The Importance of Proper Waste Characterization

An Overview of the TCLP & RCI Tests

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Legal Aspects
Financial Aspects
Corporate Stewardship

Regulatory Compliance

Disposing of hazardous waste at a permitted hazardous waste facility is expensive

Disposing of hazardous waste at a non - hazardous waste facility can be even more expensive

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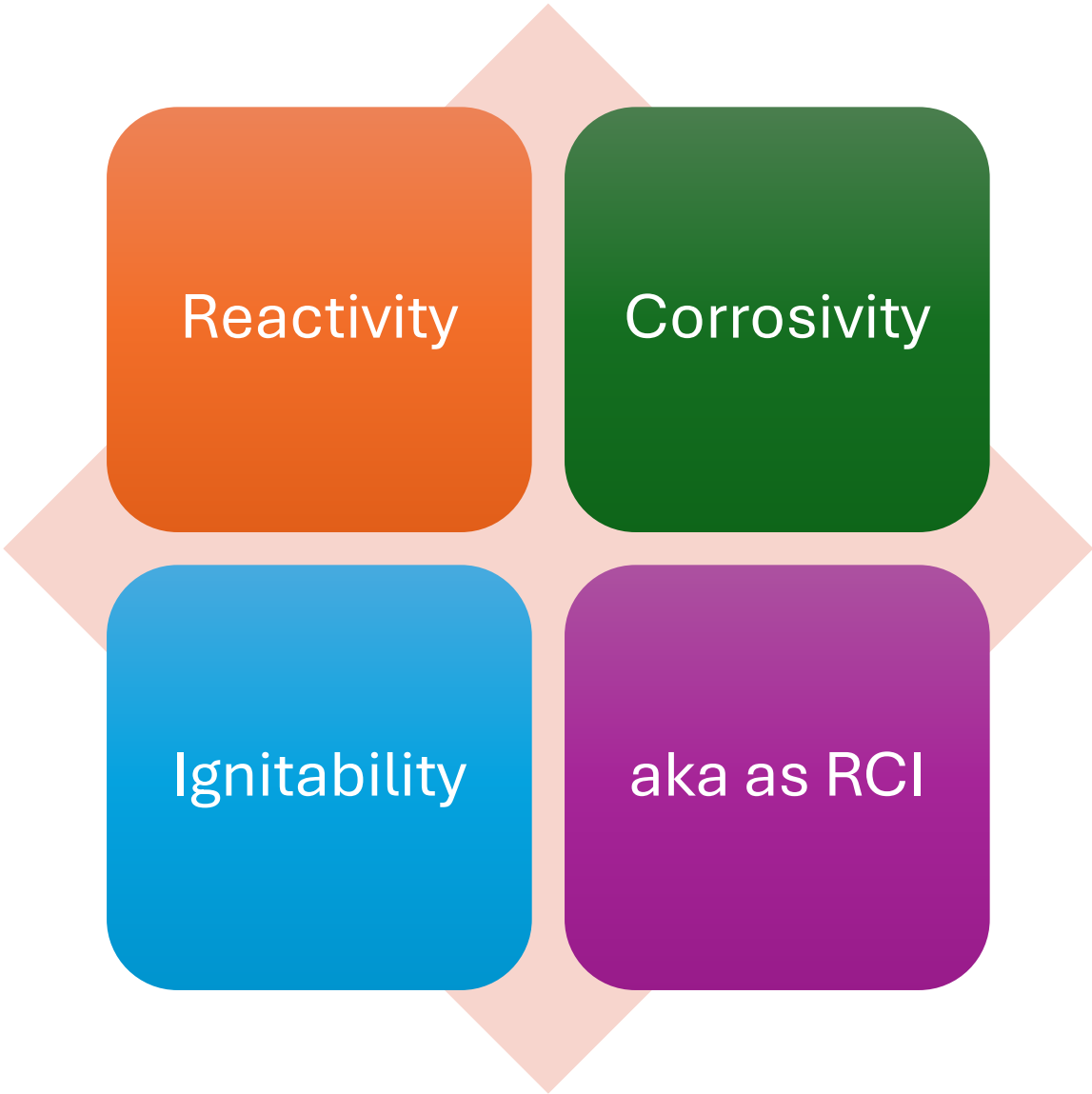
The Toxicity Characteristic Leaching Procedure aka TCLP

Federal Register Notice March 29, 1990



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TCLP Groups &Methods

- Volatiles by SW 846 1311 8260
- Semi Volatiles by SW 846 1311 8270
- Metals by SW 846 1311 6010/6020/7xxx
- Pesticides by SW 846 1311 8081
- Herbicides by SW 846 1311 8151

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TCLP Volatiles (10)

Analyte	RCRA Limit (mg/L)
Benzene	0.5
Carbon Tetrachloride	0.5
Chlorobenzene	100
Chloroform	6
1,2-Dichloroethane	0.5
1,1-Dichloroethylene	0.7
Methyl Ethyl Ketone	200
Tetrachloroethylene	0.7
Trichloroethylene	0.5
Vinyl Chloride	0.2

TCLP – VOC's ZHE & GCMS

TCLP Rotator

Rotator spins end over end at 30 +/- 2 rpm at room temperature of 21-25 °C for 18 +/- 2 hours.

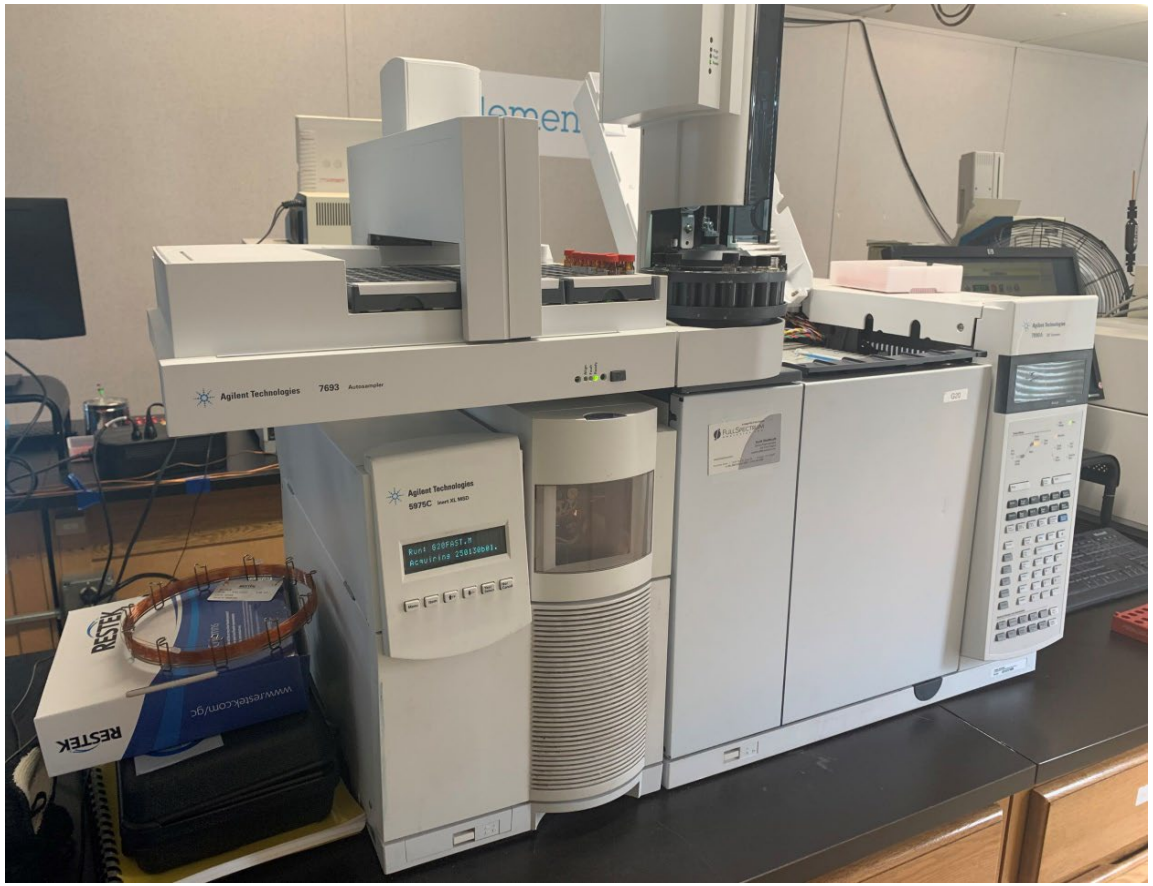
TCLP - Volatiles

- Zero Headspace Extraction – ZHE
- Percent Solids Determination
- If < 0.5% dry solids, then filter, collect filtrate and analyze.
- If > 0.5% dry solids, collect aliquot of liquid if any and tumble the solids via ZHE.
- The filtered liquid phase if any and the leachate from the solid phase are then analyzed separately and the results mathematically combined.
- EPA SW 846 1311 8260 or 8021

- Holding Time from Sample Collection to ZHE extraction is 14 days.
- Holding Time from ZHE extraction to analysis is 7 days, as extract is unpreserved and testing to include Vinyl Chloride.
- Holding Time from ZHE extraction to analysis is 14 days, if extract is preserved with HCL and testing for Vinyl Chloride is not necessary.
- Samples collected in glass containers, teflon lined lids and stored 0-6 °C.

TCLP Semi - Volatiles (13)

Analyte	RCRA Limit (mg/L)
m-cresol	200
o-cresol	200
p-cresol	200
1,4-Dichlorobenzene	7.5
2,4-Dinitrotoluene	0.13
Hexachloro-1,3-butadiene	0.5
Hexachlorobenzene	0.13
Hexachloroethane	3
Nitrobenzene	2
Pentachlorophenol	100
Pyridine	5
2,4,5-Trichlorophenol	400
2,4,6-Trichlorophenol	2



TCLP RCRA Metals (8)

Analyte	RCRA Limit (mg/L)
Arsenic	5
Barium	100
Cadmium	1
Chromium	5
Lead	5
Mercury	0.2
Selenium	1
Silver	5

TCLP Pesticides (7) & TCLP Herbicides (2)

Analyte	RCRA Limit (mg/L)
Pesticides	
Chlordane	0.03
Endrine	0.02
Heptachlor	0.008
Heptachlor Epoxide	0.008
Lindane	0.4
Methoxychlor	10
Toxaphene	0.5
Herbicides	
2,4-D	100
2,4,5-TP (Silvex)	1

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TCLP Non-Volatile Prep & Extraction Fluids

- For liquid wastes, with < 0.5% dry solids, filter thru 0.6-0.8 um glass fiber filter, to obtain TCLP extract.
- For wastes ≥0.5% dry solids, liquids are separated from the solids and stored for analysis or recombination. Particle size of solids are reduced if necessary, solid phase then extracted with extraction fluid equal to 20 times the weight of the solid phase.
- If solid content is ≥ 0.5%, determine appropriate extraction fluid, reducing solid phase particle size to 1mm diameter, with 5 grams in 96.5 mL of DI, cover and stir for 5 minutes.
- If pH is ≤ 5 use Extraction Fluid 1
- If pH is > 5 adjust with HCL, etc per method and check pH again
- If pH ≤ 5, use Extraction Fluid 1
- If pH > 5, use Extraction Fluid 2

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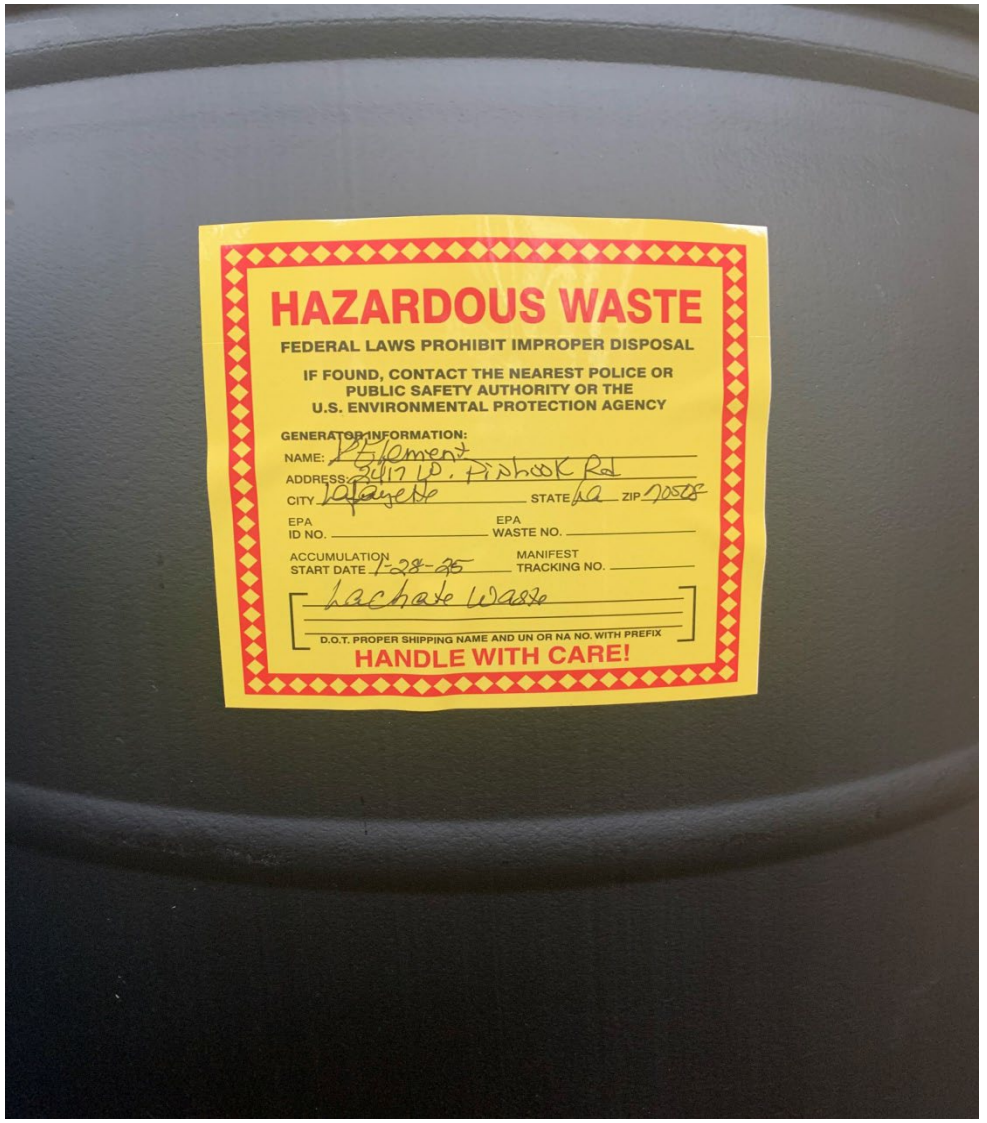
TCLP Non-Volatiles cont'd

- If compatible, the initial liquid phase is added to the leachate and the combined fluids are analyzed together.
- If incompatible, the liquids are analyzed separately and the results mathematically combined for a volume weighted average concentration.
- Final Analyte Concentration (mg/L) = V1 X C1 + V2 X C2/V1 + V2

Exceeded Holding Times or Other Sample Non- Compliances

- If sample holding times are exceeded, the results obtained will be considered minimal concentrations.
- Holding time exceedances are Not Acceptable in establishing a waste Does Not exceed the regulatory limit.
- Exceeding the holding time will not invalidate characterization if the waste Does exceed the regulatory limit.



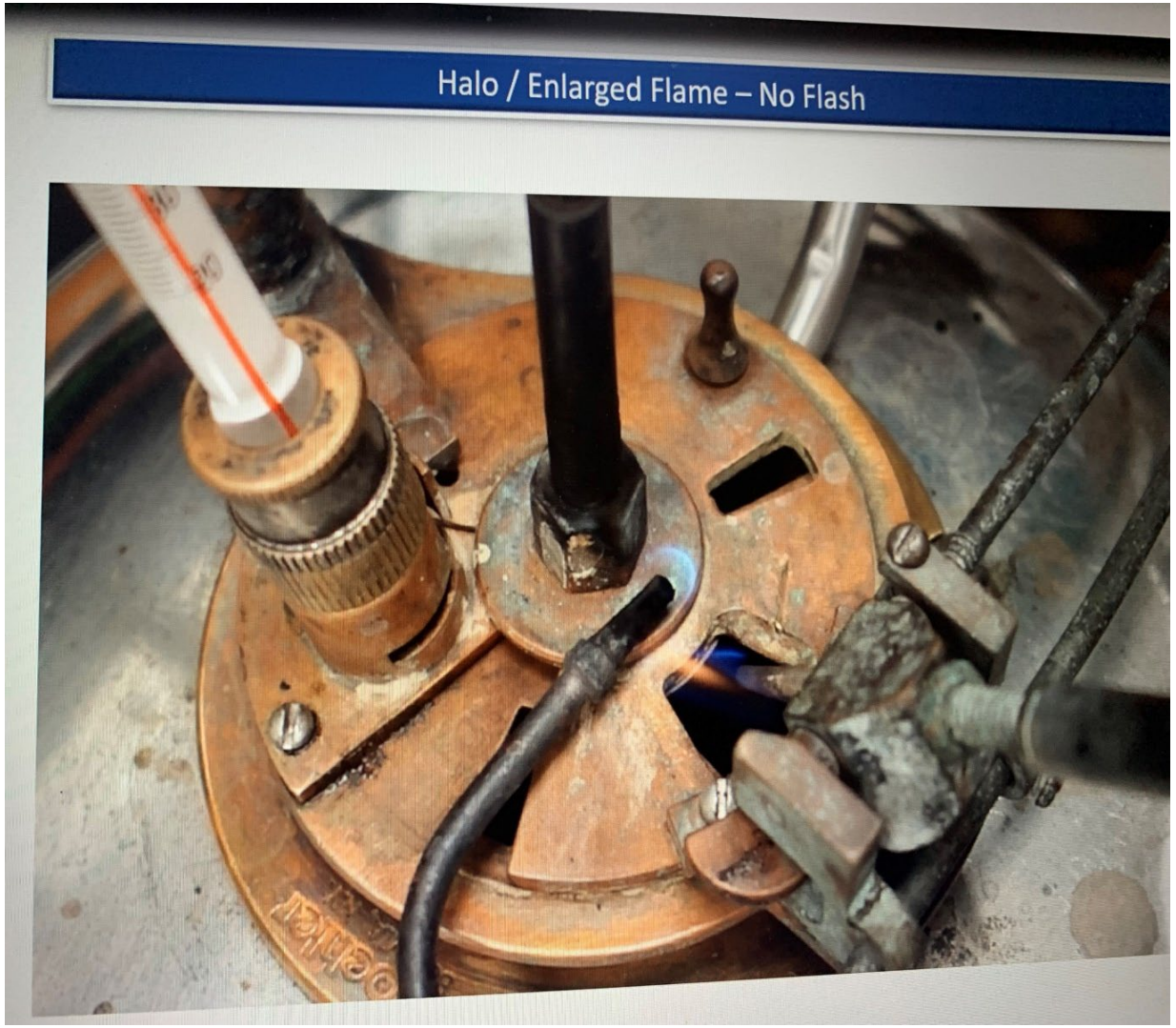
RCI Limits

Test	RCRA Limit
Reactive Cyanide was	250 mg/L
Reactive Sulfide was	500 mg/L
Corrosivity – pH	< 2 or > 12.5
Ignitability-Flashpoint	< 140 °F

Notes:

Reactivity: In July 1985, EPA issued laboratory methods for Reactivity. In 1998, EPA withdrew the Reactivity methods

See 40 CFR 261.23 for the 8 properties of Reactivity. Generators must use waste knowledge for determination



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RCI Limits cont'd

- The RCRA limits for Corrosivity and Ignitability only apply to Liquid/Aqueous waste.
- For Liquid/Aqueous waste – The appropriate Ignitability test is EPA 1010 with limit of < 140 F. D001 Waste Code
- Note: 40 CFR 261.21 a 1: A solution containing < 24 % alcohol by volume and is at least 50% water by weight is not considered Ignitable, D001 waste.
- For Ignitable Solids, the appropriate test is EPA 1030. Two criteria are necessary to determine if a waste is an ignitable solid; must be capable of causing fire thru friction or other means and must burn vigorously and persistently based on a burn rate of > 2.2 mm/second.

TCLP Test	Collection to TCLP Extraction	TCLP Extraction to Preparative Extraction	Preparative Extraction to Analysis	Container Type
VOC's	14 Days	NA	7 Days/14 Days	Glass, teflon lined lid Cool 0-6 °C
SVOC's Pesticides Herbicides	14 Days	7 Days	40 Day	Glass, teflon lined lid Cool 0-6 °C
Hg	28 Days	NA	28 Days	Plastic or Glass
Metals, less Hg	180 Days	NA	180 Days	Plastic or Glass

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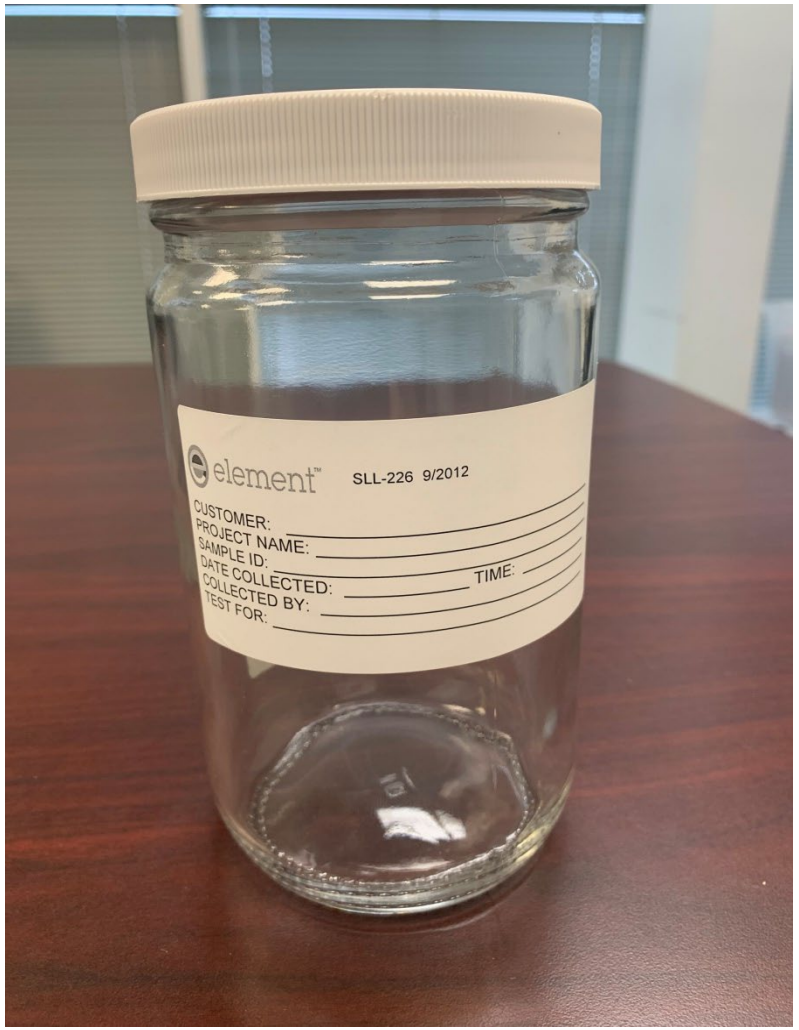
Divide By 20 Rule

- Take the “total” analysis result for any given constituent of the TCLP test and divide the result by 20.
- Compare the divided result to the TCLP limit for that constituent.
- If the divided result is less than the TCLP limit, the waste is “theoretically” non-hazardous for that constituent.
- If the divided result is greater than the TCLP limit, the waste has the “potential” to exceed the TCLP limit for that constituent.



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References

EPA SW 846

Element SOP's

40 CFR Part 261

Questions Are Welcome

Merci Beaucoup for Attending

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