

<u>SUBJECT</u>		<u>DATE</u>
1448. Definitions of Inactive Portion, Active Portion and Closed Portion of a RCRA TSDF		AUG 12, 2021
1449. Dangerous Waste Designations and Dangerous Waste Code Determinations		AUG 19, 2021
1450. Method Detection Limits and Hazardous Waste Determinations	ENCORE	AUG 26, 2021
1451. Method Detection Limits and Hazardous Waste Determinations II	ENCORE	SEP 2, 2021
1452. Totals Analysis vs. TCLP and Dividing by 20	ENCORE	SEP 9, 2021

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TWO MINUTE TRAINING

TO: CENTRAL PLATEAU CLEANUP COMPANY

FROM: PAUL W. MARTIN, RCRA Subject Matter Expert
CPCCo Environmental Protection, Hanford, WA

SUBJECT: TOTALS ANALYSIS VS. TCLP AND DIVIDING BY 20

DATE: SEPTEMBER 9, 2021

<u>CPCCo Projects</u>	<u>CPCCo Functionals</u>	<u>HMIS</u>	<u>Hanford Laboratories</u>	<u>Other Hanford Contractors</u>	<u>Other Hanford Contractors</u>
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TWO MINUTE TRAINING

SUBJECT: Totals Analysis vs. TCLP and Dividing by 20

Q: In last week's Two Minute Trainings it was mentioned that a waste can be estimated to pass or fail the Toxicity Characteristic Leaching Procedure (TCLP – [Method 1311](#)) via total analysis and dividing the totals result by twenty. Under what general circumstances can the totals analytical result be divided by 20 to estimate the TCLP result and consequently whether a waste is a D004-D043 hazardous waste?

A: In general, the TCLP was designed to simulate the leaching a waste would undergo if disposed in a sanitary landfill, i.e., not a RCRA hazardous waste landfill. The waste is filtered to separate the liquid and solid portions of the waste. Then the solid portion is subjected to buffered acetic acid to simulate the leaching that would occur in a sanitary landfill. The amount of acetic acid is equal to 20 times the weight of the solid phase of the waste. The resulting extracted fluid is then analyzed via totals analysis to determine if any of the D004 - D043 characteristic thresholds are exceeded.

Note that the amount of acetic acid used in the TCLP is 20 times the weight of the solid phase - a dilution factor of 20. This means that if the waste is 100% solid as defined by TCLP (no liquids yielded when subjected to pressure filtration – See Section 7.1.1 of the TCLP Method) the estimated maximum leachate concentration could be calculated by dividing the totals analysis of the constituent by 20. Be aware that even if the estimate exceeds the TCLP regulatory level, the generator could analyze the waste via TCLP and discover that the waste does not exceed the TCLP regulatory level and is hence a noncharacteristic waste. Using the "divide by 20" rule assumes that all the hazardous constituent leaches out which may not be the actual case due to the matrix of the waste, e.g., some of the hazardous constituents may bind with the waste matrix and not completely leach out via the TCLP. For more technical detail, see attached an excerpt from a January 12, 1993, EPA memo discussing totals analysis versus TCLP.

Also note that if the waste is less than 100% solid, the "divide by 20" rule could be applied but the liquid portion would have to be accounted for in the math calculation. The January 12, 1993, EPA memo includes this discussion and the math formula to use when making this type of estimate.

SUMMARY:

- The TCLP simulates the leaching that would occur to a waste if placed in a sanitary landfill.
- The TCLP uses a dilution factor of 20 between the acetic acid and the solid portion of the waste.
- If the waste is 100% solid, a totals analytical result can be divided by 20 to estimate if the waste will pass or fail TCLP.

The January 12, 1993, EPA memo is attached to the e-mail. If you have any questions, please contact me at [Paul W. Martin@rl.gov](mailto:Paul_W.Martin@rl.gov) or at (509) 376-6620.

FROM: Paul W. Martin

DATE: 9/9/2021

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TWO MINUTE TRAINING – ATTACHMENT

SUBJECT: Totals Analysis vs. TCLP and Dividing by 20

UNITED STATES ENVIRONMENTAL PROTECTION AGENCY
WASHINGTON, D.C. 20460

JANUARY 12, 1993

MEMORANDUM # 36

DATE: January 12, 1993
SUBJECT: Notes on RCRA Methods and QA Activities
FROM: Gail Hansen, Chief, Methods Section (OS-331)

(Excerpt)

Totals Analysis Versus TCLP

Over the past year, the Agency has received a number of questions concerning the issue of total constituent analysis with respect to the TCLP. Section 1.2 of the TCLP allows for a compositional (total) analysis in lieu of the TCLP when the constituent of concern is absent from the waste, or if present, is at such a low concentration that the appropriate regulatory level could not be exceeded. A number of persons have contacted the MICE Service and have requested clarification on this issue with respect to a number of waste testing scenarios.

Wastes that contain less than 0.5% dry solids do not require extraction. The waste, after filtration, is defined as the TCLP extract. The filtered extract is then analyzed and the resulting concentrations are compared directly to the appropriate regulatory concentration.

For wastes that are 100% solid as defined by the TCLP, the maximum theoretical leachate concentration can be calculated by dividing the total concentration of the constituent by 20. The dilution factor of 20 reflects the liquid to solid ratio employed in the extraction procedure. This value then can be compared to the appropriate regulatory concentration. If this value is below the regulatory concentration, the TCLP need not be performed. If the value is above the regulatory concentration, the waste may then be subjected to the TCLP to determine its regulatory status. The same principal applies to wastes that are less than 100% solid (i.e., wastes that have filterable liquid). In this case however, both the liquid and solid portion of the waste are analyzed for total constituency and the results are combined to determine the maximum leachable concentration of the waste. The following equation may be used to calculate this value.

$$\frac{[A \times B] + [C \times D]}{B + [20 \text{ L/Kg} \times D]} = E$$

where:

A = Concentration of the analyte in liquid portion of the sample (mg/L)

B = Volume of the liquid portion of the sample (L)

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TWO MINUTE TRAINING – ATTACHMENT

SUBJECT: Totals Analysis vs. TCLP and Dividing by 20

- C = Concentration of analyte in the solid portion of the sample (mg/kg)
D = Weight of the solid portion of the sample (kg)
E = Maximum theoretical concentration in leachate (mg/L)

To illustrate this point, the following example is provided:

An analyst wishes to determine if a lead processing sludge could fail the TC for lead. The sludge is reported to have a low concentration of lead, and the analyst decides to perform a compositional analysis of the waste instead of a full TCLP evaluation. A representative sample of waste is subjected to a preliminary percent solids determination as described in the TCLP. The percent solids is found to be 75%. Thus, for each 100 grams of this waste filtered, 25 grams of liquid and 75 grams of solid are obtained. It is assumed for the purpose of this calculation that the density of the filterable liquid is equal to one. The liquid and solid portion of the sample are then analyzed for total lead. The following data are generated:

Percent solids	=	75%
Concentration of lead in the liquid phase	=	0.023 mg/l
Volume of filtered liquid	=	0.025 L
Concentration of lead in the solid phase	=	85 mg/kg (wet weight)
Weight of the solid phase	=	0.075 kg.

The calculated concentration is as follows:

$$\frac{[0.023 \text{ mg/L} \times 0.025\text{L}] + [85 \text{ mg/kg} \times 0.075 \text{ kg}]}{0.025 \text{ L} + [20\text{L/kg} \times 0.075 \text{ kg}]} = 4.18 \text{ mg/L}$$

In this case, the maximum leachable concentration is below the 5 mg/l regulatory concentration for lead, and the TCLP need not be performed. Non-aqueous based wastes (i.e., oily wastes) may be calculated in the same manner as described above, except the concentration of constituents from the liquid portion of the waste (A in the above formula) are expressed in mg/kg units. Volumes also would be converted to weight units (kg). The final leachate concentration is expressed in mg/kg units.

Full text of memo: [Notes on RCRA Methods and QA Activities, RCRA Online# 11721, Date January 12, 1993](#)