ATTACHMENT B-2
UCL OUTPUT - NORTH PARCEL SOIL
TOTAL PCBS 0-5FT BGS

UCL Statistics for Data Sets with Non-Detects

User Selected Options	
Date/Time of Computation	6/17/2015 8:31:12 AM
From File	North Total PCBs 0-5ft UCL Input.xls
Full Precision	OFF
Confidence Coefficient	95%
Number of Bootstrap Operations	2000

Total-PCBs

General Statistics

Total Number of Observations	568	Number of Distinct Observations	129
		Number of Missing Observations	3
Number of Detects	180	Number of Non-Detects	388
Number of Distinct Detects	124	Number of Distinct Non-Detects	7
Minimum Detect	0.052	Minimum Non-Detect	0.02
Maximum Detect	7.01	Maximum Non-Detect	0.2
Variance Detects	0.925	Percent Non-Detects	68.31%
Mean Detects	0.632	SD Detects	0.962
Median Detects	0.27	CV Detects	1.521
Skewness Detects	3.117	Kurtosis Detects	12.63
Mean of Logged Detects	-1.218	SD of Logged Detects	1.195

Normal GOF Test on Detects Only

Shapiro Wilk Test Statistic	0.624	**Normal GOF Test on Detected Observations Only**
5% Shapiro Wilk P Value	0	Detected Data Not Normal at 5% Significance Level
Lilliefors Test Statistic	0.273	**Lilliefors GOF Test**
5% Lilliefors Critical Value	0.066	Detected Data Not Normal at 5% Significance Level

Detected Data Not Normal at 5% Significance Level

Kaplan-Meier (KM) Statistics using Normal Critical Values and other Nonparametric UCLs

Mean	0.214	Standard Error of Mean	0.0257
SD	0.61	95% KM (BCA) UCL	0.259
95% KM (t) UCL	0.257	95% KM (Percentile Bootstrap) UCL	0.262
95% KM (z) UCL	0.257	95% KM Bootstrap t UCL	0.264
90% KM Chebyshev UCL	0.292	95% KM Chebyshev UCL	0.326
97.5% KM Chebyshev UCL	0.375	99% KM Chebyshev UCL	0.47

Gamma GOF Tests on Detected Observations Only

A-D Test Statistic	6.407	**Anderson-Darling GOF Test**
5% A-D Critical Value	0.794	Detected Data Not Gamma Distributed at 5% Significance Level
K-S Test Statistic	0.148	**Kolmogrov-Smirnoff GOF**
5% K-S Critical Value	0.0715	Detected Data Not Gamma Distributed at 5% Significance Level

Detected Data Not Gamma Distributed at 5% Significance Level

Gamma Statistics on Detected Data Only

k hat (MLE)	0.784	k star (bias corrected MLE)	0.774
Theta hat (MLE)	0.807	Theta star (bias corrected MLE)	0.817
nu hat (MLE)	282.1	nu star (bias corrected)	278.7
MLE Mean (bias corrected)	0.632	MLE Sd (bias corrected)	0.719

Gamma Kaplan-Meier (KM) Statistics

k hat (KM)	0.123	nu hat (KM)	140.3
Approximate Chi Square Value (140.29, α)	113.9	Adjusted Chi Square Value (140.29, β)	113.9
95% Gamma Approximate KM-UCL (use when n>=50)	0.264	95% Gamma Adjusted KM-UCL (use when n<50)	0.264

Gamma ROS Statistics using Imputed Non-Detects

GROS may not be used when data set has > 50% NDs with many tied observations at multiple DLs
GROS may not be used when kstar of detected data is small such as < 0.1
For such situations, GROS method tends to yield inflated values of UCLs and BTVs
For gamma distributed detected data, BTVs and UCLs may be computed using gamma distribution on KM estimates

Minimum	0.01	Mean	0.207
Maximum	7.01	Median	0.01
SD	0.613	CV	2.959
k hat (MLE)	0.344	k star (bias corrected MLE)	0.344
Theta hat (MLE)	0.602	Theta star (bias corrected MLE)	0.603

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nu hat (MLE)	391.2	nu star (bias corrected)	390.5
MLE Mean (bias corrected)	0.207	MLE Sd (bias corrected)	0.353
		Adjusted Level of Significance (β)	0.0496
Approximate Chi Square Value (390.49, α)	345.7	Adjusted Chi Square Value (390.49, β)	345.6
95% Gamma Approximate UCL (use when n>=50)	0.234	95% Gamma Adjusted UCL (use when n<50)	0.234

Lognormal GOF Test on Detected Observations Only

Lilliefors Test Statistic	0.0729	**Lilliefors GOF Test**
5% Lilliefors Critical Value	0.066	Detected Data Not Lognormal at 5% Significance Level

Detected Data Not Lognormal at 5% Significance Level

Lognormal ROS Statistics Using Imputed Non-Detects

Mean in Original Scale	0.211	Mean in Log Scale	-3.768
SD in Original Scale	0.612	SD in Log Scale	2.254
95% t UCL (assumes normality of ROS data)	0.254	95% Percentile Bootstrap UCL	0.257
95% BCA Bootstrap UCL	0.259	95% Bootstrap t UCL	0.261
95% H-UCL (Log ROS)	0.405		

DL/2 Statistics

DL/2 Normal		**DL/2 Log-Transformed**	
Mean in Original Scale	0.218	Mean in Log Scale	-2.981
SD in Original Scale	0.61	SD in Log Scale	1.435
95% t UCL (Assumes normality)	0.26	95% H-Stat UCL	0.165

DL/2 is not a recommended method, provided for comparisons and historical reasons

Nonparametric Distribution Free UCL Statistics
Data do not follow a Discernible Distribution at 5% Significance Level

Suggested UCL to Use

95% KM (BCA) UCL	0.259

Note: Suggestions regarding the selection of a 95% UCL are provided to help the user to select the most appropriate 95% UCL.
Recommendations are based upon data size, data distribution, and skewness.
These recommendations are based upon the results of the simulation studies summarized in Singh, Maichle, and Lee (2006).
However, simulations results will not cover all Real World data sets; for additional insight the user may want to consult a statistician.