UCL Statistics for Data Sets with Non-Detects

	User Selected Options	
Date/Time of Computation	3/6/2016 10:02:27 PM	
From File	ProUCLinput_49-004_0-10.xls	
Full Precision	OFF	
Confidence Coefficient	95%	
Number of Bootstrap Operations	2000	

Aluminum

General Statistics

Total Number of Observations	157	Number of Distinct Observations	102
		Number of Missing Observations	0
Minimum	5740	Mean	12312
Maximum	35100	Median	11400
SD	4194	Std. Error of Mean	334.8
Coefficient of Variation	0.341	Skewness	1.78

Normal GOF Test

Shapiro Wilk Test Statistic	0.872	**Shapiro Wilk GOF Test**	
5% Shapiro Wilk P Value	0	Data Not Normal at 5% Significance Level	
Lilliefors Test Statistic	0.167	**Lilliefors GOF Test**	
5% Lilliefors Critical Value	0.0707	Data Not Normal at 5% Significance Level	

Data Not Normal at 5% Significance Level

Assuming Normal Distribution

95% Normal UCL		**95% UCLs (Adjusted for Skewness)**	
95% Student's-t UCL	12866	95% Adjusted-CLT UCL (Chen-1995)	12913
		95% Modified-t UCL (Johnson-1978)	12873

Gamma GOF Test

A-D Test Statistic	2.541	**Anderson-Darling Gamma GOF Test**	
5% A-D Critical Value	0.752	Data Not Gamma Distributed at 5% Significance Level	
K-S Test Statistic	0.124	**Kolmogrov-Smirnoff Gamma GOF Test**	
5% K-S Critical Value	0.0747	Data Not Gamma Distributed at 5% Significance Level	

Data Not Gamma Distributed at 5% Significance Level

Gamma Statistics

k hat (MLE)	10.49	k star (bias corrected MLE)	10.3
Theta hat (MLE)	1173	Theta star (bias corrected MLE)	1196
nu hat (MLE)	3295	nu star (bias corrected)	3233
MLE Mean (bias corrected)	12312	MLE Sd (bias corrected)	3837
		Approximate Chi Square Value (0.05)	3102
Adjusted Level of Significance	0.0485	Adjusted Chi Square Value	3101

Assuming Gamma Distribution

95% Approximate Gamma UCL (use when n>=50))	12832	95% Adjusted Gamma UCL (use when n<50)	12837

Lognormal GOF Test

Shapiro Wilk Test Statistic	0.969	**Shapiro Wilk Lognormal GOF Test**	
5% Shapiro Wilk P Value	0.0387	Data Not Lognormal at 5% Significance Level	
Lilliefors Test Statistic	0.101	**Lilliefors Lognormal GOF Test**	
5% Lilliefors Critical Value	0.0707	Data Not Lognormal at 5% Significance Level	

Data Not Lognormal at 5% Significance Level

Lognormal Statistics

Minimum of Logged Data	8.655	Mean of logged Data	9.37
Maximum of Logged Data	10.47	SD of logged Data	0.303

Assuming Lognormal Distribution

95% H-UCL	12810	90% Chebyshev (MVUE) UCL	13188
95% Chebyshev (MVUE) UCL	13601	97.5% Chebyshev (MVUE) UCL	14173
99% Chebyshev (MVUE) UCL	15297		

Nonparametric Distribution Free UCL Statistics
Data do not follow a Discernible Distribution (0.05)

Nonparametric Distribution Free UCLs

95% CLT UCL	12862	95% Jackknife UCL	12866
95% Standard Bootstrap UCL	12856	95% Bootstrap-t UCL	12909
95% Hall's Bootstrap UCL	12930	95% Percentile Bootstrap UCL	12843
95% BCA Bootstrap UCL	12895		
90% Chebyshev(Mean, Sd) UCL	13316	95% Chebyshev(Mean, Sd) UCL	13771
97.5% Chebyshev(Mean, Sd) UCL	14402	99% Chebyshev(Mean, Sd) UCL	15642

Suggested UCL to Use

95% Student's-t UCL	12866	or 95% Modified-t UCL	12873

Note: Suggestions regarding the selection of a 95% UCL are provided to help the user to select the most appropriate 95% UCL
These recommendations are based upon the results of the simulation studies summarized in Singh, Singh, and Iaci (2002)
and Singh and Singh (2003). However, simulations results will not cover all Real World data sets
For additional insight the user may want to consult a statistician.

Antimony

General Statistics

Total Number of Observations	157		Number of Distinct Observations	65
Number of Detects	96		Number of Non-Detects	61
Number of Distinct Detects	40		Number of Distinct Non-Detects	36
Minimum Detect	0.074		Minimum Non-Detect	0.17
Maximum Detect	0.45		Maximum Non-Detect	6.4
Variance Detects	0.00899		Percent Non-Detects	38.85%
Mean Detects	0.204		SD Detects	0.0948
Median Detects	0.175		CV Detects	0.466
Skewness Detects	0.82		Kurtosis Detects	-0.165
Mean of Logged Detects	-1.696		SD of Logged Detects	0.459

Normal GOF Test on Detects Only

Shapiro Wilk Test Statistic	0.906	**Normal GOF Test on Detected Observations Only**
5% Shapiro Wilk P Value	8.1275E-8	Detected Data Not Normal at 5% Significance Level
Lilliefors Test Statistic	0.138	**Lilliefors GOF Test**
5% Lilliefors Critical Value	0.0904	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	0.193	Standard Error of Mean	0.00854
SD	0.0899	95% KM (BCA) UCL	0.208
95% KM (t) UCL	0.207	95% KM (Percentile Bootstrap) UCL	0.208
95% KM (z) UCL	0.207	95% KM Bootstrap t UCL	0.208
90% KM Chebyshev UCL	0.219	95% KM Chebyshev UCL	0.23
97.5% KM Chebyshev UCL	0.246	99% KM Chebyshev UCL	0.278

Gamma GOF Tests on Detected Observations Only

A-D Test Statistic	0.913	**Anderson-Darling GOF Test**
5% A-D Critical Value	0.755	Detected Data Not Gamma Distributed at 5% Significance Level
K-S Test Statistic	0.0999	**Kolmogrov-Smirnoff GOF**
5% K-S Critical Value	0.0915	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)	4.971	k star (bias corrected MLE)	4.822
Theta hat (MLE)	0.0409	Theta star (bias corrected MLE)	0.0422
nu hat (MLE)	954.4	nu star (bias corrected)	925.9
MLE Mean (bias corrected)	0.204	MLE Sd (bias corrected)	0.0927

Gamma Kaplan-Meier (KM) Statistics

k hat (KM)	4.601	nu hat (KM)	1445
Approximate Chi Square Value (N/A, α)	1358	Adjusted Chi Square Value (N/A, β)	1357
95% Gamma Approximate KM-UCL (use when n>=50)	0.205	Gamma Adjusted KM-UCL (use when n<50)	0.205

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	0.074	Mean	0.191
Maximum	0.45	Median	0.18
SD	0.0794	CV	0.416
k hat (MLE)	6.665	k star (bias corrected MLE)	6.542
Theta hat (MLE)	0.0286	Theta star (bias corrected MLE)	0.0292
nu hat (MLE)	2093	nu star (bias corrected)	2054
MLE Mean (bias corrected)	0.191	MLE Sd (bias corrected)	0.0746
		Adjusted Level of Significance (β)	0.0485
Approximate Chi Square Value (N/A, α)	1950	Adjusted Chi Square Value (N/A, β)	1949
95% Gamma Approximate UCL (use when n>=50)	0.201	95% Gamma Adjusted UCL (use when n<50)	0.201

Lognormal GOF Test on Detected Observations Only

Lilliefors Test Statistic	0.0754	**Lilliefors GOF Test**
5% Lilliefors Critical Value	0.0904	Detected Data appear Lognormal at 5% Significance Level

Detected Data appear Approximate Lognormal at 5% Significance Level

Lognormal ROS Statistics Using Imputed Non-Detects

Mean in Original Scale	0.19	Mean in Log Scale	-1.739
SD in Original Scale	0.079	SD in Log Scale	0.384
95% t UCL (assumes normality of ROS data)	0.2	95% Percentile Bootstrap UCL	0.2
95% BCA Bootstrap UCL	0.2	95% Bootstrap t UCL	0.201
95% H-UCL (Log ROS)	0.2		

UCLs using Lognormal Distribution and KM Estimates when Detected data are Lognormally Distributed

KM Mean (logged)	-1.746	95% H-UCL (KM -Log)	0.205
KM SD (logged)	0.444	95% Critical H Value (KM-Log)	1.801
KM Standard Error of Mean (logged)	0.0432		

DL/2 Statistics

DL/2 Normal			DL/2 Log-Transformed	
Mean in Original Scale	0.339		Mean in Log Scale	-1.498
SD in Original Scale	0.553		SD in Log Scale	0.736
95% t UCL (Assumes normality)	0.412		95% H-Stat UCL	0.33

Nonparametric Distribution Free UCL Statistics
Detected Data appear Approximate Lognormal Distributed at 5% Significance Level

Suggested UCL to Use

95% KM (BCA) UCL	0.208	

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

Barium

General Statistics

Total Number of Observations	157		Number of Distinct Observations	102
			Number of Missing Observations	0
Minimum	88.7		Mean	190.1
Maximum	403		Median	188
SD	46.98		Std. Error of Mean	3.749
Coefficient of Variation	0.247		Skewness	0.812

Normal GOF Test

Shapiro Wilk Test Statistic	0.969		**Shapiro Wilk GOF Test**
5% Shapiro Wilk P Value	0.0338		Data Not Normal at 5% Significance Level
Lilliefors Test Statistic	0.0578		**Lilliefors GOF Test**
5% Lilliefors Critical Value	0.0707		Data appear Normal at 5% Significance Level

Data appear Approximate Normal at 5% Significance Level

Assuming Normal Distribution

95% Normal UCL			95% UCLs (Adjusted for Skewness)	
95% Student's-t UCL	196.3		95% Adjusted-CLT UCL (Chen-1995)	196.5
			95% Modified-t UCL (Johnson-1978)	196.3

Gamma GOF Test

A-D Test Statistic	0.283		**Anderson-Darling Gamma GOF Test**
5% A-D Critical Value	0.751		Detected data appear Gamma Distributed at 5% Significance Le
K-S Test Statistic	0.0476		**Kolmogrov-Smirnoff Gamma GOF Test**
5% K-S Critical Value	0.0746		Detected data appear Gamma Distributed at 5% Significance Le

Detected data appear Gamma Distributed at 5% Significance Level

Gamma Statistics

k hat (MLE)	16.99		k star (bias corrected MLE)	16.67
Theta hat (MLE)	11.19		Theta star (bias corrected MLE)	11.4
nu hat (MLE)	5336		nu star (bias corrected)	5235
MLE Mean (bias corrected)	190.1		MLE Sd (bias corrected)	46.55
			Approximate Chi Square Value (0.05)	5068
Adjusted Level of Significance	0.0485		Adjusted Chi Square Value	5067

Assuming Gamma Distribution

95% Approximate Gamma UCL (use when n>=50))	196.3		95% Adjusted Gamma UCL (use when n<50)	196.4

Lognormal GOF Test

Shapiro Wilk Test Statistic	0.991		**Shapiro Wilk Lognormal GOF Test**
5% Shapiro Wilk P Value	0.957		Data appear Lognormal at 5% Significance Level
Lilliefors Test Statistic	0.0637		**Lilliefors Lognormal GOF Test**
5% Lilliefors Critical Value	0.0707		Data appear Lognormal at 5% Significance Level

Data appear Lognormal at 5% Significance Level

Lognormal Statistics

Minimum of Logged Data	4.485		Mean of logged Data	5.218
Maximum of Logged Data	5.999		SD of logged Data	0.246

Assuming Lognormal Distribution

95% H-UCL	196.7		90% Chebyshev (MVUE) UCL	201.5
95% Chebyshev (MVUE) UCL	206.6		97.5% Chebyshev (MVUE) UCL	213.7
99% Chebyshev (MVUE) UCL	227.7			

Nonparametric Distribution Free UCL Statistics
Data appear to follow a Discernible Distribution at 5% Significance Level

Nonparametric Distribution Free UCLs

95% CLT UCL	196.2		95% Jackknife UCL	196.3
95% Standard Bootstrap UCL	196.2		95% Bootstrap-t UCL	196.6
95% Hall's Bootstrap UCL	196.7		95% Percentile Bootstrap UCL	196
95% BCA Bootstrap UCL	196			
90% Chebyshev(Mean, Sd) UCL	201.3		95% Chebyshev(Mean, Sd) UCL	206.4
97.5% Chebyshev(Mean, Sd) UCL	213.5		99% Chebyshev(Mean, Sd) UCL	227.4

Suggested UCL to Use

95% Student's-t UCL	196.3	

Note: Suggestions regarding the selection of a 95% UCL are provided to help the user to select the most appropriate 95% UCL

Cesium-137

General Statistics

Total Number of Observations	173	Number of Distinct Observations	123
Number of Detects	38	Number of Non-Detects	135
Number of Distinct Detects	36	Number of Distinct Non-Detects	89
Minimum Detect	0.09	Minimum Non-Detect	-0.036
Maximum Detect	3.28	Maximum Non-Detect	0.168
Variance Detects	0.512	Percent Non-Detects	78.03%
Mean Detects	0.528	SD Detects	0.716
Median Detects	0.231	CV Detects	1.356
Skewness Detects	2.419	Kurtosis Detects	5.776

Normal GOF Test on Detects Only

Shapiro Wilk Test Statistic	0.619	**Shapiro Wilk GOF Test**
5% Shapiro Wilk Critical Value	0.938	Detected Data Not Normal at 5% Significance Level
Lilliefors Test Statistic	0.372	**Lilliefors GOF Test**
5% Lilliefors Critical Value	0.144	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	0.088	Standard Error of Mean	0.0312
SD	0.405	95% KM (BCA) UCL	0.144
95% KM (t) UCL	0.14	95% KM (Percentile Bootstrap) UCL	0.142
95% KM (z) UCL	0.139	95% KM Bootstrap t UCL	0.164
90% KM Chebyshev UCL	0.182	95% KM Chebyshev UCL	0.224
97.5% KM Chebyshev UCL	0.283	99% KM Chebyshev UCL	0.398

Gamma GOF Tests on Detected Observations Only

A-D Test Statistic	3.298	**Anderson-Darling GOF Test**
5% A-D Critical Value	0.777	Detected Data Not Gamma Distributed at 5% Significance Level
K-S Test Statistic	0.283	**Kolmogrov-Smirnoff GOF**
5% K-S Critical Value	0.147	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)	1.036	k star (bias corrected MLE)	0.972
Theta hat (MLE)	0.509	Theta star (bias corrected MLE)	0.543
nu hat (MLE)	78.75	nu star (bias corrected)	73.86
MLE Mean (bias corrected)	0.528	MLE Sd (bias corrected)	0.535

Gamma Kaplan-Meier (KM) Statistics

k hat (KM)	0.0472	nu hat (KM)	16.33
		Adjusted Level of Significance (β)	0.0486
Approximate Chi Square Value (16.33, α)	8.196	Adjusted Chi Square Value (16.33, β)	8.148
95% Gamma Approximate KM-UCL (use when n>=50)	0.175	95% Gamma Adjusted KM-UCL (use when n<50)	0.176
Gamma (KM) may not be used when k hat (KM) is < 0.1			

DL/2 Statistics

Mean in Original Scale	0.129	SD in Original Scale	0.395
95% t UCL (Assumes normality)	0.178		
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

97.5% KM (Chebyshev) UCL	0.283

Chromium

General Statistics

Total Number of Observations	157	Number of Distinct Observations	71
		Number of Missing Observations	0
Minimum	4.9	Mean	9.621
Maximum	14.4	Median	9.7
SD	1.791	Std. Error of Mean	0.143
Coefficient of Variation	0.186	Skewness	-0.0816

Normal GOF Test

Shapiro Wilk Test Statistic	0.982	**Shapiro Wilk GOF Test**
5% Shapiro Wilk P Value	0.549	Data appear Normal at 5% Significance Level
Lilliefors Test Statistic	0.0506	**Lilliefors GOF Test**
5% Lilliefors Critical Value	0.0707	Data appear Normal at 5% Significance Level

Data appear Normal at 5% Significance Level

Assuming Normal Distribution

95% Normal UCL			95% UCLs (Adjusted for Skewness)		
95% Student's-t UCL	9.857		95% Adjusted-CLT UCL (Chen-1995)	9.855
			95% Modified-t UCL (Johnson-1978)	9.857

Gamma GOF Test

A-D Test Statistic	0.88		**Anderson-Darling Gamma GOF Test**	
5% A-D Critical Value	0.75		Data Not Gamma Distributed at 5% Significance Level	
K-S Test Statistic	0.0725		**Kolmogrov-Smirnoff Gamma GOF Test**	
5% K-S Critical Value	0.0746		etected data appear Gamma Distributed at 5% Significance Lev	

Detected data follow Appr. Gamma Distribution at 5% Significance Level

Gamma Statistics

k hat (MLE)	27.23		k star (bias corrected MLE)	26.71
Theta hat (MLE)	0.353		Theta star (bias corrected MLE)	0.36
nu hat (MLE)	8550		nu star (bias corrected)	8388
MLE Mean (bias corrected)	9.621		MLE Sd (bias corrected)	1.861
			Approximate Chi Square Value (0.05)	8176
Adjusted Level of Significance	0.0485		Adjusted Chi Square Value	8174

Assuming Gamma Distribution

95% Approximate Gamma UCL (use when n>=50))	9.87		Adjusted Gamma UCL (use when n<50)	9.872

Lognormal GOF Test

Shapiro Wilk Test Statistic	0.956		**Shapiro Wilk Lognormal GOF Test**	
5% Shapiro Wilk P Value	4.2759E-4		Data Not Lognormal at 5% Significance Level	
Lilliefors Test Statistic	0.085		**Lilliefors Lognormal GOF Test**	
5% Lilliefors Critical Value	0.0707		Data Not Lognormal at 5% Significance Level	

Data Not Lognormal at 5% Significance Level

Lognormal Statistics

Minimum of Logged Data	1.589		Mean of logged Data	2.245
Maximum of Logged Data	2.667		SD of logged Data	0.197

Assuming Lognormal Distribution

95% H-UCL	9.892		90% Chebyshev (MVUE) UCL	10.09
95% Chebyshev (MVUE) UCL	10.3		97.5% Chebyshev (MVUE) UCL	10.59
99% Chebyshev (MVUE) UCL	11.15			

Nonparametric Distribution Free UCL Statistics
Data appear to follow a Discernible Distribution at 5% Significance Level

Nonparametric Distribution Free UCLs

95% CLT UCL	9.856		95% Jackknife UCL	9.857
95% Standard Bootstrap UCL	9.855		95% Bootstrap-t UCL	9.863
95% Hall's Bootstrap UCL	9.856		95% Percentile Bootstrap UCL	9.867
95% BCA Bootstrap UCL	9.858			
90% Chebyshev(Mean, Sd) UCL	10.05		95% Chebyshev(Mean, Sd) UCL	10.24
97.5% Chebyshev(Mean, Sd) UCL	10.51		99% Chebyshev(Mean, Sd) UCL	11.04

Suggested UCL to Use

95% Student's-t UCL	9.857		

Note: Suggestions regarding the selection of a 95% UCL are provided to help the user to select the most appropriate 95% UCL

These recommendations are based upon the results of the simulation studies summarized in Singh, Singh, and Iaci (2002)

and Singh and Singh (2003). However, simulations results will not cover all Real World data sets

For additional insight the user may want to consult a statistician.

Note: For highly negatively-skewed data, confidence limits (e.g., Chen, Johnson, Lognormal, and Gamma) may not be reliable. Chen's and Johnson's methods provide adjustments for positvely skewed data sets.

Cobalt

General Statistics

Total Number of Observations	157		Number of Distinct Observations	64
			Number of Missing Observations	0
Minimum	1.67		Mean	6.266
Maximum	14.9		Median	6.3
SD	1.696		Std. Error of Mean	0.135
Coefficient of Variation	0.271		Skewness	1.103

Normal GOF Test

Shapiro Wilk Test Statistic	0.941		**Shapiro Wilk GOF Test**	
5% Shapiro Wilk P Value	8.6452E-7		Data Not Normal at 5% Significance Level	
Lilliefors Test Statistic	0.0863		**Lilliefors GOF Test**	
5% Lilliefors Critical Value	0.0707		Data Not Normal at 5% Significance Level	

Data Not Normal at 5% Significance Level

Assuming Normal Distribution

95% Normal UCL			95% UCLs (Adjusted for Skewness)		
95% Student's-t UCL	6.49		95% Adjusted-CLT UCL (Chen-1995)	6.502
			95% Modified-t UCL (Johnson-1978)	6.492

	A	B	C	D	E	F	G	H	I	J	K	L
426												
427						Gamma GOF Test						
428				A-D Test Statistic		1.581		Anderson-Darling Gamma GOF Test				
429				5% A-D Critical Value		0.751		Data Not Gamma Distributed at 5% Significance Level				
430				K-S Test Statistic		0.0763		Kolmogrov-Smirnoff Gamma GOF Test				
431				5% K-S Critical Value		0.0746		Data Not Gamma Distributed at 5% Significance Level				
432						Data Not Gamma Distributed at 5% Significance Level						
433												
434						Gamma Statistics						
435				k hat (MLE)		13.68		k star (bias corrected MLE)				13.43
436				Theta hat (MLE)		0.458		Theta star (bias corrected MLE)				0.467
437				nu hat (MLE)		4297		nu star (bias corrected)				4216
438				MLE Mean (bias corrected)		6.266		MLE Sd (bias corrected)				1.71
439								Approximate Chi Square Value (0.05)				4066
440				Adjusted Level of Significance		0.0485		Adjusted Chi Square Value				4065
441												
442						Assuming Gamma Distribution						
443			95% Approximate Gamma UCL (use when n>=50))			6.497		Adjusted Gamma UCL (use when n<50)				6.499
444												
445						Lognormal GOF Test						
446				Shapiro Wilk Test Statistic		0.953		Shapiro Wilk Lognormal GOF Test				
447				5% Shapiro Wilk P Value		1.7582E-4		Data Not Lognormal at 5% Significance Level				
448				Lilliefors Test Statistic		0.0926		Lilliefors Lognormal GOF Test				
449				5% Lilliefors Critical Value		0.0707		Data Not Lognormal at 5% Significance Level				
450						Data Not Lognormal at 5% Significance Level						
451												
452						Lognormal Statistics						
453				Minimum of Logged Data		0.513		Mean of logged Data				1.798
454				Maximum of Logged Data		2.701		SD of logged Data				0.281
455												
456						Assuming Lognormal Distribution						
457				95% H-UCL		6.531		90% Chebyshev (MVUE) UCL				6.711
458			95% Chebyshev (MVUE) UCL			6.906		97.5% Chebyshev (MVUE) UCL				7.176
459			99% Chebyshev (MVUE) UCL			7.708						
460												
461						Nonparametric Distribution Free UCL Statistics						
462						Data do not follow a Discernible Distribution (0.05)						
463												
464						Nonparametric Distribution Free UCLs						
465				95% CLT UCL		6.489		95% Jackknife UCL				6.49
466			95% Standard Bootstrap UCL			6.486		95% Bootstrap-t UCL				6.506
467			95% Hall's Bootstrap UCL			6.51		95% Percentile Bootstrap UCL				6.499
468			95% BCA Bootstrap UCL			6.488						
469			90% Chebyshev(Mean, Sd) UCL			6.672		95% Chebyshev(Mean, Sd) UCL				6.856
470			97.5% Chebyshev(Mean, Sd) UCL			7.111		99% Chebyshev(Mean, Sd) UCL				7.613
471												
472						Suggested UCL to Use						
473				95% Student's-t UCL		6.49			or 95% Modified-t UCL			6.492
474												
475		Note: Suggestions regarding the selection of a 95% UCL are provided to help the user to select the most appropriate 95% UCL										
476		These recommendations are based upon the results of the simulation studies summarized in Singh, Singh, and Iaci (2002)										
477		and Singh and Singh (2003). However, simulations results will not cover all Real World data sets										
478		For additional insight the user may want to consult a statistician.										
479												
480												
481	Copper											
482												
483						General Statistics						
484				Total Number of Observations		157		Number of Distinct Observations				87
485								Number of Missing Observations				0
486				Minimum		3.69		Mean				11.85
487				Maximum		339		Median				8
488				SD		28		Std. Error of Mean				2.235
489				Coefficient of Variation		2.363		Skewness				10.73
490												
491						Normal GOF Test						
492				Shapiro Wilk Test Statistic		0.191		Shapiro Wilk GOF Test				
493				5% Shapiro Wilk P Value		0		Data Not Normal at 5% Significance Level				
494				Lilliefors Test Statistic		0.385		Lilliefors GOF Test				
495				5% Lilliefors Critical Value		0.0707		Data Not Normal at 5% Significance Level				
496						Data Not Normal at 5% Significance Level						
497												
498						Assuming Normal Distribution						
499			95% Normal UCL					95% UCLs (Adjusted for Skewness)				
500				95% Student's-t UCL		15.55		95% Adjusted-CLT UCL (Chen-1995)				17.57
501								95% Modified-t UCL (Johnson-1978)				15.87
502												
503						Gamma GOF Test						
504				A-D Test Statistic		6.369E+28		Anderson-Darling Gamma GOF Test				
505				5% A-D Critical Value		0.768		Data Not Gamma Distributed at 5% Significance Level				
506				K-S Test Statistic		0.25		Kolmogrov-Smirnoff Gamma GOF Test				
507				5% K-S Critical Value		0.0759		Data Not Gamma Distributed at 5% Significance Level				
508						Data Not Gamma Distributed at 5% Significance Level						
509												
510						Gamma Statistics						

	A	B	C	D	E	F	G	H	I	J	K	L
511					k hat (MLE)	1.803			k star (bias corrected MLE)			1.772
512					Theta hat (MLE)	6.573			Theta star (bias corrected MLE)			6.685
513					nu hat (MLE)	566			nu star (bias corrected)			556.5
514				MLE Mean (bias corrected)		11.85			MLE Sd (bias corrected)			8.9
515									Approximate Chi Square Value (0.05)			502.8
516				Adjusted Level of Significance		0.0485			Adjusted Chi Square Value			502.4
517												
518						**Assuming Gamma Distribution**						
519		95% Approximate Gamma UCL (use when n>=50))				13.11		% Adjusted Gamma UCL (use when n<50)				13.13
520												
521						**Lognormal GOF Test**						
522			Shapiro Wilk Test Statistic			0.776			**Shapiro Wilk Lognormal GOF Test**			
523			5% Shapiro Wilk P Value			0			Data Not Lognormal at 5% Significance Level			
524			Lilliefors Test Statistic			0.178			**Lilliefors Lognormal GOF Test**			
525			5% Lilliefors Critical Value			0.0707			Data Not Lognormal at 5% Significance Level			
526					**Data Not Lognormal at 5% Significance Level**							
527												
528						**Lognormal Statistics**						
529			Minimum of Logged Data			1.306			Mean of logged Data			2.17
530			Maximum of Logged Data			5.826			SD of logged Data			0.513
531												
532						**Assuming Lognormal Distribution**						
533					95% H-UCL	10.77			90% Chebyshev (MVUE) UCL			11.27
534			95% Chebyshev (MVUE) UCL			11.86			97.5% Chebyshev (MVUE) UCL			12.68
535			99% Chebyshev (MVUE) UCL			14.28						
536												
537					**Nonparametric Distribution Free UCL Statistics**							
538					**Data do not follow a Discernible Distribution (0.05)**							
539												
540					**Nonparametric Distribution Free UCLs**							
541				95% CLT UCL		15.52			95% Jackknife UCL			15.55
542		95% Standard Bootstrap UCL				15.48			95% Bootstrap-t UCL			33.45
543			95% Hall's Bootstrap UCL			31.79			95% Percentile Bootstrap UCL			15.74
544			95% BCA Bootstrap UCL			18.29						
545		90% Chebyshev(Mean, Sd) UCL				18.55			95% Chebyshev(Mean, Sd) UCL			21.59
546		97.5% Chebyshev(Mean, Sd) UCL				25.8			99% Chebyshev(Mean, Sd) UCL			34.08
547												
548						**Suggested UCL to Use**						
549		95% Chebyshev (Mean, Sd) UCL				21.59						
550												
551		Note: Suggestions regarding the selection of a 95% UCL are provided to help the user to select the most appropriate 95% UCL										
552		These recommendations are based upon the results of the simulation studies summarized in Singh, Singh, and laci (2002)										
553		and Singh and Singh (2003). However, simulations results will not cover all Real World data sets										
554		For additional insight the user may want to consult a statistician.										
555												
556												
557	Iron											
558												
559						**General Statistics**						
560			Total Number of Observations			157			Number of Distinct Observations			84
561									Number of Missing Observations			0
562					Minimum	5750			Mean			12462
563					Maximum	19000			Median			12500
564					SD	2334			Std. Error of Mean			186.3
565				Coefficient of Variation		0.187			Skewness			-0.153
566												
567						**Normal GOF Test**						
568			Shapiro Wilk Test Statistic			0.989			**Shapiro Wilk GOF Test**			
569			5% Shapiro Wilk P Value			0.907			Data appear Normal at 5% Significance Level			
570			Lilliefors Test Statistic			0.0471			**Lilliefors GOF Test**			
571			5% Lilliefors Critical Value			0.0707			Data appear Normal at 5% Significance Level			
572					**Data appear Normal at 5% Significance Level**							
573												
574						**Assuming Normal Distribution**						
575		**95% Normal UCL**							**95% UCLs (Adjusted for Skewness)**			
576				95% Student's-t UCL		12770		95% Adjusted-CLT UCL (Chen-1995)				12766
577								95% Modified-t UCL (Johnson-1978)				12770
578												
579						**Gamma GOF Test**						
580				A-D Test Statistic		0.762			**Anderson-Darling Gamma GOF Test**			
581				5% A-D Critical Value		0.75			Data Not Gamma Distributed at 5% Significance Level			
582				K-S Test Statistic		0.0723			**Kolmogrov-Smirnoff Gamma GOF Test**			
583				5% K-S Critical Value		0.0746		etected data appear Gamma Distributed at 5% Significance Le				
584					**Detected data follow Appr. Gamma Distribution at 5% Significance Level**							
585												
586						**Gamma Statistics**						
587					k hat (MLE)	26.66			k star (bias corrected MLE)			26.15
588					Theta hat (MLE)	467.5			Theta star (bias corrected MLE)			476.6
589					nu hat (MLE)	8370			nu star (bias corrected)			8211
590				MLE Mean (bias corrected)		12462			MLE Sd (bias corrected)			2437
591									Approximate Chi Square Value (0.05)			8002
592				Adjusted Level of Significance		0.0485			Adjusted Chi Square Value			8000
593												
594						**Assuming Gamma Distribution**						
595		95% Approximate Gamma UCL (use when n>=50))				12789		% Adjusted Gamma UCL (use when n<50)				12792

Lognormal GOF Test

Shapiro Wilk Test Statistic	0.96	**Shapiro Wilk Lognormal GOF Test**
5% Shapiro Wilk P Value	0.00184	Data Not Lognormal at 5% Significance Level
Lilliefors Test Statistic	0.0863	**Lilliefors Lognormal GOF Test**
5% Lilliefors Critical Value	0.0707	Data Not Lognormal at 5% Significance Level

Data Not Lognormal at 5% Significance Level

Lognormal Statistics

Minimum of Logged Data	8.657	Mean of logged Data	9.412
Maximum of Logged Data	9.852	SD of logged Data	0.2

Assuming Lognormal Distribution

95% H-UCL	12820	90% Chebyshev (MVUE) UCL	13078
95% Chebyshev (MVUE) UCL	13351	97.5% Chebyshev (MVUE) UCL	13730
99% Chebyshev (MVUE) UCL	14475		

Nonparametric Distribution Free UCL Statistics
Data appear to follow a Discernible Distribution at 5% Significance Level

Nonparametric Distribution Free UCLs

95% CLT UCL	12769	95% Jackknife UCL	12770
95% Standard Bootstrap UCL	12761	95% Bootstrap-t UCL	12776
95% Hall's Bootstrap UCL	12792	95% Percentile Bootstrap UCL	12759
95% BCA Bootstrap UCL	12786		
90% Chebyshev(Mean, Sd) UCL	13021	95% Chebyshev(Mean, Sd) UCL	13274
97.5% Chebyshev(Mean, Sd) UCL	13625	99% Chebyshev(Mean, Sd) UCL	14316

Suggested UCL to Use

95% Student's-t UCL	12770

Note: Suggestions regarding the selection of a 95% UCL are provided to help the user to select the most appropriate 95% UCL
These recommendations are based upon the results of the simulation studies summarized in Singh, Singh, and Iaci (2002)
and Singh and Singh (2003). However, simulations results will not cover all Real World data sets
For additional insight the user may want to consult a statistician.

Note: For highly negatively-skewed data, confidence limits (e.g., Chen, Johnson, Lognormal, and Gamma) may not be reliable. Chen's and Johnson's methods provide adjustments for positvely skewed data sets.

Lead

General Statistics

Total Number of Observations	157	Number of Distinct Observations	86
		Number of Missing Observations	0
Minimum	5.6	Mean	16.16
Maximum	64.5	Median	15.2
SD	6.262	Std. Error of Mean	0.5
Coefficient of Variation	0.387	Skewness	4.327

Normal GOF Test

Shapiro Wilk Test Statistic	0.658	**Shapiro Wilk GOF Test**
5% Shapiro Wilk P Value	0	Data Not Normal at 5% Significance Level
Lilliefors Test Statistic	0.221	**Lilliefors GOF Test**
5% Lilliefors Critical Value	0.0707	Data Not Normal at 5% Significance Level

Data Not Normal at 5% Significance Level

Assuming Normal Distribution

95% Normal UCL		**95% UCLs (Adjusted for Skewness)**	
95% Student's-t UCL	16.99	95% Adjusted-CLT UCL (Chen-1995)	17.17
		95% Modified-t UCL (Johnson-1978)	17.02

Gamma GOF Test

A-D Test Statistic	6.245	**Anderson-Darling Gamma GOF Test**
5% A-D Critical Value	0.752	Data Not Gamma Distributed at 5% Significance Level
K-S Test Statistic	0.16	**Kolmogrov-Smirnoff Gamma GOF Test**
5% K-S Critical Value	0.0747	Data Not Gamma Distributed at 5% Significance Level

Data Not Gamma Distributed at 5% Significance Level

Gamma Statistics

k hat (MLE)	10.61	k star (bias corrected MLE)	10.41
Theta hat (MLE)	1.523	Theta star (bias corrected MLE)	1.552
nu hat (MLE)	3332	nu star (bias corrected)	3270
MLE Mean (bias corrected)	16.16	MLE Sd (bias corrected)	5.009
		Approximate Chi Square Value (0.05)	3138
Adjusted Level of Significance	0.0485	Adjusted Chi Square Value	3137

Assuming Gamma Distribution

95% Approximate Gamma UCL (use when n>=50))	16.84	95% Adjusted Gamma UCL (use when n<50)	16.85

Lognormal GOF Test

Shapiro Wilk Test Statistic	0.901	**Shapiro Wilk Lognormal GOF Test**
5% Shapiro Wilk P Value	7.772E-16	Data Not Lognormal at 5% Significance Level
Lilliefors Test Statistic	0.133	**Lilliefors Lognormal GOF Test**
5% Lilliefors Critical Value	0.0707	Data Not Lognormal at 5% Significance Level

Lognormal Statistics

Minimum of Logged Data	1.723	Mean of logged Data 2.735
Maximum of Logged Data	4.167	SD of logged Data 0.291

Assuming Lognormal Distribution

95% H-UCL	16.74	90% Chebyshev (MVUE) UCL	17.21
95% Chebyshev (MVUE) UCL	17.73	97.5% Chebyshev (MVUE) UCL	18.45
99% Chebyshev (MVUE) UCL	19.86		

Nonparametric Distribution Free UCL Statistics
Data do not follow a Discernible Distribution (0.05)

Nonparametric Distribution Free UCLs

95% CLT UCL	16.99	95% Jackknife UCL	16.99
95% Standard Bootstrap UCL	16.95	95% Bootstrap-t UCL	17.28
95% Hall's Bootstrap UCL	17.48	95% Percentile Bootstrap UCL	17.01
95% BCA Bootstrap UCL	17.18		
90% Chebyshev(Mean, Sd) UCL	17.66	95% Chebyshev(Mean, Sd) UCL	18.34
97.5% Chebyshev(Mean, Sd) UCL	19.28	99% Chebyshev(Mean, Sd) UCL	21.14

Suggested UCL to Use

95% Student's-t UCL	16.99	or 95% Modified-t UCL	17.02

Note: Suggestions regarding the selection of a 95% UCL are provided to help the user to select the most appropriate 95% UCL
These recommendations are based upon the results of the simulation studies summarized in Singh, Singh, and Iaci (2002`
and Singh and Singh (2003). However, simulations results will not cover all Real World data sets
For additional insight the user may want to consult a statistician.

Nickel

General Statistics

Total Number of Observations	157	Number of Distinct Observations	69
		Number of Missing Observations	0
Minimum	4.9	Mean	8.772
Maximum	19.6	Median	8.6
SD	1.903	Std. Error of Mean	0.152
Coefficient of Variation	0.217	Skewness	1.437

Normal GOF Test

Shapiro Wilk Test Statistic	0.933	**Shapiro Wilk GOF Test**
5% Shapiro Wilk P Value	1.7187E-8	Data Not Normal at 5% Significance Level
Lilliefors Test Statistic	0.099	**Lilliefors GOF Test**
5% Lilliefors Critical Value	0.0707	Data Not Normal at 5% Significance Level

Data Not Normal at 5% Significance Level

Assuming Normal Distribution

95% Normal UCL		95% UCLs (Adjusted for Skewness)	
95% Student's-t UCL	9.024	95% Adjusted-CLT UCL (Chen-1995)	9.041
		95% Modified-t UCL (Johnson-1978)	9.027

Gamma GOF Test

A-D Test Statistic	0.834	**Anderson-Darling Gamma GOF Test**
5% A-D Critical Value	0.751	Data Not Gamma Distributed at 5% Significance Level
K-S Test Statistic	0.0699	**Kolmogrov-Smirnoff Gamma GOF Test**
5% K-S Critical Value	0.0746	etected data appear Gamma Distributed at 5% Significance Le

Detected data follow Appr. Gamma Distribution at 5% Significance Level

Gamma Statistics

k hat (MLE)	23.28	k star (bias corrected MLE)	22.84
Theta hat (MLE)	0.377	Theta star (bias corrected MLE)	0.384
nu hat (MLE)	7311	nu star (bias corrected)	7172
MLE Mean (bias corrected)	8.772	MLE Sd (bias corrected)	1.836
		Approximate Chi Square Value (0.05)	6976
Adjusted Level of Significance	0.0485	Adjusted Chi Square Value	6975

Assuming Gamma Distribution

95% Approximate Gamma UCL (use when n>=50)	9.019	Adjusted Gamma UCL (use when n<50)	9.021

Lognormal GOF Test

Shapiro Wilk Test Statistic	0.981	**Shapiro Wilk Lognormal GOF Test**
5% Shapiro Wilk P Value	0.43	Data appear Lognormal at 5% Significance Level
Lilliefors Test Statistic	0.0582	**Lilliefors Lognormal GOF Test**
5% Lilliefors Critical Value	0.0707	Data appear Lognormal at 5% Significance Level

Data appear Lognormal at 5% Significance Level

Lognormal Statistics

Minimum of Logged Data	1.589	Mean of logged Data 2.15
Maximum of Logged Data	2.976	SD of logged Data 0.207

Assuming Lognormal Distribution

95% H-UCL	9.021	90% Chebyshev (MVUE) UCL	9.209
95% Chebyshev (MVUE) UCL	9.408	97.5% Chebyshev (MVUE) UCL	9.684

	A	B	C	D	E	F	G	H	I	J	K	L
766					99% Chebyshev (MVUE) UCL	10.23						
767												
768					**Nonparametric Distribution Free UCL Statistics**							
769					**Data appear to follow a Discernible Distribution at 5% Significance Level**							
770												
771					**Nonparametric Distribution Free UCLs**							
772				95% CLT UCL		9.022			95% Jackknife UCL			9.024
773			95% Standard Bootstrap UCL			9.017			95% Bootstrap-t UCL			9.037
774			95% Hall's Bootstrap UCL			9.061		95% Percentile Bootstrap UCL				9.03
775			95% BCA Bootstrap UCL			9.042						
776			90% Chebyshev(Mean, Sd) UCL			9.228		95% Chebyshev(Mean, Sd) UCL				9.435
777			97.5% Chebyshev(Mean, Sd) UCL			9.721		99% Chebyshev(Mean, Sd) UCL				10.28
778												
779					**Suggested UCL to Use**							
780			95% Approximate Gamma UCL			9.019						
781												
782		Note: Suggestions regarding the selection of a 95% UCL are provided to help the user to select the most appropriate 95% UCL										
783		These recommendations are based upon the results of the simulation studies summarized in Singh, Singh, and Iaci (2002)										
784		and Singh and Singh (2003). However, simulations results will not cover all Real World data sets										
785		For additional insight the user may want to consult a statistician.										
786												
787	Perchlorate											
788												
789					**General Statistics**							
790			Total Number of Observations			8		Number of Distinct Observations				8
791			Number of Detects			5		Number of Non-Detects				3
792			Number of Distinct Detects			5		Number of Distinct Non-Detects				3
793			Minimum Detect			0.0012		Minimum Non-Detect				0.00221
794			Maximum Detect			0.00802		Maximum Non-Detect				0.0024
795			Variance Detects			7.7119E-6		Percent Non-Detects				37.5%
796			Mean Detects			0.00325		SD Detects				0.00278
797			Median Detects			0.00263		CV Detects				0.853
798			Skewness Detects			1.807		Kurtosis Detects				3.475
799			Mean of Logged Detects			-5.974		SD of Logged Detects				0.755
800												
801		**Note: Sample size is small (e.g., <10), if data are collected using ISM approach, you should use**										
802		**guidance provided in ITRC Tech Reg Guide on ISM (ITRC, 2012) to compute statistics of interest.**										
803		**For example, you may want to use Chebyshev UCL to estimate EPC (ITRC, 2012).**										
804		**Chebyshev UCL can be computed using the Nonparametric and All UCL Options of ProUCL 5.0**										
805												
806					**Normal GOF Test on Detects Only**							
807			Shapiro Wilk Test Statistic			0.787		**Shapiro Wilk GOF Test**				
808			5% Shapiro Wilk Critical Value			0.762		Detected Data appear Normal at 5% Significance Level				
809			Lilliefors Test Statistic			0.332		**Lilliefors GOF Test**				
810			5% Lilliefors Critical Value			0.396		Detected Data appear Normal at 5% Significance Level				
811					**Detected Data appear Normal at 5% Significance Level**							
812												
813					**Kaplan-Meier (KM) Statistics using Normal Critical Values and other Nonparametric UCLs**							
814					Mean	0.00252		Standard Error of Mean				8.6307E-4
815					SD	0.00218		95% KM (BCA) UCL				0.00408
816			95% KM (t) UCL			0.00415		95% KM (Percentile Bootstrap) UCL				0.00403
817			95% KM (z) UCL			0.00394		95% KM Bootstrap t UCL				0.00618
818			90% KM Chebyshev UCL			0.00511		95% KM Chebyshev UCL				0.00628
819			97.5% KM Chebyshev UCL			0.00791		99% KM Chebyshev UCL				0.0111
820												
821					**Gamma GOF Tests on Detected Observations Only**							
822			A-D Test Statistic			0.39		**Anderson-Darling GOF Test**				
823			5% A-D Critical Value			0.684	etected data appear Gamma Distributed at 5% Significance Le						
824			K-S Test Statistic			0.25		**Kolmogrov-Smirnoff GOF**				
825			5% K-S Critical Value			0.36	etected data appear Gamma Distributed at 5% Significance Le						
826					**Detected data appear Gamma Distributed at 5% Significance Level**							
827												
828					**Gamma Statistics on Detected Data Only**							
829			k hat (MLE)			2.184		k star (bias corrected MLE)				1.007
830			Theta hat (MLE)			0.00149		Theta star (bias corrected MLE)				0.00323
831			nu hat (MLE)			21.84		nu star (bias corrected)				10.07
832			MLE Mean (bias corrected)			0.00325		MLE Sd (bias corrected)				0.00324
833												
834					**Gamma Kaplan-Meier (KM) Statistics**							
835					k hat (KM)	1.334		nu hat (KM)				21.34
836		Approximate Chi Square Value (21.34, α)				11.85		Adjusted Chi Square Value (21.34, β)				10.1
837		95% Gamma Approximate KM-UCL (use when n>=50)				0.00454	mma Adjusted KM-UCL (use when n<50)					0.00532
838												
839					**Gamma ROS Statistics using Imputed Non-Detects**							
840		GROS may not be used when data set has > 50% NDs with many tied observations at multiple DLs										
841		GROS may not be used when kstar of detected data is small such as < 0.1										
842		For such situations, GROS method tends to yield inflated values of UCLs and BTVs										
843		For gamma distributed detected data, BTVs and UCLs may be computed using gamma distribution on KM estimates										
844					Minimum	0.0012		Mean				0.00578
845					Maximum	0.01		Median				0.00553
846					SD	0.00407		CV				0.704
847			k hat (MLE)			1.772		k star (bias corrected MLE)				1.191
848			Theta hat (MLE)			0.00326		Theta star (bias corrected MLE)				0.00486
849			nu hat (MLE)			28.35		nu star (bias corrected)				19.05
850			MLE Mean (bias corrected)			0.00578		MLE Sd (bias corrected)				0.0053

	Row	Label	Value		Label	Value

Row		
851	Adjusted Level of Significance (β)	0.0195
852	Approximate Chi Square Value (19.05, α) — 10.16	Adjusted Chi Square Value (19.05, β) — 8.564
853	95% Gamma Approximate UCL (use when n>=50) — 0.0109	% Gamma Adjusted UCL (use when n<50) — 0.0129

Lognormal GOF Test on Detected Observations Only

Shapiro Wilk Test Statistic	0.923	**Shapiro Wilk GOF Test**	
5% Shapiro Wilk Critical Value	0.762	Detected Data appear Lognormal at 5% Significance Level	
Lilliefors Test Statistic	0.208	**Lilliefors GOF Test**	
5% Lilliefors Critical Value	0.396	Detected Data appear Lognormal at 5% Significance Level	

Detected Data appear Lognormal at 5% Significance Level

Lognormal ROS Statistics Using Imputed Non-Detects

Mean in Original Scale	0.00251	Mean in Log Scale	-6.234
SD in Original Scale	0.00234	SD in Log Scale	0.674
95% t UCL (assumes normality of ROS data)	0.00408	95% Percentile Bootstrap UCL	0.00397
95% BCA Bootstrap UCL	0.00441	95% Bootstrap t UCL	0.00767
95% H-UCL (Log ROS)	0.00488		

UCLs using Lognormal Distribution and KM Estimates when Detected data are Lognormally Distributed

KM Mean (logged)	-6.228	95% H-UCL (KM -Log)	0.00444
KM SD (logged)	0.628	95% Critical H Value (KM-Log)	2.589
KM Standard Error of Mean (logged)	0.25		

DL/2 Statistics

DL/2 Normal		DL/2 Log-Transformed	
Mean in Original Scale	0.00247	Mean in Log Scale	-6.272
SD in Original Scale	0.00236	SD in Log Scale	0.704
95% t UCL (Assumes normality)	0.00405	95% H-Stat UCL	0.00502

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

Nonparametric Distribution Free UCL Statistics
Detected Data appear Normal Distributed at 5% Significance Level

Suggested UCL to Use

95% KM (t) UCL	0.00415	95% KM (Percentile Bootstrap) UCL	0.00403

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

Plutonium-239/240

General Statistics

Total Number of Observations	157	Number of Distinct Observations	116
Number of Detects	36	Number of Non-Detects	121
Number of Distinct Detects	31	Number of Distinct Non-Detects	89
Minimum Detect	0.011	Minimum Non-Detect	-0.0319
Maximum Detect	0.998	Maximum Non-Detect	0.04
Variance Detects	0.0325	Percent Non-Detects	77.07%
Mean Detects	0.102	SD Detects	0.18
Median Detects	0.053	CV Detects	1.763
Skewness Detects	4.022	Kurtosis Detects	18.13

Normal GOF Test on Detects Only

Shapiro Wilk Test Statistic	0.488	**Shapiro Wilk GOF Test**	
5% Shapiro Wilk Critical Value	0.935	Detected Data Not Normal at 5% Significance Level	
Lilliefors Test Statistic	0.323	**Lilliefors GOF Test**	
5% Lilliefors Critical Value	0.148	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	-7.706E-5	Standard Error of Mean	0.00828
SD	0.102	95% KM (BCA) UCL	0.0242
95% KM (t) UCL	0.0136	95% KM (Percentile Bootstrap) UCL	0.0189
95% KM (z) UCL	0.0135	95% KM Bootstrap t UCL	0.0235
90% KM Chebyshev UCL	0.0248	95% KM Chebyshev UCL	0.036
97.5% KM Chebyshev UCL	0.0517	99% KM Chebyshev UCL	0.0823

Gamma GOF Tests on Detected Observations Only

A-D Test Statistic	1.944	**Anderson-Darling GOF Test**	
5% A-D Critical Value	0.782	Detected Data Not Gamma Distributed at 5% Significance Leve	
K-S Test Statistic	0.2	**Kolmogrov-Smirnoff GOF**	
5% K-S Critical Value	0.152	Detected Data Not Gamma Distributed at 5% Significance Leve	

Detected Data Not Gamma Distributed at 5% Significance Level

Gamma Statistics on Detected Data Only

k hat (MLE)	0.879	k star (bias corrected MLE)	0.824
Theta hat (MLE)	0.116	Theta star (bias corrected MLE)	0.124
nu hat (MLE)	63.3	nu star (bias corrected)	59.36
MLE Mean (bias corrected)	0.102	MLE Sd (bias corrected)	0.113

Gamma Kaplan-Meier (KM) Statistics

k hat (KM)	5.7037E-7	nu hat (KM)	1.7910E-4

	A	B	C	D	E	F	G	H	I	J	K	L
936									Adjusted Level of Significance (β)			0.0485
937		Approximate Chi Square Value (0.00, α)				-33145			Adjusted Chi Square Value (0.00, β)			-34998
938		95% Gamma Approximate KM-UCL (use when n>=50)				4.164E-13		Gamma Adjusted KM-UCL (use when n<50)				3.943E-13
939						Gamma (KM) may not be used when k hat (KM) is < 0.1						
940												
941						DL/2 Statistics						
942				Mean in Original Scale		0.0268				SD in Original Scale		0.095
943				95% t UCL (Assumes normality)		0.0394						
944				DL/2 is not a recommended method, provided for comparisons and historical reasons								
945												
946						Nonparametric Distribution Free UCL Statistics						
947						Data do not follow a Discernible Distribution at 5% Significance Level						
948												
949						Suggested UCL to Use						
950				97.5% KM (Chebyshev) UCL		0.0517						
951												
952		Note: Suggestions regarding the selection of a 95% UCL are provided to help the user to select the most appropriate 95% UCL										
953		Recommendations are based upon data size, data distribution, and skewness.										
954		These recommendations are based upon the results of the simulation studies summarized in Singh, Maichle, and Lee (2006)										
955		However, simulations results will not cover all Real World data sets; for additional insight the user may want to consult a statistician										
956												
957	Selenium											
958												
959						General Statistics						
960				Total Number of Observations		157			Number of Distinct Observations			43
961				Number of Detects		128			Number of Non-Detects			29
962				Number of Distinct Detects		28			Number of Distinct Non-Detects			19
963				Minimum Detect		0.25			Minimum Non-Detect			0.21
964				Maximum Detect		1.9			Maximum Non-Detect			1.2
965				Variance Detects		0.0526			Percent Non-Detects			18.47%
966				Mean Detects		1.121			SD Detects			0.229
967				Median Detects		1.1			CV Detects			0.205
968				Skewness Detects		-0.252			Kurtosis Detects			3.334
969				Mean of Logged Detects		0.0881			SD of Logged Detects			0.253
970												
971						Normal GOF Test on Detects Only						
972				Shapiro Wilk Test Statistic		0.944			Normal GOF Test on Detected Observations Only			
973				5% Shapiro Wilk P Value		5.6968E-5			Detected Data Not Normal at 5% Significance Level			
974				Lilliefors Test Statistic		0.123			Lilliefors GOF Test			
975				5% Lilliefors Critical Value		0.0783			Detected Data Not Normal at 5% Significance Level			
976						Detected Data Not Normal at 5% Significance Level						
977												
978						Kaplan-Meier (KM) Statistics using Normal Critical Values and other Nonparametric UCLs						
979					Mean	0.992			Standard Error of Mean			0.0312
980					SD	0.365			95% KM (BCA) UCL			1.048
981				95% KM (t) UCL		1.044			95% KM (Percentile Bootstrap) UCL			1.045
982				95% KM (z) UCL		1.044			95% KM Bootstrap t UCL			1.041
983				90% KM Chebyshev UCL		1.086			95% KM Chebyshev UCL			1.128
984				97.5% KM Chebyshev UCL		1.187			99% KM Chebyshev UCL			1.303
985												
986						Gamma GOF Tests on Detected Observations Only						
987				A-D Test Statistic		3.333			Anderson-Darling GOF Test			
988				5% A-D Critical Value		0.75		Detected Data Not Gamma Distributed at 5% Significance Level				
989				K-S Test Statistic		0.146			Kolmogrov-Smirnoff GOF			
990				5% K-S Critical Value		0.082		Detected Data Not Gamma Distributed at 5% Significance Level				
991						Detected Data Not Gamma Distributed at 5% Significance Level						
992												
993						Gamma Statistics on Detected Data Only						
994				k hat (MLE)		19.15			k star (bias corrected MLE)			18.7
995				Theta hat (MLE)		0.0586			Theta star (bias corrected MLE)			0.0599
996				nu hat (MLE)		4902			nu star (bias corrected)			4788
997				MLE Mean (bias corrected)		1.121			MLE Sd (bias corrected)			0.259
998												
999						Gamma Kaplan-Meier (KM) Statistics						
1000				k hat (KM)		7.409			nu hat (KM)			2326
1001		Approximate Chi Square Value (N/A, α)				2215			Adjusted Chi Square Value (N/A, β)			2214
1002		95% Gamma Approximate KM-UCL (use when n>=50)				1.042		Gamma Adjusted KM-UCL (use when n<50)				1.043
1003												
1004						Gamma ROS Statistics using Imputed Non-Detects						
1005			GROS may not be used when data set has > 50% NDs with many tied observations at multiple DLs									
1006			GROS may not be used when kstar of detected data is small such as < 0.1									
1007			For such situations, GROS method tends to yield inflated values of UCLs and BTVs									
1008		Eor gamma distributed detected data, BTVs and UCLs may be computed using gamma distribution on KM estimates										
1009					Minimum	0.25				Mean		1.054
1010					Maximum	1.9				Median		1.1
1011					SD	0.253				CV		0.24
1012				k hat (MLE)		15.19			k star (bias corrected MLE)			14.91
1013				Theta hat (MLE)		0.0694			Theta star (bias corrected MLE)			0.0707
1014				nu hat (MLE)		4771			nu star (bias corrected)			4681
1015				MLE Mean (bias corrected)		1.054			MLE Sd (bias corrected)			0.273
1016									Adjusted Level of Significance (β)			0.0485
1017		Approximate Chi Square Value (N/A, α)				4523			Adjusted Chi Square Value (N/A, β)			4521
1018		95% Gamma Approximate UCL (use when n>=50)				1.091		5 Gamma Adjusted UCL (use when n<50)				1.091
1019												
1020						Lognormal GOF Test on Detected Observations Only						

	A	B	C	D	E	F	G	H	I	J	K	L
1021				Lilliefors Test Statistic		0.16			**Lilliefors GOF Test**			
1022				5% Lilliefors Critical Value		0.0783			Detected Data Not Lognormal at 5% Significance Level			
1023					**Detected Data Not Lognormal at 5% Significance Level**							
1024												
1025					**Lognormal ROS Statistics Using Imputed Non-Detects**							
1026				Mean in Original Scale		1.051				Mean in Log Scale		0.0147
1027				SD in Original Scale		0.258				SD in Log Scale		0.28
1028			95% t UCL (assumes normality of ROS data)			1.085			95% Percentile Bootstrap UCL			1.083
1029				95% BCA Bootstrap UCL		1.084				95% Bootstrap t UCL		1.086
1030				95% H-UCL (Log ROS)		1.097						
1031												
1032					**DL/2 Statistics**							
1033				**DL/2 Normal**					**DL/2 Log-Transformed**			
1034				Mean in Original Scale		0.987				Mean in Log Scale		-0.119
1035				SD in Original Scale		0.356				SD in Log Scale		0.537
1036			95% t UCL (Assumes normality)			1.034				95% H-Stat UCL		1.111
1037				**DL/2 is not a recommended method, provided for comparisons and historical reasons**								
1038												
1039					**Nonparametric Distribution Free UCL Statistics**							
1040					**Data do not follow a Discernible Distribution at 5% Significance Level**							
1041												
1042					**Suggested UCL to Use**							
1043				95% KM (BCA) UCL		1.048						
1044												
1045			Note: Suggestions regarding the selection of a 95% UCL are provided to help the user to select the most appropriate 95% UCL									
1046				Recommendations are based upon data size, data distribution, and skewness.								
1047				These recommendations are based upon the results of the simulation studies summarized in Singh, Maichle, and Lee (2006)								
1048			However, simulations results will not cover all Real World data sets; for additional insight the user may want to consult a statistician									
1049												
1050	Silver											
1051												
1052					**General Statistics**							
1053			Total Number of Observations			157			Number of Distinct Observations			82
1054				Number of Detects		99			Number of Non-Detects			58
1055			Number of Distinct Detects			64			Number of Distinct Non-Detects			20
1056				Minimum Detect		0.028			Minimum Non-Detect			0.22
1057				Maximum Detect		11.6			Maximum Non-Detect			1.6
1058				Variance Detects		1.395			Percent Non-Detects			36.94%
1059				Mean Detects		0.281			SD Detects			1.181
1060				Median Detects		0.071			CV Detects			4.204
1061				Skewness Detects		9.211			Kurtosis Detects			88.52
1062				Mean of Logged Detects		-2.273			SD of Logged Detects			0.995
1063												
1064					**Normal GOF Test on Detects Only**							
1065			Shapiro Wilk Test Statistic			0.2			**Normal GOF Test on Detected Observations Only**			
1066			5% Shapiro Wilk P Value			0			Detected Data Not Normal at 5% Significance Level			
1067			Lilliefors Test Statistic			0.415			**Lilliefors GOF Test**			
1068			5% Lilliefors Critical Value			0.089			Detected Data Not Normal at 5% Significance Level			
1069				**Detected Data Not Normal at 5% Significance Level**								
1070												
1071			**Kaplan-Meier (KM) Statistics using Normal Critical Values and other Nonparametric UCLs**									
1072					Mean	0.22			Standard Error of Mean			0.0756
1073					SD	0.939			95% KM (BCA) UCL			0.368
1074				95% KM (t) UCL		0.345			95% KM (Percentile Bootstrap) UCL			0.363
1075				95% KM (z) UCL		0.344			95% KM Bootstrap t UCL			0.713
1076				90% KM Chebyshev UCL		0.447			95% KM Chebyshev UCL			0.549
1077				97.5% KM Chebyshev UCL		0.692			99% KM Chebyshev UCL			0.972
1078												
1079					**Gamma GOF Tests on Detected Observations Only**							
1080				A-D Test Statistic		12.58			**Anderson-Darling GOF Test**			
1081				5% A-D Critical Value		0.808		Detected Data Not Gamma Distributed at 5% Significance Leve				
1082				K-S Test Statistic		0.242			**Kolmogrov-Smirnoff GOF**			
1083				5% K-S Critical Value		0.0944		Detected Data Not Gamma Distributed at 5% Significance Leve				
1084				**Detected Data Not Gamma Distributed at 5% Significance Level**								
1085												
1086					**Gamma Statistics on Detected Data Only**							
1087				k hat (MLE)		0.614			k star (bias corrected MLE)			0.602
1088				Theta hat (MLE)		0.458			Theta star (bias corrected MLE)			0.467
1089				nu hat (MLE)		121.5			nu star (bias corrected)			119.1
1090			MLE Mean (bias corrected)			0.281			MLE Sd (bias corrected)			0.362
1091												
1092					**Gamma Kaplan-Meier (KM) Statistics**							
1093				k hat (KM)		0.0549				nu hat (KM)		17.24
1094			Approximate Chi Square Value (17.24, α)			8.847			Adjusted Chi Square Value (17.24, β)			8.791
1095			95% Gamma Approximate KM-UCL (use when n>=50)			0.429		mma Adjusted KM-UCL (use when n<50)				0.432
1096				**Gamma (KM) may not be used when k hat (KM) is < 0.1**								
1097												
1098					**Gamma ROS Statistics using Imputed Non-Detects**							
1099			GROS may not be used when data set has > 50% NDs with many tied observations at multiple DLs									
1100				GROS may not be used when kstar of detected data is small such as < 0.1								
1101				For such situations, GROS method tends to yield inflated values of UCLs and BTVs								
1102			For gamma distributed detected data, BTVs and UCLs may be computed using gamma distribution on KM estimates									
1103					Minimum	0.01				Mean		0.229
1104					Maximum	11.6				Median		0.062
1105					SD	0.949				CV		4.138

	A	B	C	D	E	F	G	H	I	J	K	L
1106				k hat (MLE)		0.52		k star (bias corrected MLE)				0.514
1107				Theta hat (MLE)		0.441		Theta star (bias corrected MLE)				0.446
1108				nu hat (MLE)		163.3		nu star (bias corrected)				161.5
1109				MLE Mean (bias corrected)		0.229		MLE Sd (bias corrected)				0.32
1110								Adjusted Level of Significance (ß)				0.0485
1111			Approximate Chi Square Value (161.53, α)			133.1		Adjusted Chi Square Value (161.53, β)				132.9
1112			95% Gamma Approximate UCL (use when n>=50)			0.278		Gamma Adjusted UCL (use when n<50)				0.279
1113												
1114					Lognormal GOF Test on Detected Observations Only							
1115				Lilliefors Test Statistic		0.186		Lilliefors GOF Test				
1116				5% Lilliefors Critical Value		0.089		Detected Data Not Lognormal at 5% Significance Level				
1117					Detected Data Not Lognormal at 5% Significance Level							
1118												
1119					Lognormal ROS Statistics Using Imputed Non-Detects							
1120				Mean in Original Scale		0.217		Mean in Log Scale				-2.312
1121				SD in Original Scale		0.94		SD in Log Scale				0.857
1122			95% t UCL (assumes normality of ROS data)			0.341		95% Percentile Bootstrap UCL				0.36
1123				95% BCA Bootstrap UCL		0.466		95% Bootstrap t UCL				0.78
1124				95% H-UCL (Log ROS)		0.165						
1125												
1126					DL/2 Statistics							
1127				DL/2 Normal				DL/2 Log-Transformed				
1128				Mean in Original Scale		0.301		Mean in Log Scale				-1.876
1129				SD in Original Scale		0.942		SD in Log Scale				0.981
1130				95% t UCL (Assumes normality)		0.425		95% H-Stat UCL				0.294
1131				DL/2 is not a recommended method, provided for comparisons and historical reasons								
1132												
1133					Nonparametric Distribution Free UCL Statistics							
1134					Data do not follow a Discernible Distribution at 5% Significance Level							
1135												
1136					Suggested UCL to Use							
1137				95% KM (BCA) UCL		0.368						
1138												
1139			Note: Suggestions regarding the selection of a 95% UCL are provided to help the user to select the most appropriate 95% UCL										
1140				Recommendations are based upon data size, data distribution, and skewness.								
1141				These recommendations are based upon the results of the simulation studies summarized in Singh, Maichle, and Lee (2006)								
1142			However, simulations results will not cover all Real World data sets; for additional insight the user may want to consult a statistician										
1143												
1144												
1145	Uranium											
1146												
1147					General Statistics							
1148				Total Number of Observations		23		Number of Distinct Observations				22
1149								Number of Missing Observations				0
1150				Minimum		1.59		Mean				3.606
1151				Maximum		10.7		Median				2.58
1152				SD		2.481		Std. Error of Mean				0.517
1153				Coefficient of Variation		0.688		Skewness				1.765
1154												
1155					Normal GOF Test							
1156				Shapiro Wilk Test Statistic		0.742		Shapiro Wilk GOF Test				
1157				5% Shapiro Wilk Critical Value		0.914		Data Not Normal at 5% Significance Level				
1158				Lilliefors Test Statistic		0.284		Lilliefors GOF Test				
1159				5% Lilliefors Critical Value		0.185		Data Not Normal at 5% Significance Level				
1160					Data Not Normal at 5% Significance Level							
1161												
1162					Assuming Normal Distribution							
1163				95% Normal UCL				95% UCLs (Adjusted for Skewness)				
1164				95% Student's-t UCL		4.494		95% Adjusted-CLT UCL (Chen-1995)				4.66
1165								95% Modified-t UCL (Johnson-1978)				4.526
1166												
1167					Gamma GOF Test							
1168				A-D Test Statistic		1.379		Anderson-Darling Gamma GOF Test				
1169				5% A-D Critical Value		0.75		Data Not Gamma Distributed at 5% Significance Level				
1170				K-S Test Statistic		0.209		Kolmogrov-Smirnoff Gamma GOF Test				
1171				5% K-S Critical Value		0.183		Data Not Gamma Distributed at 5% Significance Level				
1172					Data Not Gamma Distributed at 5% Significance Level							
1173												
1174					Gamma Statistics							
1175				k hat (MLE)		3.144		k star (bias corrected MLE)				2.763
1176				Theta hat (MLE)		1.147		Theta star (bias corrected MLE)				1.305
1177				nu hat (MLE)		144.6		nu star (bias corrected)				127.1
1178				MLE Mean (bias corrected)		3.606		MLE Sd (bias corrected)				2.169
1179								Approximate Chi Square Value (0.05)				102.1
1180				Adjusted Level of Significance		0.0389		Adjusted Chi Square Value				100.4
1181												
1182					Assuming Gamma Distribution							
1183			95% Approximate Gamma UCL (use when n>=50))			4.49		Adjusted Gamma UCL (use when n<50)				4.563
1184												
1185					Lognormal GOF Test							
1186				Shapiro Wilk Test Statistic		0.886		Shapiro Wilk Lognormal GOF Test				
1187				5% Shapiro Wilk Critical Value		0.914		Data Not Lognormal at 5% Significance Level				
1188				Lilliefors Test Statistic		0.165		Lilliefors Lognormal GOF Test				
1189				5% Lilliefors Critical Value		0.185		Data appear Lognormal at 5% Significance Level				
1190					Data appear Approximate Lognormal at 5% Significance Level							

	A	B	C	D	E	F	G	H	I	J	K	L
1191												
1192						Lognormal Statistics						
1193				Minimum of Logged Data		0.464			Mean of logged Data			1.115
1194				Maximum of Logged Data		2.37			SD of logged Data			0.552
1195												
1196						Assuming Lognormal Distribution						
1197					95% H-UCL	4.505			90% Chebyshev (MVUE) UCL			4.8
1198			95% Chebyshev (MVUE) UCL			5.378			97.5% Chebyshev (MVUE) UCL			6.179
1199			99% Chebyshev (MVUE) UCL			7.754						
1200												
1201						Nonparametric Distribution Free UCL Statistics						
1202					Data appear to follow a Discernible Distribution at 5% Significance Level							
1203												
1204						Nonparametric Distribution Free UCLs						
1205				95% CLT UCL		4.457			95% Jackknife UCL			4.494
1206			95% Standard Bootstrap UCL			4.455			95% Bootstrap-t UCL			5.055
1207			95% Hall's Bootstrap UCL			4.561			95% Percentile Bootstrap UCL			4.535
1208			95% BCA Bootstrap UCL			4.717						
1209			90% Chebyshev(Mean, Sd) UCL			5.158			95% Chebyshev(Mean, Sd) UCL			5.861
1210			97.5% Chebyshev(Mean, Sd) UCL			6.837			99% Chebyshev(Mean, Sd) UCL			8.753
1211												
1212						Suggested UCL to Use						
1213			95% Chebyshev (Mean, Sd) UCL			5.861						
1214												
1215		Note: Suggestions regarding the selection of a 95% UCL are provided to help the user to select the most appropriate 95% UCL										
1216		These recommendations are based upon the results of the simulation studies summarized in Singh, Singh, and Iaci (2002)										
1217		and Singh and Singh (2003). However, simulations results will not cover all Real World data sets										
1218		For additional insight the user may want to consult a statistician.										
1219												
1220												
1221	Zinc											
1222												
1223						General Statistics						
1224				Total Number of Observations		157			Number of Distinct Observations			124
1225									Number of Missing Observations			0
1226					Minimum	12.3			Mean			48.34
1227					Maximum	812			Median			32.5
1228					SD	76.73			Std. Error of Mean			6.124
1229				Coefficient of Variation		1.587			Skewness			7.577
1230												
1231						Normal GOF Test						
1232				Shapiro Wilk Test Statistic		0.34			Shapiro Wilk GOF Test			
1233				5% Shapiro Wilk P Value		0			Data Not Normal at 5% Significance Level			
1234				Lilliefors Test Statistic		0.328			Lilliefors GOF Test			
1235				5% Lilliefors Critical Value		0.0707			Data Not Normal at 5% Significance Level			
1236						Data Not Normal at 5% Significance Level						
1237												
1238						Assuming Normal Distribution						
1239			95% Normal UCL						95% UCLs (Adjusted for Skewness)			
1240					95% Student's-t UCL	58.47			95% Adjusted-CLT UCL (Chen-1995)			62.37
1241									95% Modified-t UCL (Johnson-1978)			59.09
1242												
1243						Gamma GOF Test						
1244					A-D Test Statistic	16.98			Anderson-Darling Gamma GOF Test			
1245				5% A-D Critical Value		0.767			Data Not Gamma Distributed at 5% Significance Level			
1246					K-S Test Statistic	0.284			Kolmogrov-Smirnoff Gamma GOF Test			
1247				5% K-S Critical Value		0.0758			Data Not Gamma Distributed at 5% Significance Level			
1248						Data Not Gamma Distributed at 5% Significance Level						
1249												
1250						Gamma Statistics						
1251					k hat (MLE)	1.875			k star (bias corrected MLE)			1.844
1252					Theta hat (MLE)	25.78			Theta star (bias corrected MLE)			26.22
1253					nu hat (MLE)	588.8			nu star (bias corrected)			578.9
1254				MLE Mean (bias corrected)		48.34			MLE Sd (bias corrected)			35.6
1255									Approximate Chi Square Value (0.05)			524.1
1256				Adjusted Level of Significance		0.0485			Adjusted Chi Square Value			523.6
1257												
1258						Assuming Gamma Distribution						
1259			95% Approximate Gamma UCL (use when n>=50))			53.4		95% Adjusted Gamma UCL (use when n<50)				53.45
1260												
1261						Lognormal GOF Test						
1262				Shapiro Wilk Test Statistic		0.817			Shapiro Wilk Lognormal GOF Test			
1263				5% Shapiro Wilk P Value		0			Data Not Lognormal at 5% Significance Level			
1264				Lilliefors Test Statistic		0.224			Lilliefors Lognormal GOF Test			
1265				5% Lilliefors Critical Value		0.0707			Data Not Lognormal at 5% Significance Level			
1266						Data Not Lognormal at 5% Significance Level						
1267												
1268						Lognormal Statistics						
1269				Minimum of Logged Data		2.51			Mean of logged Data			3.589
1270				Maximum of Logged Data		6.7			SD of logged Data			0.586
1271												
1272						Assuming Lognormal Distribution						
1273					95% H-UCL	46.93			90% Chebyshev (MVUE) UCL			49.39
1274			95% Chebyshev (MVUE) UCL			52.33			97.5% Chebyshev (MVUE) UCL			56.41
1275			99% Chebyshev (MVUE) UCL			64.42						

	A	B	C	D	E	F	G	H	I	J	K	L
1276												
1277						**Nonparametric Distribution Free UCL Statistics**						
1278						**Data do not follow a Discernible Distribution (0.05)**						
1279												
1280						**Nonparametric Distribution Free UCLs**						
1281					95% CLT UCL	58.41				95% Jackknife UCL		58.47
1282				95% Standard Bootstrap UCL		58.49				95% Bootstrap-t UCL		70.52
1283				95% Hall's Bootstrap UCL		100.8			95% Percentile Bootstrap UCL			59.31
1284				95% BCA Bootstrap UCL		63.75						
1285				90% Chebyshev(Mean, Sd) UCL		66.71			95% Chebyshev(Mean, Sd) UCL			75.04
1286				97.5% Chebyshev(Mean, Sd) UCL		86.59			99% Chebyshev(Mean, Sd) UCL			109.3
1287												
1288						**Suggested UCL to Use**						
1289				95% Chebyshev (Mean, Sd) UCL		75.04						
1290												
1291		Note: Suggestions regarding the selection of a 95% UCL are provided to help the user to select the most appropriate 95% UCL										
1292		These recommendations are based upon the results of the simulation studies summarized in Singh, Singh, and Iaci (2002)										
1293		and Singh and Singh (2003). However, simulations results will not cover all Real World data sets										
1294		For additional insight the user may want to consult a statistician.										
1295												