

RCRA HAZARDOUS WASTE IDENTIFICATION:

Characteristic Hazardous Waste

Agenda: Characteristic Hazardous Waste

- Hazardous waste identification (HWID) review
- Characteristic determination and testing
- Ignitability
- Corrosivity
- Reactivity
- Toxicity
- Summary





First Half Review

- Difference between the hazardous waste listings and characteristics
- The four listings and what they represent
- Difference between the P and U lists
- Four steps to the hazardous waste identification process

- Can anyone explain to me the main (historical) difference between listings and characteristics?
- Listings are based on *Pedigree (e.g., history, background, derivation)* VS. Characteristics are based on *chemistry (e.g., physical properties)*
- What are the four types of listings and what do they represent?
- F nonspecific, K specific, P acute CCPs, and U toxic CCPs
- What is the difference between P and U lists? Acute vs. Toxic.
- What are the first (3) three steps of the HWID process? Is it a Solid Waste, is it Excluded, and is it Listed.
- And the fourth? Is it characteristic?

HWID Review

First Half Review

- The four listing categories are F, K, P, and U
 - §261.31 F list, non-specific sources
 - §261.32 K list, specific sources
 - §261.33(e) and (f) P and U lists, discarded, unused commercial chemical products
- The four steps in the HWID process are:
 - 1. Is the material a solid waste?
 - 2. Is it excluded?
 - 3. Does the waste meet a hazardous waste listing?
 - 4. Does the waste exhibit a hazardous waste characteristic?

Characteristic Determination and Testing

A generator must determine if solid waste is a hazardous waste

- Representative sample
- Characteristics
- Test versus knowledge





Characteristic Determination and Testing

There are four hazardous waste characteristics



- These are the 4 HW Characteristics
- They are found in sections 261.21-261.24
- The above pictures give a good illustration of what they are.
 - » Something flammable or causing fire
 - » Something that cancause rust or decomposition
 - » Something explosive
 - » Something poisonous
- Before get into details, Where does it tell us we have to determine characteristics? 262.11
- Why? How?



- 40 CFR 261.11 (c) explains that generators have two options for determining if their waste is characteristic.... By either testing their waste or applying their knowledge.
- Acceptable Knowledge is broadly defined to include **process knowledge**, and the **facility's records of analysis** performed before the effective date of RCRA regulations or actual chemical analysis of the waste.
- **Process knowledge** includes detailed information about the waste obtained from existing published or documented waste analysis data or studies conducted on wastes generated by processes similar to that which generated the waste in question.

Characteristic Determination and Testing

A characteristic determination must be made in two instances

- If the waste is not listed in Subpart D of Part 261 (i.e., the lists of hazardous wastes)
- Even if the waste is listed, the generator must determine if the waste exhibits a characteristic in order to comply with land disposal restrictions (LDR) in 40 CFR Part 268

§262.11(c)

§260.10

The generator must take a representative sample to test waste

- A representative sample is a sample of a universe or whole expected to exhibit the average properties of the universe or whole
- Appendix I, Part 261, contains sampling methods that are representative
- The SW-846 test methods manual explains how to test samples of waste

- Generators are required to take representative samples of their wastestream for identifying the characteristics. Can anyone think of where we might find a definition of *representative sample*? Recall that most definitions are in section 260.10.
 - **Representative Sample** means a sample of a universe or whole (e.g., waste pile, lagoon, ground water) which can be expected to exhibit the average properties of the universe or whole (40 CFR Sec. 260.10).
 - » In other words, a sample is representative if it is a collection or portion of a wastestream that demonstrates the composition of the whole wastestream.



- 1st FORM = LIQUIDS THAT HAVE FLASH POINT OF LESS THAN 60 C or 140 F
 - » Examples: gasoline, benzene, alcohols, acetone, ethers...
 - » What is a flash point? Flash point is the lowest temp at which fumes above a waste ignite when exposed to flame
 - » Test Method 1311 Pressure Filtration technique is the definitive method for determining if waste is a liquid
 - » AQUEOUS = 50% WATER BY WEIGHT (July 1992 <u>Monthly Report</u> <u>Question.</u>)
 - » ALCOHOL EXCLUSION less than 24% alcohol by volume (July 1992 <u>Monthly Report Question.)</u>
- 2nd FORM = IGNITABLE SOLIDS
 - » Example magnesium tape, and other thermally unstable solids that spontaneously ignite
 - » To exhibit the characteristic the waste must meet both parts of the defnition:
 - -1. Cause fire thru friction etc.; and
 - -2. Burn vigorously & persistently
 - » (See December 9, 1999 memo)- Test Method 1030 can be used for 2nd part but not 1st. Therefore, must apply knowledge to know if waste meets 1st part.
- LAST 2 FORMS ARE OXIDIZERS & COMPRESSED GASES
 - » Both are defined by DOT regulations.

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- **1 No.** Flashpoint of more than 140 F.
- **2 No.** There is more than 50% water, therefore it is aqueous, and less than 24% alcohol, therefore the alcohol exclusion applies.
- **3 Yes.** The flashpoint is less than 60C and it is not aqueous because water content is less than 50%.



- Why would EPA want to regulate wastes that are corrosive? Corrosive wastes eat through things and make containers more susceptible to leaking and escape.
 - **>> Examples of corrosive wastes?** Hydrochloric acid, nitric acid, sulfuric acid; ammonium hydroxide, sodium hydroxide
 - Wastes are corrosive because they are either highly acidic or highly **»** basic.
- Just like the ignitablity characteristic, EPA determines whether something is corrosive based on <u>form</u> as well as the <u>way in which it is tested</u> to determine if it is corrosive.
- <u>The first form</u> is **aqueous** (a different definition from what applies to D001). Aqueous includes those wastes which are amenable to **pH measurement** ... in other words this means that these types of wastes contain enough water to be able to measure pH ... generally 20% of the total volume of the waste.
- - secondly, EPA looks at liquid wastes that can **corrode steel**
- thirdly, unlike ignitable wastes EPA has yet to characterized solids as corrosive. A short memo from August 18, 1987 explains this. There is no definition of a corrosive solid, therefore EPA does not recognize corrosive solids.



- 1.. Yes. The pH is < 2.0 b/c
- What waste code does it carry? D002
- **2..** No. There is no such waste as a corrosive solid.
- What waste code? None
- **3..** Not according to paragraph 1 of the regulations, because it is below the pH level of 12.5, however it could be corrosive according to the second paragraph, the steel corrosion rate. Our example doesn't give the steel corrosion rate for the floor cleaner.
 - What if the rate was 7.25 mm per year at a test temperature of 130F according to the specified test method?? Would it then be d002?
 YES.



- They are those which are hazardous because of their extreme instability and tendency to react violently or explode .
- What are some examples that you can think of reactive wastes ... how about things like explosives, or materials under high pressure such as compressed gases....
- let's look at the properties that make a waste reactive ... do these look like things that are easily testable using standardized methods? No, there are too many conditions or situations that could cause something to be reactive. This is why EPA relies on a **narrative description of reactivity**.
- EPA tried to put forth a numerical basis for **cyanide and sulfide bearing waste** ... but in 1998, after the testing guidance was re-evaluated, they withdrew it.
- Therefore, EPA relies on generator knowledge to determine if their waste is reactive.

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Reactivity

The reactivity characteristic (D003) applies to the following waste (cont.)

- Capable of detonation or explosive reaction if subjected to a strong initiating force or if heated under confinement
- Is readily capable of detonation or explosive decomposition or reaction at standard temperature and pressure
- Is a forbidden explosive under DOT



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§261.23



- The TC is different from the first three characteristics because the harm that they can cause is immediate and firsthand. The TC causes harm over time ... TC wastes seep into the environment or leach out of landfills where they were originally disposed and subsequently migrate into the groundwater ... water that over half the population in this country drink and use everyday as their primary water supply.
- The picture on this slide shows the way in which wastes may migrate into the groundwater which is then consumed by the general public.



- The toxicity characteristic is measured by the TCLP ... the purpose of this method is to simulate the leaching that can occur in a landfill.
 - » The method involves essentially grinding up of the waste to reduce the size of it, then introducing an acid to create a leachate and the constituent levels in the leachate (extract) are measured against an allowable level found in Table 1 to 40 CFR Sec. 261.24.



- **1. Yes**. The TCLP resulted in more than the 5.0 mg/l regulatory level for lead.
 - » What waste code would it carry? D008
- **2. Don't Know.** The concentration presented does not indicate that it is based on TCLP. The TCLP is not based on the direct concentration of the hazardous constituent, but the concentration in the extract resulting from TCLP.
- **3.** No. The concentration does not exceed the 5.0 mg/l regulatory level for silver.
 - » What waste code? None.

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Summary

There are four characteristics of hazardous waste

- Ignitability (D001)
- Corrosivity (D002)
- Reactivity (D003)
- Toxicity (D004-D043)



