

A REVIEW OF STATISTICAL METHODS FOR DATA SETS  
WITH MULTIPLE CENSORING POINTS\*

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1.0 SUMMARY

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This report reviews and summarizes recent literature on statistical methods for analyzing data sets that are censored by multiple censoring points. The following references are particularly useful for obtaining an overview of these statistical methods: Akritas et al. (1994), Helsel and Hirsch (1992), Atwood et al. (1991), Helsel (1990), Hertzler et al. (1989), and Millard and Deverel (1988).

This review indicates that for the case of multiple censoring points:

- In general, substitution methods (wherein censored values are replaced by a value such as zero, one half the detection limit (DL), or the detection limit itself) are not recommended when the objective is to estimate the mean and variance of the underlying distribution.
  - Some authors indicate that using one half the DL may be appropriate when testing hypotheses, even though it is not appropriate for estimating the mean and variance
- Robust probability plotting methods are recommended for estimating the mean and variance.
- Maximum likelihood estimation conducted assuming an underlying lognormal distribution is favored for estimating percentiles of a variety of distributions realistic for environmental studies when sample sizes are large ( $n > 25$ ).

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