



F-CODED SOLVENTS - A CLOSER LOOK

B3-3/29 Earl Thomas

March 29, 2022



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Outline

- Listing Review
- Spent Solvent History
- The Significance of the Conjunctions “and” and “or” in Regulation
- “Major” Observation
- How to Assign F-Codes
- Examples
- Peripheral Topics
- Summary



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LISTING REVIEW



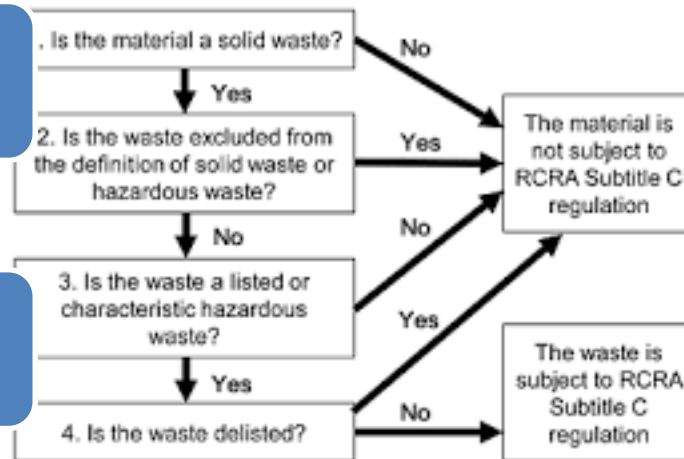
Listing Review

Resource Conservation Recovery Act (RCRA)
Hazardous Waste comprises two categories:

- Listed Hazardous Waste and
- Characteristic Hazardous Waste

There are four listings and four characteristics....

The Hazardous Waste Identification Process



Listing Review

The four listings are alpha-numerically coded with alpha prefixes of F, K, P, & U... and



The four characteristics (all bearing alpha prefixes of "D") are... Ignitability, Corrosivity, Reactivity, and Toxicity



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Listing Review

F & K-listed wastes are spent industrial process waste streams.

- F-listed waste is spent industrial process waste from non-specific sources, and
- K-listed waste is is spent industrial process waste from specific sources.



Listing Review

P & U-listed wastes are unused commercial chemical products.

- P-listed waste is *acute hazardous waste, such as arsenic and cyanide salts.
- U-listed waste is non-acute hazardous waste, examples being acetone, methyl ethyl ketone, and phenol.



**NOTE: "H" designated F-listed waste is also acute hazardous waste.*

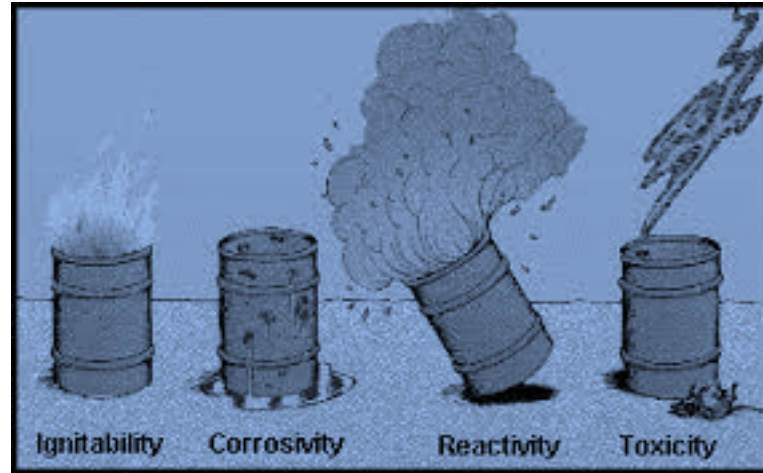


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Listing Review

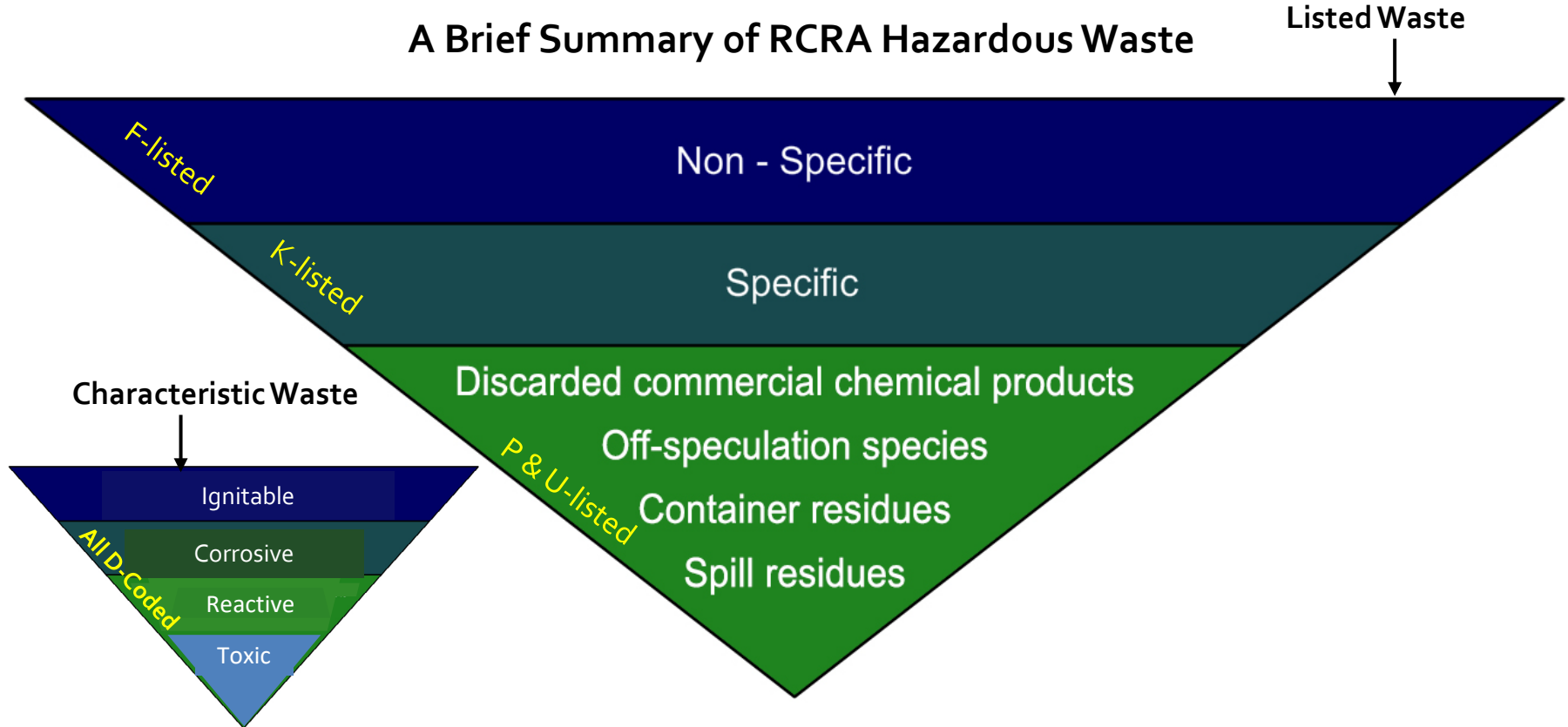
The characteristic waste codes are...

- D001 = Ignitability
- D002 = Corrosivity
- D003 = Reactivity and
- D004 – D043 = Toxicity



Listing Review

A Brief Summary of RCRA Hazardous Waste



Listing Review

The F-solvent listings are
Foo1, Foo2, Foo3, Foo4, & Foo5



Industry and EPA hazardous waste No.	Hazardous waste	Hazard code
F001	<p>The following spent halogenated solvents used in degreasing: Tetrachloroethylene, trichloroethylene, methylene chloride, 1,1,1-trichloroethane, carbon tetrachloride, and chlorinated fluorocarbons; all spent solvent mixtures/blends used in degreasing containing, before use, a total of ten percent or more (by volume) of one or more of the above halogenated solvents or those solvents listed in F002, F004, and F005; and still bottoms from the recovery of these spent solvents and spent solvent mixtures</p>	(T)

Industry and EPA hazardous waste No.	Hazardous waste	Hazard code
F002	<p>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-trichloroethane; all spent solvent mixtures/blends containing, before use, a total of ten percent or more (by volume) of one or more of the above halogenated solvents or those listed in F001, F004, or F005; and still bottoms from the recovery of these spent solvents and spent solvent mixtures</p>	(T)

Industry and EPA hazardous waste No.	Hazardous waste	Hazard code
F003	<p>The following spent non-halogenated solvents: Xylene, acetone, ethyl acetate, ethyl benzene, ethyl ether, methyl isobutyl ketone, n-butyl alcohol, cyclohexanone, and methanol; all spent solvent mixtures/blends containing, before use, only the above spent non-halogenated solvents; and all spent solvent mixtures/blends containing, before use, one or more of the above non-halogenated solvents, and, a total of ten percent or more (by volume) of one or more of those solvents listed in F001, F002, F004, and F005; and still bottoms from the recovery of these spent solvents and spent solvent mixtures</p>	(I)*

Industry and EPA hazardous waste No.	Hazardous waste	Hazard code
F004	<p>The following spent non-halogenated solvents: Cresols and cresylic acid, and nitrobenzene; all spent solvent mixtures/blends containing, before use, a total of ten percent or more (by volume) of one or more of the above non-halogenated solvents or those solvents listed in F001, F002, and F005; and still bottoms from the recovery of these spent solvents and spent solvent mixtures</p>	(T)

Industry and EPA hazardous waste No.	Hazardous waste	Hazard code
F005	<p>The following spent non-halogenated solvents: Toluene, methyl ethyl ketone, carbon disulfide, isobutanol, pyridine, benzene, 2-ethoxyethanol, and 2-nitropropane; all spent solvent mixtures/blends containing, before use, a total of ten percent or more (by volume) of one or more of the above non-halogenated solvents or those solvents listed in F001, F002, or F004; and still bottoms from the recovery of these spent solvents and spent solvent mixtures</p>	(I,T)



Spent Solvent History

Spent Solvent History

Spent solvents are defined as solvents that *"no longer meet the specifications for which the solvent was originally used either because it has outlasted its shelf life, has become contaminated so as to require treatment, or is intended to be reused, recycled, or reclaimed."*



Spent Solvent History

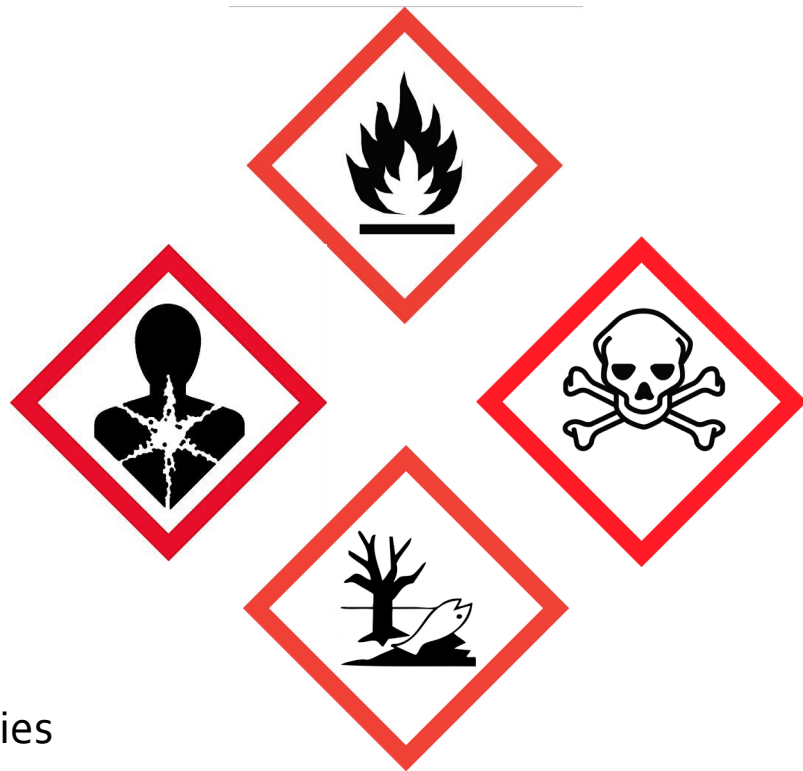
In other words, spent solvents are solvents that can no longer be used for their intended purpose, without being regenerated.



Spent Solvent History

The solvents included in the F-listings were listed for one or more of the following hazardous properties:

- Carcinogenicity
- Ignitability
- Mutagenicity
- Neurotoxicity
- Ozone depleting properties
- Teratogenicity
- Other chronic hazardous properties
- Other reproductive hazardous properties



Spent Solvent History

Additionally, it was recognized that spent solvents are likely to be contaminated with other toxic constituents, such as hexavalent chromium and lead.



Spent Solvent History

As a part of the research leading to the promulgation of the final rule, EPA determined that of the 99,000 metric tons of spent halogenated solvents collectively generated by 460,000 facilities annually throughout the U.S., 30,000 metric tons (30.3%) were disposed of in landfills or by way of open ground dumping.



Spent Solvent History

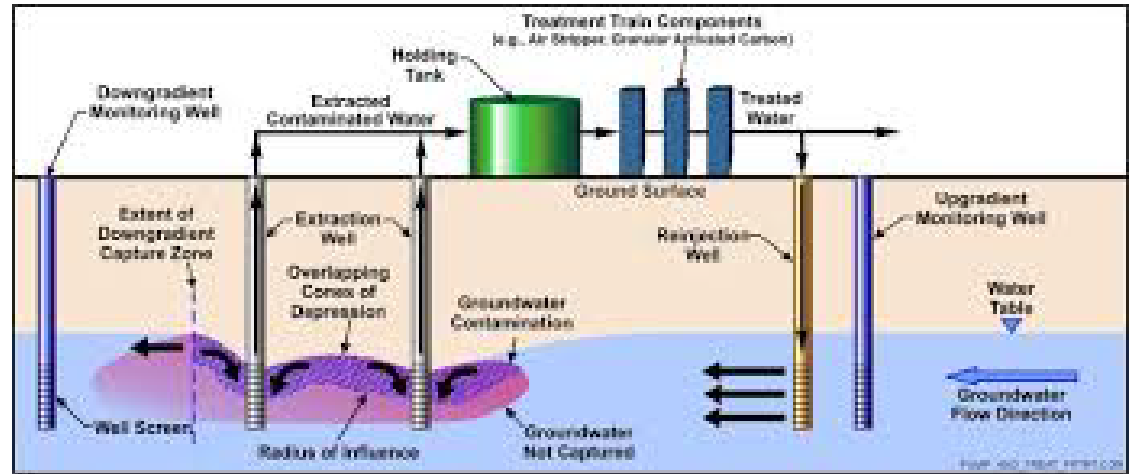
Moreover, given the mobility and environmental persistence of solvent wastes, it became apparent that stricter regulations were needed to protect human health and the environment.



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Spent Solvent History

NOTE: EPA states in 50 FR 53316 that spent solvents have been involved in more hazardous waste damage incidents than any other waste type.



Spent Solvent History

These concerns were further accentuated by the detection of solvents in well-water located down-gradient from areas where industrial waste had been poorly managed and from the 1978 Love Canal tragedy.

EPA published revisions to a previously-published "final rule" addressing hazardous waste management on May 19, 1980.



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Spent Solvent History

Originally, the F-codes pertained to individual technical grade-or-purified solvents, but without revision, this could lead to industry easily circumventing the rule by using mixtures.



At one point during the rulemaking process, EPA proposed to use a single code for all solvents, i.e., Foo01; the Agency was persuaded through public commenting that this would cause confusion among the regulated community



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Spent Solvent History

EPA was also unable to establish thresholds at or below which a solvent would be deemed a “spent solvent” or at which a “spent solvent” would be considered hazardous; therefore, EPA could not establish levels at which mixtures of solvents would pose a hazard, when spent or discarded.



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Spent Solvent History

An EPA clarification statement, published in RO 11327 reads as follows:

*"When an Foo1 waste is mixed with another hazardous waste, the proper description of the mixture would include all applicable waste codes.... **There is no de minimus amount below which a listed waste need not be identified.**"*

RCRA Online



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Spent Solvent History

In other clarification, EPA states...

"There are no 'safe thresholds' for exposure to carcinogens and offering exit thresholds may encourage dilution practices (treating or changing subsequent to waste generation)."

RCRA Online

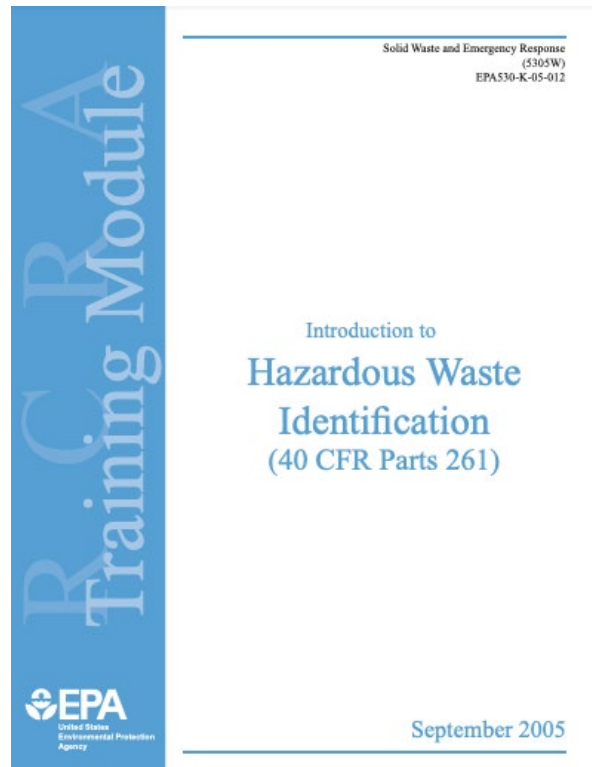


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Spent Solvent History

In yet another EPA guidance document, the Agency offers the following scenario:

*"...If a small vial of listed waste is mixed with a large quantity of nonhazardous 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....**"*



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Spent Solvent History

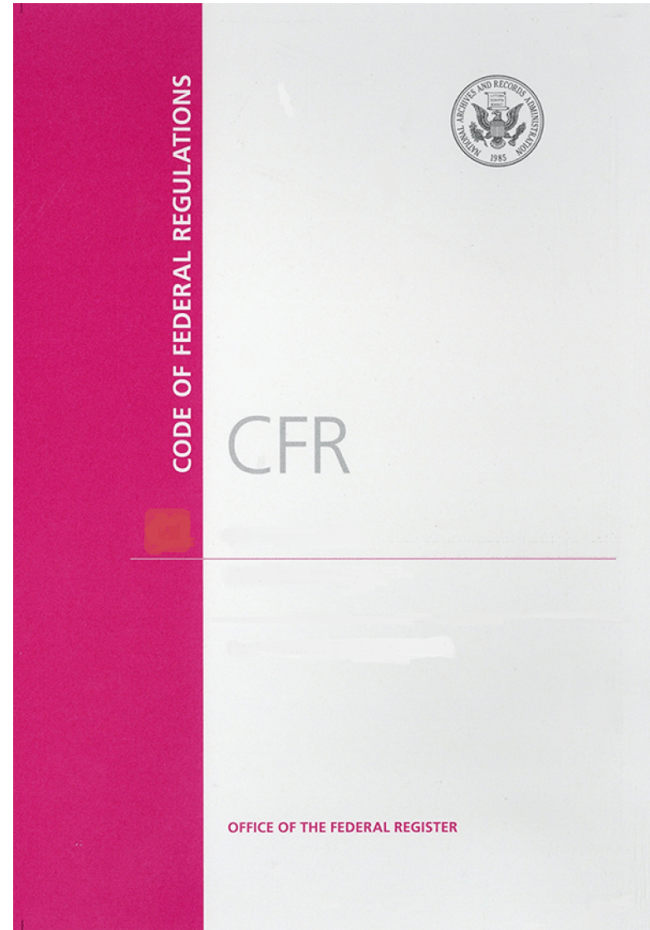
The “10% or greater” before-use threshold, which will be discussed later in greater detail, was selected because EPA determined that industry could not make effective use of solvent formulations having concentrations $< 20\%$; the 10% valve, therefore, provides a 10% buffer.

It is also worthy to note that the CFCs listed in the Foo1 description were added due to their ozone-depleting properties.



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The Significance of the Conjunctions “and” & “or” in Regulation



The Significance of the Conjunctions “or” & “and” in Regulation

A good example of this can be found in Title 49 CFR 172.205(f):

(f) ***Transportation by rail.*** Notwithstanding the requirements of [paragraphs \(d\)](#) and [\(e\)](#) of this section, the following requirements apply:

(1) When accepting hazardous waste from a non-rail transporter, the initial rail transporter must:

- (i) Sign and date the manifest acknowledging acceptance of the hazardous waste;
- (ii) Return a signed copy of the manifest to the non-rail transporter;



The Significance of the Conjunctions “or” & “and” in Regulation

49 CFR 172.205(f) (cont.)

- (iii) Forward at least three copies of the manifest to:
 - (A) The next non-rail transporter, if any;
 - (B) The designated facility, if the shipment is delivered to that facility by rail; **or**
 - (C) The last rail transporter designated to handle the waste in the United States; **and**
- (iv) Retain one copy of the manifest and rail shipping paper in accordance with [40 CFR 263.22](#).



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The Significance of the Conjunctions “or” & “and” in Regulation

Note that in this paragraph, there is an “and” between sub-subparagraphs “iii & iv” and an “or” between sub-sub-subparagraphs “(B) & (C).”

(iii) Forward at least three copies of the manifest to:

(A) The next non-rail transporter, if any;

(B) The designated facility, if the shipment is delivered to that facility by rail; or

(C) The last rail transporter designated to handle the waste in the United States; and

(iv) Retain one copy of the manifest and rail shipping paper in accordance with 40 CFR 263.22.



The Significance of the Conjunctions “or” & “and” in Regulation

This means that when a rail transporter accepts a hazardous waste shipment from a non-rail transporter, the rail transporter must do all of the following:

- i. Sign and date the manifest;
- ii. Return a copy to the non-rail transporter;
- iii. Forward three copies of the manifest; **and**
- iv. Retain one copy.



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The Significance of the Conjunctions “or” & “and” in Regulation

This further means that with regard to forwarding three copies, the rail transporter can forward them to either of the following:

- (A) The next non-rail transporter, if any;
- (B) The designated facility, if the shipment is delivered to that facility by rail; **or**
- (C) The last rail transporter designated to handle the waste in the United States



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The Significance of the Conjunctions “or” & “and” in Regulation

The conjunction “**and**” is used between the mixture clauses associated with Foo1, Foo3, & Foo4... and the conjunction “**or**” is used between mixture clauses Foo2 & Foo5....



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Industry and EPA hazardous waste No.	Hazardous waste	Hazard code
Generic: F001	The following spent halogenated solvents used in degreasing: Tetrachloroethylene, trichloroethylene, methylene chloride, 1,1,1-trichloroethane, carbon tetrachloride, and chlorinated fluorocarbons; all spent solvent mixtures/blends used in degreasing containing, before use, a total of ten percent or more (by volume) of one or more of the above halogenated solvents or those solvents listed in F002, F004, and F005; and still bottoms from the recovery of these spent solvents and spent solvent mixtures.	(T)
F002	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-trichloroethane; all spent solvent mixtures/blends containing, before use, a total of ten percent or more (by volume) of one or more of the above halogenated solvents or those listed in F001, F004, or F005; and still bottoms from the recovery of these spent solvents and spent solvent mixtures.	(T)
F003	The following spent non-halogenated solvents: Xylene, acetone, ethyl acetate, ethyl benzene, ethyl ether, methyl isobutyl ketone, n-butyl alcohol, cyclohexanone, and methanol; all spent solvent mixtures/blends containing, before use, only the above spent non-halogenated solvents; and all spent solvent mixtures/blends containing, before use, one or more of the above non-halogenated solvents, and, a total of ten percent or more (by volume) of one or more of those solvents listed in F001, F002, F004, and F005; and still bottoms from the recovery of these spent solvents and spent solvent mixtures.	(I)*
F004	The following spent non-halogenated solvents: Cresols and cresylic acid, and nitrobenzene; all spent solvent mixtures/blends containing, before use, a total of ten percent or more (by volume) of one or more of the above non-halogenated solvents or those solvents listed in F001, F002, and F005; and still bottoms from the recovery of these spent solvents and spent solvent mixtures.	(T)
F005	The following spent non-halogenated solvents: Toluene, methyl ethyl ketone, carbon disulfide, isobutanol, pyridine, benzene, 2-ethoxyethanol, and 2-nitropropane; all spent solvent mixtures/blends containing, before use, a total of ten percent or more (by volume) of one or more of the above non-halogenated solvents or those solvents listed in F001, F002 or F004; and still bottoms from the recovery of these spent solvents and spent solvent mixtures.	(I,T)

The Significance of the Conjunctions “or” & “and” in Regulation

Notwithstanding any of the
aforementioned information
concerning these
conjunctions, as these relate
to the F-listed solvents...
THEY ARE MEANINGLESS !!!





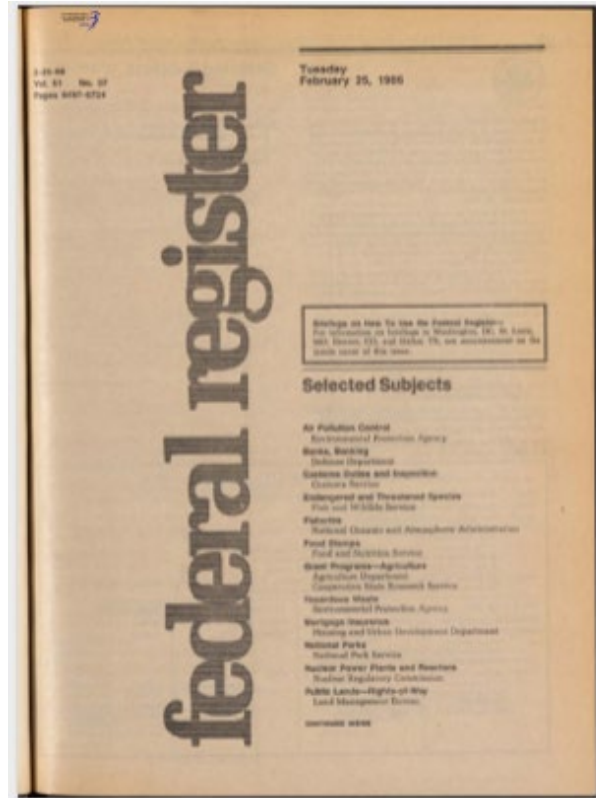
Major Observation



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Major Observation

On February 25th, 1986, in 51 FR 6537, EPA added 1,1,2-trichloroethane to Foo2... and benzene, 2-ethoxyethanol, and nitrobenzene to Foo5.



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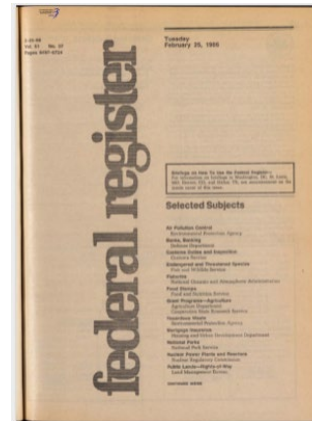


Major Observation

In the text preface to the listing table, EPA writes...

"These spent solvent listings apply to wastes that result from the use of the subject solvents in the following situations:

- *As pure or technical grade solvents;*
- *In mixtures or blends that contain, in total, 10 percent (or more) of one (or more) of the subject solvents (before use); and*
- *In mixtures or blends that contain, in total, 10 percent (or more) of one (or more) of the subject solvents and any of the solvents currently listed in **Foo1, Foo2, or Foo5** (before use)."*

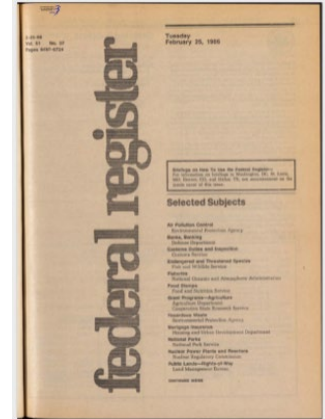


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Major Observation

Let's compare the 1986 mixture clause to the current "tantamount" clause....

*"• In mixtures or blends that contain, in total, 10 percent (or more) of one (or more) of the subject solvents and any of the solvents currently listed in **F001, F002, or F005** (before use)."*



F004	The following spent non-halogenated solvents: Cresols and cresylic acid, and nitrobenzene; all spent solvent mixtures/blends containing, before use, a total of ten percent or more (by volume) of one or more of the above non-halogenated solvents or those solvents listed in F001, F002, and F005; and still bottoms from the recovery of these spent solvents and spent solvent mixtures	(T)
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Major Observation

Please note that the F-codes listed in 51 FR 6537 are out of context, in that these three codes are mentioned in association with "Foo4." (*Foo2 & Foo5 are being revised in the final rule....*)

In addition, the conjunction "or" is used in the final rule, but the word "and" is used in the CFR....

"• *In mixtures or blends that contain, in total, 10 percent (or more) of one (or more) of the subject solvents and any of the solvents currently listed in **Foo1, Foo2, or Foo5** (before use).*"



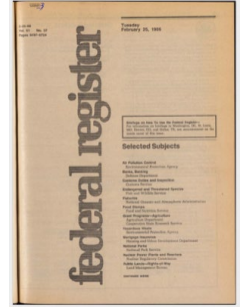
F004	The following spent non-halogenated solvents: Cresols and cresylic acid, and nitrobenzene; all spent solvent mixtures/blends containing, before use, a total of ten percent or more (by volume) of one or more of the above non-halogenated solvents or those solvents listed in F001, F002, and F005; and still bottoms from the recovery of these spent solvents and spent solvent mixtures	(T)
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Major Observation

It is now important now to look at the regulation as it appeared before the 1986 revision:

THE FOLLOWING EXCERPT IS TAKEN
FROM 51 FR 53319, published on
December 31st, 1985:

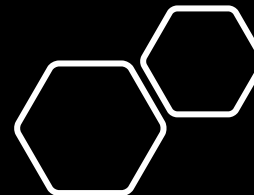


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§ 261.31 Hazardous wastes from non-specific sources.

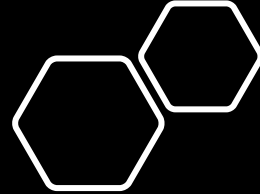
* * * *

Industry and EPA hazardous waste No.	Hazardous waste	Hazard code
Generic: F001	The following spent halogenated solvents used in degreasing: tetrachloroethylene, trichloroethylene, methylene chloride, 1,1,1-trichloroethane, carbon tetrachloride, and chlorinated fluorocarbons; all spent solvent mixtures/blends used in degreasing containing, before use, a total of ten percent or more (by volume) of one or more of the above halogenated solvents or those solvents listed in F002, F004, and F005; and still bottoms from the recovery of these spent solvents and spent solvent mixtures.	(T)
F002	The following spent halogenated solvents: tetrachloroethylene, methylene chloride, trichloroethylene, 1,1,1-trichloroethane, chlorobenzene, 1,2,2-trichloro-1,2,2-trifluoroethane, ortho-dichlorobenzene, and trichlorofluoromethane; all spent solvent mixtures/blends containing, before use, a total of ten percent or more (by volume) of one or more of the above halogenated solvents or those solvents listed in F001, F004, and F005; and still bottoms from the recovery of these spent solvents and spent solvent mixtures.	(T)



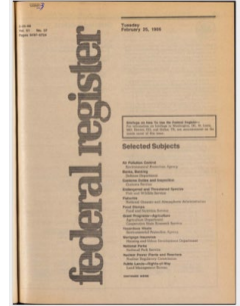
Industry and EPA hazardous waste No.	Hazardous waste	Hazard code
F003	The following spent non-halogenated solvents: xylene, acetone, ethyl acetate, ethyl benzene, ethyl ether, methyl isobutyl ketone, n-butyl alcohol, cyclohexanone, and methanol; all spent solvent mixtures/blends containing, before use, only the above spent non-halogenated solvents; and all spent solvent mixtures/blends containing, before use, one or more of the above non-halogenated solvents, and, a total of ten percent or more (by volume) of one or more of those solvents listed in F001, F002, F004, and F005; and still bottoms from the recovery of these spent solvents and spent solvent mixtures.	(I)*
F004	The following spent non-halogenated solvents: cresols and cresylic acid, and nitrobenzene; all spent solvent mixtures/blends containing, before use, a total of ten percent or more (by volume) of one or more of the above non-halogenated solvents or those solvents listed in F001, F002, and F005; and still bottoms from the recovery of these spent solvents and spent solvent mixtures.	(T)
F005	The following spent non-halogenated solvents: toluene, methyl ethyl ketone, carbon disulfide, isobutanol, and pyridine; all spent solvent mixtures/blends containing, before use, a total of ten percent or more (by volume) of one or more of the above non-halogenated solvents or those solvents listed in F001, F002, and F004; and still bottoms from the recovery of these spent solvents and spent solvent mixtures.	(T)

* (I, T) should be used to specify mixtures containing ignitable and toxic constituents.



Major Observation

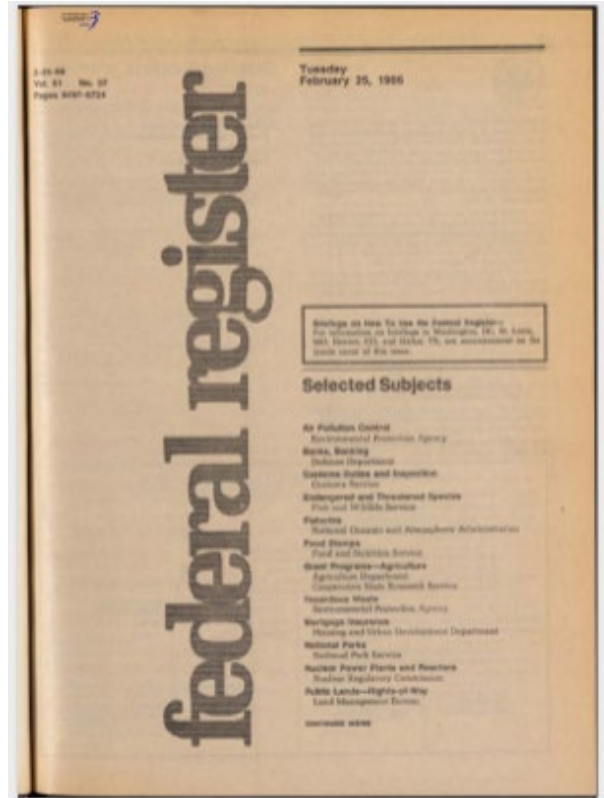
PRIOR TO 1986, "AND" WAS THE ONLY
CONJUNCTION USED!!!



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Major Observation

Now let's take a closer look
at the February 25th, 1986,
(51 FR 6537) revision.



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Major Observation

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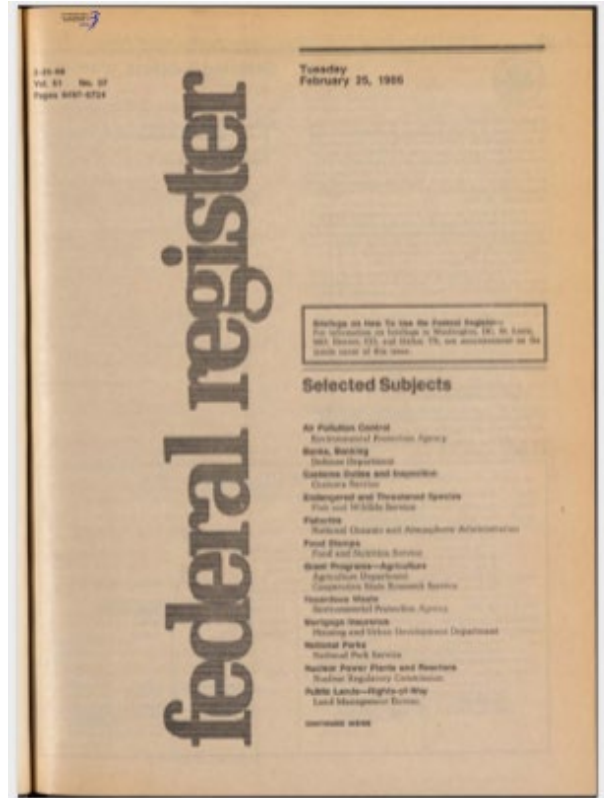
§ 261.31 [Amended]

Industry and EPA hazardous waste No.	Hazardous waste	Hazard code
Generic:		
F002	The following spent halogenated solvents: tetrachloroethylene, methylene chloride, trichloroethylene, 1, 1, 1-trichloroethane, chlorobenzene, 1, 1, 2-trichloro-1, 2, 2-trifluoroethane, orthodichlorobenzene, trichlorofluoromethane, and 1, 1, 2-trichloroethane; all spent solvent mixtures/blends containing, before use, a total of ten percent or more (by volume) of one or more of the above halogenated solvents or those listed in F001, F004, or F005; and still bottoms from the recovery of these spent solvents and spent solvent mixtures.	(T)
F005	The following spent non-halogenated solvents: toluene, methyl ethyl ketone, carbon disulfide, isobutanol, pyridine, benzene, 2-ethoxyethanol, and 2-nitropropane; all spent solvent mixtures/blends containing, before use, a total of ten percent or more (by volume) of one or more of the above non-halogenated solvents or those solvents listed in F001, F002, or F004; and still bottoms from the recovery of these spent solvents and spent solvent mix-	(LT)



Major Observation

When EPA makes changes to regulations, the Agency typically publishes the rule in its entirety for contextual review.

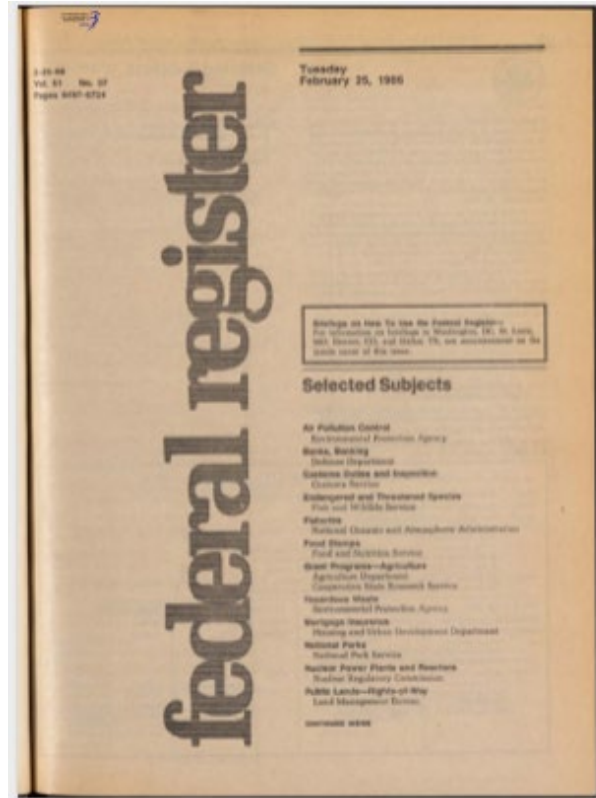


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Major Observation

In the February 25th, 1986, (51 FR 6537) revision, the amendment was published out of context, thereby not allowing for the inconsistency to be captured (and corrected) through observation.



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Major Observation

IT WAS SIMPLY A
TECHNICAL OVERSIGHT !!!



24th California Unified Program
Annual Training Conference
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BREAK TIME!

10-Minute

Followed by "How to Assign F-Codes)





How to Assign F-Codes

How to Assign F-Codes

PRECONDITIONS:

- The solvent must be spent.
- The solvent must have been used for its solvent properties.
- With respect to F001, F002, F004, & F005, the solvent must have contained **before use** a total of 10% or more of these listed solvent.



How to Assign F-Codes

There are two additional ground rules that apply; one is codified, the other was provided in a clarification letter.

- F001 pertains to large scale degreasing operations.
- F003 applies to wastes that are ignitable at the point of generation, and its first criterion pertains to technical grade (or otherwise) pure solvents.



How to Assign F-Codes

Examples of large-scale degreasing operations are provided in EPA's RCRA "Background Document" and include the following:

- Cold cleaning
- Conveyorized vapor degreasing operations
- Open top vapor degreasing operations and
- Fabric scouring



How to Assign F-Codes

Examples of small-scale cleaning operations involving the use of solvents include...

- Industrial, maintenance and repair, commercial service and repair, and
- Consumer-performed maintenance and repair....
(May 1991 EPA RCRA Hotline Summary)



How to assign F-Codes

All of the F-Codes are formatted in a four-fold manner:

1. A listing description for the spent solvent;
2. A listing description for the spent solvent having a before-use (solvent) concentration of $\geq 10\%$;
3. A listing description for solvent mixtures having a before-use (solvent) concentration of $\geq 10\%$;
4. A listing for still bottoms generated from the recovery of the listed solvents.



Industry and EPA hazardous waste No.	Hazardous waste	Hazard code
F001	<p>The following spent halogenated solvents used in degreasing: Tetrachloroethylene, trichloroethylene, methylene chloride, 1,1,1-trichloroethane, carbon tetrachloride, and chlorinated fluorocarbons; all spent solvent mixtures/blends used in degreasing containing, before use, a total of ten percent or more (by volume) of one or more of the above halogenated solvents or those solvents listed in F002, F004, and F005; and still bottoms from the recovery of these spent solvents and spent solvent mixtures</p>	(T)

Industry and EPA hazardous waste No.	Hazardous waste	Hazard code
F002	<p>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-trichloroethane; all spent solvent mixtures/blends containing, before use, a total of ten percent or more (by volume) of one or more of the above halogenated solvents or those listed in F001, F004, or F005; and still bottoms from the recovery of these spent solvents and spent solvent mixtures</p>	(T)

How to Assign F-Codes

Example:

An R & D chemist uses a cleaning agent consisting of 12% methylene chloride and 33% decyl octyl glycosides for glassware cleaning.

Any remaining spent solvent and contaminated rags would receive an Foo2 code.



POLL QUESTION # 1

What F-codes would apply to a spent solvent mixture with before-use concentrations of 4% methyl ethyl ketone (MEK), 2% trichloroethylene (TCE), and 1.8% nitrobenzene used in a small-scale cleaning operation?





1. What F-codes would apply to a spent solvent mixture with before-use concentrations of 4% methyl ethyl ketone (MEK), 2% trichloroethylene (TCE), and 1.8% nitrobenzene used in a small-scale cleaning operation?

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Industry and EPA hazardous waste No.	Hazardous waste	Hazard code
F003	<p>The following spent non-halogenated solvents: Xylene, acetone, ethyl acetate, ethyl benzene, ethyl ether, methyl isobutyl ketone, n-butyl alcohol, cyclohexanone, and methanol; all spent solvent mixtures/blends containing, before use, only the above spent non-halogenated solvents; and all spent solvent mixtures/blends containing, before use, one or more of the above non-halogenated solvents, and, a total of ten percent or more (by volume) of one or more of those solvents listed in F001, F002, F004, and F005; and still bottoms from the recovery of these spent solvents and spent solvent mixtures</p>	(I)*

How to Assign F-Codes

Example:

A spent ignitable solvent mixture consists of 33.3% acetone, 33.3% methanol, & 33.3% xylene would receive the F003 code.



POLL QUESTION # 2

Example:

Would a spent ignitable solvent mixture consisting of 25% acetone, 25% methanol, 25% xylene and, 25% isopropyl alcohol (having a flashpoint of 16°F) receive the Foo3 code?



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2. Would a spent ignitable solvent mixture consisting of 25% acetone, 25% methanol, 25% xylene and, 25% isopropyl alcohol (having a flashpoint of 160F) receive the F003 code?

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POLL QUESTION # 2 answer

No, because isopropyl alcohol is not an F003-listed solvent



Industry and EPA hazardous waste No.	Hazardous waste	Hazard code
F004	<p>The following spent non-halogenated solvents: Cresols and cresylic acid, and nitrobenzene; all spent solvent mixtures/blends containing, before use, a total of ten percent or more (by volume) of one or more of the above non-halogenated solvents or those solvents listed in F001, F002, and F005; and still bottoms from the recovery of these spent solvents and spent solvent mixtures</p>	(T)

Industry and EPA hazardous waste No.	Hazardous waste	Hazard code
F005	<p>The following spent non-halogenated solvents: Toluene, methyl ethyl ketone, carbon disulfide, isobutanol, pyridine, benzene, 2-ethoxyethanol, and 2-nitropropane; all spent solvent mixtures/blends containing, before use, a total of ten percent or more (by volume) of one or more of the above non-halogenated solvents or those solvents listed in F001, F002, or F004; and still bottoms from the recovery of these spent solvents and spent solvent mixtures</p>	(I,T)

Scenario 3

An auto repair mechanic used a solvent mixture that contained 8% toluene, 7% xylene, 1% nitrobenzene, and 1% tetrachloroethylene (PCE). (Flashpoint 27°F)

What codes would the spent solvents receive?



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**3. An auto repair mechanic used a solvent mixture that contained 7% toluene, 8% xylene, 1% nitrobenzene, and 1% tetrachloroethylene (PCE). (Flashpoint 27oF)
What codes would the spent solvents receive?**

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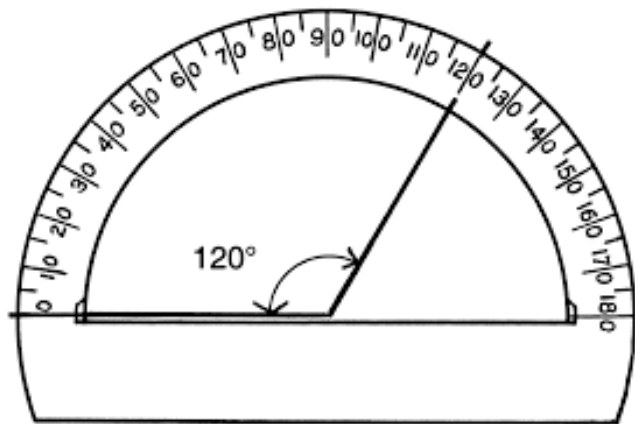
POLL QUESTION # 3 Options

a. Foo2 (for the PCE), Foo3 for the xylene, Foo4 for the nitrobenzene, and Foo5 for the toluene.

Together the Foo2, Foo4, & Foo5 solvents totaled 10% before use. Moreover, the waste contains xylene and exhibits an ignitable characteristic.

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

Peripheral Topics

- Solvents contained in and/or added to paints
- Waste contaminated with solvents during a process
- Foo3 and Land Disposal Restrictions (LDR)
- Ignitable solids vs. Flammables (the applicability of Doo1 or Foo3)
- Treatment Technologies and Standards



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F001, F002, F003, F004, & F005	F001, F002, F003, F004 and/or F005 solvent wastes that contain any combination of one or more of the following spent solvents: acetone, benzene, n-butyl alcohol, carbon disulfide, carbon tetrachloride, chlorinated fluoro-carbons, chlorobenzene, o-cresol, m-cresol, p-cresol, cyclohexanone, o-dichlorobenzene, 2-ethoxyethanol, ethyl acetate, ethyl benzene, ethyl ether, isobutyl alcohol, methanol, methylene chloride, methyl ethyl ketone, methyl isobutyl ketone, nitrobenzene, 2-nitropropane, pyridine, tetrachloroethylene, toluene, 1,1,1-trichloroethane, 1,1,2-trichloroethane, 1,1,2-trichloro-1,2,2-trifluoroethane, trichloroethylene, trichlorofluoromethane, and/or xylenes [except as specifically noted in other subcategories]. See further details of these listings in § 261.31.	Acetone	67–64–1	0.28	160		
		Benzene	71–43–2	0.14	10		
		n-Butyl alcohol	71–36–3	5.6	2.6		
		Carbon disulfide	75–15–0	3.8	NA		
		Carbon tetrachloride	56–23–5	0.057	6.0		
		Chlorobenzene	108–90–7	0.057	6.0		
		o-Cresol	95–48–7	0.11	5.6		
		m-Cresol (difficult to distinguish from p-cresol)	108–39–4	0.77	5.6		
		p-Cresol (difficult to distinguish from m-cresol)	106–44–5	0.77	5.6		
		Cresol-mixed isomers (Cresylic acid) (sum of o-, m-, and p-cresol concentrations)	1319–77–3	0.88	11.2		
		Cyclohexanone	108–94–1	0.36	NA		
		o-Dichlorobenzene	95–50–1	0.088	6.0		
		Ethyl acetate	141–78–6	0.34	33		
		Ethyl benzene	100–41–4	0.057	10		
		Ethyl ether	60–29–7	0.12	160		
				Isobutyl alcohol	78–83–1	5.6	170
		Methanol	67–56–1	5.6	NA		
		Methylene chloride	75–9–2	0.089	30		
		Methyl ethyl ketone	78–93–3	0.28	36		
		Methyl isobutyl ketone	108–10–1	0.14	33		
		Nitrobenzene	98–95–3	0.068	14		
		Pyridine	110–86–1	0.014	16		
		Tetrachloroethylene	127–18–4	0.056	6.0		
		Toluene	108–88–3	0.080	10		
		1,1,1-Trichloroethane	71–55–6	0.054	6.0		
		1,1,2-Trichloroethane	79–00–5	0.054	6.0		
		1,1,2-Trichloro-1,2,2-trifluoroethane	76–13–1	0.057	30		
		Trichloroethylene	79–01–6	0.054	6.0		
		Trichlorofluoromethane	75–69–4	0.020	30		
		Xylenes-mixed isomers (sum of o-, m-, and p-xylene concentrations)	1330–20–7	0.32	30		
	F003 and/or F005 solvent wastes that contain any combination of one or more of the following three solvents as the only listed F001–5 solvents: carbon disulfide, cyclohexanone, and/or methanol. (formerly 268.41(c))	Carbon disulfide	75–15–0	3.8	4.8 mg/L TCLP		
		Cyclohexanone	108–94–1	0.36	0.75 mg/L TCLP		
		Methanol	67–56–1	5.6	0.75 mg/L TCLP		

Summary

- Listing Review
- Spent Solvent History
- The Significance of the Conjunctions “and” and “or” in Regulation
- “Major” Observation
- How to Assign F-Codes
- Examples
- Peripheral Topics



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Audience Q&A Session

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Any Questions?

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