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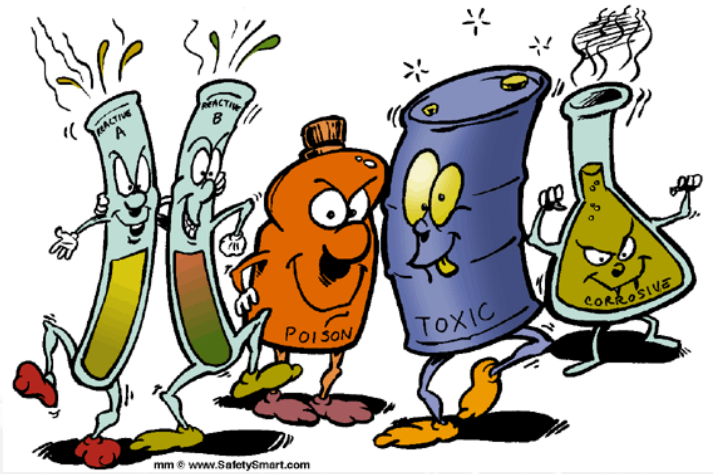
RESEARCH SAFETY

CU Hazardous Waste Training – How to Dispose of Chemical Waste

Presented by The Office of Research Safety



June Brock-Carroll, LVT, CHMP
Hazardous Materials Manager

CLEMSON UNIVERSITY

Two Laws to Remember:

Resource Conservation and Recovery Act (RCRA)

This is the law most associated with hazardous waste. Under RCRA, a waste can be hazardous if it is Listed (i.e. identified by name on one of several lists) or characteristic (is not listed, but has some hazardous property, like flammability). RCRA requires generators to ensure and fully document that the hazardous waste they produce is properly identified, managed on-site for no more than 90 days and transported to a RCRA-permitted treatment, storage or disposal (TSD) facility.

These RCRA requirements are administered by the South Carolina Department of Health and Environmental Control (SCDHEC) and implemented under the South Carolina Hazardous Waste Management Regulations, SCHWMR.

Comprehensive Environmental Response, Clean up, and Liability Act (CERCLA)

CERCLA is a federal law which makes it illegal to dispose of any material which is harmful to the environment. No lists or characteristics are included; it's up to the individual disposing of the waste to determine if it is environmentally unfriendly.

There are other environmental laws which govern the release of materials into the air and water such as The Toxic Substance Control Act (TSCA), The Federal Insecticide, Fungicide and Rodenticide Act (FIFRA), The Clean Air Act (CAA) and The Clean Water Act (CWA).

Hazardous Waste Management Training is required if you:

- Generate hazardous waste
- Identify hazardous waste
- Add hazardous waste to accumulation containers
- Transport hazardous waste to accumulation points
- Inspect hazardous waste accumulation points
- Prepare hazardous waste manifests or reports
- Or engage in any other activity which involves exposure to, or management of hazardous waste.

Generators in Satellite Accumulation Areas (SAAs) are required to have training initially and retrained if their process or their job changes per SCHWMR.

Hazardous Waste Managers in Central Accumulation Areas (CAAs) aka 90 day facilities are required to have annual training per RCRA and SCHWMR.

Hazardous Waste Generator Status

Those within Clemson University who have a potential for generating hazardous waste at any generator status level are responsible for four primary management activities:

- **Hazardous waste minimization**
  - **Toxicity Reduction**
  - **Volume Reduction**
  - **Material Substitution**
- Proper management of the waste material while it is being generated
- Processing hazardous waste for removal.
- Obtaining the knowledge and putting that into practice in the proper management of hazardous waste in accordance with all federal and state regulations and laws

Hazardous Waste Generator Status

Generators must not:

- Treat hazardous waste on site
- Store hazardous waste longer than their respective accumulation time limits at the Central Accumulation Area (CAA)
- Transport hazardous waste to or from any other CU facility/location operating under a separate EPA ID Number
- Negligently or otherwise unlawfully dispose of hazardous waste

Hazardous Waste Generator Status

Hazardous Waste Generator Status

"**Conditionally Exempt Small Quantity Generator(CESQG)**"

- Generates no more than 100 kg (220lbs) of hazardous waste per calendar month
- Generates no more than 1kg (2.2lbs) of an acutely toxic hazardous waste per calendar month
- Can not accumulate more than 1,000kg (2200lbs) at any given time
- Must ensure that hazardous waste is delivered to a facility that is authorized to manage it.

- Must follow "Best Practices" set forth by Clemson University for training and container management. These will be the same practices described later in the presentation for container management and labeling under generator requirements.

Under the new Hazardous Waste Generator Waste Rules, a CESQG will be known as a "Very Small Quantity Generator".

Hazardous Waste Generator Status

"**Small Quantity Generator (SQG)**"

- EPA ID Number required
- Generates more than 100 kg (220lbs) but less than 1,000kg (2200lbs) of hazardous waste per calendar month
- Can accumulate up to 6,000 kg (13,200lbs) of hazardous waste at any given time
- May accumulate hazardous waste on-site for 180 days
- Must comply with container management regulations
- Must comply with hazardous waste manifest and pre-transport requirements
- Must comply with the preparedness and prevention requirements basic Plan required)
- Must comply with the land disposal restriction requirements
- Must always be at least one employee available to respond to an emergency. (Emergency Coordinator)

Hazardous Waste Generator Status

"**Small Quantity Generator (SQG)**" cont'd.

- Basic training in proper hazardous waste management and emergency procedures for the waste generated
- Must demonstrate a good faith effort at waste minimization
- Waste must be sent to a RCRS permitted TSDF
- Must submit Annual Notice of Activity (DHEC 2701 form) to DHEC by January 31 of each year

- Must follow "Best Practices" set forth by Clemson University.

Hazardous Waste Generator Status

"<u>Large Quantity Generator LQG</u>"

- EPA ID Number Required
- Generates 1000kg (2200lbs) or more hazardous waste per calendar month
- Accumulate waste on site for 90 days
- Hazardous Waste must be managed in containers in compliance with 40 CFR part 265 subpart I
    - Container integrity
    - Compatibility of container
    - Container management
    - Inspections (weekly)
    - Air emissions (VOCs)
- Must comply with hazardous waste manifests and pre-transport requirements
- Must comply with land disposal restrictions regulations
- Must have a written contingency plan and emergency procedures and this must be circulated to all emergency responders that may respond to an incident. Contingency Plans must be updated immediately when information changes.

Hazardous Waste Generator Status

"**Large Quantity Generator LQG**" cont'd.

- Must submit quarterly reports to DHEC
- All generators must be trained in hazardous waste management under SC Hazardous Waste Regulations initially and then retrained if their job or function/procedures change.
- All hazardous waste managers must be trained in Hazardous waste Management, DOT transportation Regulations, Emergency response, in-house training specific to the 90 day facility operations annually
- Must have a written Hazardous Waste Minimization plan and this must be circulated to all emergency responders that may respond to an incident. Contingency Plans must be updated immediately when information changes.

Hazardous Waste Generator Status

Clemson University Hazardous Waste Minimization Plan

As a large quantity generator of hazardous waste, Clemson University Main Campus is required to have a waste minimization plan under RCRA. As a teaching institute and a research facility with the potential to generate any and all types of hazardous waste with a multitude of generators, Clemson University incorporates waste minimization into our Hazardous Waste Training for Generators. Generators are instructed that they must strive to:

- reduce hazardous waste whenever possible by replacing hazardous materials with non-hazardous ones,
- reducing the volume(s) of waste by only running an experiment the necessary numbers of times to achieve their end results or
- replacing toxic chemicals with less toxic ones.

Clemson University has implemented this plan as a ”Best Practice” at all of our facilities no matter the generator status.

Hazardous Waste Generator Status

Conditionally Exempt Small Quantity Generators (CESQGs)

- must identify all the hazardous waste generated
- may not generate more than 100 kilograms (220 lbs) of hazardous waste or 1kg (2.2) lbs of acutely hazardous waste at any time
- may not accumulate more than 1000 kilograms (2200 lbs)
- must ensure that hazardous waste is delivered to a person or facility who is authorized to manage it (TSDF)

Small Quantity Generators (SQGs)

- above plus
- generate more than 100 kilograms, but less than 1,000 kilograms, of hazardous waste or 1kg (2.2) lbs of acutely hazardous waste per month (>220lbs but <2200lbs)
- may accumulate hazardous waste on-site for 180 days without a permit (or 270 days if shipping a distance greater than 200 miles)
- quantity of hazardous on-site waste must never exceed 6,000 kilograms
- must comply with the hazardous waste manifest and pre-transport requirements
- must comply with the preparedness and prevention requirements and the land disposal restriction requirements
- must always be at least one employee available to respond to an emergency. This employee is the emergency coordinator responsible for coordinating all emergency response measures. SQGs are not required to have detailed, written contingency plans.

Large Quantity Generators (LQGs)

- above plus
- no limit of waste generated per month or onsite at any given time
- may only accumulate onsite for 90 days prior to shipping to a TSDF
- All liquids must be in secondary containment
- must have a written contingency plan
- generators must be trained
- annual trainings for Hazardous Waste Managers

What is Hazardous Waste?

Hazardous waste is waste that is dangerous or potentially harmful to our health or the environment. Hazardous wastes can be liquids, solids, gases, or sludges. They can be discarded products, like cleaning fluids or pesticides, or the by-products of research processes.

If it is a chemical that is ready for disposal, you must dispose of it as a Hazardous Waste.

DO NOT DUMP ANY CHEMICAL DOWN THE DRAIN!

Clemson University Main Campus is a municipality which operates it's own Waste Water Treatment Plant (POTW). This plant is governed by a DHEC permit which controls what can and can not be introduced into this sewer system. Our Waste Water Treatment Plant
has not permitted any amount
of chemical to be discharged
into its system.

All other CU facilities must contact Research Safety Hazardous Materials personnel prior to any drain disposals. Approvals for drain disposal must be given by Research Safety and ***Written Permission must be Obtained from The loca. POTWs and kept on file***

Excerpt from CU Waste Water Discharge Permit for Main Campus issued by SC DHEC of what is NOT allowed:

Pollutant(s) which create a fire or explosion hazard in the POTW, including, but not limited to, waste streams with a closed cup flashpoint of less than 140 degrees Fahrenheit or 60 degrees Centigrade.

Pollutant(s) which will cause corrosive structural damage to the POTW, but in no case discharges with pH lower than 5.0, unless the works is specifically designed to accommodate such discharges.

Solid or viscous pollutant(s) in amounts which will cause obstruction to the flow in the POTW resulting in interference.

Any pollutant, including oxygen demanding pollutants, (BOD, etc.), released in a discharge at a flow rate and/or pollutant concentration which will cause interference with the POTW.

Heat in amounts which will inhibit biological activity in the POTW resulting in Interference, but in no case heat in such quantities that the temperature at the POTW Treatment Plant exceeds 40°C (104 OF) unless the Department, upon request of the POTW, approves alternate temperature limits.

Petroleum oil, nonbiodegradable cutting oil, or products of mineral oil origin in amounts that will cause interference or pass through.

Pollutants which result in the presence of toxic gases, vapors, or fumes within the POTW in a quantity that may cause acute worker health and safety problems.

Any trucked or hauled pollutants, except at discharge points designated by the POTW.

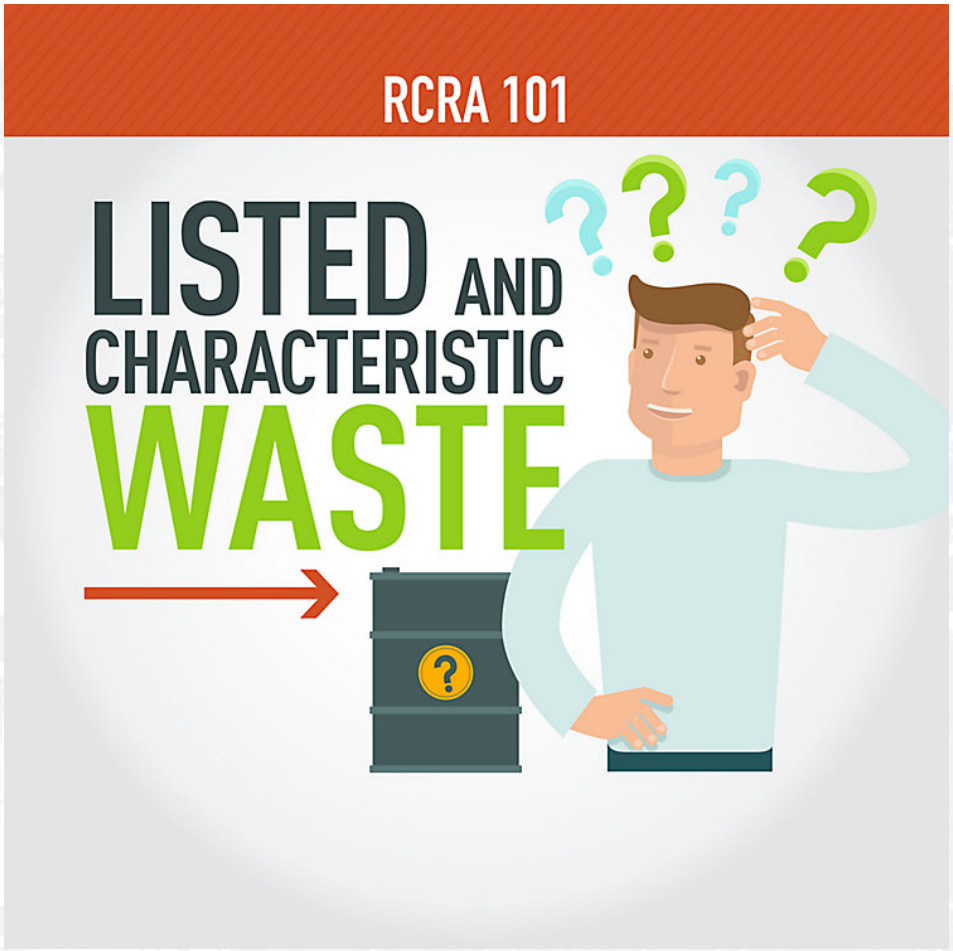
Types of Hazardous Waste

Characteristic Waste

- Ignitable
- Corrosive
- Toxic
- Reactive

Listed Waste

- F
- P
- U



Types of Hazardous Waste

Characteristic Waste

Ignitable (Flammables/Oxidizers)
Flash Point equal to or less than 140 degrees Fahrenheit
Aqueous solution containing 24% or more of an alcohol
(Examples: Flammable - Acetone, Methanol, Naphthalene, Oxidizers - Sodium Nitrate, Nitric Acid, Chromium Trioxide)

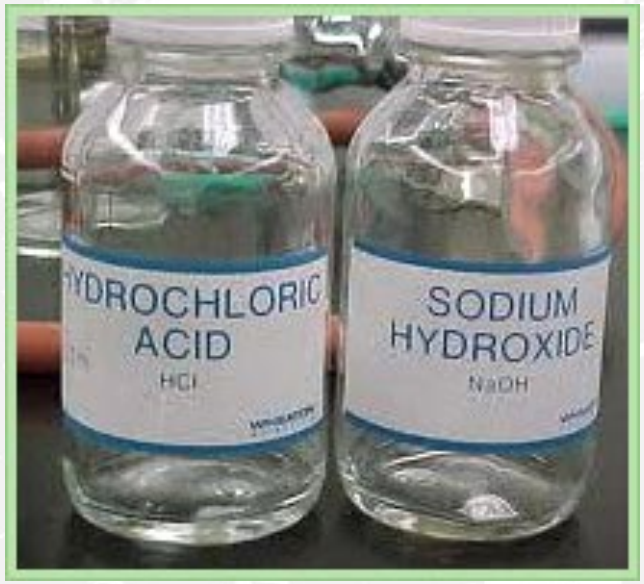
Flammable Liquids/Solids

Oxidizers

Types of Hazardous Waste

Characteristic Waste

Corrosive (Acids/Bases)
pH equal to or less than 2 or equal to or greater than 12.5
(Ex. Sulfuric, Hydrochloric, Sodium Hydroxide, Butyl Lithium)



Types of Hazardous Waste

Characteristic Waste

Toxic (RCRA D-listed)

Solid waste which exhibits the characteristics of toxicity when using TCLP (Toxicity Characteristic Leaching Procedure). This list is found in the CU Hazardous Waste Management Manual and on SCDHEC website. *(Ex. Chloroform, Trichloroethylene, Barium, Lead, Mercury)*

The D-List

RCRA HW No.	Contaminant	CAS No.	Regulatory Level (mg/L)
D004	Arsenic	7440-38-2	5.0
D005	Barium	7440-39-3	100.0
D018	Benzene	71-43-2	5.0
D006	Cadmium	7440-43-9	1.0
D019	Carbon Tetrachloride	56-23-5	0.5
D020	Chlordane	57-74-9	0.03
D021	Chlorobenzene	108-90-7	100.0
D022	Chloroform	67-66-3	6.0
D007	Chromium	7440-47-3	5.0
D023	o-Cresol	95-48-7	[5]200.0
D024	m-Cresol	108-39-4	[5]200.0
D025	p-Cresol	106-44-5	[5]200.0
D026	Cresol		[5]200.0
D016	2,4-D	94-75-5	10.0
D027	1,4-Dichlorobenzene	106-46-7	7.5
D028	1,2-Dichloroethane	107-06-2	0.5
D029	1,1-Dichloroethene	75-35-4	0.7
D030	2,4-Dinitrotoluene	121-14-2	[5]0.13
D012	Endrin	72-20-8	0.02
D031	Heptachlor (and its epoxide)	76-44-8	0.008
D032	Hexachlorobenzene	118-74-1	[5]0.13
D033	Hexachlorobutadiene	87-68-3	0.5
D034	Hexachloroethane	67-72-1	3.0
D008	Lead	7439-92-1	5.0
D013	Lindane	58-89-9	0.4
D009	Mercury	7439-97-6	0.2
D014	Methoxychlor	72-43-5	10.0
D035	Methyl ethyl ketone	78-93-3	200.0
D036	Nitrobenzene	98-95-3	2.0
D037	Pentrachlorophenol	87-86-5	100.0
D038	Pyridine	110-86-1	[5]5.0

Types of Hazardous Waste

Characteristic Waste

Reactive

Reacts Violently with Water, Unstable, Explosive. Use Safety Data Sheets (Material Safety Data Sheets) to help with this characteristic determination.

(Ex. Calcium Hydride, Sodium/Potassium Metals, Sodium Perchlorate)

Types of Hazardous Waste

Listed Wastes

TOXIC & OTHER
Alphabetical Order

Hazardous Waste No.	Chemical Abstracts No.	Substance
See F027	93-76-5	Acetic acid, (2,4,5-trichlorophenoxy)-
U002	67-64-1	Acetone (I)
U003	75-05-8	Acetonitrile (I,T)

Toxic Waste	(T)
Acute Hazardous Waste	(H)
Ignitable Waste	(I)
Corrosive Waste	(C)
Reactive Waste	(R)
Toxicity Characteristic Waste	(E)

Types of Hazardous Waste

Listed Wastes

F-List (spent solvents from Non-Specific Sources)

(Ex. Acetone, Methanol, Dichloromethane, Toluene)

Industry and EPA hazardous waste number	Hazardous waste	Hazard code
Generic:		
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 per cent 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.	(T)
F002	The following spent halogenated solvents: tetrachloroethylene, methylene chloride, trichloroethylene, 1,1,1-trichloroethane, chlorobenzene, 1,1,2-trichloro-1,2,2-trifluoroethane, orthodichlorobenzene, trichlorofluoromethane, and 1,1,2-trichloroethane; all spent solvent mixtures/blends containing, before use, a total of ten per cent 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.	(T)
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 per cent 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.	(I) *

These lists are also found in the CU Hazardous Waste Management Manual and on the SCDHEC website.

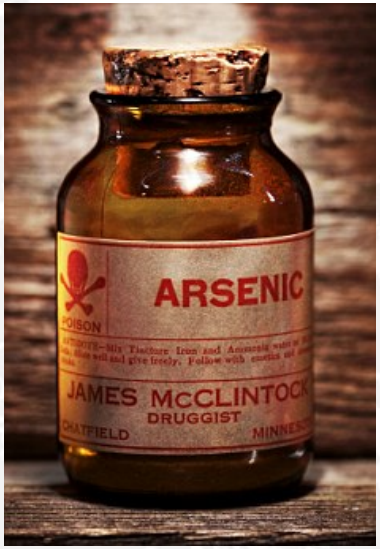
Types of Hazardous Waste

Listed Wastes

P-List (Acute Toxics, unused chemicals, sole active ingredients)

(Ex. Arsenics, Cyanides, Epinephrine, Nicotine)

(P-List materials are of discarded commercial chemical products, off-specification species, container residues, or spill residues.)



Example RCRA P-Listed Waste Codes

Note: must contain constituent as sole-active ingredient and be unused or discarded

Waste Code	Constituent of Concern	Product Name Examples:
P001	Warfarin & salts (concentration > 0.3%)	Coumadin; Warfarin
P012	Arsenic trioxide	Trisenox
P042	Epinephrine	Adrenalin; EpiPen; Eppy/N; Epifrin; Epinal; Anaphalaxis kit; Epinephrine (inhalants, injectibles, kits); Racepinephrine; Racord; Primatene aerosol inhaler
P046	Phentermine	Phentermine (CIV)
P075	Nicotine & salts	Nicotine patches; Habitrol; Nicoderm; Nicorette; Nicotrol; Tetrahydronicotyrine
P188	Physostigmine salicylate	aka Eserine salicylate
P204	Physostigmine	aka Eserine

These lists are also found in the CU Hazardous Waste Management Manual and on the SCDHEC website.

Types of Hazardous Waste

Listed Wastes

U-Listed (Toxics, unused chemicals, sole active ingredients) *(Ex. Acetone, Chloroform, Phenol, Toluene)*
(U list materials are of discarded commercial chemical products, off-specification species, container residues, or spill residues.)

These lists are also found in the CU Hazardous Waste Management Manual and on the SCDHEC website.

Example RCRA U-Listed Waste Codes

Note: must contain constituent as sole-active ingredient and be unused or discarded

Waste Code	Constituent of Concern	Product Name Examples:
U010	Mitomycin C	Mitomycin; Mitomycin C; Mutamycin; Mutamycin VHA Plus
U015	Azaserine	Chemotherapy for leukemia
U034	Chloral / Chloral hydrate	Chloral hydrate (CIV)
U035	Chlorambucil	Leukeran
U044	*Chloroform*	*Not commonly seen*
U058	Cyclophosphamide	CTX; Cytoxan injection, Lycophilized/VHA Plus; Neosar; Procytox
U059	Daunomycin	Daunorubicin, Cerubidin, DaunoXome, Rubidomycin; Liposomal; Idarubicin/Idamycin; Daunomycin
U075	Dichlorodifluoromethane	Dichlorodifluoromethane
U089	Diethylstilbesterol	Diethylstilbestrol, DES (synthetic estrogen), Stilphostrol
U121	Trichloromonofluromethane	Trichlorofluoromethane
U129	Lindane	G-Well shampoo; Kwell; shampoo
U132	Hexachlorophene	Phisohex disinfectant
U150	Melphalan	Alkeran; L-PAM; Melphalan
U151	Mercury	Mercurochrome; Mercury iodide; Mercury chloride; Mercury sulfate
U182	Paraldehyde	Paral; Paraldehyde (CIV)
U187	Phenacetin	Acetophenetidin; typically veterinary
U188	Phenol	Phenol; Liquified phenol
U200	Reserpine	Resperine
U201	Resorcinol	Resorcinol
U205	Selenium sulfide	Exsel shampoo; selenium sulfide; Selsun
U206	Streptozotocin	Streptozotocin; Streptozocin; Zanosar
U237	*Uracil mustard*	*Not commonly seen: Uracil mustard; Uramustine*
U248	Warfarin & salts (concentration ≤ 0.3%)	Warfarin

Types of Hazardous Waste

Miscellaneous Hazardous Wastes

These are materials that you may not think of as hazardous:

Aerosol containers (even when empty)

Ruptured/leaking batteries

Broken lamps

Soil/gravel contaminated with hazardous material

Types of Hazardous Waste

Non-RCRA Regulated Hazardous Wastes

Any chemical wastes that do not meet the definition of a RCRA characteristic or listed waste. These are Non-RCRA regulated Wastes.

Ex. Ethidium Bromide, Stains/Dyes, 10% Formalin

Types of Hazardous Waste

Non-RCRA Regulated Hazardous Wastes

Oils contaminated with water, metals, antifreeze and oil clean up materials, pads, socks, etc must be managed under the hazardous waste program for disposal.

Generator (That's you!)Responsibilities

- **Hazardous Waste Container Selection**

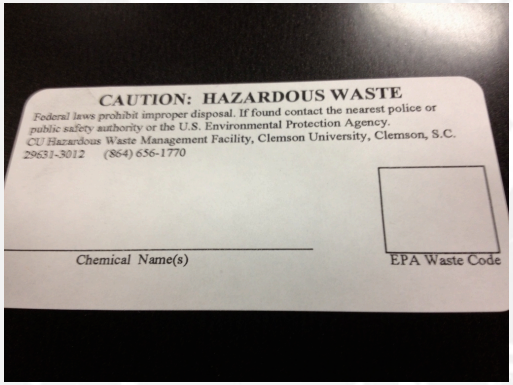
(Must be compatible with waste, i.e. you would not use a metal container for an acidic waste stream or an empty oxidizer container to collect flammable waste.)

- **Proper Management of Container while at Satellite Accumulation Area:**
  - Labeling
  - Closed Container
  - Integrity of Container
  - Secondary Containment
  - Segregation
  - Declare Hazardous Waste to Research Safety

Generator (That's you!)Responsibilities

Labeling

- A hazardous waste label or the words "Hazardous Waste" must be applied to the container when the **first drop** of waste is added to it or in the case of an unused chemical, as soon as you decide it is no longer needed.
- All chemical constituents must be listed on the container. Percentages of each constituent should also be listed.
- Chemical names, *NOT ABBREVIATIONS*, must be used.
- The hazard(s) of the Hazardous Waste Stream, i.e. flammable, corrosive, toxic, oxidizer, reactive, etc., must also be marked on the container. (The generator is responsible for making the hazard determination(s) of their waste streams.)



Please NOTE:

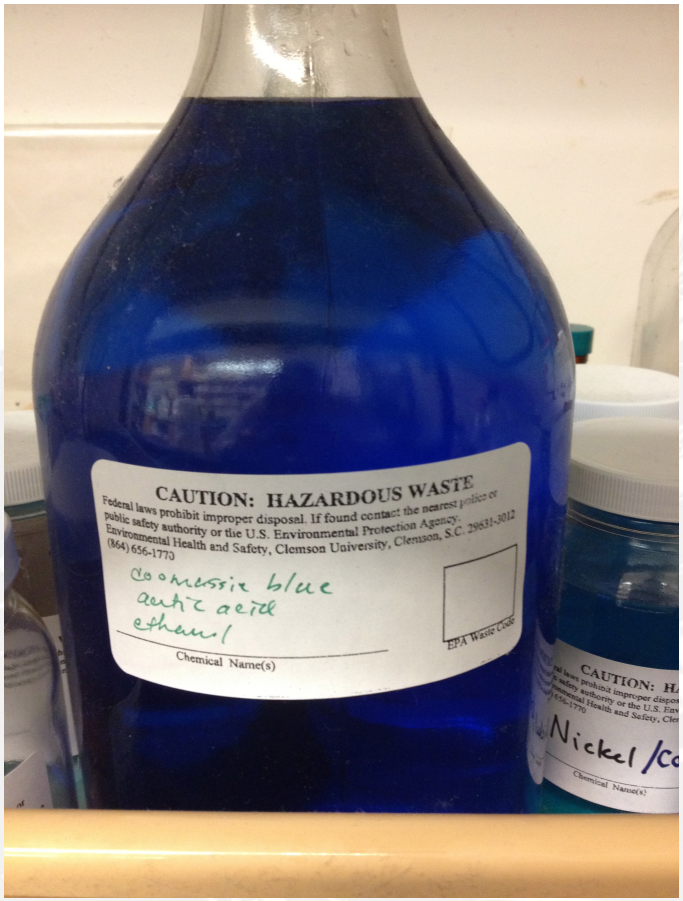
Dates should not be applied in the Satellite Accumulation Area (aka your lab).

This area has no time limit for accumulation of Hazardous Waste as long as you remain below 55 gallons of Hazardous Waste or 1 quart of P-listed (Acutely Toxic) waste. If these limits are reached, you are then required to date the excess waste and notify the Hazardous Waste Officer. We then have 3 days to remove the excess hazardous waste.

*CU and ORS Hazardous Waste Staff recommends that you arrange with us to remove all hazardous waste on a routine basis and do not let it accumulate indefinitely, especially those wastes that are unstable and/or may form peroxides.

If dates are applied, the 180 or 90 days that Clemson University has as a Small Quantity Generator or a Large Quantity Generator, respectively, to dispose of hazardous waste begins with that date.

Hazardous Waste Labels



Remember: Label must be applied when the first drop of waste is added to the container.

Generator (That's you!)Responsibilities

KEEP CONTAINERS CLOSED

Closed is defined as the lid is attached/secured in such a way that if tipped or knocked over nothing leaks out. **All hazardous waste containers must be kept tightly closed with a properly fitting lid** unless you are adding to them or taking away from them. The generator must be in the vicinity of the open container and actively working to have an open hazardous waste container.

Generator (That's you!)Responsibilities

Secondary Containment

All liquid Hazardous Waste must be kept in secondary containment. This containment must be compatible with the hazardous waste stream it holds. It MUST also be able to hold 10% of the total volume (if one container) or 100% total volume of the largest container (if more than one container).

Generator (That's you!)Responsibilities

Hazardous Waste Segregation

All hazardous waste must be stored in such a way as to prevent incompatibles from coming into contact with each other. This is most commonly accomplished by using secondary containers and chemical storage cabinets.

Generator (That's you!)Responsibilities

Declare Hazardous Waste to Research Safety

Hazardous Waste must be declared in writing to Research Safety for removal from the Satellite Accumulation Area. As with the Hazardous Waste Labelling requirements, you must use chemical names when filling out this form, abbreviations are not allowed.

Online Request Form:
http://www.clemson.edu/research/safety/hazardouswaste/HazWasteForm.html

This form meets the requirement for documentation of a hazard determination, serves as a transportation document that allows us to transport from your lab to the Accumulation Area, and an emergency document in case of incident during transport.

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Satellite Accumulation Area (SAA)

Hazardous Waste Responsibilities

❖Select an approved container

❖Container(s) Management:

- ✓ Label the container with the words "Hazardous Waste."
  Include all chemical constituents with percentages and hazard(s)
  (i.e. ……Hazardous Waste: Acetone50%,Water50% Flammable)
- ✓ Keep container tightly closed at all times!
- ✓ Protect the integrity of the container (Free of Dents, Corrosion or Bulging)
- ✓ Segregation of incompatible hazard classes
- ✓ Provide Secondary Containment for all liquid hazardous waste
- ✓ Declare hazardous waste in writing to Research Safety
  http://www.clemson.edu/research/safety/hazardouswaste/HazWasteForm.html

For more information please visit the Office of Research Safety website at:
http://www.clemson.edu/research/safety

Scan this QR code for a video demonstration

Universal Waste

Hazardous Material that meet the definition of a hazardous waste but may be managed under the Universal Waste regulations for recycle.

Lamps: Must be kept closed and labeled as “Used Lamps” or “Universal Waste Lamps”. Boxes must also be labeled with the accumulation start date. Lamps must be intact.

Universal Waste

Batteries: must be intact. Terminals must be either taped or each battery bagged separately to prevent contact. Labeled as “Used Batteries” or “Universal Waste Batteries” with accumulation start dates.
(Lead Acid Batteries have their own regulation.)

Universal Waste

Manufactured Articles Containing Mercury: Thermostats, Thermometers, etc. Labeled as “Used Manufactured Articles containing Mercury” or “Universal Waste Manufactured Articles containing Mercury” with accumulation Start Date.

At CU all mercury items are managed by Research Safety Hazardous Material Program.

Used Oil

Non-contaminated oil managed for recycling. Must be labeled as “**Used Oil**” not “Waste Oil”. Must be kept closed unless adding to the container. Also must have an accumulation start date on the container.

Inherently Waste-Like

Something may become a waste because it is discarded, abandoned, or considered inherently waste-like:

- Not managed as a valuable raw material or product
- Open with physical contaminants (leaves or dirt)
- Container in very poor condition
- Exposed to the elements
- Stored improperly
- Newer product or materials used prior to the container of concern
- Not labeled or identified as to the contents and hazards

Pharmaceutical Wastes

Disposal of pharmaceuticals, DEA Controlled or Non-controlled drugs/substances, is managed by the Hazardous Waste Management Facility. Guidance for disposal is located in the CU Hazardous Waste Management Manual. You may also contact the Hazardous Materials Manager for assistance with this waste stream.

Note: **Sanitary Sewer Disposal of Controlled Substances and Pharmaceuticals is forbidden at Clemson University.**

Unknowns

The potential exists for containers of unknown material to be discovered. These unknowns can be accepted by the Hazardous Waste Officer conditionally, but may be returned to the generating department for chemical analysis if the hazardous waste contractor cannot categorize the waste through on-site tests. Without knowledge of the container contents, appropriate disposal options cannot be determined.

DO NOT GUESS AT THE IDENTITY OR “CREATE” A NAME FOR AN UNKNOWN!

A wrongly identified waste, if released accidentally to the environment, if exploding during disposal, or if causing the fouling of an incinerator pollution control system, not only will harm life and property, but could result in potential litigation. Likewise, the indiscriminate discarding of unknown chemical substances can have equally serious consequences.

If an unidentified container is discovered, the following steps shall be taken:

- Mark the container with the words “Awaiting Administrative Determination” and date the container.
- Initiate a hazardous waste pickup.
- Immediately notify Pee Dee REC’s Safety and Compliance Officer to arrange for the container to be relocated to the Central Accumulation Area (CAA).

Empty Containers

An empty container is any container which has been emptied using all normal practices and contains no more 1 inch in the bottom of the container or 3% by weight of total capacity of the container if under 119 gallons or 0.3% if over 119 gallons and did not hold any acutely toxic (P-listed) waste.
These empty containers must be defaced, marked empty and then may be placed in the regular garbage.
An empty container that has held a P-Listed waste must be managed as a Hazardous Waste!

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Broken Glass Boxes

Broken glass and other sharp items shall be disposed of in rigid, puncture resistant containers to protect persons collecting the waste materials. These containers must be properly labeled. They should never be filled to the point where any material is protruding, or so that the weight of the carton would present a lifting hazard. Check to ensure that the container is intact and sound before attempting to lift. Securely tape the container before depositing in the dumpster. Ensure that **only clean** (not contaminated) glass is deposited to these containers.

No Needles
No contaminated pipettes
No contaminated glassware
No radioactive materials (must be disposed of as Radioactive Waste)
No chemicals (must be disposed of Hazardous Waste)
No biological materials (must be disposed of as Biohazard Waste)
BROKEN MERCURY THERMOMETERS MUST BE DISPOSED OF AS HAZARDOUS WASTE!

Also make sure that the box does not have a Biohazard symbol on it or is lined with a Biohazard bag.

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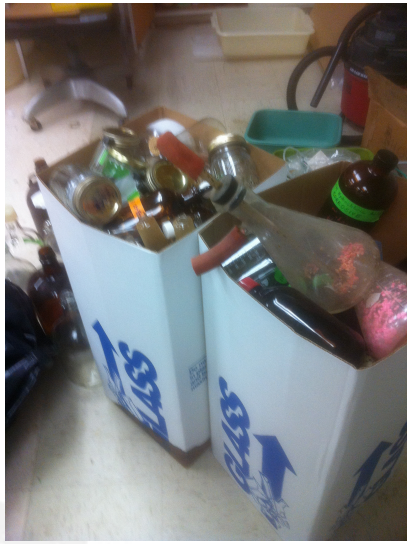

Unacceptable

Acceptable

Reacting Hazardous Waste

If a chemical effluent is generated and is still reacting at the end of a procedure, it is not yet a hazardous waste! It will not become a hazardous waste until the reaction/process is completed.

During the time the effluent is reacting, the generator should:
Place the collection **CONTAINER** labeled with the chemical constituents in a safe place (such as the chemical fume hood) inside Secondary Containment;
Loosely cap the container until the reaction has stopped;
Place a sign on the container that says:

"Caution: Contents Under Pressure, Loosely Capped Container"

When the reaction has completed, the generator should tightly close the cap, label the container with a Hazardous Waste label and declare the waste to the Hazardous Materials Program with the Office of Research Safety for removal from the Satellite Accumulation Area to the Hazardous Waste Management Central Accumulation Area in the same manner as non-reacting hazardous waste is declared.

Spill Incident Response

Clemson University Fire Department is the Hazardous Materials Response Team for main campus. In the event of a spill please contact CUFD by dialing **911 or 656-2222**.

For sites not on main campus or too far for the CUFD to service, agreements should be made with the local area emergency responders.

A written emergency plan should be established and communicated to all personnel in your laboratory. It should include procedures for ventilation failure, evacuation, medical care, reporting, and drills. There should be an alarm system to alert people in all parts of the facility including isolation areas such as walk-in cold rooms.

Appendix C of the CU Lab Safety Manual gives detailed information for laboratory chemical spill clean up procedures. However in the event of an acutely hazardous or large spill, Clemson University maintains a Remediation contract which can and should be utilized.

Any Deficiencies/Possible Problems Noted?

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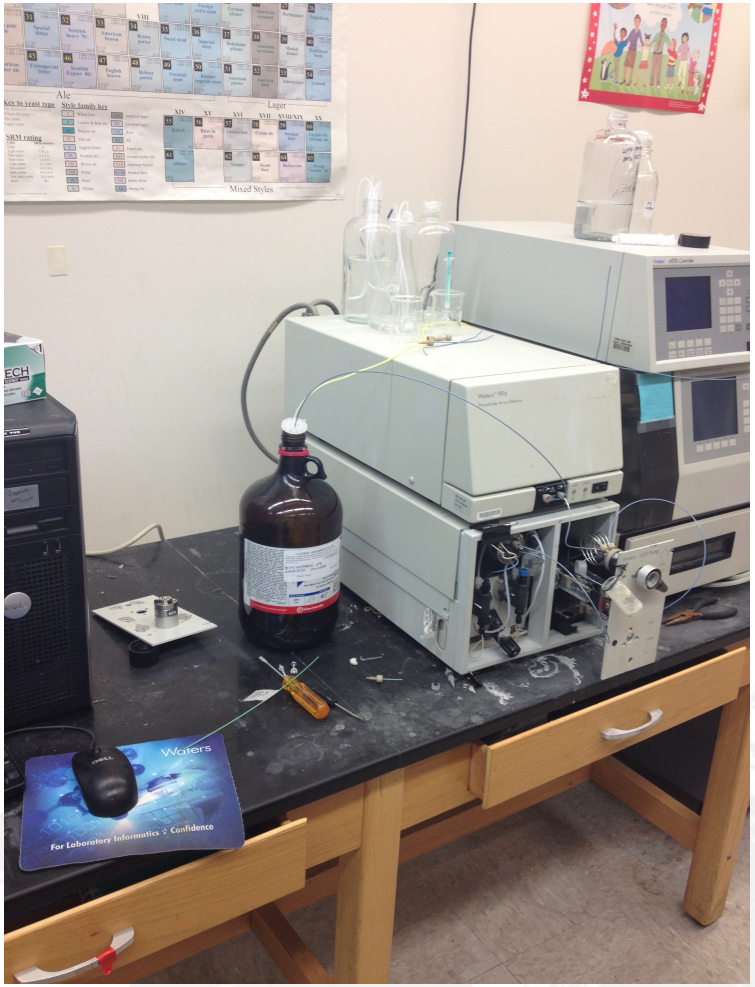
- Improper storage of cylinders
- No segregation
- No labels
- “Inherently Waste-like”

Any Deficiencies/Possible Problems Noted?



Any Deficiencies/Possible Problems Noted?

- Open container
- No secondary containment

Any Deficiencies/Possible Problems Noted?

Any Deficiencies/Possible Problems Noted?

Illegal discharge of Hazardous Waste to sewer drain

Any Deficiencies/Possible Problems Noted?

Any Deficiencies/Possible Problems Noted?

- Hazardous Waste container being stored and filled in laboratory sink.
- Illegal Discharge of Hazardous Waste via Sewer Drain

Any Deficiencies/Possible Problems Noted?

Any Deficiencies/Possible Problems Noted?

- Satellite Accumulation Area well over allowable limit of 55 gallons regulated hazardous waste.

Any Deficiencies/Possible Problems Noted?

Any Deficiencies/Possible Problems Noted?

Empty container in recycle bin

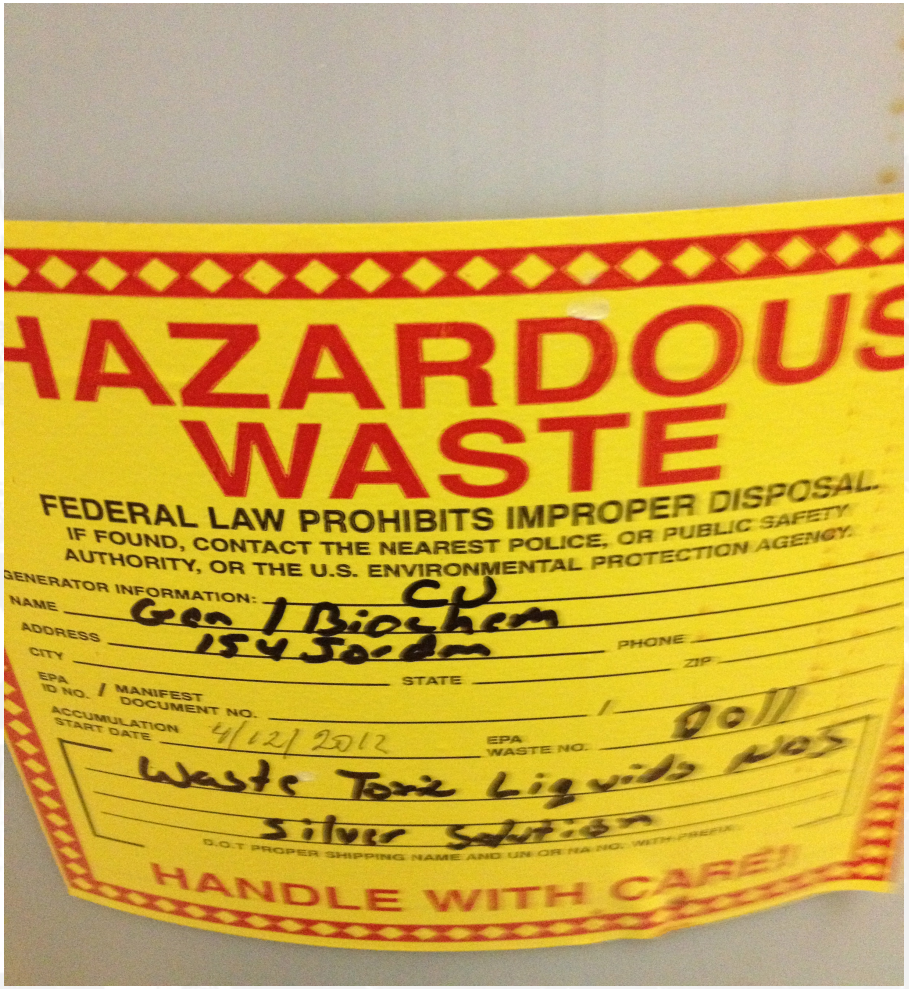
- labels not defaced
- no marking to indicate that container is empty.

Any Deficiencies/Possible Problems Noted?

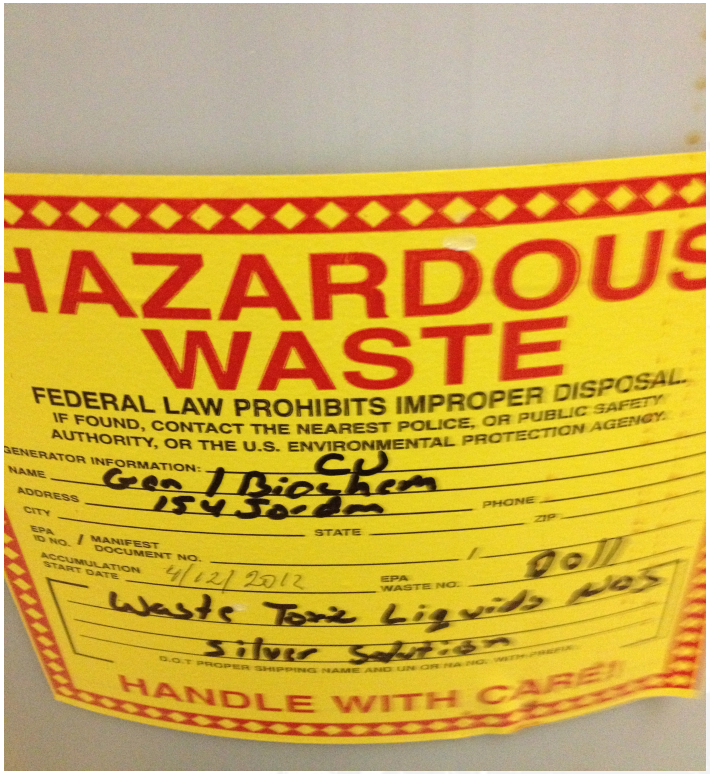
Any Deficiencies/Possible Problems Noted?

- Aerosol Can disposed of improperly
- Labeling on empty drum not defaced

Any Deficiencies/Possible Problems Noted?



Any Deficiencies/Possible Problems Noted?



- Insufficient Secondary Containment
- Date on label

Any Deficiencies/Possible Problems Noted?

Any Deficiencies/Possible Problems Noted?

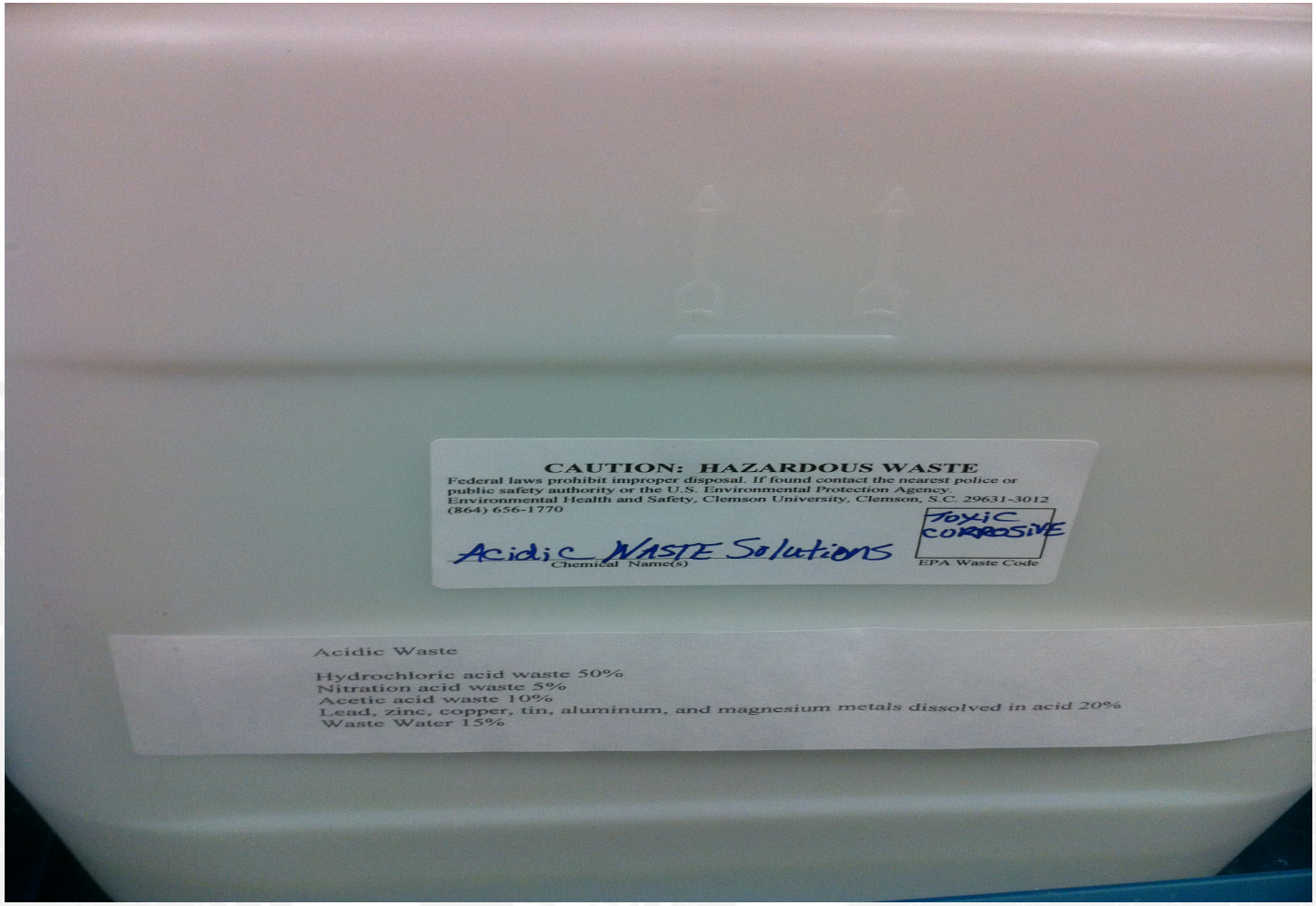
- No segregation
- No secondary containment
- Improper labeling
- Spillage on containers

Any Deficiencies/Possible Problems Noted?

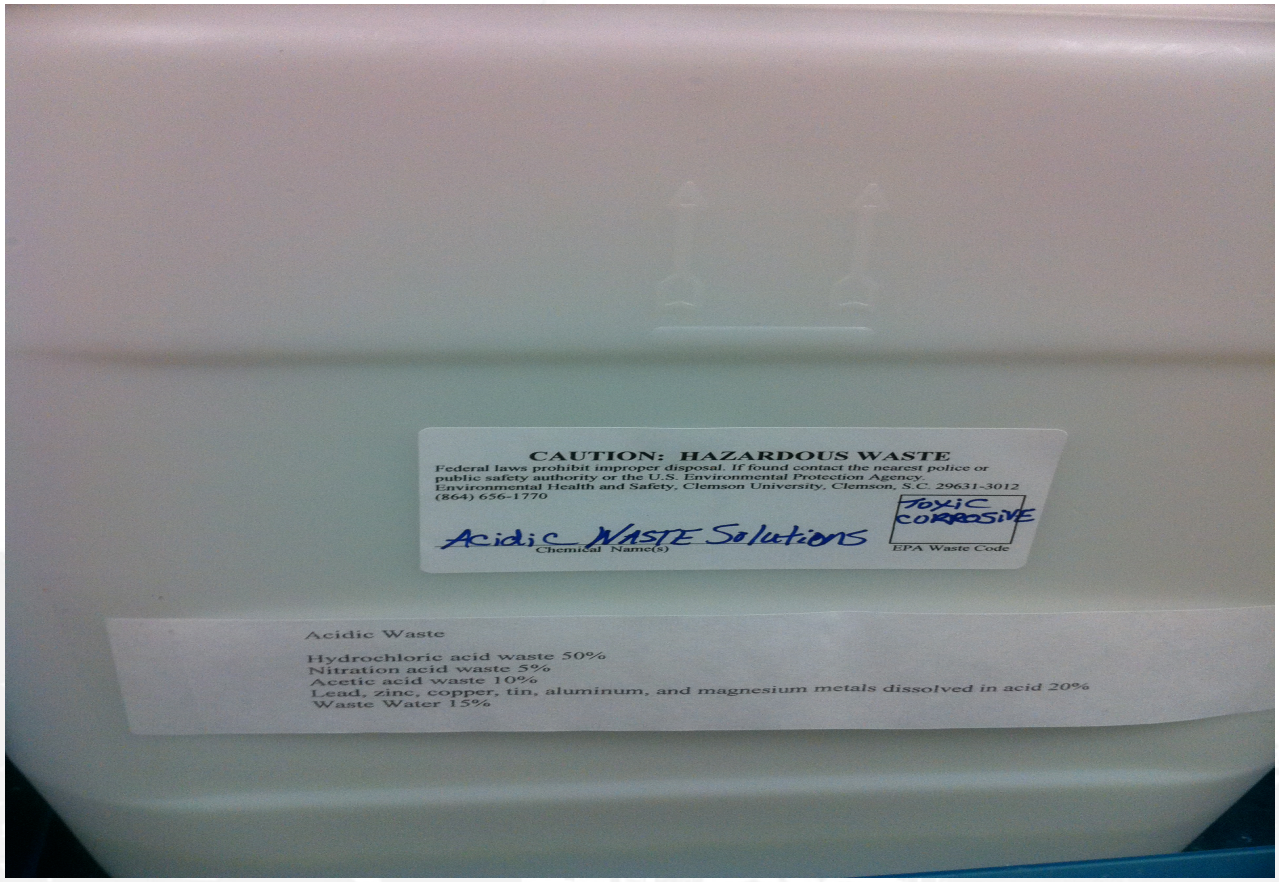
Any Deficiencies/Possible Problems Noted?

- Hazardous Waste collected in improper containers!
- Never use food containers for waste containers.

Any Deficiencies/Possible Problems Noted?



Any Deficiencies/Possible Problems Noted?



Properly Labeled Hazardous Waste

Office of Research Safety - Hazardous Waste Personnel

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The Office of Research Safety provides online training in the following areas:

Hazardous Materials Shipping
Biological Safety
Biological Safety Cabinets
Bloodborne Pathogens
Chemical Hygiene
Hazard Communication
Hazardous Waste Management
Laser Safety
Safety Data Sheets

http://www.clemson.edu/research/safety/

In person training is also available upon request in any of these subjects.

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