ATTACHMENT B-5
UCL OUTPUT - SOUTH 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 8:35:22 AM
From File	South 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	291	Number of Distinct Observations	57
		Number of Missing Observations	4
Number of Detects	58	Number of Non-Detects	233
Number of Distinct Detects	50	Number of Distinct Non-Detects	8
Minimum Detect	0.052	Minimum Non-Detect	0.02
Maximum Detect	3.15	Maximum Non-Detect	0.5
Variance Detects	0.237	Percent Non-Detects	80.07%
Mean Detects	0.329	SD Detects	0.487
Median Detects	0.208	CV Detects	1.481
Skewness Detects	4.183	Kurtosis Detects	21.07
Mean of Logged Detects	-1.655	SD of Logged Detects	0.978

Normal GOF Test on Detects Only

Shapiro Wilk Test Statistic	0.552	**Normal GOF Test on Detected Observations Only**
5% Shapiro Wilk P Value	0	Detected Data Not Normal at 5% Significance Level
Lilliefors Test Statistic	0.285	**Lilliefors GOF Test**
5% Lilliefors Critical Value	0.116	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	0.0821	Standard Error of Mean	0.0147
SD	0.248	95% KM (BCA) UCL	0.107
95% KM (t) UCL	0.106	95% KM (Percentile Bootstrap) UCL	0.108
95% KM (z) UCL	0.106	95% KM Bootstrap t UCL	0.123
90% KM Chebyshev UCL	0.126	95% KM Chebyshev UCL	0.146
97.5% KM Chebyshev UCL	0.174	99% KM Chebyshev UCL	0.228

Gamma GOF Tests on Detected Observations Only

A-D Test Statistic	2.034	**Anderson-Darling GOF Test**
5% A-D Critical Value	0.778	Detected Data Not Gamma Distributed at 5% Significance Level
K-S Test Statistic	0.135	**Kolmogrov-Smirnoff GOF**
5% K-S Critical Value	0.12	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)	1.057	k star (bias corrected MLE)	1.014
Theta hat (MLE)	0.311	Theta star (bias corrected MLE)	0.324
nu hat (MLE)	122.6	nu star (bias corrected)	117.6
MLE Mean (bias corrected)	0.329	MLE Sd (bias corrected)	0.327

Gamma Kaplan-Meier (KM) Statistics

k hat (KM)	0.109	nu hat (KM)	63.57
Approximate Chi Square Value (63.57, α)	46.23	Adjusted Chi Square Value (63.57, β)	46.15
95% Gamma Approximate KM-UCL (use when n>=50)	0.113	95% Gamma Adjusted KM-UCL (use when n<50)	0.113

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	0.0735
Maximum	3.15	Median	0.01
SD	0.251	CV	3.41
k hat (MLE)	0.458	k star (bias corrected MLE)	0.455
Theta hat (MLE)	0.161	Theta star (bias corrected MLE)	0.162
nu hat (MLE)	266.4	nu star (bias corrected)	265
MLE Mean (bias corrected)	0.0735	MLE Sd (bias corrected)	0.109
		Adjusted Level of Significance (β)	0.0492

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Approximate Chi Square Value (264.95, α)	228.3	Adjusted Chi Square Value (264.95, β)	228.1
95% Gamma Approximate UCL (use when n>=50)	0.0854	95% Gamma Adjusted UCL (use when n<50)	0.0854

Lognormal GOF Test on Detected Observations Only

Lilliefors Test Statistic	0.127	**Lilliefors GOF Test**	
5% Lilliefors Critical Value	0.116	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	0.0749	Mean in Log Scale	-4.564
SD in Original Scale	0.251	SD in Log Scale	2.038
95% t UCL (assumes normality of ROS data)	0.0992	95% Percentile Bootstrap UCL	0.102
95% BCA Bootstrap UCL	0.111	95% Bootstrap t UCL	0.116
95% H-UCL (Log ROS)	0.122		

DL/2 Statistics

DL/2 Normal		**DL/2 Log-Transformed**	
Mean in Original Scale	0.0884	Mean in Log Scale	-3.284
SD in Original Scale	0.248	SD in Log Scale	1.008
95% t UCL (Assumes normality)	0.112	95% H-Stat UCL	0.0707

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 (t) UCL	0.106	95% KM (% Bootstrap) UCL	0.108

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.