12.0 DATA SUMMARY METHODS

Measuring any physical quantity has some degree of inherent uncertainty. This uncertainty results from the combination of all possible inaccuracies in the measurements process, including such factors as the reading of the result, the calibration of the measuring device, and numerical rounding errors.

In this report, individual radioactive measurements are accompanied by a plus or minus (±) value, which represents the total propagated analytical uncertainty (or 2-sigma counting error). The two-sigma counting error gives information on what the measurement might be if the same sample were counted again under identical conditions. The two-sigma counting error implies that approximately 95% of the time, a recount of the same sample would give a value within plus or minus the two-sigma counting error at the value reported.

Values in the tables that are less than the minimum detectable activity indicate that the reported result might have come from a sample with no radioactivity. Such values are considered below the detection limits of the measuring instrument. Also note that each radioactive measurement must have the random background radioactivity of the measuring instrument subtracted; therefore, negative results are possible, especially when the sample has very little radioactivity.

Reported averages also are accompanied by a plus or minus (±) value, which represents two standard deviations from the mean. If the data fluctuate randomly, this is a measure of the uncertainty in the estimated average of the data because of this randomness.

Where averages of averages are reported, the plus or minus (±) value represents two standard errors of the mean.

The mean, X, is computed as:

$$\mathrm{X} = \frac{1}{n}\sum_{i=1}^{n} \mathrm{X}_i$$

where X_i is the ith measurement and n is the number of measurements.

The standard error of the mean was computed as:

$$SE = \sqrt{\frac{S^2}{n}}$$

where S^2, the variance of the n measurements, was computed as:

$$S_M^2 = \frac{1}{n-1}\sum_{i=1}^{n}(\mathrm{X}_i - \mathrm{X})^2$$

This estimator, S^2, includes the variance among the samples and the counting variance. The estimated S^2 occasionally may be less than the average counting variance.