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### Presentation Topics

- ◆ Hazardous waste identification process
  - ◆ Discarded materials
  - ◆ Solid waste
  - ◆ Exclusions
  - ◆ Listed hazardous waste
  - ◆ Characteristic hazardous waste
    - ◆ Toxicity Characteristic Leaching Procedure

- ◆ Mixture Rule
- ◆ Methods to Make a Waste Determination
- ◆ Hazardous waste counting
- ◆ Hazardous waste treatment
- ◆ Recycling

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**40 CFR 262.11** requires "a person who generates a solid waste, as defined in 40 CFR 261.2, must **make an accurate determination** as to whether that was is a hazardous waste..."

Photo courtesy of the Florida Department of Environmental Protection.

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### Hazardous Waste Identification Process

VSQG  
 SQG  
 LQG

Step #1: Is the waste a "solid waste"?

Step #2: Is the waste specifically excluded from the RCRA regulations?

Step #3: Is the waste a "listed" hazardous waste?

Step #4: Does the waste exhibit a characteristic of hazardous waste?

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### Discarded Materials

Garbage, refuse, and sludge

Materials that are thrown away, abandoned, or destroyed

Spent materials

Tars, residues, slags, and other materials

DEQ

VSQG  
SQG  
LQG

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### Step #1: Is the Waste a Solid Waste?

First, it must be a waste  
RCRA uses the term "solid waste" instead of the common term "waste."

Generator Manual Page 11

Solid

Liquid

Semi-solid

Contained Gas

DEQ

VSQG  
SQG  
LQG

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### Step #1: Is the Waste a Solid Waste?

- Materials that are abandoned
- Materials that are recycled
- Materials that are inherently waste-like
- Waste military munitions

DIOXIN

DEQ

VSQG  
SQG  
LQG

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### Step #1: Is the Waste a Solid Waste?

Abandoned materials

- Materials that are disposed
- Materials that are burned or incinerated
- Materials that are stored in lieu of being abandoned
- Materials that are sham recycled

DEQ

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**Step #1: Is the Waste a Solid Waste?**  
Materials that are recycled (some)

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**Step #1: Is the Waste a Solid Waste?**  
Inherently waste-like

These materials may pose a threat to human health and the environment when they are recycled.

ClC1=CC(=C2C=C1OC(=C(Cl)C(Cl)=C2)O

**DIOXIN**

This Photo by Unknown Author is licensed under CC BY.

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**Step #1: Is the Waste a Solid Waste?**  
Military Munitions

- Unused military munitions are solid waste when:
  - Removed from storage or disposal or treatment
  - Leaking or deteriorated
- Used military munitions are solid waste when:
  - Buried or landfilled on-site
  - Removed from landing spot for management

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**Solid Waste**

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Is material discarded by being either:

1. Abandoned
2. Recycled
3. Inherently waste-like
4. Discarded military munition

YES → Material is a solid waste and may be a hazardous waste subject to RCRA Subtitle C

NO → Material is not a solid waste and is not subject to RCRA Subtitle C

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The first category of Solid Waste was Abandoned Materials  
Materials that are disposed of are Abandoned Materials and would be a Solid Waste


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## Hazardous Waste

VSQG  
 SQG  
 LQG

**40 CFR 261.3 Definition of Hazardous Waste**


- A solid waste is a hazardous waste if:
  - It is not excluded from regulation as a hazardous waste under 261.4(b)
  - AND-
  - Exhibits a characteristic of hazardous waste, or
  - Is a listed hazardous waste, or
  - Is a mixture of solid waste and a listed hazardous waste





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## Hazardous Waste Identification Process

- Step #1: Is the waste a "solid waste"?
- Step #2: Is the waste excluded from the RCRA regulations?**
- Step #3: Is the waste a "listed" hazardous waste?
- Step #4: Does the waste exhibit a characteristic of hazardous waste?



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## Exclusions

*Generator Manual Page 21*

*40 CFR 261.4*

**27 Solid Waste Exclusions**

- Domestic sewage
- Industrial wastewater discharges
- Spent sulfuric acid
- Certain scrap metals
- Shredded circuit boards
- Recycled hazardous secondary materials (HSM)


**17 Hazardous Waste Exclusions**


- Household hazardous waste
- Used oil filters**
- Agricultural wastes
- Fossil fuel combustion wastes
- Mineral & mineral-processing wastes
- Solvent-contaminated wipes**

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## Hazardous Waste Identification Process

- Step #1: Is the waste a "solid waste"?
- Step #2: Is the waste excluded from the RCRA regulations?
- Step #3: Is the waste a "listed" hazardous waste?**
- Step #4: Does the waste exhibit a characteristic of hazardous waste?





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## Listed Wastes – Subpart D

VSQG  
 SQG  
 LQG

List	Types of waste	Regulation
F-wastes	Non-specific sources	40 CFR 261.31
K-wastes	Specific sources	40 CFR 261.32
P-wastes	Acute hazardous unused commercial chemicals	40 CFR 261.33(e)
U-wastes	Unused commercial chemicals	40 CFR 261.33(f)

*Page 15-16 Generator Compliance Manual*

§262.11 sets forth the generator's responsibility to determine whether its waste meets any of the listing descriptions under subpart D.



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Ignitable      Corrosive      Toxic      Reactive

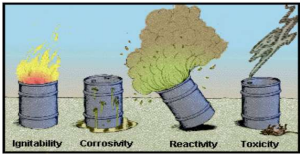

## Four Characteristics of Hazardous Waste

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### Listed Wastes §261.31 – 261.33

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

*\*To designate listed wastes whose constituents pose an additional threat to human health and the environment.*

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### Listed Wastes: F-listed Wastes from Nonspecific Sources

- Spent solvent wastes (F001 - F005)
- Wastes from electroplating and other metal finishing operations (F006 - F012, F019)
- Dioxin-bearing wastes (F020 - F023 and F026 - F028)
- Wastes from the production of certain chlorinated aliphatic hydrocarbons (F024, F025)
- Wastes from wood preserving (F032, F034, and F035)
- Petroleum refinery wastewater treatment sludges (F037 and F038)
- Multisource leachate (F039)

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### F-listed Solvents F001 – F005



- Spent solvents that have:
  - Been used for its "solvent properties,"
  - Becomes too contaminated (spent), AND
  - The concentration of the solvent(s) is **10% or more before use** (in general)



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### F-listed Solvents (F001, F002)


EPA Waste Code	Listing Description	Hazard Code
F001	Spent halogenated solvents used in large-scale industrial degreasing operations. Examples include methylene chloride and tetrachloroethylene.	(T)
F002	Spent halogenated solvents used for other purposes than large-scale degreasing operations. Examples include methylene chloride, tetrachloroethylene, and trichlorofluoromethane.	(T)

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### F-listed Solvents (F003 – F005)

-  F003 – Spent non-halogenated. Examples include **acetone, methanol, and xylene** (I).
-  F004 – Wastes that result from using cresols, cresylic acid, or nitrobenzene for their solvent properties (T)
-  F005 – Spent non-halogenated solvents. Examples include **toluene and methyl ethyl ketone** (I, T).



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### F001 – F005 Spent Solvents

*You must know the process for listed HW!*

USED FOR CLEANING = F005      INGREDIENT IN A PAINT ≠ F005



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### F-Listed Solvent: Example



**Safety Data Sheet**  
Methyl ethyl ketone  
Version 1.1 Revision Date: 03/10/2015

**SECTION 1. PRODUCT AND COMPANY IDENTIFICATION**

Product name : Methyl ethyl ketone  
Product Use Description : SOLVENT

Manufacturer or supplier's details  
Company : Nexeo Solutions LLC  
Address : 2 Waterway Square Place Suite 1000  
Woodlands, Tx, 77380  
United States of America

Emergency telephone number:  
Health North America: 1-855-NEXEO4U (1-855-639-3648)  
Health International: 1-855-NEXEO4U (1-855-639-3648)  
Transport North America: CHEMTREC 800.424.9300


Additional Information:  
Responsible Party: Product Safety Gr  
E-Mail: msd@nexeosolutions.com  
SDS Requests: 1-855-429-2661  
SDS Requests Fax: 1-281-500-3370  
Website: www.nexeosolutions.com




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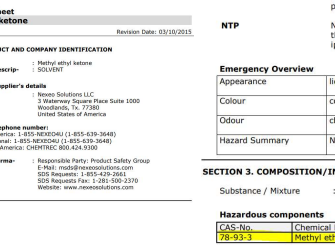


- F005 – The following spent non-halogenated solvents: Toluene, methyl ethyl ketone, carbon disulfide, isobutanol, pyridine, benzene, 2-ethoxyethanol, and 2-nitropropane; all spent solvent mixtures/blends containing, before use, a total of ten percent or more (by volume) of one or more of the above non-halogenated solvents or those solvents listed in F001, F002, or F004; and still bottoms from the recovery of these spent solvents and spent solvent mixtures.
- Hazard Codes (I,T)



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### F-Listed Solvent: Example



**Safety Data Sheet**  
Methyl ethyl ketone  
Version 1.1 Revision Date: 03/10/2015

**SECTION 1. PRODUCT AND COMPANY IDENTIFICATION**

Product name : Methyl ethyl ketone  
Product Use Description : SOLVENT

Manufacturer or supplier's details  
Company : Nexeo Solutions LLC  
Address : 2 Waterway Square Place Suite 1000  
Woodlands, Tx, 77380  
United States of America

Emergency telephone number:  
Health North America: 1-855-NEXEO4U (1-855-639-3648)  
Health International: 1-855-NEXEO4U (1-855-639-3648)  
Transport North America: CHEMTREC 800.424.9300

Additional Information:  
Responsible Party: Product Safety Group  
E-Mail: msd@nexeosolutions.com  
SDS Requests: 1-855-429-2661  
SDS Requests Fax: 1-281-500-3370  
Website: www.nexeosolutions.com

**ACGIH**  
No component of this product present at levels greater than or equal to 0.1% is identified as a carcinogen or potential carcinogen by ACGIH.

**OSHA**  
No component of this product present at levels greater than or equal to 0.1% is identified as a carcinogen or potential carcinogen by OSHA.

**NTP**  
No component of this product present at levels greater than or equal to 0.1% is identified as a known or anticipated carcinogen by NTP.


**Emergency Overview**

Appearance	liquid
Colour	colourless
Odour	characteristic, pleasant, acetone-like
Hazard Summary	No information available.

**SECTION 3. COMPOSITION/INFORMATION ON INGREDIENTS**

Substance / Mixture : Substance



Hazardous components		
CAS-No.	Chemical Name	Concentration (%)
78-93-3	Methyl ethyl ketone	90 - 100



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### F-Listed Solvent: Conclusions

Is methyl ethyl ketone on one of the F-lists?	Yes (F005)
Was the MEK used for its solvent property?	Yes (cleaning the paint gun tip)
If yes, was it more than 10% before use?	Yes (90-100%)





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### Listed Wastes – K-listed Wastes from Specific Sources



- wood preservation
- inorganic pigment manufacturing
- organic chemicals manufacturing
- inorganic chemicals manufacturing
- pesticides manufacturing
- explosives manufacturing
- petroleum refining
- iron and steel production
- primary aluminum production
- secondary lead processing
- veterinary pharmaceutical manufacturing
- ink formulation
- coking (processing of coal to produce coke, a material used in iron and steel production).



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### Listed Wastes – P & U Lists Discarded Commercial Chemical Products

**Pure** or commercial-grade formulations of certain **unused** chemicals.

- The waste must be on the P or U list
- The chemical in the waste must be unused
- The chemical in the waste must be in the form of a "commercial chemical product"

**P - pure**  
**U - unused**

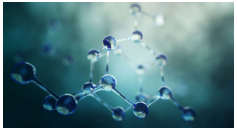
Generator Manual Pages 15-16



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### CAS Number

- Chemicals have different names
  - 2-butanone is methyl ethyl ketone
- Use the CAS number on an SDS to compare to the CAS numbers in the regulations



Hazardous waste No.	Chemical abstracts No.	Substance	
U155	91-80-5	Methacrylene	Same
U142	143-50-0	1,3,4-Metheno-2H-cyclobuta[cd]pentalen-2-one, 1,1a,3,3a,4,5,5a,5b,6,6-decachlorocyclohexa-	Chlord
U247	72-43-5	Methoxychlor	Same
U154	67-56-1	Methyl alcohol (l)	Metha
U029	74-83-9	Methyl bromide	Same
U186	504-60-9	1-Methylbutadiene (l)	1,3-Pe
U045	74-87-3	Methyl chloride (l,T)	Same
U156	79-22-1	Methyl chloroacetate (l,T)	Same
U226	71-55-6	Methyl chloroform	1,1,1,3
U157	56-49-5	3-Methylcholanthrene	Same
U158	101-144-4	4,4'-Methylenebis(2-chloroaniline)	Same
U068	74-95-3	Methylene bromide	Dibron
U080	75-09-2	Methylene chloride	Same
U159	78-93-3	Methyl ethyl ketone (MEK) (l,T)	Same

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Hazardous waste No.	Chemical abstracts No.	Substance	
U155	91-80-5	Methacrylene	Same
U142	143-50-0	1,3,4-Metheno-2H-cyclobuta[cd]pentalen-2-one, 1,1a,3,3a,4,5,5a,5b,6,6-decachlorocyclohexa-	Chlord
U247	72-43-5	Methoxychlor	Same
U154	67-56-1	Methyl alcohol (l)	Metha
U029	74-83-9	Methyl bromide	Same
U186	504-60-9	1-Methylbutadiene (l)	1,3-Pe
U045	74-87-3	Methyl chloride (l,T)	Same
U156	79-22-1	Methyl chloroacetate (l,T)	Same
U226	71-55-6	Methyl chloroform	1,1,1,3
U157	56-49-5	3-Methylcholanthrene	Same
U158	101-144-4	4,4'-Methylenebis(2-chloroaniline)	Same
U068	74-95-3	Methylene bromide	Dibron
U080	75-09-2	Methylene chloride	Same
U159	78-93-3	Methyl ethyl ketone (MEK) (l,T)	Same

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### Are these P or U Listed?



P - pure  
U - unused

U159 CAS #78-93-3 Methyl ethyl ketone (l,T)

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### Are these P or U Listed?

U151 CAS #7439-97-6 Mercury

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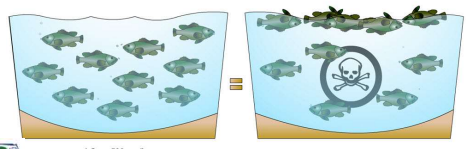
### Difference between P & U listed

**U-LISTED (I)**

- Long-term (e.g., years to lifetime) exposure may result in chronic effects (cancer, neurological problems, etc.)

**P-LISTED – ACUTE HW (H)**

- Short-term (e.g., minutes, hours, days) exposure may result in acute effects (mid-eye irritation to extreme—asthma attack).



LC50 < 500 mg/l Acute Aquatic Toxicity

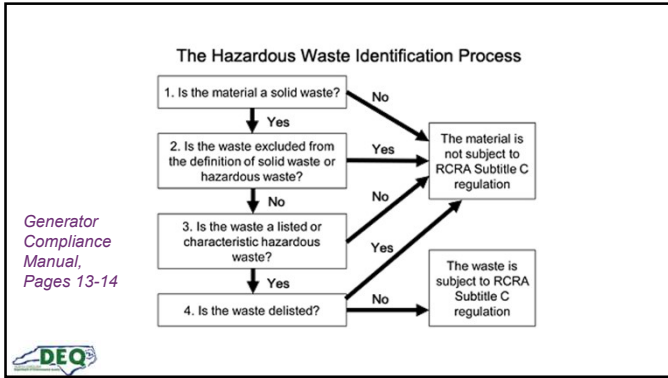
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### Hazardous Waste Identification Process

- Step #1: Is the waste a "solid waste"?
- Step #2: Is the waste excluded from the RCRA regulations?
- Step #3: Is the waste a "listed" hazardous waste?
- Step #4: Does the waste exhibit a characteristic of hazardous waste?




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### D001 – Ignitability 40 CFR 261.21

- Liquids, other than a solution containing less than 24% alcohol by volume and at least 50% water by weight, that has a **flash point below 140°F (60°C)**.
- Non-liquids that can cause fire under standard temperature and pressure or burns vigorously when ignited.
- Ignitable compressed gas
- It is an oxidizer



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### D002 – Corrosivity 40 CFR 261.22

Aqueous liquid with a pH ≤ 2 or a pH of ≥ 12.5





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### D003 – Reactivity 40 CFR 261.23

- Normally unstable and readily undergoes violent change w/o detonating
- Reacts violently with water
- Forms potentially explosive mixtures with water
- Generates toxic gases when mixed with water
- Cyanide or sulfide-bearing waste that can generate toxic gases
- Forbidden explosives per DOT regulations




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### Toxicity – D004 to D043 40 CFR 261.24



- 8 heavy metals (e.g., chromium, lead, mercury)
- 6 pesticides (e.g., chlordane)
- 26 solvents and other organics (e.g., methyl ethyl ketone, benzene)

Paracelsus



All things are poisons, for there is nothing without poisonous qualities. It is only the dose which makes a thing poison.

At 1530 AD

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### Toxicity Characteristic Leaching Procedure (TCLP)

VSQG  
 SQG  
 LQG

- A lab procedure that replicates the leaching process and other effects when wastes are buried in a municipal landfill.



Waste Code	Contaminants	Concentration
D007	Chromium	5.0 mg/L
D008	Lead	5.0 mg/L
D009	Mercury	0.2 mg/L
D020	Chlordane	0.03 mg/L
D035	Methyl ethyl ketone	200.0 mg/L
D018	Benzene	0.5 mg/L

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### Waste Determination

40 CFR 262.11

VSQG  
 SQG  
 LQG


#### The Hazardous Waste Identification Process

```

    graph TD
      Q1[1. Is the material a solid waste?] -- No --> R1[The material is not subject to RCRA Subtitle C regulation]
      Q1 -- Yes --> Q2[2. Is the waste excluded from the definition of solid waste or hazardous waste?]
      Q2 -- Yes --> R1
      Q2 -- No --> Q3[3. Is the waste a listed or characteristic hazardous waste?]
      Q3 -- Yes --> R2[The waste is subject to RCRA Subtitle C regulation]
      Q3 -- No --> R1
      Q4[4. Is the waste delisted?] -- Yes --> R1
      Q4 -- No --> R2
    
```


The determination is made at the point of generation, before dilution, mixing, or other alteration of the waste occurs.

- Process knowledge
  - Chemical or physical characteristics of the waste
- Analysis-based (testing the waste)




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### Point of Generation Examples



- When the waste exits the process unit.
- Solvents in parts washers
- Commercial Chemical Products (P- or U-listed)



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### Waste Determination

Knowledge-based determination

VSQG  
 SQG  
 LQG

Acceptable knowledge can include:

- Process knowledge (e.g., info on chemical feedstocks and other inputs);
- Information from suppliers or vendors
- Chemical or physical characteristics from Safety Data Sheets (use caution).



*Example: A lab uses methanol in a laboratory analysis of its product. This produces an F003 listed hazardous waste.*

Generator Compliance Manual, pages 37-38

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What questions do we ask to determine if this is a hazardous waste?

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### Waste Determinations & Safety Data Sheets (SDSs)

Generally, manufacturers must identify constituents present in the material at concentrations  $\geq 1\%$  (10,000 ppm).

Waste Code	Contaminants	Concentration
D007	Chromium	5.0 mg/L or ppm

Material Safety Data Sheet


Material Name: ALODINE® 1201 ID: 235110

\*\*\* Section 1 - Chemical Product and Company Identification \*\*\*

Product Trade Name ALODINE® 1201  
 Manufacturer Information  
 Henkel Surface Technologies  
 32100 Stephenson Highway  
 Madison Heights, MI 48071  
 Contact Phone: (248) 583-9300  
 Chemtrec Emergency # (800) 424-9300

\*\*\* Section 2 - Composition / Information on Ingredients \*\*\*

CAS #	Component	Percent
7732-94-5	Chromic acid	<1
7664-39-3	Hydrofluoric Acid	<1
13146-68-2	Potassium ferrioxalate	<1



**DEQ** The product might contain toxicity characteristic constituents above RCRA regulatory levels even though they are not on the SDS.

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### Waste Determination Example



*Knowledge-based determination*

\*\*\* Section 5 - Fire Fighting Measures \*\*\*

Flash Point:	Not applicable	Method Used:	Not applicable	Flammability Classification:
Upper Flammable Limit (UFL):	Not applicable	Lower Flammable Limit (LFL):	Not applicable	

\*\*\* Section 9 - Physical & Chemical Properties \*\*\*

Physical State:	Liquid	Appearance:	Orange
Odor:	None	Vapor Pressure:	Not applicable
Vapor Density:	Not applicable	Boiling Point:	>312 °F (100 °C)
Specific Gravity:	1.0-1.1	pH:	<2
Viscosity:	Not applicable	VOC:	Not applicable
Solubility Water:	Complete	Evaporation Rate:	Not determined
Percent Volatile:	Not applicable	Percent Solids:	<2%


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### Waste Determination

*Analysis-based determinations*

Performing waste analysis and laboratory testing

- There are specific test methods used to make analysis-based determinations (e.g., flash point, pH, and TCLP).
- It must be done on a "representative sample" of the solid waste.
- It must be done at the point of waste generation.



VSQG  
 SQG  
 LQG

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**Was this a hazardous waste?**

Yes, methyl ethyl ketone solvent (D035/F005) and chromium (D007)



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### Waste Determination

*Analysis-based determinations*

Tip when waiting for test results:

- The generator should manage a possible hazardous waste until it is certain that the waste is not hazardous.

VSQG  
 SQG  
 LQG

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### Hazardous Waste Determination

40 CFR 262.40(c)

Facilities must have records of:

- Any test results
- Waste analyses,
- Or other information
- Knowledge-based determinations still need documentation to back up your results.




3 years



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### Unknown Waste

How do I manage a waste that I do not know how it was generated?



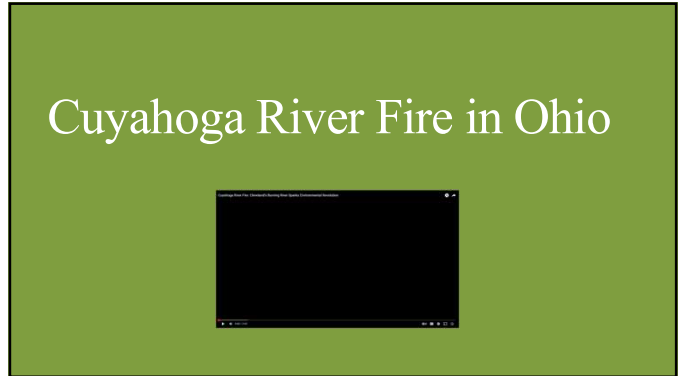
NCDEQ/HWS Photo Library

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### EPA Test Methods

Characteristic	Test Method
Ignitibility	By a Pensky-Martens Closed Cup Tester, using ASTM Standard D 93-79 or D 93-80, or a Setafash Closed Cup Tester, using ASTM Standard D 3278-78
Corrosivity	If aqueous: pH meter using Method 9040C Non-aqueous liquid that corrodes steel (SAE 1020) at 55°C (130°F) by Method 1110A
Reactivity	No test method: unstable, reacts violently with water; forms potentially explosive mixtures with water, etc.
Toxicity	Method 1311

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### Hazardous Waste Generator Category 40 CFR 260.10 & 262.13

VSQG  
 SQG  
 LQG

Type of Hazardous Waste (non-acute)	Very Small Quantity Generator (VSQG)	Small Quantity Generator (SQG)	Large Quantity Generator (LQG)
Non-acute hazardous waste <i>Per calendar month</i>	≤ 100 kg (220 pounds)	> 100 kg (220 pounds) but < 1,000 kg (2,200 pounds)	≥ 1,000 kg (2,200 pounds)
= approx. 55 gallons	≤ 1/2	> 1/2 But less than	Equal to or more than

*Generator Compliance Manual, pages 42-66*

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### Hazardous Waste Generator Category 40 CFR 260.10 & 262.13

Type of Hazardous Waste (Acute)	Very Small Quantity Generator (VSQG)	Small Quantity Generator (SQG)	Large Quantity Generator (LQG)
Acute hazardous waste (e.g., P075 nicotine) <i>Per calendar month</i>	≤ 1 kg (2.2 pounds) acute HW	≤ 1 kg (2.2 pounds) acute HW	> 1 kg (2.2 pounds)
Residues from cleanup of acute hazardous waste <i>Per calendar month</i>	≤ 100 kg (220 pounds) residues	≤ 100 kg (220 pounds) residues	> 100 kg (220 pounds) residues

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### Hazardous Waste Generator Category 40 CFR 260.10 & 262.13



VSQG  
 SQG

Type of Hazardous Waste	Very Small Quantity Generator (VSQG)	Small Quantity Generator (SQG)	Large Quantity Generator (LQG)
Non-acute hazardous waste <i>Per calendar month</i>	≤ 1/2	> 1/2 But less than	Equal to or more than
<b>Accumulation limit at any one time</b>	Accumulate no more than 1,000 kg (2,200 pounds) onsite at any one time! Or, Manage the waste under the more extensive conditions for exemption under a larger category.	Accumulate no more than 6,000 kg (13,200 pounds) onsite at any one time! Or, 1) Becomes subject to Parts 264, 265, and 270	N/A

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### HW Must be Counted Monthly


- Generators are required to count the HW that they generate each calendar month.
- This can fluctuate on a month-to-month basis
- Generator category is based on the amount of hazardous waste **generated** (not shipped off-site on a manifest)

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### Wastes exempt from counting 40 CFR 262.13(c)

Do not include:



- Excluded Solvent-Contaminated Wipes
- Elementary Neutralization Unit WITHOUT prior accumulation
- Waste that is recycled WITHOUT prior accumulation
- Used Oil

HW Compliance Manual Pages 33-35



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### Wastes exempt from counting 40 CFR 262.13(c)

The generator does not need to include:



- Spent Lead-acid Batteries  
40 CFR 266 Subpart G
- Universal Waste  
40 CFR 273
- Approved Episodic HW  
40 CFR 262 Subpart L
- Recycled Scrap metal  
40 CFR 261.6(a)(3)(ii)

HW Compliance Manual Pages 33-35



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REGULATORY PROVISION	VERY SMALL QUANTITY GENERATOR (VSQG)	SMALL QUANTITY GENERATOR (SQG)	LARGE QUANTITY GENERATOR (LQG)
Notify of HW activity and obtain EPA ID #	Not required	Required	Required
Hazardous waste determination	Required	Required	Required
Container/Tank markings	Not required	Required	Required
Accumulation start date	Not required	Required	Required
Use of manifest to ship waste off-site	Not required	Required	Required
Personnel Training	Not required	Required	Required
Emergency planning	Not required	Required	Required

*Generator Compliance Manual, pages 42-66.*



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## Mixture Rule



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### Mixture Rule

SQG  
 LQG

**THE SOLUTION TO POLLUTION IS DILUTION**  
**NOT**

*Generator Manual Page 19*

- #1 – Characteristic hazardous waste mixed with a solid waste
- #2 – Listed hazardous waste that is only ignitable, corrosive, and/or reactive (ICR-only) is mixed with a solid waste
- #3 – Listed hazardous waste (other than ICR-only) is mixed with a solid waste



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### 1<sup>st</sup> Element of the Mixture Rule – Characteristic HW

40 CFR 262.13(f)(2) ✓ SQG  
✓ LQG

Solid waste + Characteristic hazardous waste  $\xrightarrow{\text{Waste Determination}}$  Still Characteristic  $\rightarrow$  Hazardous Waste  
 Not Characteristic  $\rightarrow$  Solid Waste

HCl with a pH of 1.9 (D002) + Add sodium hydroxide = pH of 6.1

DEQ

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### 2<sup>nd</sup> Element of the Mixture Rule – Listed HW (ICR-only)

40 CFR 262.13(f)(2) ✓ SQG  
✓ LQG

Solid waste + hazardous waste Listed solely for characteristic (ICR-only, e.g., F003)  $\xrightarrow{\text{Waste Determination}}$  Still Characteristic  $\rightarrow$  Hazardous Waste  
 Not Characteristic  $\rightarrow$  Solid Waste

U002 67-64-1 Acetone (l)

F003 (1) The following spent non-halogenated solvents: Xylene, acetone, ethyl acetate, ethyl benzene, isobutyl ketone, methyl alcohol, cyclohexanone, and methanol; all spent solvent mixture use, only the above spent non-halogenated solvents; and all spent solvent mixtures/ble...

Flashpoint of 175°F

DEQ

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### 3<sup>rd</sup> Element of the Mixture Rule – Listed HW (toxic)

40 CFR 262.13(f)(2) ✓ SQG  
✓ LQG

Solid waste + Listed waste  $\xrightarrow{\text{Waste Determination}}$  Hazardous Waste

F005 The following spent non-halogenated solvents: Toluene, methyl ethyl ketone, carbon disulfide, isobutanol, pyridine, benzene, 2-ethoxyethanol, and 2-nitropropane; all spent solvent mixtures/blends containing, before use, a total of ten percent or more (by volume) of one or more of the above non-halogenated solvents or those solvents listed in F001, F002, or F004; and still bottoms from the recovery of these spent solvents and spent solvent mixtures. (1)

Lacquer Thinner + Crumpled Paper = HW

DEQ

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### Mixture Rule for VSQGs

40 CFR 262.13(f)(1) ✓ VSQG

Solid waste + Characteristic or Listed hazardous waste  $\xrightarrow{\text{Waste Determination}}$  Still Characteristic  $\rightarrow$  Hazardous Waste  
 Not Characteristic  $\rightarrow$  Solid Waste

Tank Residuals have a pH of 13 (D002) + wastewater = pH ≤ 12.5 and ≥ 2

DEQ

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### Mixing, Diluting and Alteration of the Waste – Points to Remember

✓ SQG  
✓ LQG

- However, dilution of waste as a substitute for adequate treatment or to otherwise circumvent the waste treatment requirements is prohibited by the land disposal restriction (LDR) regulations (see 268.3)
- A hazardous waste *determination* must be made *before* mixing or alteration.
- Waste that is hazardous when generated but has been decharacterized may remain subject to the LDR waste treatment requirements (see 261.3(d)(1)).

DEQ

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### Hazardous Waste Treatment

40 CFR 260.10 ✓ VSQG  
✓ SQG  
✓ LQG

**Definition of Treatment:** Any method, technique, or process, including neutralization, designed to change the physical, chemical, or biological character or composition of any hazardous waste so as to neutralize such waste, or so as to recover energy or material resources from the waste, or so as to render such waste non-hazardous, or less hazardous, safer to transport, store, or dispose of; or amenable for recovery, amenable for storage, or reduced in volume.

Generator Compliance Manual, pages 68 & 143

**Example of Treatment**  
 Changes the physical composition  
 To render it non-hazardous...or reduced in volume

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### Permit-Exempt Options for HW Treatment


- Treatment in wastewater treatment units
- Treatment in 90/180/270-day accumulation units
- Recycling
- Elementary neutralization
- Treatment in totally enclosed treatment facilities
- Adding absorbents to waste
- Immediate response
- Burning small quantities of wastes in onsite units

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### Treatment Status of Waste Activities


Activity	Treatment (Yes/No)	Comments/EPA Guidance
Using a compactor to compact waste in a container	Yes	If the density of the HW in the drum is increased to reduce the volume of waste [RO 11609, 14890].
Evaporation	Yes	Evaporating water from a hazardous waste changes its physical character to reduce its volume [RO 12923].
Decanting	Yes	Decanting an aqueous phase from an organic hazardous waste [RO 11885, 14834].

VSQG  
SQG  
LQG



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### Recycling




Discarded Materials (including recycled materials)

"Solid wastes"

Hazardous wastes

VSQG  
SQG  
LQG



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### 5 Steps in the Recycling Process

- Not a Solid Waste by Definition  
*Is the secondary material a solid waste in Table 1, 261.2(c)?*
- Excluded Use/Reuse  
*Not a SW under one of the use/reuse exclusions?*
- Legitimacy & Documentation Requirements  
*If yes to #2, does it meet the additional criteria?*
- Is the Recycling Legitimate
- Meet documentation requirements

Generator Compliance Manual, pages 79-84

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Generator Compliance Manual, page 82 & Appendix J

	Use constituting disposal (§261.2(c)(1))	Energy recovery/ fuel (§261.2(c)(2))	Reclamation (261.2(c)(3), except as provided in §§261.2(a)(2)(ii), 261.4(a)(17), 261.4(a)(23), 261.4(a)(24), or 261.4(a)(25)	Speculative accumulation (§261.2(c)(4))
	1	2	3	4
Spent Materials	(*)	(*)	(*)	(*)
Sludges (listed in 40 CFR Part 261.31 or 261.32)	(*)	(*)	(*)	(*)
Sludges exhibiting a characteristic of hazardous waste	(*)	(*)	(*)	(*)
By-products (listed in 40 CFR 261.31 or 261.32)	(*)	(*)	(*)	(*)
By-products exhibiting a characteristic of hazardous waste	(*)	(*)	(*)	(*)
Commercial chemical products listed in 40 CFR 261.33	(*)	(*)	(*)	(*)
Scrap metal other than excluded scrap metal (see 261.1(c)(9))	(*)	(*)	(*)	(*)

Note: The terms "spent materials," "sludges," "by-products," and "scrap metal" and "processed scrap metal" are defined in §261.1.

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Spent material

*A material that has been used and is now contaminated...*

Sludge

*Any residue from a water or air pollution control device.*

By-product

*A material that is not the primary product of a production process.*

← Classifying Hazardous Secondary Materials (Page 79-80) →

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**Commercial chemical products**  
Unused, essentially pure chemical products listed in the U-and P-lists.



**Scrap metal**  
Bits and pieces of metal parts (e.g., bars, turnings, rods, sheets, wire).

← **Classifying Hazardous Secondary Materials (Page 79-80)** →

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**Use Constituting Disposal**  
Materials are placed directly on the land (e.g., road oiling).



**Burning for Energy Recovery**  
Materials are burned in boilers or industrial furnaces.



**Reclamation**  
Materials that are processed to recover something of value or regenerated.




**Speculative Accumulation**  
Secondary materials can only be accumulated for a limited period.

← **Types of Recycling Activities (Pages 80-81 of Generator Manual)** →

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*Table 1 – 40 CFR 261.2(c)  
Determining When Recycled Materials are Solid Wastes*

	Use Constituting Disposal (261.2(c)(1))	Energy Recovery/Fuel (261.2(c)(2))	Reclamation (261.2(c)(3) except as provided in 261.2(a)(2)(ii), 261.4(a)(17), 261.4(a)(23), 261.4(a)(24) or 261.4(a)(27)	Speculative Accumulation (261.2(c)(4))
Spent Materials	Solid Waste (*)	Solid Waste (*)	Solid Waste (*)	Solid Waste (*)
Sludges (listed in 261.31 or 261.32)	Solid Waste (*)	Solid Waste (*)	Solid Waste (*)	Solid Waste (*)
Sludges exhibiting a characteristic of HW	Solid Waste (*)	Solid Waste (*)	<b>Not a Solid Waste</b> -	Solid Waste (*)
By-products (listed in 261.31 or 261.32)	Solid Waste (*)	Solid Waste (*)	Solid Waste (*)	Solid Waste (*)
By-product exhibiting a characteristic of HW	Solid Waste (*)	Solid Waste (*)	<b>Not a Solid Waste</b> -	Solid Waste (*)
Commercial Chemical Products listed in 261.33	Solid Waste (*)	Solid Waste (*)	<b>Not a Solid Waste</b> -	<b>Not a Solid Waste</b> -
Scrap metal that is not excluded under 261.4(a)(13)	Solid Waste (*)	Solid Waste (*)	Solid Waste (*)	Solid Waste (*)



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*Recycling Example*



**Spent Materials** .....  
Sludges (listed in 40 CFR Part 261.31 or 261.32) .....  
Sludges exhibiting a characteristic of hazardous waste .....  
By-products (listed in 40 CFR 261.31 or 261.32) .....  
By-products exhibiting a characteristic of hazardous waste .....  
Commercial chemical products listed in 40 CFR 261.33 .....  
Scrap metal other than excluded scrap metal (see 261.1(c)(9)) .....


Note: The terms "spent materials," "sludges," etc. § 261.1.

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**TABLE 1**


Use constituting disposal (§ 261.2(c)(1))	Energy recovery/ fuel (§ 261.2(c)(2))	Reclamation (261.2(c)(3), except as provided in §§ 261.2(a)(2)(ii), 261.4(a)(17), 261.4(a)(23), 261.4(a)(24) or 261.4(a)(25)	Speculative accumulation (§ 261.2(c)(4))
1	2	3	4



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*Table 1 – 40 CFR 261.2(c)  
Determining When Recycled Materials are Solid Wastes*

	Use Constituting Disposal (261.2(c)(1))	Energy Recovery/Fuel (261.2(c)(2))	Reclamation (261.2(c)(3) except as provided in 261.2(a)(2)(ii), 261.4(a)(17), 261.4(a)(23), 261.4(a)(24) or 261.4(a)(27)	Speculative Accumulation (261.2(c)(4))
Spent Materials	Solid Waste (*)	Solid Waste (*)	<b>Solid Waste (*)</b>	Solid Waste (*)
Sludges (listed in 261.31 or 261.32)	Solid Waste (*)	Solid Waste (*)	Solid Waste (*)	Solid Waste (*)
Sludges exhibiting a characteristic of HW	Solid Waste (*)	Solid Waste (*)	<b>Not a Solid Waste</b> -	Solid Waste (*)
By-products (listed in 261.31 or 261.32)	Solid Waste (*)	Solid Waste (*)	Solid Waste (*)	Solid Waste (*)
By-product exhibiting a characteristic of HW	Solid Waste (*)	Solid Waste (*)	<b>Not a Solid Waste</b> -	Solid Waste (*)
Commercial Chemical Products listed in 261.33	Solid Waste (*)	Solid Waste (*)	<b>Not a Solid Waste</b> -	<b>Not a Solid Waste</b> -
Scrap metal that is not excluded under 261.4(a)(13)	Solid Waste (*)	Solid Waste (*)	Solid Waste (*)	Solid Waste (*)



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### Recycling a Spent Solvent by Distillation

- Count the spent solvent if it accumulates before distillation (treatment).
- Containers accumulating before treatment are subject to hazardous waste regulations (40 CFR 262).
- The recycling unit is not subject to RCRA §261.6(c)(1).

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### Recycling a Spent Solvent by Distillation

- The distillation bottom is a new point of waste generation.
- If the spent solvent was counted, do not count the distillation bottom (if HW).

*Generator Compliance Manual, Appendix P*

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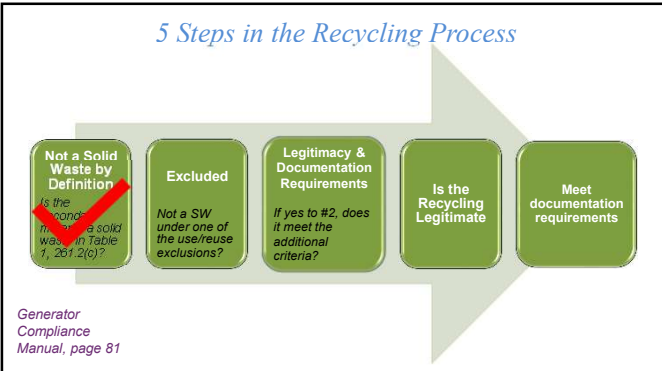
### Waste Determination on Distillation Bottoms

- The distillation bottom is a new point of waste generation.

F003	The following spent non-halogenated solvents: Xylene, acetone, ethyl acetate, ethyl benzene, ethyl ether, methyl isobutyl ketone, n-butyl alcohol, cyclohexanone, and methanol; all spent solvent mixtures/blends containing, before use, only the above spent non-halogenated solvents; and all spent solvent mixtures/blends containing, before use, one or more of the above non-halogenated solvents, and a total of ten percent or more (by volume) of one or more of those solvents listed in F001, F002, F004, and F005; and still bottoms from the recovery of these spent solvents and spent solvent mixtures	(U)*
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### 5 Steps in the Recycling Process



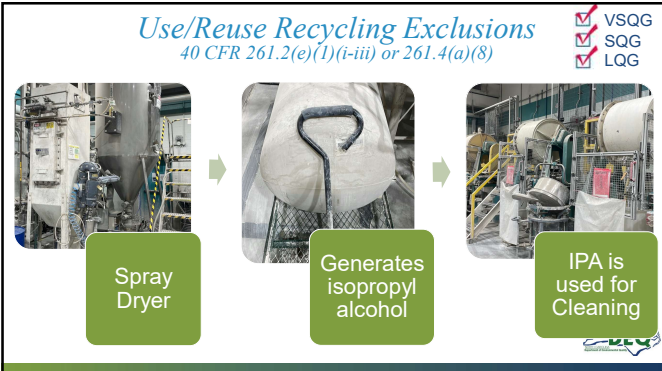
*Generator Compliance Manual, page 81*

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### Use/Reuse Recycling Exclusions

40 CFR 261.2(e)(1)(i-iii) or 261.4(a)(8)

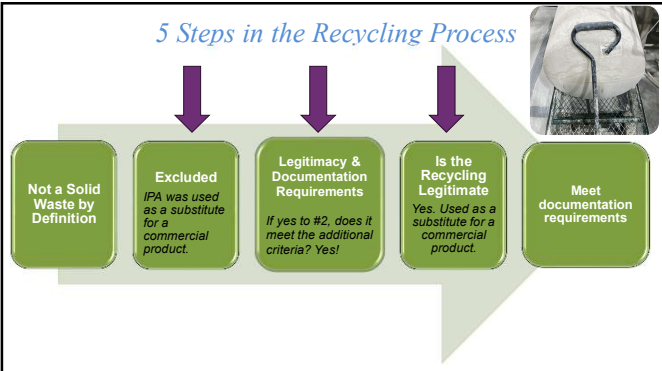
- VSQG
- SQG
- LQG



Spray Dryer → Generates isopropyl alcohol → IPA is used for Cleaning

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### 5 Steps in the Recycling Process





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*Accumulated Speculatively*  
40 CFR 261.1(c)(8)

VSQG  
 SQG  
 LQG

**Accumulated Speculatively** means a Hazardous Secondary Material is accumulated before being recycled.

A material is ***not*** accumulated speculatively if:

-  > The person accumulating it can show that the material is potentially recyclable and has a feasible means of being recycled; and
-  > During the calendar year, January 1<sup>st</sup> - December 31<sup>st</sup>, the total amount of a material that is recycled or transferred off-site for recycling ***must be 75 percent*** of the weight or volume of that material that was accumulated onsite on January 1<sup>st</sup>.



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*Be Cautious of Recycling Activities!!*






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*Now You Know How to Make a Waste Determination*



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*Questions?*

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