

**3745-30-03 Residual waste characterization.**

- (A) In order to determine and confirm the appropriate residual waste landfill class for disposal of wastes specified in rule 3745-30-01 of the Administrative Code, residual waste shall be sampled in accordance with paragraph (C) of this rule, and an extract shall be obtained and tested in accordance with paragraphs (D) and (E) of this rule for all of the following parameters unless an alternative list is used in accordance with paragraph (B) of this rule:
- (1) For residual wastes generated by fuel burning operations as specified in paragraph (B)(1) of rule 3745-30-01 of the Administrative Code, parameter numbers one through eight, ten through fifteen, and forty of appendix A to rule 3745-30-04 of the Administrative Code.
  - (2) For residual wastes generated by foundry operations as specified in paragraph (B)(2) of rule 3745-30-01 of the Administrative Code, parameter numbers one through eighteen, twenty-two through twenty-four, thirty-two, thirty-five, thirty-six, and forty of appendix A to rule 3745-30-04 of the Administrative Code.
  - (3) For residual wastes generated by pulp and papermaking operations as specified in paragraph (B)(3) of rule 3745-30-01 of the Administrative Code, parameter numbers one through forty of appendix A to rule 3745-30-04 of the Administrative Code.
  - (4) For residual wastes generated by steelmaking operations as specified in paragraph (B)(4) of rule 3745-30-01 of the Administrative Code, parameter numbers one through seventeen and forty of appendix A to rule 3745-30-04 of the Administrative Code.
  - (5) For residual wastes generated from gypsum processing plant operations as specified in paragraph (B)(5) of rule 3745-30-01 of the Administrative Code, parameter numbers one through seventeen and forty of appendix A to rule 3745-30-04 of the Administrative Code.
  - (6) For residual wastes generated from lime processing operations as specified in paragraph (B)(6) of rule 3745-30-01 of the Administrative Code, parameter numbers one through six, eight, ten through fifteen, and forty of appendix A to rule 3745-30-04 of the Administrative Code.
  - (7) For residual wastes generated from portland cement operations as specified in paragraph (B)(7) of rule 3745-30-01 of the Administrative Code, parameter numbers one through seventeen and forty of appendix A to rule 3745-30-04 of the Administrative Code.
- (B) As an alternate to a parameter list prescribed in paragraph (A) of this rule, another parameter list may be used to characterize a residual waste in accordance with the following:
- (1) For the purpose of determining the appropriate residual solid waste landfill class, parameters may be added or removed from the parameters listed in paragraph (A) of this rule if approved by the director.
  - (2) For the purpose of determining the appropriate residual solid waste landfill class, the director, based on process or material knowledge or previously acquired waste characterization data, may require the addition of a parameter(s) to the parameter list prescribed in paragraph (A) of this rule.
  - (3) For the purpose of confirming the residual solid waste is appropriate for the landfill class, compounds may be removed from the parameters listed in paragraph (A) of this rule when performing the waste characterization required by paragraph (G) of this rule if the waste characterization conducted in

accordance with paragraphs (C) to (F) of this rule demonstrates that the parameter is either not present in the waste, or present at such low concentrations that the applicable maximum allowable concentration for the proposed residual waste landfill class will not be exceeded.

- (C) All samples of a residual waste shall be composite samples of that residual waste as described in section 9.1.1.4.1. of USEPA's "Test Methods for Evaluating Solid Waste, Physical/Chemical Methods, third edition" (SW-846), as amended through January 3, 2008, and the sampler shall employ all reasonable measures, such as sampling different sources of the residual waste at different times, or conducting random sampling of a representative pile of the residual waste generated by the same production processes using the same raw materials at different times, to ensure that representative composite samples are obtained. Wastes may be mixed or treated prior to collecting composite samples as long as one of the following criteria are met:
- (1) The individual wastes are mixed prior to discharge in the normal production process of the generator or the individual wastes are generated by substantially similar industrial processes and raw materials.
  - (2) The mixing of individual wastes results in a waste in which leaching characteristics are reduced relative to one or more of the individual wastes due to attenuation factors other than dilution, such as precipitation, adsorption, or ion exchange and demonstrates all of the following:
    - (a) It is demonstrated to the satisfaction of the director that a reduction in leaching characteristics occurs in one or more parameters due to such a factor. The demonstration shall be submitted to Ohio EPA for approval and it shall include, at a minimum, all of the following:
      - (i) The concentration, determined in accordance with the waste characterization specified in paragraph (E) of this rule, of each parameter that undergoes a reduction in concentration due to such a factor and of each parameter with a concentration greater than fifty per cent of the maximum concentration for the proposed landfill class, for the following:
        - (a) Each individual waste in the mixture.
        - (b) The resultant mixture.
      - (ii) A listing and the ratio, by weight and volume, of the individual wastes which comprise the mixture.
      - (iii) Calculations using the concentration and weight data required by paragraphs (C)(2)(a)(i)(a), (C)(2)(a)(i)(b) and (C)(2)(a)(ii) of this rule, which demonstrate quantitatively that the reduction in leaching characteristics is not due solely to dilution.
      - (iv) An identification and explanation of the chemical reaction(s), including chemical equations, which causes the attenuation.
    - (b) The individual wastes are mixed in the same ratios and in the same manner in which they will be mixed prior to disposal during the normal operation of the residual waste landfill.
  - (3) A residual waste may be treated by aeration to reduce the concentration of phenol prior to the waste characterization performed in accordance with paragraph (D) of this rule provided that an aeration process is performed in the same manner and for the same duration on all similar residual waste prior to disposal in the residual waste landfill.
- (D) The toxicity characteristic leaching procedure (TCLP) (USEPA method 1311) shall be used to obtain all

extracts for the purpose of characterizing a residual waste proposed for disposal in a residual waste landfill. For a leaching solution to obtain the extract, the applicant or permittee may use either the acid solution specified in the TCLP or the water solution specified in the ASTM water leaching method (ASTM D 3987-85). The acid and water solutions may each be used for specific parameters as appropriate to utilize characterization knowledge from other testing, such as hazardous waste determination. The solution chosen for a parameter in the initial characterization of a residual waste shall be used for that parameter in all subsequent characterizations of that residual waste. For the purpose of obtaining an extract which will be analyzed for any of the volatile organic compounds listed in appendix A to rule 3745-30-04 of the Administrative Code, a zero headspace extraction (ZHE) apparatus, as specified in the TCLP, shall be used. Laboratory analytical methods for determining the concentration of the parameters required by paragraph (A) of this rule in an extract shall use all of the following:

- (1) Methods specified in USEPA's "Test Methods for Evaluating Solid Waste, Physical/Chemical Methods, third edition" (SW-846), as amended through January 3, 2008, for the analysis of volatile organic compounds.
  - (2) Methods specified in "methods for chemical analysis of water and wastes" (EPA 600/4-79-020) for the analysis of total dissolved solids.
  - (3) Methods specified in either of the documents listed in paragraphs (D)(1) and (D)(2) of this rule for the analysis of arsenic, barium, cadmium, chromium, lead, mercury, selenium, silver, chloride, fluoride, iron, manganese, sodium, sulfate, cyanide, and phenols.
- (E) To determine the appropriate residual waste landfill class for disposal of wastes, the concentration of all parameters required to be analyzed by paragraph (A) of this rule shall be determined using a minimum number of seven samples. Based on a high degree of variability in the concentration of a parameter at or near the maximum allowable concentration for a particular landfill class, the sampler, applicant, permittee, or the director may determine that more samples are required. The residual waste classification shall be performed in accordance with one of the following:
- (1) All concentrations of all parameters required for analysis by paragraph (A) of this rule are less than seventy percent of the maximum allowable concentrations for the class.
  - (2) The upper limit of the eighty percent confidence interval of the mean of the concentration of each parameter required for analysis by paragraph (A) of this rule is below the maximum allowable concentration for the class. The statistical procedure for determining the eighty per cent confidence intervals shall be in accordance with appendix A to this rule or with an alternative statistical procedure deemed acceptable by the director.
- (F) For purposes of determining the appropriate residual waste landfill class, actual leachate from previously disposed residual waste which is representative of long-term field leachate of the residual wastes proposed for future disposal may be substituted for the extract specified in paragraph (D) of this rule upon the written concurrence of the director. The director may allow alternate statistical procedures to those specified in paragraph (E) of this rule when actual leachate is used.
- (G) To confirm the residual waste is appropriate for the landfill class as established by rule 3745-30-04 of the Administrative Code, after the effective date of a permit to install for a residual waste landfill, the permittee shall characterize each residual waste in accordance with the following:

- (1) Within twelve months of the effective date of the permit, establish a confirmation sampling date by collecting one sample of each residual waste and characterizing it in accordance with paragraphs (A) to (D) of this rule. Based on a concentration of a parameter which exceeds the upper limit of the confidence interval calculated for that parameter in accordance with paragraph (E) of this rule, the sampler, applicant, permittee, or the director may determine that more samples are required.
  - (2) Annually, within forty-five days of the confirmation sampling date established in accordance with paragraph (G)(1) of this rule, or according to a more frequent schedule as established by the director based on variability noted in previous sampling events and/or other factors affecting the predictability of waste characteristics, collect one (or more) sample(s) of each residual waste and characterize it in accordance with paragraphs (A) to (D) of this rule.
  - (3) All characterization data shall be submitted to Ohio EPA within seventy-five days of sampling and include a general process flow diagram which displays the processes, points of generation, and types of wastes generated.
  - (4) If test results indicate that the maximum concentration for the previously established landfill class is exceeded, two test results from additional samples must be submitted within seventy-five additional days. Testing may be limited to the parameter in exceedence and any parameters with a concentration greater than fifty per cent of the maximum allowable concentration. Test results from two samples are required to reject the original exceedence. If the original exceedence is not rejected, the permittee may either submit to Ohio EPA a new waste characterization in accordance with paragraphs (A) to (E) of this rule, within seventy-five days, or submit a permit to install application for modification to future phases of the residual waste landfill to comply with the appropriate landfill class. If the permittee submits a new waste characterization, the director shall evaluate the characterization for landfill classification and may require that the permittee submit a permit to install application to modify the landfill to comply with a new class as appropriate. The director shall not apply the siting criteria specified in rule 3745-30-06 of the Administrative Code to such a permit to install application, but may require additional environmentally protective measures.
  - (5) Whenever the production process or raw materials used in the production process change significantly and/or new wastes are proposed for disposal in the residual waste landfill, characterize the waste in accordance with paragraphs (A) to (E) of this rule. For the purpose of this rule, to "change significantly" means that the change would be reasonably expected to alter the appropriate residual waste landfill classification as required in rule 3745-30-04 of the Administrative Code.  
  
[Comment: The confirmation sampling date established pursuant to paragraph (G)(1) of this rule is the same date to be applied to new residual waste(s) approved for a facility.]
- (H) All characterization data shall be submitted to the director accompanied by a completed chain of custody documentation. The chain of custody documentation shall be a field tracking report form to record sample custody in the field prior to and during shipment.
- (I) Incorporation by reference. The text of the incorporated materials is not included in this rule and are hereby made a part of this rule. Only the specific version specified in this rule is incorporated. Any amendment or revision to a referenced document is not incorporated until this rule has been amended to specify the new version. The materials incorporated by reference are available as follows:
- (1) Other publications. The availability of these documents is provided below; however, many of the documents are also available for inspection and copying at most public libraries and "The State Library of Ohio." As used in this rule:

- (a) Specifications of the "Test Methods for Evaluating Solid Waste, Physical/Chemical Methods, third edition, including Volume II, Field Manual (SW-846)" as amended through January 3, 2008. Information and copies may be obtained by writing to: "National Technical Information Service, U.S. Department of Commerce, 5285 Port Royal Rd., Springfield, VA 22161." The full text is also available in electronic format at <http://www.epa.gov/epawaste/index.htm>.

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CERTIFIED ELECTRONICALLY

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Certification

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Date

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## Appendix A

## Statistical Procedure

The statistical procedure in this appendix shall be used to determine the 80% upper confidence intervals for the mean concentrations of waste characterization parameters, as required by paragraph (E) of this rule, for the test results obtained in accordance with paragraph (D) of this rule. For any set of concentration values for a parameter from independent samples of waste, the 80% upper confidence interval (CI) for the mean is as follows:

$$CI = \bar{X} + t_{.80} S_{\bar{X}}$$

Where:  $\bar{X}$  = arithmetic mean of the concentration of the parameter,  
 $t_{.80}$  = "t" value taken from the table below,  
 $S_{\bar{X}}$  = estimate of the standard error of the mean of the concentration of the parameter, calculated as follows:

$$S_{\bar{X}} = \frac{s}{\sqrt{n}}$$

Where:  $n$  = total number of samples of a waste analyzed for the parameter.  
 $s$  = estimate of the population standard deviation of the concentration of the parameter in a waste, calculated as follows:

$$s = \sqrt{\frac{\sum_{i=1}^n x_i^2}{n-1}}$$

Where:  $x_i$  = concentration of the parameter determined for one sample of a waste.

Tabulated Values of Student's "t<sub>.80</sub>"

Degrees of Freedom (n-1)*	Tabulated "t <sub>.80</sub> " value**	Degrees of Freedom (n-1)*	Tabulated "t <sub>.80</sub> " value**	Degrees of Freedom (n-1)*	Tabulated "t <sub>.80</sub> " value**
6	1.440	11	1.363	16	1.337
7	1.415	12	1.356	17	1.333
8	1.397	13	1.350	18	1.330
9	1.383	14	1.345	19	1.328
10	1.372	15	1.341	20	1.325

\* Degrees of freedom are equal to one less than the number of samples (n) tested for a waste.

\*\* Tabulated "t" values are for a two-tailed confidence interval and a probability of 0.80 for the population mean being within the confidence interval. Additional degrees of freedom and associated "t" values can be found in standard statistical manuals when calculating the upper confidence limit with more than seven samples.

The sample concentration data may be assumed to be normally distributed and may be used directly in determining the confidence interval. The upper limit of the confidence interval is compared with the applicable class limits in Appendix A to Chapter 3745-30-04 of the Administrative Code. The upper limit of the confidence interval shall be less than or equal to the applicable class limit.