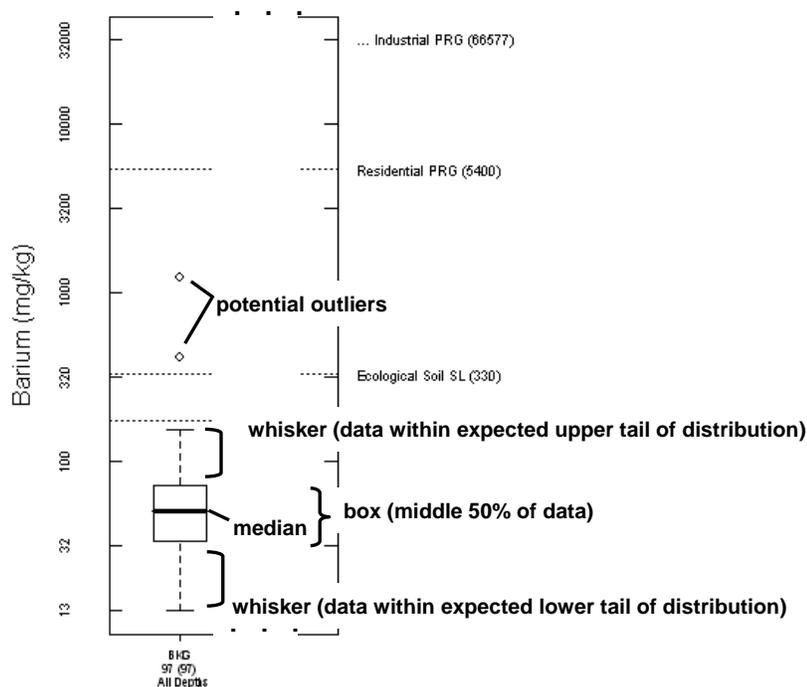


Box plots are presented in Figures B5-1 through B5-21 that summarize, for each of 21 metals, the data distribution for each study area as well as background. For perspective, toxicity screening levels are identified.

Each box plot depicts a summary of the associated data distribution along a log transformed scale, as follows. The open box incorporates the middle 50% of the data referred to as the inter-quartile range (IQR), and thus is stretched between the 75th percentile and the 25th percentiles of the data (see in-text diagram below). The median is indicated by a black bar. The dotted lines, referred to as whiskers, stretch to the highest data point before what is considered by the algorithm to be an isolated value, a potential outlier. The end limits of each upper (or lower) whisker is an observed data point that is no more than 1.5 times the IQR above the upper edge of the open box (or below the lower edge). Any separate lines above or below the whisker limits are potential outliers. Outliers are considered unusual, and outside the distribution of remaining data, however interpretation of why the outlier exists (analysis error, localized contamination, etc.) must be made on a case by case basis. Under each study area abbreviation, the total sample size and number of detected values (in parenthesis) are indicated.



Censored data are plotted at their detection limits. However, using this, or any other replacement value occasionally affects the size, location, or behavior (e.g. what is considered an outlier), of the boxes to the extent that the plot itself can be misleading. For example, in the figures for Cobalt, the box plot algorithm does not show a box for the middle 75% of the data, but only a line for the median. In effect, the box does not extend beyond the median because 53 of the 97 background data points (over 50%) are “less than 5.0” and represented as all equaling 5.0 (rather than as their unique unknown concentrations varying in the range less than 5. When the central 50% of the data points are equal, the algorithm considers all remaining points (most of which, in this case, are detected concentrations) as low and high outliers. A

better box plot representation of the sampled population would involve using specialized statistical methods censored data, such as regression order statistics (Helsel, 1994).

Aside from detection limit uncertainty, these box plots are helpful for quickly viewing distributions as varying across the site and also for identifying outliers. Although the condensation of the full information contained in a given data into only a few statistics (IQR, median, and outliers) necessarily drops information which may sometimes be important (in particular cases), this condensation allows many box plots to be grouped onto a single page to compare across study areas.

The calculation of box and whiskers on the log transformed data scale was chosen because background and study area metals were found to have skewed distributions generally characterized by a lognormal distribution type. The box plot whiskers calculated from and applied to log-transformed data identify outliers that are “outside” of expectations for a lognormal distribution.

References

Helsel, D.R., Hirsch, R.M., 1994. *Statistical Methods in Water Resources*. John Wiley.

Box Plots

List of Figures

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- Figure B5-2 – Log Scale Box Plots of Antimony (0 to 10 feet)
- Figure B5-3 – Log Scale Box Plots of Arsenic (0 to 10 feet)
- Figure B5-4 – Log Scale Box Plots of Barium (0 to 10 feet)
- Figure B5-5 – Log Scale Box Plots of Beryllium (0 to 10 feet)
- Figure B5-6 – Log Scale Box Plots of Cadmium (0 to 10 feet)
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- Figure B5-16 – Log Scale Box Plots of Nickel (0 to 10 feet)
- Figure B5-17 – Log Scale Box Plots of Selenium (0 to 10 feet)
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Figure B5-1
Log Scale Box Plots of Aluminum (0 to 10 Feet)

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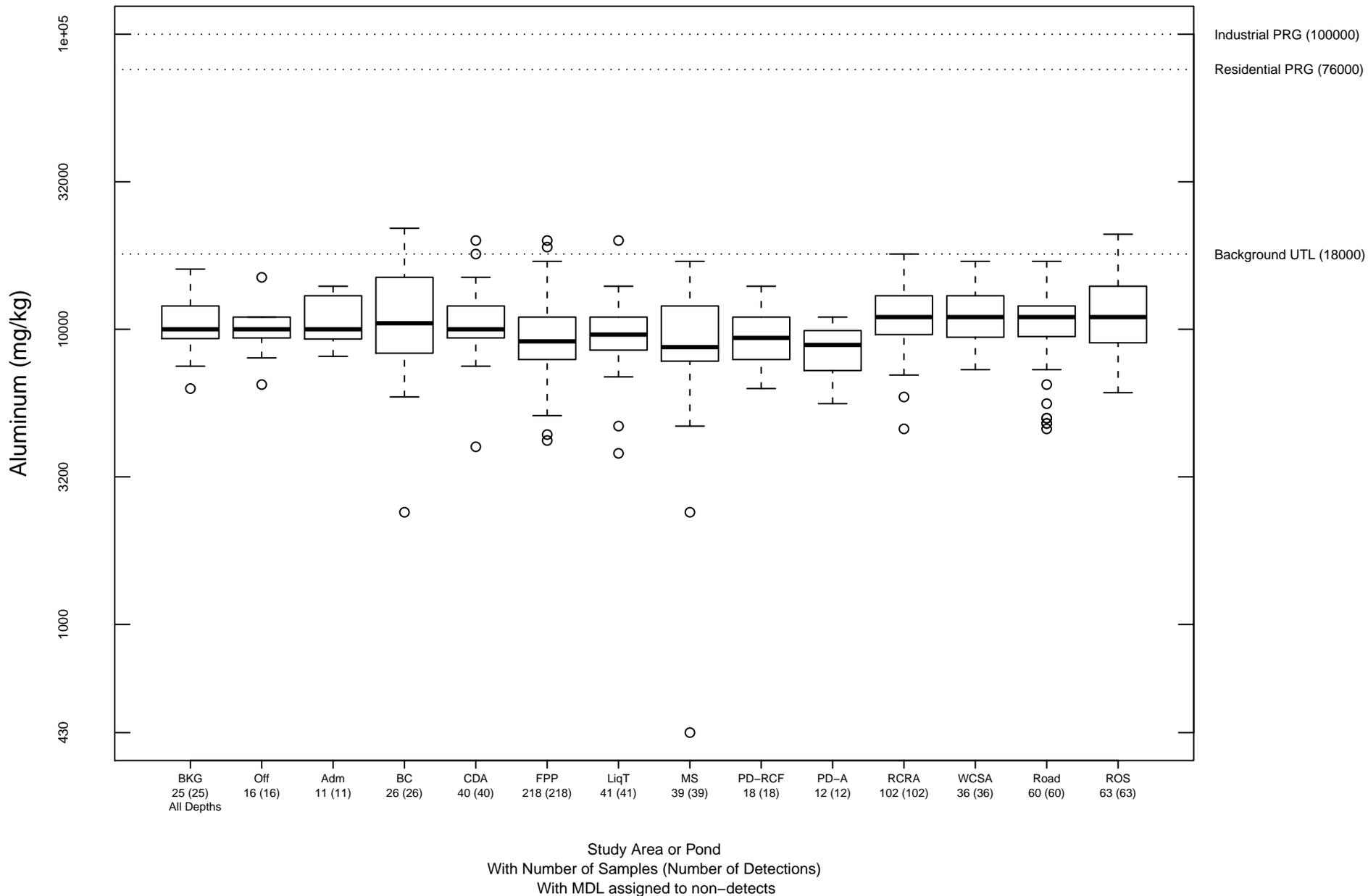


Figure B5-2
Log Scale Box Plots of Antimony (0 to 10 Feet)

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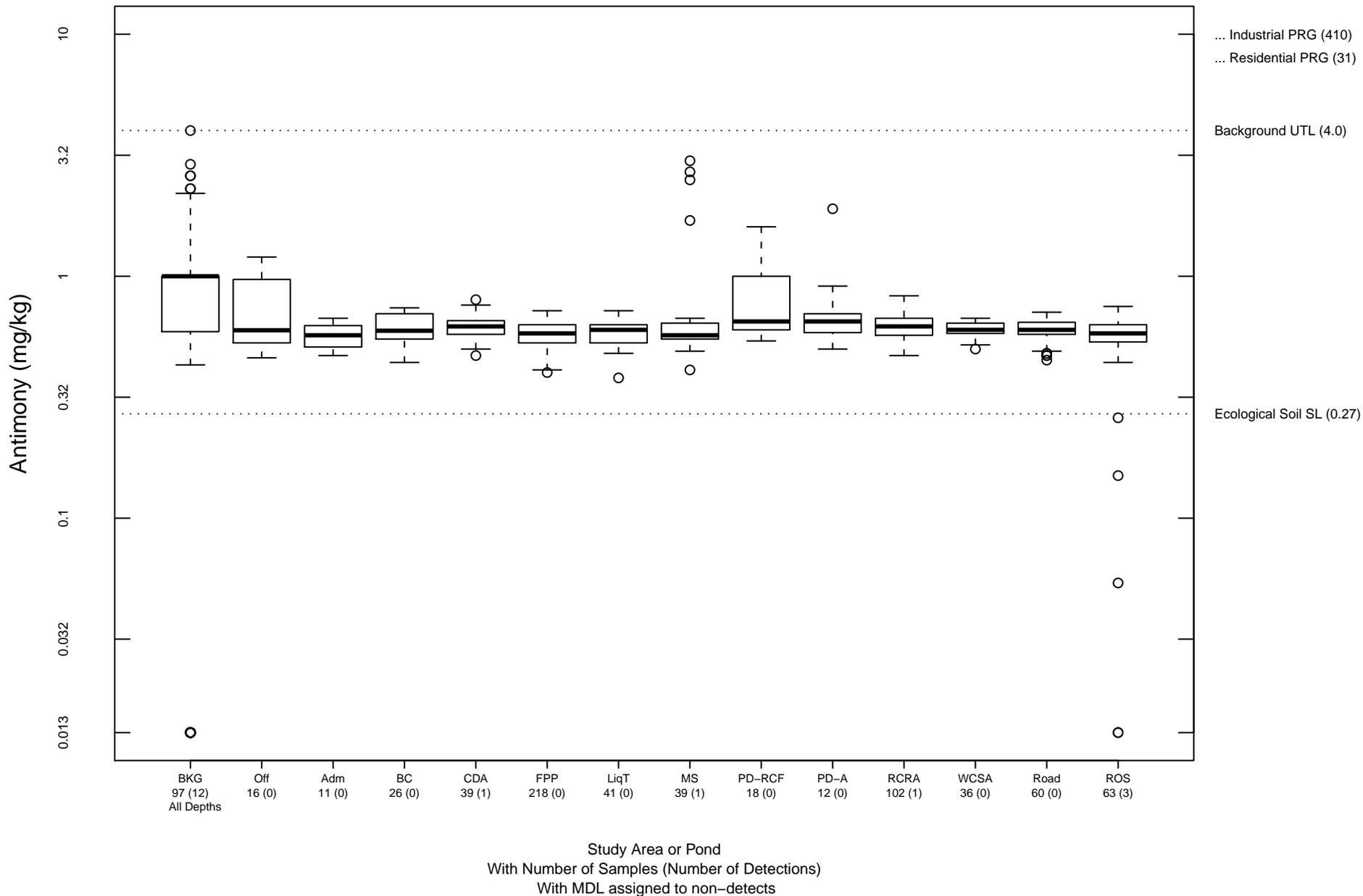


Figure B5-3
Log Scale Box Plots of Arsenic (0 to 10 Feet)

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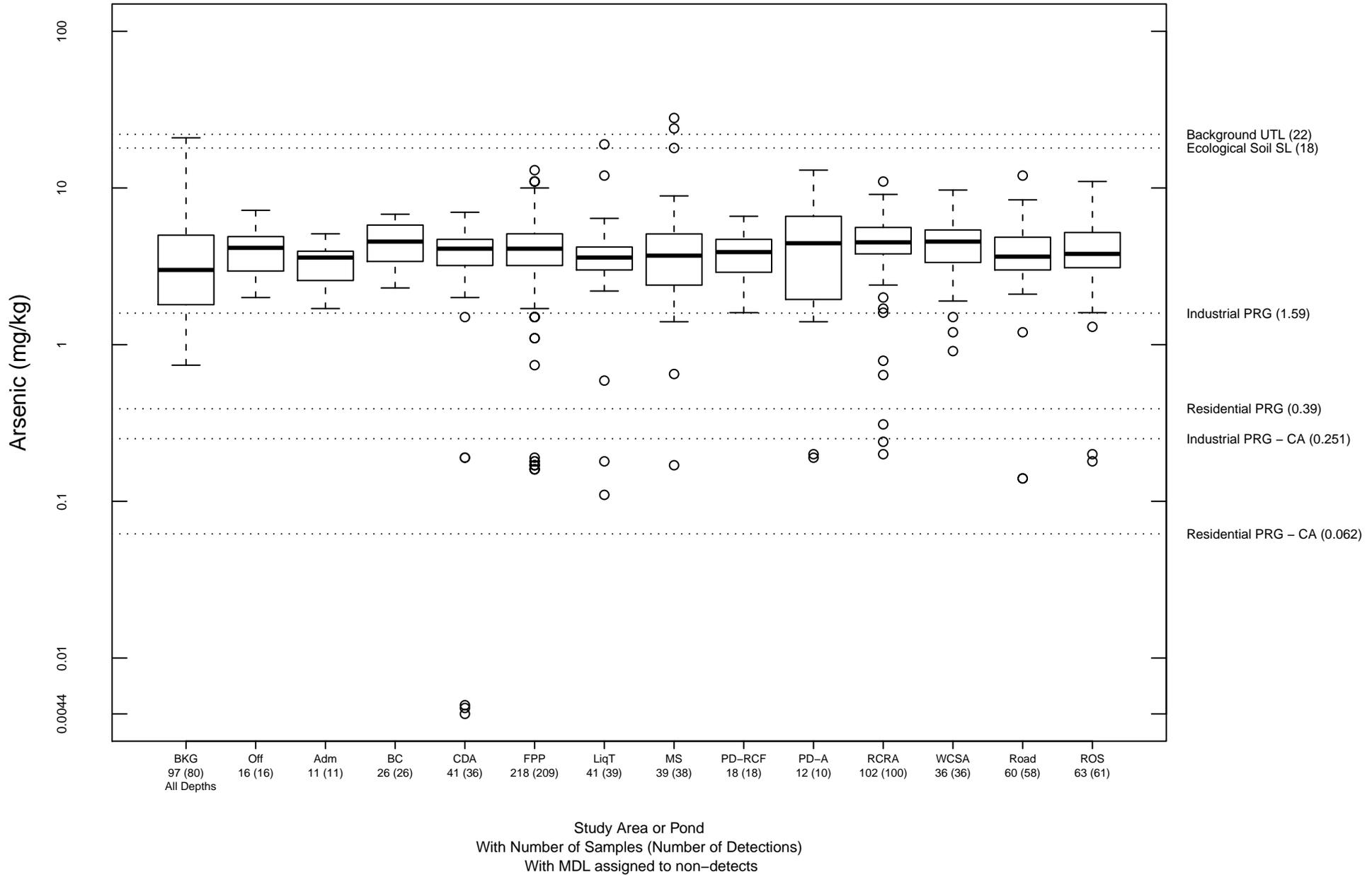


Figure B5-4
Log Scale Box Plots of Barium (0 to 10 Feet)

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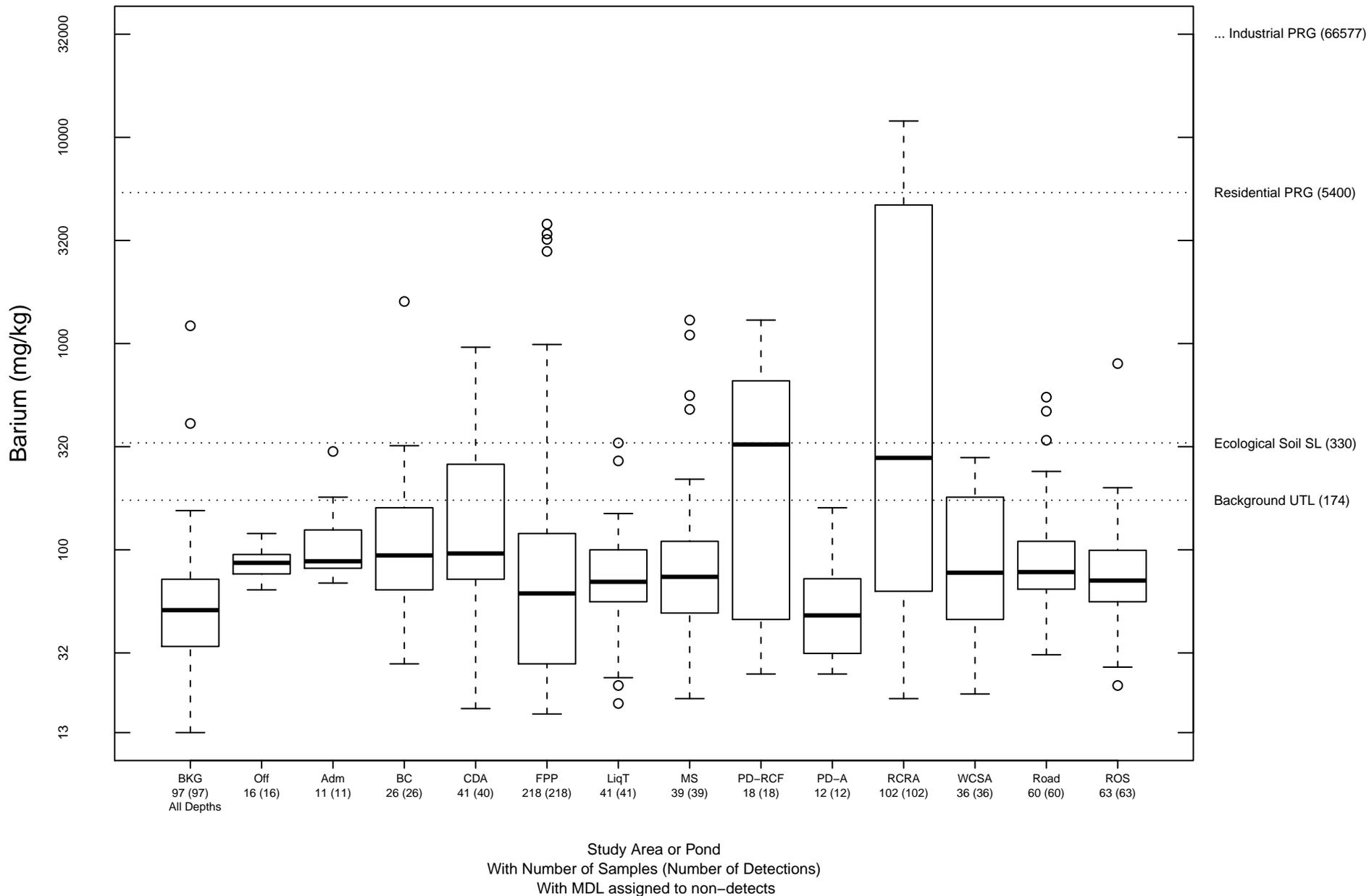


Figure B5-5
Log Scale Box Plots of Beryllium (0 to 10 Feet)

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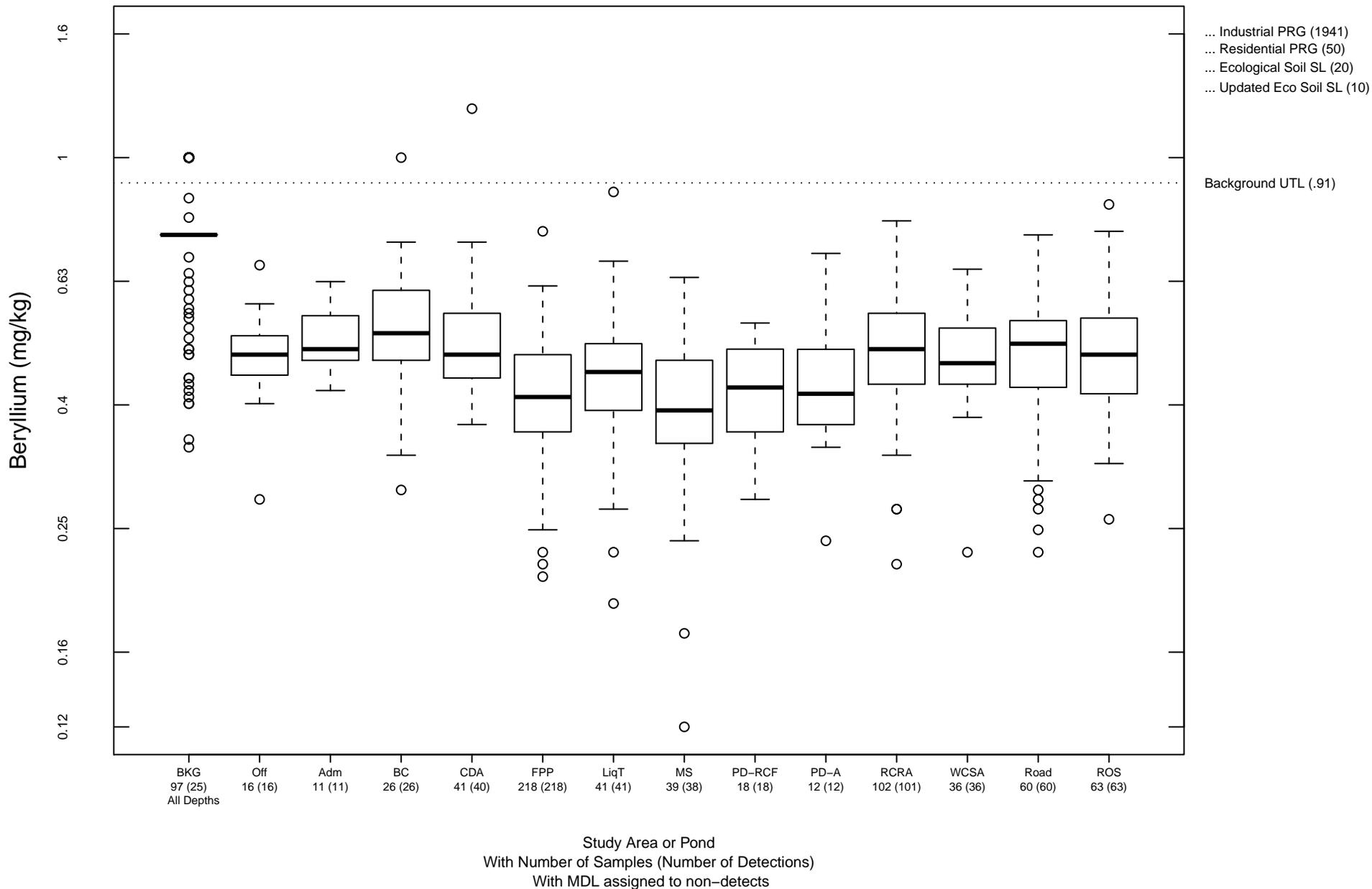


Figure B5-6
Log Scale Box Plots of Cadmium (0 to 10 Feet)

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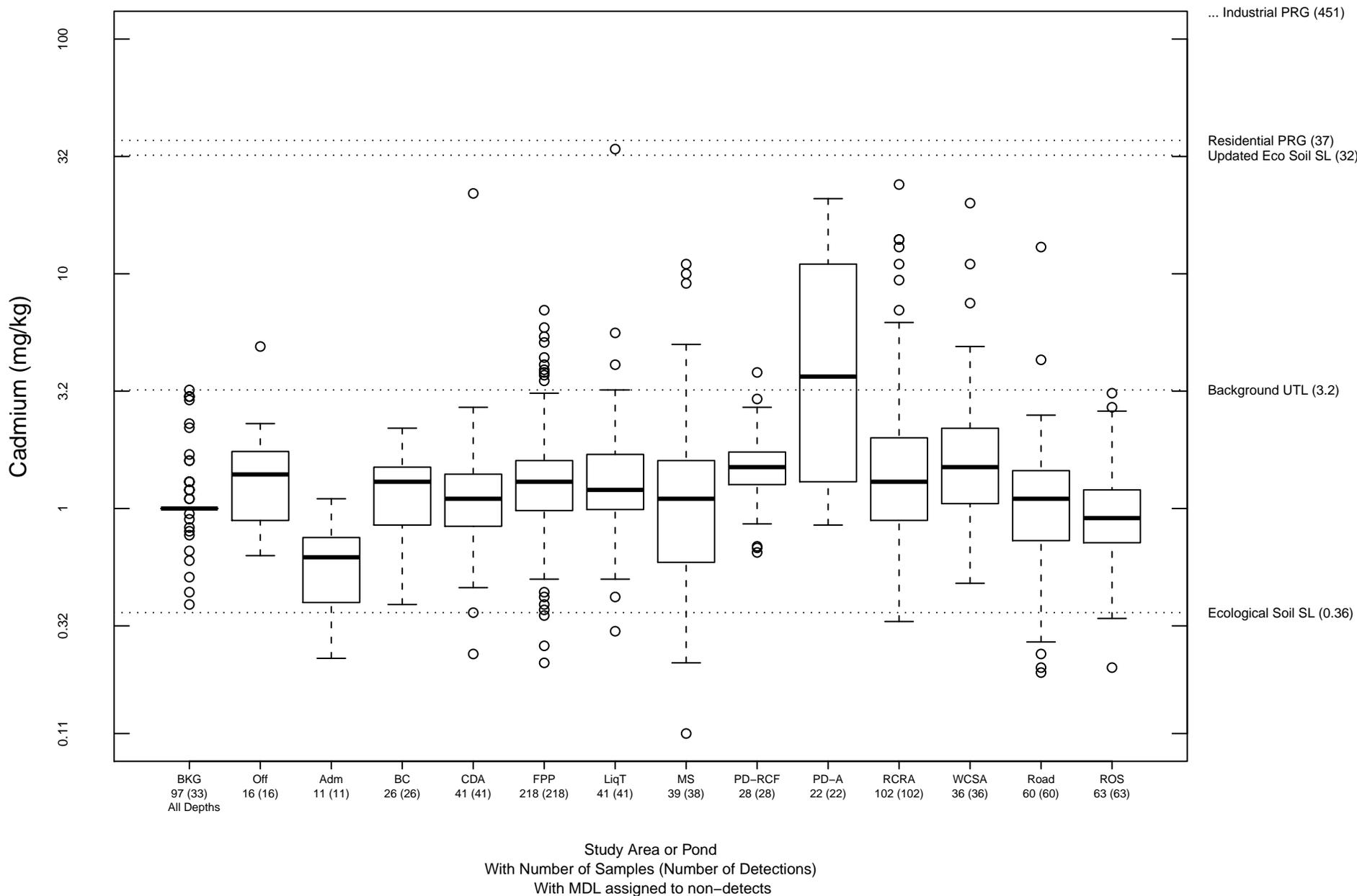


Figure B5-7
Log Scale Box Plots of Chromium (0 to 10 Feet)

Casmalia Resources Superfund Site Remedial Investigation

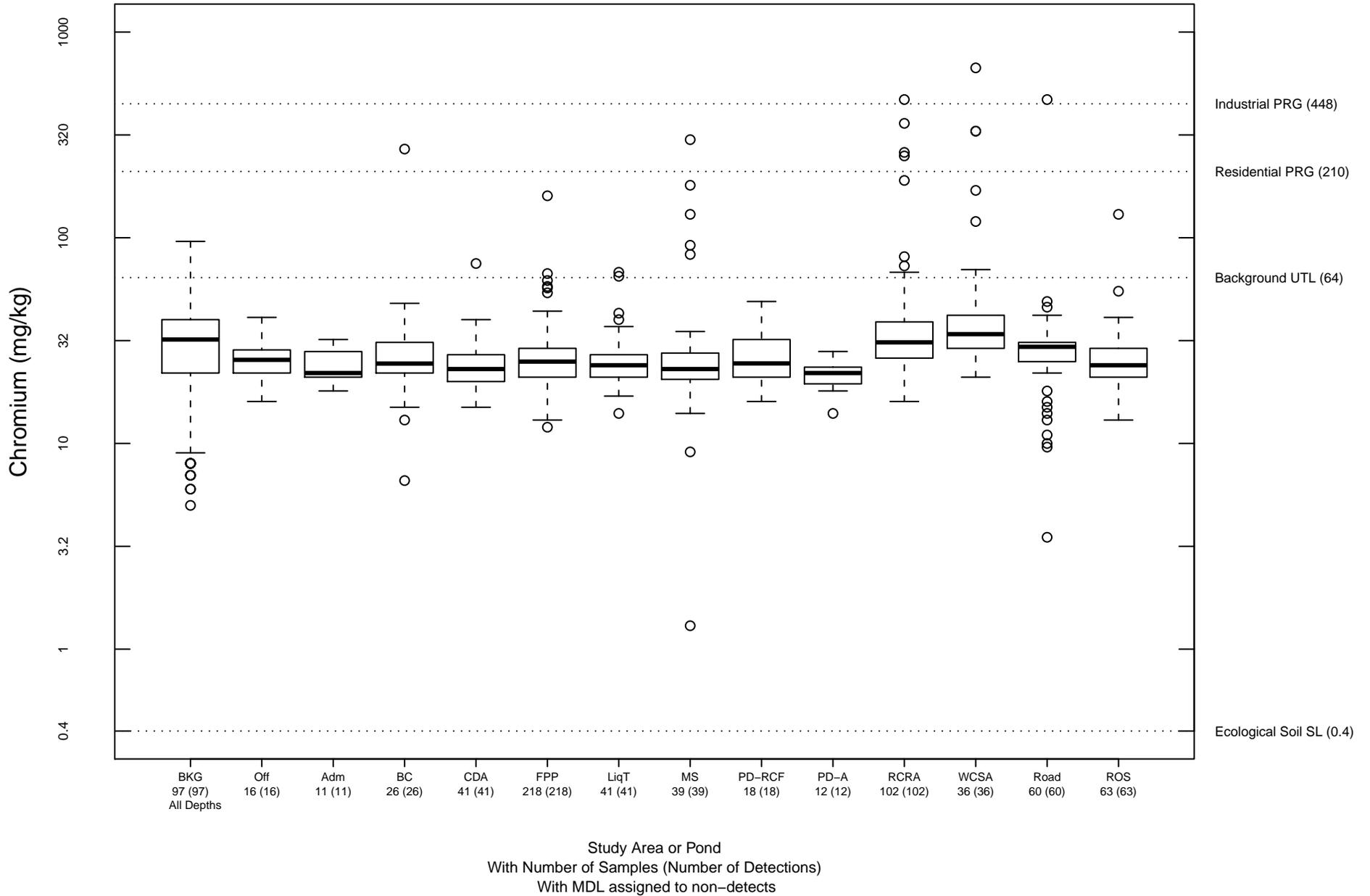


Figure B5-8
Log Scale Box Plots of Cobalt (0 to 10 Feet)
 Casmlia Resources Superfund Site Remedial Investigation

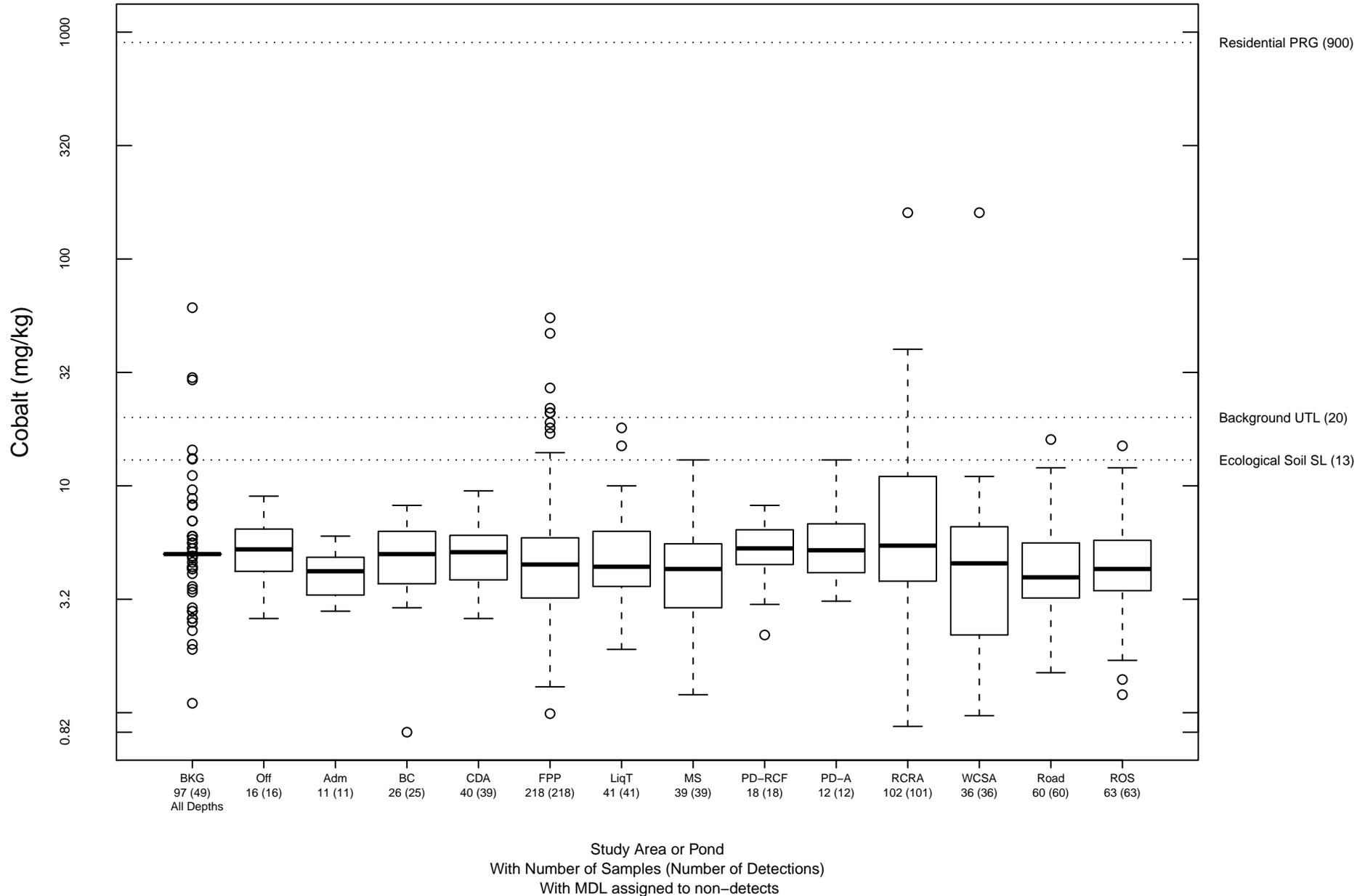


Figure B5-9
Log Scale Box Plots of Copper (0 to 10 Feet)

Casmalia Resources Superfund Site Remedial Investigation

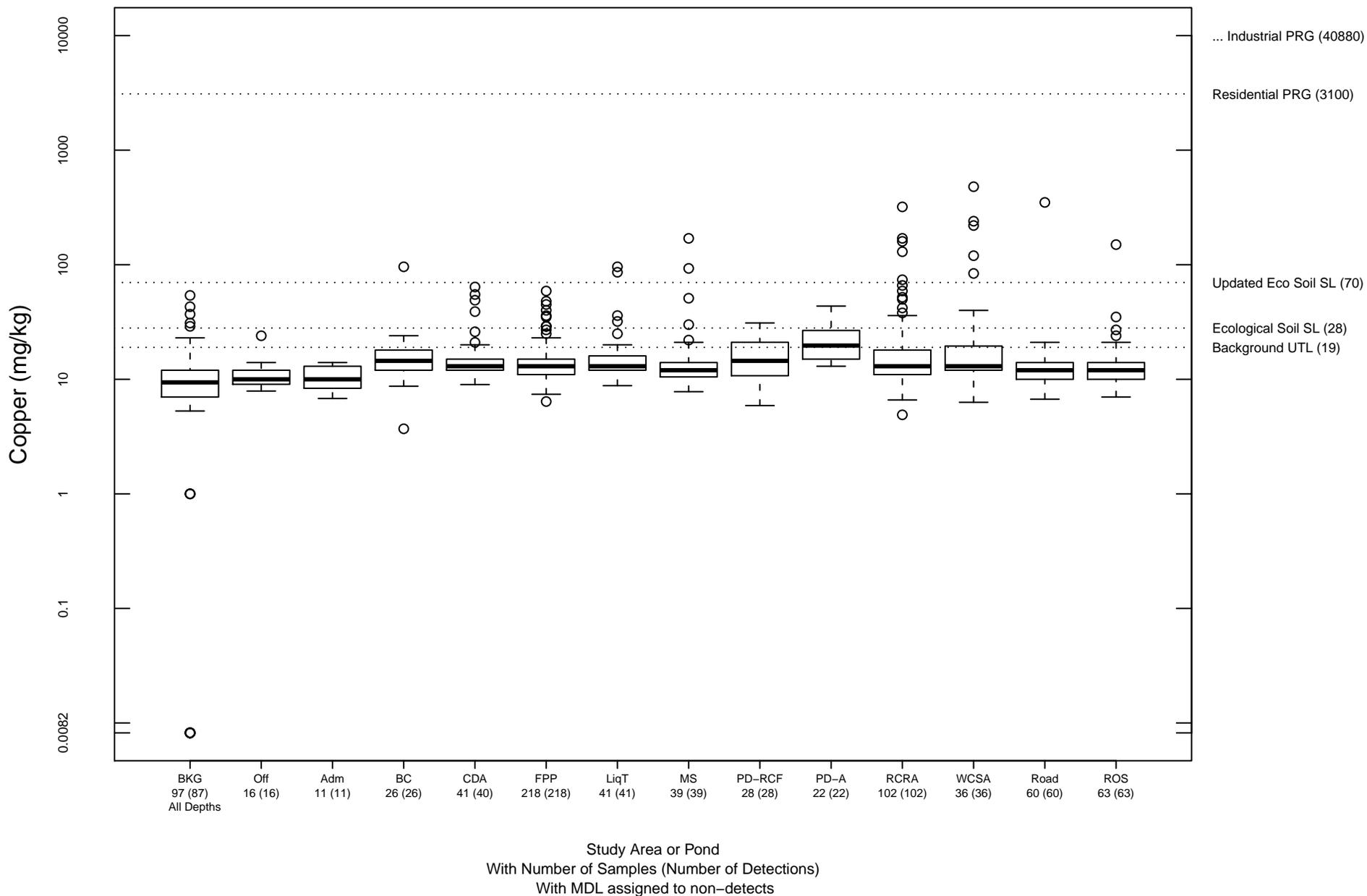


Figure B5-10
Log Scale Box Plots of Iron (0 to 10 Feet)
 Casmlia Resources Superfund Site Remedial Investigation

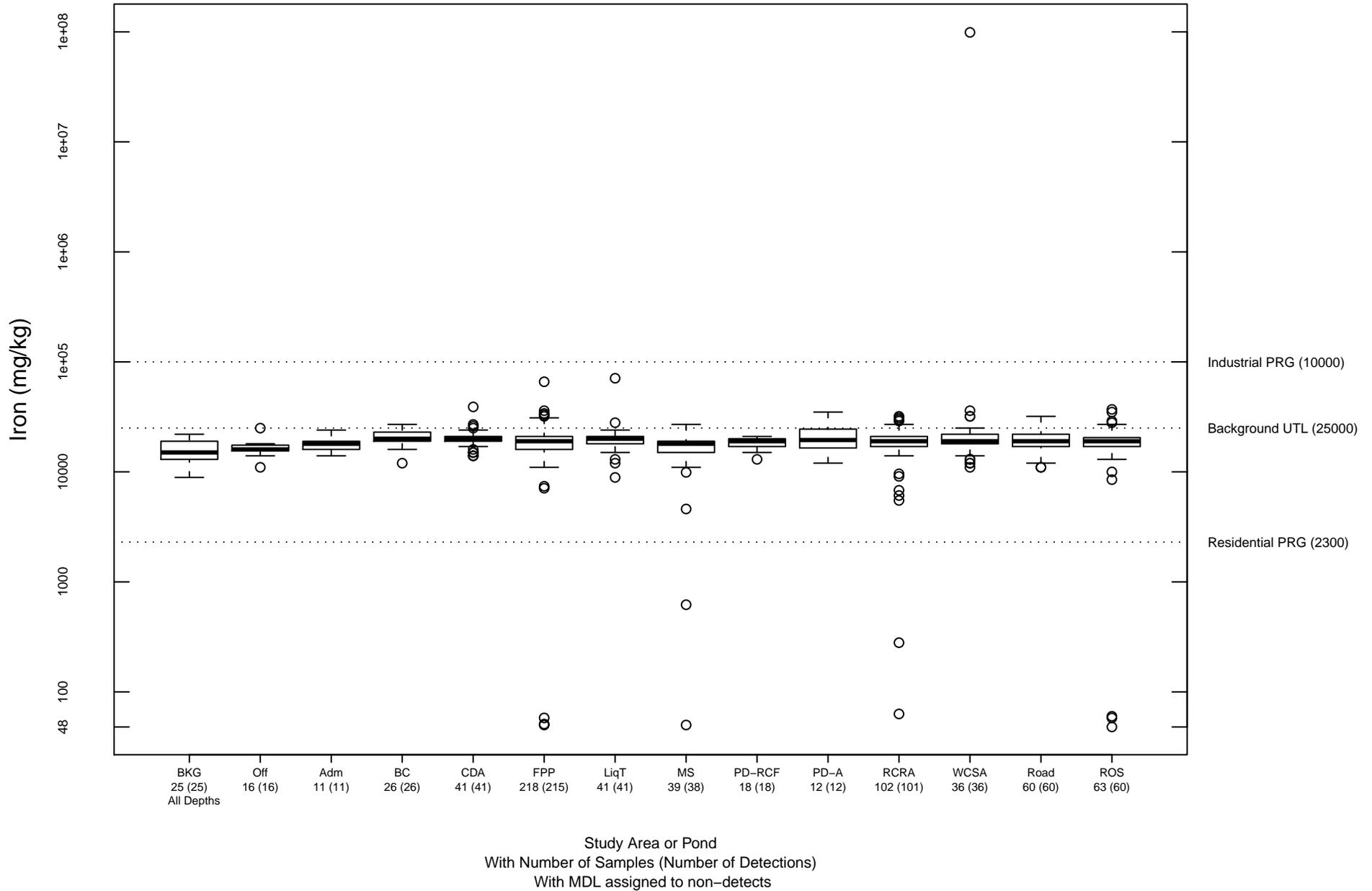


Figure B5-11
Log Scale Box Plots of Lead (0 to 10 Feet)
Casmalia Resources Superfund Site Remedial Investigation

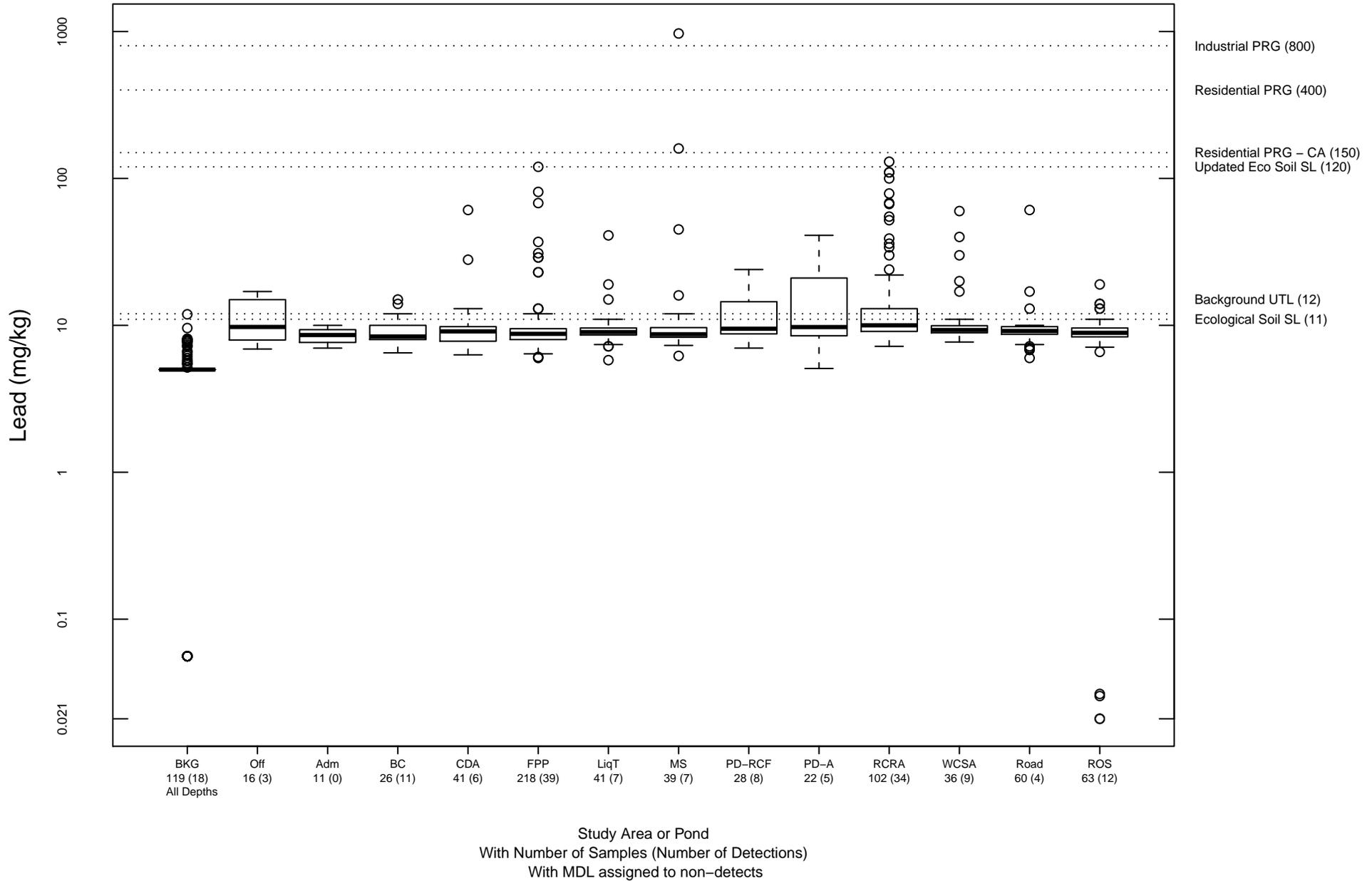


Figure B5-12
Log Scale Box Plots of Magnesium (0 to 10 Feet)

Casmalia Resources Superfund Site Remedial Investigation

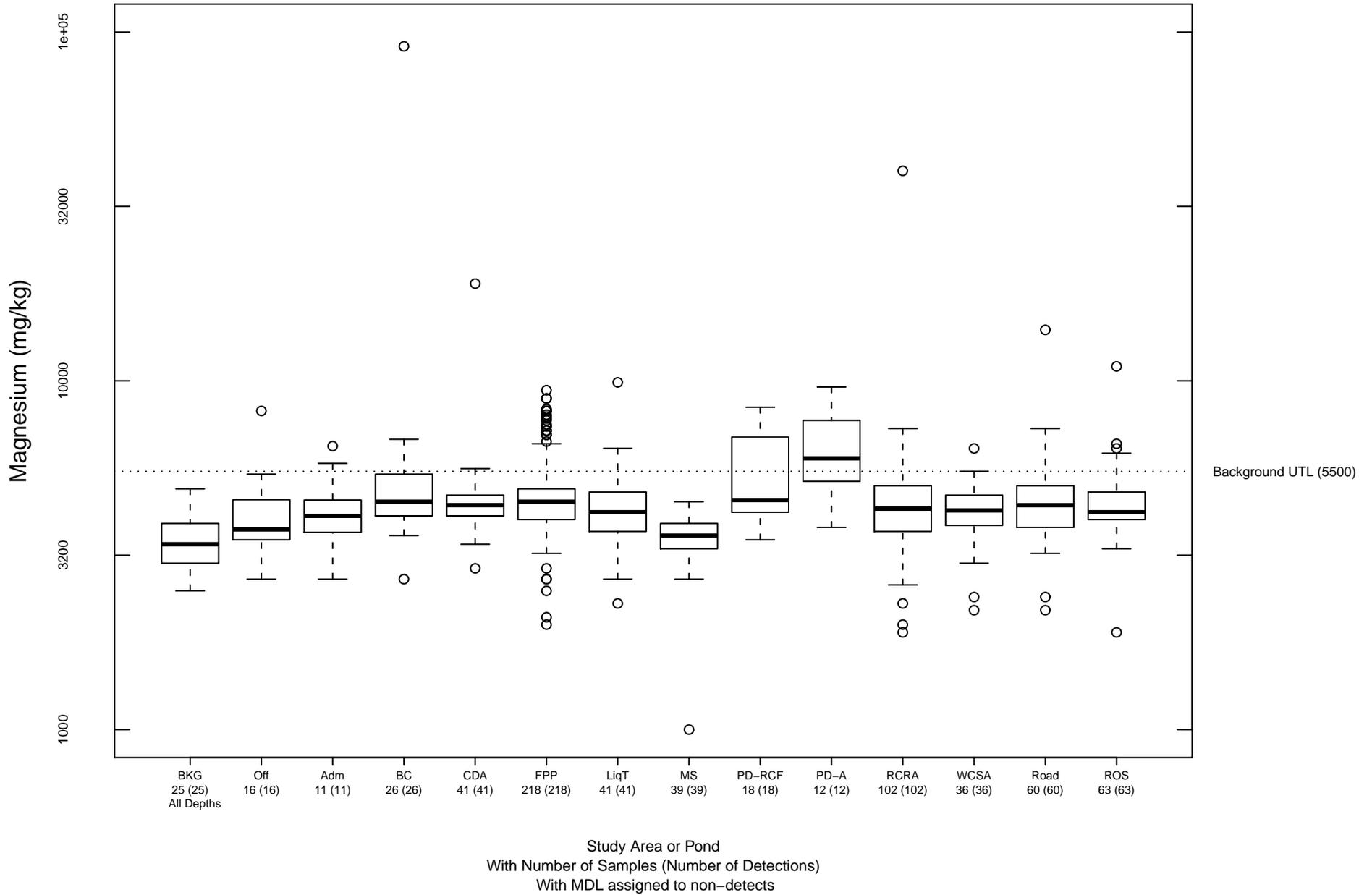


Figure B5-13
Log Scale Box Plots of Manganese (0 to 10 Feet)

Casmalia Resources Superfund Site Remedial Investigation

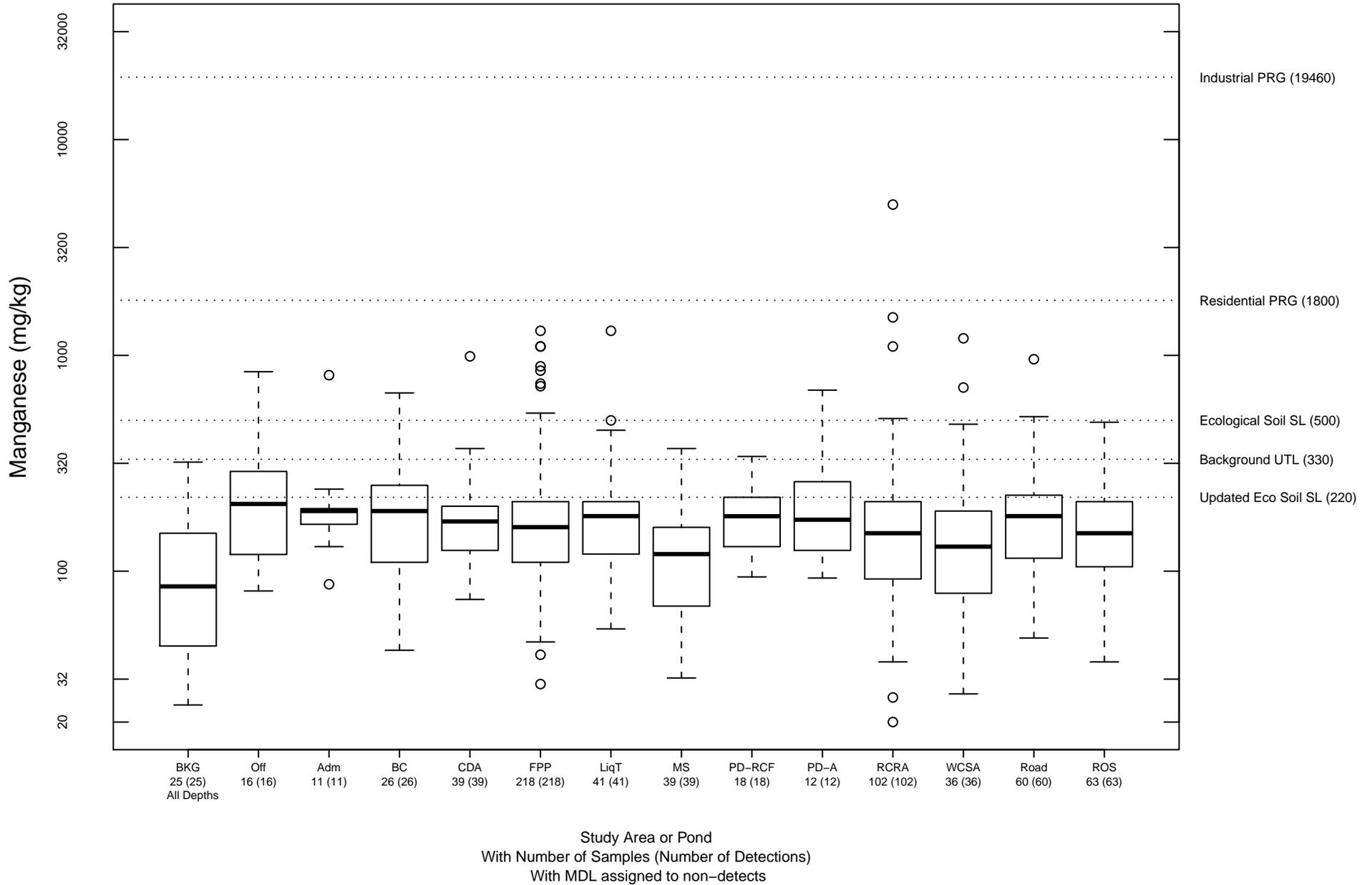


Figure B5-14
Log Scale Box Plots of Mercury (0 to 10 Feet)

Casmalia Resources Superfund Site Remedial Investigation

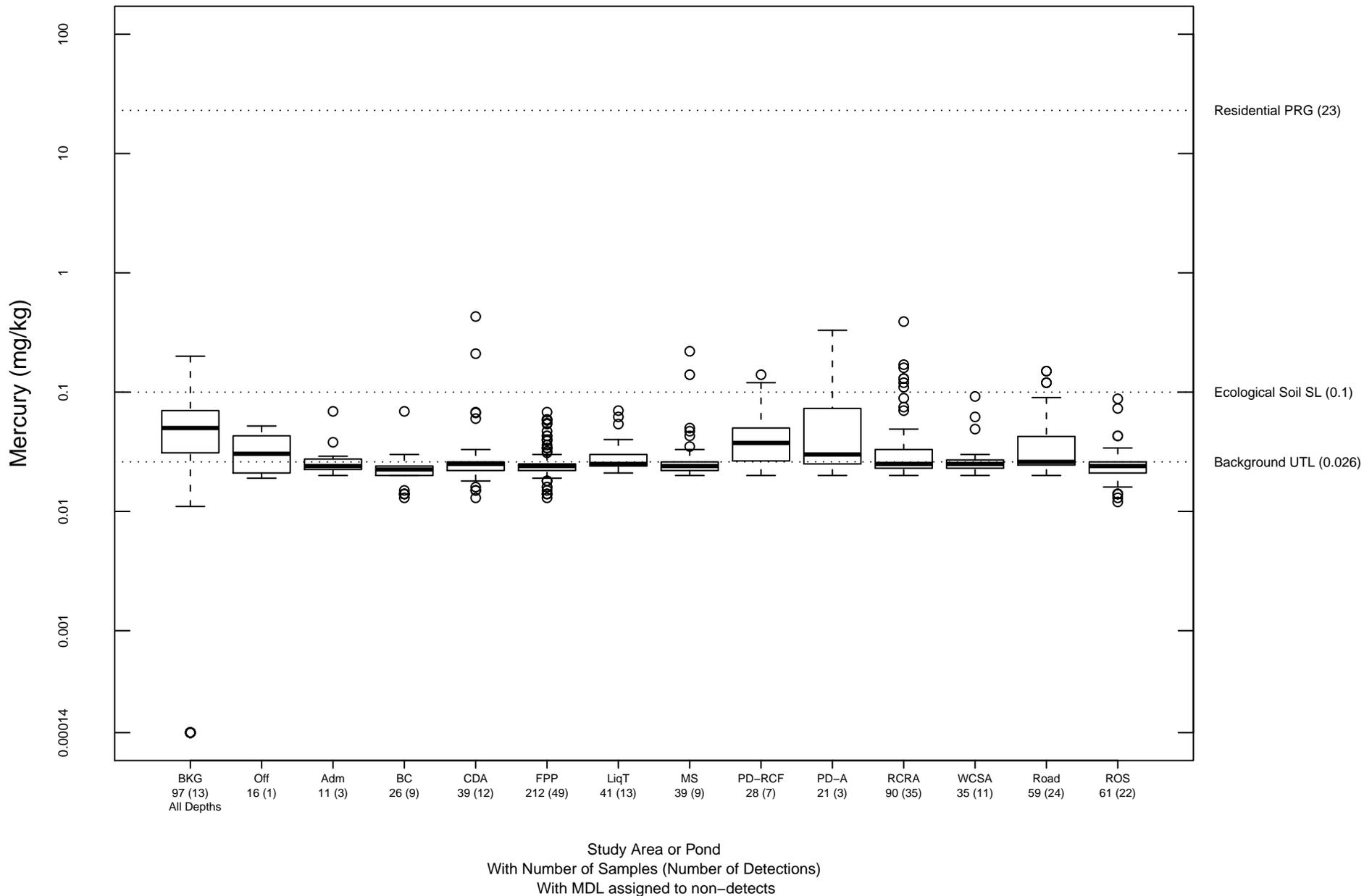


Figure B5-15
Log Scale Box Plots of Molybdenum (0 to 10 Feet)

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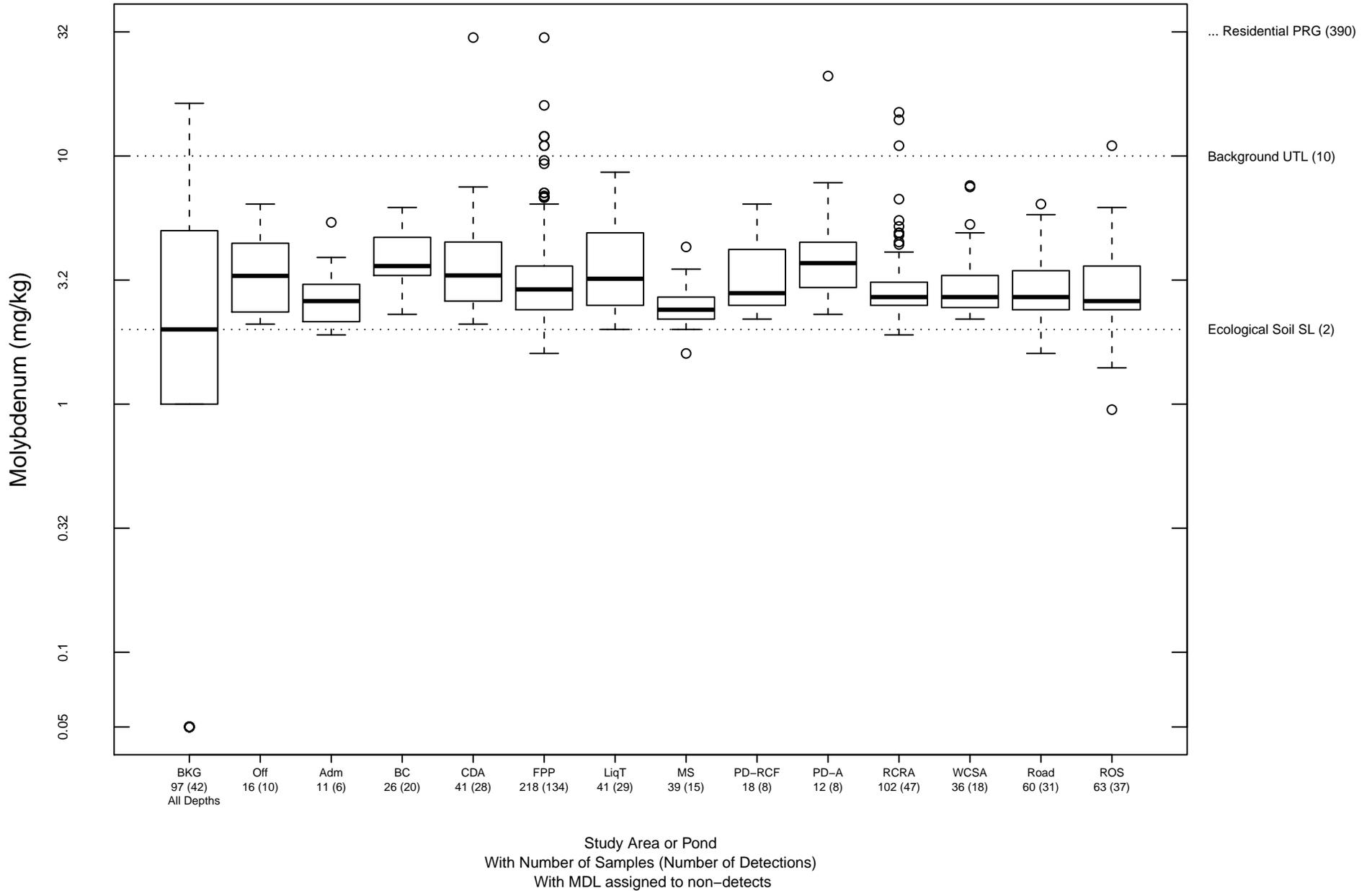


Figure B5-16
Log Scale Box Plots of Nickel (0 to 10 Feet)

Casmalia Resources Superfund Site Remedial Investigation

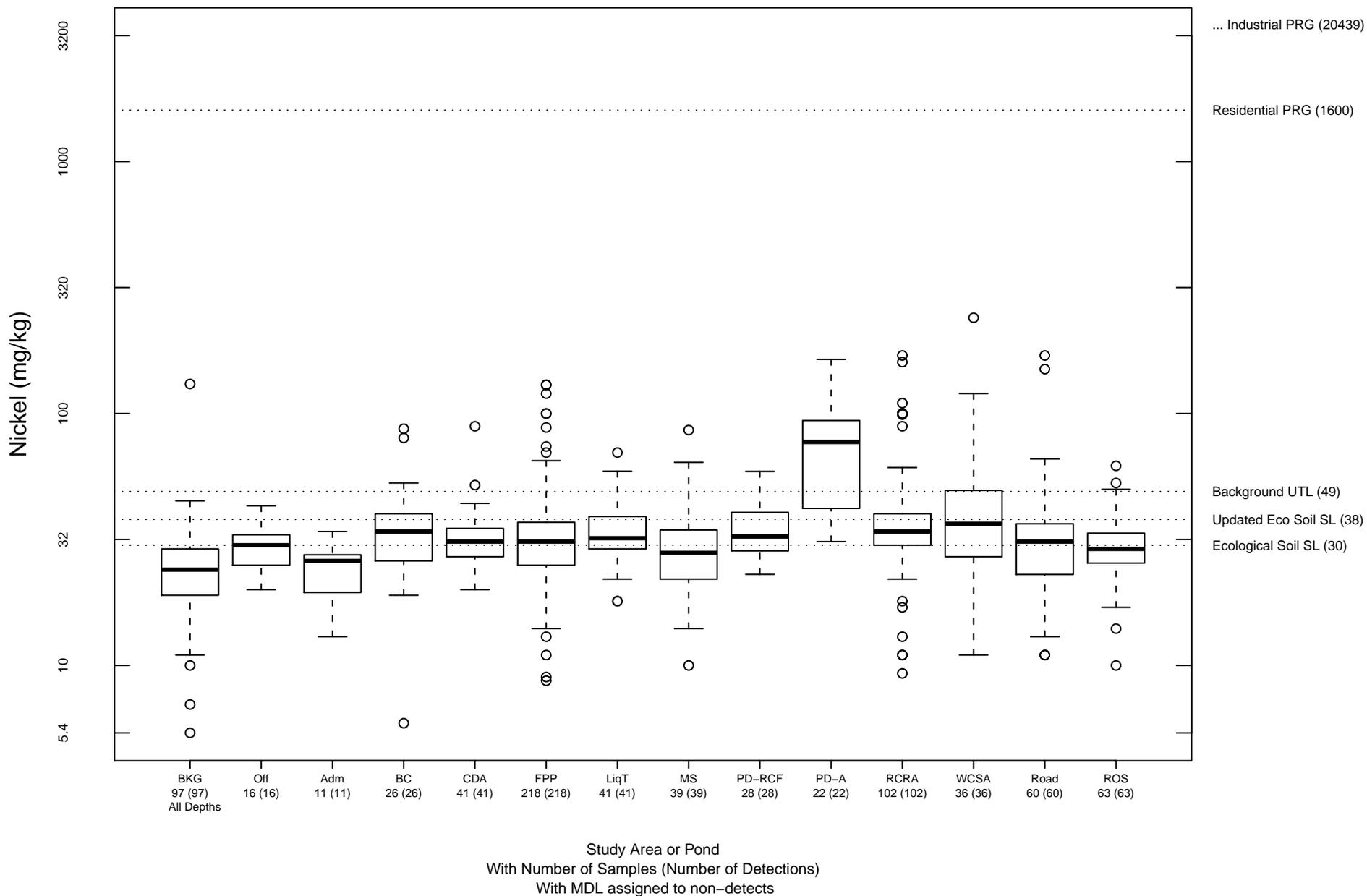


Figure B5-17
Log Scale Box Plots of Selenium (0 to 10 Feet)

Casmalia Resources Superfund Site Remedial Investigation

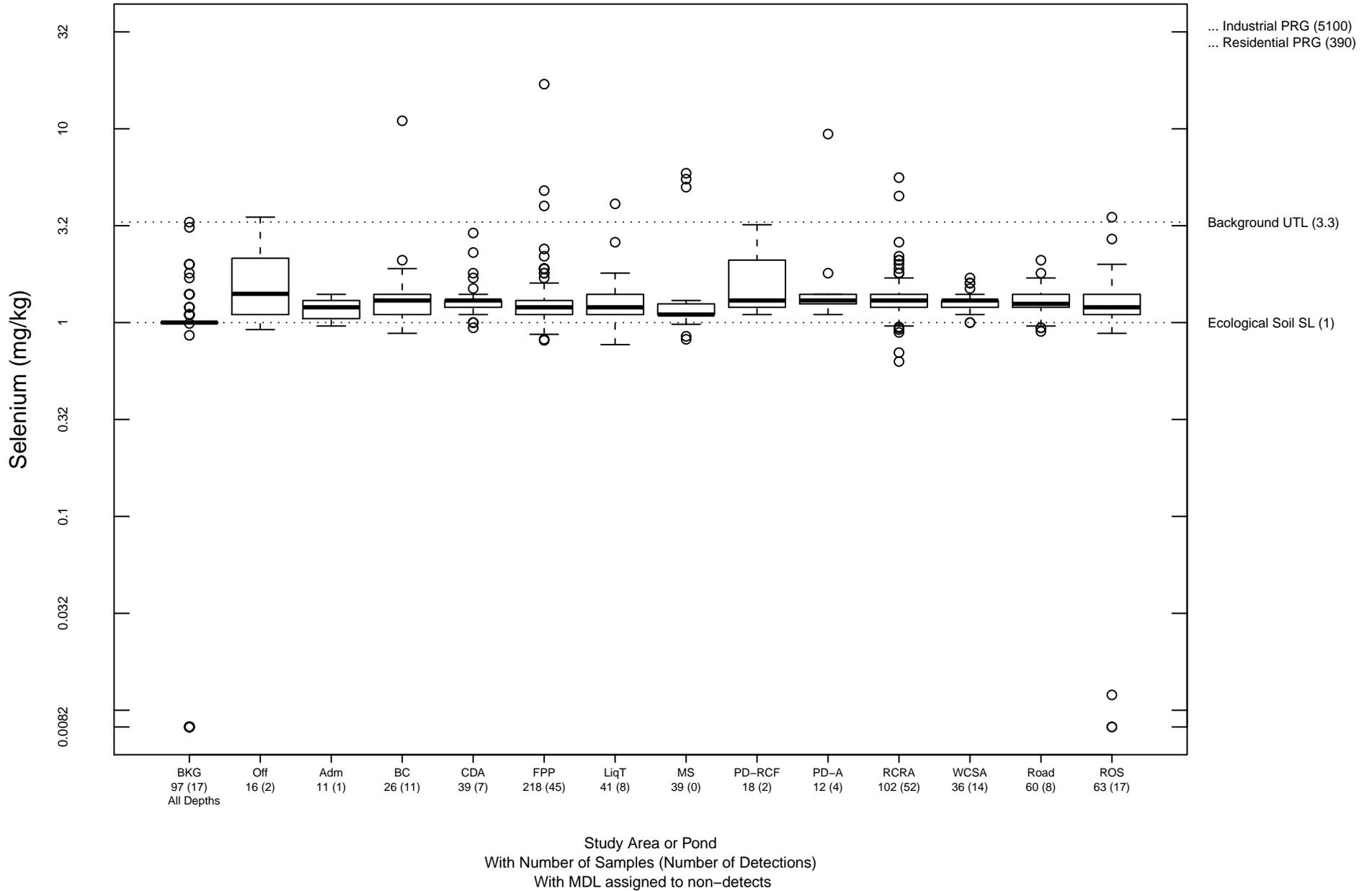


Figure B5-18
Log Scale Box Plots of Thallium (0 to 10 Feet)

Casmalia Resources Superfund Site Remedial Investigation

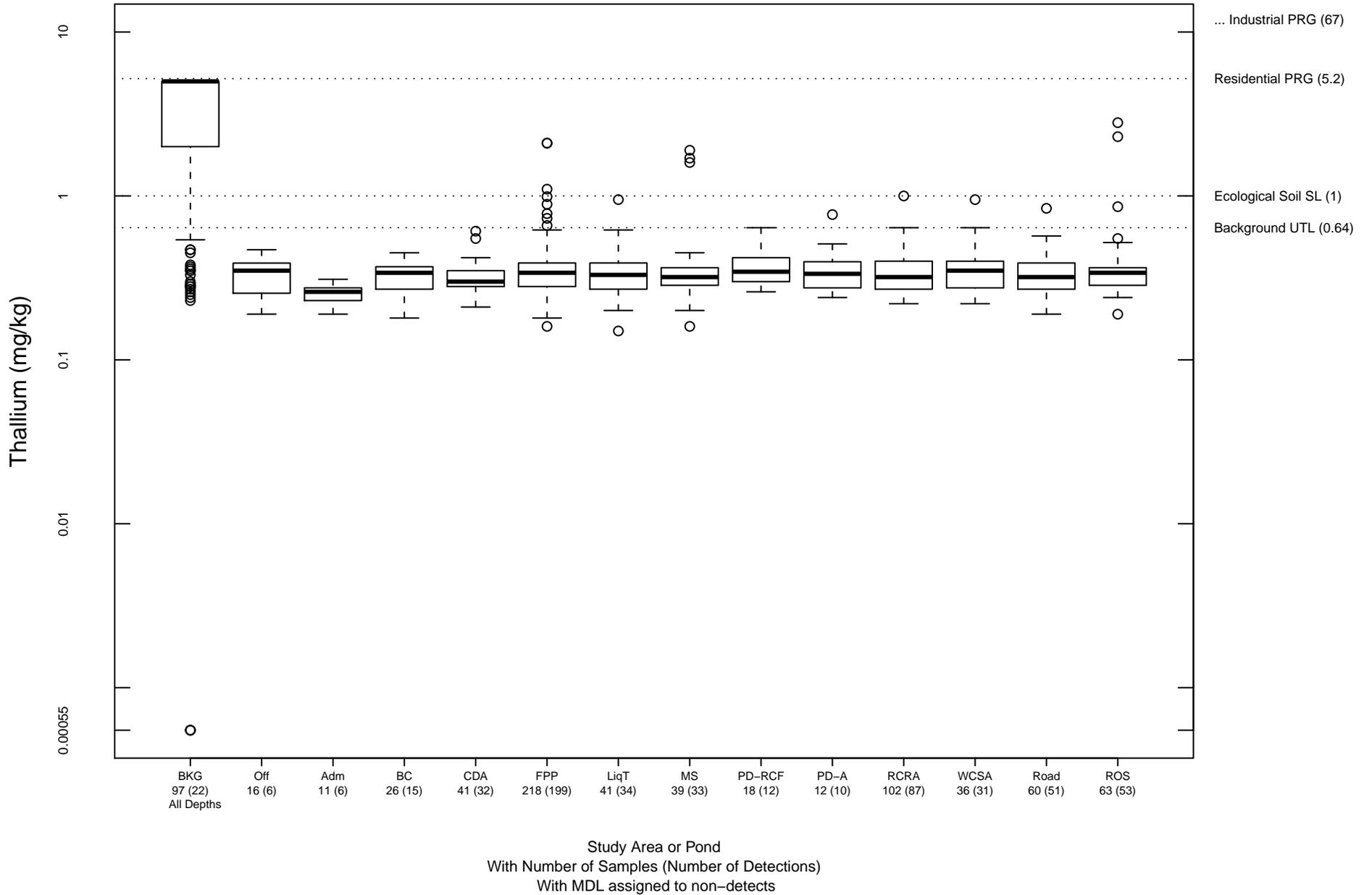


Figure B5-19
Log Scale Box Plots of Tin (0 to 10 Feet)

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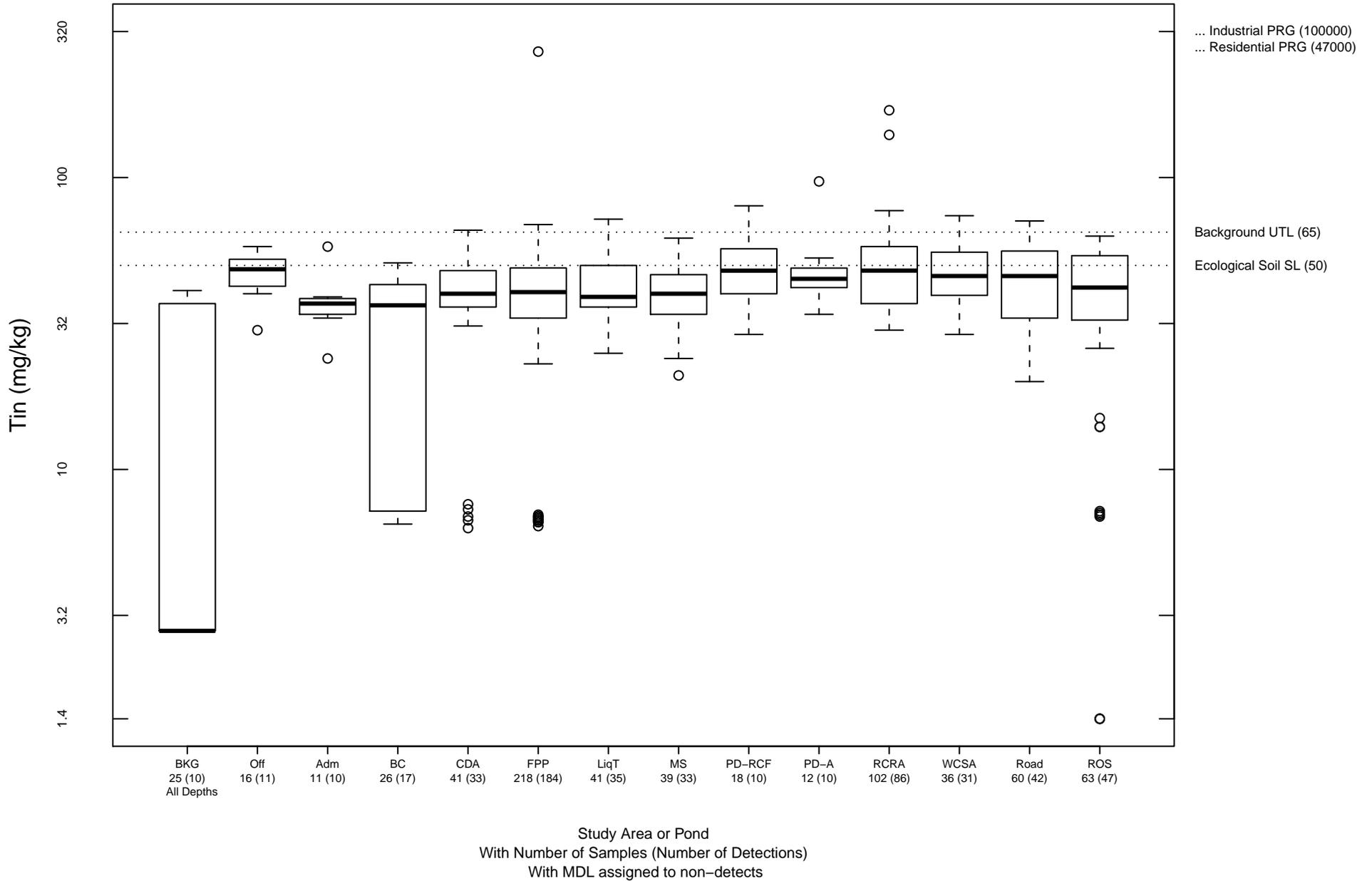


Figure B5-20
Log Scale Box Plots of Vanadium (0 to 10 Feet)

Casmalia Resources Superfund Site Remedial Investigation

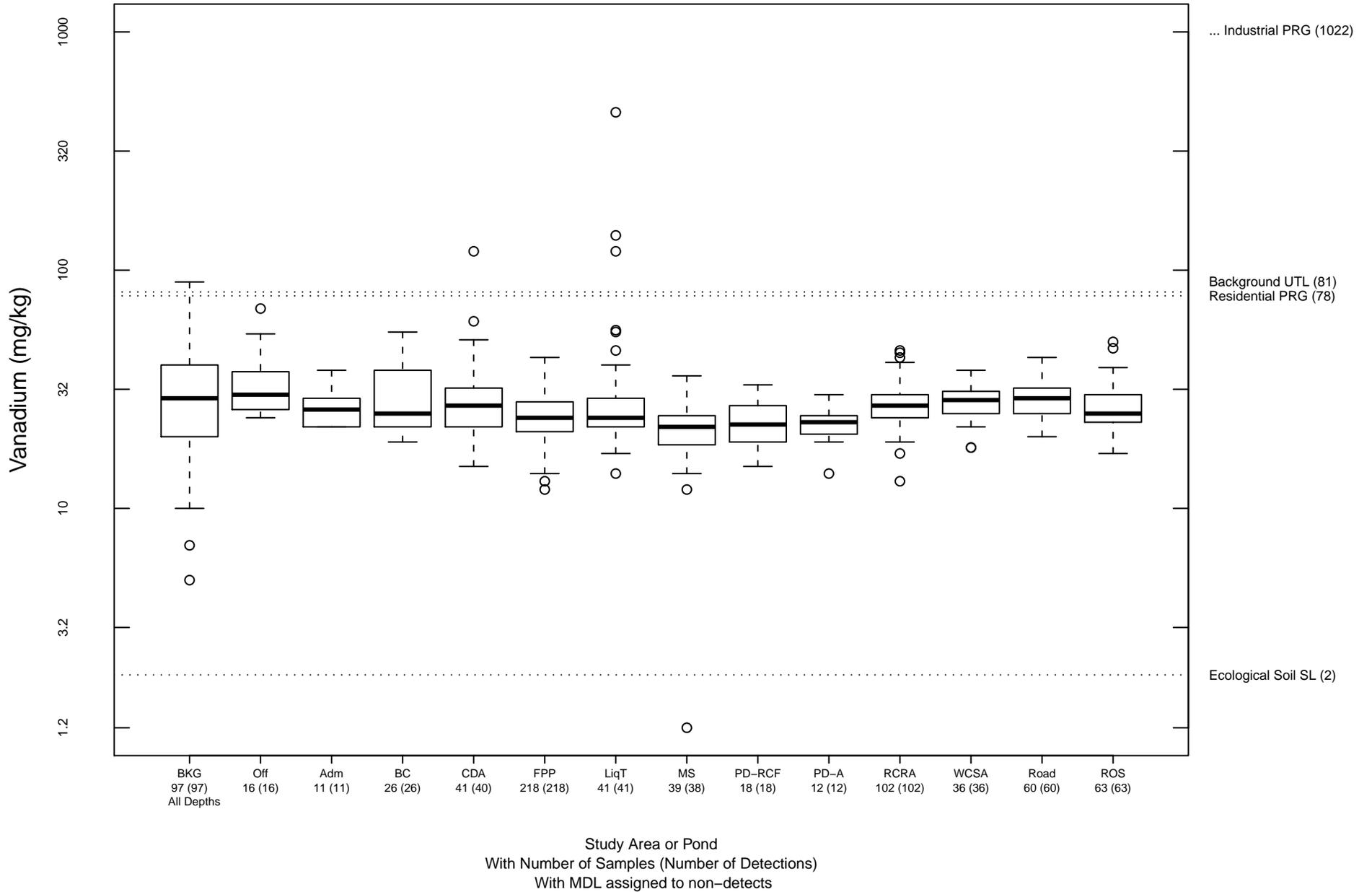


Figure B5-21
Log Scale Box Plots of Zinc (0 to 10 Feet)
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