Welcome to Hazardous Waste Generator Training

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HP-RCRIGEN3-CLASSROOM

Course Objective

All BNL employees, guests, contractors and visitors who create waste regulated under the Resource Conservation and Recovery Act (RCRA) by the Environmental Protection Agency (EPA) and the New York State Department of Environmental Conservation (NYSDEC) are required to take this course.

This course has been designed to enable you to meet these requirements by strictly adhering to the Standards Based Management System Subject Area “Hazardous Waste Management.” This course highlights and discusses each step in the Subject Area.

Topic Areas

- **Waste Generation**
  - Your responsibilities
  - Packaging
  - Labeling
  - Proper waste descriptions
  - Satellite Accumulations Areas (SAAs)

- **Waste Disposal**
  - Filling out waste forms
  - 90-Day Accumulation Area;

- **Other Wastes**
  - Batteries, aerosol cans, unknowns, unstable

Waste Generation - Responsibilities

You are responsible for proper management of your waste and all it's related hazards.

Why?

- The Lab can get violation's from the State or the EPA.
- People can get hurt.
  - Students, WM techs, transporters, disposal facility staff and you.

What is Hazardous Waste?

RCRA Characteristic Waste

- **Ignitable**
  - FP < 140 oF (60 oC)
  - Oxidizer
- **Corrosive**
  - pH < 2, pH > 12.5
- **Reactive**
  - Water/air reactive
  - Unstable
  - Explosive
- **Toxic**
  - 8 Toxic Metals
    - Arsenic
    - Barium
    - Cadmium
    - Chromium
    - Lead
    - Mercury
    - Selenium
    - Silver
  - Specific toxic organics
  - Specific pesticides

What is Hazardous Waste?

		YES	NO
	Physical State CHECK ONLY ONE: Solid ☐ Liquid ☐ Gas ☐		
PCBs	Does the waste contain **PCBs**? If yes,_____ ppm _____	☐	☐
	For articles/equip. containing PCBs, provide date item was **removed from service**____/____/____		
	For drummed ballasts, capacitors, and transformers provide number of pieces and individual weights in boxes above or attach separate inventory sheet.		
IGNITABILITY	Is the flashpoint **less than 140° F (60° C)**?	☐	☐
	Is the waste an **oxidizer**?	☐	☐
CORROSIVITY	For **aqueous wastes**:		
	Is the pH **less than or equal to 2.0 OR greater than or equal to 12.5**? _____ pH	☐	☐
REACTIVITY	Is the waste **unstable, air or water reactive, or explosive**? If so, list in PRECAUTIONS.	☐	☐
	Will the waste **liberate cyanide or sulfide**? If so, list in PRECAUTIONS.	☐	☐
GENERAL	Is the waste from a spill clean-up? Provide Spill # if applicable. _____	☐	☐
	Was the waste used as a solvent or degreaser? If so,which? _____	☐	☐
TOXICITY	Based on your knowledge of the process and the information available to you (MSDS, manufacturers specs., etc.) does the waste contain any of the following materials?	☐	☐

Arsenic		Chlorobenzene		Cresol		Endrin		Lindane		Pyridine		2,4,5-Trichlorophenol	
Barium		Chloroform		2,4 D		Heptachlor & its epoxide		Mercury		Selenium		2,4,6-Trichlorophenol	
Benzene		Chromium		1,4 Dichlorobenzene		Hexachlorobenzene		Methoxychlor		Silver		2,4,5 TP (Silvex)	
Cadmium		o-Cresol		1,2 Dichloroethane		Hexachlorobutadiene		Methyl Ethyl Ketone		Tetrachloroethylene		Vinyl Chloride	
Carbon Tetrachloride		m-Cresol		1,1 Dichloroethylene		Hexachloroethane		Nitrobenzene		Toxaphene			
Chlordane		p-Cresol		2,4 Dinitrotoluene		Lead		Pentachlorophenol		Trichloroethylene			

PRECAUTIONS Note any special hazards. _____(e.g. shock sensitive, water/air reactive)

_____**Initial here if waste has been in a Radiological Area.** If waste has been in a Radiological Area, a Process Knowledge Certification Form (PKCF), shall be attached to this WCF to define waste specific parameters.

Wastes Decayed In Storage at the Point of Generation Must be Managed in accordance with BNLs SBMS Subject Area "Radioactive Waste Management". DO NOT Document DIS Wastes on this form.

CERTIFICATION *I certify that, to the best of my knowledge, the information provided on this form is true and complete and that I am minimizing all waste generated to the best of my ability.* ***I also certify that no radioactivity has been added to this waste.***

Generators Signature _____ Date _____

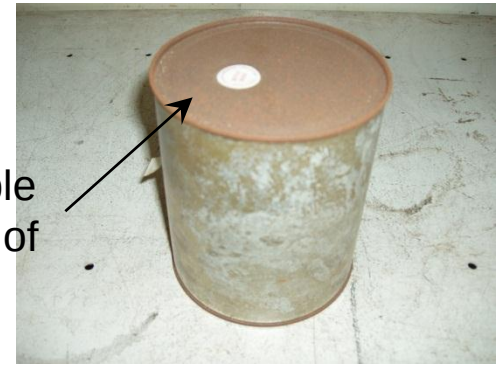
BNL F2974C 6/00

Waste Generation – Packaging Waste

- **Choose a container that is clean and in good condition**
  - Preferably new
  - Not dented
  - Not rusty
  - Compatible with the waste
  - Adequate to contain the waste
    - No heavy materials or sharp items in plastic bags

  - And keep the containers closed unless you are adding waste.

Not acceptable because of rust



Waste Generation - Labels

Fill out the Hazardous Waste label completely.

Most Importantly: Label the container with the <u>specific major chemical constituents</u> that make it a RCRA hazardous waste.

- **Ignitable chemicals?**
- **Corrosive chemicals?**
- **Reactive chemicals?**
- **Toxic chemicals?**

If no RCRA chemicals are in the waste, list the component chemicals in the highest concentration or that pose the greatest health hazard.

Generating Waste - Waste Descriptions

Examples of Waste Descriptions

Acceptable	Unacceptable*
Methylene chloride, trichoroethane, trichloroethylene	Halogenated solvents
Benzene, methanol	Non-halogenated solvents
Lead-containing solution	Degreaser/mold release
Degreaser containing hexane and acetone	LPS Degreaser (Tri Super Cleaner)
HACH solution containing mercuric nitrate	HACH solution
Phosphoric acid solution with lead and cadmium	AC500 coolant
Chloroform, phenol solution	Type #1
Lead, cadmium, and chromium metal debris	Heavy metals
Solvent containing perchloroethylene	Leak test
Cleaning solution with hydrochloric acid	Corr shield
Isobutane, pentane, octane solution	Hydrocarbons C4-C8
Methanol, isopropyl alcohol, and Carbon-14	Mixed wastes
Glass contaminated with mercury	Glass debris
Paint filters with toluene	Paint debris
Waste methanol and acetonitrile	Wastewater
Acetone and chloroform solution	Legacy waste
Isopropanol and hydrofluoroether	Smith's solvent

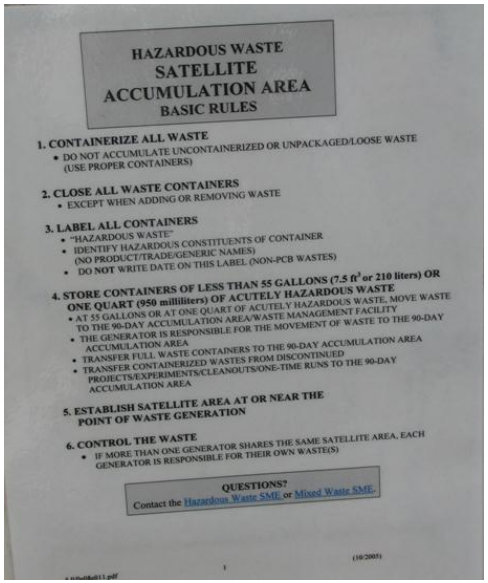
*** General descriptions such as these do not provide any information with respect to the associated hazard/properties or constituents of the waste and must not be used. Specific chemical descriptions are required by WM to complete associated documentation (NYSDEC Part 373 Permit).**

Waste Generation - Waste Descriptions

Waste Descriptions must be on the container.

Waste Generation - SAAs

- **Once labeled, move the waste into a satellite accumulation area (SAA).**
  - Located at or near the point of waste generation.
  - Under the control of the waste generator.
  - Has 2nd containment for liquids that is capable of holding 100% of the largest container's volume.*
  - The 2nd containment should not obscure the waste label.
  - Post with SAA Rules Posting



HAZARDOUS WASTE
SATELLITE
ACCUMULATION AREA
BASIC RULES

1. CONTAINERIZE ALL WASTE
   - DO NOT ACCUMULATE UNCONTAINERIZED OR UNPACKAGED/LOOSE WASTE (USE PROPER CONTAINERS)
2. CLOSE ALL WASTE CONTAINERS
   - EXCEPT WHEN ADDING OR REMOVING WASTE
3. LABEL ALL CONTAINERS
   - "HAZARDOUS WASTE"
   - IDENTIFY HAZARDOUS CONSTITUENTS OF CONTAINER (NO PRODUCT/TRADE/GENERIC NAMES)
   - DO NOT WRITE DATE ON THIS LABEL (NON-PCB WASTES)
4. STORE CONTAINERS OF LESS THAN 55 GALLONS (7.5 ft³ or 210 liters) OR ONE QUART (950 milliliters) OF ACUTELY HAZARDOUS WASTE
   - AT 55 GALLONS OR AT ONE QUART OF ACUTELY HAZARDOUS WASTE, MOVE WASTE TO THE 90-DAY ACCUMULATION AREA/WASTE MANAGEMENT FACILITY
   - THE GENERATOR IS RESPONSIBLE FOR THE MOVEMENT OF WASTE TO THE 90-DAY ACCUMULATION AREA
   - TRANSFER FULL WASTE CONTAINERS TO THE 90-DAY ACCUMULATION AREA
   - TRANSFER CONTAINERIZED WASTES FROM DISCONTINUED PROJECTS/EXPERIMENTS/CLEANOUTS/ONE-TIME RUNS TO THE 90-DAY ACCUMULATION AREA
5. ESTABLISH SATELLITE AREA AT OR NEAR THE POINT OF WASTE GENERATION
6. CONTROL THE WASTE
   - IF MORE THAN ONE GENERATOR SHARES THE SAME SATELLITE AREA, EACH GENERATOR IS RESPONSIBLE FOR THEIR OWN WASTE(S)

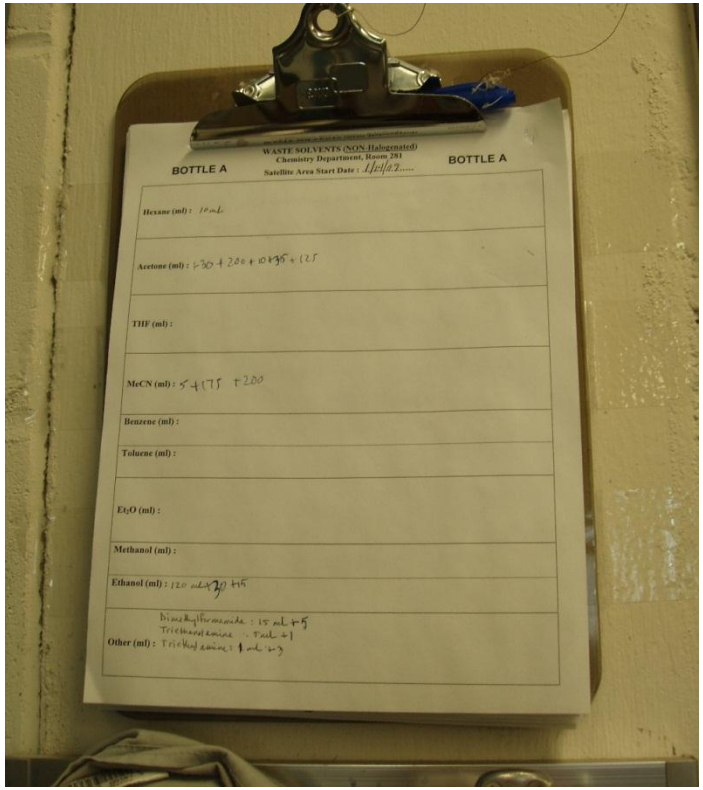
QUESTIONS?
Contact the Hazardous Waste SME or Mixed Waste SME

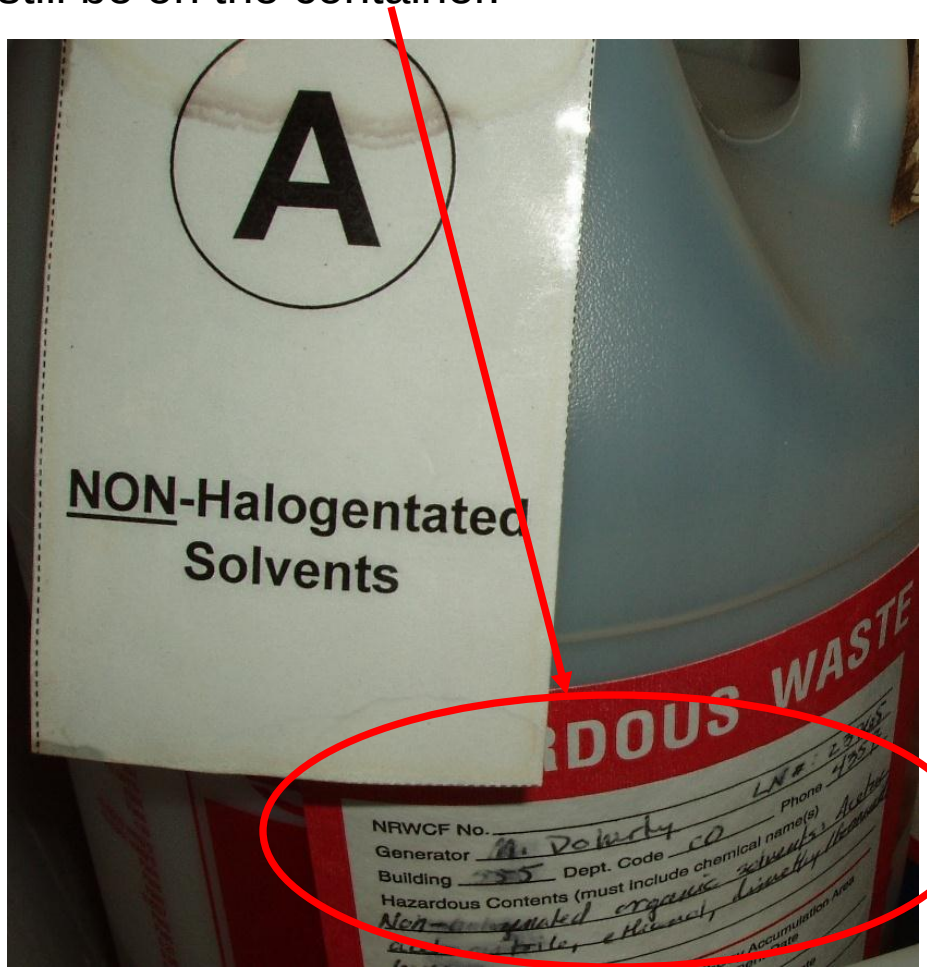
(10/2005)

Waste Generation -SAAs

Mixtures & Multiple generators:

- Add only compatible wastes to any given container.
- Record entries on the inventory
- The major chemical constituents must still be on the container.
  - Don't just write "mixed organics"

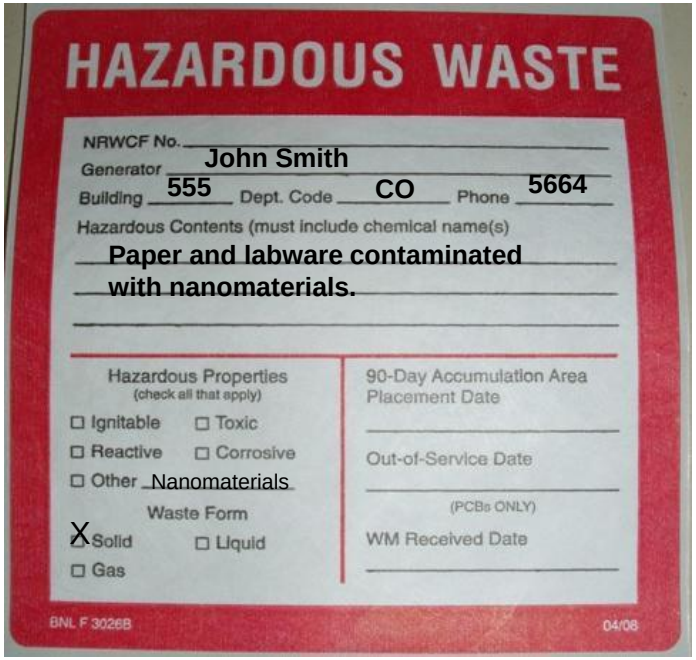




Remember: It has to be readable.

Waste Generation - Nano

- **Nanowaste is hazardous waste.**
  - Include contaminated wipes, gloves, labware, etc…
  - Double bag the waste.
  - Label with red, hazardous waste label and nano label.



Waste Generation - SAAs

- **Segregate Incompatibles**
  - Acids
  - Bases
  - Oxidizers
    - nitrates, perchlorics, peroxides, permanganates, hypochlorites
  - Acetic acid (store alone)
  - Poisons/toxics
    - cyanides, azides, metals
  - Combustible and flammable liquids/materials.

https://sbms.bnl.gov/sbmsearch/subjarea/120/12029e011.pdf

Establishing a SAA

Recommendation: Design the SAA to promote segregation of incompatibles

- Clearly label the SAA bins as to which class of chemical may be stored within.
- Create separate SAAs for incompatibles, physically separated from each other.

- Separate area from any rad or mixed waste storage areas.
- Notify 90-Day Area Manager so that the area may be added to the SAA inventory list.

Result when an organic (isopropyl alcohol) was inadvertently mixed with piranha etch (sulfuric acid and hydrogen peroxide).

Corrosive Etch Management

Acid and base solution, especially those mixed with hydrogen peroxide, can pose a vessel rupture hazard from off-gases emitted during the oxidation of organic compounds with the corrosives. To prevent damage to personnel and equipment, extreme care is needed in the mixing, handling, and waste disposal of these solutions.

- **Examples:**
  - Aqua Regia
  - Piranha etch
  - RCA clean
  - Nochromix
  - Etc…

- Must have specific procedures to manage etchant and waste in your ESR.

Waste Disposal

- **Move waste from a SAA to the 90-day area when:**
  - The container is close to being full (approx 80%)
  - You accumulate 55 gallons of hazardous wastes (collectively) OR one quart (950 milliliters) of an acutely hazardous waste.
    - Examples of acutely hazardous waste: Phosgene, potassium cyanide, potassium silver cyanide, beryllium powder, beryllium cyanide, thiophenol, carbon disulfide, nickel carbonyl, etc
  - Your generating process comes to an end.

Don't fill the containers all the way. Waste volume fluctuates with temperature….a container may rupture as a result.

Waste Disposal –Waste Control Forms

Non Radioactive Waste Control Form

WCF# 98595

WMD Use Only Rvwd by: _____

Form Rad'd _____ EPA Codes _____

Waste Code _____ Storage Location _____ DOT Haz Class _____

GENERAL INFORMATION PLEASE PRINT USING BLUE OR BLACK INK

Generator Name _____ Life/Guest # _____ Ext. _____

Dept./Div. _____ Bldg. of Waste Origin _____ Rm. # _____ Accumulation Area Bldg. # _____

Date Waste was Placed in 90-Day Area ___/___/___ **Account # for Waste Disposal** _____

WASTE QUANTITY Number of **Identical** Packages _____ **Type** of pkg. _____ (jar,drum,carboy, etc.)

PLEASE USE DECIMALS **Total Volume of Waste** _____ ft³ **Solid OR** _____ gal **Liquid** **Total Weight of Waste** _____ lbs.

WASTE CHARACTERIZATION **Chemical Name** _____ CMS# _____

Describe process that generated waste: _____ Check to return Pkg. _____

Provide percent by volume of constituents for mixtures: (no. & size for PCB items) **Check if unused, unopened chemical** ____

	%		%		%
	%		%		%

List additional constituents on back.

Physical State (CHECK ONLY ONE): Solid ☐ Liquid ☐ Gas ☐

		YES	NO
PCBs	Does the waste contain **PCBs**? If yes, _____ ppm	☐	☐
	For articles/equip. containing PCBs, provide date item was **removed from service** ___/___/___		
	For drummed ballasts, capacitors, and transformers provide number of pieces and individual weights in boxes above or attach separate inventory sheet.		
IGNITABILITY	Is the flashpoint **less than 140° F (60° C)**?	☐	☐
	Is the waste an **oxidizer**?	☐	☐
CORROSIVITY	For **aqueous wastes**: Is the pH **less than or equal to 2.0 OR greater than or equal to 12.5**? _____ pH	☐	☐
REACTIVITY	Is the waste **unstable, air or water reactive, or explosive**? If so, list in PRECAUTIONS.	☐	☐
	Will the waste **liberate cyanide or sulfide**? If so, list in PRECAUTIONS.	☐	☐
GENERAL	Is the waste from a spill clean-up? Provide Spill # if applicable. _____	☐	☐
	Was the waste used as a solvent or degreaser? If so,which? _____	☐	☐

TOXICITY Based on your knowledge of the process and the information available to you (MSDS, manufacturers specs., etc.) does the waste contain any of the following materials? ☐ ☐

	Arsenic		Chlorobenzene		Cresol		Endrin		Lindane		Pyridine		2,4,5-Trichlorophenol
	Barium		Chloroform		2,4-D		Heptachlor & its epoxide		Mercury		Selenium		2,4,6-Trichlorophenol
	Benzene		Chromium		1,4-Dichlorobenzene		Hexachlorobenzene		Methoxychlor		Silver		2,4,5-TP (Silvex)
	Cadmium		o-Cresol		1,2-Dichloroethane		Hexachlorobutadiene		Methyl Ethyl Ketone		Tetrachloroethylene		Vinyl Chloride
	Carbon Tetrachloride		m-Cresol		1,1-Dichloroethylene		Hexachloroethane		Nitrobenzene		Toxaphene		
	Chlordane		p-Cresol		2,4-Dinitrotoluene		Lead		Pentachlorophenol		Trichloroethylene		

PRECAUTIONS Note any special hazards. _____ (e.g., shock sensitive, water/air reactive)

_____ **Initial here if waste has been in a Radiological Area.** If waste has been in a Radiological Area, a Process Knowledge Certification Form (PKCF), shall be attached to this WCF to define waste-specific parameters.

Wastes Decayed In Storage (DIS) at the Point of Generation Must be Managed in accordance with BNL's SBMS Subject Area "Radioactive Waste Management." DO NOT Document DIS Wastes on this form.

CERTIFICATION *I certify that, to the best of my knowledge, the information provided on this form is true and complete and that I am minimizing all waste generated to the best of my ability.* ***I also certify that no radioactivity has been added to this waste.***

Generators Signature _____ Date _____

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MUST BE DATED WHEN IT GOES INTO THE 90-DAY ACCUMULATION AREA

Waste Disposal –Waste Control Forms

Non-Radioactive Waste Control Form

WCF# 95939

WMD Use Only Rvwd by: _____

Form Rec'd _____ EPA Codes _____

Waste Code _____ Storage Location _____ _____ DOT Haz Class

GENERAL INFORMATION PLEASE PRINT USING BLUE OR BLACK INK

Generator Name John Smith Life/Guest # X4444 Ext. x1111

Dept./Div. CO Bldg. of Waste Origin 555 Rm. # 252 Accumulation Area Bldg. # 555

Date Waste was Placed in 90 Day Area 6/30/10 **Account # for Waste Disposal** XXXXX – get from PI

WASTE QUANTITY Number of **Identical** Packages 1 **Type** of pkg. bottle (jar,drum,carboy, etc.)

PLEASE USE DECIMALS **Total Volume of Waste** _____ ft³ **Solid** **OR** 1 gal **Liquid** **Total Weight of Waste** 8 lbs.

WASTE CHARACTERIZATION **Chemical Name** Methanol and Acetone CMS# _____

Describe process that generated waste: Chemical synthesis Check to return Pkg. _____

Provide percent by volume of constituents for mixtures: (no. & size for PCB items) **Check if unused, unopened chemical** ____

Methanol	25 %	Water	50 %		%
Acetone	25 %		%		%

List additional constituents on back.

Please fill out using blue or black ink. --- NO RED INK!!!

Waste Disposal –Waste Control Forms

		YES	NO
	Physical State CHECK ONLY ONE: Solid ☐ Liquid ☒ Gas ☐		
PCBs	Does the waste contain **PCBs**? If yes,_____ ppm _____	☐	☒
	For articles/equip. containing PCBs, provide date item was **removed from service**____/____/____		
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IGNITABILITY	Is the flashpoint **less than 140° F (60° C)**?	☒	☐
	Is the waste an **oxidizer**?	☐	☒
CORROSIVITY	For **aqueous wastes**:		☒
	Is the pH **less than or equal to 2.0 OR greater than or equal to 12.5**? _____ pH	☐	☐
REACTIVITY	Is the waste **unstable, air or water reactive, or explosive**? If so, list in PRECAUTIONS.	☐	☒
	Will the waste **liberate cyanide or sulfide**? If so, list in PRECAUTIONS.	☐	☒
GENERAL	Is the waste from a spill clean-up? Provide Spill # if applicable._____	☐	☒
	Was the waste used as a solvent or degreaser? If so,which? _____	☐	☒
TOXICITY	Based on your knowledge of the process and the information available to you (MSDS, manufacturers specs., etc.) does the waste contain any of the following materials?	☐	☒

Arsenic		Chlorobenzene		Cresol		Endrin		Lindane		Pyridine		2,4,5-Trichlorophenol	
Barium		Chloroform		2,4 D		Heptachlor & its epoxide		Mercury		Selenium		2,4,6-Trichlorophenol	
Benzene		Chromium		1,4 Dichlorobenzene		Hexachlorobenzene		Methoxychlor		Silver		2,4,5 TP (Silvex)	
Cadmium		o-Cresol		1,2 Dichloroethane		Hexachlorobutadiene		Methyl Ethyl Ketone		Tetrachloroethylene		Vinyl Chloride	
Carbon Tetrachloride		m-Cresol		1,1 Dichloroethylene		Hexachloroethane		Nitrobenzene		Toxaphene			
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Generators Signature SIGN THE FORM Date DATE

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Waste Disposal – 90 Day Areas

- When waste leaves a SAA, it goes directly to the 90-day area - *Do not put it anywhere else*.
- Waste Management will not pick up waste if
  - It is in a compromised container.
  - They don't get a waste control form.
  - The form is not properly filled out or they can't read it.
  - The generator is not trained.
  - Corrosive Etches:
    - They have not been deactivated and/or are not in the correct container.
    - Contact myself or Joe Pavlak, our Waste Management Rep, if you are planning on generating a corrosive etch solution (strong acid/base + oxidizer).

Other Wastes

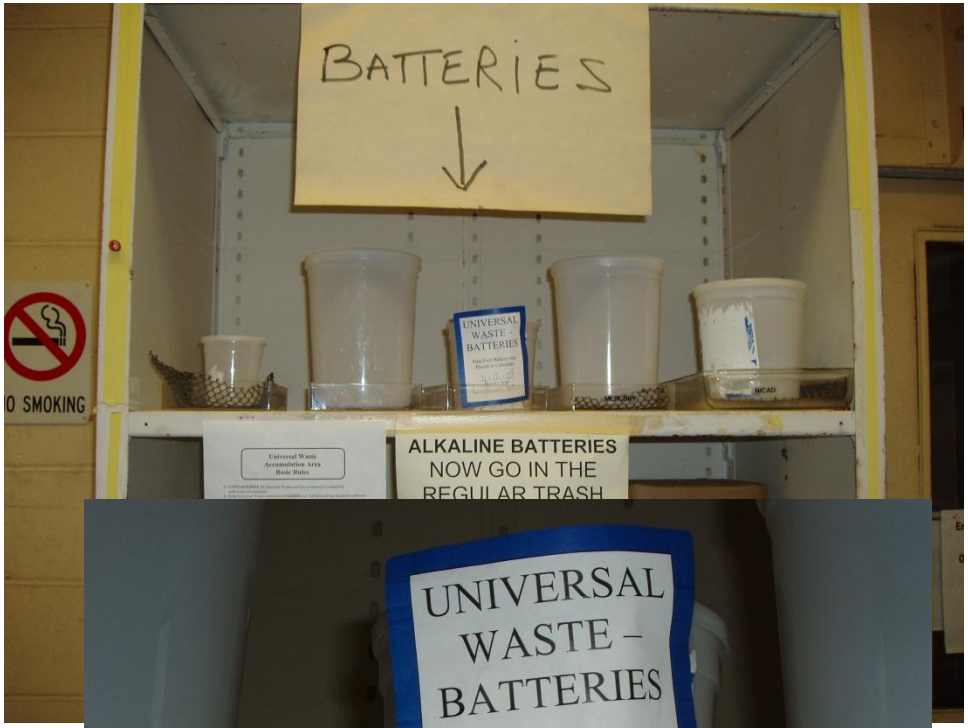
Tell Diane, Joe or I about:

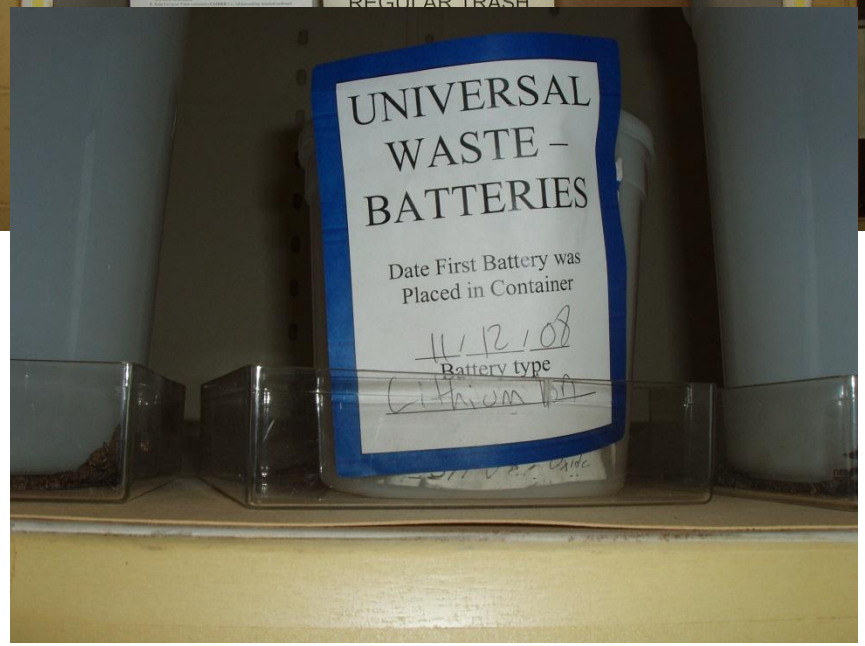
- *Anything unknown, unstable, expired, reactive, temperature sensitive or otherwise suspicious or potentially dangerous.*
  - Joe is coming in on a regular basis to help us get rid of old, unneeded or otherwise unstable chemicals.

Other Wastes – Universal

Batteries

- Central collection area in 90-day area.
- Separate containers for different battery types.
- Tape the terminals. (Fire risk)
- Attach label, ID battery and date when the first battery is placed in the container.





Last, but not least…

- Don’t evaporate waste as a means of disposal.
- Don’t bring waste home.
- Don’t bring household hazardous waste to the lab for disposal.
- Be extremely cautious about any chemical product you bring to the Lab.