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RCRA/UST, Superfund, & EPCRA Hotline Training Module

Introduction to:

Hazardous Waste Identification

(40 *CFR* Part 261)

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HAZARDOUS WASTE IDENTIFICATION

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1. INTRODUCTION

The goal of this module is to teach you how to answer the following question: "Is this waste a hazardous waste regulated under the Resource Conversation and Recovery Act (RCRA)?" This is one of the most common and important questions you will encounter about RCRA. Proper hazardous waste identification is so important because whether or not a waste qualifies as hazardous usually dictates whether all or none of the extensive RCRA hazardous waste regulations will apply to its handling. Proper hazardous waste identification can also be quite difficult, because the RCRA regulations establish a complex definition of the term "hazardous waste." To assist you in tackling the issue of hazardous waste identification, this module introduces a specific hazardous waste identification method or process. This process involves asking and analyzing a series of questions about any waste you are evaluating. Learning this method should be one of your goals while reading this module.

Use of the hazardous waste identification process explained in this module depends on a clear understanding of certain regulatory issues, including the RCRA definition of the term "hazardous waste." This module therefore analyzes in detail the RCRA definition of hazardous waste. Other modules will explore additional regulatory issues essential to proper use of the hazardous waste identification method, such as the definition of solid waste and the solid and hazardous waste exclusions.

This module only provides an introduction to a number of extremely complex regulatory issues. However, after reading it, you should be familiar with and able to explain the hazardous waste identification process. You should also understand the definition of hazardous waste and be able to explain the following concepts that are essential to identifying a RCRA hazardous waste:

- Hazardous waste listings
- Hazardous waste characteristics
- The "mixture" and "derived-from" rules
- The "contained-in" policy
- The Hazardous Waste Identification Rule (HWIR)

2. REGULATORY OVERVIEW

What is a hazardous waste? In its most basic form, the answer to that question can be quite simple. A hazardous waste is a waste whose chemical composition or other properties make it capable of causing illness, death, or some other harm to humans and other life forms. Developing a regulatory program that ensures the safe handling of such dangerous wastes demands a far more precise definition of the term, however. EPA therefore created a set of hazardous waste identification regulations that allow one to determine whether any particular material is a hazardous waste for the purposes of RCRA. The following paragraphs provide a general introduction to the RCRA hazardous waste identification process and the logic behind it.

2.1 HAZARDOUS WASTE IDENTIFICATION PROCESS

Hazardous waste identification begins with an obvious point: in order for any material to be a hazardous waste, it must first be a waste. A waste is essentially a thing that someone throws away, an item with no value. The first step in proper hazardous waste identification is deciding whether an item is or is not a waste. Deciding whether an item is or is not a waste is not always easy, however. For example, a material (like an aluminum can) that one person discards could seem valuable to another person who recycles that material. EPA therefore developed a set of regulations to assist in determining whether a material is a waste. RCRA uses the term "solid waste" in place of the common term "waste." Under RCRA, the term "solid waste" means any waste, whether in solid, semi-solid, or liquid physical form. Thus, the first step in the RCRA hazardous waste identification process is deciding whether an item qualifies as a RCRA solid waste. This explains why the first section of the RCRA hazardous waste identification regulations focuses upon the definition of solid waste. For now you need only understand in general terms the role that the definition of solid waste plays in the RCRA hazardous waste identification process. Another module, "Definition of Solid Waste and Recyclable Materials," explains the definition of solid waste in greater detail.

Only a small fraction of all RCRA solid wastes actually qualify as hazardous wastes. At first glance, one would imagine that distinguishing between hazardous and non-hazardous wastes is a simple matter of chemical and toxicological analysis. Other factors must be considered, however, before evaluating the actual hazard that a waste's chemical composition poses. Regulation of certain wastes may be impractical, unfair, or otherwise undesirable, regardless of the hazards they pose. For instance, household waste often contains dangerous chemicals, but making households subject to the strict RCRA waste management regulations would create a number of practical problems. Therefore, EPA exempted or excluded certain wastes, like household wastes, from the hazardous waste definition and regulations. Deciding whether or not a waste is excluded or exempted from hazardous waste

regulation is the second step in the RCRA hazardous waste identification process. Only after determining that a solid waste is not somehow excluded from hazardous waste regulation should one proceed to evaluate the actual chemical hazard that a waste poses. The module entitled "Solid and Hazardous Waste Exclusions" explains which wastes are excluded from RCRA regulation. For now, you should remember that evaluation of these exclusions is the second step in the hazardous waste identification process.

The third step in the hazardous waste identification process is determining whether a waste actually poses a sufficient chemical or physical hazard to merit regulation. This step in the hazardous waste identification process involves evaluating the waste in light of the regulatory definition of hazardous waste. The remainder of this module explains the definition of hazardous waste in detail. Comparing a waste to this hazardous waste definition is arguably the most important step in the hazardous waste identification process. That is why this first training module is devoted to analyzing the hazardous waste definition. You should always remember, however, that the RCRA hazardous waste identification process involves three primary steps:

- Determining whether the material in question is a solid waste
- Determining whether the solid waste in question is excluded from regulation
- Determining whether the solid waste in question is a hazardous waste.

Since proper hazardous waste identification is essential to the success of the hazardous waste management program, the RCRA regulations at 40 CFR §262.11 actually require that any person who produces or generates a waste must determine whether that waste is or is not hazardous. In doing so, §262.11 also explains the steps in the hazardous waste identification process summarized above. Whenever you are faced with the question of whether or not a waste is hazardous under RCRA, turn to §262.11. This regulation will remind you of the three primary steps in the RCRA hazardous waste identification process. This module will now explain in detail the third element in this process, the definition of hazardous waste.

2.2 DEFINITION OF HAZARDOUS WASTE

Any discussion of the definition of hazardous waste begins with Congress' original statutory definition of the term. RCRA §1004(5) defines hazardous waste as:

> A solid waste, or combination of solid waste, which because of its quantity, concentration, or physical, chemical, or infectious

> characteristics may (a) cause, or significantly contribute to, an increase in mortality or an increase in serious irreversible, or incapacitating reversible, illness; or (b) pose a substantial present or potential hazard to human health or the environment when improperly treated, stored, transported, or disposed of, or otherwise managed.

This broad statutory definition provides a general indication of which wastes Congress intended to regulate as hazardous. However, it obviously does not provide the clear distinctions necessary for industrial waste handlers to determine whether their wastes pose a sufficient threat to warrant regulation or not. Recognizing this fact, Congress instructed EPA to develop more specific criteria for defining hazardous waste. Therefore, there are two definitions of hazardous waste under the RCRA program: a statutory definition and a regulatory definition. The statutory definition cited above is seldom used today. It served primarily as a general guideline for EPA to follow in developing its own definition of hazardous waste in the hazardous waste regulations. The regulatory definition is an essential element of the current RCRA program. It precisely identifies which wastes are subject to RCRA waste management regulations.

Congress asked EPA to fulfill the task of developing a regulatory definition of hazardous waste by using two different mechanisms: by listing certain wastes as hazardous and by identifying characteristics which, when present in a waste, make it hazardous. Following its statutory mandate, EPA developed a regulatory definition of hazardous waste that incorporates both listings and characteristics. The following discussion provides a general explanation of the terms "hazardous waste listing" and "hazardous waste characteristic." Later portions of this module will define RCRA listings and characteristics more precisely.

HAZARDOUS WASTE LISTINGS

A hazardous waste listing is a narrative description of a specific type of waste that EPA considers dangerous enough to deserve regulation. Hazardous waste listings describe wastes from very specific industrial processes, wastes from very specific sectors of industry, or wastes in the form of very specific chemical formulations. Before developing a hazardous waste listing, EPA thoroughly studies a particular wastestream and the threat it can pose to human health and the environment. If the waste poses enough of a threat to deserve hazardous waste regulation, EPA includes a precise description of that waste on one of the hazardous waste lists. Thereafter, any waste that meets that narrative listing description is considered hazardous, regardless of its chemical composition or any other potential variable. For example, one of the current hazardous waste listings reads as follows: "API separator sludge from the petroleum refining industry." An API separator is a device commonly used by the petroleum refining industry to separate contaminants from refinery wastewaters. After studying the petroleum refining industry and typical sludges from API separators, EPA decided these sludges were dangerous

enough to warrant regulation as hazardous waste under all circumstances. The listing therefore designates all petroleum refinery API separator sludges as hazardous. Chemical composition or other factors about a specific sample of API separator sludge are not relevant to its status as hazardous waste under the RCRA program.

Using listings to define hazardous wastes presents certain advantages and disadvantages. One advantage is that listings make the hazardous waste identification process easy for industrial waste handlers. Only knowledge of a waste's origin is needed to determine if it is listed; laboratory analysis is unnecessary. By comparing any waste to narrative listing descriptions, one can easily determine whether or not the waste is hazardous. EPA's use of listings also presents certain disadvantages. For example, listing a waste as hazardous demands extensive study of that waste by EPA. EPA lacks the resources to investigate the countless types of chemical wastes produced in the United States. Therefore, the hazardous waste listings simply cannot address all dangerous wastes. Another disadvantage of the hazardous waste listings is their lack of flexibility. Listings designate a waste as hazardous if it falls within a particular category or class. The actual composition of the waste is not a consideration as long as waste the matches the appropriate listing description. For instance, some API separator sludges from petroleum refining might contain relatively few hazardous constituents and pose a negligible risk to human health and the environment. Such sludges are still regulated as hazardous, however, because the listing for this wastestream does not consider variations is waste composition. Thus, the hazardous waste listings can unnecessarily regulate some wastes that do not pose a significant health threat. As you will see, the hazardous waste characteristics provide an important complement to listings by addressing most of the shortcomings of the hazardous waste listings.

HAZARDOUS WASTE CHARACTERISTICS

A hazardous waste characteristic is a measurable property which, when present in a waste, indicates that the waste poses a sufficient threat to deserve regulation as hazardous. When defining hazardous waste characteristics, EPA does not study particular wastestreams from specific industries. Instead, EPA asks the question, "what properties or qualities can a waste have which cause that waste to be dangerous?" For example, EPA found that ignitability, or the tendency for a waste to easily catch fire and burn, is a dangerous property. Thus, ignitability is one of the hazardous waste characteristics and a waste displaying that property is regulated as hazardous. When defining hazardous waste characteristics, EPA attempts to identify analytical tests capable of detecting or demonstrating the presence of the characteristic. For instance, EPA regulations reference a laboratory flash point test to be used when deciding if a liquid waste is ignitable. Whether or not a waste displays a hazardous characteristic generally depends on how it fares in one of the characteristics tests. Therefore, the chemical makeup or other factors about the composition of a particular waste typically determine whether or not it tests as hazardous for a characteristic.

Using characteristics to define hazardous wastes presents certain advantages over designating hazardous wastes by listings. One advantage is that hazardous characteristics and the tests used to evaluate their presence have broad applicability. Once EPA has defined a characteristic and selected a test for use in identifying it, waste handlers can evaluate any wastestream to see if it is classified as a hazardous waste. Furthermore, use of characteristics can be a more equitable way of designating wastes as hazardous. Instead of categorizing an entire group of wastes as hazardous, characteristics allow a waste handler to evaluate each waste sample on its own merits and classify it according to the actual danger it poses. Aware of these advantages, EPA originally planned to use characteristics as the primary means of identifying hazardous waste. EPA hoped to define and select test methods for identifying all hazardous characteristics, including organic toxicity, mutagenicity (the tendency to cause mutations), teratogenicity (the tendency to cause defects in offspring), bioaccumulation potential, and phytotoxicity (toxicity to plants). EPA encountered problems, however, when trying to develop regulatory definitions of these properties. One primary problem was that no straightforward testing protocol was available for use in determining if a waste possessed one of these characteristics. For example, deciding if a particular wastestream poses an unacceptable cancer risk demands extensive laboratory experimentation. Requiring such analysis on a routine basis from industrial waste handlers would be impractical. Therefore, EPA developed a hazardous waste definition that relies on both listings and characteristics to define a hazardous wastes. The following sections of the module explain hazardous waste listings and characteristics in more detail.

2.3 LISTED HAZARDOUS WASTES

EPA has studied and listed as hazardous hundreds of specific industrial wastestreams. These wastes are described or listed on four different lists which are found in the regulations at Part 261, Subpart D. These four lists include:

- The F list. The F list designates as hazardous particular wastes from certain common industrial or manufacturing processes. Because the processes producing these wastes can occur in different sectors of industry, the F list wastes are known as waste from non-specific sources. The F list is codified in the regulations at §261.31.

- The K list. The K list designates as hazardous particular wastestreams from certain specific sectors of industry. K list wastes are therefore known as wastes from specific sources. The K list is found at §261.32.

- The P list and the U list. These two lists are similar in that both list as hazardous pure or commercial grade formulations of certain specific unused chemicals. Both the P list and U list are codified in §261.33.

These four lists each designate anywhere from 30 to a few hundred wastestreams as hazardous. Each waste on the lists is assigned a waste code consisting of the letter associated with the list followed by three numbers. For example, the wastes listed as hazardous on the F list are assigned the waste codes F001, F002, and so on. As you will learn, waste codes are an important part of the RCRA regulatory system. Assigning the correct waste code to a waste has important implications for the management standards that apply to the waste.

LISTING CRITERIA

Before listing any waste as hazardous, the Agency developed a set of criteria to use as a guide when determining whether or not a waste deserves to be listed. These listing criteria provide a consistent frame of reference when EPA considers listing a wastestream. Always remember that these criteria are only used by EPA when evaluating whether a waste deserves to be listed; the listing criteria are not used by waste handlers, who refer to the actual hazardous waste lists for hazardous waste identification purposes. There are four different criteria upon which EPA may base its determination to list a waste as hazardous. These criteria are codified in Part 261, Subpart B. Note that these four criteria do not directly correspond to the four different lists of hazardous waste. The four reasons why EPA may list a waste are:

- The waste typically contains harmful chemicals, and other factors indicate that it could pose a threat to human health and the environment in the absence of special regulation. Such wastes are known as toxic listed wastes.

- The waste contains such dangerous chemicals that it could pose a threat to human health and the environment even when properly managed. Such wastes are known as acutely hazardous wastes.

- The waste typically exhibits one of the four characteristics of hazardous waste described in the hazardous waste identification regulations. A later portion of this module explains the four hazardous waste characteristics in detail.

- EPA has cause to believe that, for some other reason, the waste typically fits within the statutory definition of hazardous waste developed by Congress.

EPA may list a waste as hazardous for any and all of the above reasons. The majority of listed wastes fall into the toxic wastes category. To decide if a waste

should be a toxic listed waste, EPA first determines whether it typically contains harmful chemical constituents. Appendix VIII of Part 261 contains a list of chemical compounds or elements which scientific studies show to have toxic, carcinogenic, mutagenic, or teratogenic effects on humans or other life forms. If a waste contains chemical constituents found on the Appendix VIII list, EPA then evaluates eleven other factors to determine if the wastestream is likely to pose a threat in the absence of special restrictions on its handling. These additional considerations include a risk assessment and study of past damage cases caused by the waste. Acutely hazardous wastes are the second most common type of listed waste. EPA designates a waste as acutely hazardous if it contains Appendix VIII constituents that scientific studies show to be fatal to humans or animals in low doses. In a few cases, acutely hazardous wastes contain no Appendix VIII constituents, but are extremely dangerous for another reason. An example is the listed waste P081, which designates unused discarded formulations of nitroglycerine as acutely hazardous. Although nitroglycerine is not an Appendix VIII hazardous constituent, wastes containing unused nitroglycerine are so unstable that they pose an acute hazard. The criteria for designating a waste as acutely hazardous require only that EPA consider the typical chemical makeup of the wastestream. EPA is not required to study other factors, such as relative risk and past damage cases, when listing a waste as acutely hazardous.

To indicate its reason for listing a waste, EPA assigns a hazard code to each waste listed on the F, K, P, and U lists. These hazard codes are listed below. The last four hazard codes apply to wastes that have been listed because they typically exhibit one of the four regulatory characteristics of hazardous waste. You will learn more about the four characteristics of hazardous waste. The hazard codes indicating the basis for listing a waste are:

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

The hazard codes assigned to listed wastes actually do affect the regulations that apply to handling of the waste. For instance, acute hazardous wastes accompanied by the hazard code (H) are subject to stricter management standards than most other wastes. Other examples of the relationship between hazard codes and management standards for listed wastes will be explored later in this module.

THE F LIST: WASTES FROM NON-SPECIFIC SOURCES

The F list designates as hazardous particular wastestreams from certain common industrial or manufacturing processes. F list wastes usually consist of chemicals that

have been used for their intended purpose in an industrial process. That is why F list wastes are known as "manufacturing process wastes." The F list wastes can be divided into seven groups, depending on the type of manufacturing or industrial operation which creates them. The seven categories of F-listed wastes are:

- 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).

Spent Solvent Wastes (F001 - F005)

Waste codes F001 - F005 apply to wastestreams from the use of certain common organic solvents. Solvents are chemicals with many functions, although they are most often used in degreasing or cleaning. The solvents covered by the F listings are commonly used in industries ranging from mechanical repair to dry cleaning to electronics manufacturing. EPA decided that only certain solvents used in certain ways produce wastestreams that warrant a hazardous waste listing. Therefore, one must evaluate a number of key factors in order to determine whether the F001 - F005 waste codes apply to a particular waste. First, one or more of the 31 specific organic solvents designated in the F001 - F005 listing description must have been used in the operation that created the waste. Second, the listed solvent must have been used in a particular manner; it must have been used for its "solvent properties," as EPA defines that expression. Finally, EPA decided that only a wastestream created through use of a concentrated solvents should be listed. Thus, the concentration of the solvent formulation or product before its use in the process that created the waste is also a factor in determining the applicability of the F001 - F005 listing.

The F001 - F005 spent solvent listings provide perhaps the best illustration of a principle common to all listed hazardous wastes. As this module has explained, to determine whether a waste qualifies as listed, knowledge of the process that created the waste is essential, while information about the waste's chemical composition is usually irrelevant. For example, the F005 listing description can allow two different wastes with identical chemical contents to be regulated differently because of subtle differences in the processes that created the wastes. A waste made up of toluene (an F005 solvent) and paint is listed if the toluene has been used to clean the paint from brushes or some other surface. A waste with the same chemical composition is not F005 if the toluene has been used as an ingredient (such as a thinner) in the paint. EPA considers use as a cleaner to be "use as a solvent;" use as an ingredient does not

qualify as "solvent" use. As you can see, knowledge of the process that created a waste is a key factor in evaluating whether a waste can be a hazardous spent solvent or other listed hazardous waste.

Wastes from Electroplating and Other Metal-finishing Operations (F006 - F012, F019)

The listed hazardous wastes F006 - F012 and F019 are wastes commonly produced during electroplating and other metal finishing operations. Diverse industries use electroplating and other methods to change the surface of a metal objects in order to enhance the appearance of the objects, make them more resistant to corrosion, or impart some other desirable property to them. Industries involved in plating and metal finishing range from jewelry manufacture to automobile production. A variety of techniques can be used to amend a metal's surface. For example, electroplating uses electricity to deposit a layer of one decorative or protective metal on the surface of another metal object. Chemical conversion coating also amends the surface of a metal, but does so by chemically converting a layer of the original base metal into a protective coating. Because each of these processes produces different types of wastes, EPA only designated wastes from certain metal-finishing operations as hazardous. Thus, the first step in determining whether one of the F006-F012 or F019 listings applies to a waste is identifying the type of metal finishing process involved in creating the waste:

- F006 - F009 listings only apply to wastes from electroplating operations
- F010 - F012 listings only apply to wastes from metal heat treating operations
- the F019 listing only applies to wastes from chemical conversion coating.

Dioxin-bearing Wastes

The listed wastes F020 - F023 and F026 - F028 are commonly known as the "dioxin-bearing wastes." These listings describe a number of wastestreams that EPA believes are likely to contain dioxins, which are among the most dangerous known chemical compounds. The dioxin listings apply primarily to manufacturing process wastes from the production of specific pesticides or specific chemicals used in the production of pesticides. The F027 listing deserves special notice because it does not apply to used manufacturing wastes. It applies only to certain unused pesticide formulations. F027 is in fact the only listing on the F list or K list that describes an unused chemical rather than an industrial wastestream consisting of chemicals that have served their intended purpose. You should also note that, with the exception of F028, all of the dioxin-bearing wastes are considered acute hazardous wastes and are designated with the hazard code (H). These wastes are therefore subject to stricter management standards than other hazardous wastes, as later modules will explain.

Wastes from the Production of Certain Chlorinated Aliphatic Hydrocarbons

The F024 and F025 listings designate as hazardous certain wastestreams produced in the manufacture of chlorinated aliphatic hydrocarbons. These listings stand out on the F list (the list of wastes from non-specific sources) because they focus on wastes from a very narrow industrial sector. Many other wastestreams from the manufacture of organic chemicals are listed on the K list, the list of wastes from specific sources.

Wood Preserving Wastes

The F032, F034, and F035 listings apply to certain wastes from wood preserving operations. Most wood used for construction or other non-fuel applications is chemically treated to slow the deterioration caused by decay and insects. Such chemical treatment is especially evident in telephone poles, railroad cross ties, and other wood products prepared to withstand the rigors of outdoor usage. Wood preservation typically involves coating lumber with pentachlorophenol, creosote, or preservatives containing arsenic or chromium. The wood preserving process creates a number of common wastestreams containing these chemicals. For example, once wood has been treated with a preservative, it is placed in a storage yard where excess preservative drips from the lumber. The F032, F034, and F035 listings designate this preservative drippage as listed hazardous waste. These listings also apply to a variety of other residuals from wood preserving. Whether the F032, F034, or F035 listings apply to a particular wood preserving waste depends entirely on the type of preservative used at the facility. Waste from wood preservation using pentachlorophenol is F032, waste from use of creosote is F034, and waste from treating wood with arsenic or chromium is F035.

Petroleum Refinery Wastewater Treatment Sludges

The F037 and F038 listings apply to specific wastestreams from petroleum refineries. The petroleum refining process typically creates large quantities of contaminated wastewater. Before this wastewater can be discharged to a river or sewer, it must be treated to remove oil, solid material, and chemical pollutants. Gravity provides a simple way of separating these pollutants from refinery wastewaters. Over time, solids and heavier pollutants precipitate from wastewaters to form a sludge. Other less dense pollutants accumulate on the surface of wastewaters, forming a material known as float. These gravitational separation processes can be encouraged through chemical or mechanical means. The F037 listing applies to the sludges and float created by gravitational treatment of petroleum refinery wastewaters. The F038 listing applies to sludges and float created during the chemical or physical treatment of refinery wastewaters.

Multisource Leachate

The F039 listing applies to multisource leachate, the liquid material that accumulates at the bottom of a hazardous waste landfill. Understanding the natural phenomenon known as leaching is essential to understanding a number of key RCRA regulations. Leaching occurs when liquids such as rainwater filter through soil or buried materials, such as wastes placed in a landfill. When this liquid comes in contact with buried wastes, it leaches or draws chemicals out of those wastes. This liquid (called leachate) then carries the leached chemical contaminants further into the ground, eventually depositing them elsewhere in the subsurface or in groundwater. The leachate that percolates through landfills, particularly hazardous waste landfills, usually contains high concentrations of chemicals. Therefore, landfill leachate is often collected to minimize the potential that it may enter the subsurface environment and contaminate soil or groundwater. F039 designates as listed hazardous waste this leachate that percolates through hazardous waste landfills and other buried hazardous waste.

THE K LIST: WASTES FROM SPECIFIC SOURCES

The K list of hazardous wastes designates as hazardous particular wastes from specific sectors of industry and manufacturing. The K list wastes are therefore known as wastes from specific sources. Like F list wastes, K list wastes are manufacturing process wastes. They contain chemicals that have been used for their intended purpose. When determining whether a waste qualifies as K-listed, one should ask two primary questions. First, is the facility that created the waste within one of the seventeen different industrial or manufacturing categories on the K list? Second, does the waste match one of the specific K list waste descriptions? The seventeen industries that can generate K list wastes are:

- Wood preservation
- Inorganic pigment manufacturing
- Organic chemicals manufacturing
- Inorganic chemicals manufacturing
- Pesticides manufacturing
- Explosives manufacturing
- Petroleum refining
- Iron and steel production
- Primary copper production
- Primary lead production
- Primary zinc production
- Primary aluminum production
- Ferroalloys production
- Secondary lead processing
- Veterinary pharmaceuticals manufacturing
- Ink formulation
- Coking (processing of coal to produce coke, a material used in iron and steel production).

Remember that not all wastes from these seventeen industries are hazardous, only those specifically described in the detailed K list descriptions.

In general, the K listings target much more specific wastestreams than the F listings. For example, EPA recently added a number of listings to the organic chemicals manufacturing category of the K list. These new listings are for wastes from the production of carbamate chemicals. EPA estimates that only two dozen facilities nationwide produce wastestreams covered by these new K listings. In contrast, F-listed spent solvent wastes are commonly generated in thousands of different plants and facilities. You may also notice that industries that generate K-listed wastes, such as the wood preserving and petroleum refining industries, can also generate F-listed wastes. Typically, K listings describe more specific wastestreams than F listings applicable to the same industry. For example, K051 and K048 designate as hazardous two very specific types of petroleum refinery wastewater treatment residues: wastewater treatment sludges created in API separators and wastewater treatment float created using dissolved air flotation (DAF) pollution control devices. The F037 and F038 listings complement these two K listings by designating as hazardous all other types of petroleum refinery wastewater treatment sludges and floats. These petroleum refinery listings illustrate that the K listings are typically more specific than the F listings. They also illustrate that the two lists are in many ways very similar.

THE P AND U LISTS: DISCARDED COMMERCIAL CHEMICAL PRODUCTS

The P and U lists designate as hazardous pure or commercial grade formulations of certain unused chemicals. As you will see, the P and U listings are quite different from the F and K listings. For a waste to qualify as P- or U-listed, a waste must meet the following three criteria:

- The waste must contain one of the chemicals listed 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," as EPA defines that term.

The following paragraphs explore these three criteria in detail and examine EPA's rationale in creating the P and U lists.

You have already learned that hazardous waste listings are narrative descriptions of specific wastestreams and that a waste's actual chemical composition is generally irrelevant to whether a listing applies to it. At first glance, the P and U listings seem inconsistent with these principles. Each P and U listing consists only of the chemical name of a compound known to be toxic or otherwise dangerous; no description is included. EPA adopted this format because the same narrative description applies to all P and U list wastes. Instead of appearing next to each one

of the hundreds of P and U list waste codes, this description is found in the regulatory text that introduces the two lists. This generic P and U list waste description involves two key factors. First, a P or U listing applies only if one of the listed chemicals is discarded unused. In other words, the P and U lists do not apply to manufacturing process wastes, as do the F and K lists. The P and U listings apply to unused chemicals that become wastes. Unused chemicals become wastes for a number of reasons. For example, some unused chemicals are spilled by accident. Others are intentionally discarded because they are off-specification and cannot serve the purpose for which they were originally produced. The second key factor governing the applicability of the P or U listings is that the listed chemical must be discarded in the form of a "commercial chemical product." EPA uses the phrase commercial chemical product to describe a chemical that is in pure form, that is in commercial grade form, or that is the sole active ingredient in a chemical formulation. The pure form of a chemical is a formulation consisting of 100% of that chemical. The commercial grade form of a chemical is a formulation in which the chemical is almost 100% pure, but contains minor impurities. A chemical is the sole active ingredient in a formulation if that chemical is the only ingredient serving the function of the formulation. For instance, a pesticide made for killing insects may contain a poison such as heptachlor as well as various solvent ingredients which act as carriers or lend other desirable properties to the poison. Although all of these chemicals may be capable of killing insects, only the heptachlor serves the primary purpose of the insecticide product. The other chemicals involved are present for other reasons, not because they are poisonous. Therefore, heptachlor is the sole active ingredient in such a formulation.

As you can now see, the P and U listings apply only to a very narrow category of wastes. For example, an unused pesticide consisting of pure heptachlor is listed waste P059 when discarded. An unused pesticide consisting of pure toxaphene is listed waste P123 when discarded. However, an unused pesticide made up of 50% heptachlor and 50% toxaphene as active ingredients, while being just as deadly as the first two formulations, is not a listed waste when discarded. That is because neither compound is discarded in the form of a commercial chemical product. Why did EPA chose such specific criteria for designating P- or U-listed chemicals as hazardous? When first developing the definition of hazardous waste, EPA was not able to identify with confidence all the different factors which can cause a waste containing a known toxic chemical to be dangerous. It was obvious, however, that wastes consisting of pure, unadulterated forms of certain chemicals were worthy of regulation. EPA used the P and U lists to designate as hazardous wastes consisting of pure or highly-concentrated forms of known toxic chemicals. As you will see in the following sections of the module, wastes that remain unregulated by listings may still fall under protective hazardous waste regulation due to the four characteristics of hazardous waste.

2.4 CHARACTERISTIC HAZARDOUS WASTES

As you have learned, a hazardous waste characteristic is a measurable property which indicates that a waste poses a sufficient threat to deserve regulation as hazardous. EPA tried to identify characteristics which, when present in a waste, can cause death or illness in humans or ecological damage. EPA also decided that the presence of any characteristic of hazardous waste should be detectable by using a standardized test method or by applying general knowledge of the waste's properties. EPA believed that unless generators were provided with widely available and uncomplicated test methods for determining whether their wastes exhibited hazardous characteristics, this system of identifying hazardous wastes would be unfair and impractical. Given these criteria, EPA only finalized four hazardous waste characteristics. These characteristics are a necessary supplement to the hazardous waste listings. They provide a screening mechanism that waste handlers must apply to all wastes from all industries. In this sense, the characteristics provide a more complete and inclusive means of identifying hazardous wastes than do the hazardous waste listings. The four characteristics of hazardous waste are:

- Ignitability
- Corrosivity
- Reactivity
- Toxicity.

The regulations explaining these characteristics and the test methods to be used in detecting their presence are found in Part 261, Subpart C. Note that although waste handlers can use the test methods referenced in Subpart C to determine whether a waste displays characteristics, they are not required to do so. In other words, any handler of industrial waste may apply knowledge of the waste's properties to determine if it exhibits a characteristic, instead of sending the waste for expensive laboratory testing. As with listed wastes, characteristic wastes are assigned waste codes. Ignitable, corrosive, and reactive wastes carry the waste codes D001, D002, and D003, respectively. Wastes displaying the characteristic of toxicity can carry any of the waste codes D004 through D043. The following paragraphs introduce each of the four hazardous waste characteristics.

IGNITABILITY

Ignitable wastes are wastes which can readily catch fire and sustain combustion. Many paints, cleaners, and other industrial wastes pose such a fire hazard. Most ignitable wastes are liquid in physical form. EPA selected a flash point test as the method for determining whether a liquid waste is combustible enough to deserve regulation as hazardous. The flash point test determines the lowest temperature at which a chemical ignites when exposed to flame. Many wastes in solid or non-liquid physical form (i.e., wood and paper) can also readily catch fire and sustain

combustion, but EPA did not intend to regulate most of these non-liquid materials as ignitable wastes. A non-liquid waste is only hazardous due to ignitability if it can spontaneously catch fire under normal handling conditions and can burn so vigorously that it creates a hazard. Certain compressed gases and chemicals called oxidizers can also be ignitable. Ignitable wastes carry the waste code D001 and are among the most common hazardous wastes. The regulations describing the characteristic of ignitability are codified at §261.21.

CORROSIVITY

Corrosive wastes are acidic or alkaline (basic) wastes which can readily corrode or dissolve flesh, metal, or other materials. They are also among the most common hazardous wastestreams. Waste sulfuric acid from automotive batteries is an example of a corrosive waste. EPA uses two criteria to identify corrosive hazardous wastes. The first is a pH test. Wastes with a pH greater than or equal to 12.5 or less than or equal to 2 are corrosive under EPA's rules. A waste may also be corrosive if it has the ability to corrode steel in a specific EPA-approved test protocol. Corrosive wastes carry the waste code D002. The regulations describing the corrosivity characteristic are found at §261.22.

REACTIVITY

A reactive waste is one that readily explodes or undergoes violent reactions. Common examples are discarded munitions or explosives. In many cases, no reliable test method exists to evaluate a waste's potential to explode or react violently under common handling conditions. Therefore, EPA uses narrative criteria to define most reactive wastes and allows waste handlers to use their best judgement in determining if a waste is sufficiently reactive to be regulated. This is possible because reactive hazardous wastes are relatively uncommon and the dangers they pose are well known to the few waste handlers who deal with them. A waste is reactive if it meets any of the following criteria:

- It can explode or violently react when exposed to water or under normal handling conditions
- It can create toxic fumes or gases when exposed to water or under common handling conditions
- It meets the criteria for classification as an explosive under Department of Transportation rules.

Wastes exhibiting the characteristic of reactivity are assigned the waste code D003. The reactivity characteristic is described in the regulations at §261.23.

TOXICITY CHARACTERISTIC

The leaching of toxic compounds or elements into groundwater drinking supplies from wastes disposed in landfills is one of the most common ways the general population can be exposed to the chemicals found in industrial wastes. EPA therefore developed a characteristic designed to identify wastes likely to leach dangerous concentrations of certain known toxic chemicals into groundwater. In order to predict whether any particular waste is likely to leach chemicals into groundwater in the absence of special restrictions on its handling, EPA first designed a lab procedure which replicates the leaching process and other effects that occur when wastes are buried in a typical municipal landfill. This lab procedure is known as the Toxicity Characteristic Leaching Procedure (TCLP). Using the TCLP on a waste sample creates a liquid leachate that is similar to the liquid EPA would expect to find in the ground near a landfill containing the same waste. Once the leachate is created in the lab, a waste handler must determine whether it contains any of 39 different toxic chemicals above specified regulatory levels. If the leachate sample contains a sufficient concentration of one of the specified chemicals, the waste exhibits the toxicity characteristic (TC). EPA used groundwater modeling studies and toxicity data for a number of common toxic compounds and elements to set these threshold concentration levels. Much of these toxicity data was originally developed under the Safe Drinking Water Act. Remember that determining whether a waste exhibits the toxicity characteristic involves two principal steps: (1) creating a leachate sample using the TCLP and (2) evaluating the concentration of 39 chemicals in that sample against the regulatory levels listed in below in Table 1. If a waste exhibits the TC, it carries the waste code associated with the compound or element which exceeded the regulatory level. The following table presents the toxicity characteristic waste codes, regulated constituents, and regulatory levels. This table and the regulations describing the characteristic of toxicity are codified at §261.24.

Table 1
TOXICITY CHARACTERISTIC CONSTITUENTS AND REGULATORY LEVELS

Waste Code	Contaminants	Concentration
D004	Arsenic	5.0
D005	Barium	100.0
D018	Benzene	0.5
D006	Cadmium	1.0
D019	Carbon tetrachloride	0.5
D020	Chlordane	0.03
D021	Chlorobenzene	100.0
D022	Chloroform	6.0
D007	Chromium	5.0
D023	o-Cresol*	200.0
D024	m-Cresol*	200.0
D025	p-Cresol*	200.0
D026	Total Cresols*	200.0
D016	2,4-D	10.0
D027	1,4-Dichlorobenzene	7.5
D028	1,2-Dichloroethane	0.5
D029	1,1-Dichloroethylene	0.7
D030	2,4-Dinitrotoluene	0.13
D012	Endrin	0.02
D031	Heptachlor (and its epoxide)	0.008
D032	Hexachlorobenzene	0.13
D033	Hexachlorobutadiene	0.5
D034	Hexachloroethane	3.0
D008	Lead	5.0
D013	Lindane	0.4
D009	Mercury	0.2
D014	Methoxychlor	10.0
D035	Methyl ethyl ketone	200.0
D036	Nitrobenzene	2.0
D037	Pentachlorophenol	100.0
D038	Pyridine	5.0
D010	Selenium	1.0
D011	Silver	5.0
D039	Tetrachloroethylene	0.7
D015	Toxaphene	0.5
D040	Trichloroethylene	0.5
D041	2,4,5-Trichlorophenol	400.0
D042	2,4,6-Trichlorophenol	2.0
D017	2,4,5-TP (Silvex)	1.0
D043	Vinyl chloride	0.2

*If o-, m-, and p- cresols cannot be individually measured, the regulatory level for total cresols is used.

2.5 THE MIXTURE AND DERIVED-FROM RULES

So far, this module has introduced the fundamentals of the hazardous waste identification process and an overview of the hazardous waste listings and characteristics. You should now be able to explain in general terms which solid wastes are hazardous wastes. The following pages of the module introduce and analyze a new question: "When do these hazardous wastes cease being hazardous wastes?" The regulations governing this issue are commonly known as the mixture and derived-from rules.

BACKGROUND

When EPA first developed the RCRA regulations and the definition of hazardous waste in the late 1970s, the Agency focused on establishing the listings and characteristics, criteria allowing industry to identify which wastes deserved regulation as hazardous wastes. Commenters on EPA's original proposed regulations brought up other key questions about the hazardous waste identification process. For example, these commenters asked, "once a waste is identified as hazardous, what happens if that waste changes in some way? If the hazardous waste is changed, either by mixing it with other wastes or by treating it to modify its chemical composition, should it still be regulated as hazardous?" Faced with a short time frame for answering this difficult question, EPA developed a fairly simple and strict answer: the mixture and derived-from rules.

THE MIXTURE AND DERIVED-FROM RULES

The mixture and derived-from rules operate differently for listed waste and characteristic wastes. The mixture rule for listed wastes states that a mixture made up of any amount of a non-hazardous solid waste and any amount of a listed hazardous waste is considered a listed hazardous waste. In other words, if a small vial of listed waste is mixed with a large quantity of non-hazardous waste, the resulting mixture bears the same waste code and regulatory status as the original listed component of the mixture. This principle applies regardless of the actual health threat posed by the waste mixture or the mixture's chemical composition. The derived-from rule governs the regulatory status of materials that are created by treating or changing a hazardous waste in some way. For example, ash created by burning a hazardous waste is considered "derived-from" that hazardous waste. The derived-from rule for listed wastes states that any material derived from a listed hazardous waste is also a listed hazardous waste. Thus, ash produced by burning a listed hazardous waste bears that same waste code and regulatory status as the original listed waste, regardless of the ash's actual properties. The net effect of the mixture and derived-from rules for listed wastes can be summarized as follows: once a waste matches a listing description, it is forever a listed hazardous waste, regardless of how it is mixed, treated, or otherwise changed. Furthermore, any material that comes in contact with the listed waste will also be considered listed, regardless of its chemical composition.

Although the regulations do provide a few exceptions to the mixture and derived-from rules, most listed hazardous wastes are subject to the strict principles outlined above. Why did EPA create such a rigid system? To understand the logic behind the mixture and derived-from rules, one must consider the circumstances under which EPA developed them. If EPA relied solely on the narrative listing descriptions to govern when a waste ceased being hazardous, industry might easily circumvent RCRA's protective regulation. For example, a waste handler could simply mix different wastes and claim that they no longer exactly matched the applicable hazardous waste listing descriptions. These wastes would no longer be regulated by RCRA, even though the chemicals they contained would continue to pose the same threats to human health and the environment. EPA was not able to determine what sort of treatment or concentrations of chemical constituents indicated that a waste no longer deserved regulation. EPA therefore adopted the simple and conservative approach of the mixture and derived-from rules, while admitting that these rules might make some waste mixtures and treatment residues subject to unnecessary regulation. Adopting the mixture and derived-from rules also presented certain advantages. For instance, the mixture rule gives waste handlers a clear incentive to keep their listed hazardous wastes segregated from other non-hazardous or less dangerous wastestreams.

As mentioned previously, the mixture and derived-from rules apply differently to listed and characteristic wastes. A mixture involving characteristic wastes is hazardous only if the mixture itself exhibits a characteristic. Similarly, treatment residues and materials derived from characteristic wastes are hazardous only if they themselves exhibit a characteristic. Unlike listed hazardous wastes, characteristic wastes are hazardous because they possess one of four unique and measurable properties. EPA decided that once a characteristic waste no longer exhibits one of these four dangerous properties, it no longer deserves regulation as hazardous. Thus, a characteristic waste can be made non-hazardous by treating it to remove its hazardous property. Please note that EPA places certain restrictions on the manner in which a waste can be treated. You will learn more about these restrictions in the "Land Disposal Restrictions" module. Handlers who make characteristic wastes non-hazardous must consider these restrictions when treating wastes to remove their hazardous properties.

There are a few situations in which EPA does not require strict application of the mixture and derived-from rules. EPA determined that certain mixtures involving listed wastes and certain residues from the treatment of listed wastes typically do not pose enough of a health or environmental threat to deserve regulation as listed wastes. The seven principal regulatory exclusions from the mixture and derived-from rules are summarized below.

Mixture and Derived-from Rule Exemptions

The first exemption from the mixture rule applies to mixtures of solid wastes and wastes listed solely because they exhibit characteristics. As you know, EPA can list a waste as hazardous if that waste typically exhibits one or more of the four hazardous waste characteristics. If a hazardous waste listed only for a characteristic is mixed with a solid waste, the original listing does not carry through to the resulting mixture if that mixture does not exhibit any hazardous waste characteristics. For example, EPA listed the F003 spent solvents as hazardous because these wastes typically display the ignitability characteristic. If F003 waste is treated by mixing it with another waste, and the resulting mixture does not exhibit a characteristic, the F003 listing no longer applies. Please remember that EPA places certain restrictions on how hazardous wastes can be treated or mixed with other wastes. Any hazardous waste mixing must be consistent with these rules.

A second exemption from the mixture rule applies to certain listed hazardous wastes that are discharged to wastewater treatment facilities. This exemption is sometimes referred to as the *de minimis* wastewater mixture rule. Many industrial facilities produce large quantities of non-hazardous wastewaters as their primary wastestreams. These wastewaters are typically discharged to a water body or local sewer system after being treated to remove pollutants, as required by the Clean Water Act. At many of these large facilities, on-site cleaning, chemical spills, or laboratory operations also create relatively small secondary wastestreams that are hazardous due to listings or characteristics. For example, a textile plant producing large quantities of non-hazardous wastewater can generate a secondary wastestream of listed spent solvents from cleaning equipment. Routing such secondary hazardous wastestreams to the facility's wastewater treatment system is a practical way of treating and getting rid of these wastes. This management option triggers the mixture rule, however, since even a very small amount of a listed wastestream combined with very large volumes of non-hazardous wastewater causes the entire mixture to be listed. EPA provided an exemption from the mixture rule for a number of these situations where relatively small quantities of listed hazardous wastes are routed to large-volume wastewater treatment systems. To qualify for this exemption from the mixture rule, the amount of listed waste introduced into a wastewater treatment system must be very small (or *de minimis*) relative to the total amount of wastewater treated in the system.

A third exemption from the mixture rule applies to mixtures involving characteristic wastes and specific mining wastes. This narrow exemption allows certain mixtures to qualify as non-hazardous wastes, even if the mixtures exhibit one or more hazardous waste characteristics. The legality of this exemption has been the subject of litigation between EPA and various interested parties.

There are four regulatory exemptions from the derived-from rule. The first of these derived-from rule exemptions applies to materials that are reclaimed from hazardous wastes and used beneficially. Many listed and characteristic hazardous

wastes can be recycled to make new products or recover usable materials with economic value. Such products derived-from recycled hazardous wastes are no longer wastes at all. Since they are not wastes, these derived from materials are not hazardous wastes. Therefore, whether they are derived-from listed wastes or whether they exhibit hazardous characteristics is irrelevant. The "Definition of Solid Waste and Recyclable Materials" module will explain which residues derived from hazardous wastes actually cease to be wastes and qualify for this exemption.

The last three exemptions from the derived-from rule apply to residues from the treatment of specific wastes using very specific treatment processes. For example, K062 describes spent pickle liquor from the iron and steel industry. Pickle liquor is an acid solution used to finish the surface of steel. When pickle liquor is spent and becomes a waste, it usually contains acids and toxic heavy metals. This waste can be treated by mixing it with lime to form a sludge. This treatment, called stabilization, neutralizes the acids in the pickle liquor and makes the metals less dangerous by chemically binding them into the sludge. EPA studied this process and determined that K062 treated in this manner no longer poses enough of a threat to warrant hazardous waste regulation. Therefore lime-stabilized waste pickle liquor sludge derived from K062 is not a listed hazardous waste. The other exemptions from the derived-from rule for listed wastes are also quite specific.

The RCRA regulations do provide another form of relief from the mixture and derived-from rule principles for listed hazardous wastes. Through a process known as delisting, a waste handler can petition EPA to prove that a waste meeting a hazardous waste listing description does not deserve RCRA regulation. Because the delisting process is difficult, time-consuming, and expensive, it is not considered a readily available exception to the mixture and derived-from rules. You will learn more about delisting at a later date.

The hazardous waste listings, the hazardous waste characteristics, and the mixture and derived-from rules are all essential parts of the definition of hazardous waste. However, these key elements are all described in different sections of the RCRA regulations. Only one regulatory section, §261.3, unites all four elements to establish the formal definition of hazardous waste. This section is entitled "definition of hazardous waste." Section 261.3 states that all solid wastes exhibiting one of the four hazardous characteristics defined in Part 261, Subpart C, are hazardous wastes. This section also states that all solid wastes listed on one of the four hazardous waste lists in Part 261, Subpart D, are hazardous wastes. Finally, this section explains in detail the mixture and derived-from rules and the seven regulatory exemptions from these rules. Thus, although §261.3 is entitled "definition of hazardous waste," it serves primarily as a guide to the mixture and derived-from rules. Substantive rules about the two most crucial elements of the hazardous waste definition, the listings and characteristics, are found elsewhere.

2.6 THE CONTAINED-IN POLICY

The contained-in policy is a special, more flexible version of the mixture and derived-from rules that applies to environmental media and debris contaminated with hazardous waste. The next paragraphs explain what environmental media and debris are and why EPA developed a more flexible policy for regulating these materials under RCRA. The following discussion also explores in greater detail how the contained-in policy applies to media and debris.

Environmental media is the term EPA uses to describe soil, sediments, and groundwater. Debris is a term EPA uses to describe a broad category of manufactured and naturally-occurring objects that are commonly discarded. Examples of debris include:

- Dismantled construction materials such as used bricks, wood beams, and chunks of concrete
- Decommissioned industrial equipment such as pipes, pumps, and tanks
- Other discarded manufactured objects such as personal protective equipment (gloves, coveralls, eyewear)
- Large, naturally-occurring objects such as tree trunks and boulders.

Environmental media and debris are contaminated with hazardous waste in a number of ways. Environmental media are usually contaminated through accidental spills of hazardous waste or spills of product chemicals which, when spilled, become hazardous wastes. Debris can also be contaminated through spills. Most debris in the form of industrial equipment and personal protective gear becomes contaminated with waste or product chemicals during normal industrial operations. Contaminated media and debris are primary examples of "remediation wastes." In other words, they are not wastestreams created during normal industrial or manufacturing operations. They are typically created during cleanups of contaminated sites and during the decommissioning of factories. Handlers of contaminated media and debris usually cannot control or predict the composition of these materials, which have become contaminated though accidents or past negligence. "As-generated" wastes is the term often used to describe chemical wastestreams created during normal industrial or manufacturing operations. Examples of "as-generated" wastes are concentrated spent chemicals, industrial wastewaters, and pollution control residues such as sludges. Handlers of "as-generated" wastes can usually predict or control the creation of these wastes through the industrial process.

The hazardous waste identification principles you have learned, including the mixture and derived-from rules, apply to "as-generated" industrial wastes. EPA

decided that a more flexible version of these principles should apply to the primary remediation wastes, environmental media, and debris. In particular, EPA determined that strict application of the mixture and derived-from rules was inappropriate for media and debris, especially when listed wastes were involved. Applying the mixture and derived-from rules to media and debris would present certain disadvantages, as the following examples illustrate. First, under the traditional mixture and derived-from rules, environmental media and debris contaminated with any amount of listed hazardous waste would be forever regulated as hazardous. Such a strict regulatory interpretation would require excavated or dismantled materials to be handled as listed hazardous wastes and could discourage environmental cleanup efforts. Second, most spills of chemicals into soil or groundwater produce very large quantities of these media containing relatively low concentrations of chemicals. Strict application of the mixture and derived-from principles to media would therefore cause many tons soil to be regulated as listed hazardous waste despite containing low concentrations of chemicals and posing little actual health threat. Finally, one of the main benefits of the mixture and derived-from rules is not relevant to media and debris. The mixture and derived-from principles encourage handlers of as-generated wastes to keep their listed wastes segregated from other, less hazardous wastestreams to avoid creating more listed wastes. Handlers of contaminated media and debris generally have no control over the process by which these materials come into contact with hazardous waste.

For all of the above reasons, EPA chose to apply a special, more flexible, version of the mixture and derived-from rules to environmental media and debris. Contaminated soil, groundwater, and debris can still present health threats if they are not properly handled and disposed. Therefore, EPA requires that any media and debris contaminated with a listed waste or exhibiting a hazardous characteristic be regulated like any other hazardous waste. However, media and debris contaminated with listed hazardous wastes can lose their listed status and become non-hazardous. This occurs only after a demonstration that the particular medium or debris in question no longer poses a sufficient health threat to deserve RCRA regulation. The requirements for making this demonstration are explained below. Once the demonstration is made, the medium or debris in question is no longer considered to "contain" a listed hazardous waste and is no longer regulated. This concept that media and debris can contain or cease to contain a listed hazardous waste accounts for the name of the policy. Of course, if media or debris exhibit a characteristic, they can become non-hazardous once the characteristic is removed, as is the case with any other waste.

The contained-in policy for environmental media is not actually codified in the RCRA regulations. In legal terms, it is merely a special interpretation of the applicability of the mixture and derived-from rules to soil and groundwater that has been upheld in federal court. These principles for the management of contaminated media are therefore known as a "policy" instead of a rule. The terms of the

contained-in policy are relatively general. In order for environmental media contaminated with a listed waste to no longer be considered hazardous, the handler of that media must demonstrate to EPA's satisfaction that it no longer poses a sufficient health threat to deserve RCRA regulation. Although handlers of listed media must obtain EPA's concurrence before disposing of such media as non-hazardous, the current contained-in policy provides no guidelines on how this demonstration to EPA should be made. You should note that the contained-in policy is a far easier option for eliminating unwarranted hazardous waste regulation for low-risk listed wastes than the process of delisting a hazardous waste mentioned previously. The delisting process demands extensive sampling and analysis, submission of a formal petition, and a complete rulemaking by EPA. A determination that environmental media no longer contain a listed hazardous waste can be granted on a site-specific basis by EPA officials without any regulatory procedure.

Debris contaminated with hazardous waste has traditionally been governed by the same non-regulatory contained-in policy explained above. In 1992, EPA codified certain aspects of the contained-in policy for debris in the definition of hazardous waste regulations at §261.3. In particular, EPA included a regulatory passage which explains the process by which handlers of debris contaminated with listed hazardous waste can demonstrate that the debris is non-hazardous. This passage also references certain treatment technologies that one may use to decontaminate listed debris so that it no longer contains a listed waste. Thus, the term "contained-in policy" is now something of a misnomer for contaminated debris, since a "contained-in rule" for debris now exists.

2.7 REGULATORY DEVELOPMENTS

During the summer and fall of 1995, EPA expects to publish two proposed rulemakings that will drastically change the hazardous waste identification regulations. These two proposals are part of EPA's Hazardous Waste Identification Rule or HWIR, which is likely to completely replace the mixture rule, the derived-from rule, and the contained-in policy for contaminated environmental media. As you now understand, the current mixture and derived-from rules present certain disadvantages. They are fairly inflexible rules, especially where listed wastes are concerned. Furthermore, although they govern whether and when a hazardous waste is no longer subject to RCRA regulation, they do not consider the actual health risks associated with a waste. The current contained-in policy for environmental media also presents certain problems. Neither the regulations nor EPA guidance documents clarify exactly when contaminated soil and groundwater cease to be regulated as listed hazardous waste. Through the two HWIR rulemakings, EPA plans to resolve a number of these problems. The first HWIR rule will revise the mixture and derived-from regulations for as-generated wastes. Under the new HWIR for as-generated wastes, chemical-specific risk-related factors will affect whether or not a waste remains subject to RCRA regulations. The second

HWIR rule will establish regulations for the management of contaminated environmental media. The HWIR media rule will probably also include chemical-specific, risk-related factors.