find the minimum unit required for an experiment and order accordingly. Do not stockpile chemicals unnecessarily.

Recycling

The University collects some precious metals and valuable chemicals for recycling by outside contractors to reduce waste treatment costs. Also, some campus departments are involved in the reclamation of precious metals and chemicals from laboratory process.

Examples of this are:

- Reclamation of silver from photofixing chemicals
- Recycling batteries, including lead-acid batteries, metal halide batteries, lithium-ion batteries, and nickel-cadmium batteries.

Segregation and Characterization

Do not mix hazardous wastes with nonhazardous waste.

Do not mix different classes of hazardous waste together unless required as part of the experiment (i.e. putting mercuric chloride waste in with the acetone waste bottle). Refer to section VI. in the Chemical Waste Management Guide entitled Specific Handling Requirements for Chemicals.

Accurately label waste bottles as to their exact content and approximate percentages. Segregation and characterization simplifies the waste streams, thus minimizing the cost of disposal.

Training

Train your employees when they are first hired and yearly thereafter in waste minimization concepts. Training should include:

- The concepts described above.
- Annual documentation of the hazardous waste training signed by both the employee and supervisor.

III. Hazardous Chemical Waste Definition

The definition of a hazardous chemical waste can be confusing. The following section attempts to make this issue more clear. At the end of this section is a flow chart which can be used to determine if a waste is hazardous according to EPA regulations**.**
Remember that regulated waste can never be disposed in the trash or down the sink! If you are in doubt, collect the waste – don't dump it in the trash or down the sink – and contact CEHS for disposal guidance.

What is Hazardous Waste?

Congress defined hazardous waste as a "solid waste, or combination of solid wastes, which because of its quantity, concentration, or chemical, or infectious characteristics may:
"1. Cause, or significantly contribute to an increase in mortality or an increase in serious irreversible, or incapacitating reversible illness; or
"2. Pose a substantial present or potential hazard to human health or the environment when improperly treated, stored, transported, disposed of, or otherwise managed."
Congress defined the term hazardous waste, and the Environmental Protection Agency (EPA) was required to develop the regulatory framework which the regulated community could use to identify their wastes.
EPA uses the term "solid waste" to refer to solids, liquids and gases!

According to EPA, a waste is a regulated hazardous waste if it is listed on the D list, the F list, the P list, the U list, or the K list. Each of the lists is discussed below.

D-Listed Waste

D-listed waste is regulated because it has some hazard characteristic. It is discarded material that is ignitable, corrosive, reactive, or toxic. Most of the waste generated at the University is D-listed waste. These chemicals are spent, or used; that means that they have been mixed with other chemicals, diluted, or put into solution with a solvent. They are not in their original container, and have been altered in some way.

Ignitability (EPA Code D001)
Waste which exhibits any of the following properties:

- a liquid, except aqueous solutions containing less than 24% alcohol, that has a flashpoint less than 60°C (140°F)
- a non-liquid capable, under normal conditions, of spontaneous combustion
- an ignitable compressed gas per Department of Transportation (DOT) regulations
- an oxidizer per DOT regulations

Corrosivity (EPA Code D002)

Waste which exhibits any of the following properties:

- aqueous materials pH less than or equal to 2, or greater than or equal to 12.5
- a liquid that corrodes steel at a rate $\geq$ 1/4 inch per year at a temperature of 55°C (130°F)

Reactivity (EPA Code D003)
Waste which exhibits any of the following:

- normally unstable and readily undergoes violent change without detonating
- reacts violently with water
- forms potentially explosive mixtures with water
- when mixed with water, generates toxic gases, vapors or fumes in a quantity sufficient to present a danger to human health or the environment
- is a cyanide- or sulfide-bearing waste which, when exposed to pH conditions between 2 and 12.5, can generate toxic gases, vapors or fumes in a quantity sufficient to present a danger to human health or the environment
- is capable of detonation or explosive reaction if it is subjected to a strong initiating source or if heated under confinement.
- is readily capable of detonation or explosive decomposition or reaction at standard temperature and pressure.
- is a forbidden explosive, Class A explosive, or a Class B explosive as per DOT

Toxicity (EPA Codes D004-D043)

D-listed toxic waste is a liquid, or an extract from a solid using a specific leachate procedure, that contains any of the following 40 metals, herbicides, pesticides or organic chemicals in excess of the listed regulatory limit.

Contaminant	Regulatory Level (mg/l)	EPA Number
Arsenic	5.0	D004
Barium	100.0	D005
Cadmium	1.0	D006
Chromium	5.0	D007
Lead	5.0	D008
Mercury	0.2	D009
Selenium	1.0	D010
Silver	5.0	D011
Endrin	0.02	D012
Lindane	0.4	D013
Methoxychlor	10.0	D014
Toxaphene	0.5	D015
2,4-D	10.0	D016
2,4,5 TP (Silvex)	1.0	D017
Benzene	0.5	D018

Contaminant	Regulatory Level (mg/l)	EPA Number
Carbon tetrachloride	0.5	D019
Chlordane	0.03	D020
Chlorobenzene	100.0	D021
Chloroform	6.0	D022
o-Cresol	200.0	D023
m-Cresol	200.0	D024
p-Cresol	200.0	D025
Cresol	200.0	D026
1,4-Dichlorobenzene	7.5	D027
1,2-Dichloroethane	0.5	D028
1,1-Dichloroethylene	0.7	D029
2,4-Dinitrotoluene	0.13	D030
Heptachlor (and its hydroxide)	0.008	D031
Hexachloroethane	3.0	D032
Hexachlorobutadiene	0.5	D033
Hexachloroethane	3.0	D034
Methyl ethyl ketone	200.0	D035
Nitrobenzene	2.0	D036
Pentachlorophenol	100.0	D037
Pyridine	5.0	D038
Tetrachloroethylene	0.7	D039
Trichloroethylene	0.5	D040
2,4,5-Trichlorophenol	400.0	D041
2,4,6-Trichlorophenol	2.0	D042
Vinyl chloride	0.2	D043

F-Listed Waste

F-listed wastes are spent (used) mixtures of solvents:

EPA #	Nonspecific Source Waste Description
F001	The following spent halogenated solvents used in degreasing: **tetrachloroethylene, trichloroethylene, methylene chloride, 1,1,1-trichloroethane, carbon tetrachloride, and chlorinated fluorocarbons**; all spent solvent mixtures/blends used in degreasing containing, before use, a total of ten percent or more (by volume) of one or more of the above halogenated solvents or those solvents listed in F002, F004, and F005; and still bottoms from the recovery of these spent solvents and spent solvent mixtures
F002	The following spent halogenated solvents: **tetrachloroethylene, methylene chloride, trichloroethylene, 1,1,1-trichloroethane, chlorobenzene, 1,1,2-trichloro-1,2,2-trifluoroethane, ortho-dichlorobenzene, trichlorofluoromethane, and 1,1,2-trichloroethane**; all spent solvent mixtures/blends containing, before use, a total of ten percent or more (by volume) of one or more of the above halogenated solvents or those listed in F001, F004, or F005; and still bottoms from the recovery of these spent solvents and spent solvent mixtures
F003	The following spent non-halogenated solvents: **xylene, acetone, ethyl acetate, ethyl benzene, ethyl ether, methyl isobutyl ketone, n-butyl alcohol, cyclohexanone, and methanol**; all spent solvent mixtures/blends containing, before use, only the above spent non-halogenated solvents; and all spent solvent mixtures/blends containing, before use, one or more of the above non-halogenated solvents, and, a total of ten percent or more (by volume) of one or more of those solvents listed in F001, F002, F004, and F005; and still bottoms from the recovery of these spent solvents and spent solvent mixtures
F004	The following spent non-halogenated solvents: **cresols and cresylic acid, and nitrobenzene**; all spent solvent mixtures/blends containing, before use, a total of ten percent or more (by volume) of one or more of the above non-halogenated solvents or those solvents listed in F001, F002, and F005; and still bottoms from the recovery of these spent solvents and spent solvent mixtures
F005	The following spent non-halogenated solvents: **toluene, methyl ethyl ketone, carbon disulfide, isobutanol, pyridine, benzene, 2-ethoxyethanol, and 2-nitropropane**; all spent solvent mixtures/blends containing, before use, a total of ten percent or more (by volume) of one or more of the above non-halogenated solvents or those solvents listed in F001, F002, or F004; and still bottoms from the

EPA #	Nonspecific Source Waste Description
	recovery of these spent solvents and spent solvent mixtures

P-listed Waste

These are waste products that are UNUSED chemicals, or residues in original containers. They are classified as acute discarded waste. Unused means that the chemical has not been mixed with another chemical, diluted, or put into solution in a solvent.

Chemical	Code
1,2,3-Propanetriol, trinitrate (R)	P081
1,2-Benzenediol, 4-[1-hydroxy-2-(methylamino)ethyl]-,(R)-	P042
1,2-Propylenimine	P067
1,4,5,8-Dimethanonaphthalene, 1,2,3,4,10,10-hexa-chloro-1,4,4a,5,8,8a,-hexahydro-, (1alpha,4alpha,4abeta,5alpha,8alpha,8abeta)	P004
1,4,5,8-Dimethanonaphthalene, 1,2,3,4,10,10-hexa-chloro-1,4,4a,5,8,8a-hexahydro-, (1alpha,4alpha,4abeta,5beta,8beta,8abeta)-	P060
1-(o-Chlorophenyl)thiourea	P026
1-Acetyl-2-thiourea	P002
2,4-Dinitrophenol	P048
2,7:3,6-Dimethanonaphth [2,3-b]oxirene, 3,4,5,6,9,9-hexa- chloro-1a,2,2a,3,6,6a,7,7a-octahydro-, (1aal-pha,2beta,2abeta,3alpha,6alpha,6abeta,7beta,7aalpha)-, & metabolites	P051
2,7:3,6-Dimethanonaphth [2,3-b]oxirene, 3,4,5,6,9,9-hexa-chloro-1a,2,2a,3,6,6a,7,7a-octahydro-, (1aalpha,2beta,2aalpha,3beta,6beta,6aalpha,7beta, 7aalpha)-	P037
2-Butanone, 3,3-dimethyl-1-(methylthio)-,O-[methylamino)carbonyl] oxime	P045
2-Cyclohexyl-4,6-dinitrophenol	P034
2-Methyllactonitrile	P069
2-Propanone, 1-bromo-	P017
2-Propen-1-ol	P005
2-Propenal	P003
2-Propyn-1-ol	P102
2H-1-Benzopyran-2-one, 4-hydroxy-3-(3-oxo-1-phenylbutyl)-, & salts, when present at concentrations greater than 0.3%	P001
3(2H)-Isoxazolone, 5-(aminomethyl)-	P007
3-Chloropropionitrile	P027
4,6-Dinitro-o-cresol, & salts	P047
4,7-Methano-1H-indene, 1,4,5,6,7,8,8-heptachloro-...3a,4,7,7a-tetrahydro-	P059
4-Aminopyridine	P008
4-Pyridinamine	P008
5-(Aminomethyl)-3-isoxazolol	P007
6,9-Methano-2,4,3-benzodioxathiepin,6,7,8,9,10,10-hexachloro-1,5,5a,6,9,9a-hexahydro-,3-oxide	P050
7-Oxabicyclo[2.2.1]heptane-2,3-dicarboxylic acid	P088
Acetaldehyde, chloro-	P023
Acetamide, 2-fluoro-	P057
Acetamide, N-(aminothioxomethyl)-	P002
Acetic acid, fluoro-, sodium salt	P058

Chemical	Code
Acrolein	P003
Aldicarb	P070
Aldrin	P004
Allyl alcohol	P005
alpha,alpha-Dimethylphenethylamine	P046
alpha-Naphthylthiourea	P072
Aluminum phosphide (R,T)	P006
Ammonium picrate (R)	P009
Ammonium vanadate	P119
Argentate(1-), bis(cyano-C)-, potassium	P099
Arsenic acid H_3AsO_4	P010
Arsenic oxide As_2O_3	P012
Arsenic oxide As_2O_5	P011
Arsenic pentoxide	P011
Arsenic trioxide	P012
Arsine, diethyl-	P038
Arsonous dichloride, phenyl-	P036
Aziridine	P054
Aziridine, 2-methyl-	P067
Barium cyanide	P013
Benzenamine, 4-chloro-	P024
Benzenamine, 4-nitro-	P077
Benzene, (chloromethyl)-	P028
Benzeneethanamine, alpha,alpha-dimethyl-	P046
Benzenethiol	P014
Benzyl chloride	P028
Beryllium	P015
Bromoacetone	P017
Brucine	P018
Calcium cyanide	P021
Calcium cyanide $Ca(CN)_2$	P021
Carbon disulfide	P022
Carbonic dichloride	P095
Chloroacetaldehyde	P023
Copper cyanide	P029
Copper cyanide Cu(CN)	P029
Cyanides (soluble cyanide salts), not otherwise specified	P030
Cyanogen	P031
Cyanogen chloride	P033
Cyanogen chloride (CN)Cl	P033
Dichloromethyl ether	P016
Dichlorophenylarsine	P036
Dieldrin	P037
Diethyl-p-nitrophenyl phosphate	P041
Diethylarsine	P038
Diisopropylfluorophosphate (DFP)	P043
Dimethoate	P044
Dinoseb	P020
Diphosphoramide, octamethyl-	P085
Diphosphoric acid, tetraethyl ester	P111
Disulfoton	P039
Dithiobiuret	P049

Chemical	Code
Endosulfan	P050
Endothall	P088
Endrin	P051
Endrin, & metabolites	P051
Epinephrine	P042
Ethanedinitrile	P031
Ethanimidothioic acid,N-[[(methylamino)carbonyl]oxy]-, methyl ester	P066
Ethyl cyanide	P101
Ethyleneimine	P054
Famphur	P097
Fluorine	P056
Fluoroacetamide	P057
Fluoroacetic acid, sodium salt	P058
Fulminic acid, mercury(2+) salt (R,T)	P065
Heptachlor	P059
Hexaethyl tetraphosphate	P062
Hydrazine, methyl-	P068
Hydrazinecarbothioamide	P116
Hydrocyanic acid	P063
Hydrogen cyanide	P063
Hydrogen phosphide	P096
Isodrin	P060
Mercury fulminate (R,T)	P065
Mercury, (acetato-O)phenyl-	P092
Methanamine, N-methyl-N-nitroso-	P082
Methane, isocyanato-	P064
Methane, oxybis[chloro-	P016
Methane, tetranitro-(R)	P112
Methanethiol, trichloro-	P118
Methomyl	P066
Methyl hydrazine	P068
Methyl isocyanate	P064
Methyl parathion	P071
N-Nitrosodimethylimine	P082
N-Nitrosomethylvinylamine	P084
Nickel carbonyl	P073
Nickel carbonyl $Ni(CO)_4$, (T-4)-	P073
Nickel cyanide	P074
Nickel cynaide $Ni(CN)_2$	P074
Nicotine, & salts	P075
Nitric oxide	P076
Nitrogen dioxide	P078
Nitrogen oxide NO	P076
Nitrogen oxide NO_2	P078
Nitroglycerine (R)	P081
O,O-Diethyl O-pyrazinyl phosphorothioate	P040
Octamethylpyrophosphoramide	P085
Osmium oxide OsO_4, (T-4)-	P087
Osmium tetroxide	P087
p-Chloroaniline	P024
p-Nitroaniline	P077
Parathion	P089

Chemical	Code
Phenol, 2,4,6-trinitro-, ammonium salt (R)	P009
Phenol, 2,4-dinitro-	P048
Phenol, 2-(1-methylpropyl)-4,6-dinitro-	P020
Phenol, 2-cyclohexyl-4,6-dinitro-	P034
Phenol, 2-methyl-4,6-dinitro-, & salts	P047
Phenylmercury acetate	P092
Phenylthiourea	P093
Phorate	P094
Phosgene	P095
Phosphine	P096
Phosphoric acid, diethyl 4-nitrophenyl ester	P041
Phosphorodithioic acid, O,O-diethyl...S-[(ethylthio)methyl] ester	P094
Phosphorodithioic acid, O,O-diethyl...S-[2-(ethylthio)ethyl] ester	P039
Phosphorodithioic acid, O,O-dimethyl S-[2-(methylamino)-2-oxoethyl] ester	P044
Phosphorofluoridic acid, bis(1-methylethyl) ester	P043
Phosphorothioic acid, O,O,-dimethyl O-(4-nitrophenyl)ester	P071
Phosphorothioic acid, O,O-diethyl O-(4-nitrophenyl)ester	P089
Phosphorothioic acid, O,O-diethyl O-pyrazinyl ester	P040
Phosphorothioic acid,O-[4-[(dimethylamino)sulfonyl]phenyl] O,O-dimethyl ester	P097
Plumbane, tetraethyl-	P110
Potassium cyanide	P098
Potassium cyanide K(CN)	P098
Potassium silver cyanide	P099
Propanal, 2-methyl-2-(methylthio)-,O-[(methylamino)carbonyl]oxime	P070
Propanenitrile	P101
Propanenitrile, 2-hydroxy-2-methyl-	P069
Propanenitrile, 3-chloro-	P027
Propargyl alcohol	P102
Pyridine, 3-(1-methyl-2-pyrrolidinyl)-, (S)-, & salts	P075
Selenious acid, dithallium(1+) salt	P114
Selenourea	P103
Silver cyanide	P104
Silver cyanide Ag(CN)	P104
Sodium azide	P105
Sodium cyanide	P106
Sodium cyanide Na(CN)	P106
Strontium sulfide SrS	P107
Strychnidin-10-one, & salts	P108
Strychnidin-10-one, 2,3-dimethoxy-	P018
Strychnine, & salts	P108
Sulfuric acid, dithallium(1+) salt	P115
Tetraethyl lead	P110
Tetraethyl pyrophosphate	P111
Tetraethyldithiopyrophosphate	P109
Tetranitromethane (R)	P112
Tetraphosphoric acid, hexaethyl ester	P062
Thallic oxide	P113
Thallium oxide Tl_2O_3	P113
Thallium(I) selenite	P114
Thallium(I) sulfate	P115
Thiodiphosphoric acid, tetraethyl ester	P109
Thiofanox	P045

Chemical	Code
Thioimidodicarbonic diamide $[(H_2N)C(S)]_2NH$	P049
Thiophenol	P014
Thiosemicarbazide	P116
Thiourea, (2-chlorophenyl)-	P026
Thiourea, 1-naphthalenyl-	P072
Thiourea, phenyl-	P093
Toxaphene	P123
Trichloromethanethiol	P118
Vanadic acid, ammonium salt	P119
Vanadium oxide V_2O_5	P120
Vanadium pentoxide	P120
Vinylamine, N-methyl-N-nitroso-	P084
Warfarin, & salts, when present at concentrationsgreater than 0.3%	P001
Zinc cyanide	P121
Zinc cyanide $Zn(CN)_2$	P121
Zinc phosphide Zn_3P_2, when present at concentrations greater than 10% (R,T)	P122

U-Listed Waste

These are waste products that are UNUSED chemicals, or residues in original containers. They are classified as toxic discarded waste. Unused means that the chemical has not been mixed with another chemical, diluted, or put into solution in a solvent.

Chemical	Code
[1,1'-Biphenyl]-4,4'-diamine	U021
[1,1'-Biphenyl]-4,4'-diamine, 3,3'-dichloro-	U073
[1,1'-Biphenyl]-4,4'-diamine, 3,3'-dimethoxy-	U091
[1,1'-Biphenyl]-4,4'-diamine, 3,3'-dimethyl-	U095
1,1,1,2-Tetrachloroethane	U208
1,1,2,2-Tetrachloroethane	U209
1,1,2-Trichloroethane	U227
1,1-Dichloroethylene	U078
1,1-Dimethylhydrazine	U098
1,2,4,5-Tetrachlorobenzene	U207
1,2-Benzenedicarboxylic acid, bis(2-ethylhexyl) ester	U028
1,2-Benzenedicarboxylic acid, dibutyl ester	U069
1,2-Benzenedicarboxylic acid, diethyl ester	U088
1,2-Benzenedicarboxylic acid, dimethyl ester	U102
1,2-Benzenedicarboxylic acid, dioctyl ester	U107
1,2-Benzisothiazol-3(2H)-one, 1,1-dioxide, & salts	U202
1,2-Dibromo-3-chloropropane	U066
1,2-Dichloroethylene	U079
1,2-Dimethylhydrazine	U099
1,2-Diphenylhydrazine	U109
1,2-Ethanediamine, N,N-dimethyl-N'-2-pyridinyl-N'-(2-thienylmethyl)-	U155
1,2-Oxathiolane, 2,2-dioxide	U193
1,2:3,4-Diepoxybutane (I,T)	U085
1,3,4-Metheno-2H-cyclobuta [cd]pentalen-2-one,1,1a,3,3a,4,5,5,5a,5b,6-decachlorooctahydro-	U142

Chemical	Code
1,3,5-Trinitrobenzene (R,T)	U234
1,3,5-Trioxane, 2,4,6-trimethyl-	U182
1,3-Benzenediol	U201
1,3-Benzodioxole, 5-(1-propenyl)-	U141
1,3-Benzodioxole, 5-(2-propenyl)-	U203
1,3-Benzodioxole, 5-propyl-	U090
1,3-Butadiene, 1,1,2,3,4,4-hexachloro-	U128
1,3-Cyclopentadiene, 1,2,3,4,5,5-hexachloro-	U130
1,3-Dichloropropene	U084
1,3-Isobenzofurandione	U190
1,3-Pentadiene (I)	U186
1,3-Propane sultone	U193
1,4-Dichloro-2-butene (I,T)	U074
1,4-Diethyleneoxide	U108
1,4-Dioxane	U108
1,4-Naphthalenedione	U166
1,4-Naphthoquinone	U166
1-Butanamine, N-butyl-N-nitroso-	U172
1-Butanol (I)	U031
1-Methylbutadiene (I)	U186
1-Naphthalenamine	U167
1-Propanamine, N-nitroso-N-propyl-	U111
1-Propanamine, N-propyl-(I)	U110
1-Propanol, 2,3-dibromo-, phosphate (3:1)	U235
1-Propanol, 2-methyl-(I,T)	U140
1-Propene, 1,1,2,3,3,3-hexachloro-	U243
1-Propene, 1,3-dichloro-	U084
1-Propylamine (I,T)	U194
1H-1,2,4-Triazol-3-amine	U011
2,2'-Bioxirane	U085
2,4-(1H,3H)-Pyrimidinedione, 5-[bis(2-chloroethyl)amino]-	U237
2,4-D, salts & esters	U240
2,4-Dichlorophenol	U081
2,4-Dimethylphenol	U101
2,4-Dinitrotoluene	U105
2,5-Cyclohexadiene-1,4-dione	U197
2,5-Furandione	U147
2,6-Dichlorophenol	U082
2,6-Dinitrotoluene	U106
2,7-Naphthalenedisulfonic acid, 3,3'-[(3,3'-...dimethyl[1,1'-biphenyl]-4,4'-diyl)bis(azo)bis[5-amino-4-hydroxy]-, tetrasodium salt	U236
2-Acetylaminofluorene	U005
2-Butanone (I,T)	U159
2-Butanone, peroxide (R,T)	U160
2-Butenal	U053
2-Butene, 1,4-dichloro-(I,T)	U074
2-Butenoic acid, 2-methyl-, 7-[[2,3-dihydroxy-...2-(1-methoxyethyl)-3-methyl-1-oxobutoxy]methyl]-...2,3,5,7a-tetrahydro-1H-pyrrolizin-1-yl ester,...[1S-[1alpha(Z),7(2S*,3R*),7aalpha]]-	U143
2-Chloroethyl vinyl ether	U042
2-Furancarboxaldehyde (I)	U125
2-Nitropropane (I,T)	U171

Chemical	Code
2-Picoline	U191
2-Propanone (I)	U002
2-Propenamide	U007
2-Propenenitrile	U009
2-Propenenitrile, 2-methyl-(I,T)	U152
2-Propenoic acid (I)	U008
2-Propenoic acid, 2-methyl-, ethyl ester	U118
2-Propenoic acid, 2-methyl-, methyl ester (I,T)	U162
2-Propenoic acid, ethyl ester (I)	U113
2H-1,3,2-Oxazaphosphorin-2-amine,...N,N-bis(2-chloroethyl)te trahydro-, 2-oxide	U058
2H-1-Benzopyran-2-one, 4-hydroxy-3-(3-oxo-1-phenyl-butyl)-, & salts, when present at concentrations of 0.3% or less	U248
3,3'-Dichlorobenzidine	U073
3,3'-Dimethoxybenzidine	U091
3,3'-Dimethylbenzidine	U095
3,6-Pyridazinedione, 1,2-dihydro-	U148
3-Methylcholanthrene	U157
4(1H)Pyrimidinone, 2,3-dihydro-6-methyl-2-thioxo-	U164
4,4'-Methylenebis(2-chloroaniline)	U158
4,7,Methano-1H-indene, 1,2,4,5,6,7,8,8-octachloro-2,3,3a,4,7,7a-hexahydro-	U036
4-Bromophenyl phenyl ether	U030
4-Chloro-o-toluidine, hydrochloride	U049
4-Methyl isobutyl ketone (I)	U161
5,12-Naphthacenedione, 8-acetyl-10-[(3-amino-2,3,6-trideoxy)-alpha-L-lyxo-hexopyranosyl)oxy]-7,8,9,10-tetrahydro-6 ,8,11-trihydroxy-1-methoxy-, (8S-cis)-	U059
5-Nitro-o-toluidine	U181
7,12-Dimethylbenz[a]anthracene	U094
Acetaldehyde (I)	U001
Acetaldehyde, trichloro-	U034
Acetamide, N-(4-ethoxyphenyl)-	U187
Acetamide, N-9H-fluoren-2-yl-	U005
Acetic acid ethyl ester (I)	U112
Acetic acid, (2,4-dichlorophenoxy)-, salts & esters	U240
Acetic acid, lead(2+) salt	U144
Acetic acid, thallium(1+) salt	U214
Acetone (I)	U002
Acetonitrile (I,T)	U003
Acetophenone	U004
Acetyl chloride (C,R,T)	U006
Acrylamide	U007
Acrylic acid (I)	U008
Acrylonitrile	U009
alpha,alpha-Dimethylbenzylhydroperoxide (R)	U096
alpha-Naphthylamine	U167
Amitrole	U011
Aniline (I,T)	U012
Arsinic acid, dimethyl-	U136
Auramine	U014
Azaserine	U015
Azirino[2',3':3,4]pyrrolo [1,2-a]indole-4,7-dione,6-amino-8-[[(aminocarbonyl)oxy]methyl]-1,1a,2,8,8a,8b-hexahydro-8a-methoxy-5-methyl-, [1aS-(1aalpha, 8beta,8aalpha,8balpha)]-	U010

Chemical	Code
Benz[a]anthracene	U018
Benz[a]anthracene, 7,12-dimethyl-	U094
Benz[c]acridine	U016
Benz[j]aceanthrylene, 1,2-dihydro-3-methyl-	U157
Benzal chloride	U017
Benzamide, 3,5-dichloro-N-(1,1-dimethyl-2-propynyl)-	U192
Benzenamine (I,T)	U012
Benzenamine, 2-methyl-	U328
Benzenamine, 2-methyl-, hydrochloride	U222
Benzenamine, 2-methyl-5-nitro-	U181
Benzenamine, 4,4'-carbonimidoylbis [N,N-dimethyl-	U014
Benzenamine, 4,4'-methylenebis[2-chloro-	U158
Benzenamine, 4-chloro-2-methyl-, hydrochloride	U049
Benzenamine, 4-methyl-	U353
Benzenamine, N,N-dimethyl-4-(phenylazo)-	U093
Benzene (I,T)	U019
Benzene, (1-methylethyl)-(I)	U055
Benzene, (dichloromethyl)-	U017
Benzene, (trichloromethyl)-	U023
Benzene, 1,1'-(2,2,2-trichloroethylidene)bis [4-chloro-	U061
Benzene, 1,1'-(2,2,2-trichloroethylidene)bis [4-methoxy-	U247
Benzene, 1,1'-(2,2-dichloroethylidene)bis [4-chloro-	U060
Benzene, 1,2,4,5-tetrachloro-	U207
Benzene, 1,2-dichloro-	U070
Benzene, 1,3,5-trinitro-	U234
Benzene, 1,3-dichloro-	U071
Benzene, 1,3-diisocyanatomethyl-(R,T)	U223
Benzene, 1,4-dichloro-	U072
Benzene, 1-bromo-4-phenoxy-	U030
Benzene, 1-methyl-2,4-dinitro-	U105
Benzene, 2-methyl-1,3-dinitro-	U106
Benzene, chloro-	U037
Benzene, dimethyl-(I,T)	U239
Benzene, hexachloro-	U127
Benzene, hexahydro-(I)	U056
Benzene, methyl-	U220
Benzene, nitro-	U169
Benzene, pentachloro-	U183
Benzene, pentachloronitro-	U185
Benzeneacetic acid, 4-chloro-alpha-(4-chlorophenyl)-alpha-hydroxy-, ethyl ester	U038
Benzenebutanoic acid, 4-[bis(2-chloroethyl)amino]-	U035
Benzenediamine, ar-methyl-	U221
Benzenesulfonic acid chloride (C,R)	U020
Benzenesulfonyl chloride (C,R)	U020
Benzidine	U021
Benzo[a]pyrene	U022
Benzo[rst]pentaphene	U064
Benzotrichloride (C,R,T)	U023
beta-Chloronaphthalene	U047
Beta-Naphthylamine	U168
Bromoform	U225
Cacodylic acid	U136

Chemical	Code
Calcium chromate	U032
Carbamic acid, ethyl ester	U238
Carbamic acid, methylnitroso-, ethyl ester	U178
Carbamic chloride, dimethyl-	U097
Carbamodithioic acid, 1,2-ethanediylbis-,...salts & esters	U114
Carbamothioic acid, bis(1-methylethyl)-, S-(2,3-dichloro-2-propenyl) ester	U062
Carbon oxyfluoride (R,T)	U033
Carbon tetrachloride	U211
Carbonic acid, dithallium(1+) salt	U215
Carbonic difluoride	U033
Carbonochloridic acid, methyl ester (I,T)	U156
Chloral	U034
Chlorambucil	U035
Chlordane, alpha & gamma isomers	U036
Chlornaphazin	U026
Chlorobenzene	U037
Chlorobenzilate	U038
Chloroform	U044
Chloromethyl methyl ether	U046
Chromic acid H_2CrO_4, calcium salt	U032
Chrysene	U050
Creosote	U051
Cresol (Cresylic acid)	U052
Crotonaldehyde	U053
Cumene (I)	U055
Cyanogen bromide (CN)Br	U246
Cyclohexane (I)	U056
Cyclohexane, 1,2,3,4,5,6-hexachloro- ,...(1alpha,2alpha,3beta,4alpha,5alpha,6beta)-	U129
Cyclohexanone (I)	U057
Cyclophosphamide	U058
D-Glucose, 2-deoxy-2-[[(methylnitrosoamino)-...carbonyl]amino]-	U206
Daunomycin	U059
DDD	U060
DDT	U061
Di-n-octyl phthalate	U107
Di-n-propylnitrosamine	U111
Diallate	U062
Dibenz[a,h]anthracene	U063
Dibenzo[a,i]pyrene	U064
Dibutyl phthalate	U069
Dichlorodifluoromethane	U075
Dichloroethyl ether	U025
Dichloroisopropyl ether	U027
Dichloromethoxy ethane	U024
Diethyl phthalate	U088
Diethylhexyl phthalate	U028
Diethylstilbesterol	U089
Dihydrosafrole	U090
Dimethyl phthalate	U102
Dimethyl sulfate	U103
Dimethylamine (I)	U092

Chemical	Code
Dimethylcarbamoyl chloride	U097
Dipropylamine (I)	U110
Epichlorohydrin	U041
Ethanal (I)	U001
Ethanamine, N-ethyl-N-nitroso-	U174
Ethane, 1,1'-[methylenebis(oxy)]bis[2-chloro-	U024
Ethane, 1,1'-oxybis-(I)	U117
Ethane, 1,1'-oxybis[2-chloro-	U025
Ethane, 1,1,1,2-tetrachloro-	U208
Ethane, 1,1,1-trichloro-	U226
Ethane, 1,1,2,2-tetrachloro-	U209
Ethane, 1,1,2-trichloro-	U227
Ethane, 1,1-dichloro-	U076
Ethane, 1,2-dibromo-	U067
Ethane, 1,2-dichloro-	U077
Ethane, hexachloro-	U131
Ethane, pentachloro-	U184
Ethanethioamide	U218
Ethanol, 2,2'-(nitrosoimino)bis-	U173
Ethanol, 2-ethoxy-	U359
Ethanone, 1-phenyl-	U004
Ethene, (2-chloroethoxy)-	U042
Ethene, 1,1-dichloro-	U078
Ethene, 1,2-dichloro-, (E)-	U079
Ethene, chloro-	U043
Ethene, tetrachloro-	U210
Ethene, trichloro-	U228
Ethyl acetate (I)	U112
Ethyl acrylate (I)	U113
Ethyl carbamate (urethane)	U238
Ethyl ether (I)	U117
Ethyl methacrylate	U118
Ethyl methanesulfonate	U119
Ethylene dibromide	U067
Ethylene dichloride	U077
Ethylene glycol monoethyl ether	U359
Ethylene oxide (I,T)	U115
Ethylenebisdithiocarbamic acid, salts & esters	U114
Ethylenethiourea	U116
Ethylidene dichloride	U076
Fluoranthene	U120
Formaldehyde	U122
Formic acid (C,T)	U123
Furan (I)	U124
Furan, tetrahydro-(I)	U213
Furfural (I)	U125
Furfuran (I)	U124
Glucopyranose, 2-deoxy-2-(3-methyl-3-nitrosoureido)-,D-	U206
Glycidylaldehyde	U126
Guanidine, N-methyl-N'-nitro-N-nitroso-	U163
Hexachlorobenzene	U127
Hexachlorobutadiene	U128

Chemical	Code
Hexachlorocyclopentadiene	U130
Hexachloroethane	U131
Hexachlorophene	U132
Hexachloropropene	U243
Hydrazine (R,T)	U133
Hydrazine, 1,1-dimethyl-	U098
Hydrazine, 1,2-diethyl-	U086
Hydrazine, 1,2-dimethyl-	U099
Hydrazine, 1,2-diphenyl-	U109
Hydrofluoric acid (C,T)	U134
Hydrogen fluoride (C,T)	U134
Hydrogen sulfide	U135
Hydrogen sulfide H_2S	U135
Hydroperoxide, 1-methyl-1-phenylethyl-(R)	U096
Imidazolidinethione	U116
Indeno[1,2,3-cd]pyrene	U137
Isobutyl alcohol (I,T)	U140
Isosafrole	U141
Kepone	U142
L-Phenylalanine, 4-[bis(2-chloroethyl)amino]-	U150
L-Serine, diazoacetate (ester)	U015
Lasiocarpine	U143
Lead acetate	U144
Lead phosphate	U145
Lead subacetate	U146
Lead, bis(acetato-O)tetrahydroxytri-	U146
Lindane	U129
m-Dichlorobenzene	U071
Maleic anhydride	U147
Maleic hydrazide	U148
Malononitrile	U149
Melphalan	U150
Mercury	U151
Methacrylonitrile (I, T)	U152
Methanamine, N-methyl-(I)	U092
Methane, bromo-	U029
Methane, chloro-(I, T)	U045
Methane, chloromethoxy-	U046
Methane, dibromo-	U068
Methane, dichloro-	U080
Methane, dichlorodifluoro-	U075
Methane, iodo-	U138
Methane, tetrachloro-	U211
Methane, tribromo-	U225
Methane, trichloro-	U044
Methane, trichlorofluoro-	U121
Methanesulfonic acid, ethyl ester	U119
Methanethiol (I, T)	U153
Methanol (I)	U154
Methapyrilene	U155
Methoxychlor	U247
Methyl alcohol (I)	U154

Chemical	Code
Methyl bromide	U029
Methyl chloride (I,T)	U045
Methyl chlorocarbonate (I,T)	U156
Methyl chloroform	U226
Methyl ethyl ketone (MEK) (I,T)	U159
Methyl ethyl ketone peroxide (R,T)	U160
Methyl iodide	U138
Methyl methacrylate (I,T)	U162
Methyl-2-pentanone (I)	U161
Methylene bromide	U068
Methylene chloride	U080
Methylthiouracil	U164
Mitomycin C	U010
MNNG	U163
N,N'-Diethylhydrazine	U086
n-Butyl alcohol (I)	U031
N-Nitroso-N-ethylurea	U176
N-Nitroso-N-methylurea	U177
N-Nitroso-N-methylurethane	U178
N-Nitrosodi-n-butylamine	U172
N-Nitrosodiethanolamine	U173
N-Nitrosodiethylamine	U174
N-Nitrosopiperidine	U179
N-Nitrosopyrrolidine	U180
n-Propylamine (I,T)	U194
Naphthalenamine	U168
Naphthalenamine, N,N'-bis(2-chloroethyl)-	U026
Naphthalene	U165
Naphthalene, 2-chloro-	U047
Nitric acid, thallium(1+) salt	U217
Nitrobenzene (I,T)	U169
O,O-Diethyl S-methyl dithiophosphate	U087
o-Chlorophenol	U048
o-Dichlorobenzene	U070
o-Toluidine	U328
o-Toluidine hydrochloride	U222
Oxirane (I,T)	U115
Oxirane, (chloromethyl)-	U041
Oxiranecarboxyaldehyde	U126
p-Benzoquinone	U197
p-Chloro-m-cresol	U039
p-Dichlorobenzene	U072
p-Dimethylaminoazobenzene	U093
p-Nitrophenol	U170
p-Toluidine	U353
Paraldehyde	U182
Pentachlorobenzene	U183
Pentachloroethane	U184
Pentachloronitrobenzene (PCNB)	U185
Pentanol, 4-methyl-	U161
Phenacetin	U187
Phenol	U188

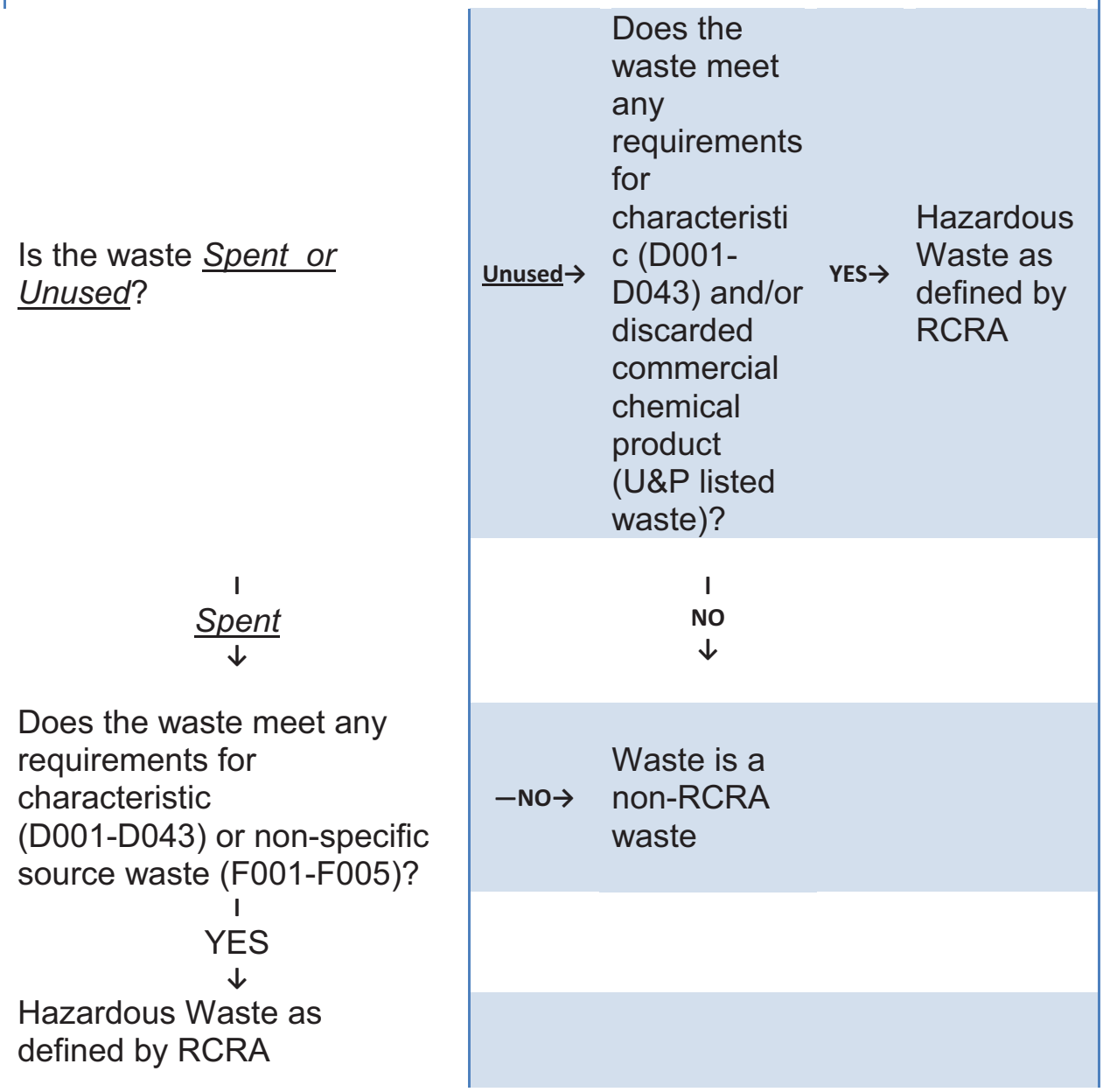
Chemical	Code
Phenol, 2,2'-methylenebis[3,4,6-trichloro-	U132
Phenol, 2,4-dichloro-	U081
Phenol, 2,4-dimethyl-	U101
Phenol, 2,6-dichloro-	U082
Phenol, 2-chloro-	U048
Phenol, 4,4'-(1,2-diethyl-1,2-ethenediyl)bis-, (E)-	U089
Phenol, 4-chloro-3-methyl-	U039
Phenol, 4-nitro-	U170
Phenol, methyl-	U052
Phosphoric acid, lead(2+) salt (2:3)	U145
Phosphorodithioic acid, O,O-diethyl S-methyl ester	U087
Phosphorus sulfide (R)	U189
Phthalic anhydride	U190
Piperidine, 1-nitroso-	U179
Pronamide	U192
Propane, 1,2-dibromo-3-chloro-	U066
Propane, 1,2-dichloro-	U083
Propane, 2,2'-oxybis[2-chloro-	U027
Propane, 2-nitro-(I,T)	U171
Propanedinitrile	U149
Propylene dichloride	U083
Pyridine	U196
Pyridine, 2-methyl-	U191
Pyrrolidine, 1-nitroso-	U180
Reserpine	U200
Resorcinol	U201
Saccharin, & salts	U202
Safrole	U203
Selenious acid	U204
Selenium dioxide	U204
Selenium sulfide	U205
Selenium sulfide SeS_2 (R,T)	U205
Streptozotocin	U206
Sulfur phosphide (R)	U189
Sulfuric acid, dimethyl ester	U103
Tetrachloroethylene	U210
Tetrahydrofuran (I)	U213
Thallium chloride Tlcl	U216
Thallium(I) acetate	U214
Thallium(I) carbonate	U215
Thallium(I) chloride	U216
Thallium(I) nitrate	U217
Thioacetamide	U218
Thiomethanol (I,T)	U153
Thioperoxydicarbonic diamide $[(H_2N)C(S)]_2S_2$,tetramethyl-	U244
Thiourea	U219
Thiram	U244
Toluene	U220
Toluene diisocyanate (R,T)	U223
Toluenediamine	U221
Trichloroethylene	U228
Trichloromonofluoromethane	U121

Chemical	Code
Tris(2,3-dibromopropyl) phosphate	U235
Trypan blue	U236
Uracil mustard	U237
Urea, N-ethyl-N-nitroso-	U176
Urea, N-methyl-N-nitroso-	U177
Vinyl chloride	U043
Warfarin, & salts, when present at concentrations of 0.3% or less	U248
Xylene	U239
Yohimban-16-carboxylic acid, 11,17-dimethoxy-18-[(3,4,5-trimethoxybenzoyl)oxy]-, methyl ester, (3beta,16beta,17alpha,18beta,20alpha)-	U200
Zinc phosphide Zn_3P_2, when present at concentrations of 10% or less	U249

K-Listed Waste

These wastes are from specific industrial sources and processes. The University does not generate any K-listed waste, so we have not included this detailed listing.

RCRA Hazardous Waste Determination Flow Chart



IV. NONHAZARDOUS WASTE DISPOSAL

Examples of nonhazardous waste are given on the following pages. These chemicals were selected because they:

- have oral-rat LD_{50} toxicity values higher than 500 mg/kg
- have no positive determination for carcinogenicity according to the National Institute of Occupational Safety and Health (NIOSH) 1979 Registry of Toxic Effects of Chemical Substances

These compounds can generally be put in the trash if they are in solid form, or in the sewer if in liquid form. Common sense must be used, especially when putting compounds in the trash. Once something is put in the trash, other people such as custodians and trash haulers may come in contact with the waste prior to landfill. Although the compounds listed are considered nonhazardous for disposal purposes, acute human exposure could be harmful.

If the waste is in solid form, triple bag it, or better yet, place it inside a box. This will keep anyone from being exposed to powders. Label the box "Nonhazardous, Non-regulated Chemicals" and put it in the trash can or dumpster.

Before disposing of **empty containers**, triple rinse the interior of the container. If the bottle contained a hazardous chemical, the rinsate should be collected and disposed as hazardous waste through CEHS. Remove all labels from empty, clean bottles, then dispose of the unbroken empty container in the trash can; put broken glass in a cardboard box with a lid.

If the waste is in liquid form, flush it to the sewer with copious amounts of water (20-30 times the volume disposed).

If you have a container of this waste greater than five pounds in solid form or five gallons in liquid form to dispose of, contact the Center for Environmental Health & Safety. We will instruct you whether or not we should collect the waste.

Compound	CAS #
Acacia Gum	9000015B
Acetate Buffer (Acetate Kinase)	9027423B
Acethropan	9002602D
Acid Ascorbic	50817B
Acrylate (Monomer Mgl)	900314A
Activated Carbon	7440440A
Agar	9002180A
Agarose	9012366A
Alanine, Dl-	302727A
Alanine, L-	56417A
Alanine-D	338692A
Algin	9005383B
Alginic Acid	9005327A
Alginic Acid, Sodium Salt	9005383A
Alkyl Aryl Sodium Sulphonate	68037490A
Aloe Gum	67479270A
Aloe-Emodin	481721A

Compound	CAS #
Alumin-Ar Cc-10 100-200 Mesh	1344281G
Alumina	1344281F
Aluminum Hydroxide Hydrate	21645512A
Aluminum Oxide	1344281C
Aluminum Oxide, Acidic	1344281A
Aluminum Oxide, Activated	1344281D
Aluminum Oxide, Basic	1344281B
Aluminum Silicate	12141467B
Aluminum Sodium Sulfate	10102713A
Aluminum Sulfate Anhydrous, Solid	10043013A
Alundum	1344281E
Amber	9000026A
Amberlite Ira-410cp	9002260A
Ambilhar	61574A
Amino Acids	29022115A
Aminoacetic Acid	56406B
Aminonaphthol Sulfonic Acid	87025A
Amioca	9037223A
Ammonium Phosphate Monobasic	7722761A
Ammonium Phosphate, Dibasic	7783280A
Ammonium Salicylate	528949A
Ammonium Stearate	1002897A
Ammonium Sulfate	7783202A
Ammonium Valerate	42739388A
Amygdalin	29883156A
Amylopectin	9037223B
Ansolysen	52620B
Anti Oxidant 2246	119471A
Aquacide I, Calbiochem	9004324D
Aquacide II, Calbiochem	9004324E
Arabinose, L-(+)-	87729A
Arabinose,D-	28697532A
Arginine Hydrochloride	1119342A
Arginine, L-	74793A
Arlacel	31566311B
Asafetida Gum	9000048A
Ascorbic Acid, L-	50817A
Asparaginase, L-	9015683A
Asparagine Hydrate, (L)-	5794138A
Asparagine,L-	70473A
Aspartic Acid, D-	1783966A
Aspartic Acid, Dl-	617458A
Aspartic Acid,L-	56848A
Azapropazone	22304309A
Azauracil	461892A
Azauridine,6-	54251A
B-Lactoglobulin	50863928A
Behenic Acid	112856A
Bentonite	12141467A
Benzoyl Acrylic Acid-3	18507294A

Compound	CAS #
Bicinchoninate, Dipotassium Salt,2,2'-	63451343A
Bio-Gel A	9012366B
Bis Hydroxyethylimino Tris Hydroxy Methyl Methane	6976370B
Bis(2-Ethoxyethyl)Phthalate	117828A
Bis(2-N-Butoxyethyl)-Phthalate	117839A
Bismuth Citrate	813934A
Boileezers (Boiling Chips)	1344281H
Bone Flour	7758874B
Borax, Anhydrous	1330434C
Borneol	507700A
Boron Carbide	12069328A
Bromo-Alpha-Ergocryptine Methane Sulfonate,2-	22260511A
Butyl Benzoate	136607A
Butyl Phenoxy Iso Propyl 2-Chloroethyl Sulfite	140578C
Butyrylthiocholine Chloride	2206637A
Cab-O-Sil	7631869B
Calcium Acetate	62544A
Calcium Borate	12007566A
Calcium Carbonate	471341A
Calcium Chloride	10043524A
Calcium Chloride Dihydrate	10035048A
Calcium Citrate	813945A
Calcium Disodium Edta	62339B
Calcium Disodium Versenate	62339A
Calcium Gluconate	299285A
Calcium Iodide	10102688A
Calcium Lactate	814802A
Calcium Lignosulfonate	8061527A
Calcium Oleate	142176A
Calcium Pantothenate	137086A
Calcium Phosphate, Dibasic	7789777A
Calcium Phosphate, Monobasic	7758238A
Calcium Phosphate, Tribasic	7758874A
Calcium Sulfate	7778189A
Calcium Sulfate Dihydrate	10101414A
Calcofluor- White	133664A
Carbolon	409212C
Carbon Decolorizing	7440440D
Carbon Lampblack	133864A
Carborundum	409212A
Carbowax	37225266A
Carboxymethyl Cellulose	9004324C
Carboxymethyl Cellulose, Sodium Salt	9004324A
Carnauba,Wax	8015869A
Carnitine Hydrochloride	461052A
Carotene, Trans-Beta-	7235407A
Casein, Sodium Complex	9005463A
Catechu Gum	69599333A
Cefotaxime	64485934A
Celite	68855549A

Compound	CAS #
Cellex	9004324B
Charcoal, Animal Bone	16291966A
Chlorhexidine	55561A
Chlorohexidine Diacetate	56951A
Chlorophyll	1406651A
Chlorthiazide	58946A
Cholesteryl Acetate	604353A
Choline	62497A
Choline Chloride	67481A
Chromosorb W-Aw-Dmcs	61790532C
Chromosorb W-Hp	61790532D
Citric Acid	77929A
Citric Acid Monohydrate	5949291A
Citric Acid Trisodium Salt Dihydrate	68042B
Clarase-Diastase	9001110A
Clay	1318747A
Clomiphene Citrate	50419A
Cm Cellulose	9000117A
Cocoanut Charcoal	68647869A
Comet Cleanser	1330434D
Copper Oxychloride	1332407A
Corn Syrup	8029434A
Corticotropin	9002602A
Creatinine	60275A
Cristobalite	14464461A
Cyanocobalamin	68199A
Cyclodextrin Hydrate, Alpha-	10016203A
Cyclohexaamylose	10016203B
Cystine	923320B
Cystine, Dl-	923320A
Cystine, L-	56893A
Cytidine 5'-Diphosphoglucose	102601309A
Cytidine-3'-Monophosphate	84526B
Cytidylic Acid, 3'-	84526A
Cytodex 3, Beaded Micro Carrier	88895196A
Cytosine	71307A
Dansylglycine Free Acid	1091856A
Darran #404	8061527B
Dehydroisandrosterone Sulfate - Sodium Salt	78590177A
Dextran Sulfate	9011181A
Dextran T 70	9004540A
Dextrin	9004539A
Dextrose	492626B
Di-N-Butyl Sebacate	109433A
Diatase (Of Malt)	900024A
Diatomaceous Earth	68855549B
Diatrizoate Sodium	737315B
Dibutyl Adipate	105997A
Dibutyl Fumarate	105759A
Dibutyl Maleate	105760A

Compound	CAS #
Dichlorophenamide	120978A
Diethyl Barbituric Acid	57443B
Dihydroxyphenyl)-L-Alanine], [3-(3,4-	59927A
Diisopropyl Phthalate	605458A
Dimethyl Thiourea	534134B
Dimethyl Urea 1,3	96311A
Dimethylaniline Hcl	51786539A
Dimethylglycine Hcl, N,N-	2491067A
Diphospho-D-Glyceric Acid,2,3-	62868795A
Dipotassium Phosphate	7758114B
Disodium Phosphate	7758794A
Disodium Pytophosphate	7758169A
Disodium Sulfate	7757826B
Distearin	31566311D
Dl-Alpha-Glycerophosphate	3325006A
Dowtherm A	8004135A
Dypyridamole	58322A
Enalapril Maleate	76095164
Epon 1001 Resin	25068386F
Epsom Salt	10034998B
Escalol 106	136447A
Ethyl(2)-Hexyl Acetate	103093A
Ethyl-1,3-Hexane Diol-2	94962C
Ferric Citrate	2338058A
Ferric Phosphate	10045860A
Ferritin	9007732A
Ferrous Gluconate	299296A
Ferrous Oxide	1345251A
Fibrin	9001314A
Fibrinolysin	9001905A
Ficin	9001336A
Filter Agent, Celite	61790532A
Flazo Orange	3566947A
Florisil	1343880A
Flunisolide Hemihydrate	3385033A
Fluorescein	2321075A
Formvar Resin, Hardened	63450157A
Forvar, Solid	9003332B
Fructose 1,6-Diphosphate Disodium Salt	26177855A
Fructose, D-	57487A
Fructose-6-Phosphate	643130A
Fucose, L-	6696417A
Fuller's Earth	8031183A
Galactose, D-(+)-	59234A
Galactric Acid	526998B
Gelatin	9000708A
Gluconic Acid	527071A
Gluconic Acid, D-Sodium Salt	527071B
Gluconic Acid, Potassium Salt	299274B
Glucose 6-Phosphate, D-	56735A

Compound	CAS #
Glucose Pentaacetate, Alpha-D-	604682A
Glucose Pentaacetate, Beta-D-	604693A
Glucose Reagent	50997B
Glucose, Alpha-D	492626A
Glucose, D-(+)-	50997A
Glucose-1-Phosphate Dipotassium, Alpha, D-	5996145A
Glutamic Acid, L-	56860A
Glutamine, L-	56859A
Glutaric Acid	110941A
Glutathione Reduced Form	70188A
Glutathione S-Transferase	50812378A
Glycerol 2-Phosphate, Disodium Salt Hydrate	819830A
Glyceryl Guaiacolate	93141A
Glyceryl Monostearate	31566311A
Glycine	56406A
Glycogen	9005792A
Graphite Powder	7782425A
Guaiac Resin	9000297B
Guanine	73405A
Guar Gum	9000300A
Gum Arabic	9000015A
Gum Benzoin	9000059A
Gum Elemi	9000753A
Gum Ghatti	9000286A
Gum Guaic	9000297A
Gum Tragacanth	9000651A
Gypsum	10101414B
Hemoglobin	9008020A
Heparin	9005496A
Histamine	51456A
Histamine Dihydrochloride	56928A
Histidine Monohydrochloride Mononydrate, D-	6341248A
Hsa Minispheres	9000708B
Hydroquinone	123-31-9
Hydroxy Propyl Methyl Cellulose	9004653A
Hydroxy-3-Methoxybenzoic Acid, 4-	121346A
Hydroxy-L-Proline, Cis-4-	618279A
Hydroxy-L-Proline, Trans-4-	51354A
Hydroxyethyl Cellulose	9004620A
Hydroxylapatite	1306065A
Hypaque	737315A
Imidazole,1-Methyl-2-	60560B
Iminodipropionatrile(-3,3)	111944A
Indican	2642377B
Infusorial Earth	61790532B
Inosine, (-)-	58639A
Inositol	87898A
Iron Citrate	2338058B
Isocitric Acid, Trisodium Salt Hydrate, Dl-	1637736A
Isocitric Dehydrogenase	9028482A

Compound	CAS #
Isoleucine, L-	73325A
Isopropamide	7492322A
Kaolin	1332587A
Karaya Gum	9000366A
Keratin	9008188A
Klucel	9004642A
L-Glutamic Acid, Monosodium Salt	142472B
Lactalbumin Enzymatic Hydrolysate	9073603A
Lactobionic Acid	3847298A
Lactose Monohydrate	63423B
Lactose, Beta-D-	63423A
Lactulose	4618182A
Lanolin, Wool Fat	8006540A
Lecithin	8002435A
Lente Iletin	8049625A
Leucine, D-	328381A
Leucine, Dl-	328392A
Leucine, L-	61905A
Leupeptin	103476897A
Levulose	57487B
Limestone, Crushed	1317653A
Litmus Blue	1393926A
Litmus, Indicator	1393926B
Lusozyme	9001632A
Lysine Monohydrochloride, L-	657272A
Lysine Monohydrochloride,Dl-	70531A
Lysine, L-	56871A
Lysozyme	12650883A
Magnesium Acetate	142723A
Magnesium Carbonate Basic	546930B
Magnesium Carbonate Hydroxide	546930A
Magnesium Carbonate, Basic	3409820A
Magnesium Chloride	7786303A
Magnesium Oxide	1309484A
Magnesium Phosphate Tribase	7757860A
Magnesium Sulfate	7487889A
Magnesium Sulfate Heptahydrate	10034998A
Malt Extract	8002480A
Maltodextrin	9050366A
Maltose Monohydrate, D-	6363537A
Mannitol, D-	69658A
Methionine, Dl-	59518A
Methionine, L-	63683A
Methionine,D-	348674A
Methyclothiazide	135079A
Methyl Cellulose	9004675A
Methyl Cysteine-S	7728985A
Methyl Histidine, L-1-	15507763A
Methyl Laurate	111820A
Methyl-L-Histidine	368161A

Compound	CAS #
Methyl-N-Nitroso-P-Toluenesulfon Amide, N-	80115D
Methylmannoside, Alpha	617049A
Mica	12001262A
Monostearin, Tech	31566311C
Mucic Acid	526998A
Mutarotase	9031769A
Myoglobin	9008451A
Myrrh Gum	900045A
Naphthoflavone, Alpha-	604591A
Niacin	59676B
Niacinamide	98920B
Nicotinamide	98920A
Nicotinamide Adenine Dinucleotide Phosphate	53598A
Nicotinic Acid	59676A
Nylon	63428831A
Ofloxacin	82419361A
Olibanum Gum	8050075A
P-Anilinophenol	122372A
Pancreatin	8049476A
Papain	9001734A
Pentbutolol Sulfate	38363325A
Pepsin Powder	9001756A
Phenyl-5ehtyl-Hexahydropyrimidine-4,6-Dione,5-	125337A
Phenylalanine, D-	673063A
Phenylalanine, L-	63912A
Phenylethyl-(2) Acetate	103457A
Phosphalase, Acid	9001778A
Phosphatidyl Choline, L-Alpha-	8002435B
Phosphodiesterase 3-5-Cyclic Nucleotide	9040599A
Phytonadione	84800B
Pimozide	2062784A
Piperazine Citrate	144296A
Pirenzepine Hcl Hydrate	29868971A
Plasmin	9001905B
Poly (3-Hydroxy Butyric Acid)	26063003B
Poly Ethylene Oxide	25322683B
Poly Propylene, Isotactic	25085534A
Poly(Ethylene Glycol), Solid	25322683A
Poly(Ethylene), Solid	9002884A
Poly(Isobutylene), Solid	9003274A
Poly(Isoprene), Solid	9003310A
Poly(Methyl Methacrylate), Solid	9011147A
Poly(Sodium 4-Styrene Sulfonate)	25704181A
Poly(Vinyl Alcohol), Solid	9002895A
Poly(Vinyl Formal), Solid	9003332A
Poly(Vinyl Pyrrolidone), Solid	9003398A
Poly-Beta-Hydroxybutyric Acid	26063003A
Polyacrylic Acid, Solid	9003014A
Polyanetholsulfonic Acid, Sodium Salt	63589560A
Polybutadiene, Cis-, Solid	9003172A

Compound	CAS #
Polybutene	9003285A
Polyethylene Glycol	37225266B
Polyethylene Glycol 8000	25322683C
Polyvinyl Acetate, Solid	9003207A
Portland Cement	65997151A
Potassium Acetate	127082A
Potassium Bicarbonate	298146A
Potassium Bisulfite	1310618A
Potassium Bitartrate	868144A
Potassium Carbonate	584087A
Potassium Chloride	7447407A
Potassium Citrate	866842A
Potassium Gibberellate	125677A
Potassium Gluconate	299274A
Potassium Hydrogen Sulfite	1310618B
Potassium Hydrogen Tartrate	868144B
Potassium Iodide	7681110A
Potassium Phosphate Dibasic Trihydrate	16788571A
Potassium Phosphate Monobasic, Anhydrous	7778770A
Potassium Phosphate, Dibasic, Anhydrous	7758114A
Potassium Phosphate, Tribasic	7778532A
Potassium Pyrophosphate, Tetra-	7320345A
Potassium Sodium Tartrate	304596A
Potassium Sulfate	7778805A
Potassium Tetraborate Tetrahydrate	12045782A
Povidone	9003398D
Procion Brilliant Red	17804498A
Proteidase	9014011A
Protoporphyrin Ix, Sodium Salt	50865015A
Pth-Aspartic Acid	5624135A
Pth-Glutamic Acid	562471A
Putrescine Dihydrohydrochloride	333937C
Pvp	9003398B
Pyridoxal Phosphate	54477A
Pyrite	1309360A
Quartz	14808607A
Quebracho	1401554C
Rennase	9001983B
Rennin	9001983A
Resacetophenone	89849A
Retinyl Acetate	127479A
Riboflavin	83885B
Riboflavin-5-Phosphate	146178A
Ribose	24259594A
Ribose Nucleic Acid	9014259A
Ribose, D-	50691A
Rongalite	149440C
Rosin, Powder	8050097A
Saccharose	57501B
Salicylic Acid	69727A

Compound	CAS #
Sand	14808607C
Sandimmun	59865433A
Sea Sand	14808607B
Senna Gum	51434185A
Serine, Dl-	302841A
Serine, L-	56451A
Shellac Gum	9000593A
Silicic Acid	7699414A
Silicic Acid Sodium Salt	13440908A
Silicon Carbide	409212B
Silicon Dioxide	7631869A
Silicon Dioxide, Amorphous	112945525A
Silicone Rubber, Solid	9016006A
Sminosalicylic Acid,5-	89576A
Soda Ash	497198B
Sodium 2-Ethylhexyl Sulfate	126921A
Sodium Acetate	127093A
Sodium Acetate Trihydrate	6131904A
Sodium Ascorbate	134032A
Sodium Bicarbonate	144558A
Sodium Borate, Anhydrous	1330434B
Sodium Carbonate	497198A
Sodium Carbonate Monohydrate	5968116A
Sodium Carbonate, Decahydrate	6132021A
Sodium Cellulose Phosphate	9038419A
Sodium Chloride	7647145A
Sodium Cholate	361091A
Sodium Citrate	68042A
Sodium Cloxaxillin	642784A
Sodium Glucuronate	7182776A
Sodium Glutamate	142472A
Sodium Hyaluronate	9067327A
Sodium Iodide	7681825A
Sodium L-Aspartate	5598538A
Sodium Lactate	72173A
Sodium Lignosulfonate	8061516A
Sodium Metaphosphate	10361032A
Sodium Monofluorophosphate	10163152A
Sodium Nitrobenzene Sulfonate	27215710A
Sodium Nucleinate	9014259B
Sodium Oleate	143191A
Sodium Phosphate Dibasic Dodecahydrate	10039324B
Sodium Phosphate Monobasic Monohydrate	10049215A
Sodium Phosphate Tribasic Dodecahydrate	10101890A
Sodium Phosphate, Dibasic	10039324A
Sodium Phosphate, Dibasic, Anhydrous	7558794A
Sodium Phosphate, Dibasic, Heptahydrate	7782856A
Sodium Phosphate, Monobasic, Anhydrous	7558807A
Sodium Polymetaphosphate	50813166A
Sodium Polymethacrylate	54193361A

Compound	CAS #
Sodium Polystyrene Sulfonate	9080799A
Sodium Potassium Phosphate	7782696A
Sodium Potassium Tartrate	304596B
Sodium Pyrophosphate	7722885A
Sodium Silicate	1344098A
Sodium Sulfadiazine	547320A
Sodium Sulfate	7767826A
Sodium Sulfate, Anhydrous	7757826A
Sodium Tartrate	868188A
Sodium Tetraborate, Anhydrous	1330434A
Sodium Tetraphosphate	14986846A
Sodium Titanate	12034343A
Sodium Trimetaphosphate	7785844A
Sodium Tripolyphosphate	13573187A
Sodium Tripolyphosphate	7758294A
Sodium Tungstate	13472452A
Sorbitol, D-	50704A
Sorbose, L-(-)-	87796A
Spectra-Sorb Uv-9	131577A
Starch, Electrophoresis	9005258A
Starch, Soluble	9005849A
Steapsin	9001621A
Strontium Carbonate	1633052A
Succinic Semialdehyde	692295A
Sucrose	57501A
Sulfadoxine	2447576A
Sulfamylon	138374A
Suloctidil	54767758A
Talc	14807966A
Tantalum Carbide	12070063A
Tartaric Acid, L(+)-	87694A
Terrasodium Pyrophosphate	7772885B
Tetrahydroxybenzophenol(2,2,4,4)	13155A
Thiamine Hydrochloride	67038A
Thienyl-Dl-A-Alanine-Z	139866A
Threonine, D-	632202A
Threonine, Dl-	80682A
Threonine, L-	72195A
Thyodene	9005849B
Titanium Dioxide	13463677A
Tocopherol, Alpha-	59029A
Tocopheryl Acetate, Dl-Alpha-	7695912A
Tolazoline Hcl	59972B
Tragacanth Powder	9000651B
Tri(B-Chloroethyl) Pohosphate	115968A
Tricalcium Phosphate	7758874C
Triethelene Glycol Diacetate	111217A
Trifluorothymine	54206A
Trigonelline	535831A
Triphosphopyridine Nucleotide, Sodium Salt	53598B

Compound	CAS #
Tripropyleneglycolmethyl Ether	25498491A
Trisodium Phosphate, Activator	7601549A
Trypsin	9002077A
Trypsin Inhibitor	9087701B
Tyrosine, D-	556025A
Tyrosine, Dl-	556036A
Tyrosine, L-	60184A
Urease	9002135A
Urecholine	590636A
Uricase	9002124A
Uridine	58968A
Valine, L-	72184A
Vanillic Acid	121346B
Vanillin	121335A
Variton	62975A
Vinyl Resin	9005098A
Vitamin B12	68199B
Vitamin B2	83885A
Vitamin E	59029B
Vitamin E	7695912B
Vitamin K-5	83705A
Vp-16	33419420A
Xanthine	69896A
Xylan	9014635A
Yeast Extract	8013012A
Zein	9010666A
Zinc Phosphate	7779900A
Zirconium Oxychloride	7699436A

V. USE OF JERRICANS FOR COLLECTION OF WASTESTREAMS

In a few circumstances, some nonaqueous solvent streams may be collected in 5-gallon flame-proof red cans. CEHS personnel will collect the cans when they are full, and bulk the solvents into a drum for disposal.

To dispose of solvents in this manner, request a jerrican from CEHS, and specify whether you need one for halogenated solvents, nonhalogenated solvents, or one for each type of waste.

CEHS will bring empty cans and green sheets of paper for listing the contents of the can. **It is imperative that each person in the lab writes the name of the solvent and approximate amount added when adding solvent to the waste can.** Do not mix halogenated and non-halogenated solvents.

Halogenated solvents include the elements chlorine, fluorine, bromine, or iodine. Examples are dichloromethane (also called methylene chloride), bromobenzene, and chloroform.

VI. Specific Handling Requirements for Types of Chemical Waste

This section is intended to give guidance for the management of certain types of chemical waste.

Acids and Bases

Neutralization of strong acids and bases can reduce the size of your laboratory's and the University's aqueous waste stream. Neutralization is the most efficient and least costly way of managing waste acids and bases. After neutralization, waste liquids can be disposed of in the sanitary sewer, **IF** they do not contain any other regulated substances, such as metals or toxic organics.

The solution you plan to neutralize should not contain heavy metals such as arsenic, barium, cadmium, chromium, lead, mercury, selenium and silver. Wastes containing high levels of other metals may be of concern, as well. Contact CEHS to find out if these wastes can be neutralized and sewered.

Acids that are very reactive with water should not be neutralized, unless you are an expert in handling and using these acids. These include: Acid anhydrides and chlorides; chlorosulfonic acid, fuming nitric and sulfuric acids; liquid halides of boron, silicon, tin, titanium and vanadium; and liquid halides and oxhalides of phosphorus, selenium and sulfur.

Carry out neutralizations in a well-ventilated fume hood. Use the sash or a safety shield for protection against vigorous reactions. Wear an apron, splash-proof goggles or a full-face shield and nitrile gloves. Long gloves or gauntlets are also recommended. A five gallon polyethylene bucket is recommended for neutralizing 1-10 liters. A large container is needed for addition of ice and base, and to safely stir the reaction.

PROCEDURES FOR NEUTRALIZATION

Neutralization of strong acids

1. Prepare a 6 N solution of sodium hydroxide (240 g/L) or potassium hydroxide (336g/L). Remember that the solution will heat as the pellets dissolve.

2. One liter of 6 N base can neutralize:

Acid	Quantity, mL
Acetic acid (glacial)	342
Formic acid (88%)	264
Hydrobromic acid (48%)	720
Hydrochloric acid (37%)	504
Hydriodic acid (47%)	1080

Nitric acid (70%)	378
Perchloric acid (70%)	516
Phosphoric acid (85%)	414
Sulfuric acid (96%)	166
Trichloroacetic acid (20% sol'n)	4902

3. Dilute the acid to a 5% (by weight) concentration or less (add acid to water, NOT water to acid). Use ice as necessary to cool the solution. Limit the solution to a maximum of 10 liters. Acids that may generate heat upon neutralization are phosphoric and sulfuric acids.

4. Neutralize with 6 N NaOH or KOH, adding it slowly.

5. Monitor pH with pH paper, a pH meter, or a suitable indicator.

6. When pH is between 6 and 10, wash solution down the sanitary sewer using 20 parts water to one part waste.

Neutralization of strong bases

Bases that may be neutralized include: solutions of potassium and sodium hydroxides, alcoholic sodium or potassium hydroxide cleaning solutions, ammonium hydroxide and ammonia solutions.

1. Dilute the base to a 5% concentration or less.

2. Slowly add 6 N HCl or other acid.

3. Monitor pH changes with pH meter or pH paper. (Note: Liquid indicators can oxidize rapidly in basic solutions and give false color change).

4. When pH is between 6 and 10, solution can be washed down sanitary sewer with 20 parts water to one part waste.

Aerosol Cans

Many products come in aerosol cans, including cleaners, coolants, paints, lubricants and starting fluid. Aerosol cans frequently contain hazardous materials that are flammable or toxic. Aerosol cans should be disposed through CEHS by completing a chemical waste pickup request form.

Arsenic

Any compound containing Arsenic > 5.0 mg/L is regulated as a Hazardous Waste under RCRA. There are very few disposal options due to recent regulations concerning the disposal of mercury and arsenic. Thus, the use of any arsenic compound must be limited to that which is essential to research. Contact the Laboratory and Hazardous Waste Section prior to initiating research involving the use of arsenic to discuss possible alternatives. Do not keep any arsenic compounds in your inventory for which you do not have an immediate use.

Batteries

Waste batteries may be considered hazardous waste because of their corrosivity, reactivity, or toxicity. According to battery-producing industry sources, nickel-cadmium batteries typically exhibit hazardous waste characteristics, whereas low-mercury alkaline and carbon-zinc batteries do not. Alkaline batteries with higher concentrations of mercury and larger mercury batteries would be likely to test as hazardous, and some lithium batteries might be considered reactive. Lead acid batteries are considered corrosive, as well as toxic. Button batteries may or may not test as hazardous, depending on their type and size.

We recommend the following steps to minimize battery waste:

1) Purchase only low mercury ("green") batteries.
2) Substitute rechargeable alkaline batteries for nickel-cadmium.
3) Collect batteries for Hazardous Waste pick-up according to the recommendations in the table below.

Using the table below, try to identify the type of battery you wish to dispose. If you find that it should be disposed as a hazardous waste, complete a pickup request form and return to CEHS. If not, you may dispose it in one of the recycling containers.

Battery Type	Appearance	Hazardous Waste?	Can Be Recycled? Primary
Alkaline	Alkaline, carbon-zinc, and nickel-cadmium batteries are similar in size and shape, although nickel-cadmium mercury or batteries are labeled as such.	Not usually	Yes, but it is costly
Carbon Zinc	As above	No	No
Mercuric-oxide button	Mercuric-oxide button batteries are easy to distinguish from nonbutton types of batteries but not from other buttons.	Yes	Yes

Silver-oxide button	Silver-oxide button batteries are difficult to distinguish from mercuric-oxide buttons.	Yes	Yes
Zinc-air	Zinc-air batteries are easily identifiable by the holes in the bottom.	No	No
Lithium	Most large lithium batteries are labeled with the word “lithium” or the initials “LI”. Lithium button batteries are smaller and lighter than most types of button batteries and are also unique because they come with only a 3-volt charge.	Yes	Yes
Secondary Cells (Rechargeable) Alkaline	Alkaline, carbon-zinc and nickel-cadmium batteries are similar in size and shape, although nickel-cadmium batteries are labeled as such.	No	Yes
Nickel-cadmium	Labeled as such	No	Yes
Small sealed lead-acid flat plates	Most are enclosed in battery packs and are not easily distinguishable.	Yes	Yes

Chromic Acid

Chromium compounds are considered hazardous due to the toxic effect they have on the bacteria used to decompose organic matter in sewage treatment, as well as their toxic effect on human beings. Waste containing chromium in any oxidation state is regulated as a hazardous waste. Its presence in an acid waste stream means that the waste cannot be neutralized and sewered. In addition, cleaning methods that involve concentrated acids present a hazard to the lab employee. Corrosive resistant gloves and eye protection should be worn.

Many researchers have found that detergents provide sufficient cleaning capabilities for their needs. In other instances acidic or basic solutions that can be neutralized and sewered after use achieve desired cleaning levels. Overall, we recommend the following alternative cleaning agents be considered (listed in order of increasing hazard):

Non-hazardous solutions:

Alconox, or similar detergents
Pierce RBS-35, or similar detergents

Neutralizable/sewerable solutions:

dilute hydrochloric acid
aqua regia (mixture of hydrochloric and nitric acids)
oxidizing agents without chromium or other metals

Other: potassium permanganate/sulfuric acid

Nochromix or Micro 90, produced by Godax Laboratories, contains an inorganic oxidizer that is combined with sulfuric acid. They can be purchased through suppliers such as Fisher Scientific and Flinn Scientific. There is a color change as the oxidizer is used up. Since these products involve the use of concentrated sulfuric acid, proper safety precautions should be taken.

CONTROLLED SUBSTANCES

DEA controlled substances cannot be disposed by our usual chemical waste disposal firm. In order to dispose of regulated substances, the substances must be transferred to a special disposal firm using a DEA form 222, or arrangements must be made through CEHS to conduct a witnessed burn at the incinerator after receiving permission from DEA by filling out a DEA form 41.

DEA CONTROLLED SUBSTANCES CLASSES I-V

DEA Class	Name
II	Alphaprodine HCl
III	Alphenal
IV	Alprazolam
IV	Alprazolam-d_5
II	Amobarbital Na
II	L-Amphetamine
II	D-Amphetamine sulfate
II	DL-Amphetamine sulfate
II	D-Amphetamine-d_3 sulfate
III	5α-Androstan-17β-ol-3-one
III	5α-Androstan-17β-ol-3-one benzoate
III	5-Androstene-3β
III	5-Androstene-3β,17β-diol
III	5-Androstene-3β,17β-diol 3-acetate
III	5-Androstene-3β,17β-diol 3-acetate 17-benzoate
III	5-Androstene-3β,17β-diol 17-benzoate
III	5-Androstene-3β,17β-diol diacetate
III	5-Androstene-3β,17β-diol dipropionate
III	5-Androstene-3β,17β-diol 3-sulfate
III	5-Androstene-3β,17β-diol 17-sulfate
III	5α-Androst-1-en-17β-ol-3-one

DEA Class	Name
II	Aprobarbital
IV	Barbital
IV	Barbital
II	Benzoylecgonine
II	Benzoylecgonine-d_3
III	Benzphetamine HCl
III	Bolasterone
IV	Bromazepam
I	Bufotenine monooxalate
V	Buprenorphine hydrochloride
III	Butabarbital
III	Butalbital
III	Butethal
I	Cannanbidiol
I	Cannabinol
II	(-)-2β-Carbomethoxy-3β-(4-fluorophenyl)tropane
I	(S)-(-)-Cathinone HCl
IV	Chloral Hydrate
IV	Chlordiazepoxide HCl
IV	Chlordiazepoxide-d_5
III	4-Chlorotestosterone acetate
IV	Clobazam
IV	Clonazepam
IV	Clorazepate K_2
II	Cocoaethylene
II	Cocoaethylene-d_5
II	Cocaine
II	Cocaine HCl
II	Cocaine-d_3
II	Codeine
II	Codeine-d_3 HCl
III	1-Dehydro-17α-methyltestosterone
III	9(11)-Dehydro-17α-methyltestosterone
III	1-Dehydrotestosterone
III	1-Dehydrotestosterone acetate
III	1-Dehydrotestosterone benzoate
III	1-Dehydrotestosterone undeculenate
IV	Delorazepam
II	()-Deoxyephedrine
II	(±)-Deoxyephedrine HCl
II	(±)-Deoxyephedrine-d_5 HCl
IV	Desmethyldiazepam
IV	Desmethyldiazepam-d_5

DEA Class	Name
III	5,5-Diallylbarbiturc acid
IV	Diazepam
IV	Diazepam-d_5
IV	Diethylpropion HCl
I	N,N-Diethyltryptamine
I	(±)-2,5-Dimethoxy-4-bromoamphetamine HBr
I	(±)-2,5-Dimethoxy-4-bromoamphetamine HCl
I	N,N-Dimethyltryptamine
II	Diphenoxylate HCl
II	Ecgonine HCl
II	Ecgonine-d_3 HCl
IV	Nitrazepam
II	Norcocaine
II	Norcodeine HCl
I	Normorphine HCl
II	Noroxymorphone
III	19-Nortestosterone
III	19-Nortestosterone 3-(O-carboxymethyl)oxime
III	19-Nortestosterone decanoate
III	19-Nortestosterone dodecanoate
III	19-Nortestosterone glucuronide Na
III	19-Nortestosterone phenylpropionate
III	19-Nortestosterone propionate
I	11-NorΔ^8-tetrahydrocannabinol-9-carboxylic acid
I	11-NorΔ^9-tetrahydrocannabinol-9-carboxylic acid
II	Opium powder
IV	Oxazepam
IV	Oxazepam-d_5
IV	Oxazolam
II	Oxycocdone HCl
III	Oxymetholone
II	Oxymorphone
II	Oxymorphone HCl
IV	Paraldehyde
IV	Pemoline
IV	Pentazocine
IV	Pentazocine HCl
II	Pentobarbital
II	Pentobarbital Na

DEA Class	Name
II	Phencyclidine HCl
II	Phencyclidine-d_5 HCl
III	Phendimetrazine bitartrate
IV	Phenobarbital
IV	Phenobarbital Na
IV	Phentermine HCl
II	Phenylacetone
IV	Prazepam
II	Ecgonine methyl ester HCl
II	Ecgonine methy ester-d_3 HCl
IV	Estazolam
IV	Ethinamate
II	Ethylmorphine
I	α-Ethyltryptamine acetate salt
IV	Fencamfamine HCl
IV	Fenfluramine HCl
IV	(+)-Fenfluramine HCl
IV	Fenproporex
II	Fentanyl citrate
II	Fentanyl-d_5 citrate
IV	Flunitrazepam
III	Fluoxymesterone
IV	Flurazepam 2HCl
II	DL-Glutethimide
III	Hexobarbital
II	Hydrocodone bitartrate
II	Hydromorphone HCl
IV	α-Hydroxyalprazolam
I	N-Hydroxy-3,4-methylenedioxyamphetamine HCl
III	11α-Hydroxy-17α-methyltestosterone
III	2α-Hydroxytestosterone
III	2β-Hydroxytestosterone
III	6α-Hydroxytestosterone
III	6β-Hydroxytestosterone
III	11β-Hydroxytestosterone
III	14α-Hydroxytestosterone
III	15α-Hydroxytestosterone
III	16α-Hydroxytestosterone
III	Hydroxytestosterone Standard Mixture
III	19-Hydroxytestosterone 17-benzoate
I	11-Hydroxy-Δ^9-tetrahydrocannabinol
I	Ibogaine
III	11-Ketotertosterone

DEA Class	Name
II	Levorphanol tertrate
IV	(±)-Lorazepam
IV	Lormetazepam
III	D-Lysergic acid
I	D-Lysergic acid diethylamide
I	D-Lysergic acid diethylamide-d_6
IV	Mazindol
IV	Medazepam
II	Meperidine HCl
IV	Mephobarbital
IV	Meprobamate
I	Mescaline hemisulfate
I	Mescaline HCl
I	Mescaline sulfate
III	Mesterolone
II	(±)-Methadone HCl
II	Methadone-d_3 HCl
II	(+)-Methamphetamine HCl
I	Methaqualone HCl
I	Methaqualone-d_4
I	(±)-p-Methoxyamphetamine HCl
I	2-(Methylamino)propiophenone HCl
III	17α-Methyl-5α-androstan-17β-ol-3-one
III	17α-Methyl-5-androstene-3β,17β-diol
III	17α-Methyl-5-androstene-3β,17β-diol dipropionate
I	(±)-3,4-Methylenedioxyamphetamine HCl
I	(±)-3,4-Methylenedioxymethamphetamine HCl
I	3-Methylfentanyl HCl
II	Methylphenidate HCl
III	17α-Mehtyltestosterone
III	17α-Methyltestosterone-d_3
III	Methyprylon
IV	Midazolam
II	Morphine 6-acetate
II	Morphine sulfate
II	Morphine-d_3 HCl
II	Morphine 3-(β-D-glucuronide)
II	Morphine 6-(β-D-glucuronide)
III	Nalorphine HCl
II	d-Propoxyphene HCl

DEA Class	Name
II	d-Propoxyphene-d_7 HCl
I	Psilocin
II	Secobarbital
II	Secobarbital Na
II	Secobarbital-d_5
III	Stanozolol
III	Stanozolol-d_3
IV	Temazepam
I	Tenocyclidine
III	Testosterone
III	Testosterone-d_3
III	Testosterone acetate
III	Testosterone benzoate
III	Testosterone decanoate
III	Testosterone cypionate
III	Testosterone enanthate
III	Testosterone glucuronide
III	Testosterone glucuronide Na
III	Testosterone glucuronide K
III	Testosterone hemisuccinate
III	Testosterone isocaproate
III	Testosterone phenylpropionate
III	Testosterone propionate
I	Δ^8-Tetrahydrocannabinol
I	Δ^9-Tetrahydrocannabinol
I	Δ^9-Tetrahydrocannabinol-d_3
II	Thebaine alkaloid powder
III	Thiamylal Na
III	(±)-Thiopental
III	(±)-Thiopental Na/Na_2CO_3
III	Trenbolone
III	Trenbolone Acetate
IV	Triazolam
II	Tropacocaine HCl

Cyanogen Bromide

Cyanogen bromide solutions (CNBr) can be used to cleave protein samples for peptide analysis. Some protocols call for a stock solution of cyanogen bromide dissolved in an organic acid (such as formic acid.) The mixing of cyanogen bromide with acid will result in the release of cyanide gas. This mixture can be handled safely in the lab if the following precautions are taken:

1. Purchase the smallest quantity of cyanogen bromide needed for your work. We recommend purchasing it in 1 gram quantities. Acidification of 25 grams of cyanogen bromide (as recommended in the protocol) could release approximately 6 liters of cyanogen gas. Date the container when you receive it.

2. Use a fume hood when mixing or handling the solution.

3. Store the stock solution of cyanogen bromide in acid in a minus 80° C freezer.

4. Clearly label the stock solution of cyanogen bromide in acid with the following warning: "Caution: Solution will release cyanide gas at room temperature." Mark the date formulated on the container.

5. Dispose of the solution as a chemical waste.

6. Store cyanogen bromide in a dry location. Cyanogen bromide decomposes exothermically when exposed to moisture, releasing hydrogen cyanide and hydrogen bromide gases. The plastic cap of the bottle may shatter if the pressure in the container becomes excessive.

7. Dispose of the chemical if the exterior metal shipping container shows signs of corrosion, or within two years after receipt of the reagent.

3,3' Diaminobenzidine Tetrahydrochloride (DAB)

Contrary to popular belief, treating DAB with bleach does not make it safe to dispose down the drain. DAB waste should be collected and disposed through CEHS as hazardous chemical waste. Do not pre-treat or neutralize DAB solutions.

Ethidium Bromide

One of the most common wastes collected from laboratories involved in research in the biological and biotechnological sciences is ethidium bromide (EtBr) liquid and solid wastes. EtBr is used to visualize DNA on a gel. EtBr and its byproducts are potent mutagens, suspect carcinogens and suspect teratogens. Although this waste is not regulated as a hazardous waste, we feel that the mutagenic properties of these wastes may present a hazard if disposed down the drain or in the regular trash. Several products have been developed as a

substitute for EtBr; these products are considered safer and more environmentally sound. They include SYBR safe and MegaFluor.

Solutions containing EtBr should be collected for disposal. Test tubes, gloves, papers, and other items may or may not require special treatment. If these items are clearly contaminated with EtBr, they should be disposed of as hazardous waste. If these items are not clearly contaminated with EtBr, then they may be disposed in the normal trash. The laboratory user is usually the best person to determine reasonable disposable needs.

Typically, campus researchers collect their EtBr wastes and submit a chemical waste pickup request so that CEHS will collect and dispose the waste. Solids must be separated from liquids. Liquids, including those inside microcentrifuge tubes, should be emptied into containers with screw-cap tops. Label these containers with the contents (approx. concentration and chemical name), as well as the lab location (room no. and building name).

EtBr contaminated objects classified as sharps should be placed in the special sharps containers. Contact CEHS to obtain additional information. Other EtBr contaminated solids should be placed in plastic bags and labeled “Ethidium Bromide contaminated solids”. When you collect gels, use a wide-mouth poly jar with a screw cap top no larger than 1 gallon in size and label it.

Fluorescent Lamps

Some used fluorescent lamps (bulbs) and some high intensity discharge (HID) bulbs are regulated as hazardous waste, because of mercury in the lamp. Mercury-containing lamps, either used or unused, should be disposed through CEHS by filing a chemical pickup request. Some fluorescent lamp ballasts may contain polychlorinated biphenyls (PCBs). SIU has removed most of the old PCB-containing ballasts. Any ballast containing PCBs should be disposed through CEHS by filing a chemical waste pickup request.

Gas Cylinders

Through CEHS, the University establishes a contract with a preferred vendor for compressed gas cylinders. Information concerning the current vendor, including ordering instructions and price list, can be found on the CEHS website. The vendor will deliver compressed gas cylinders to the labs directly, and remove them when they are empty or are no longer needed. The laboratory purchases the gas, and pays a monthly rental fee (“demurrage”) for the cylinder.

Lecture cylinders (small cylinders) are not rented, but are purchased from the manufacturer. No rental fees are paid. However, since the cylinder is purchased, it becomes the property of the laboratory, and the laboratory is responsible for disposal of the cylinder. Most lecture cylinders cost between $400 and $1,000 to dispose. Every effort should be made to avoid the use of lecture cylinders. If the

laboratory does choose to purchase lecture cylinders, they will be held responsible for the fees involved in disposal.

Hydrofluoric Acid

Hydrofluoric acid (HF) is an extremely corrosive acid used for many purposes, including mineral digesion, surface cleaning, etching, and biological staining. HF's properties make it significantly more hazardous than most other mineral acids on campus.

Since HF is so dangerous, the waste must be carefully packaged. Spent HF-containing liquids must be placed in a plastic bottle and overpacked in a larger plastic container. Solids contaminated with HF must be placed in a plastic wide-mouth jar or plastic bucket with a lid, and clearly marked "Hydrofluoric acid waste." Special handling procedures for HF are listed in the chemical hygiene plan.

Labware, Chemical Contaminated

Labware that has been contaminated with a particular contaminant must be treated for the contaminant it contains. Use the Chemical Waste Management guide for normal disposal procedures. If the labware can't be placed in a container with a screw-top lid, place it in a large bag, double-bag it, and note it on the Chemical Pickup Request Form.

Mercury and Mercury Compounds

Hazardous waste regulations now require that wastes containing mercury be sent to a facility where mercury can be recovered in a retort or roasting thermal process unit. Compared with landfilling or stabilization, recovery methods are very expensive.

Red alcohol or mineral spirit-filled thermometers can generally adequately meet accuracy and range requirements. If mercury thermometers must be purchased, those with teflon coatings should be utilized. In physics labs, thermocouples may be used to replace mercury thermometers. Manometers can be phased out in favor of pressure transducers in mechanical engineering experiments. Bimetal or stainless steel thermometers can be used instead of mercury thermometers in heating and cooling units. Stainless steel thermometers may work in some labs as well. Mercury-containing equipment should always be stored in a secondary container, such as a plastic tray or bin, to contain any spills or leaks.

When mercury compounds are used as catalysts for reactions, one alternative is to eliminate the catalyst and simply let the reaction run longer. Mercury-free catalysts, such as $CuSO_4$-TiO_2-K_2SO_4, can be used in Kjeldahl digests instead of mixtures that contain mercury metal or salts. There are also alternatives for mercuric chloride circuit board etching reagents. One is available through Kepro Circuit Systems (1-800-325-3878).

We strongly encourage you to eliminate the use of mercury. Please examine all of your procedures which involve the use of mercury to evaluate the possibility of eliminating, or at least reducing, the use of mercury.

Mercury is defined as a hazardous material by the U.S. and Illinois Environmental Protection Agency. Therefore, all mercury "spills," including droplets of mercury from a broken laboratory thermometer, need to be cleaned up following safe and environmentally sound procedures. Anyone who has questions regarding mercury or spill procedures should contact their professor, a laboratory supervisor, their own supervisor, or CEHS.

Cleaning Up a Mercury Spill

-Prevent the spread of mercury. Mercury beads can splash and roll around. Secure the area around the spill so the mercury does not get "tracked" or "kicked" around. Cease activities and keep the area restricted until the entire spill is cleaned up.

-Get assistance. A special vacuum cleaner is available which is designed to safely pick up mercury droplets from CEHS.

-**Do not** use a regular household vacuum cleaner, or attempt to sweep up a mercury spill. Either of these actions break the mercury droplets into microscopic size, increasing the rate of offgassing.

-After Hours. If no help is available, contact Facilities Operations Control (453-3621) or University Police (453-3771 if non-emergency or 911 in an emergency) and explain that you have a mercury spill. Try to indicate whether the spill is small (e.g. a broken thermometer) or large (e.g. more than 1 or 2 ml [1/4 teaspoon]). If the spill is large or if it must be cleaned up right away, you will normally be directed to secure the area and wait until laboratory personnel arrive (usually 30 to 60 minutes). Otherwise, the area will be secured until the next working day.

-Special Consideration. Large spills, spills in confined areas with poor ventilation or spills in areas heated above room temperature must be addressed by trained personnel with protective equipment because there is a risk of high exposure to mercury vapors.

-Place all clean-up materials, including broken items and any liquid mercury, into a sealed plastic bag or a bucket. Put a hazardous waste label on it and submit a chemical waste pickup request to CEHS.

Mercury and all materials contaminated with mercury must be turned over to CEHS. No mercury, including broken thermometers, may be disposed of in the normal trash, the broken glass box, or into the sewer system.

Mercury spills are disruptive. Therefore, preventative measures can really pay off. Trays, buckets or other containers placed under apparatus containing mercury help confine spills and make clean up less troublesome. Replacing mercury thermometers with red liquid thermometers can avoid mercury spills altogether. Red liquid alcohol or glycol thermometers are available for temperatures up to 200° C (300° F) from many manufacturers, including Fisher Scientific. These thermometers are not expensive and are environmentally friendly.

Free-flowing metallic mercury is recyclable. The most common source of this material is from broken thermometers. Alcohol thermometers should be substituted wherever possible. If you should spill mercury, do not put anything on it to clean it up (i.e. sulfur). If the mercury is collected first, this can be recycled.

> NOTE: **Do not use mercury thermometers in ovens**. Use thermocouple or non-mercury thermometers only. The cleanup cost for a broken mercury thermometer in a oven will far exceed the cost of the oven. The mercury often condenses on the interior metal surface and revolatilizes each time the oven is heated.

Oils

Oil includes any petroleum-based or synthetic oil. Oils are used as lubricants for motors and pumps, for hydraulic fluids, cutting fluids, and heat transfer fluids. Used oil should be stored in sturdy, leak-proof containers and properly labeled. Most oils can be recycled for reuse. If the oil contains polychlorinated biphenyls (PCBs), refer to polychlorinated biphenyls in this section. If the oil is suspected to contain PCB's mark it as such on the chemical pickup request form. Labs continually producing oils (i.e. vacuum pump oil) should request a Jerrican from CEHS for the collection of this wastestream.

Organic Peroxide Formers

Peroxides are shock-sensitive compounds that can explode if subjected to mechanical shock, intense light, rapid changes in temperature, heat, or in some cases, by spontaneous reaction.

Common peroxide-forming compounds can be divided into the following groups:

- Ethers, including open chain and cyclic ethers, acetals, and ketals (e.g., ethyl ether, isopropyl ether).
- Hydrocarbons with allylic, benzylic or proparglic hydrogen (e.g., cumene, cyclohexene).
- Conjugated dienes, eneynes and diynes (e.g., butadiene).

Managing your peroxide-forming chemicals can help CEHS avoid having to test and stabilize them later. Follow these important steps:

-Keep the containers tightly closed. Unopened bottles, those bottles that have been stabilized with an additive, and bottles packaged under an inert gas will not form peroxides (oxygen is necessary for the formation of peroxides).

-Exposure to light can accelerate the formation of peroxides. Keep containers away from light. Airtight amber bottles are the best choice for storage.

-Test for the presence of peroxides regularly, preferably before each use.

-Consider product substitution, where possible.

-Purchase only the amount that will be used in one year or less.

Many common peroxide-formers are marked by the manufacturer with an expiration date, usually one year from the date of manufacture. Laboratories must send expired peroxide-forming compounds to CEHS for disposal as soon as possible after the expiration date. Containers that have been expired for more than one year will be disposed using a high-hazard disposal firm, and those costs may be passed on to the laboratory.

Organic Solvents

Please refer to section V. of this guide entitled “Use of Jerricans for Collection of Wastestreams.” Remember to separate halogenated and nonhalogenated solvents for disposal.

Paint

Wastes generated from paint application processes may be considered hazardous because of the presence of toxic metals or organic solvents. Typical paint-related wastes collected include:

- Used thinner/spent solvents from equipment cleaning
- Empty or nearly empty paint containers
- Obsolete or unwanted paints

In addition, paint removal processes may generate paint chips and rinse water that contains toxic metals.

Full or partially-full cans of latex paint can be picked up by CEHS. Small amounts of latex paint can be solidified using cat litter or vermiculite, then place the open can in the dumpster. Cans with less than ½” of paint should be allowed to dry for a few days, then place the open container in the dumpster.

Oil-based paint contains solvents that are hazardous. All oil-based paint should be disposed through CEHS. We recommend using latex (water-based) paint whenever possible.

There are numerous techniques that will reduce the quantity and toxicity of waste generated from paint application. These include using alternative, less-

hazardous paint, reducing the quantity of solution used for surface preparation, reducing the toxicity of solutions used. For further information, please contact the CEHS Chemical Waste Section.

Picric Acid

Picric acid is used in some biological dyes. It is safe to handle when it contains 30% or more by weight of water. When dried, though, it can become shock-sensitive and explode.

Caution: Dry picric acid residue on the outer surface of the bottle, as well as the threaded container closure, may present a significant friction sensitive hazard!

CEHS will accept picric acid waste at concentrations of 10% water or more. Dry picric acid will be disposed using the Bomb Squad or the high hazard disposal firm.

Polychlorinated Biphenyls (PCB's)

Disposal options for PCB containing waste are determined by the concentration of PCB's in the waste. Most PCB waste must go to an incinerator permitted by RCRA and TSCA. When sending PCB-contaminated or containing material for disposal, put the concentration of PCB's in mg/L (ppm) on the Chemical Pickup Request Form.

Silica Gel

Spent silica gel is not a RCRA regulated waste; however, the local solid waste disposal firms consider spent silica gel to be construction waste, and will not allow large amounts to be placed in the trash. Collect spent silica gel and send it to CEHS for disposal. Silica gel that has been used with solvents retains some trace solvent, and is considered a flammable waste; it should be sent to CEHS for disposal.

Solvent Rags

Solvent rags are fabric or paper towels used with cleansers and solvents to remove oil, grease and dirt. They may also be used to remove paint from brushes. Most of the solvents used are classified as ignitable, so the solvent-contaminated rags are considered to be hazardous waste, and are collected and disposed by CEHS. Solvent rags should be stored in a flame-proof, self-closing red can marked "Solvent Rags".

Spill Cleanup Materials

All spill cleanup materials are regulated in Illinois as a Special Waste. Any sorbents, towels, etc. which are used to cleanup a chemical spill must be kept and disposed of through CEHS, unless listed as nonhazardous under section IV of this guide.

Universal Wastes

This is a program set up by the EPA to streamline hazardous waste management regulations governing the collection and management of certain widely generated wastes known as “universal wastes”. These wastes include: hazardous waste batteries, certain hazardous waste pesticides, and mercury-containing devices. They are to be treated by the generator as standard hazardous waste and disposed of through CEH&S. The Universal Waste Rule allows CEH&S greater leniency in the time and method of recycling or disposing of the aforementioned wastes.

Unknowns

Unlabeled chemicals present potential hazards and are expensive to dispose. The following are classified as “Unlabeled Chemicals”: bottles without a label, containers labeled with only codes, generic process labels that do not specifically list chemicals contained, and obviously mislabeled chemicals. Note: Tradenames are not considered unlabeled chemicals, but an MSDS should be obtained from the company.

All users of chemicals are required to properly label each and every container of chemicals, including chemical wastes, indicating by proper chemical name(s) the nature of its contents. Any container not so labeled will be considered to contain unknown chemicals for disposal and will require that the generator have the unknown(s) characterized and disposed of at generator’s expense.

If an unlabeled container is found, it is to the advantage of the generator to have the characterization carried out expeditiously so as to make use of any knowledge which may exist as to the circumstances in which the unknown was generated. Such information can often aid in simplifying the characterization process and therefore reducing its cost to the generator.

If you have an unknown material, contact the Chemical Hygiene Officer. The Chemical Hygiene Officer will then work to either determine the chemicals involved or characterize the unknown into a category for legal disposal.

VII. PACKAGING AND LABELING CHEMICAL WASTE

Each container to be collected by CEHS must have a waste label affixed to the container to be collected. Self-adhesive labels will be provided by CEHS. Keep extra blank labels in the pocket located in the front of the Chemical Waste Management Guide. There are two types of labels to be used. Hazardous Waste Labels (yellow) are only to be used if the material has been determined to be RCRA hazardous under "Hazardous Waste Definition" of this guide. NON-RCRA waste labels (blue) are only to be used if the material does not meet the guidelines as specified in the "Hazardous Waste Definition" section of this guide.

For yellow Hazardous Waste Labels, use the following guidelines for completing the label:

1. Write all chemicals in the container using chemical names (no acronyms or symbols). Use percentages or estimate concentrations if there are multiple chemicals in the container.
2. Under amount, use liters for liquids and kilograms for solids.
3. If the waste is a tradename, put the chemical constituents of the tradename waste in parenthesis after the tradename.
4. Type or print legibly on the label.

For blue Non-RCRA Waste Labels, use the following guidelines for completing the label:

1. Write all chemicals in the container under chemical name. Use percentages or estimate concentrations if there are multiple chemicals in the container.
2. Under amount, use liters for liquids and kilograms for solids.
3. Do not use chemical symbols on the label.
4. If the waste is a tradename, put the chemical constituents of the tradename waste in parenthesis after the tradename.
5. Type or print legibly on the label.

Use the following guidelines when placing the label on the container:

1. Two sizes of labels are provided. Use the appropriate sized label for the container. If you need more labels contact CEHS.
2. If the original label on the container depicts **ALL** contents of the container, place the waste label on the container so as to not cover any portion of the original label. Many times there is information on the original manufacturer's label which is useful to the disposal contractor.
3. If the original manufacturer's label on the container **DOES NOT** depict the entire contents of the container, **completely remove the label** and affix a yellow or blue waste label. That is, if you are reusing empty bottles for waste, you must completely remove the original label from the bottle before placing waste in the container. Do not mark out the original label with a marker, and do not place the yellow label on top of the original label.

4. Do NOT cross out the original lable and write “Waste” on it. Do NOT put a piece of label tape with the word “Waste” written on it over the original label.

VIII. WASTE COLLECTION

To have a waste chemical collected by CEHS, you must first complete a chemical pickup request form. These forms are available on the CEHS website. Instructions and examples for proper completion of this form are located on the website.

Guidelines:

1. Chemical waste must be labeled and placed in an appropriately sealed container, preferably with the original cap or lid (this usually ensures a good seal). Do not use parafilm, stoppers, broken caps etc. A hazardous waste label must be placed on each container containing waste, with the type(s) of chemicals legibly typed or printed in the chemical name(s) section of the label.
2. Access the “Chemical Pickup Request Form” on the CEHS website.
3. Fill out the information at the top of the form, including building, room, and phone number.
4. List the contents of each waste container. Do not use tradenames, synonyms, or chemical formulas.
5. Save the form to your desktop. Open your e-mail client and attach the form to an e-mail message to chempickup@cehs.siu.edu
6. Waste pickups are made at least twice per week. We intend to collect the waste within three days of receiving the pick-up form.

IX. Generator Compliance Inspections

Once each month, every laboratory that has a chemical satellite waste accumulation area must complete the checklist entitled “Inspection Checklist for Chemical Waste Satellite Accumulation Areas.”

The completed checklists should be kept with the other safety documents in the lab. Completed lists must be kept for three years.

When possible, personnel from CEHS plan to conduct routine laboratory complicance audits (inspections) on an annual basis, personnel levels permitting. Reports from the inspections will be sent to the principal investigator, the chair of the department, and the College or School Safety Liaison. Please refer to the Chemical and Biological Compliance Policy for more information.

The most common noncompliances can usually be remediated in a few minutes. They include making sure that:

1. each lab contains a copy of the chemical waste management guide
2. each lab contains at least one posted copy of the emergency contingency plan which has been completed within the last 12 months and is easily visible
3. all waste containers are labeled with proper Hazardous Waste or Non-RCRA Waste labels
4. all waste bottles are **closed**
5. there is a clearly labeled "Chemical Waste Accumulation Area" in which **only** waste materials are stored
6. the chemical waste accumulation area is inspected once each month, the checksheet is filled out and signed, and a copy is kept in the lab for at least three years
7. chemical waste bottles which are full or no longer in use are added immediately to a chemical pick-up request form for disposal

CEHS is only responsible for advising and aiding in laboratory compliance. Ultimately, each laboratory is responsible for compliance. Laboratory personnel should take time during inspections to ask questions. Inspection time is also an opportunity to request compliance materials (i.e. additional labels, chemical pick-up request forms, emergency contingency plans, etc.).

X. CHEMICAL SPILLS

The following guidelines are offered to help you decide if you should clean up a chemical spill. These guidelines constitute a portion of a document that the Environmental Protection Agency (EPA) calls a **Contingency Plan** for Hazardous Waste Generators, and these guidelines must be followed in the event of a chemical spill.

Who Cleans Up A Chemical Spill ?

YOU CLEAN UP THE SPILL

For chemical spills which do not involve injury, do not represent a fire hazard, are less than one gallon, and for which you have the proper training and proper protective equipment to do the cleanup, it is the responsibility of laboratory personnel to clean up the spill.

WE CLEAN UP THE SPILL

For all other chemical spill situations, including those for which you have any questions or doubts about your ability to clean up the spill, call the Center for Environmental Health & Safety at (618) 453-7180 for a chemical spill response team to handle the cleanup duties. Report all injuries, fires, explosions and potentially life threatening situations first to 911, then to CEHS.

Planning For Chemical Spill Emergencies

1. Designate two people in your lab or service area to be on-site emergency coordinator and back-up emergency coordinator. These people should know what hazards exist in your area and how to implement the spill response plan (contingency plan) for the area. They will act as advisors to Police, Fire Department, and Center for Environmental Health & Safety Personnel.

2. Prepare an Emergency Contingency Plan and post it in an easily visible area of your satellite accumulation area (preferably near the telephone or exitway). An example plan is located at the end of this section. Contact CEHS for a blank form, if needed.

3. Train all your employees in chemical spill procedures when they are first hired and yearly thereafter. Document the training, and have employee and supervisor sign the documentation form to certify that the training was given.

4. You can aid CEH&S by drawing a map of your lab or service area and clearly labeling where chemicals and waste chemicals are stored and the total quantity of chemical types in a room (e.g. 5 gallons flammables, 2 pounds oxidizers, 5 cylinders of

compressed non-flammable gas, etc.). Fire extinguishers, eyewashes, spill kits and exit routes and other safety equipment or hazards should also be clearly marked. Keep a copy of the map and send a copy to CEHS. If an emergency then does occur, your departmental office or CEHS could provide advance warning to emergency response personnel of hazards in a room. Update these maps whenever chemical management practices change in the room.

5. Purchase spill cleanup material and personal protective equipment (respirators, chemical resistant suits and gloves, safety goggles, etc.) for your laboratory. Know what the limitations of the personal protective equipment are. If you have any questions about the personal protective equipment, call CEHS.

Hazardous Chemical Spill Cleanup Guidelines

Chemical spills or hazardous materials emergency situations should be handled as a fire emergency. Initial response in a fire situation can be summarized as RESCUE, CONFINE, REPORT, SECURE, AND CLEANUP (FIGHT FIRE). These principles can also be applied to a hazardous materials spill situation.

Rescue

Just as you are not to re-enter a burning building, **DO NOT** go back into an area where a chemical spill has occurred. In many documented cases, rescuers not wearing proper protective equipment have been overcome by toxic or asphyxiating fumes trying to rescue other victims and died as a result. Do not make this mistake.

As you leave an area involved in a chemical spill, assist people exiting the area.

- Evacuate personnel from the spill area.
- Direct personnel to nearest fire exit. Do not use elevators.
- Alert neighbors.
- Attend to victims.

First Aid

- Remove victim from spill area to fresh air (but do not endanger your own life by entering areas with toxic gases).
- Immediately remove contaminated clothing.
- Wash skin with soap and water.
- Flush skin and/or eyes with water for a least 15 minutes. (You may not feel any immediate effect from chemical spills, but it is very important to wash quickly and thoroughly as many chemicals can cause severe tissue damage which is not apparent until hours later.)
- Get medical attention for victims.

Chemical spills over large body areas

- Remove contaminated clothing while under shower.
- Flood affected body area in cool water for at least fifteen minutes.
- Resume water wash if pain returns.
- Wash off chemicals with mild detergent and water; do not use neutralizing chemicals, unguents, creams, lotions or salves.
- Make sure medical personnel understand exactly what chemicals are involved.

Victims of Bromine spills

- Flush with cold water; apply compress saturated with dilute thiosulfate.
- Get immediate medical help.

Victims of Hydrogen Fluoride (HF) spills

- Flush with cool water until any whitening of tissue disappears.
- Apply calcium gluconate gel, or another form of calcium.
- Swath injured areas with soaking wet, iced cloths.
- Get immediate medical help.

Confine

- Close fire doors.
- Isolate area.
- Establish exhaust ventilation if possible.
- Vent fumes only to outside of building.
- Open windows, if possible without exposing you to fumes.
- If fumes are in a room which is not vented to outside of building, close off room.

Report

Call 911:

- for spills that involve injury requiring medical treatment
- for spills that involve fire or explosion hazards
- for spills which are potentially life threatening

Call Center for Environmental Health & Safety, 453-7180:

- for chemical spill situations which do not require 911 assistance
- for spills of one gallon of a chemical or more, or <u>any</u> quantity of a highly reactive or toxic material
- for spills of an unknown chemical
- for spills you do not have proper training or proper protective equipment to do the cleanup
- for spills for which you have any questions or doubts about your ability to clean up the spill

The type of information you will be requested to provide when you call 911 and CEH&S consists of the following:

- First, state that this is an emergency.
- The name, telephone number and location of the reporter.
- Location of the incident.
- Time and type of incident.
- Name and quantity of material involved, to the extent known.
- The extent of injuries, if any.
- The possible hazards to human health or the environment outside the facility.
- Warn emergency responders of any other hazards they may encounter, such as large quantities of stored chemicals (particularly flammables, oxidizers and air-born toxic or irritant materials), radioactive materials or biohazards, etc., on site.
- The safest route to approach the spill.

Secure

Until Emergency Responders arrive on the scene, you and your staff will have to block off entrances to the spill site and prevent people from entering the contaminated area.

- Lock doors leading to the chemical spill and post signs on doors warning of the spill.
- Tape or rope off stairwells and elevators leading to the spill and hang signs on the tape.
- When chemical fumes are being spread through a building's air handling system, call the Physical Plant to have the ventilation system shut off.
- Post staff by commonly used entrances to the spill site, so they can warn people to use other routes.
- For large outdoor chemical spills, keep people upwind and uphill from the site.

Cleanup

Based on the chemical spill situations described in the "YOU CLEAN UP THE SPILL" and the "WE CLEAN UP THE SPILL" sections, decide who will do the cleanup. If you are going to do the cleanup, follow the procedures listed in the "What To Do When You Clean Up A Chemical Spill" section.

What To Do When You Clean Up A Chemical Spill

If you have the proper training, proper personal protective equipment and the proper material to absorb and clean up your chemical spill, and no one has been injured, the spill is contained, and the spill is not life threatening or a fire or explosion hazard, then follow these procedures:

1. Perform all the procedures in the RESCUE, CONFINE, REPORT, and SECURE sections above, with the exception that you do not need to report the incident to 911.

2. When cleaning the spill yourself, locate the spill kit.

3. Choose appropriate personal protection.
   - Always wear protective gloves and goggles or face shield.
   - If there is a chance of body contact, wear apron and coveralls.
   - If the spill is on the floor, wear rubber or plastic boots (NOT leather).

4. Remove ignition sources.
   - Turn off hot plates, stirring motors, flame sources.
   - Shut down all equipment.
   - If unable to shut off sources of ignition, notify emergency responders.

5. Confine or contain the spill.
   - Cover with an absorbent mixture.
   - Clean up minor spills with paper towels or sponge if they won't react.
   - Sweep solid materials into a dust pan, place in sealed container.
   - If acid/base, first add a neutralizing agent; sodium bicarbonate for acids, sodium bisulfate for bases.

   Small amounts of inorganic acids/bases:
   - Use neutralizing agent and absorbent material.

   Small amounts of other materials:
   - Absorb with non-reactive material (e.g. vermiculite, sand, towels, Floor-Dri).

   Large amounts of inorganic acids/bases:
   - Neutralize and call for help.

   Large amounts of other materials:
   - Make a judgment call: depending on the amount, toxicity or what the substance can run into or react with, you may handle it yourself or call for help.

6. Spills that require special handling:

Mercury:

- Small spill (broken laboratory thermometer and smaller quantities of mercury), open windows and ventilate area while cleaning.
- Scrape scattered mercury droplets together into a larger droplet. Turn off the lights and use a flashlight to see small mercury droplets.
- Use aspirator bulb or suction device to suction the mercury droplets. Put them in a ziplock bag or a small container with a screw lid.
- Tape the ends of the broken thermometer or instrument and put it in the bag or container.
- Put a yellow hazardous waste label on the container. Write "Mercury Spill Debris" on the label. Fill out a chemical waste pickup request.

Alkali Metal (e.g. Sodium or Potassium Metals):

- Smother with dry sand.
- Put in hood.
- If possible, react with isopropyl alcohol.

White (Yellow) Phosphorus:

- Blanket with wet sand or wet absorbent.

7. Remove absorbent material with a broom and dust pan.
   - Place in plastic bag or other appropriate container.
   - If the spilled chemical is a volatile solvent, transfer plastic bag and dispose of as a hazardous waste.
   - If spilled material in a non-volatile, hazardous chemical, dispose as a hazardous chemical waste.
   - If spilled material is a non-volatile, non-hazardous chemical, contact the Center for Environmental Health & Safety to determine the appropriate route of disposal.

8. Wet mop spill area.

Comments

Questions arise as to what constitutes a large spill requiring a chemical cleanup team and what the limitations are for the spill kits commonly purchased for laboratories.

A "large" spill can be as small as a few milliliters if the material is highly volatile, toxic compound spilled in a confined space. Many times you will have to make a professional judgment as to the severity of the spill.

When in doubt, you can always call the Center for Environmental Health & Safety for advice at 453-7180.

Chemical spill cleanup kits are very handy to have in the lab and other service areas which use chemicals. The kits are useful if you and your fellow workers know how to use them properly. Chemical absorbent or neutralizing powder pads can be used to quickly contain a spill. Use these items if your personal safety is not jeopardized. Often the best use of such a kit is to put the absorbent on the spill to contain the material, then leave the room and secure the area until the Center for Environmental Health & Safety arrives and finishes the cleanup.

Be aware of the fact that while you may be in a well ventilated room, the Lower Explosive Limit (LEL) of a chemical may be reached at the surface of the spill and you want to avoid any sparks of sources of ignition when doing the clean up. The protective equipment in the spill kit will not protect you from a flash fire. Many times, the best way to handle the spill of a highly volatile compound, such as diethyl ether or chloroform, is to open windows and fume hoods, leave the room, close and lock the door and let the room air out. In these cases, call CEHS so they can send some people to monitor the situation. If, in your professional judgment, there is a strong risk of a flash fire or explosion, pull the nearest fire alarm and evacuate the building. Then call 911, and finally call the Center for Environmental Health & Safetyat 453-7180. In most cases of a chemical bottle breaking in a laboratory, however, you will not need to call the fire department, as the lab ventilation system is usually designed to handle such situations.

Any person who needs to wear a respirator on a regular basis should be fit tested in the respirator. Call CEHS for more information on respirator fit tests.

For hazardous chemical spills which do not involve injury, do not represent a fire or life hazard and are less than one gallon, contact the Center for Environmental Health & Safety for cleanup. The Chemical Waste Division of CEHS will take any necessary information over the phone and respond to the spill immediately. After cleaning the spill, CEHS personnel will complete a “Chemical Spill Response Report.” A copy of this report will be forwarded to the person(s) in charge of the area the chemical spilled.

For all other chemical spills, the room should be evacuated. Notify the Center for Environmental Health & Safety immediately. If there is any potential danger to fire or life, notify the police immediately.

Chemical Spill Response Report

Center for Environmental Health & Safety, Chemical Waste Division

Background:

TIME:	DATE:	BLDG/ROOM:	
MATERIAL SPILLED:			AMOUNT:
NAME:	TITLE:		PHONE:
LAB SUP'VR:	DEPT:	LOCATION OF MEEETING PLACE:	
DESCRIPTION OF INCIDENT:			
ANY INJURIES? ☐ YES ☐ NO	NAME:		
DESCRIBE INJURIES:			

Emergency Response:

EMERGENCY COORDINATOR:	SECOND RESPONDER:	"RUNNER":
REPORTABLE QUANTITY:	HAS THIS BEEN MET? ☐ Yes ☐ No	If so, **SENIOR STAFF MEMBER** is to contact Ilinois Emergency Management Agency & National Response Center.

Personal Protection:

Hazard: ☐ Flammable ☐ Reactive ☐ Corrosive ☐ Carcinogen ☐ Toxic ☐ Sensitizer ☐ Irritant

Route of Entry: ☐ Inhalation ☐ Skin ☐ Ingestion **Exposure Limits:** TLV _____ PEL _____ IDLH _____

Respirators:	**Cartridges:**	**Gloves:**	**Body:**	**Foot:**
☐ Self Contained Breathing Apparatus	☐ OV/AG	☐ Nitrile	☐ Tyvek/Coveralls	☐ Steel Toed PVC Boots
☐ PAPR	☐ Methylamine/Ammonia	☐ Neoprene	☐ Polytyvek	☐ Over-Shoe Boots
☐ Full Face Respirator	☐ Formaldehyde	☐ Silver Shield	☐ Saranex	**Miscellaneous:**
☐ Half Face Respirator	☐ HEPA	☐ Viton	☐ Lifeguard Level B	☐ Radio
		☐ Butyl	☐ Lifeguard Level A	☐ Spill Warning Sign

Spill Control: ☐ Red Spill Bag ☐ Extra Sorbent ☐ Chemical Wipes ☐ Hg Vac / Sulfur ☐ Large Haz. Material Bags

Detectors: ☐ PHOTOVAC Photoionization Detector ☐ JEROME Hg Vapor Analyzer ☐ MSA Passport (O_2, CO, H_2S, LEL)

Follow-Up:

PROBLEMS ENCOUNTERED:
RECOMMENDATIONS:

Contaminated Spill Cleanup Material: ☐ Dustpan ☐ Gloves Other:		
Form Completed By:	Date:	Response Time:

Time Out: _____ A.M. P.M.

White-Ctr. for Env. Health & Safety **Green**-Laboratory Supervisor

XI. TRAINING

Initial training for all personnel generating or handling hazardous chemical waste, and annual refresher training, is mandatory as per United States and Illinois Environmental Protection Agency. This requirement includes laboratory Principal Investigators.

CEHS will train all personnel involved in hazardous chemical waste activities. CEHS will present 1-hour workshops on a regular basis.

Training documentation must be maintained for personnel trained. These records must be maintained for not less than three years from the last date of employment. Laboratory supervisors are responsible for determining who in their lab must be trained, keeping training records for all their personnel, and ensuring attendance at annual training sessions. All personnel must receive initial training within six months of hire.

Following are parts of the Illinois regulations mandating training.

Excerpt from Illinois Regulations:

Section 722.134 Accumulation Time

a) Except as provided in subsections (d), (e) or (f), a generator is exempt from all the requirements in 35 Ill. Adm. Code 725. Subparts G and H, except from all the requirements in 35 Ill. Adm. Code 725.211 and 725.214 and may accumulate hazardous waste on site for 90 days or less without a permit or without having interim status provided that:

4) The generator complies with the requirements for owners and operators in 35 Ill. Adm. Code 725.116 and 728.107(a)(4).

Section 725.116 Personnel Training

a) 1) **Facility personnel must successfully complete a program of classroom instruction or on-the-job training that teaches them to perform their duties in a way that ensures the facility's compliance with the requirements of this Part.** The owner or operator must ensure that this program includes all the elements described in the document required under paragraph (d)(3) of this section.

2) This program must be directed by a person trained in hazardous waste management procedures, and must include instruction which teaches facility personnel (including contingency plan implementation) relevant to the positions in which they are employed.

3) At a minimum, the training program must be designed to ensure that facility personnel are able to respond effectively to emergencies by familiarizing them with emergency procedures, emergency equipment, and emergency systems, including where applicable:

A) Procedures for using, inspecting, repairing and replacing facility emergency and monitoring equipment;
B) Key parameters for automatic waste feed cut-off systems;
C) Communications or alarms systems;
D) Response to fire or explosions;
E) Response to groundwater contamination incidents; and
F) Shutdown of operations.

b) Facility personnel must successfully complete the program required in paragraph (a) of this Section upon the effective date of these regulations or six months after the date of their employment or assignment to a facility or to a new position at a facility, whichever is later. Employees hired after the effective date of these regulations must not work in unsupervised positions until they have completed the training requirements of paragraph (a) of this Section.

c) Facility personnel must take part in an annual review of the initial training in paragraph (a) of this Section.

d) The owner or operator must obtain the following documents and records at the facility:

1) The job title for each position at the facility related to hazardous waste management and the name of the employee filling each job;
2) A written job description for each position listed under paragraph (d)(1) of this Section. This description may be consistent in its degree of specificity with descriptions for other similar positions in the same company location or bargaining unit, but must include the requisite skill, education or other qualifications and duties of facility personnel assigned to each position;
3) A written description of the type and amount of both introductory and continuing training that will be given to each person filling a position listed under paragraph (d)91) of this Section;
4) Records that document that the training or job experience required under paragraphs (a), (b) and (c) of this Section has been given to and completed by facility personnel.

e) Training records on current personnel must be kept until closure of the facility, training records on former employees must be kept for at least three years from the date the employee last worked at the facility. Personnel training records may accompany personnel transferred within the same company.

XII. GENERAL REQUIREMENTS FOR SATELLITE ACCUMULATION POINTS

SIUC is required to dispose of generated hazardous waste within a ninety day time period. This 90 day “clock” starts when a waste container becomes full, or a pickup request form is completed. The waste is taken from each Satellite Accumulation Point to the Central Accumulation Facility at CEHS, where an outside disposal contractor comes on a regular basis to take the waste. This waste is then taken to an off-site Treatment Storage and Disposal Facility where it is incinerated, neutralized, or otherwise treated.

Each laboratory generating hazardous waste on campus must establish a Chemical Waste Satellite Accumulation Area. This is the point of generation for hazardous waste. As long as the generator keeps no more than 55 gallons of non-acute waste, or one gallon of acute waste, in this area where waste is being accumulated, it will remain a satellite area. If a waste container is full, it can no longer be accumulating, since it can’t have any more material put in it. If this waste is left in the laboratory for three days, the satellite area may be deemed by EPA as having become a Central Accumulation Facility. This area could then be cited for failure to follow requirements for a Central Accumulation Facility, including weekly inspections, physical separation of waste, and other requirements.

In order for a lab to avoid being declared a Central Accumulation Facility, each container must be removed from the lab within three days of the time it is full, or within three days of the time it is no longer needed. Therefore, if a waste container becomes full, complete a pickup request form for the material *immediately* and send it to CEHS. Only one bottle is allowed for each waste stream.

1. Keep an area of the laboratory designated for chemical waste only, and label as such. CEHS will provide a poster for this purpose.
2. Keep all chemical waste in an appropriate container, closed with a screw type lid. Waste containers must be compatible with the contents, so that the waste does not degrade the container. For example, don’t place waste hydrofluoric acid in a glass bottle, since the HF will damage the bottle.
3. Keep waste containers ***closed*** at all times waste is not being added to them.
4. Keep an appropriate label on all chemical waste containers.
5. Post an emergency contingency plan in a clearly visible area of the lab near a telephone or exit.
6. Fill out a pickup request form as soon as a waste container becomes full.
7. Each month, inspect the satellite area and complete the required checklist.
8. Clean up any chemical spills immediately. Material spilled on benchtops, in fume hoods or on floors can be deemed uncontrolled chemical waste releases by EPA.
9. Keep a copy of the Chemical Waste Management Guide in an area of the laboratory where all personnel know the location of it.
10. Make sure all laboratory personnel have been trained regarding proper chemical waste management activities, and that training records are kept for at least three years after their employment with the University.

Excerpt from Illinois Regulations:

c) Accumulation near point of generation. *(Satellite Accumulation Point)*

1) A generator may accumulate as much as 55 gallons of hazardous waste or one quart of acutely hazardous waste listed in 35 Ill. Adm. Code 721.133(e) in containers at or near any point of generation where wastes initially accumulate, which is under the control of the operator of the process generating the waste, without a permit or interim status and without complying with paragraph (a) provided by the generator:

   A) Complies with 35 Ill. Adm. Code 725.271, 725.272 and 725.273(a); and

   B) marks the generator's containers either with the words "Hazardous Waste" or with other words that identify the contents of the containers.

2) A generator who accumulates either hazardous waste or acutely hazardous waste listed in 35 Ill. Adm. Code 721.133(e) in excess of the amounts listed in subsection (c)(1) at or near any point of generation must, with respect to that amount of excess waste, comply within three days with subsection (a) or other applicable provisions of this chapter. During the three day period the generator must continue to comply with subsection (c)(1). The generator must mark the container holding the excess accumulation of hazardous waste with the date the excess amount began accumulating.