Clemson University Hazardous Waste Management Manual

Main Campus and Statewide Facilities

Revised: July 2024

List of Figures

List of Tables

Purpose

This manual outlines the proper procedures for managing hazardous waste at Clemson University, Clemson, South Carolina. This document is intended to serve as a "how-to" manual for Clemson employees, students and subcontractors involved with the handling of hazardous waste. These procedures will be revised as necessary to reflect changes in Clemson practices and environmental regulations.

Note: Clemson University has numerous off Campus Facilities that, due to their differing status under RCRA operate slightly differently under the regulations. However, with that said, Generator responsibilities that are required at a Large Quantity Generator facility will be implemented as Best Practices for Small Quantity and Very Small Quantity facilities. This includes but is not limited to: Hazardous Waste Determinations, Container management, labeling, segregation and secondary containment for liquid wastes. If a generator has any questions or concerns, they should consult with Occupational and Environmental Safety for guidance.

A description of hazardous waste and hazardous waste determination practices is provided in Section II. A discussion of hazardous waste minimization is also provided.

Hazardous waste storage procedures are presented in Section III. Section IV details the hazardous waste pick-up procedures. Section V provides off-site shipping requirements for hazardous waste. Procedures for addressing non-routine situations are detailed in Section VI. Section VII outlines the required training for applicable personnel.

Applicability

The procedures contained in this Hazardous Waste Management Manual shall be followed by all Clemson employees, students and subcontractor personnel employed by the University. The Hazardous Materials/Environmental Compliance Manager must approve any deviation from the procedures defined in this document in writing.

Regulatory Requirements

The Resource Conservation and Recovery Act of 1976 (RCRA) requires generators of hazardous waste to comply with the regulatory requirements contained in Title 40 of the Code of Federal Regulations Part 262 (40 CFR Part 262). This Part 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 for LQGs and 180 for SQGs and transported to a RCRA-permitted treatment, storage or disposal (TSD) facility. These RCRA requirements are administered by the South Carolina Department of Environmental Services (SCDES) and implemented under the South Carolina Hazardous Waste Management Regulations (R.61-79.262).

All procedures defined in this manual are written for compliance with the above regulations.

Clemson University's Classification

The South Carolina Hazardous Waste Management Regulations apply to the storage, treatment, transportation and disposal of wastes that either are listed by the Environmental Protection Agency (EPA) or meet one or more of the characteristics of ignitability, corrosivity, reactivity or toxicity as defined in 40 CFR 261.

Under these regulations, Clemson University's main campus is currently classified as a "Large Quantity Generator" of hazardous waste. Within this limitation, Clemson University personnel are prohibited from:

- Treating a hazardous waste,

- Storing a hazardous waste at an accumulation point for greater than ninety (90) days,
- Transporting hazardous waste away from the main campus, and
- Negligent or otherwise unlawful waste disposal.

Clemson University provides its departments with a single means for the lawful disposal of hazardous waste. A state and/or university contract service is maintained without charge to the generating department.

Those within Clemson University who have a potential for generating hazardous waste are responsible for four primary management activities:

- Hazardous waste minimization
- Hazard Determinations
- Proper management of the waste material while it is being generated
- Processing hazardous waste for removal.
- Obtaining the knowledge (training) and putting that into practice in the proper management of hazardous waste in accordance with all federal and state regulations and laws

This manual defines the procedures a department must implement in order to properly conduct these activities. In order to simplify compliance with hazardous waste regulations, each department may wish to select a Departmental Safety Coordinator for safety and environmental compliance issues. This individual will be trained by Occupational and Environmental Safety in the appropriate regulations. A fifth area of responsibility, Emergency Response Procedures for Accidental Release of Hazardous Waste, is discussed in the Hazardous Waste Incident Standard Operating Procedures.

Some chemicals are not regulated as hazardous substances but are, nonetheless, environmentally unfriendly and it is Clemson University's intent to protect the environment. Therefore, these chemicals will be managed as Non-RCRA Hazardous Waste.

At all Clemson University operated/owned/leased facilities, when any chemical/hazardous material/hazardous substance/dangerous good is ready for disposal, that chemical/hazardous material/hazardous substance/dangerous good will be managed as Hazardous Waste and only shipped via a Clemson University approved Hazardous Waste Disposal and/or Remediation Contractor for proper disposal. All Hazardous Waste will be managed under the Hazardous Materials Program within Occupational and Environmental Safety by those annually trained in Hazardous Materials Management. Only Occupational and Environmental Safety trained personnel can approve and sign Hazardous Waste Manifests.

The Hazardous Materials Manager will make all final determinations as to the final disposition of all chemical and biological substances that may be hazardous.

Notice: All of this material and the proper forms and on-line training are available on the Clemson University OES webpage at
https://www.clemson.edu/finops/oes/hazmaterials/hazardouswaste/index.html

Waste Characterization

General

Any substance that no longer serves its intended purpose and is destined for disposal should be evaluated by the generator to determine if it meets the definition of a hazardous waste per Clemson University's Hazardous Waste Determination Documentation Policy. (Appendix C) Every possible effort shall be made by the department to identify each waste stream. Unknowns can be accepted by the Hazardous Materials/Environmental Compliance Manager 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. 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.

NOTE: All radioactive waste, including those radioactive wastes that meet the definition for a hazardous waste, must be processed through Clemson University's Radiological Safety program for radioactive waste disposal.

The following sources shall be used to accurately characterize a waste stream:

- Section II of this Manual,
- Safety Data Sheets (SDS),
- Process Knowledge
- Appendix C Hazardous Waste Determination Documentation Policy

In the event that a waste chemical substance does not meet the regulatory definition of a RCRA hazardous waste, yet the generator recognizes unique hazardous characteristics which are not subject to other regulatory requirements, the generator should refer to the Hazardous Waste Determination Documentation Policy or contact the Hazardous Materials/Environmental Compliance Manager to determine if the waste substance should be disposed as a hazardous waste. Many hazardous chemicals may not be RCRA regulated but may be regulated by other laws and disposal restrictions.

Hazardous Waste Determination Procedures

Waste material, which may be a hazardous waste, is generated within three primary activities at Clemson University. These activities include:

- teaching
- research projects
- physical plant operations and maintenance.

The generators in these areas are responsible for properly characterizing the waste generated to determine if it is a hazardous waste. These activities generate three general categories of hazardous waste:

- off-specification chemical stock,
- research effluent and residue,

- facility operations and maintenance waste (e.g., paint related waste).

A Hazardous Waste Determination will be documented on the Pick Up Request and serve as the Documentation that the Generator had made this determination before any waste is moved by Occupational and Environmental Safety Hazardous Waste Personnel to the Central Accumulation Point. No waste can or will be picked up without this document.

The waste characterization process is defined in Figures II-1 through II-10. These flow charts guide the user through a systematic decision-making process for categorizing the wastes. Note that a waste stream may belong to more than one category; therefore, follow all of the flow charts in order to properly characterize the waste. This process is discussed in more detail in the following sections.

Solid Waste

The first question to be answered when defining a waste stream is: “Is this material a solid waste?” A solid waste is any solid, semi-solid, liquid or contained gaseous material that is discarded or considered “inherently waste-like” (R.61-79.261.2). Materials, which are solid wastes, are identified in Figure II-1.

Several types of materials are specifically excluded from the definition of solid waste under R.61-79.261.4. These waste types are listed in Figure II-2. Some recycled materials are also exempt from the definition of a solid waste. Some materials when recycled are solid wastes and others are not; these materials are defined in Figure II-3.

After reviewing Figures II-1, II-2 and II-3 classify the waste stream as either a solid waste or not a solid waste. If it is a solid waste, proceed to Section II.B.2. and determine if the waste is also a hazardous waste or if other regulatory programs (such as the Toxic Substances Control Act (TSCA) regulate it. If the material is not a solid waste, it may still be a miscellaneous regulated waste; therefore, proceed to Section II.B.2.

Hazardous and Miscellaneous Regulated Wastes

In order for a waste material to be a hazardous waste, it must first meet the definition of a solid waste (Section II.B.1.). Figure II-4 outlines the procedure for determining which solid wastes are also hazardous wastes. There are two different ways a waste can be classified as a hazardous waste. It can be a listed hazardous waste and/or it can be a characteristic hazardous waste. Figure II-5, along with the tables in R.61-79.261.31 through 261.33, define listed hazardous wastes. If a waste is included in any of these lists, and in the case of U and P listed wastes it is un-used, it is a listed hazardous waste. These lists are as follows:

- F-listed waste from operations that are not specific to a particular manufacturing operation (R.61-79.261.31). Example: Spent halogenated solvents used in degreasing.
- K-listed waste from specific manufacturing process (R.61-79.261.32). Example: Sludge from wood preserving.
- P-listed acute hazardous commercial chemical products (R.61- 79.261.33(e)).
- U-listed toxic commercial chemical products (R.61-79.261.33(f)).

It is also necessary to determine if a waste is a characteristic hazardous waste. The four hazardous waste characteristics are:

- ignitability,
- corrosivity,

- reactivity,
- toxicity

To determine if a solid waste exhibits the characteristics of ignitability, follow Figure II-6. Use Figure II-7 to determine if the waste exhibits the characteristics of corrosivity, and Figures II-8 and II-9 to determine if the waste exhibits the characteristics of reactivity and toxicity, respectively. If a waste exhibits any of the above four characteristics, it is a characteristic hazardous waste. A waste may be both a listed and a characteristic hazardous waste.

The generator of the waste must also determine if it is regulated under TSCA or any other applicable federal or state laws or regulations. A waste does not necessarily have to be defined as a solid waste in order to belong in these categories. Use Figure II-10 to determine if the waste belongs in these additional waste categories.

Empty Containers

Residues of hazardous waste remaining in a container may not be subject to the requirements specified in this manual if the container meets the regulatory definition of an empty container.

A container or an inner liner removed from a container that has held a hazardous waste, except a compressed gas or acute hazardous waste, is empty if:

- All wastes have been removed that can be removed using common practices (e.g., pouring, pumping, aspirating), and
- No material pours out of the container when held upside down or for Department of Transportation (DOT) recycling, no more than 2.5 cm (one inch) of residue remain on the bottom of the container or inner liner, or
- No more than 3% by weight of the total capacity of the container remains in the container or inner liner if the container is less than or equal to 100 gallons, or
- No more than 0.3% by weight of the total capacity of the container remains in the container or inner liner if the container is greater than 100 gallons in size.

A container that has held a hazardous waste that is a compressed gas is empty when the pressure in the container approaches atmospheric pressure.

However, it should be noted that releasing hazardous waste from a compressed gas cylinder for the purpose of returning the cylinder to atmospheric pressure is considered illegal discharge of a hazardous waste.

CAUTION! A container or an inner liner removed from a container that has held a P-listed or acute hazardous waste (as identified in Appendix A) is not considered empty until:

The container or inner liner has been triple rinsed using a solvent capable of removing the waste,

The container or inner liner has been cleaned by another method that has been shown in the scientific literature, or by tests conducted by the generator, to achieve equivalent removal, or

In the case of a container, the inner liner that prevented contact of the acute hazardous waste with the container has been removed.

The rinsate generated when cleaning hazardous material from an acute hazardous waste container, should be managed in accordance with the requirements specified in this manual unless it can be determined, using the procedures outlined in this section, that the material is not a hazardous waste. NORMALLY, ALL RINSATE FROM ACUTE HAZARDOUS WASTE

CONTAINERS IS AN ACUTE HAZARDOUS WASTE AND SHOULD BE COLLECTED AND MANAGED ACCORDINGLY.

For disposal of empty containers into landfill at Clemson University see Appendix D for guidance on defacing. Recycling should be investigated.

Hazardous Waste Minimization Requirements

EPA defines waste minimization as the reduction, to the most feasible extent, of hazardous waste that is subsequently treated, stored and disposed of. Waste minimization includes any source reduction or recycling activity undertaken by a generator that results in either the reduction of the total volume or quantity of hazardous waste, or the reduction of toxicity of hazardous waste, or both, so long as the reduction is consistent with the goal of minimizing the present and future threat to human health and the environment.

The main ideas behind waste minimization are toxicity, volume reduction and material substitution. Toxicity reduction means reducing the degree of hazard associated with the raw material that, consequently, reduces the degree of hazard of the waste. Material substitution means the use of lesser or even nontoxic materials.

The South Carolina Hazardous Waste Management Regulations and the ever-rising costs for disposal, dictate that all possible efforts be taken to eliminate or reduce the generation of hazardous waste. Clemson University departments are responsible for assessing each source of hazardous waste within their operations and for establishing control measures to ensure that the least possible amount of waste is generated.

In anticipation of future hazardous waste minimization audits by SCDES, each department should record any efforts undertaken for hazardous waste reduction and submit the documentation to the Hazardous Materials/Environmental Compliance Manager on an annual basis. Waste reduction action is to be implemented by an effective combination of the following methods:

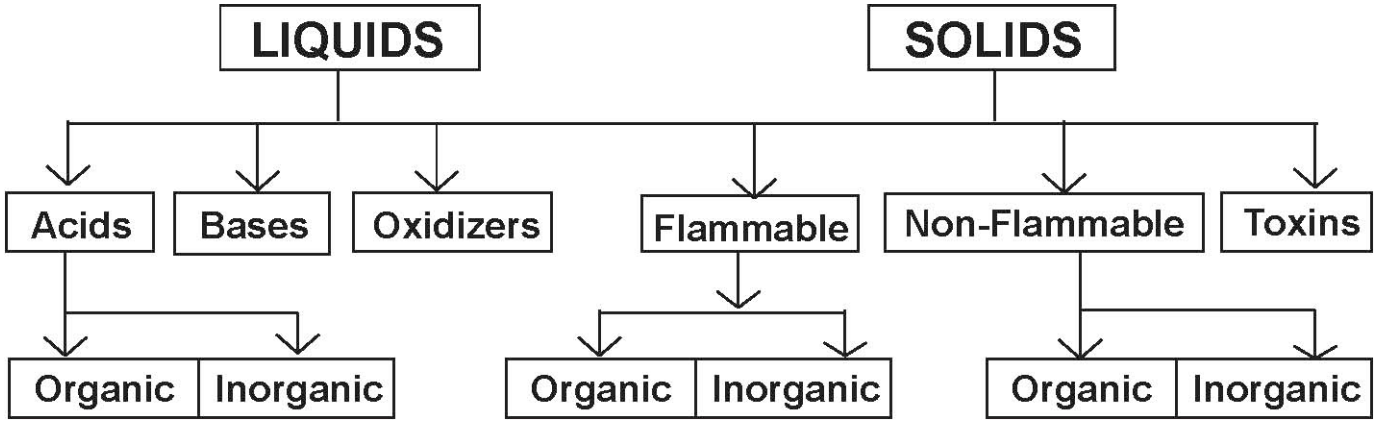
- Non-hazardous reagents shall be substituted for hazardous reagents where possible, to avoid generating hazardous waste.
- Current equipment that produces a hazardous waste stream and can be replaced by a new technology that reduces or eliminates that waste stream shall be given high priority in the selection and procurement of replacement equipment.
- No greater quantity of a hazardous reagent shall be procured than will be necessary to satisfy immediate planned usage. Unused chemical overstock constitutes a large portion of hazardous waste generated at Clemson University.
- Any written agreement entered into by a department with an industrial client, where hazardous reagents or samples are supplied for specific research or experimental use on behalf of that client, shall include a provision for return of the unused amounts to the client for appropriate disposal.
- Any agent of a department shall not accept donations of chemicals unless immediate planned usage is confirmed for the entire amount.
- Chemical reaction systems shall be preplanned and designed so that by-products and effluent may be rendered non-hazardous in the process, prior to reaching waste status.
- Upon application of hazardous reagents such as paints, pesticides, etc., the entire volume of material shall be applied or an additional area shall be identified where any

remaining excess can be properly applied at the same rate, so that the entire amount can be depleted.

- Upon termination of an employee or separation of a student, the exit process shall include immediate collection of all chemical reagents and waste residues used by or in the possession of that person. Prior to separation, the department is responsible for documenting the identity of each chemical reagent collected.

The intent here is to ensure that unused chemicals are returned to the department chemical stores and placed on inventory for continued use, wherever possible. Also, this procedure can help prevent the need for future analysis of “unknown” chemicals.

Until an effective chemical stock management program is introduced throughout Clemson University, old chemical stock will be a major portion of the waste stream. Some of this old stock is hazardous waste. Other constituents of this old stock may not meet the definition of hazardous waste. However, these wastes usually cannot be accepted into local sanitary or solid waste landfills. In order that liabilities are minimized, these chemical wastes are given to a hazardous waste disposer and classified managed as non-RCRA regulated wastes. From a regulatory standpoint, these unused chemicals are not hazardous wastes. From a cost standpoint, disposal of these chemicals as wastes may cost as much as the disposal of hazardous waste.


LIQUIDS
SOLIDS
Acids
Bases
Oxidizers
Flammable
Non-Flammable
Toxins
Organic
Inorganic
Organic
Inorganic
Organic
Inorganic

Acetal	Diethylene glycol dimethyl ether	Limonene
Acetaldehyde	Diethylketene	1,5-p-Menthadiene
Acrylamide	Digylme	Methoxy-1,3,5,7-cyclo octatetraene
Acrylic Acid	2,3-Dihydrofuran	2-Methoxyethanol
Acrylonitrile	2,3-Dihydropyran	2-Methoxyethyl vinyl ether
Allyl ethyl ether	Diisopropyl ether*	Methyl acetylene
Allyl phenyl ether	1,1-Dimethoxyethane	Methyl methacrylate
Allyl vinyl ether	1,2-Dimethoxyethane	4-Methyl-1,3-dioxane
1-Allyloxy-2,3-epoxypropane	1,1-Dimethoxypropane	2-(1-Methylheptyl)-4,6-dinitrophenyl crotonate
Benzyl-1-naphthyl ether	2,2-Dimethoxypropane	2,3-methyl-2-methylene butanal
Benzyl butyl ether	3,3-Dimethoxypropene	4-Methyl-2-pentanone
Benzyl ethyl ether	2,2-Dimethyl-1,3-dioxolane	2-Methyltetrahydrofuran
Bis(2-ethoxyethyl) ether	2,6-Dimethyl-1,4-dioxane	Methyl vinyl ether
Bis(2-methoxythyl) ether	1,3-Dioxane	2-Penten-4-yn-3-ol
1,3-Butadiene	1,4-Dioxane	a-Pentylcinnamaldehyde
1,3-Butadiyne	1,3-Dioxep-5-ene	Potassium* (forms yellow potasssium peroxide on the surface)
2-Butanol	1,3-Dioxol-4-en-2-one	Potassium amide
Buten-3-yne	Dipropoxymethane	2-Propanol
Butyl ethyl ether	Dipropyl ether	Propionaldehyde
Butyl formate	Divinyl acetylene*	2-propyne-1-thiol
Butyl vinyl ether	Divinyl ether	Sodium 5,8,11,14-eicosatetraenoate
2-Chloro-1,3-butadiene	1,2-Epoxy-3-isopropoxy propane	Sodium amide*
1-Chloro-2,2-diethoxy-ethane	1-Ethoxy-2-propyne	Sodium ethoxyacetylide
2-Chloroacrynitrile	2-Ethoxyethanol	Styrene
2-Chloroethyl vinyl ether	2-Ethyl butanal	1,1,2,3-Tetrachloro-1,3-butadiene
Chloroethylene	Ethyl isopropyl ether	Tetrafluoroethylene
Chloroprene	Ethyl propenyl ether	Tetrahydrofuran
Chlorotrifluoroethylene	Ethyl vinyl ether	Tetrahydronaphthalene
Cinnamaldehyde	2-Ethylacrylaldhyde oxime	Tetrahydropyran

Crotonaldehdye	Ethylene glycol dimethyl ether	Tetralin
Cyclohexene	2-Ethylhexanal	Tridecanal
Cycloolooctene	2-Ethylhexyl vinyl ether	1,3,3-Trimethoxypropene
Cyclopropyl methyl ether	2-Furaldehyde	3,3,5-Trimethyl-2-cyclohexene-1-one (isophorone)
Decahydronaphthalene	Furan	Vinyl acetate
Di(2-propynyl)ether	Glyme compounds	Vinyl acetylene
Diacetylene	4,5-Hexadien-2-yn-1-ol	Vinyl chloride
Diallyl ether	2,4-Hexadienal	Vinyl ethers
Dibenzyl ether	2,5-Hexadiyn-1-ol	Vinyl pyridine
p-Dibenzyloxybenzene	2-Hexenal	4-Vinylcyclohexene
1,2-Dibenzyoxyethane	Indole-2-carboxyaldehyde	Vinylidene chloride
Dibutyl ether	Isobutyl vinyl ether	
1,1-Dichloroethylene	Isobutyraldehyde	
Dicyclopentadiene	Isopropoxypropionitrile	
1,1-Diethoxyethane	Isopropyl ether*	
1,2-Diethoxyethane	Isopropyl propyl ether	
Diethoxymethane	Isopropyl vinyl ether	
3,3-Diethoxypropene	2-Isopropylacrylaldehyde oxime	
Diethyl ether	Isovaleraldehyde	
Diethyl fumarate		

This is only a partial list of peroxidizable compounds; not intended to be all inclusive.

Figure II-1 Logic Diagram for Identifying Solid Wastes

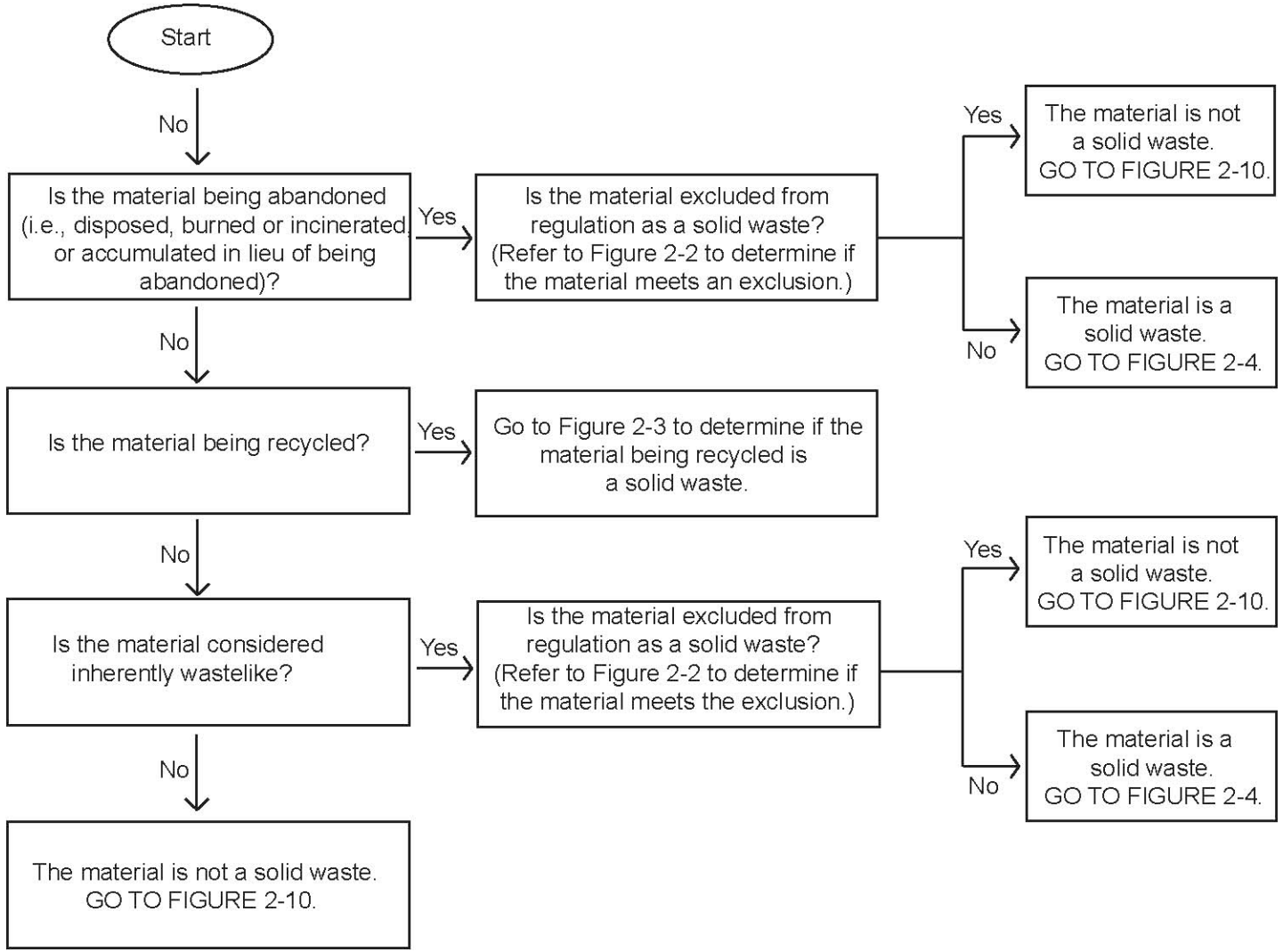


Figure II-2 Exclusions From The Definition Of Solid Waste And Hazardous Waste

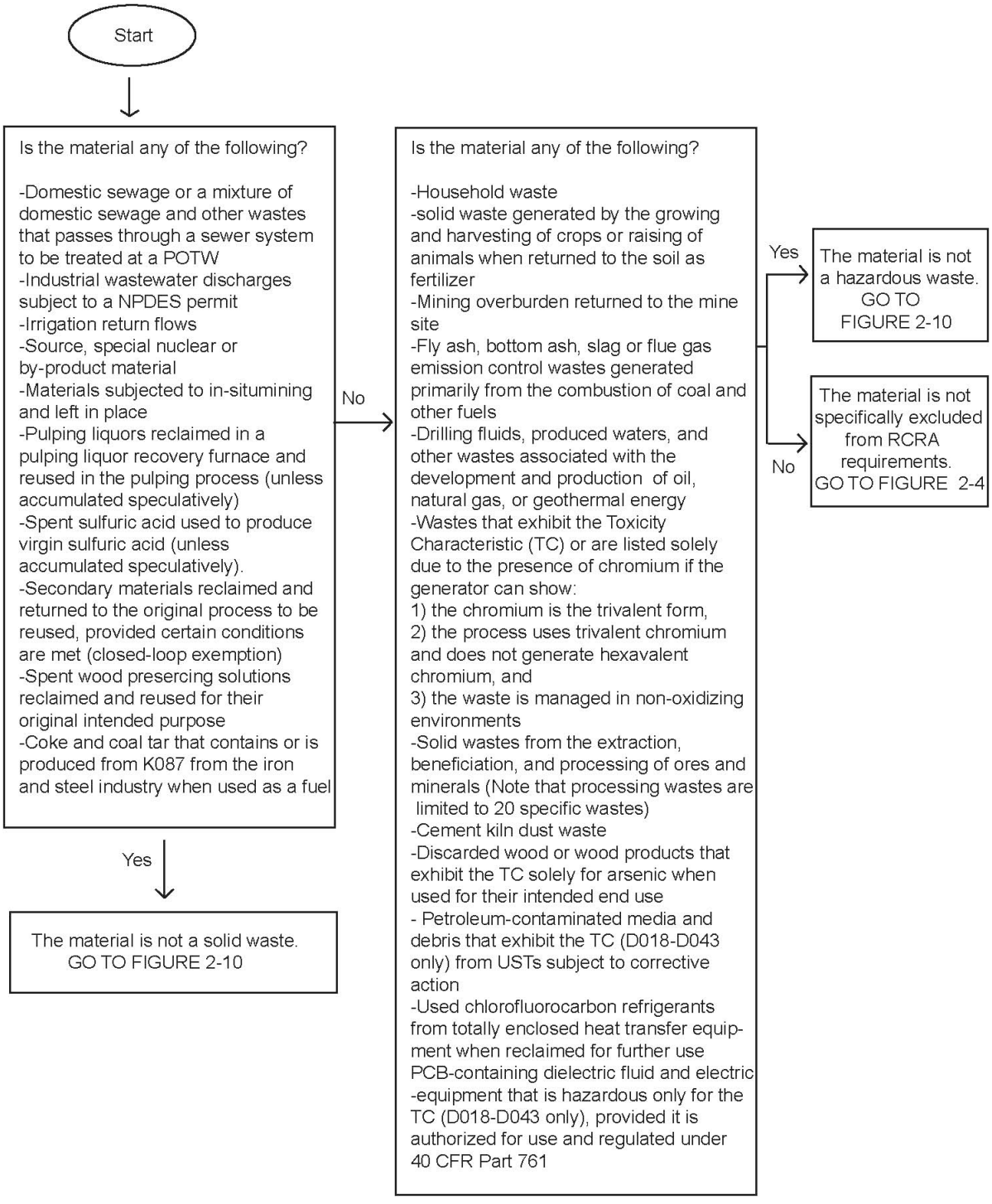


Figure 11-3 Logic Diagram for Determining When a Recycled Material is a Solid Waste

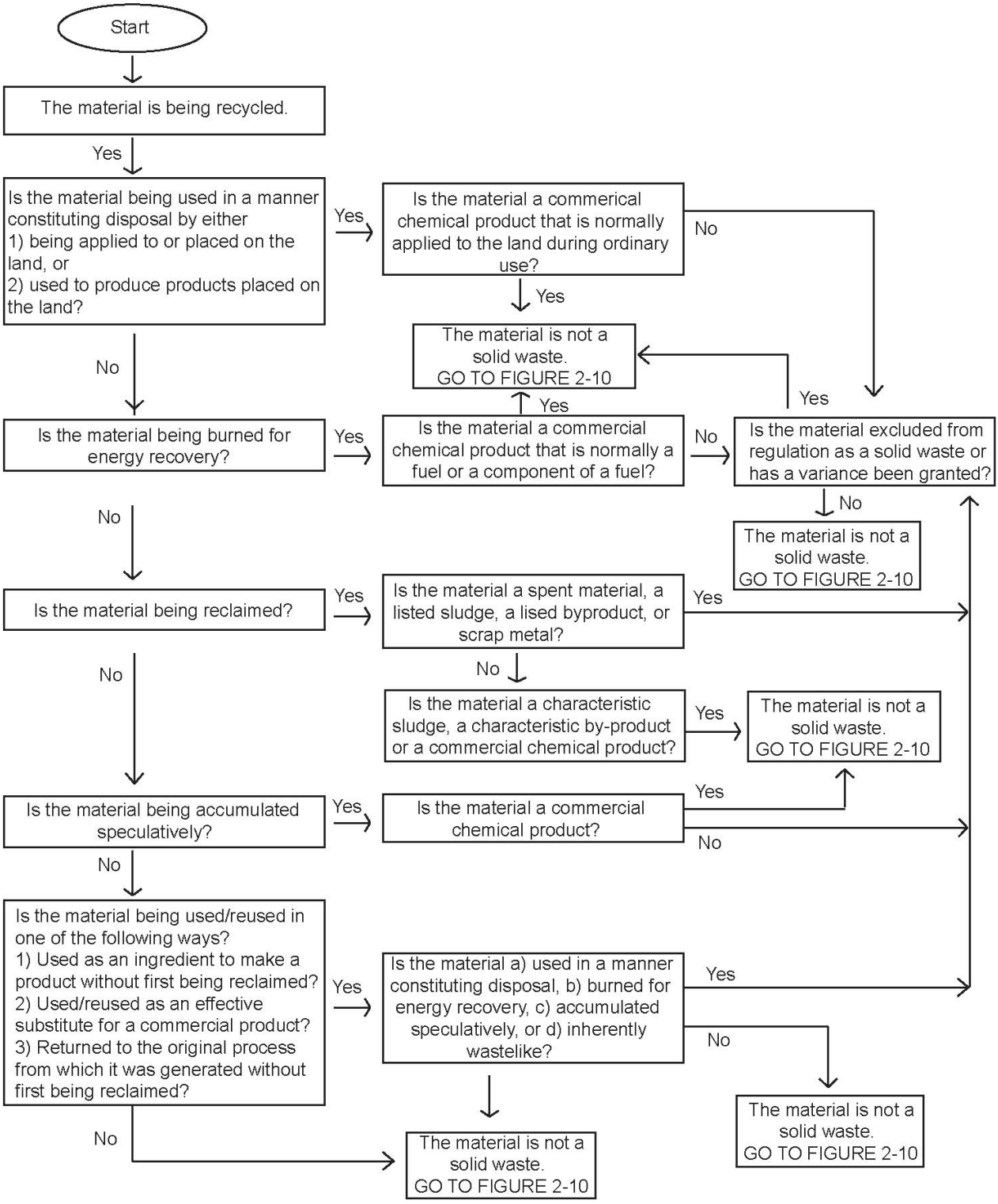


Figure II-4 Logic Diagram for Identifying Hazardous Wastes

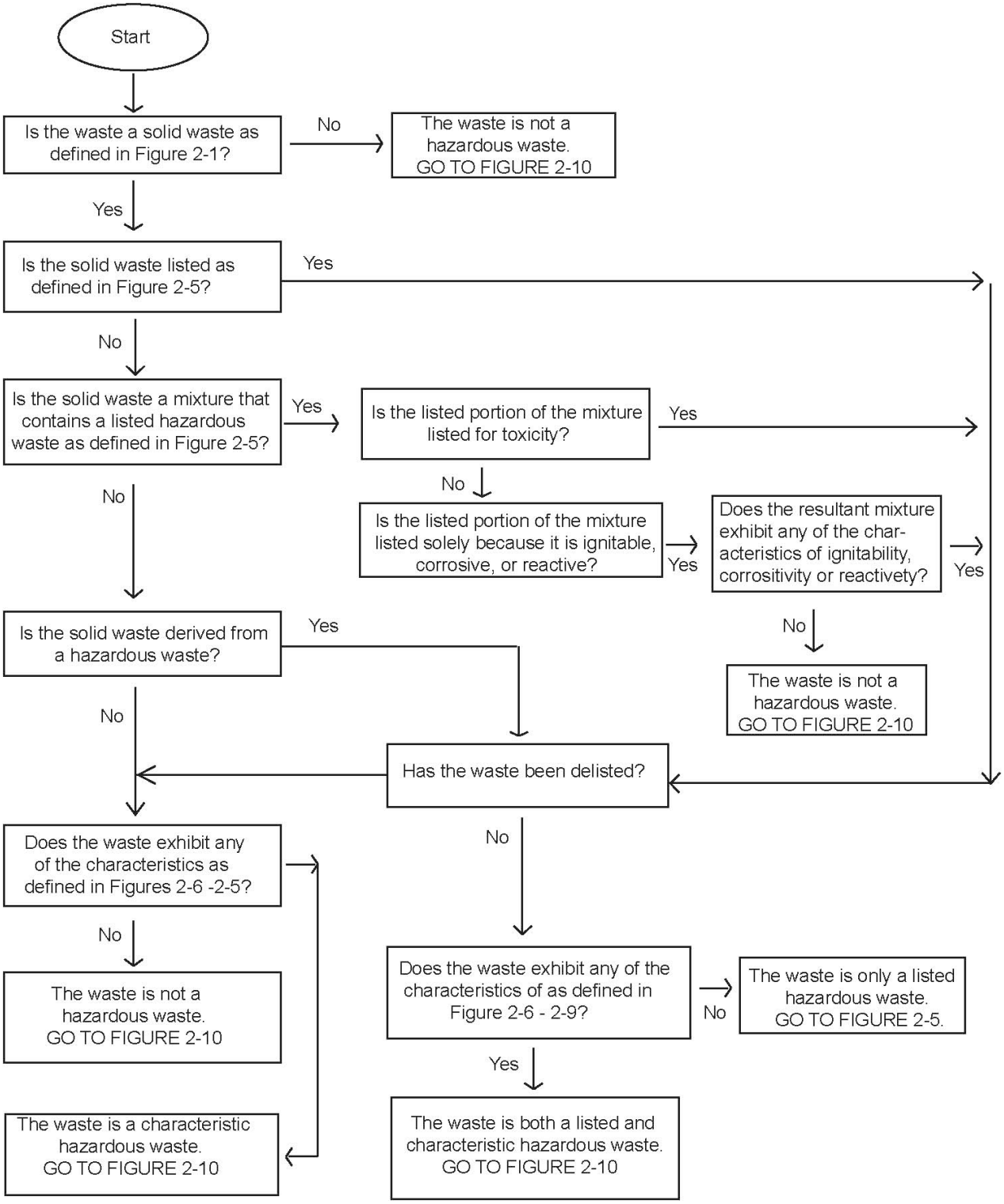


Figure 11-5 Logic Diagram for Determining if a Solid Waste is a Listed Hazardous Waste

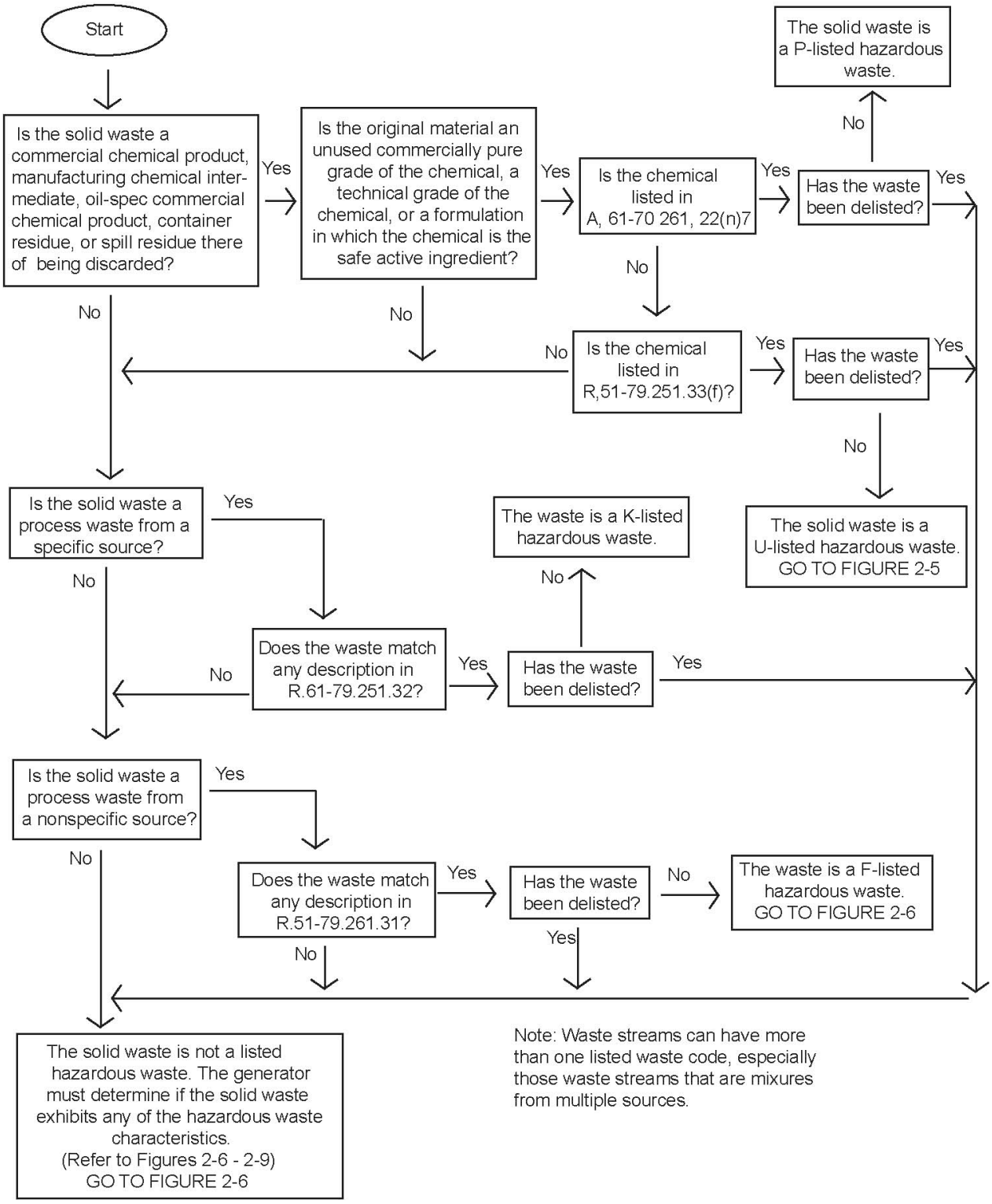


Figure 11-6 Logic Diagram for Determining if a Solid Waste Exhibits the Characteristics of Ignitability

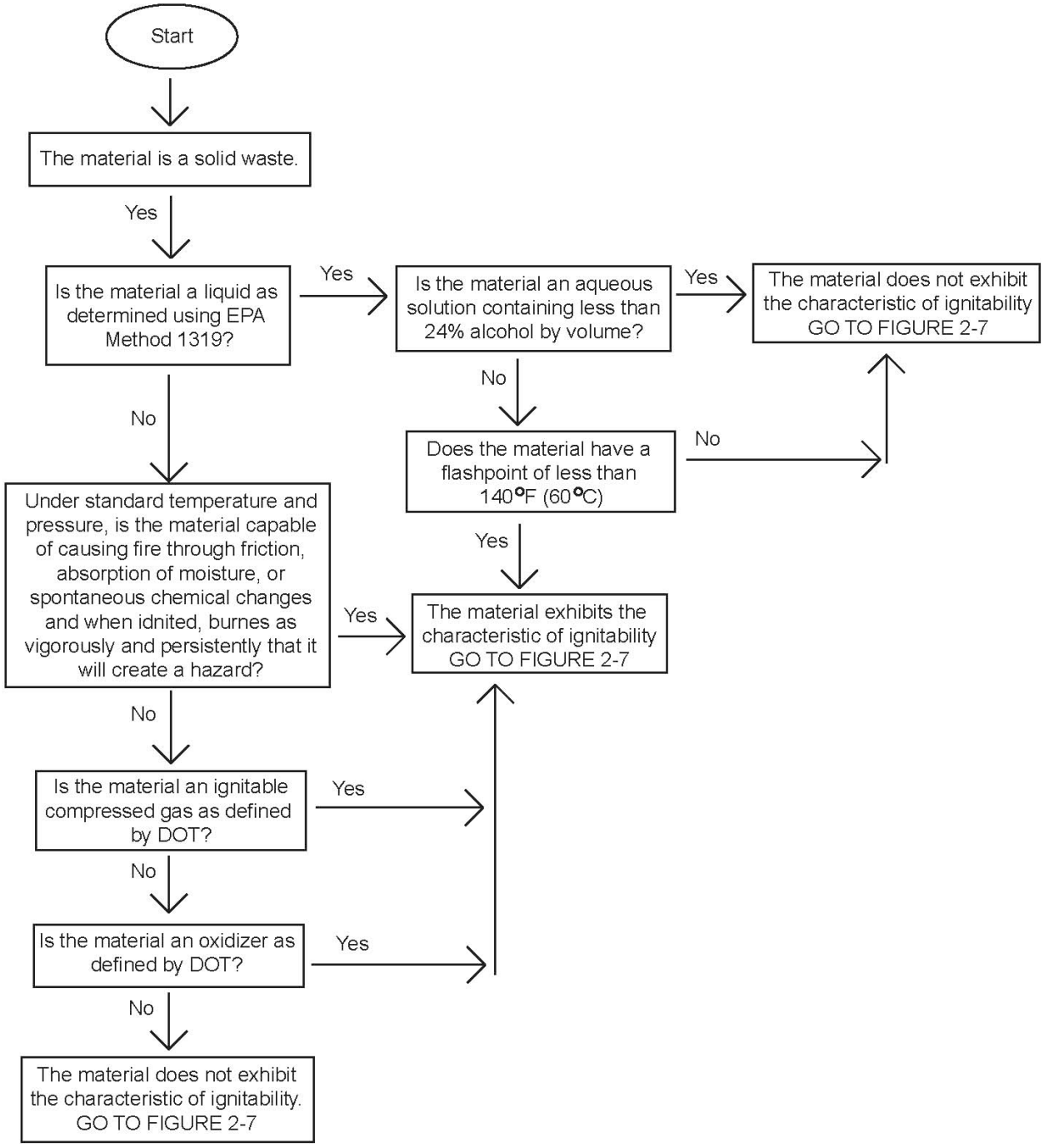


Figure 11-7 Logic Diagram for Determining if a Solid Waste Exhibits the Characteristics of Corrosivity

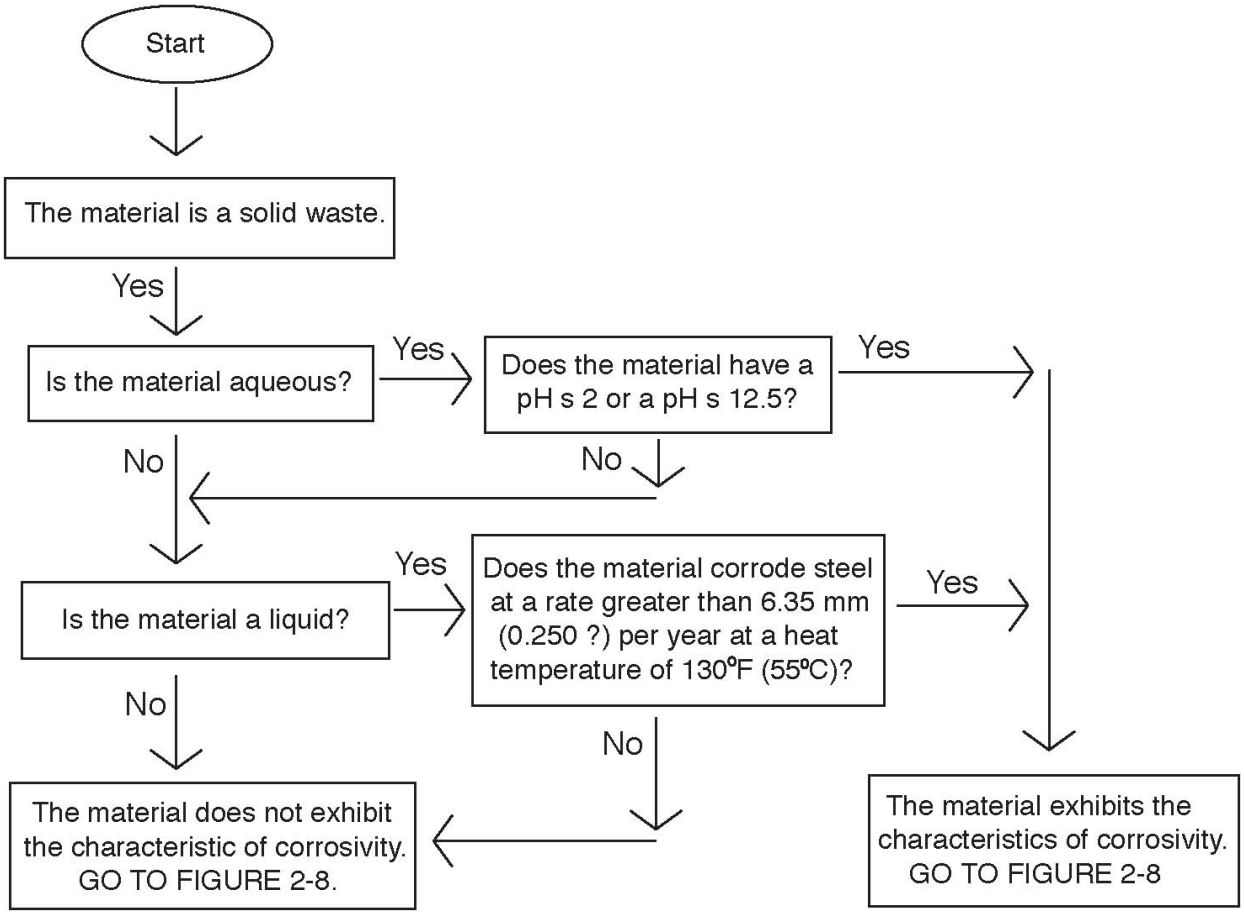


Figure 11-8 Logic Diagram or Determining if a Solid Waste Exhibits the Characteristic of Reactivity

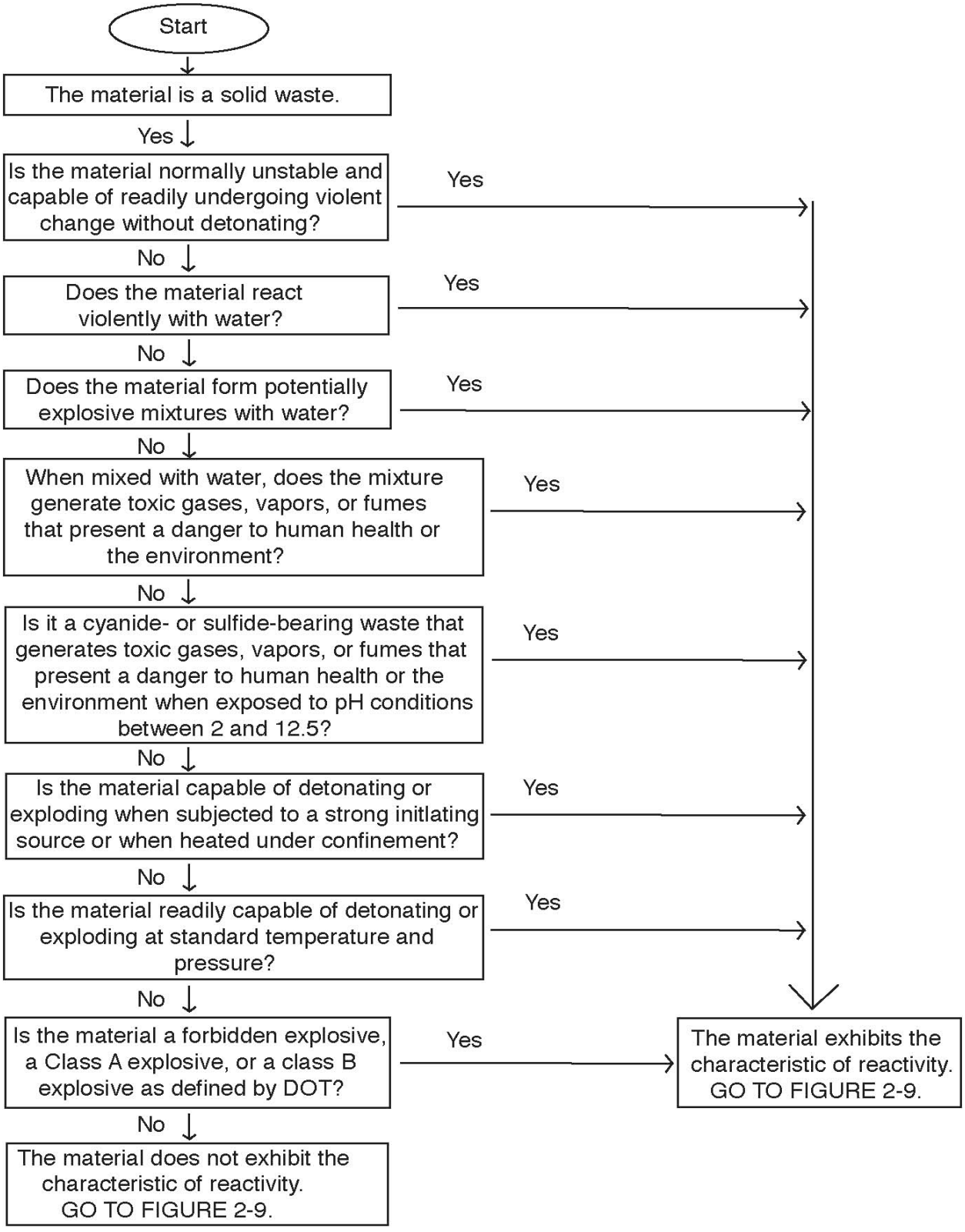


Figure 11-9 Logic Diagram for Determining if a Solid Waste Exhibits the Characteristic of Toxicity

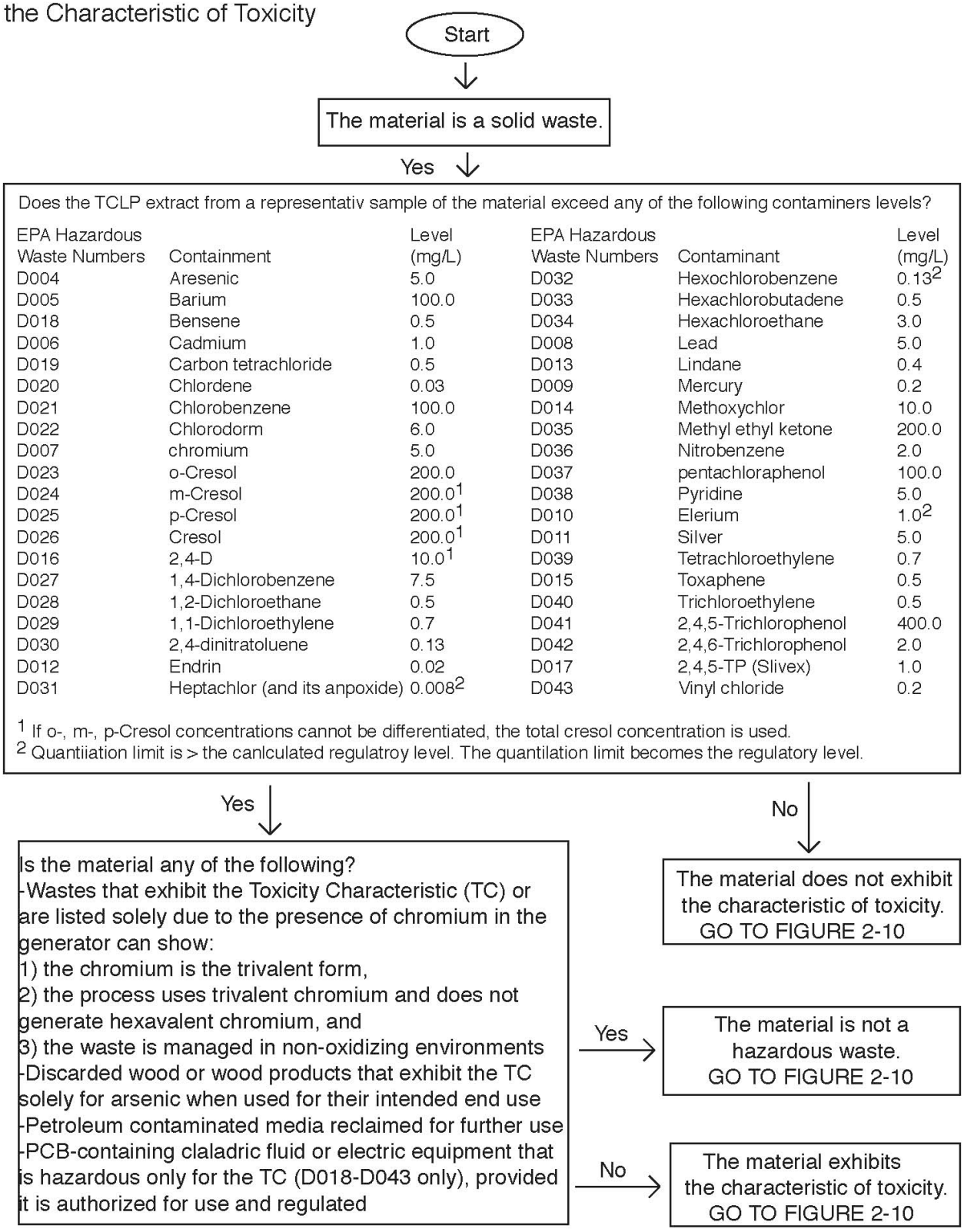
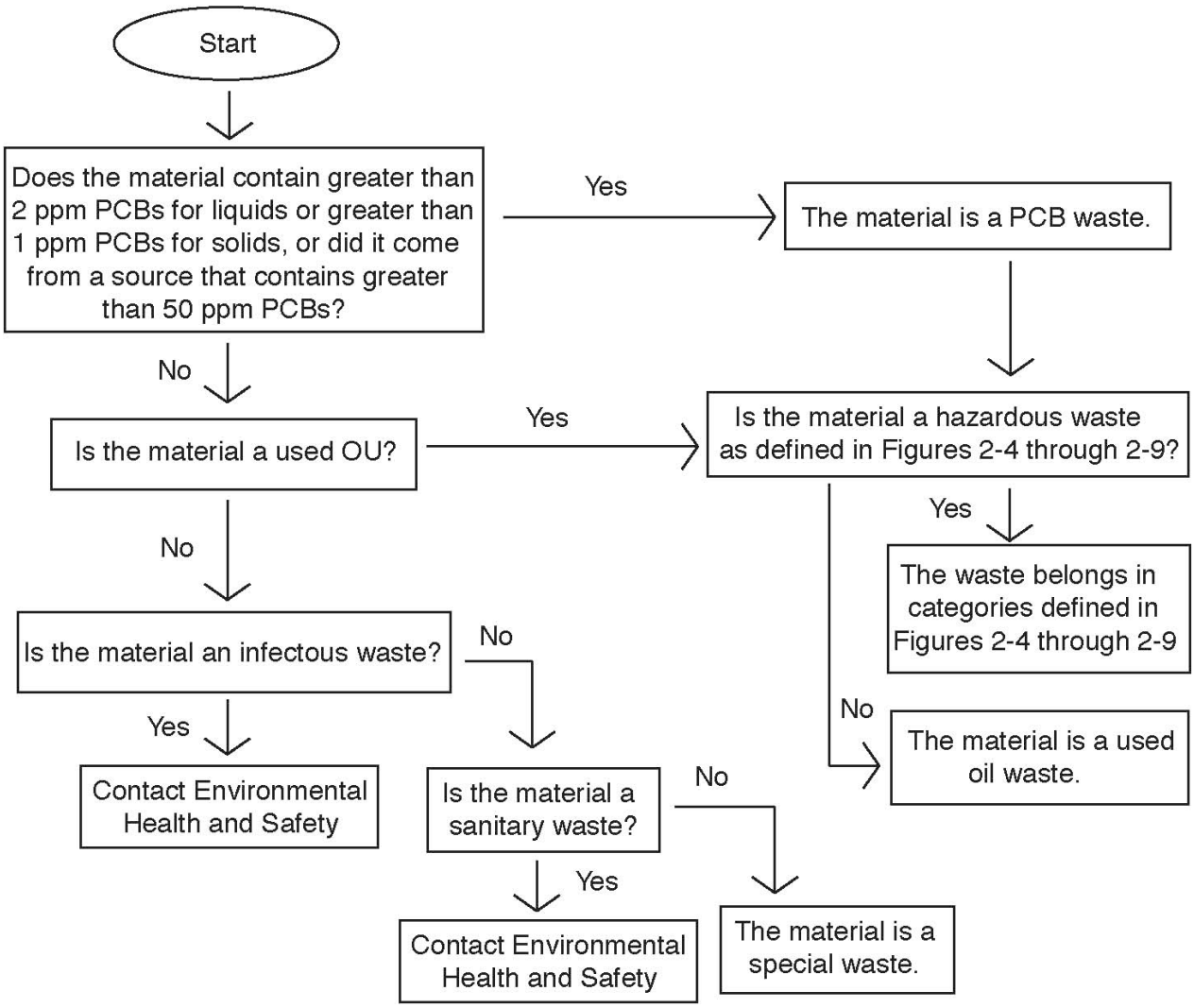


Figure 11-10 Logic Diagram for Identifying Miscellaneous Regulated Wastes



Hazardous Waste Storage Procedures

General Procedures

Two types of hazardous waste accumulation points are present at Clemson University's main campus:

- Accumulation Points
- Satellite Accumulation Points

A hazardous waste accumulation point is a location on-site at which hazardous waste can be accumulated for up to 90 days without a permit. At an accumulation point, any amount of hazardous waste can be collected and stored providing no container remains in the accumulation point storage for over 90 days. If hazardous waste is added to a container at the accumulation point, the 90-day limit for that container begins as soon as the first waste is added to the container. For this reason, container size selection is very important in minimizing costs when accumulating in these areas. Estimate your waste volume carefully while allowing for extra time to arrange shipping. It is recommended that you chose a container size that you can fill within a 30 or 60-day period in this situation.

A satellite accumulation point is a location at or near the point of generation that is under the control of the operator of the process generating the waste. No more than 55 gallons of RCRA regulated hazardous waste or one quart of acute hazardous waste can be accumulated at a satellite accumulation point.

The difference between a satellite accumulation point and an accumulation point are the volume and the length of time wastes may be accumulated. At a satellite accumulation point, up to 55 gallons of RCRA regulated hazardous waste or up to one quart of acute hazardous waste may be accumulated for a reasonable amount of time. At an accumulation point, an unlimited volume of waste may be accumulated in containers for up to 90 days. If a facility has not been approved by the Hazardous Materials/Environmental Compliance Manager to maintain a hazardous waste accumulation point, then they are, by default, satellite accumulation points and must stay in status with the volumes stated above.

Occupational and Environmental Safety operates the Central Hazardous Waste Accumulation Building on main campus. No hazardous waste shall be stored at an Accumulation Point at Clemson University's main campus for greater than 90 days from the accumulation date on the container.

Maps of the Central Hazardous Waste Accumulation Building site and any other Accumulation Areas/Sites approved by the Hazardous Materials/Environmental Compliance Manager will be maintained in the Hazardous Waste Incident Contingency Plan and/or at the Hazardous Waste Management Facility and OES Main Office.

Hazardous waste must be kept in designated areas at all times. Wastes that are accumulated in these areas must be managed in accordance with the procedures specified below. The generator is responsible for ensuring compliance with these procedures for his/her hazardous waste satellite accumulation point(s). The Hazardous Materials/Environmental Compliance Manager is responsible for managing the Central Hazardous Waste Accumulation Building(s) in compliance with these procedures.

All hazardous waste Accumulation Points must meet the following requirements:

- A Hazardous Waste sign must be posted at each area.

- The name and phone number of the accumulation point supervisor and an alternate contact must be posted at each area.
- The area should be used for hazardous waste accumulation only. No raw materials or chemical stock should be stored in the same area with hazardous waste.
- Flammable materials cabinet shall be used when possible for storage of ignitable hazardous wastes.
- The satellite accumulation area must be located at or near the point of waste generation and must be under the control of the person responsible for the waste-generating process.
- All containers will be appropriately labeled and segregated for compatibility.

Access to the hazardous waste accumulation points and building must never be blocked. The area shall be quickly and easily accessible by emergency response personnel in the event of a spill, leak or fire. Appropriate emergency response equipment shall be maintained for each hazardous waste accumulation and satellite area. The accumulation point supervisor is responsible for ensuring the equipment is in good condition at each of his/her accumulation points. The Hazardous Materials/Environmental Compliance Manager is responsible for the Central Hazardous Waste Accumulation Building(s). Emergency equipment shall include the following:

- Fire extinguisher, 20lb ABC type.
- Absorbent of the proper type and of sufficient amount to absorb the volume present.
- Broom, bucket and mop.
- Telephone or other communication device.
- First aid kit.
- Safety shower and eye wash station as applicable.
- Coveralls, eye protection and gloves compatible with wastes.
- Empty containers and bags compatible with cleanup characteristics.

The accumulation point shall be managed as follows:

- The person responsible for the area must meet the Occupational Safety and Health Administration (OSHA) requirements for hazardous waste training contained in 29 CFR 1910.120 and Department of Transportation (DOT) HM-181/ HM-126F.
- Waste shall be stored in approved containers.
- Containers shall be kept closed except during waste transfers.
- Inspections shall be conducted weekly (see Section III.E).
- Incompatible materials shall not be combined into one container. Containers of incompatible materials shall be separated to protect against mixture in the event of a spill, leak or release (see EPA compatibility table - Table III-1).
- Containers shall be labeled with an approved hazardous waste label before any waste is received (see Section III.B).

Satellite accumulation points are subject to the following requirements defined below:

- No more than 55 gallons total of RCRA regulated hazardous waste or one quart total of acute hazardous waste may be accumulated. See Appendix A for a list of acute hazardous wastes.
- Containers with the excess must be dated as soon as 55 gallons of RCRA regulated hazardous waste or one-quart total of acute hazardous waste or more are accumulated. All subsequent containers will be dated upon initiation of the first addition of waste until the site's status is returned to a Satellite Accumulation point by the reduction of wastes at the site to meet the less than 55 gallons of RCRA regulated hazardous or less than one quart of acutely toxic waste limit. This should be accomplished within 3 days. In order to minimize the establishment of new Accumulation Points, containers must be moved to an established or central accumulation point within three days of the date the storage volume limits are exceeded, unless permission to establish a new Accumulation Point is obtained from the Hazardous Materials/Environmental Compliance Manager.

In order to minimize the risk of hazardous waste incidents and in order to comply with published regulations, each site of hazardous waste generation will be considered a satellite accumulation point unless designated otherwise by the Hazardous Materials/Environmental Compliance Manager. This will be particularly useful considering the large number of laboratories generating hazardous waste on campus.

In spite of the flexibility allowed in the regulations concerning volume limits at satellite accumulation points, it will be Clemson University's procedure to pick up hazardous waste on demand. This will also minimize the risk of potential hazardous waste incidents by not allowing undue accumulation of waste.

Waste Storage Containers

Hazardous waste shall be placed only in approved hazardous waste containers. An approved hazardous waste container is made of or lined with a material compatible with the waste. Empty containers, which originally held the primary waste constituent or similar material, are acceptable hazardous waste containers. The original container label must be removed or defaced. An approved hazardous waste label with the appropriate information shall be affixed to the container before any hazardous waste is received. (Container labeling requirements are summarized in Section III.C)

The container must be in good condition without holes, rust or dents. The container shall always be closed during storage, except when waste is being added or removed. A hazardous waste container shall not be opened, handled or stored in a manner that may rupture the container or cause it to leak. Consideration should be given to doubly contain certain particularly dangerous chemicals if storage conditions and limitations are not ideal. All liquid hazardous waste must be stored in secondary containment that meets the regulation requirements. These requirements are: 1) must be able to hold 10% volume if only one container is being accumulated or, 2) must hold 100% volume of the largest container if multiple containers are being accumulated in the containment.

If drums are stacked in the Hazardous Waste Accumulation Building, pallets shall be used to separate the containers, and stacking and spacing shall meet applicable fire protection requirements. Aisle spacing for container storage in the Hazardous Waste Accumulation Building shall be such that each row of containers can be easily inspected for leakage or damage.

Labeling and Marking

An approved hazardous waste label (Figure III-1) shall be affixed to each hazardous waste container prior to receiving any waste material. The Hazardous Materials/Environmental Compliance Manager or their designee is responsible for ensuring each container is properly labeled before being picked up from a Satellite Accumulation Point or an Accumulation Point and moved to the Central Accumulation Point. However, the Generator or Accumulation Point Supervisor responsible for the waste is responsible for ensuring each container in his/her area is properly labeled before placing waste into the container or receiving any waste into an Accumulation Point.

The following information shall be provided on each hazardous waste label:

- HAZARDOUS WASTE - Federal law prohibit improper disposal. If found, contact the nearest police or public safety authority or the U.S. Environmental Protection Agency.
- The specific chemical name of the hazardous waste in the container shall be identified (e.g., waste acetone), including percentages of constituents if more than one.
- Each container shall be appropriately labeled with the EPA Hazardous Waste Number(s) at the Accumulation Point or the hazard(s) exhibited by the waste while in the Satellite Accumulation Point.

WASTE CONTAINERS ARE REQUIRED TO BE LABELED, BY THE GENERATOR, AS SOON AS THE FIRST DROP OF WASTE IS PLACED INTO THE CONTAINER!

The labels shall be placed on the side of each container in such a manner that they are clearly visible for inspection.

Up to 55 gallons total of RCRA Regulated hazardous waste or one quart total of acutely hazardous waste may be collected in each satellite area. The accumulation point supervisor is responsible for notifying the Hazardous Materials/Environmental Compliance Manager as soon as 55 gallons of RCRA regulated hazardous waste or one quart of acutely hazardous waste have been collected (see Section IV). Each container that is stored in the Central Hazardous Waste Accumulation Building or at any other Accumulation Point (not Satellite) shall have the accumulation start date on the label.

Accumulation Time Limits

Up to 55 gallons total of RCRA regulated hazardous waste or one quart total of acutely hazardous waste may be collected in each Satellite Accumulation area. Once 55 gallons of RCRA regulated hazardous waste or one quart of acutely hazardous waste has accumulated, the Generator shall date the container(s) containing the excess waste. The container(s) must be moved to a designated university Accumulation Point or picked up for off-site disposal within three (3) days of declaration to the Hazardous Materials/Environmental Compliance Manager. Within 90 days of the accumulation start date, the container must be shipped off-site for disposal at an approved RCRA disposal facility. Hazardous waste may not be stored on-site at a designated Accumulation Point for greater than 90 days from the date it is first accumulated.

Inspections

The applicable accumulation point supervisor or their designee shall conduct weekly inspections of the hazardous waste accumulation points and a copy kept on file at the site. The Hazardous Materials/Environmental Compliance Manager or his/her qualified designee shall inspect the Central Hazardous Waste Accumulation Building(s). During the inspection, the inspector shall check each item listed on Figure III-4. The results of the inspection shall be documented on this form. A copy of the form shall be retained on site for inspection.

If any corrective action is required, the Accumulation Point Supervisor must comply immediately. Once the problem has been corrected, the Accumulation Point Supervisor is to date and initial a copy of the form and send to the Hazardous Materials/Environmental Compliance Manager. The Hazardous Materials/Environmental Compliance Manager shall maintain these records for three years.

Satellite Accumulations Points will be audited for regulatory compliance at each requested waste pick up. A written notification of any compliance deficiencies will be sent to the Faculty Member and/or the PI responsible for the area. A copy of the written notification may be sent to the appropriate Dean, Department Head or Director as well as the Executive Director of Occupational and Environmental Safety. A copy will also be kept on file at the Hazardous Waste Central Accumulation Point maintained by Occupational and Environmental Safety. It will be the sole responsibility of the Department or Division to correct deficiencies.

Record keeping and reporting

During the weekly inspections of the departmental accumulation points and the Central Hazardous Waste Accumulation Building(s), the current inventory of waste shall be recorded (see Section IV). The Hazardous Materials/Environmental Compliance Manager, for the purpose of coordinating shipments of hazardous waste, shall use this inventory.

Within 30 days after the end of each calendar quarter, a written report must be submitted by the Hazardous Materials/Environmental Compliance Manager, signed by the Executive Director of Occupational and Environmental Safety, to SCDES summarizing the hazardous waste activities for that quarter. In addition to general facility information, the report must include the following information:

- Hazardous waste transporters used during the quarter to transport the waste to a treatment or disposal facility.
- The types and quantities of RCRA regulated hazardous wastes generated, including the EPA waste number(s).
- The types and quantities of wastes shipped off site during the quarter.
- The types and quantities of waste remaining in storage at the end of the quarter.
- A description of waste minimization and toxicity reduction efforts for the year (to be included with the fourth quarter report). and
- A description of the effectiveness of the waste minimization and toxicity reduction efforts using comparisons to previous years (to be included with the fourth quarter report).
- All quarterly reports must be maintained at the facility for at least three years from the date the report was filed.

Training

Personnel who handle or are occupationally exposed to hazardous waste are required to be trained initially in the proper methods for the management of hazardous waste and the implementation of the facility's contingency plan. The training program must be directed by a person trained in hazardous waste management. Personnel who are assigned to a position related to hazardous waste management must complete training within 90 days of their assignment. These personnel must not work in unsupervised positions until they have successfully completed training. Refer to Section VII for details regarding who must be trained and the scope of the required training.

Table III-1. Environmental Protection Agency (EPA) Compatibility Table

EPA has published a list of potentially incompatible wastes, waste components and materials along with the harmful consequences of mixing those materials together. This list does not include every possible hazardous chemical reaction but should be used as a guide in packaging and storing these materials. The list indicates the potential consequences of the mixing of a Group A material with a Group B material.

For example, mixing any Group 2-A waste, which include reactive metals and metal hydrides, with a Group 2-B waste, which include the Group 1-A alkaline and the Group 1-B acidic wastes, may produce a fire or explosion and the generation of flammable hydrogen gas. Mixing a Group 3-A waste, which includes alcohols and water, with a Group 3-B waste, which encompass Groups 1-A, 1-B and Group 3-B listed chemicals, may produce a fire, explosion or heat and the generation of flammable or toxic gases.

These compatibility listings and packaging guides should not be the only information used when packaging or accumulating waste chemicals. RCRA regulations require that wastes should be adequately analyzed by TSD facilities so uncontrolled substances or reactions do not occur. Pay close attention to any waste characterization data you receive on material reactivity and compatibility. There are also other sources of data that may be helpful in determining waste compatibility. SDS's contain a section devoted to chemical reactivity and incompatibility. The National Fire Protection Association (NFPA) publishes a manual of hazardous chemical reactions which contains over 3,500 documented dangerous chemical reactions.

If research protocols call for the mixing of incompatible hazardous materials resulting in incompatible hazardous waste being accumulated in the same waste container, the written protocol/procedure must be available in the Satellite Accumulation area or lab upon request during a regulatory audit or inspection.

Group 1-A	Group 1-B
Acetylene sludge	Acid sludge
Alkaline caustic liquids	Acid and water
Alkaline cleaner	Battery acid
Alkaline corrosive liquids	Chemical cleaners
Alkaline corrosive battery fluids	Electrolyte, acid
Caustic wastewater	Etching acid liquid or solvent
Lime sludge and other corrosive alkalies	Pickling liquor and other corrosive acids
Lime wastewater	Spent acid
Lime and water	Spent mixed acid
Spent caustic	Spent sulphuric acid

Potential consequences: Heat generation; violent reaction.

Group 2-A

Sodium

Aluminum

Lithium

Beryllium

Calcium

Magnesium

Zinc powder

Potassium

Other reactive metals and metal hydrides

Group 2-B

Any waste in Group 1-A or 1-B

Potential consequences: Fire or explosion; generation of flammable hydrogen gas.

Group 3-A	Group 3-B
Alcohols	Any concentrated waste in Groups 1-A or 1-B
Water	Calcium
	Lithium
	Metal Hydrides
	Potassium
	SO2Cl2, SOCl2, PCl3, CH2SiCl2
	Other water-reactive waste

Potential consequences: Fire, explosion, or heat generation; generation of flammable or toxic gases.

Group 4-A	Group 4-B
Alcohols	Concentrated Group 1-A or 1-B wastes
Aldehydes	Group 2-A wastes
Halogenated hydrocarbons	
Nitrated hydrocarbons	
Unsaturated hydrocarbons	

Other reactive organic compounds and solvents	

Potential consequences: Fire, explosion or violent reaction.

Group 5-A	**Group 5-B**
Spent cyanide and sulfide solutions Group	1-B wastes

Potential consequences: Generation of toxic hydrogen cyanide or hydrogen sulfide gas.

Group 6-A	**Group 6-B**
Chlorates	Concentrated mineral acids
Chlorine	Group 2-A wastes
Chlorites	Group 4-A wastes
Chromic acid	Other flammable and combustible wastes
Hypochlorites	
Nitrates	
Nitric acid, fuming	
Perchlorates	
Permanganates	
Peroxides	
Other strong oxidizers	
Acetic acid and other organic acids	

Potential consequences: Fire, explosion, or violent reaction.

Source: 40 CFR 264, Appendix V.

Figure III – 1 Hazardous Waste Label

CAUTION: HAZARDOUS WASTE

Federal laws prohibit improper disposal. If found contact the nearest police or public safety authority or the U.S. Environmental Protection Agency.
Occupational and Environmental Safety, Clemson University, Clemson, S.C. 29631 (864) 656-1770

EPA Waste Code

_____

Chemical Name(s)

Please circle all that apply:

Flammable Oxidizer Corrosive Toxic Reactive Non-RCRA Other _____

A printable online version of this label using a standard Avery 5163 shipping label is located here:

https://www.clemson.edu/finops/oes/hazmaterials/hazardouswaste/manualsformstrain.html

Figure III-2 Hazardous Waste Satellite/Accumulation Area Inspection Report

Location: _____ Department: _____
Inspected By: _____ Date: _____ Time: _____
Department Head: _____

Hazardous Waste Containers			
		Yes	No
Container Condition	Are any open:		
	Are any severly rusted or damaged?		
	Are any container heads bulging?		
	Are any leaking?		
If any of these questions were marked Yes, comment: _____			
Describe actions needed to correct situation: _____		Date of Corrective Action / /	
		Sup. Initials:	
		Yes	No
Container Marking	Begin accumulation date marked on container(s)		
	Hazardous waste warning marked on container		
	Comments marked on container		
Accumulation Point			
		Yes	No
Is the accumulation point free of structure deterioration?			
Is adequate space present between containers to allow unobstructed movement for emergency responses?			
Is 55 gallons of hazardous or one quart of acutely hazardous waste accumulated in the area?			
If any of these questions were marked No, comment: _____			
Describe actions needed to correct situation: _____		Date of Corrective Action / /	
		Sup. Initials:	
Emergency Response Equipment (*Accumulation Areas Only)			
		Yes	No
Telephone	Is it easially accessiable in case of emergency?		
	Is it in working order?		
Spill Control*	Is an empty salvage drum nearby?		
	Is unused absorbent material nearby?		
	Is all personal protective equipment nearby? Gloves Boots Apron Goggles Respirator		
Fire Protection	Is a fire extinguisher readily accessiable?		
	Is the fire extinguisher fully charged?		
	Is the fire extinguisher seal intact?		
If any of these questions were marked No, comment: _____			
Describe actions needed to correct situation: _____		Date of Corrective Action / /	
		Sup. Initials:	

Signature of Inspector: _____ Date: _____

Hazardous Waste Pick-Up Procedures

General Procedures

When requesting a hazardous waste pick-up, the generator shall:

- Verify that a correct hazardous waste determination has been conducted.
- Complete a Hazardous Waste Removal - Department Checklist (Figure IV-1).
- Complete a Hazardous or Chemical Waste Pickup Request form (Figure IV-2) and submit it to the Hazardous Materials/Environmental Compliance Manager.
- Follow up with the Hazardous Materials/Environmental Compliance Manager to ensure that the hazardous waste is removed from a satellite area within three days of the accumulation start date and that no waste is accumulated on site for greater than 90 days from the date it is generated.

The generator must initiate a request for a hazardous waste pick-up. Usually when the total accumulated volume of waste in the satellite area approaches 55 gallons of RCRA regulated hazardous waste or one quart of acutely hazardous waste. All accumulated waste must be removed from the satellite area within three days of reaching these volume limits. However, it will be Clemson University's procedure to pick up waste immediately after generation and upon demand.

NO HAZARDOUS WASTE SHALL BE DISCARDED IN GENERAL REFUSE, THROUGH WASTEWATER DRAINS, BY BURNING, BURIAL, SALE, GIVEAWAY, OR ANY ROUTE OTHER THAN THAT PROVIDED BY CONTRACT WASTE DISPOSAL SERVICE THROUGH OCCUPATIONAL AND ENVIRONMENTAL SAFETY AND THE HAZARDOUS MATERIALS/ENVIRONMENTAL COMPLAINCE MANAGER.

Categorizing Hazardous Waste

The generator shall assign the hazards associated to each waste stream at the time of generation. The Hazardous Materials/Environmental Compliance Manager and/or the generator shall assign the EPA hazardous waste code(s) to each waste stream at the time the waste enters the Central Accumulation Point or other Accumulation Point. The following hazard codes shall be used to indicate the class or type of waste:

Ignitable Waste	D001- see Figure II-6 (and check the F-list)
Corrosive Waste	D002- see Figure II-7
Reactive Waste	D003- see Figure II-8
Toxicity Characteristic Waste	See Figure II-9 (D-List)
Acute Hazardous Waste	See appendix A the P-List (also check F-List)
Toxic Waste	See appendix A the U-List
Non RCRA regulated	NR (all waste hazardous materials not falling under an above category but destined for disposal or recycling)

Ignitable, corrosive, reactive and toxicity characteristic wastes are those RCRA regulated hazardous wastes identified by the characteristics outlined in 40 CFR 261 Subpart C. The RCRA regulated hazardous waste "lists" are found in 40 CFR 261.31, .32 and .33

Preparing Hazardous Waste Removal Request

To request a hazardous waste pick-up, the generator shall follow the following procedures:

- Complete a Hazardous or Chemical Waste Pickup Request form.
- Submit completed form to the Hazardous Materials/Environmental Compliance Manager.

Satellite Accumulation Point

Hazardous waste shall be accumulated safely by the department until removed by the Hazardous Materials/Environmental Compliance Manager, their designee or contract hazardous waste service representative. Removal will take place as soon as possible after notification is given to the Hazardous Materials/Environmental Compliance Manager but no later than within three days of the accumulation start date for excess wastes.

Ignitable wastes shall be stored in accordance with fire safety requirements for storage of flammables. Contact the University Fire Department for information (656-2323).

Corrosive wastes shall be stored in accordance with procedures for storage of corrosive materials, with secondary containment employed to prevent contamination or reaction from leakage.

Poisonous/Toxic wastes shall be stored in exhaust-ventilated areas and double contained to prevent leakage.

Reactive wastes shall be isolated and reported to the Hazardous Materials/Environmental Compliance Manager for immediate removal or special handling by the contract hazardous waste service representative.

Specific storage procedures referenced above may be found in “Prudent Practices for Handling Hazardous Chemicals in Laboratories, cited in 29 CFR 1910.1450, OSHA’s laboratory standard for occupational exposure to hazardous chemicals in laboratories.

Figure IV-1 Hazardous Waste Removal - Department Checklist

1. _____Each potential waste substance is identified and its container marked with the container contents and hazard(s).

2. _____The generator of the waste has confirmed that no further possible use of the substance exists within the department or in other Clemson University departments.

3. _____The waste is a hazardous waste according to the South Carolina Hazardous Waste Management Regulations, the CU Hazardous Waste Determination Document Policy or after consultation with the Hazardous Materials/Environmental Compliance Manager is declared hazardous.

4. _____The waste is not radioactive and does not contain PCBs.

5. _____The waste has been screened and categorized according to hazard type.

6. _____A label with the words “hazardous waste” (see “labeling and marking”, pg. 39 for exact verbiage required) has been affixed to each container, complete with the chemical name(s) and hazard(s).

7. _____A Hazardous Waste Removal Request form (Figure IV-2) has been prepared for each existing hazard category.

8. _____Each request has been copied. One copy for department records directed through the Faculty member responsible and/or Department Head, and the remaining copy has been affixed to the waste group while awaiting pick-up.

9. _____Each group of hazardous waste is being temporarily stored in accordance with safety requirements for that specific hazard category.

Figure IV-2 Hazardous Waste Removal Request

The single and multiple item forms are located online at:
https://www.clemson.edu/finops/oes/hazmaterials/wastepickupreq.html

Hazardous Waste Shipping Procedures

General Procedures

Pre-transport regulations are designed to provide safe transportation of a hazardous waste from origin to ultimate disposal. The pre-transport regulations used by the Department of Transportation (DOT) for transporting hazardous waste (49 CFR 172, 173, 178, and 179) were adopted by the South Carolina Public Service Commission and are referenced in R.61-79.262. These pre-transport regulations apply only to hazardous waste shipped off site.

Labeling and Marking

An approved Department of Transportation hazardous waste label shall be affixed to each hazardous waste container prior to off-site shipment. Labeling requirements and marking regulations are found in R.61-79.262 and 49 CFR 172.101, Hazard Material Table. These regulations specify the following:

- containers must be labeled in accordance with the DOT Hazardous Materials Table (available from the Hazardous Materials/Environmental Compliance Manager); and
- containers must be marked with the following information:
    - Proper chemical/shipping name
    - Percent of constituents if applicable
    - EPA waste codes
    - University Tracking I.D. number
    - Accumulation Date

The Hazardous Materials/Environmental Compliance Manager is responsible for ensuring this information is provided prior to off-site shipment.

Manifesting

When hazardous waste is shipped off-site for treatment or disposal, it must be accompanied by a properly completed and signed Uniform Hazardous Waste Manifest. This form has multiple copies for distribution as described in this section. The facility to which the waste will be shipped will provide a copy of the blank manifest to Clemson University. Emergency response information for each waste shipped must accompany all manifest.

The Uniform Hazardous Waste Manifest must be completed by Clemson University before offering any hazardous wastes for shipment.

The information listed in line 9b of the Hazardous Waste Manifest (US DOT Description) must comply with DOT requirements (49 CFR 172.101) for proper shipping name, hazard class and identification number.

The quantity is to be specified by a whole number only (line11) and includes the entire container. The units for this quantity (line 12) must also conform to DOT standards. SC Hazardous Waste Management Regulations require that the units be listed on the manifest in pounds with the exception of PCBs which should be listed in kilograms.

The EPA waste code number for each waste listed in line 9b must be identified in line 13.

As a generator of hazardous waste, Clemson University is responsible for initiating the manifest with each shipment of waste. The generator completes the sections of the manifest outlined above and signs and dates the appropriate section of the manifest. At the time the waste is

picked up, the transporter signs and dates the manifest in the appropriate section indicating that he has accepted the waste and agrees to deliver it to the designated treatment, storage or disposal facility.

The generator must keep one copy of the manifest, which has been signed by the generator and transporter for each shipment of waste made to a hazardous waste facility. The original copy of the manifest must accompany the waste shipment along with two additional copies. Once the disposal facility receives the waste, the facility representative signs the manifest and returns it to the generator. Clemson University must retain the returned copy of the manifest signed by the receiving treatment, storage or disposal facility for at least three years from the date of shipment (General Counsel recommendation is that these manifests and supporting documents are kept indefinitely).

Land Disposal Restriction Certification

Listed and characteristic hazardous wastes have been evaluated by EPA to determine their suitability for land disposal. The result of this evaluation is a treatment standard for each waste. Any waste meeting the treatment standards may be land disposed without restriction in a RCRA land disposal unit. If the treatment standard for a waste is not met, the waste cannot be land disposed without prior treatment.

Information defining the restricted wastes and their treatment standards is available from the Hazardous Materials/Environmental Compliance Manager. Whether the waste is restricted under the Land Disposal Restrictions 40 CFR Part 268 will be determined by testing the waste or using knowledge of the waste. At the time the waste is shipped for off-site disposal, a Notification and Certification Form must be completed in full and must accompany the shipment. This form will identify the appropriate land disposal treatment standards and whether or not these standards have been met.

All laboratory analyses used to determine if a waste is subject to the land disposal restrictions will be conducted in accordance with approved EPA test methods and procedures. For wastes with treatment standards expressed as constituent concentrations in the waste extract (40 CFR 268.41), waste residues or an extract of such residues will be tested using the toxicity characteristic leaching procedure (TCLP). For wastes with treatment standards expressed as constituent concentrations in the waste (40 CFR 268.43), waste residues will be tested using a total constituent analyses (TCA).

Placarding

Clemson University is responsible for providing the transporter with the proper placards when required to comply with DOT shipping and labeling requirements. For example, if 1,001 pounds or more of flammable and/or combustible material are offered for shipment at one time, the placards for flammable and/or combustible material must be provided. The appropriate placards will be maintained at the facility or will be purchased by Clemson University prior to shipping quantities requiring placarding. Placards must be located on all sides of the motor vehicle.

Record keeping and Reporting

One copy of each manifest prepared for a hazardous waste shipment must be kept at the OES Main Office until the original signed copy is returned from the disposal facility which received the waste. The copy signed by Clemson University, the transporter and the receiving facility must be maintained at the facility for three years from the date of shipment (General Counsel recommendation is that these manifests and supporting documents are kept indefinitely). If a hand-signed copy is not returned from the disposal facility within 35 days of the shipping date,

Clemson University must contact the transporter or the disposal facility to determine the status of the hazardous waste.

If the completed manifest has not been returned from the disposal facility within 45 days of the date the waste was shipped from Clemson University, the Hazardous Materials/Environmental Compliance Manager will submit an Exception Report to SCDES. The report must contain a copy of the manifest retained by Clemson University and a letter of explanation stating what efforts have been made to locate the completed manifest and the results of those efforts.

All manifests and exception reports must be maintained at the OES Main Office for at least three years from the date the report was filed or the waste shipment was made (General Counsel recommendation is that these manifests and supporting documents are kept indefinitely).

Non-Routine Activity Procedures

New Waste Streams

A new waste stream may be generated in three ways:

- change in an existing process,
- implementation of a new process, or
- change in the regulations.

The generator, with the assistance of the Hazardous Materials/Environmental Compliance Manager, is responsible for reviewing any new waste streams to determine if they will be subject to the hazardous waste management regulations. If the new waste stream is not excluded from regulation, analysis of a waste stream sample may be required. Laboratory work may include analysis for the hazardous waste characteristics outlines in Section II.

Knowledge of the process shall be applied to determine analytical needs. Analytical data will be reviewed to determine potential concerns of ignitability or reactivity during storage. The generator is responsible for appropriately characterizing all new waste streams generated in his area.

Professors, students and employees shall notify the Hazardous Materials/Environmental Compliance Manager if new waste streams are to be generated.

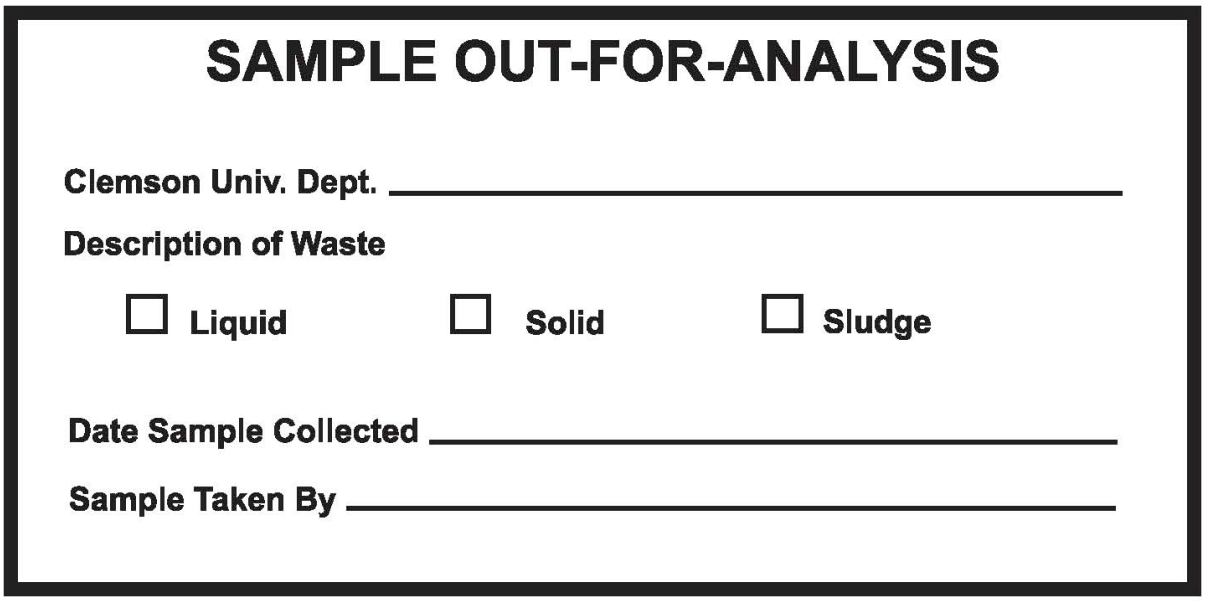
Unlabeled Containers

The potential exists for containers of unknown material to be discovered. Without knowledge of the container contents, appropriate disposal options cannot be determined.

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 the Hazardous Materials/Environmental Compliance Manager to arrange for the container to be relocated to the Hazardous Waste Accumulation Building.
- If laboratory analysis is required to appropriately characterize the waste material, a completed “Sample Out for Analysis” label shall be affixed to the side of the container (Figure VI-1).
- If the material is determined to be a hazardous waste, label and date the container immediately, and properly dispose of the material within 90 days.

Figure VI-1 Sample Out-for-Analysis Label



Training Requirements

Who Must be Trained and How Often

The regulatory framework which identifies who must be trained may be circuitous, but must be complied with nevertheless. 40 CFR 265.16 and 40 CFR 264.16 require training for personnel at interim status and permitted hazardous waste management treatment, storage and disposal (TSD) facilities. Hazardous waste generators are instructed in 40 CFR 262.34(a)(4) to comply with the requirements of 40 CFR 265.16 which is included in Appendix D of this manual. Therefore, hazardous waste management training is required for personnel who work at facilities which fit into any of the following categories:

- Permitted hazardous waste TSD facilities,
- Interim status hazardous waste TSD facilities,
- Large quantity generators.

Persons who must be trained include those who are involved with or are occupationally exposed to hazardous waste. This may include (but is not limited to) persons who perform any of the following tasks:

- decide which wastes are hazardous waste,
- add hazardous waste into accumulation containers at accumulation points,
- remove hazardous waste from accumulation containers,
- transport hazardous waste to or from accumulation points,
- transport hazardous waste to or from storage units,
- respond to spills, fires or explosions involving hazardous waste,
- complete hazardous waste manifests, annual reports or exception reports,
- inspect hazardous waste accumulation points and storage facilities,
- operate or work at accumulation points,
- work at permitted or interim status TSD facilities,
- conduct any tasks involving occupational exposure to or which require management of hazardous waste.

The required training must be successfully completed by all of the personnel described above. For new personnel, training must be successfully completed within six months after assignment to the facility or to a new position at the facility, whichever is later. Until that time, untrained personnel must not perform any tasks involving hazardous waste management unless they are supervised by trained personnel. Facility personnel may be required to take part in an annual review of the entire training program.

The Hazardous Materials/Environmental Compliance Manager will direct training of all applicable facility personnel in hazardous waste management procedures. Included in this training will be instruction in job specific hazardous waste management as well as contingency plan implementation.

Scope of Mandatory Training Requirements

There are two general components to the training requirements in 40 CFR 265.16; personnel must be trained:

1. How to perform their duties in a way that ensures the facility's compliance with the regulations; and
2. How to respond to emergencies involving hazardous waste.

EPA regulations published in 40 CFR 265.16 regarding personnel training are presented in Appendix D of this manual (separate document, copies available from EH&S).

Training Required by Other Laws

Besides the required RCRA training, other laws and regulations require training for many of the same personnel who must receive RCRA training. For example, persons working at permitted TSD facilities as well as hazardous substance emergency response personnel are required to be trained in accordance with OSHA regulations published in 29 CFR 1910.120. Personnel who work in areas in which hazardous chemicals are present may be required to be trained in accordance with OSHA regulations published in 29 CFR 1910.1200 or in accordance with substance specific standards in 29 CFR 1910 Subpart Z. All employees who handle, prepare for shipment, load, unload or drive a vehicle hauling DOT hazardous materials must be trained in accordance with the DOT training requirements in 49 CFR 172.700-.704. These regulations require initial general awareness, function-specific and safety training as well as recurrent training every three years or when changes in the regulation occur. To ensure that Clemson University personnel meet all of the training requirements specified by environmental laws, the dean, director, department head or supervisor, with guidance from the Hazardous Materials/Environmental Compliance Manager, should determine the necessary training required for associated employees.

Documentation and Training Records

The following documents and records must be maintained at Clemson University:

- The job title for each position at Clemson University related to hazardous waste management including the name of the employee filling the job.
- A written job description for each position listed including the requisite skill, education or other qualifications, and duties of personnel assigned to each position.
- A written description of the type and amount of introductory and continuing training that will be given to each person filling the listed position.
- Records documenting that the required training/job experience has been given to and completed by applicable Clemson University personnel.
- 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 to a different department within the university.

Appendix A - Hazardous Waste Lists

(Remove this page and attach all current hazardous waste lists from SCDES regulation R.61-79 here)

Appendix B - Hazardous Waste Management Regulations

(Separate Documents)

For Copies of these documents to maintain a departmental library, contact Occupational and Environmental Safety at (864) 656-0341

Appendix B Table of Contents

The following federal regulations (or parts thereof) concerning the management of hazardous waste are included in this appendix:

40 CFR 261	IDENTIFICATION AND LISTING OF HAZARDOUS WASTE
40 CFR 262	STANDARDS APPLICABLE TO GENERATORS OF HAZARDOUS WASTE
40 CFR 264 264.16; SUBPART C,D & I	STANDARDS FOR OWNERS AND OPERATORS OF HAZARDOUS WASTE TREATMENT, STORAGE, AND DISPOSAL FACILITIES
40 CFR 265 265.15; SUBPART C,D & I	INTERIM STATUS STANDARDS FOR OWNERS AND OPERATORS OF HAZARDOUS WASTE TREATMENT, STORAGE, AND DISPOSAL FACILITIES
40 CFR 279	STANDARDS FOR THE MANAGEMENT OF USED OIL
49 CFR 172.700-.704	DOT TRAINING REQUIREMENTS
29 CFR 1910.120	OSHA HAZARDOUS WASTE OPERATIONS AND EMERGENCY RESPONSE

Appendix C - Hazardous Waste Determination Documentation Policy

At all Clemson University operated/owned/leased facilities, when any chemical/hazardous material/hazardous substance/dangerous good is ready for disposal, that chemical/hazardous material/hazardous substance/dangerous good will be managed as Hazardous Waste and only shipped via a Clemson University approved Hazardous Waste Disposal and/or Remediation Contractor for proper disposal. All Hazardous Waste will be managed under the Hazardous Materials Program within the Clemson University Occupational and Environmental Safety by those annually trained in Hazardous Materials Management. Occupational and Environmental Safety trained personnel can approve and sign Hazardous Waste Manifests.

Hazardous Waste at Clemson will be managed in two categories:

1) Hazardous Waste (RCRA)
2) Hazardous Waste (Non-RCRA Regulated)

Hazardous Waste (RCRA):

Any chemical/hazardous material that meets the definition of Characteristic or Listed under the South Carolina Hazardous Waste Management Regulation (SCHWMR) 61-79. EPA Waste codes can be found in the sections of the SCHWM regulation noted below.

1) Ignitable (Flammables/Oxidizers) – R.61-79.261.21
2) Corrosive (pH $\leq$ 2 or $\geq$ 12.5) –R.61-79.261.22
3) Reactivity –R.61-79.261.23
4) Toxic (D list) –R.61-79.261.24
5) Listed –R.61-79.261.30:
    a. F list (Non-source specific) –R.61-79.261.31
    b. K list (Source Specific) –R.61-79.261.32
    c. P and U list (Discarded commercial chemical products, off-specification species, container residues and spill residues thereof) –R.61-79.261.33

Hazardous Waste (Non-RCRA Regulated):

All other chemicals/hazardous materials/hazardous substances/dangerous goods that do not meet the above RCRA characteristics and/or listed wastes but are required to carry any GHS hazard pictogram, Department of Transportation Hazard Class or any other materials deemed hazardous by Clemson University.

SCHWMR 262.11 Hazardous Waste Determination and Recordkeeping

A person who generates a solid waste, as defined in R.61–79.261.2 must make an accurate determination as to whether that waste is a hazardous waste in order to ensure wastes are properly managed according to applicable RCRA regulations. A hazardous waste determination is made using the following steps:

> (a) The hazardous waste determination for each solid waste must be made at the point of waste generation, before any dilution, mixing, or other alteration of the waste occurs, and at any time in the course of its management that it has, or may have, changed its properties as a result of exposure to the environment or other factors that may change the properties of the waste such that the RCRA classification of the waste may change.

262.11(f)

Recordkeeping for small and large quantity generators. A small or large quantity generator must maintain records supporting its hazardous waste determinations, including records that identify whether a solid waste is a hazardous waste, as defined by R.61-79.261.3. Records must be maintained for at least three (3) years from the date that the waste was last sent to on-site or off-site treatment, storage, or disposal. These records must comprise the generator's knowledge of the waste and support the generator's determination, as described at paragraphs (c) and (d) of this section. The records must include, but are not limited to, the following types of information: the results of any tests, sampling, waste analyses, or other determinations made in accordance with this section; records documenting the tests, sampling, and analytical methods used to demonstrate the validity and relevance of such tests; records consulted in order to determine the process by which the waste was generated, the composition of the waste, and the properties of the waste; and records which explain the knowledge basis for the generator's determination, as described at R.61-79 paragraph (d)(1) of this section. The periods of record retention referred to in this section are extended automatically during the course of any unresolved enforcement action regarding the regulated activity or as requested by the Department.

> 262.11(d) The person then must also determine whether the waste exhibits one or more hazardous characteristics as identified in subpart C of R.61–79.261 by following the procedures in paragraph (d)(1) or (2) of this section, or a combination of both.
>
> > (1) The person must apply knowledge of the hazard characteristic of the waste in light of the materials or the processes used to generate the waste. Acceptable knowledge may include process knowledge (e.g., information about chemical feedstocks and other inputs to the production process); knowledge of products, by-products, and intermediates produced by the manufacturing process; chemical or physical characterization of wastes; information on the chemical and physical properties of the chemicals used or produced by the process or otherwise contained in the waste; testing that illustrates the properties of the waste; or other reliable and relevant information about the properties of the waste or its constituents. A test other than a test method set forth in subpart C of R.61–79.261, or an equivalent test method approved by the Department under R.61–79.260.21, may be used as part of a person's knowledge to determine whether a solid waste exhibits a characteristic of hazardous waste. However, such tests do not, by themselves, provide definitive results. Persons testing their waste must obtain a representative sample of the waste for the testing, as defined at R.61–79.260.10.
> >
> > (2) When available knowledge is inadequate to make an accurate determination, the person must test the waste according to the applicable methods set forth in subpart C of R.61–79.261 or according to an equivalent method approved by the Department under R.61–79.260.21

Appendix D - Hazardous Waste Storage and other Miscellaneous Information

CU Hazardous Waste Policy for PPE Use

Personal protective equipment, PPE, is required by Hazardous Waste Regulations for small and large quantity generators. It is also vital for the health and safety of the generator. Personal protective equipment should be considered the last line of defense. Physical contact and exposure time with Hazardous Waste should be limited in all "Satellite Accumulation Areas". All generators of Hazardous Waste, whether they are Faculty, Staff, Graduate Students, Undergrads or Visitors to Clemson University, are required to use PPE. This PPE must consist of safety glasses, lab coats or equivalent such as uniforms provided specifically for the job, and gloves. Gloves should be suitable for the hazardous waste that is being managed.

For instance:

Nitrile gloves protect against most chemicals and infectious agents.

Rubber gloves protect against mild corrosive material.

Neoprene gloves protect against most solvents, oils, and mild corrosive materials.

Avoid latex gloves as many people are allergic or develop allergies to this material. Latex gloves also lose their structural integrity when exposed to most chemicals. Solvents and corrosive liquids actually degrade these gloves on contact.

The following sites may be used to help in the selection of the gloves recommended for specific chemicals:

- www.ansellpro.com/specware

  www.bestglove.com/site/chemrest

Disposal of Controlled Drugs Pharmaceuticals at Clemson University

Currently there are 2 methods for disposal of off specification and out of date Controlled Drugs/Substances that are regulated by DEA. These methods include Reverse Distribution or disposal through the Hazardous Waste Disposal Contract managed by Occupational and Environmental Safety.

Please note that Controlled drug and Controlled Substance are one and the same and are used interchangeable in this document.

Do not wait until you are in need of immediate disposal of a DEA Controlled Substance. Because of the paperwork involved, notifications and scheduling required, this is a lengthy disposal procedure. Notification should start at least 2 months prior to the actual time/date these substances need to be removed from your inventory.

Under Reverse Distribution:
The licensee must file the DEA form 41 with their local DEA office and also request a copy of the Companies currently approved by DEA to receive these controlled drugs. Then the licensee will follow the proper procedures provided by one of those companies in order to complete the transfer. The licensee must package and mail the materials to the reverse distribution company and keep all related records. Occupational and Environmental Safety's Hazardous Waste Management Facility cannot provide this service or be in possession of controlled substances. Any controlled substances that inadvertently come into Occupational and Environmental Safety's Hazardous Waste Management Facility possession will be returned to the licensee immediately.

Under the Hazardous Waste Disposal Contract:
The licensee notifies the Hazardous Materials/Environmental Compliance Manager that they have controlled drugs ready for disposal. The licensee will also supply a list of these controlled drugs to include name, DEA classification, amount and lot number. The Hazardous Materials/Environmental Compliance Manager will then arrange disposal with the Hazardous Waste Disposal Contractor. The Hazardous Waste Disposal Contractor will fill out all forms needed for disposal including the DEA Form 41. They will submit this paperwork to the Hazardous Materials Manager for the appropriate signatures as needed. The Hazardous Waste Disposal Contractor will then file all paperwork with the appropriate agencies. A date will be set for the Hazardous Waste Disposal Contractor's DEA licensed representative to arrive on campus and take possession of the controlled drugs from the licensee. *Note: The controlled drugs will remain with the licensee until the Hazardous Waste Disposal contractor's representative takes physical possession of them.*

Please take all precautions not to lose control of any Controlled Substance as this constitutes a serious violation of your license. DEA Controlled Substances include all those containers labeled with a large "C" and respective Roman numerals as to their classification by DEA.

Sanitary Sewer Disposal of Controlled Substances and Pharmaceuticals is forbidden at Clemson University. Our treatment plant has no industrial discharge permit for such materials. And many of them can be harmful to the environment. Occupational and Environmental Safety Hazardous Waste Management Facility can and will provide services for the other Pharmaceuticals that are **NOT** Controlled Drugs under DEA. These can be declared as Hazardous Wastes and we will pick them up and properly destroy them.

If you are unsure of whether your Pharmaceuticals are Controlled Substances (for example, the label is missing, the compound was made in the laboratory or the items is from very old stock before the common use of the large "C") you can consult lists from the Department of Justice, Drug Enforcement Division: http://www.deadiversion.usdoj.gov/schedules/index.html

There you will find two links: one to the "List of Controlled Substances" (I, II, III, IV and V), and one to "Exempted Lists". If your Pharmaceutical is NOT on the List of Controlled Substances, declare it as a chemical waste in the normal fashion.
If you find your Pharmaceutical's name on the list of controlled substances, consult the "Exempted Lists." If your material is on the Controlled Substance list, but not the Exempted list, you have a controlled substance and will have to be disposed of via one of the two routes for Controlled Substance Disposal explained in this document. If it is on both lists, you have an exempted material. If you do find that you have an Exempt item, we ask that you expressly declare this type of waste separately from any other wastes as an "Exempt Controlled Substance" on the disposal declaration form, and the Licensee will have to co-witness the destruction and documentation of destruction when we come to pick it up. The licensee will have to place the declared material into some destructive media we will provide and sign off on the destruction. This waste will then be further and permanently destroyed by incineration through the Hazardous Waste Disposal Contractor.

Standard Operating Procedure for 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:

1. Place the collection **CONTAINER** labeled with the chemical constituents in a safe place (such as the chemical fume hood) inside Secondary Containment;
2. Loosely cap the container until the reaction has stopped;
3. 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/Environmental Compliance Manager with Occupational and Environmental 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.

Occupational and Environmental Safety will not collect waste that is still reacting; that waste is still considered to be "in process" until the reaction has finished.

CLEMSON
UNIVERSITY

Empty Container Management at Clemson University

Once a container that has held a hazardous material or waste is determined to be empty it must be disposed of properly. To determine if the container is empty you should refer to Section II-3, on page 7 of the "Hazardous Waste Management Manual". The following is a reprint of the definition and it is applicable to containers that have held hazardous materials as well as empty hazardous waste containers.

3. **Empty Containers**

Residues of hazardous waste remaining in a container may not be subject to the requirements specified in this manual if the container meets the regulatory definition of an empty container.

A container or an inner liner removed from a container that has held a hazardous waste, except a compressed gas or acute hazardous waste, is empty if:

- All wastes have been removed that can be removed using common practices (e.g., pouring, pumping, aspirating), and
- No material pours out of the container when held upside down or for Department of Transportation (DOT) recycling, no more than 2.5 cm (one inch) of residue remain on the bottom of the container or inner liner, or
- No more than 3% by weight of the total capacity of the container remains in the container or inner liner if the container is less than or equal to 100 gallons, or
- No more than 0.3% by weight of the total capacity of the container remains in the container or inner liner if the container is greater than 100 gallons in size.

A container that has held a hazardous waste that is a compressed gas is empty when the pressure in the container approaches atmospheric pressure. However, it should be noted that releasing hazardous waste from a compressed gas cylinder for the purpose of returning the cylinder to atmospheric pressure is considered illegal discharge of a hazardous waste.

CAUTION! A container or an inner liner removed from a container that has held an acute hazardous waste (as identified in Appendix A) is not considered empty until:

- The container or inner liner has been triple rinsed using a solvent capable of removing the waste,
- The container or inner liner has been cleaned by another method that has been shown in the scientific literature, or by tests conducted by the generator, to achieve equivalent removal, or
- In the case of a container, the inner liner that prevented contact of the acute hazardous waste with the container has been removed.

The rinsate generated when cleaning hazardous waste containers, including the rinsate from containers that are rendered empty by that rinsing, should be managed in accordance with the requirements specified in this manual unless it can be determined, using the procedures outlined in this section, that the material is not a hazardous waste. NORMALLY, ALL RINSATE FROM ACUTE HAZARDOUS WASTE CONTAINERS IS AN ACUTE HAZARDOUS WASTE AND SHOULD BE COLLECTED AND MANAGED ACCORDINGLY.

After establishing that the container is empty, The labels must be defaced in such a manner that the original wording and any symbols or signs (i.e. DOT markings, NFPA symbols or OSHA hazard symbols) on the label cannot be determined. You may accomplish this by either removing the labels or spray painting over all labels and or signs. **Only then may they be placed into a trash disposal receptacle or recycled.**

Cylinder Management

Empty and old cylinders represent a real problem for the university and are not only expensive to deal with but can be dangerous as well. The following is a description of an incident that demonstrates some thought that should be put into the purchasing and management of these items at Clemson University.

This communication was to a Department Head…

I recently had our deactivation specialist come up on a non-football Saturday. He was to open and identify three old rusty cylinders found in a storage cabinet under a fume hood from a retiring professor's laboratory. He also was to do the same for a "homemade" one we got from another professor's storage room. The "homemade" one turned out to be hydrogen fluoride which reacted violently and sent a cloud of hydrochloric acid gas through the air when it was allowed to react with water to stabilize it. Of the three found under the hood, one had an obvious hole in it (and had emptied itself somewhere in the lab, I assume), one we verified as empty and we field-tested one to identify for later shipment. This last one cost over $1000.00 to dispose.

The real surprise was the two that had previously been given to us as "empty". They did not turn out to be so. One cylinder contained hydrogen bromide and was full. Some one had opened the valve and when nothing came out, they had mistakenly assumed it was empty. There were two like this. The other one was chlorine. Both valves were open and could have let go and discharged their contents into the lab at any time. We suspected that they were not empty and decided not to risk taking the valves out ourselves. A good thing huh?

The lesson here is that cylinders that have contained corrosive or oxidizing gasses or liquids cannot be considered empty by just opening the valve or by looking at the pressure gauge on the regulator. These gasses routinely clog the valves so that you cannot get the material out. Any cylinder that has contained a gas with these characteristics should be considered to still have material in it unless you can see into the cylinder because the valve has been removed or a hole has been drilled into it as our deactivation contractor does. This is the only way we can consider a cylinder to be truly empty. I would never recommend removing a valve on a cylinder that has held one of these types of gasses.

Solutions? Don't buy non-returnable cylinders of any gasses, especially of this kind. Buy only returnable cylinders so that you can send the cylinder back regardless of whether it's empty or not. This may cost more up front but you really must figure in the entire cost. If you really need to see if one of these types of cylinders is empty, you could try to feed nitrogen back into the cylinder to see if it will repressurize. If nitrogen

flows into the cylinder, you know the cylinder does not have a clogged valve and is empty so you can unscrew the valve from the cylinder and it will be scrap metal. This half of a day of deactivation described above, with seven small cylinders, cost us over $7000.00. We were lucky in that most of them were empty and we were able to field-test them so that we have very little further analysis and disposal costs.

Lessons learned: Buy gasses only in returnable or rented cylinders, especially those that contain corrosive or oxidizing liquids or gasses. Manage them carefully so that you keep track of their condition and location. Return them to the vendor as soon as you finish with your project. For further guidance contact Occupational and Environmental Safety (864) 656-0341 or (864) 656-1770.

Universal Waste Management

Some Hazardous Materials that meet the definition of a hazardous waste may be managed under the Universal Waste Rule 61-79.273 and sent for recycle. These materials must be intact and properly packaged and labeled as Universal Waste. Unlike RCRA Hazardous wastes, Universal Waste Regulations require that the containers must be dated when the item is placed in the container.

Universal Wastes consist of:

1) Lamps – labeled as “Universal Waste Lamps”
    a. Fluorescent
    b. Mercury Vapor
    c. High Intensity
    d. Neon
    e. High Pressure Sodium
    f. Metal Halide
    g. LED
2) Batteries – labeled as “Universal Waste Batteries”
    a. Nickle Cadmium (NiCad)
    b. Nickle Metal Hydride
    c. Lithium
    d. Mercury
    e. Lead Acid (unless managed under Lead Acid Battery exemption)
3) Manufactured Articles Containing Mercury – labeled as “Universal Waste Manufactured Articles Containing Mercury”
    a. Mercury Thermometers
    b. Mercury Thermostats
    c. Manometers, Hygrometers, etc.
4) Aerosol Cans – labeled as “Universal Waste Aerosol Cans”
    a. Even empty aerosols must be managed as Universal Waste due to the propellant remaining in the cans.

OES Hazardous Materials Program manages these wastes for all Clemson University Facilities.

Disposal of Used Printer Cartridges

These cartridges contain carbon black. This is a restricted waste because it is a flammable solid and a carcinogen. It cannot be disposed of in the dumpsters or on the ground. We have found both situations recently and the clean up of these has cost the university money. Occupational and Environmental Safety reminds you that it is illegal to improperly dispose of these cartridges.

Most Cartridges come with a prepaid, return label and can be recycled at no cost to you. Occupational and Environmental Safety encourages you to do so or contact the recycling center at Kite Hill. For further guidance on this and other hazardous waste management issues contact the Hazardous Materials/Environmental Compliance Manager at 656-1770 or Occupational and Environmental Safety at 864-656-0341.

Used Oil Management at Clemson University

Several years ago the state of South Carolina decided to declare used motor oil “Hazardous Waste”. This declaration was at odds with the intent of the Resource Recovery and Conservation Act (RCRA) that originally defined hazardous wastes. The state rethought this decision and now considers used motor oil to be hazardous waste only if released to the environment or if improperly managed during its accumulation for recycling. Otherwise, used oil is exempt from some of the specific regulations that other hazardous waste must follow. The South Carolina Department of Environmental Control (DHEC) administers RCRA in our state.

Used oil is defined by the Environmental Protection Agency (EPA) as “any used oil that has been refined from crude oil, or any synthetic oil that has been used and as a result of such use is contaminated by physical or chemical impurities”. Farmers (with less than 25 gallons) and homeowners are excluded from any regulation. The exemption for used oil applied to Clemson University states that this material may be “accumulated speculatively” for recycling. “Accumulated speculatively” is defined as at least 75% of the material will be recycled in a given one year period. The EPA, DHEC, and Clemson University wants to encourage the recycling of this valuable waste, but also wants to protect the environment. The definition of recycling gets real tricky here. If the oil is re-fined as usable oil, it is truly recycled. If however, it is burned for energy recovery in a boiler or furnace (a form of recycling) it could release contaminants to the environments at these levels:

Arsenic	5ppm maximum
Cadmium	2ppm maximum
Chromium	10ppm maximum
Lead	100ppm maximum
Total Halogens	4000ppm maximum
Flash Point	100 deg. Minimum

Only after providing by laboratory analysis that it is “on-specification” and can be burned, can we allow anyone to take our oil for this purpose!

Oil filters are not hazardous waste and can be disposed of without special concern if handled in the following manner. They must not be “tern-plated”. This means coated with lead and other heavy metals to prevent corrosion. These tern-plated type filters have not been manufactured for several years and shouldn’t be of concern. All filters should be hot drained for 12 hours and crushed or punctured.

As you can see, this simple attempt at recycling could prove to be dangerous if you don’t know where your oil comes from and where it’s going. Because of the potential for waste oils and their related wastes to become hazardous wastes, Occupational and Environmental Safety and the Hazardous Materials/Environmental Compliance Manager must be consulted and informed of any activities in this area. It should not be the practice to accept oil from unknown sources or from outside the university. These questionable sources could lead to serious fines from DHEC. Please call Occupational and Environmental Safety’s Hazardous Waste Management facility if you are having questions or problems with used oil management or any other hazardous waste problem at 864-656-1770.

Clemson Recycling Services under the management of Clemson University Facilities has a collection area for both uncontaminated used oil and oil filters. They should be contacted at 864-656-4219 with any questions concerning the recycling of these wastes.

Contaminated oils should be managed as a hazardous waste and declared to the Hazardous Materials/Environmental Compliance Manager for proper disposal.

Guidance on Conducting Hazardous Waste Treatability Studies

The purpose of this document is to offer clarification regarding the conditional exemptions provided by the South Carolina Hazardous Waste Management Regulations R.61-79 (SCHWMR) for Hazardous Waste Treatability Studies. Per SCHWMR R.61-79.260.10 a **"Treatability Study" means a study in which a hazardous waste is subjected to a treatment process to determine: (1) Whether the waste is amenable to the treatment process, (2) what pretreatment (if any) is required, (3) the optimal process conditions needed to achieve the desired treatment, (4) the efficiency of a treatment process for a specific waste or wastes, or (5) 5860.11 References 260 - 10 the characteristics and volumes of residuals from a particular treatment process. Also included in this definition for the purpose of the 261.4 (e) and (f) exemptions are liner compatibility, corrosion, and other material compatibility studies and toxicological and health effects studies. *A "treatability study" is not a means to commercially treat or dispose of hazardous waste.* (11/90)**

A researcher conducting a hazardous waste treatability study must comply with the exclusion regulations found in SCHWMR R61-79.261.4(e) and (f). These exemptions apply to the following categories of wastes:
1) non-acutely hazardous waste,
2) acutely hazardous waste
3) media (e.g., soil and debris) contaminated with acutely hazardous waste
4) media contaminated with non-acutely hazardous waste

Exclusions as they apply to generators or sample collectors:
The maximum quantities allowable for exemption that a generator or sample collector may use or ship to a testing facility or laboratory are limited to no more than:

1) 10,000 kg of media contaminated with non-acute hazardous waste,
2) 1000 kg of non-acute hazardous waste other than contaminated media,
3) 1 kg of acute hazardous waste,
4) 2500 kg of media contaminated with acute hazardous waste for each process being evaluated for each generated waste stream; and

The mass of each sample shipment does not exceed 10,000 kg; the 10,000 kg quantity may be all media contaminated with non-acute hazardous waste, or may include 2500 kg of media contaminated with acute hazardous waste, 1000 kg of hazardous waste, and 1 kg of acute hazardous waste.

The sample must be packaged so that it will not leak, spill, or vaporize from its packaging during shipment and the requirements for transportation are met.

Exclusions as they apply to transporters:

The transportation of each sample shipment must comply with U.S. Department of Transportation (USDOT), U.S. Postal Service (USPS), South Carolina Public Service Commission or other applicable shipping requirements.

If USDOT, USPS, or other shipping requirements do not apply to the shipment of the sample, the following information must accompany the sample:
1) the name, mailing address, and telephone number of the generator of the sample and of the facility performing the treatability study, and
2) the quantity of waste, date of the shipment, a description of the sample (including the EPA Hazardous Waste Number), and confirmation of the sample being shipped to a laboratory or testing facility that either

(1) has a RCRA permit,
(2) has interim status, or
(3) is exempt under 40CFR 261.4(f)

The generator or sample collector maintains the following records for a period ending 3 years after completion of the treatability study:
1) Copies of the shipping documents;
2) A copy of the contract with the facility conducting the treatability study;
3) Documentation showing:

(1) The amount of waste shipped under this exemption;
(2) The name, address, and EPA identification number of the laboratory or testing facility that received the waste;
(3) The date the shipment was made; and
(4) Whether or not unused samples and residues were returned to the generator.

The generator reports this information to the state in its annual report.

Exclusions as they apply to Laboratories or testing facilities:
(1) No less than 45 days before conducting treatability studies, the facility notifies the Department in writing that it intends to conduct treatability studies under this paragraph.
(2) The laboratory or testing facility conducting the treatability study has an EPA identification number.
(3) No more than a total of 10,000 kg of "as received" media contaminated with non-acute hazardous waste, 2500 kg of media contaminated with acute hazardous waste or 250 kg of other "as received" hazardous waste is subject to initiation of treatment in all treatability studies in any single day. "As received" waste refers to the waste as received in the shipment from the generator or sample collector.
(4) The quantity of "as received" hazardous waste stored at the facility for the purpose of evaluation in treatability studies does not exceed 10,000 kg, the total of which can include 10,000 kg of media contaminated with non-acute hazardous waste, 2500 kg of media contaminated with acute hazardous waste, 1000 kg of non-acute hazardous wastes other than contaminated media, and 1 kg of acute hazardous waste. This quantity limitation does not include treatment materials
(including nonhazardous solid waste) added to "as received" hazardous waste.
(5) No more than 90 days have elapsed since the treatability study for the sample was completed, or no more than one year (two years for treatability studies involving bioremediation) have elapsed since the generator or sample collector shipped the sample to the laboratory or testing facility, whichever date first
occurs. Up to 500 kg of treated material from a particular waste stream from treatability studies may be archived for future evaluation up to five years from the
date of initial receipt. Quantities of materials archived are counted against the total storage limit for the facility.
(6) The treatability study does not involve the placement of hazardous waste on the land or open burning of hazardous waste.
(7) The facility maintains records for 3 years following completion of each study that show

compliance with the treatment rate limits and the storage time and quantity limits. The following specific information must be included for each treatability study conducted:

(i) The name, address, and EPA identification number of the generator or sample collector of each waste sample;

(ii) The date the shipment was received;

(iii) The quantity of waste accepted;

(iv) The quantity of "as received" waste in storage each day;

(v) The date the treatment study was initiated and the amount of "as received" waste introduced to treatment each day;

(vi) The date the treatability study was concluded;

(vii) The date any unused sample or residues generated from the treatability study were returned to the generator or sample collector or, if sent to a designated facility, the name of the facility and the EPA identification number.

(8) The facility keeps, onsite, a copy of the treatability study contract and all shipping papers associated with the transport of treatability study samples to and from the facility for a period ending 3 years from the completion date of each treatability study.

(9) The facility prepares and submits a report to the Department by March 15 of each year, that includes the following information for the previous calendar year: (6/08)

(i) The name, address, and EPA identification number of the facility conducting the treatability studies;

(ii) The types (by process) of treatability studies conducted;

(iii) The names and addresses of persons for whom studies have been conducted (including their EPA identification numbers);

(iv) The total quantity of waste in storage each day;

(v) The quantity and types of waste subjected to treatability studies;

(vi) When each treatability study was conducted;

(vii) The final disposition of residues and unused sample from each treatability study.

(10) The facility determines whether any unused sample or residues generated by the treatability study are hazardous waste under 261.3 and, if so, are subject to parts 261 through 268, and part 270, unless the residues and unused samples are returned to the sample originator under the 261.4(e) exemption.

(11) The facility notifies the Department by letter when the facility is no longer planning to conduct any treatability studies at the site.

Please contact Occupational and Environmental Safety for more guidance and/or assistance with reporting these studies to SCDES and EPA.

CU Environmental Remediation SOP

Clemson University maintains remediation contract services for planned (non-emergency) and emergency environmental remediation site work. These contract services are managed by Occupational and Environmental Safety and the Clemson University Restoration Institute (CURI) campus. Instructions for specific locations and contacts for each are as follows:

If an incident/spill occurs **on main campus**, contact June Brock-Carroll @ 864-633-6357 or email: juneb@clemson.edu. (If June is not available contact Jim Grieger, Executive Director, Occupational and Environmental Safety @ 607-229-0695 or email: jgriege@clemson.edu.) The Occupational and Environmental Safety contact will evaluate the situation and determine if remediation is needed.

If an incident/spill occurs at **an off campus location (with exception to CURI Campus, Coastal REC, Edisto REC or Baruch Institute)**, contact June Brock-Carroll prior to initiation of remediation services. If the incident/accident occurs **at CURI, Coastal REC, Edisto REC or Baruch Institute** contact Kurt Rayburg, Low Country Safety Manager @ 843-730-5073 or email: kdraybu@clemson.edu If the appropriate contact is not available contact Jim Grieger, Executive Director, Occupational and Environmental Safety @ 607-229-0695 or email: jgriege@clemson.edu.) The Occupational and Environmental Safety contact will evaluate the situation and determine if remediation is needed.

In addition, the following people at CURI should be contacted and have authorization to activate the remediation contract for CURI Campus only:

CURI incidents:

James Tuten, Director of Facilities, CURI
843-730-5071 or jtuten@clemson.edu
EdiVania (AJ) Arena, Campus Manager, CURI
arena@clemson.edu

Prior to the start of any remediation work, if **regulated waste** is involved or will be generated (whether research or institutional in nature), contact:

June Brock-Carroll, Occupational and Environmental Safety Hazardous Materials/Environmental Compliance Manager @ 864-633-6357 or email: juneb@clemson.edu

All invoices other than the work at CURI shall be sent to the Occupational and Environmental Safety.

When an Environmental Permit is Required

The environmental permitting policy for Clemson University requires all departments to evaluate their needs for any required environmental permits as appropriate for their operations. Obtaining these permits and complying with their requirements is the responsibility of the department, as are all fines and other penalties for non-compliance. Copies of all permits obtained must be sent to Occupational and Environmental Safety. Occupational and Environmental Safety will maintain a central repository for the university environmental permits that they oversee and audit permit compliance as necessary. This policy applies to all Clemson University operations, regardless of location.

Contractors working on behalf of Clemson University are required to comply with this policy if their operations require environmental permitting. Failure of a contractor to adhere to this policy will result in withholding all payments until proper permits are provided and penalties are satisfied.

Permits may be required under these circumstances:

1) Discharge into the air. Any new discharge into the air requires evaluation to see if it falls under our existing Title V permit, if another permit is required, or if the activity does not require a permit.

2) Discharge into the "waters of the State." Any discharge that eventually can make its way into "the waters of the State" has to be reviewed to see if it is covered under an existing permit (NPDEA, Storm Water), requires its own permit, or is unregulated.

3) Disturbance of or discharge on to soil. Activities disturbing soil (generally construction) or which discharges onto or into the soil (generally petroleum products) must be evaluated for permit requirements.

4) Collection and or disposal of chemical, biological, or radiological materials. These activities are regulated, and permits may be required.

Upon request, Occupational and Environmental Safety will review an activity to determine if a permit is required and also assist in obtaining the permit if desired.