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Topics for Discussion

- Introduction to RCRA
- Hazardous Waste Determination
- Small Quantity Generator Requirements
  - *Container & Tank Storage*
  - *Pre-Transport Functions*
  - *Uniform Hazardous Waste Manifest and Land Ban Restrictions*

Topics for Discussion (cont'd)

- *Emergency Preparedness & Planning*
- *Inspection & Maintenance*
- *Employee Training*
- *Storage area closure requirements*

- **Universal Waste Requirements**
- **Used Oil Requirements**

Introduction to RCRA

- What is RCRA?
  - *Resource Conservation & Recovery Act*
  - *Title 40 of the Code of Federal Regulations*
    - *Parts 260 – 279 for solid and hazardous waste*
  - *Effective November 1980*
  - *Cradle to grave law*
  - *Authorizes the States to run their RCRA program*
    - *CT is an Authorized State (40 CFR 272 subpart H)*

- Goals of RCRA
  - *Encourage generators to reduce, reuse, recover, eliminate solid & hazardous waste*

Small Quantity Generator SQG

100 to 1000 kilograms non-acute HW per month and less than one kilogram of acute HW per month, never exceed 1000 kilograms of non-acute HW or 1 kilogram of acute HW at any one time

•EPA Id. No.	(40 CFR 262.12)
•Determine if waste is HW (and document)	(40 CFR 262.11)
•Land disposal restrictions	(40 CFR 268)
•Satellite containers	(40 CFR 262.34)
•Ship waste within 180 days (270 if >200 miles)	(40 CFR 262.34)
•Container management	(40 CFR 265.170-177)
• Secondary containment impervious base	(40 CFR 264.175)
• Aisle space	(40 CFR 264.35)
•Tank management	(40 CFR 265.201)
• *Note: SQG cannot operate an open top tank*	

SQG continued

- Weekly, daily inspections and inspection logs (40 CFR 265.15 & 201)
- Emergency response procedures (posting) (40 CFR 262.34)
- Employee training (40 CFR 262.34)
- Pre-transport requirements (40 CFR 30-33)
  - *DOT containers*
  - *Marking*
  - *Labeling*
- Hazardous waste manifests (40 CFR 20-22)
- Closure (40 CFR 265.111, 114, 201)

If applicable

- Used oil requirements in 40 CFR 279
- Universal waste requirements in 40 CFR 273

Where it begins

Determining if your waste is a hazardous waste

(*40 CFR 262.11*)

"A hazardous waste is a solid waste that is listed as a hazardous waste and/or exhibits the characteristic of hazardous waste and has not been excluded "

1. *Determine if the waste is a solid waste*

2. *Determine if the waste is a hazardous waste*
   - *Use knowledge of the chemicals, processes, contaminants*
     - ✓ *Material Safety Data Sheets*
     - ✓ *Product labeling and manufacturer's information*
   - *Testing*
   - *Both*

3. *Determine if the waste is excluded from the definition of solid waste and hazardous waste*

Determine if waste is a Solid Waste?

Solid waste is –

- *Spent material*
- *Sludge*
- *By-product*
- *Commercial chemical product*
- *Scrap metal*

When discarded by –

- *Burned (energy recovery)*
- *Recycled/reclaimed*
- *Accumulated speculatively*
- *Used in a manner constituting disposal**

disposed means placed on ground, water, or incinerated

Table 1 in 261.2

	Use constituting disposal	Energy recovery (fuel)	Reclaimed	Speculative accumulation
Spent material	*	*	*	*
Sludge (listed in 262.31 or 32)	*	*	*	*
Sludge (exhibiting a characteristic of hazardous waste)	*	*		*
By-products (listed in 262.31 or 32)	*	*	*	*
By-products (exhibiting a characteristic of hazardous waste)	*	*		*
Commercial chemical products (listed in 262.33)	*	*		*
Scrap metal	*	*	*	*

Some Exclusions

"Used as effective substitute for a commercial chemical product, provided the product is not *used in a manner constituting disposal or burned"*

Copper sulfate from metal finishing (corrosive)

Used to make pesticides (algaecide, fungicide, herbicide)

- ✓ Applied to ground or water – solid waste (HW corrosive)
- ✓ Applied to plants above ground – not solid waste

Fuel & fuel/water mixtures (ignitable and benzene)

- ✓ *Sent for fuel use or blending – not solid waste*
- ✓ *Spilled or incinerated – is solid waste (HW ignitable/benzene)*

Where it begins

Documenting your waste determinations

- *Documentation for both HW and non-HW*
  - *Also, for any waste when claiming its excluded*
    - *Reuse as effective substitute as ingredient*
    - *Reuse as commercial product*

- *No prescribed way to document waste determination*
  - *Use waste profile sheets from receiving facility*
  - *Memo to your file with supporting documentation*
    - ✓ *Description of process/chemicals that generates the waste*
    - ✓ *Material Safety Data Sheets or other product information*
    - ✓ *Analytical testing*
    - ✓ *Waste profiles from other businesses doing similar processes*
    - ✓ *Documentation from off-site business claiming reuse for excluded materials*

Solid Wastes that are Hazardous Wastes

Those that are listed as hazardous waste

40 CFR part 261.31 – 33

Those that exhibit a characteristic of hazardous waste

40 CFR part 261.21 – 24

Two sub-categories

- ✓ *Used oil – 40 CFR 279*
- ✓ *Universal waste – 40 CFR 273*

Waste Codes

Hazardous wastes are identified by "waste codes"

(except for used oil and universal waste)

The listed hazardous waste codes

F, K, U, P waste codes

(Example – F006 metal hydroxide sludge from electroplating)

The characteristic hazardous waste codes

D waste codes

(Example – D035 material with 200 mg/L or more MEK)

The Listed Hazardous Waste

Four types of listed waste

- *"F" waste code – Non-specific source (includes some acute)*
- *"K" waste code – Specific source*
- *"U" waste code – Commercial chemical product (non-acute)*
- *"P" waste code – Commercial chemical product (acute)*

Reason for listings

- *Ignitable (I)*
- *Corrosive (C)*
- *Reactive (R)*
- *Acutely hazardous (H)*
- *Toxic (T)*

Mixture Rule

- *mixing a listed waste with any other solid waste makes the entire mixture a listed waste!*
- *not dependent on amount (one drop, one gallon, etc).*
- *not dependent on the source (intentional mixing, accidental mixing).*
- *Can cause an otherwise inexpensive waste to become more expensive when shipped off-site*

Non-specific Source “F” Waste

Waste from generic sources:

F001 – F039

- Spent solvents (F001 – F005)
- Metal finishing (F006 – F019)
- Pesticides/wood preservative (F020 - F035)
  - *Includes some acute hazardous waste (F020-23, F026 & F027)*

Some common “F” waste in CT

F001 (T)

F002 (T)

- The following spent halogenated solvents used in degreasing: tetrachloroethylene, trichloroethylene, methylene chloride, 1,1,1 trichloroethane, carbon tetrachloride, chlorinated fluorocarbons, still bottoms from solvent recovery

- The following spent halogenated solvents: tetrachloroethylene, methylene chloride, trichloroethylene, 1,1,1 trichloroethane, chlorobenzene, 1,1,2-trichloro-1,2,2,-trifluoroethane, ortho-dichlorobenzene, trichlorofluoromethane, and 1,1,2-trichloroethanetrichloroethylene, still bottoms from solvent recovery

Halogens

Word **chlor** or **fluor** in chemical name

Per**chlor**oethylene (1.6)

Tri**chlor**oethylene (1.46)

Methylene **chlor**ide (1.33)

Chlorinated **fluor**ocarbon (1.56)

Known or suspected carcinogens

Heavier than water

Improper handling/treatment = Dioxins

Dioxins – known carcinogen

Some common “F” waste in CT

F003 (I)

The following spent non-halogenated solvents: xylene, acetone, ethyl acetate, ethyl benzene, ethyl ether, methyl isobutyl ketone, butyl alcohol, cyclohexanone, methanol, (10% or more) still bottoms from solvent recovery.

F005 (I,T)

The following spent non-halogenated solvents: toluene, methyl ethyl ketone, carbon disulfide, isobutanol, pyridine, benzene, 2-ethoxyethanol, 2-nitropropane ; (10% or more) still bottoms from recovery of spent solvents

Some common “F” waste in CT

F006 (T)	Wastewater treatment sludge from electroplating operations except from the following processes: (1) sulfuric acid anodizing of aluminum; (2) tin plating on carbon steel; (3) zinc plating on carbon steel; (4) aluminum or zinc-aluminum plating on carbon steel; (5) cleaning/stripping associated with tin, zinc, aluminum plating on carbon steel; (6) chemical etching of aluminum.
F019 (T)	Wastewater treatment sludge from chemical conversion coating of aluminum except zirconium phosphating in aluminum can washing

F006 Electroplating Sludge

Removing some of the confusion

- Electroplating processes
  - common & precious metal electroplating
  - etching (including anodizing and bright dip)
  - chemical milling (including ECM)
  - cleaning & stripping (when associated with above)
- Sludge from wastewater treatment
  - solids & semi-solids from settling/precipitation (clarifier)
  - spun filters & ion exchange resin
  - sand filters
  - evaporator concentrate

Specific Source "K" Waste

Specifically listed industry doing specifically listed processes:

K001 – K160

- Refineries (K048, K170)
- Pharmaceutical (K084, K101)
- Foundry (K061, K069)
- Explosives (K044, K45)

Example “K” Waste

Industry	Hazardous waste	Waste & Hazard code
Wood Preservation	Bottom sediment sludge from treatment of wastewater from wood preserving process that uses creosote and/or pentachlorophenol	K001 (T)
Inorganic Pigments	Wastewater treatment sludge from the production of chrome yellow and orange pigments	K002 (T)
Organic Chemicals	Bottom stream from the acetonitrile column in the production of acrylonitrile	K013 (T, R)
Explosives	Wastewater treatment sludge from the manufacturing and processing of explosives	K044 (R)

Commercial Chemical Product

"U" and "P" waste codes

- Unused commercial products
- Pure, technical grade
- Sole active ingredient

Typically discarded because off-spec, shelf life, spilled

Examples "P" Listed Waste

"acute hazardous wastes"

P001 - P205(H)

- *Empty containers of "P" listed materials (unless triple rinsed)*
- *Waste from rinsing empty containers*

Hazardous waste No.	Chemical abstract No.	Substance
P006	20859-73-8	Aluminum phosphide (R, T)
P075	54-11-5	Nicotine
P106	143-33-9	Sodium cyanide
P001	81-81-2	Warfarin (coumadin)
P022	75-15-0	Carbon disulfide

Examples "U" Listed Waste

U001 – U411(T)

Hazardous waste No.	Chemical abstract No.	Substance
U002	67-64-1	Acetone (I)
U080	75-09-2	Methylene chloride
U210	127-18-4	Tetrachloroethylene *(perchloroethylene)*
U220	108-88-3	Toluene
U240	94-75-7	2,4, Dichlorophenoxyacetic acid *(2,4D)*
U023	98-07-7	Benzotrichloride (C, R)
U159	1338-23-4	2-butanone (I) *(MEK)*

Characteristic Hazardous Waste

Four types

"D" waste codes

- *Ignitable (D001)*
- *Corrosive (D002)*
- *Reactive (D003)*
- *Toxicity Characteristic (D004-D043)*

Some Facts

All discarded solid waste must be evaluated for the characteristics

- *Paper*
- *Tires*
- *Chemicals*
- *Lamps*
- *Electronic equipment*
- *Paint*
- *Scrap metal*
- *Construction debris*

Some Facts

Some characteristics are based on physical properties

- ***flash point***
- ***pH***
- ***Compressed gases***
- ***Oxidizers***

Some Facts

Some characteristics are based on concentration limits

- ***milligrams per liter (mg/L)***
- ***test method "Toxicity Characteristic Leaching Procedure" (TCLP)***
- ***limits range between 0.008 to 400 mg/L***

***note**: one percent (1%) equals 10,000 ppm*

Ignitable Characteristic D001

- *Liquid with a flashpoint less than 140 degrees F*
  - *Mineral spirits, petroleum distillate, stoddard solvent, paint*
- *Oxidizers (49 CFR 173.151)*
  - *Nitric acid, peroxides, permanganate*
- *Ignitable compressed gas (49 CFR 173.300)*
  - *Propane, aerosol products*
- *Not a liquid – fire through friction, moisture, spontaneous chemical change, & burns vigorously and persistently*
  - *Aluminum, zirconium, magnesium fines and chips*

Corrosive Characteristic D002

- Aqueous liquid, pH less than 2 or greater than 12.5.
- A liquid that corrodes steel at greater than 0.025 inches per year at 130 degrees F.
    - *nitric acid, sulfuric acid, phosphoric acid, hydrochloric acid, chromic acid*
    - *sodium hydroxide, potassium hydroxide, ammonium hydroxide*

Reactive Characteristic D003

- Normally unstable
- Reacts violently with water or forms toxic fumes or vapors (cyanides & sulfides)
- Capable of detonation or explosion when heated under confinement or subjected to a strong initiating force

Example D003

- *Fire works and explosives*
- *Flameless ration heaters (ready-to-eat meals)*
- *Air bags (un-deployed)*
- *Old picric acid and ether*
- *Cyanides*
- *Lithium batteries (with electrical charge)*
- *Sodium*
- *Nickel catalyst*
- *Compressed cylinders*

Toxicity Characteristic D004 – D043

- 39 elements and compounds
- cause damage to tissue, impair CNS, cause severe illness or death when ingested, inhaled, or absorbed.
- based on concentration limits (mg/L).
- testing using Toxicity Characteristic Leaching Procedure.

Toxicity Characteristic D004 – D043

Waste Code & CAS		Contaminant	Concentration limit
D004	7440-38-2	Arsenic	5 mg/L
D005	7440-39-3	Barium	100 mg/L
D006	7440-43-9	Cadmium	1 mg/L
D007	7440-47-3	Chromium	5 mg/L
D008	7439-92-1	Lead	5 mg/L
D009	7439-97-6	Mercury	0.2 mg/L
D010	7782-49-2	Selenium	1 mg/L
D011	7440-22-4	Silver	5 mg/L
D012	72-20-8	Endrin	0.02 mg/L
D013	58-89-9	Lindan	0.4 mg/L
D014	72-43-5	Methoxychlor	10 mg/L
D015	8001-35-2	Toxaphene	0.5 mg/L
D016	94-75-7	2,4D	10 mg/L

Toxicity Characteristic D004 – D043

Waste Code & CAS		Contaminant	Concentration limit
D017	93-72-1	2,4,5 TP	1 mg/L
D018	71-43-2	Benzene	0.5 mg/L
D019	56-23-5	Carbon tetrachloride	0.5 mg/L
D020	57-74-9	Chlordane	0.03 mg/L
D021	108-90-7	Chlorobenzene	100 mg/L
D022	67-66-3	Chloroform	6 mg/L
D023	95-48-7	O-cresol	200 mg/L
D024	108-39-4	M-cresol	200 mg/L
D025	106-44-5	P-cresol	200 mg/L
D026	None	Cresol	200 mg/L
D027	106-46-7	1,4 dichlorobenzene	7.5 mg/L
D028	107-06-2	1,2 dichloroethane	0.5 mg/L
D029	75-35-4	1,1 dichloroethylene	0.7 mg/L

Toxicity Characteristic D004 – D043

Waste Code & CAS		Contaminant	Concentration limit
D030	121-14-2	2,4, dinitrotoluene	0.13 mg/L
D031	76-44-8	Heptachlor	0.008 mg/L
D032	118-74-1	Hexachlorobenzene	0.13 mg/L
D033	87-68-3	Hexachlorobutadiene	0.5 mg/L
D034	67-72-1	Hexachloroethane	3 mg/L
D035	78-93-3	Methyl ethyl ketone	200 mg/L
D036	98-95-3	Nitrobenzene	2 mg/L
D037	87-86-5	Pentachlorophenol	100 mg/L
D038	110-86-1	Pyridine	5 mg/L
D039	127-18-4	Tetrachloroethylene	0.7 mg/L
D040	79-01-6	Trichloroethylene	0.5 mg/L
D041	95-95-4	2,4,5 trichlorophenol	400 mg/L
D042 D043	88-06-2 75-01-4	2,4,6 trichlorophenol Vinyl chloride	2 mg/L 0.2 mg/L

Used Oil Reclaimed/Recycled

- Used oil testing
  - ✓ *Total halogens (state regulations require generator determine halogens)*
    - *Less than 1000 assumed not mixed HW (halogenated solvents)*
    - *Greater than 1000 must prove not mixed with HW*
  - *Transporter required to test under federal law – get the results from them*

- Mixtures used oil and ignitable (only) HW
  - *Test mixture for flash point*
  - *Below 140 F, HW*

- Mixtures used oil and other characteristic HW
  - *Test mixture for RCRA characteristics*
  - *If any characteristic exhibited, HW*

- Mixtures used oil and listed HW
  - ✓ *It is that listed HW*

Used Oil Disposal

- Placed on ground, water, or incinerated
  - ✓ *Determine if listed and/or characteristic HW , if yes-*
    - ✓ *Fully regulated as hazardous waste*
    - ✓ *Comply with the applicable generator or TSDF requirements*

Universal Waste

- Sent to another UW handler
  - *No waste determination required*
    - ✓ Universal waste are hazardous waste
      - Corrosive and heavy metals (batteries, lamps, equipment w/mercury)
    - ✓ *Two exceptions*
      - FIFRA recalled pesticides
      - Solid waste added by states
- Disposed or sent to destination facility
  - *Determine if listed and/or characteristic HW , if yes-*
    - ✓ Fully regulated as hazardous waste
    - ✓ Comply with the applicable generator or TSDF requirements

CT Regulated Waste

- Waste codes only apply if transported/sent to facility in CT
- Testing –

  CR01 – CR03 – total halogens (if used oil)

  CR02 – no testing if waste oil is fuel reused for fuel

  CR04 & CR05 – RCRA Toxicity Characteristics if sent to Solid Waste Facility (Special Waste Authorization)

Waste Code	Description	Examples
CR01	Waste oil with PCBs (at or above 50 ppm)	Transformer, heat transfer, hydraulic
CR02	Waste oil (& materials containing oil)	Tank bottoms, lubrication, hydraulic, machining, grinding, bilge water
CR03	Water soluble waste oil (& materials containing oil)	Machining and grinding
CR04	Waste chemical liquid	Latex, glycol, power washing
CR05	Waste chemical solid	Foundry sand, sand blasting, polluted soil, corrosive solids

Any Questions?