

## UCL Statistics for Data Sets with Non-Detects

### User Selected Options

Date/Time of Computation	ProUCL 5.16/19/17 4:29:43 PM
From File	ProUCLinput_20-002(a)_0-1.xls
Full Precision	OFF
Confidence Coefficient	95%
Number of Bootstrap Operations	2000

### Barium

#### General Statistics

Total Number of Observations	9	Number of Distinct Observations	9
		Number of Missing Observations	0
Minimum	21.3	Mean	40.02
Maximum	92.1	Median	31.2
SD	23.78	Std. Error of Mean	7.927
Coefficient of Variation	0.594	Skewness	1.714

**Note: Sample size is small (e.g., <10), if data are collected using ISM approach, you should use guidance provided in ITRC Tech Reg Guide on ISM (ITRC, 2012) to compute statistics of interest.**

**For example, you may want to use Chebyshev UCL to estimate EPC (ITRC, 2012).**

**Chebyshev UCL can be computed using the Nonparametric and All UCL Options of ProUCL 5.1**

#### Normal GOF Test

Shapiro Wilk Test Statistic	0.758	<b>Shapiro Wilk GOF Test</b>	
5% Shapiro Wilk Critical Value	0.829	Data Not Normal at 5% Significance Level	
Lilliefors Test Statistic	0.307	<b>Lilliefors GOF Test</b>	
5% Lilliefors Critical Value	0.274	Data Not Normal at 5% Significance Level	

**Data Not Normal at 5% Significance Level**

#### Assuming Normal Distribution

<b>95% Normal UCL</b>		<b>95% UCLs (Adjusted for Skewness)</b>	
95% Student's-t UCL	54.76	95% Adjusted-CLT UCL (Chen-1995)	57.9
		95% Modified-t UCL (Johnson-1995)	55.52

#### Gamma GOF Test

A-D Test Statistic	0.751	<b>Anderson-Darling Gamma GOF Test</b>	
5% A-D Critical Value	0.724	Data Not Gamma Distributed at 5% Significance Level	
K-S Test Statistic	0.289	<b>Kolmogorov-Smirnov Gamma GOF Test</b>	
5% K-S Critical Value	0.28	Data Not Gamma Distributed at 5% Significance Level	

**Data Not Gamma Distributed at 5% Significance Level**

#### Gamma Statistics

k hat (MLE)	4.27	k star (bias corrected MLE)	2.921
Theta hat (MLE)	9.373	Theta star (bias corrected MLE)	13.7

nu hat (MLE)	76.86	nu star (bias corrected)	52.57
MLE Mean (bias corrected)	40.02	MLE Sd (bias corrected)	23.42
		Approximate Chi Square Value (0.0)	36.92
Adjusted Level of Significance	0.0231	Adjusted Chi Square Value	34.17
<b>Assuming Gamma Distribution</b>			
95% Approximate Gamma UCL (use when n>=50))	56.99	95% Adjusted Gamma UCL (use	61.58
<b>Lognormal GOF Test</b>			
Shapiro Wilk Test Statistic	0.866	<b>Shapiro Wilk Lognormal GOF Test</b>	
5% Shapiro Wilk Critical Value	0.829	Data appear Lognormal at 5% Significance Level	
Lilliefors Test Statistic	0.261	<b>Lilliefors Lognormal GOF Test</b>	
5% Lilliefors Critical Value	0.274	Data appear Lognormal at 5% Significance Level	
<b>Data appear Lognormal at 5% Significance Level</b>			
<b>Lognormal Statistics</b>			
Minimum of Logged Data	3.059	Mean of logged Data	3.568
Maximum of Logged Data	4.523	SD of logged Data	0.491
<b>Assuming Lognormal Distribution</b>			
95% H-UCL	58.78	90% Chebyshev (MVUE) UCL	59.02
95% Chebyshev (MVUE) UCL	67.91	97.5% Chebyshev (MVUE) UCL	80.25
99% Chebyshev (MVUE) UCL	104.5		
<b>Nonparametric Distribution Free UCL Statistics</b>			
<b>Data appear to follow a Discernible Distribution at 5% Significance Level</b>			
<b>Nonparametric Distribution Free UCLs</b>			
95% CLT UCL	53.06	95% Jackknife UCL	54.76
95% Standard Bootstrap UCL	52.36	95% Bootstrap-t UCL	88.55
95% Hall's Bootstrap UCL	130.2	95% Percentile Bootstrap UCL	54.11
95% BCA Bootstrap UCL	57.04		
90% Chebyshev(Mean, Sd) UCL	63.8	95% Chebyshev(Mean, Sd) UCL	74.57
97.5% Chebyshev(Mean, Sd) UCL	89.53	99% Chebyshev(Mean, Sd) UCL	118.9
<b>Suggested UCL to Use</b>			
95% Student's-t UCL	54.76	or 95% Modified-t UCL	55.52
or 95% H-UCL	58.78		

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.

**ProUCL computes and outputs H-statistic based UCLs for historical reasons only.**  
**H-statistic often results in unstable (both high and low) values of UCL95 as shown in examples in the Technical Guide.**  
**It is therefore recommended to avoid the use of H-statistic based 95% UCLs.**

Use of nonparametric methods are preferred to compute UCL95 for skewed data sets which do not follow a gamma distribution.

## Copper

### General Statistics

Total Number of Observations	9	Number of Distinct Observations	8
		Number of Missing Observations	0
Minimum	2.36	Mean	6.408
Maximum	18.1	Median	5.51
SD	4.978	Std. Error of Mean	1.659
Coefficient of Variation	0.777	Skewness	1.861

**Note: Sample size is small (e.g., <10), if data are collected using ISM approach, you should use guidance provided in ITRC Tech Reg Guide on ISM (ITRC, 2012) to compute statistics of interest.**

**For example, you may want to use Chebyshev UCL to estimate EPC (ITRC, 2012).**

**Chebyshev UCL can be computed using the Nonparametric and All UCL Options of ProUCL 5.1**

### Normal GOF Test

Shapiro Wilk Test Statistic	0.795	<b>Shapiro Wilk GOF Test</b>	
5% Shapiro Wilk Critical Value	0.829	Data Not Normal at 5% Significance Level	
Lilliefors Test Statistic	0.22	<b>Lilliefors GOF Test</b>	
5% Lilliefors Critical Value	0.274	Data appear Normal at 5% Significance Level	

**Data appear Approximate Normal at 5% Significance Level**

### Assuming Normal Distribution

<b>95% Normal UCL</b>		<b>95% UCLs (Adjusted for Skewness)</b>	
95% Student's-t UCL	9.493	95% Adjusted-CLT UCL (Chen-19	10.24
		95% Modified-t UCL (Johnson-19	9.665

### Gamma GOF Test

A-D Test Statistic	0.378	<b>Anderson-Darling Gamma GOF Test</b>	
5% A-D Critical Value	0.729	Detected data appear Gamma Distributed at 5% Significance Level	
K-S Test Statistic	0.182	<b>Kolmogorov-Smirnov Gamma GOF Test</b>	
5% K-S Critical Value	0.282	Detected data appear Gamma Distributed at 5% Significance Level	

**Detected data appear Gamma Distributed at 5% Significance Level**

### Gamma Statistics

k hat (MLE)	2.423	k star (bias corrected MLE)	1.69
Theta hat (MLE)	2.644	Theta star (bias corrected MLE)	3.793
nu hat (MLE)	43.62	nu star (bias corrected)	30.41
MLE Mean (bias corrected)	6.408	MLE Sd (bias corrected)	4.93
		Approximate Chi Square Value (0.0	18.82
Adjusted Level of Significance	0.0231	Adjusted Chi Square Value	16.92

### Assuming Gamma Distribution

95% Approximate Gamma UCL (use when n>=50))	10.36	95% Adjusted Gamma UCL (use	11.52
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### Lognormal GOF Test

Shapiro Wilk Test Statistic	0.928	<b>Shapiro Wilk Lognormal GOF Test</b>	
5% Shapiro Wilk Critical Value	0.829	Data appear Lognormal at 5% Significance Level	
Lilliefors Test Statistic	0.185	<b>Lilliefors Lognormal GOF Test</b>	
5% Lilliefors Critical Value	0.274	Data appear Lognormal at 5% Significance Level	

**Data appear Lognormal at 5% Significance Level**

### Lognormal Statistics

Minimum of Logged Data	0.859	Mean of logged Data	1.637
Maximum of Logged Data	2.896	SD of logged Data	0.683

### Assuming Lognormal Distribution

95% H-UCL	12.14	90% Chebyshev (MVUE) UCL	10.71
95% Chebyshev (MVUE) UCL	12.7	97.5% Chebyshev (MVUE) UCL	15.47
99% Chebyshev (MVUE) UCL	20.92		

### Nonparametric Distribution Free UCL Statistics

**Data appear to follow a Discernible Distribution at 5% Significance Level**

### Nonparametric Distribution Free UCLs

95% CLT UCL	9.137	95% Jackknife UCL	9.493
95% Standard Bootstrap UCL	8.949	95% Bootstrap-t UCL	12.11
95% Hall's Bootstrap UCL	21.47	95% Percentile Bootstrap UCL	9.036
95% BCA Bootstrap UCL	10.05		
90% Chebyshev(Mean, Sd) UCL	11.39	95% Chebyshev(Mean, Sd) UCL	13.64
97.5% Chebyshev(Mean, Sd) UCL	16.77	99% Chebyshev(Mean, Sd) UCL	22.92

### Suggested UCL to Use

95% Student's-t UCL	9.493
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When a data set follows an approximate (e.g., normal) distribution passing one of the GOF test

When applicable, it is suggested to use a UCL based upon a distribution (e.g., gamma) passing both GOF tests in ProUCL

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.

### Lead

#### General Statistics

Total Number of Observations	9	Number of Distinct Observations	9
		Number of Missing Observations	0
Minimum	7.48	Mean	10.9
Maximum	14.5	Median	10.6

SD	2.467	Std. Error of Mean	0.822
Coefficient of Variation	0.226	Skewness	0.0955

**Note: Sample size is small (e.g., <10), if data are collected using ISM approach, you should use guidance provided in ITRC Tech Reg Guide on ISM (ITRC, 2012) to compute statistics of interest. For example, you may want to use Chebyshev UCL to estimate EPC (ITRC, 2012). Chebyshev UCL can be computed using the Nonparametric and All UCL Options of ProUCL 5.1**

#### Normal GOF Test

Shapiro Wilk Test Statistic	0.926	<b>Shapiro Wilk GOF Test</b>	
5% Shapiro Wilk Critical Value	0.829	Data appear Normal at 5% Significance Level	
Lilliefors Test Statistic	0.205	<b>Lilliefors GOF Test</b>	
5% Lilliefors Critical Value	0.274	Data appear Normal at 5% Significance Level	

**Data appear Normal at 5% Significance Level**

#### Assuming Normal Distribution

<b>95% Normal UCL</b>		<b>95% UCLs (Adjusted for Skewness)</b>	
95% Student's-t UCL	12.43	95% Adjusted-CLT UCL (Chen-19	12.28
		95% Modified-t UCL (Johnson-19	12.43

#### Gamma GOF Test

A-D Test Statistic	0.4	<b>Anderson-Darling Gamma GOF Test</b>	
5% A-D Critical Value	0.721	Detected data appear Gamma Distributed at 5% Significance Level	
K-S Test Statistic	0.221	<b>Kolmogorov-Smirnov Gamma GOF Test</b>	
5% K-S Critical Value	0.279	Detected data appear Gamma Distributed at 5% Significance Level	

**Detected data appear Gamma Distributed at 5% Significance Level**

#### Gamma Statistics

k hat (MLE)	21.58	k star (bias corrected MLE)	14.46
Theta hat (MLE)	0.505	Theta star (bias corrected MLE)	0.754
nu hat (MLE)	388.5	nu star (bias corrected)	260.3
MLE Mean (bias corrected)	10.9	MLE Sd (bias corrected)	2.866
		Approximate Chi Square Value (0.05)	224
Adjusted Level of Significance	0.0231	Adjusted Chi Square Value	216.8

#### Assuming Gamma Distribution

95% Approximate Gamma UCL (use when n>=50))	12.67	95% Adjusted Gamma UCL (use	13.08
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#### Lognormal GOF Test

Shapiro Wilk Test Statistic	0.929	<b>Shapiro Wilk Lognormal GOF Test</b>	
5% Shapiro Wilk Critical Value	0.829	Data appear Lognormal at 5% Significance Level	
Lilliefors Test Statistic	0.212	<b>Lilliefors Lognormal GOF Test</b>	
5% Lilliefors Critical Value	0.274	Data appear Lognormal at 5% Significance Level	

**Data appear Lognormal at 5% Significance Level**

#### Lognormal Statistics

Minimum of Logged Data	2.012	Mean of logged Data	2.365
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Maximum of Logged Data	2.674	SD of logged Data	0.231
<b>Assuming Lognormal Distribution</b>			
95% H-UCL	12.81	90% Chebyshev (MVUE) UCL	13.43
95% Chebyshev (MVUE) UCL	14.57	97.5% Chebyshev (MVUE) UCL	16.15
99% Chebyshev (MVUE) UCL	19.27		

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

<b>Nonparametric Distribution Free UCLs</b>			
95% CLT UCL	12.25	95% Jackknife UCL	12.43
95% Standard Bootstrap UCL	12.19	95% Bootstrap-t UCL	12.53
95% Hall's Bootstrap UCL	12.1	95% Percentile Bootstrap UCL	12.15
95% BCA Bootstrap UCL	12.18		
90% Chebyshev(Mean, Sd) UCL	13.37	95% Chebyshev(Mean, Sd) UCL	14.48
97.5% Chebyshev(Mean, Sd) UCL	16.03	99% Chebyshev(Mean, Sd) UCL	19.08

**Suggested UCL to Use**  
95% Student's-t UCL 12.43

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.

**Nitrate**

<b>General Statistics</b>			
Total Number of Observations	9	Number of Distinct Observations	9
		Number of Missing Observations	0
Minimum	1.34	Mean	2.374
Maximum	4.61	Median	2.18
SD	0.974	Std. Error of Mean	0.325
Coefficient of Variation	0.41	Skewness	1.617

**Note: Sample size is small (e.g., <10), if data are collected using ISM approach, you should use guidance provided in ITRC Tech Reg Guide on ISM (ITRC, 2012) to compute statistics of interest. For example, you may want to use Chebyshev UCL to estimate EPC (ITRC, 2012). Chebyshev UCL can be computed using the Nonparametric and All UCL Options of ProUCL 5.1**

<b>Normal GOF Test</b>			
Shapiro Wilk Test Statistic	0.858	<b>Shapiro Wilk GOF Test</b>	
5% Shapiro Wilk Critical Value	0.829	Data appear Normal at 5% Significance Level	
Lilliefors Test Statistic	0.22	<b>Lilliefors GOF Test</b>	
5% Lilliefors Critical Value	0.274	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	2.978	95% Adjusted-CLT UCL (Chen-1995)	3.095
		95% Modified-t UCL (Johnson-1970)	3.007

Gamma GOF Test

A-D Test Statistic	0.297	<b>Anderson-Darling Gamma GOF Test</b>	
5% A-D Critical Value	0.722	Detected data appear Gamma Distributed at 5% Significance Level	
K-S Test Statistic	0.165	<b>Kolmogorov-Smirnov Gamma GOF Test</b>	
5% K-S Critical Value	0.28	Detected data appear Gamma Distributed at 5% Significance Level	

Detected data appear Gamma Distributed at 5% Significance Level

Gamma Statistics

k hat (MLE)	7.966	k star (bias corrected MLE)	5.385
Theta hat (MLE)	0.298	Theta star (bias corrected MLE)	0.441
nu hat (MLE)	143.4	nu star (bias corrected)	96.92
MLE Mean (bias corrected)	2.374	MLE Sd (bias corrected)	1.023
		Approximate Chi Square Value (0.05)	75.22
Adjusted Level of Significance	0.0231	Adjusted Chi Square Value	71.19

Assuming Gamma Distribution

95% Approximate Gamma UCL (use when n>=50))	3.06	95% Adjusted Gamma UCL (use when n>=50))	3.233
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Lognormal GOF Test

Shapiro Wilk Test Statistic	0.958	<b>Shapiro Wilk Lognormal GOF Test</b>	
5% Shapiro Wilk Critical Value	0.829	Data appear Lognormal at 5% Significance Level	
Lilliefors Test Statistic	0.156	<b>Lilliefors Lognormal GOF Test</b>	
5% Lilliefors Critical Value	0.274	Data appear Lognormal at 5% Significance Level	

Data appear Lognormal at 5% Significance Level

Lognormal Statistics

Minimum of Logged Data	0.293	Mean of logged Data	0.801
Maximum of Logged Data	1.528	SD of logged Data	0.369

Assuming Lognormal Distribution

95% H-UCL	3.133	90% Chebyshev (MVUE) UCL	3.245
95% Chebyshev (MVUE) UCL	3.644	97.5% Chebyshev (MVUE) UCL	4.197
99% Chebyshev (MVUE) UCL	5.284		

Nonparametric Distribution Free UCL Statistics

Data appear to follow a Discernible Distribution at 5% Significance Level

Nonparametric Distribution Free UCLs

95% CLT UCL	2.908	95% Jackknife UCL	2.978
95% Standard Bootstrap UCL	2.881	95% Bootstrap-t UCL	3.316

95% Hall's Bootstrap UCL	5.499	95% Percentile Bootstrap UCL	2.949
95% BCA Bootstrap UCL	3.07		
90% Chebyshev(Mean, Sd) UCL	3.348	95% Chebyshev(Mean, Sd) UCL	3.789
97.5% Chebyshev(Mean, Sd) UCL	4.402	99% Chebyshev(Mean, Sd) UCL	5.604

#### Suggested UCL to Use

95% Student's-t UCL	2.978
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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.

#### Uranium-235/236

##### General Statistics

Total Number of Observations	9	Number of Distinct Observations	9
Number of Detects	5	Number of Non-Detects	4
Number of Distinct Detects	5	Number of Distinct Non-Detects	4
Minimum Detect	0.0609	Minimum Non-Detect	0.0193
Maximum Detect	0.0963	Maximum Non-Detect	0.0717
Variance Detects	1.8430E-4	Percent Non-Detects	44.44%
Mean Detects	0.0825	SD Detects	0.0136
Median Detects	0.0859	CV Detects	0.165
Skewness Detects	-1.16	Kurtosis Detects	1.457
Mean of Logged Detects	-2.507	SD of Logged Detects	0.178

**Note: Sample size is small (e.g., <10), if data are collected using ISM approach, you should use guidance provided in ITRC Tech Reg Guide on ISM (ITRC, 2012) to compute statistics of interest.**

**For example, you may want to use Chebyshev UCL to estimate EPC (ITRC, 2012).**

**Chebyshev UCL can be computed using the Nonparametric and All UCL Options of ProUCL 5.1**

##### Normal GOF Test on Detects Only

Shapiro Wilk Test Statistic	0.928	<b>Shapiro Wilk GOF Test</b>	
5% Shapiro Wilk Critical Value	0.762	Detected Data appear Normal at 5% Significance Level	
Lilliefors Test Statistic	0.205	<b>Lilliefors GOF Test</b>	
5% Lilliefors Critical Value	0.343	Detected Data appear Normal at 5% Significance Level	

**Detected Data appear Normal at 5% Significance Level**

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

KM Mean	0.0556	KM Standard Error of Mean	0.0122
KM SD	0.0321	95% KM (BCA) UCL	0.0783
95% KM (t) UCL	0.0783	95% KM (Percentile Bootstrap) UCL	0.0756
95% KM (z) UCL	0.0757	95% KM Bootstrap t UCL	0.0646
90% KM Chebyshev UCL	0.0923	95% KM Chebyshev UCL	0.109
97.5% KM Chebyshev UCL	0.132	99% KM Chebyshev UCL	0.177



<b>Gamma GOF Tests on Detected Observations Only</b>		
A-D Test Statistic	0.359	<b>Anderson-Darling GOF Test</b>
5% A-D Critical Value	0.678	Detected data appear Gamma Distributed at 5% Significance Level
K-S Test Statistic	0.224	<b>Kolmogorov-Smirnov GOF</b>
5% K-S Critical Value	0.357	Detected data appear Gamma Distributed at 5% Significance Level
<b>Detected data appear Gamma Distributed at 5% Significance Level</b>		

<b>Gamma Statistics on Detected Data Only</b>			
k hat (MLE)	41.83	k star (bias corrected MLE)	16.87
Theta hat (MLE)	0.00197	Theta star (bias corrected MLE)	0.00489
nu hat (MLE)	418.3	nu star (bias corrected)	168.7
Mean (detects)	0.0825		

<b>Gamma ROS Statistics using Imputed Non-Detects</b>			
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 detects is small such as <1.0, especially when the sample size is small (e.g., <15-20)			
For such situations, GROS method may yield incorrect values of UCLs and BTVs			
This is especially true when the sample size is small.			
For gamma distributed detected data, BTVs and UCLs may be computed using gamma distribution on KM estimates			
Minimum	0.0491	Mean	0.0682
Maximum	0.0963	Median	0.0609
SD	0.0195	CV	0.287
k hat (MLE)	13.92	k star (bias corrected MLE)	9.353
Theta hat (MLE)	0.0049	Theta star (bias corrected MLE)	0.00729
nu hat (MLE)	250.5	nu star (bias corrected)	168.4
Adjusted Level of Significance ( $\beta$ )	0.0231		
Approximate Chi Square Value (168.35, $\alpha$ )	139.3	Adjusted Chi Square Value (168.35	133.8
95% Gamma Approximate UCL (use when n>=50)	0.0824	95% Gamma Adjusted UCL (use w	0.0858

<b>Estimates of Gamma Parameters using KM Estimates</b>			
Mean (KM)	0.0556	SD (KM)	0.0321
Variance (KM)	0.00103	SE of Mean (KM)	0.0122
k hat (KM)	2.987	k star (KM)	2.066
nu hat (KM)	53.77	nu star (KM)	37.18
theta hat (KM)	0.0186	theta star (KM)	0.0269
80% gamma percentile (KM)	0.0829	90% gamma percentile (KM)	0.107
95% gamma percentile (KM)	0.13	99% gamma percentile (KM)	0.182

<b>Gamma Kaplan-Meier (KM) Statistics</b>			
Approximate Chi Square Value (37.18, $\alpha$ )	24.22	Adjusted Chi Square Value (37.18,	22.04
95% Gamma Approximate KM-UCL (use when n>=50)	0.0853	95% Gamma Adjusted KM-UCL (	0.0937

<b>Lognormal GOF Test on Detected Observations Only</b>			
Shapiro Wilk Test Statistic	0.891	<b>Shapiro Wilk GOF Test</b>	
5% Shapiro Wilk Critical Value	0.762	Detected Data appear Lognormal at 5% Significance Level	
Lilliefors Test Statistic	0.236	<b>Lilliefors GOF Test</b>	
5% Lilliefors Critical Value	0.343	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	0.0691	Mean in Log Scale	-2.704
SD in Original Scale	0.0186	SD in Log Scale	0.266
95% t UCL (assumes normality of ROS data)	0.0806	95% Percentile Bootstrap UCL	0.0793
95% BCA Bootstrap UCL	0.0794	95% Bootstrap t UCL	0.0824
95% H-UCL (Log ROS)	0.0835		

Statistics using KM estimates on Logged Data and Assuming Lognormal Distribution

KM Mean (logged)	-3.115	KM Geo Mean	0.0444
KM SD (logged)	0.715	95% Critical H Value (KM-Log)	2.646
KM Standard Error of Mean (logged)	0.275	95% H-UCL (KM -Log)	0.112
KM SD (logged)	0.715	95% Critical H Value (KM-Log)	2.646
KM Standard Error of Mean (logged)	0.275		

DL/2 Statistics

DL/2 Normal		DL/2 Log-Transformed	
Mean in Original Scale	0.0553	Mean in Log Scale	-3.149
SD in Original Scale	0.0343	SD in Log Scale	0.842
95% t UCL (Assumes normality)	0.0766	95% H-Stat UCL	0.145

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	0.0783
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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.