



Ohio Administrative Code Rule 3745-535-815 Statistical methods.

Effective: March 1, 2026

[Comment: For dates of publications of recognized organizations and associations referenced in this rule, see rule 3745-500-03 of the Administrative Code titled "Incorporation by reference."]

(A) The owner or operator shall select and revise the statistical methods as follows:

(1) Specify one of the following statistical methods to be used in evaluating the groundwater monitoring data for each parameter contained in paragraph (B) of rule 3745-535-820 of the Administrative Code not later than four hundred and fifty days after implementation of the groundwater monitoring program and after completing the background sample collection in accordance with paragraph (B)(3) of rule 3745-535-820 of the Administrative Code:

(a) A tolerance or prediction interval procedure in which an interval for each constituent is established from the distribution of the background data, and the level of each constituent in each monitoring well is compared to the upper tolerance or prediction limit.

(b) A control chart approach that gives control limits for each constituent.

(c) A parametric analysis of variance "ANOVA" followed by multiple comparisons procedures to identify statistically significant evidence of contamination, including estimation and testing of the contrasts between the mean of each monitoring well and the background mean levels for each constituent.

(d) An analysis of variance "ANOVA" based on ranks followed by multiple comparisons procedures to identify statistically significant evidence of contamination, including estimation and testing of the contrasts between the median of each monitoring well and the background median levels for each constituent.

(e) Another statistical test method submitted by the owner or operator and approved by the director



or the director's authorized representative, that is demonstrated to be protective of human health and the environment and which demonstrates compliance with the performance standards of paragraph (B) of rule 3745-535-815 of the Administrative Code.

(2) Submit any revisions to the statistical methods in accordance with paragraph (D) or (E) of rule 3745-535-800 of the Administrative Code, as applicable, not later than thirty days prior to revising the statistical method.

[Comment: The statistical method to be used during the initial statistical comparison pursuant to paragraph (B) of rule 3745-535-820 of the Administrative Code needs to be submitted not later than ninety days after collecting the eighth background sample. If it is anticipated that the statistical method to be used will be an intrawell method, then the statistical plan needs to be submitted not later than ninety days after the eighth sample has been collected from the well in question. If it is anticipated that the statistical method to be used will be an interwell method, then the statistical plan needs to be submitted ninety days after a total of eight samples have been collected from the background wells. The eight background samples collected should be evenly distributed across all background wells.]

(B) Performance standards for statistical methods. The owner or operator shall ensure that any statistical method chosen in accordance with paragraph (A) of this rule complies with the following performance standards, as appropriate:

(1) The statistical method used to evaluate groundwater monitoring data is appropriate for the distribution of chemical parameters or waste-derived constituents. If the distribution of the chemical parameters or waste-derived constituents is shown by the owner or operator to be inappropriate for a normal theory test, the owner or operator shall transform the data or use a distribution free theory test. If the distributions for the constituents differ, more than one statistical method may be needed.

(2) If an individual well comparison procedure is used to compare an individual monitoring well constituent concentration with background constituent concentrations or a groundwater concentration level, the test is conducted at a type I error level not less than 0.01 for each testing period. If multiple comparisons procedures are used, the type I experimentwise error rate for each testing period shall be not less than 0.05, with the type I error rate of not less than 0.01 for individual monitoring well



comparisons maintained. This performance standard does not apply for tolerance intervals, prediction intervals, or control charts.

(3) If a control chart approach is used to evaluate groundwater monitoring data, the specific type of control chart and its associated parameter values is protective of human health and safety and the environment with the parameters determined after considering the number of samples in the background data base, the data distribution, and the range of the concentration values for each constituent.

(4) If a tolerance interval or a prediction interval is used to evaluate groundwater monitoring data, the levels of confidence, the tolerance intervals, and the percentage of the population that the interval must contain is protective of human health and safety and the environment. The owner or operator shall determine the parameters after considering the number of samples in the background data base, the data distribution, and the range of the concentration values for each constituent of concern.

(5) The statistical method accounts for data below the limit of detection with one or more statistical procedures that ensure protection of human health and the environment and any practical quantitation limit (PQL) used in the statistical method is the lowest concentration level that can be reliably achieved within the specified limits of precision and accuracy during routine laboratory operating conditions that are available to the facility.

(6) If necessary, the statistical method includes procedures to control or correct for seasonal and spatial variability as well as temporal correlation in the data.

(7) Background data can be added only in blocks of data resulting from the analysis of four or more statistically independent samples after the data have been statistically compared to the current background data and no statistical differences are detected, unless another method is deemed acceptable to Ohio EPA.

(8) Prior to using an intrawell statistical method under the groundwater detection monitoring program, the owner or operator shall submit a demonstration that the groundwater has not been affected by the landfill within the relevant monitoring wells in accordance with paragraph (D) or (E) of rule 3745-535-800 of the Administrative Code, as applicable.



(C) Determination of a statistically significant increase over background. The owner or operator shall determine whether or not there is a statistically significant increase over background for each parameter or constituent analyzed pursuant to paragraph (A) of this rule each time the owner or operator assesses groundwater quality by comparing the groundwater quality of each parameter or constituent at each downgradient groundwater monitoring well to the background value of that parameter or constituent according to the statistical procedures specified in paragraphs (A) and (B) of this rule.