

WAC 173-351-420 Statistical methods for groundwater monitoring.

(1) The owner or operator must calculate and evaluate all of the following statistics for background groundwater quality data:

- (a) The background mean;
- (b) The background variance;
- (c) The standard deviation of the background data;
- (d) The coefficient of variation of the background data;
- (e) The standard error of the background data; and
- (f) Other statistics testing for homogeneity of variance and the normality of the background data.

(2) The owner or operator must specify in the permit application in accordance with WAC 173-351-730 (1)(b)(iii) appropriate statistical methods to be used in evaluating groundwater monitoring data for each constituent. The statistical test chosen must be conducted separately for each constituent in each well. The owner or operator must demonstrate that the statistical methods meet the following performance standards, as appropriate:

(a) The statistical method used to evaluate groundwater monitoring data must be appropriate for the distribution of chemical parameters or constituents. If the distribution of the chemical parameters or constituents is shown by the owner or operator to be inappropriate for a normal theory test, then the data must be evaluated to determine if nonnormal conditions are due to laboratory or sampling error, poor well construction, seasonal or spatial variability, or actual site conditions. Transformed or a distribution-free theory test may be used, upon a determination of why nonnormal conditions exist. If the distributions for the constituents differ, more than one statistical method may be needed.

(b) If an individual well comparison procedure is used to compare an individual compliance well constituent concentration with background constituent concentrations or a groundwater protection standard, the test must be done at a Type I error level no less than 0.01 for each testing period. If a multiple comparison procedure is used, the Type I experiment wise error rate for each testing period must be no less than 0.05; however, the Type I error of no less than 0.01 for individual well comparisons must be maintained. This performance standard does not apply to tolerance intervals, prediction intervals, or control charts.

(c) Parameter values must be protective of human health and the environment. The parameters must be determined after considering the number of samples in the background database, the data distribution, and the range of the concentration values for each constituent of concern.

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

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

(3) The owner or operator must determine whether or not there is a statistically significant increase over background values for each parameter or constituent required in the particular groundwater moni-

toring program that applies to the MSWLF unit after each sampling event and as determined under this section.

(a) In determining whether a statistically significant increase has occurred, the owner or operator must compare the groundwater quality of each parameter or constituent at each monitoring well designated pursuant to WAC 173-351-430 or 173-351-440 to the background value of that constituent, according to the statistical procedures and performance standards specified under this section.

(b) Within thirty days after receipt of the analytical data, the owner or operator must determine whether there has been a statistically significant increase over background at each monitoring well.

[Statutory Authority: RCW 70.95.020(3), 70.95.060(1), and 70.95.260(1), (6). WSR 12-23-009 (Order 07-15), § 173-351-420, filed 11/8/12, effective 12/9/12. Statutory Authority: Chapter 70.95 RCW and 40 C.F.R. 258. WSR 93-22-016, § 173-351-420, filed 10/26/93, effective 11/26/93.]