

MW-67S PCE

General Statistics

Total Number of Observations	7	Number of Distinct Observations	5
		Number of Missing Observations	0
Minimum	1.4	Mean	1.8
Maximum	2.5	Median	1.7
SD	0.392	Std. Error of Mean	0.148
Coefficient of Variation	0.218	Skewness	0.933

Note: Sample size is small (e.g., <10), if data are collected using incremental sampling methodology (ISM) approach, refer also to ITRC Tech Reg Guide on ISM (ITRC 2020 and ITRC 2012) for additional guidance, but note that ITRC may recommend the t-UCL or the Chebyshev UCL for small sample sizes ($n < 7$). The Chebyshev UCL often results in gross overestimates of the mean. Refer to the ProUCL 5.2 Technical Guide for a discussion of the Chebyshev UCL.

Normal GOF Test

Shapiro Wilk Test Statistic	0.895	Shapiro Wilk GOF Test	
1% Shapiro Wilk Critical Value	0.73	Data appear Normal at 1% Significance Level	
Lilliefors Test Statistic	0.207	Lilliefors GOF Test	
1% Lilliefors Critical Value	0.35	Data appear Normal at 1% Significance Level	
Data appear Normal at 1% Significance Level			
Note GOF tests may be unreliable for small sample sizes			

Assuming Normal Distribution

95% Normal UCL		95% UCLs (Adjusted for Skewness)	
95% Student's-t UCL	2.088	95% Adjusted-CLT UCL (Chen-1995)	2.099
		95% Modified-t UCL (Johnson-1978)	2.096

Gamma GOF Test

A-D Test Statistic	0.383	Anderson-Darling Gamma GOF Test	
5% A-D Critical Value	0.707	Detected data appear Gamma Distributed at 5% Significance Level	
K-S Test Statistic	0.229	Kolmogorov-Smirnov Gamma GOF Test	
5% K-S Critical Value	0.311	Detected data appear Gamma Distributed at 5% Significance Level	
Detected data appear Gamma Distributed at 5% Significance Level			
Note GOF tests may be unreliable for small sample sizes			

Gamma Statistics

k hat (MLE)	26.31	k star (bias corrected MLE)	15.13
Theta hat (MLE)	0.0684	Theta star (bias corrected MLE)	0.119
nu hat (MLE)	368.3	nu star (bias corrected)	211.8
MLE Mean (bias corrected)	1.8	MLE Sd (bias corrected)	0.463
		Approximate Chi Square Value (0.05)	179.1
Adjusted Level of Significance	0.0158	Adjusted Chi Square Value	170

Assuming Gamma Distribution

95% Approximate Gamma UCL	2.128	95% Adjusted Gamma UCL	2.242
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Lognormal GOF Test

Shapiro Wilk Test Statistic	0.918	Shapiro Wilk Lognormal GOF Test	
10% Shapiro Wilk Critical Value	0.838	Data appear Lognormal at 10% Significance Level	
Lilliefors Test Statistic	0.212	Lilliefors Lognormal GOF Test	
10% Lilliefors Critical Value	0.28	Data appear Lognormal at 10% Significance Level	
Data appear Lognormal at 10% Significance Level			
Note GOF tests may be unreliable for small sample sizes			

Lognormal Statistics

Minimum of Logged Data	0.336	Mean of logged Data	0.569
Maximum of Logged Data	0.916	SD of logged Data	0.208

Assuming Lognormal Distribution

95% H-UCL	2.14	90% Chebyshev (MVUE) UCL	2.224
95% Chebyshev (MVUE) UCL	2.417	97.5% Chebyshev (MVUE) UCL	2.685
99% Chebyshev (MVUE) UCL	3.21		

Nonparametric Distribution Free UCL Statistics

Data appear to follow a Discernible Distribution

Nonparametric Distribution Free UCLs

95% CLT UCL	2.043	95% BCA Bootstrap UCL	2.057
95% Standard Bootstrap UCL	2.034	95% Bootstrap-t UCL	2.212
95% Hall's Bootstrap UCL	2.083	95% Percentile Bootstrap UCL	2.043
90% Chebyshev(Mean, Sd) UCL	2.244	95% Chebyshev(Mean, Sd) UCL	2.445
97.5% Chebyshev(Mean, Sd) UCL	2.724	99% Chebyshev(Mean, Sd) UCL	3.273

Suggested UCL to Use

95% Student's-t UCL	2.088
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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 using results from simulation studies. However, simulations results will not cover all Real World data sets; for additional insight the user may want to consult a statistician.

MW-67D PCE

User Selected Options

Date/Time of Computation	ProUCL 5.2 2/23/2026 4:05:00 PM
From File	WorkSheet.xls
Full Precision	OFF
Confidence Coefficient	95%
Number of Bootstrap Operations	2000

General Statistics

Total Number of Observations	7	Number of Distinct Observations	3
Number of Detects	3	Number of Non-Detects	4
Number of Distinct Detects	2	Number of Distinct Non-Detects	2
Minimum Detect	0.3	Minimum Non-Detect	0.3
Maximum Detect	0.33	Maximum Non-Detect	0.47
Variance Detects	3.00E-04	Percent Non-Detects	57.14%
Mean Detects	0.31	SD Detects	0.0173
Median Detects	0.3	CV Detects	0.0559
Skewness Detects	1.732	Kurtosis Detects	N/A
Mean of Logged Detects	-1.172	SD of Logged Detects	0.055

Warning: Data set has only 3 Detected Values.

This is not enough to compute meaningful or reliable statistics and estimates.

Note: Sample size is small (e.g., <10), if data are collected using incremental sampling methodology (ISM) approach refer also to ITRC Tech Reg Guide on ISM (ITRC 2020 and ITRC 2012) for additional guidance, but note that ITRC may recommend the t-UCL or the Chebyshev UCL for small sample sizes ($n < 7$). The Chebyshev UCL often results in gross overestimates of the mean.

Refer to the ProUCL 5.2 Technical Guide for a discussion of the Chebyshev UCL.

Normal GOF Test on Detects Only

Shapiro Wilk Test Statistic	0.75	Shapiro Wilk GOF Test
1% Shapiro Wilk Critical Value	0.753	Detected Data Not Normal at 1% Significance Level
Lilliefors Test Statistic	0.385	Lilliefors GOF Test
1% Lilliefors Critical Value	0.429	Detected Data appear Normal at 1% Significance Level

Detected Data appear Approximate Normal at 1% Significance Level
Note GOF tests may be unreliable for small sample sizes

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

KM Mean	0.305	KM Standard Error of Mean	0.00559
90KM SD	0.0112	95% KM (BCA) UCL	N/A
95% KM (t) UCL	0.316	95% KM (Percentile Bootstrap) UCL	N/A
95% KM (z) UCL	0.314	95% KM Bootstrap t UCL	N/A
90% KM Chebyshev UCL	0.322	95% KM Chebyshev UCL	0.329
97.5% KM Chebyshev UCL	0.34	99% KM Chebyshev UCL	0.361

Gamma GOF Tests on Detected Observations Only

A-D Test Statistic	0.619	Anderson-Darling GOF Test
5% A-D Critical Value	0.635	Detected data appear Gamma Distributed at 5% Significance Level
K-S Test Statistic	0.427	Kolmogorov-Smirnov GOF
5% K-S Critical Value	0.431	Detected data appear Gamma Distributed at 5% Significance Level

Detected Data Not Gamma Distributed at 5% Significance Level

Gamma Statistics on Detected Data Only

k hat (MLE)	490.5	k star (bias corrected MLE)	N/A
Theta hat (MLE)	6.32E-04	Theta star (bias corrected MLE)	N/A
nu hat (MLE)	2943	nu star (bias corrected)	N/A
Mean (detects)	0.31		

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 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	0.242	Mean	0.284
Maximum	0.33	Median	0.283
SD	0.0294	CV	0.104
k hat (MLE)	108.4	k star (bias corrected MLE)	62.06
Theta hat (MLE)	0.00262	Theta star (bias corrected MLE)	0.00457
nu hat (MLE)	1518	nu star (bias corrected)	868.8
Adjusted Level of Significance (β)	0.0158		
Approximate Chi Square Value (868.79, α)	801.4	Adjusted Chi Square Value (868.79, β)	781.7
95% Gamma Approximate UCL	0.308	95% Gamma Adjusted UCL	N/A

Estimates of Gamma Parameters using KM Estimates

Mean (KM)	0.305 SD (KM)	0.0112
Variance (KM)	1.25E-04 SE of Mean (KM)	0.00559
k hat (KM)	744.2 k star (KM)	425.4
nu hat (KM)	10419 nu star (KM)	5955
theta hat (KM)	4.10E-04 theta star (KM)	7.17E-04
80% gamma percentile (KM)	0.317 90% gamma percentile (KM)	0.324
95% gamma percentile (KM)	0.33 99% gamma percentile (KM)	0.34

Gamma Kaplan-Meier (KM) Statistics

Approximate Chi Square Value (N/A, α)	5777 Adjusted Chi Square Value (N/A, β)	5723
95% KM Approximate Gamma UCL	0.314 95% KM Adjusted Gamma UCL	0.317

Lognormal GOF Test on Detected Observations Only

Shapiro Wilk Test Statistic	0.75 Shapiro Wilk GOF Test	
10% Shapiro Wilk Critical Value	0.789 Detected Data Not Lognormal at 10% Significance Level	
Lilliefors Test Statistic	0.385 Lilliefors GOF Test	
10% Lilliefors Critical Value	0.389 Detected Data appear Lognormal at 10% Significance Level	
Detected Data appear Approximate Lognormal at 10% Significance Level		
Note GOF tests may be unreliable for small sample sizes		

Lognormal ROS Statistics Using Imputed Non-Detects

Mean in Original Scale	0.285 Mean in Log Scale	-1.257
SD in Original Scale	0.0273 SD in Log Scale	0.0954
95% t UCL (assumes normality of ROS data)	0.306 95% Percentile Bootstrap UCL	0.302
95% BCA Bootstrap UCL	0.302 95% Bootstrap t UCL	0.308
95% H-UCL (Log ROS)	N/A	

Statistics using KM estimates on Logged Data and Assuming Lognormal Distribution

KM Mean (logged)	-1.188 KM Geo Mean	0.305
KM SD (logged)	0.0355 95% Critical H Value (KM-Log)	N/A
KM Standard Error of Mean (logged)	0.0178 95% H-UCL (KM -Log)	N/A
KM SD (logged)	0.0355 95% Critical H Value (KM-Log)	N/A
KM Standard Error of Mean (logged)	0.0178	

DL/2 Statistics

DL/2 Normal	DL/2 Log-Transformed	
Mean in Original Scale	0.231 Mean in Log Scale	-1.522
SD in Original Scale	0.0806 SD in Log Scale	0.365
95% t UCL (Assumes normality)	0.29 95% H-Stat UCL	0.328
DL/2 is not a recommended method, provided for comparisons and historical reasons		

Nonparametric Distribution Free UCL Statistics

Detected Data appear Approximate Normal Distributed at 1% Significance Level

Suggested UCL to Use

95% KM (t) UCL	0.316
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When a data set follows an approximate distribution passing only one of the GOF tests, it is suggested to use a UCL based upon a distribution 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 using results from simulation studies. However, simulations results will not cover all Real World data sets; for additional insight the user may want to consult a statistician

MW-67D Cis-1,2 DCE

General Statistics

Total Number of Observations	7	Number of Distinct Observations	5
Number of Detects	5	Number of Non-Detects	2
Number of Distinct Detects	3	Number of Distinct Non-Detects	2
Minimum Detect	0.33	Minimum Non-Detect	0.3
Maximum Detect	0.35	Maximum Non-Detect	0.71
Variance Detects	7.00E-05	Percent Non-Detects	28.57%
Mean Detects	0.338	SD Detects	0.00837
Median Detects	0.34	CV Detects	0.0248
Skewness Detects	0.512	Kurtosis Detects	-0.612
Mean of Logged Detects	-1.085	SD of Logged Detects	0.0247

Note: Sample size is small (e.g., <10), if data are collected using incremental sampling methodology (ISM) approach, refer also to ITRC Tech Reg Guide on ISM (ITRC 2020 and ITRC 2012) for additional guidance,

but note that ITRC may recommend the t-UCL or the Chebyshev UCL for small sample sizes ($n < 7$).

The Chebyshev UCL often results in gross overestimates of the mean.

Refer to the ProUCL 5.2 Technical Guide for a discussion of the Chebyshev UCL.

Normal GOF Test on Detects Only

Shapiro Wilk Test Statistic	0.881	Shapiro Wilk GOF Test	
1% Shapiro Wilk Critical Value	0.686	Detected Data appear Normal at 1% Significance Level	
Lilliefors Test Statistic	0.231	Lilliefors GOF Test	
1% Lilliefors Critical Value	0.396	Detected Data appear Normal at 1% Significance Level	
Detected Data appear Normal at 1% Significance Level			
Note GOF tests may be unreliable for small sample sizes			

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

KM Mean	0.332	KM Standard Error of Mean	0.00718
90KM SD	0.0157	95% KM (BCA) UCL	N/A
95% KM (t) UCL	0.346	95% KM (Percentile Bootstrap) UCL	N/A
95% KM (z) UCL	0.343	95% KM Bootstrap t UCL	N/A
90% KM Chebyshev UCL	0.353	95% KM Chebyshev UCL	0.363
97.5% KM Chebyshev UCL	0.376	99% KM Chebyshev UCL	0.403

Gamma GOF Tests on Detected Observations Only

A-D Test Statistic	0.427	Anderson-Darling GOF Test	
5% A-D Critical Value	0.678	Detected data appear Gamma Distributed at 5% Significance Level	
K-S Test Statistic	0.259	Kolmogorov-Smirnov GOF	
5% K-S Critical Value	0.357	Detected data appear Gamma Distributed at 5% Significance Level	
Detected data appear Gamma Distributed at 5% Significance Level			
Note GOF tests may be unreliable for small sample sizes			

Gamma Statistics on Detected Data Only

k hat (MLE)	2050	k star (bias corrected MLE)	820
Theta hat (MLE)	1.65E-04	Theta star (bias corrected MLE)	4.12E-04
nu hat (MLE)	20497	nu star (bias corrected)	8200
Mean (detects)	0.338		

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 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	0.317	Mean	0.335
Maximum	0.35	Median	0.335
SD	0.0103	CV	0.0308
k hat (MLE)	1222	k star (bias corrected MLE)	698.4
Theta hat (MLE)	2.74E-04	Theta star (bias corrected MLE)	4.79E-04
nu hat (MLE)	17108	nu star (bias corrected)	9777
Adjusted Level of Significance (β)	0.0158		
Approximate Chi Square Value (N/A, α)	9549	Adjusted Chi Square Value (N/A, β)	9479
95% Gamma Approximate UCL	0.343	95% Gamma Adjusted UCL	0.345

Estimates of Gamma Parameters using KM Estimates

Mean (KM)	0.332	SD (KM)	0.0157
Variance (KM)	2.47E-04	SE of Mean (KM)	0.00718
k hat (KM)	445	k star (KM)	254.4
nu hat (KM)	6229	nu star (KM)	3561
theta hat (KM)	7.45E-04	theta star (KM)	0.0013
80% gamma percentile (KM)	0.349	90% gamma percentile (KM)	0.359
95% gamma percentile (KM)	0.367	99% gamma percentile (KM)	0.382

Gamma Kaplan-Meier (KM) Statistics

Approximate Chi Square Value (N/A, α)	3423	Adjusted Chi Square Value (N/A, β)	3382
95% KM Approximate Gamma UCL	0.345	95% KM Adjusted Gamma UCL	0.349

Lognormal GOF Test on Detected Observations Only

Shapiro Wilk Test Statistic	0.881	Shapiro Wilk GOF Test	
10% Shapiro Wilk Critical Value	0.806	Detected Data appear Lognormal at 10% Significance Level	
Lilliefors Test Statistic	0.232	Lilliefors GOF Test	
10% Lilliefors Critical Value	0.319	Detected Data appear Lognormal at 10% Significance Level	
Detected Data appear Lognormal at 10% Significance Level			
Note GOF tests may be unreliable for small sample sizes			

Lognormal ROS Statistics Using Imputed Non-Detects

Mean in Original Scale	0.335	Mean in Log Scale	-1.095
SD in Original Scale	0.0102	SD in Log Scale	0.0306
95% t UCL (assumes normality of ROS data)	0.342	95% Percentile Bootstrap UCL	0.34
95% BCA Bootstrap UCL	0.34	95% Bootstrap t UCL	0.342
95% H-UCL (Log ROS)	N/A		

Statistics using KM estimates on Logged Data and Assuming Lognormal Distribution

KM Mean (logged)	-1.105	KM Geo Mean	0.331
KM SD (logged)	0.0487	95% Critical H Value (KM-Log)	N/A
KM Standard Error of Mean (logged)	0.0222	95% H-UCL (KM -Log)	N/A
KM SD (logged)	0.0487	95% Critical H Value (KM-Log)	N/A
KM Standard Error of Mean (logged)	0.0222		

DL/2 Statistics

DL/2 Normal	DL/2 Log-Transformed		
Mean in Original Scale	0.314	Mean in Log Scale	-1.194
SD in Original Scale	0.0727	SD in Log Scale	0.311
95% t UCL (Assumes normality)	0.367	95% H-Stat UCL	0.422

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

Nonparametric Distribution Free UCL Statistics

Detected Data appear Normal Distributed at 1% Significance Level

Suggested UCL to Use

95% KM (t) UCL	0.346
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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 using results from simulation studies.

However, simulations results will not cover all Real World data sets; for additional insight the user may want to consult a statistician.

MW-69 PCE

User Selected Options

Date/Time of Computation ProUCL 5.2 2/23/2026 4:05:24 PM
 From File WorkSheet.xls
 Full Precision OFF
 Confidence Coefficient 95%
 Number of Bootstrap Operations 2000

General Statistics

Total Number of Observations	7	Number of Distinct Observations	4
Number of Detects	3	Number of Non-Detects	4
Number of Distinct Detects	3	Number of Distinct Non-Detects	2
Minimum Detect	0.3	Minimum Non-Detect	0.3
Maximum Detect	0.38	Maximum Non-Detect	0.47
Variance Detects	0.00163	Percent Non-Detects	57.14%
Mean Detects	0.337	SD Detects	0.0404
Median Detects	0.33	CV Detects	0.12
Skewness Detects	0.722	Kurtosis Detects	N/A
Mean of Logged Detects	-1.093	SD of Logged Detects	0.119

Warning: Data set has only 3 Detected Values.

This is not enough to compute meaningful or reliable statistics and estimates.

Note: Sample size is small (e.g., <10), if data are collected using incremental sampling methodology (ISM) approach refer also to ITRC Tech Reg Guide on ISM (ITRC 2020 and ITRC 2012) for additional guidance, but note that ITRC may recommend the t-UCL or the Chebyshev UCL for small sample sizes ($n < 7$). The Chebyshev UCL often results in gross overestimates of the mean.

Refer to the ProUCL 5.2 Technical Guide for a discussion of the Chebyshev UCL.

Normal GOF Test on Detects Only

Shapiro Wilk Test Statistic	0.98	Shapiro Wilk GOF Test
1% Shapiro Wilk Critical Value	0.753	Detected Data appear Normal at 1% Significance Level
Lilliefors Test Statistic	0.232	Lilliefors GOF Test
1% Lilliefors Critical Value	0.429	Detected Data appear Normal at 1% Significance Level

Detected Data appear Normal at 1% Significance Level
 Note GOF tests may be unreliable for small sample sizes

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

KM Mean	0.318	KM Standard Error of Mean	0.0148
90KM SD	0.0297	95% KM (BCA) UCL	N/A
95% KM (t) UCL	0.347	95% KM (Percentile Bootstrap) UCL	N/A
95% KM (z) UCL	0.343	95% KM Bootstrap t UCL	N/A
90% KM Chebyshev UCL	0.363	95% KM Chebyshev UCL	0.383
97.5% KM Chebyshev UCL	0.411	99% KM Chebyshev UCL	0.466

Gamma GOF Tests on Detected Observations Only

A-D Test Statistic	0.266	Anderson-Darling GOF Test
5% A-D Critical Value	0.635	Detected data appear Gamma Distributed at 5% Significance Level
K-S Test Statistic	0.237	Kolmogorov-Smirnov GOF
5% K-S Critical Value	0.431	Detected data appear Gamma Distributed at 5% Significance Level

Detected Data Not Gamma Distributed at 5% Significance Level

Gamma Statistics on Detected Data Only

k hat (MLE)	105.6	k star (bias corrected MLE)	N/A
Theta hat (MLE)	0.00319	Theta star (bias corrected MLE)	N/A
nu hat (MLE)	633.3	nu star (bias corrected)	N/A
Mean (detects)	0.337		

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 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	0.167	Mean	0.271
Maximum	0.38	Median	0.269
SD	0.073	CV	0.27
k hat (MLE)	15.35	k star (bias corrected MLE)	8.869
Theta hat (MLE)	0.0176	Theta star (bias corrected MLE)	0.0305
nu hat (MLE)	215	nu star (bias corrected)	124.2
Adjusted Level of Significance (β)	0.0158		
Approximate Chi Square Value (124.17, α)	99.43	Adjusted Chi Square Value (124.17, β)	92.75
95% Gamma Approximate UCL	0.338	95% Gamma Adjusted UCL	N/A

Estimates of Gamma Parameters using KM Estimates

Mean (KM)	0.318 SD (KM)	0.0297
Variance (KM)	8.81E-04 SE of Mean (KM)	0.0148
k hat (KM)	115.1 k star (KM)	65.86
nu hat (KM)	1611 nu star (KM)	922
theta hat (KM)	0.00277 theta star (KM)	0.00483
80% gamma percentile (KM)	0.351 90% gamma percentile (KM)	0.37
95% gamma percentile (KM)	0.385 99% gamma percentile (KM)	0.417

Gamma Kaplan-Meier (KM) Statistics

Approximate Chi Square Value (921.99, α)	852.5 Adjusted Chi Square Value (921.99, β)	832.2
95% KM Approximate Gamma UCL	0.344 95% KM Adjusted Gamma UCL	0.353

Lognormal GOF Test on Detected Observations Only

Shapiro Wilk Test Statistic	0.988 Shapiro Wilk GOF Test	
10% Shapiro Wilk Critical Value	0.789 Detected Data appear Lognormal at 10% Significance Level	
Lilliefors Test Statistic	0.218 Lilliefors GOF Test	
10% Lilliefors Critical Value	0.389 Detected Data appear Lognormal at 10% Significance Level	

Detected Data appear Lognormal at 10% Significance Level

Note GOF tests may be unreliable for small sample sizes

Lognormal ROS Statistics Using Imputed Non-Detects

Mean in Original Scale	0.279 Mean in Log Scale	-1.297
SD in Original Scale	0.0629 SD in Log Scale	0.226
95% t UCL (assumes normality of ROS data)	0.326 95% Percentile Bootstrap UCL	0.317
95% BCA Bootstrap UCL	0.318 95% Bootstrap t UCL	0.335
95% H-UCL (Log ROS)	0.338	

Statistics using KM estimates on Logged Data and Assuming Lognormal Distribution

KM Mean (logged)	-1.149 KM Geo Mean	0.317
KM SD (logged)	0.0882 95% Critical H Value (KM-Log)	N/A
KM Standard Error of Mean (logged)	0.0441 95% H-UCL (KM -Log)	N/A
KM SD (logged)	0.0882 95% Critical H Value (KM-Log)	N/A
KM Standard Error of Mean (logged)	0.0441	

DL/2 Statistics

DL/2 Normal	DL/2 Log-Transformed	
Mean in Original Scale	0.242 Mean in Log Scale	-1.489
SD in Original Scale	0.0963 SD in Log Scale	0.408
95% t UCL (Assumes normality)	0.313 95% H-Stat UCL	0.359

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

Nonparametric Distribution Free UCL Statistics

Detected Data appear Normal Distributed at 1% Significance Level

Suggested UCL to Use

95% KM (t) UCL	0.347
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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 using results from simulation studies.

However, simulations results will not cover all Real World data sets; for additional insight the user may want to consult a statistician

MW-88 Cis-1,2 DCE

General Statistics

Total Number of Observations	18	Number of Distinct Observations	13
Number of Detects	13	Number of Non-Detects	5
Number of Distinct Detects	12	Number of Distinct Non-Detects	1
Minimum Detect	0.17	Minimum Non-Detect	0.3
Maximum Detect	1.8	Maximum Non-Detect	0.3
Variance Detects	0.209	Percent Non-Detects	27.78%
Mean Detects	0.848	SD Detects	0.457
Median Detects	0.78	CV Detects	0.539
Skewness Detects	0.816	Kurtosis Detects	0.643
Mean of Logged Detects	-0.32	SD of Logged Detects	0.623

Normal GOF Test on Detects Only

Shapiro Wilk Test Statistic	0.933	Shapiro Wilk GOF Test	
1% Shapiro Wilk Critical Value	0.814	Detected Data appear Normal at 1% Significance Level	
Lilliefors Test Statistic	0.181	Lilliefors GOF Test	
1% Lilliefors Critical Value	0.271	Detected Data appear Normal at 1% Significance Level	
Detected Data appear Normal at 1% Significance Level			

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

KM Mean	0.659	KM Standard Error of Mean	0.118
90KM SD	0.481	95% KM (BCA) UCL	0.905
95% KM (t) UCL	0.865	95% KM (Percentile Bootstrap) UCL	0.868
95% KM (z) UCL	0.854	95% KM Bootstrap t UCL	0.89
90% KM Chebyshev UCL	1.013	95% KM Chebyshev UCL	1.174
97.5% KM Chebyshev UCL	1.396	99% KM Chebyshev UCL	1.834

Gamma GOF Tests on Detected Observations Only

A-D Test Statistic	0.271	Anderson-Darling GOF Test	
5% A-D Critical Value	0.738	Detected data appear Gamma Distributed at 5% Significance Level	
K-S Test Statistic	0.138	Kolmogorov-Smirnov GOF	
5% K-S Critical Value	0.238	Detected data appear Gamma Distributed at 5% Significance Level	
Detected data appear Gamma Distributed at 5% Significance Level			

Gamma Statistics on Detected Data Only

k hat (MLE)	3.391	k star (bias corrected MLE)	2.66
Theta hat (MLE)	0.25	Theta star (bias corrected MLE)	0.319
nu hat (MLE)	88.16	nu star (bias corrected)	69.15
Mean (detects)	0.848		

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 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	0.01	Mean	0.649
Maximum	1.8	Median	0.65
SD	0.509	CV	0.784
k hat (MLE)	1.132	k star (bias corrected MLE)	0.981
Theta hat (MLE)	0.573	Theta star (bias corrected MLE)	0.662
nu hat (MLE)	40.76	nu star (bias corrected)	35.3
Adjusted Level of Significance (β)	0.0357		
Approximate Chi Square Value (35.30, α)	22.71	Adjusted Chi Square Value (35.30, β)	21.74
95% Gamma Approximate UCL	1.009	95% Gamma Adjusted UCL	1.054

Estimates of Gamma Parameters using KM Estimates

Mean (KM)	0.659	SD (KM)	0.481
Variance (KM)	0.231	SE of Mean (KM)	0.118
k hat (KM)	1.879	k star (KM)	1.603
nu hat (KM)	67.65	nu star (KM)	57.71
theta hat (KM)	0.351	theta star (KM)	0.411
80% gamma percentile (KM)	1.013	90% gamma percentile (KM)	1.352
95% gamma percentile (KM)	1.68	99% gamma percentile (KM)	2.418

Gamma Kaplan-Meier (KM) Statistics			
Approximate Chi Square Value (57.71, α)	41.24	Adjusted Chi Square Value (57.71, β)	39.91
95% KM Approximate Gamma UCL	0.923	95% KM Adjusted Gamma UCL	0.954

Lognormal GOF Test on Detected Observations Only

Shapiro Wilk Test Statistic	0.937	Shapiro Wilk GOF Test	
10% Shapiro Wilk Critical Value	0.889	Detected Data appear Lognormal at 10% Significance Level	
Lilliefors Test Statistic	0.179	Lilliefors GOF Test	
10% Lilliefors Critical Value	0.215	Detected Data appear Lognormal at 10% Significance Level	
Detected Data appear Lognormal at 10% Significance Level			

Lognormal ROS Statistics Using Imputed Non-Detects

Mean in Original Scale	0.674	Mean in Log Scale	-0.66
SD in Original Scale	0.481	SD in Log Scale	0.788
95% t UCL (assumes normality of ROS data)	0.871	95% Percentile Bootstrap UCL	0.856
95% BCA Bootstrap UCL	0.881	95% Bootstrap t UCL	0.913
95% H-UCL (Log ROS)	1.103		

Statistics using KM estimates on Logged Data and Assuming Lognormal Distribution

KM Mean (logged)	-0.723	KM Geo Mean	0.485
KM SD (logged)	0.826	95% Critical H Value (KM-Log)	2.396
KM Standard Error of Mean (logged)	0.203	95% H-UCL (KM -Log)	1.103
KM SD (logged)	0.826	95% Critical H Value (KM-Log)	2.396
KM Standard Error of Mean (logged)	0.203		

DL/2 Statistics

DL/2 Normal	DL/2 Log-Transformed		
Mean in Original Scale	0.654	Mean in Log Scale	-0.758
SD in Original Scale	0.501	SD in Log Scale	0.896
95% t UCL (Assumes normality)	0.859	95% H-Stat UCL	1.203

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

Nonparametric Distribution Free UCL Statistics

Detected Data appear Normal Distributed at 1% Significance Level

Suggested UCL to Use

95% KM (t) UCL	0.865
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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 using results from simulation studies. However, simulations results will not cover all Real World data sets; for additional insight the user may want to consult a statistician.

MW-111 TCE

General Statistics

Total Number of Observations	7	Number of Distinct Observations	6
Number of Detects	5	Number of Non-Detects	2
Number of Distinct Detects	4	Number of Distinct Non-Detects	2
Minimum Detect	0.38	Minimum Non-Detect	0.2
Maximum Detect	1.2	Maximum Non-Detect	0.69
Variance Detects	0.128	Percent Non-Detects	28.57%
Mean Detects	0.924	SD Detects	0.358
Median Detects	1.1	CV Detects	0.388
Skewness Detects	-1.086	Kurtosis Detects	-0.306
Mean of Logged Detects	-0.162	SD of Logged Detects	0.493

Note: Sample size is small (e.g., <10), if data are collected using incremental sampling methodology (ISM) approach, refer also to ITRC Tech Reg Guide on ISM (ITRC 2020 and ITRC 2012) for additional guidance,

but note that ITRC may recommend the t-UCL or the Chebyshev UCL for small sample sizes ($n < 7$).

The Chebyshev UCL often results in gross overestimates of the mean.

Refer to the ProUCL 5.2 Technical Guide for a discussion of the Chebyshev UCL.

Normal GOF Test on Detects Only

Shapiro Wilk Test Statistic	0.839	Shapiro Wilk GOF Test	
1% Shapiro Wilk Critical Value	0.686	Detected Data appear Normal at 1% Significance Level	
Lilliefors Test Statistic	0.288	Lilliefors GOF Test	
1% Lilliefors Critical Value	0.396	Detected Data appear Normal at 1% Significance Level	
Detected Data appear Normal at 1% Significance Level			
Note GOF tests may be unreliable for small sample sizes			

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

KM Mean	0.73	KM Standard Error of Mean	0.175
90KM SD	0.411	95% KM (BCA) UCL	N/A
95% KM (t) UCL	1.069	95% KM (Percentile Bootstrap) UCL	N/A
95% KM (z) UCL	1.017	95% KM Bootstrap t UCL	N/A
90% KM Chebyshev UCL	1.254	95% KM Chebyshev UCL	1.491
97.5% KM Chebyshev UCL	1.821	99% KM Chebyshev UCL	2.468

Gamma GOF Tests on Detected Observations Only

A-D Test Statistic	0.56	Anderson-Darling GOF Test	
5% A-D Critical Value	0.68	Detected data appear Gamma Distributed at 5% Significance Level	
K-S Test Statistic	0.319	Kolmogorov-Smirnov GOF	
5% K-S Critical Value	0.358	Detected data appear Gamma Distributed at 5% Significance Level	
Detected data appear Gamma Distributed at 5% Significance Level			
Note GOF tests may be unreliable for small sample sizes			

Gamma Statistics on Detected Data Only

k hat (MLE)	6.208	k star (bias corrected MLE)	2.616
Theta hat (MLE)	0.149	Theta star (bias corrected MLE)	0.353
nu hat (MLE)	62.08	nu star (bias corrected)	26.16
Mean (detects)	0.924		

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 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	0.226	Mean	0.747
Maximum	1.2	Median	0.74
SD	0.423	CV	0.567
k hat (MLE)	3.031	k star (bias corrected MLE)	1.827
Theta hat (MLE)	0.246	Theta star (bias corrected MLE)	0.409
nu hat (MLE)	42.43	nu star (bias corrected)	25.58
Adjusted Level of Significance (β)	0.0158		
Approximate Chi Square Value (25.58, α)	15.06	Adjusted Chi Square Value (25.58, β)	12.69
95% Gamma Approximate UCL	1.268	95% Gamma Adjusted UCL	1.505

Estimates of Gamma Parameters using KM Estimates

Mean (KM)	0.73	SD (KM)	0.411
Variance (KM)	0.169	SE of Mean (KM)	0.175
k hat (KM)	3.151	k star (KM)	1.896
nu hat (KM)	44.11	nu star (KM)	26.54
theta hat (KM)	0.232	theta star (KM)	0.385
80% gamma percentile (KM)	1.1	90% gamma percentile (KM)	1.438
95% gamma percentile (KM)	1.761	99% gamma percentile (KM)	2.481

Gamma Kaplan-Meier (KM) Statistics

Approximate Chi Square Value (26.54, α)	15.8	Adjusted Chi Square Value (26.54, β)	13.36
95% KM Approximate Gamma UCL	1.227	95% KM Adjusted Gamma UCL	1.45

Lognormal GOF Test on Detected Observations Only

Shapiro Wilk Test Statistic	0.799	Shapiro Wilk GOF Test	
10% Shapiro Wilk Critical Value	0.806	Detected Data Not Lognormal at 10% Significance Level	
Lilliefors Test Statistic	0.299	Lilliefors GOF Test	
10% Lilliefors Critical Value	0.319	Detected Data appear Lognormal at 10% Significance Level	
Detected Data appear Approximate Lognormal at 10% Significance Level			
Note GOF tests may be unreliable for small sample sizes			

Lognormal ROS Statistics Using Imputed Non-Detects

Mean in Original Scale	0.75	Mean in Log Scale	-0.449
SD in Original Scale	0.418	SD in Log Scale	0.641
95% t UCL (assumes normality of ROS data)	1.057	95% Percentile Bootstrap UCL	0.986
95% BCA Bootstrap UCL	0.974	95% Bootstrap t UCL	1.073
95% H-UCL (Log ROS)	1.616		

Statistics using KM estimates on Logged Data and Assuming Lognormal Distribution

KM Mean (logged)	-0.53	KM Geo Mean	0.589
KM SD (logged)	0.706	95% Critical H Value (KM-Log)	2.92
KM Standard Error of Mean (logged)	0.305	95% H-UCL (KM -Log)	1.754
KM SD (logged)	0.706	95% Critical H Value (KM-Log)	2.92
KM Standard Error of Mean (logged)	0.305		

DL/2 Statistics

DL/2 Normal		DL/2 Log-Transformed	
Mean in Original Scale	0.724	Mean in Log Scale	-0.597
SD in Original Scale	0.456	SD in Log Scale	0.917
95% t UCL (Assumes normality)	1.058	95% H-Stat UCL	3.071
DL/2 is not a recommended method, provided for comparisons and historical reasons			

Nonparametric Distribution Free UCL Statistics

Detected Data appear Normal Distributed at 1% Significance Level

Suggested UCL to Use

95% KM (t) UCL	1.069
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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 using results from simulation studies.

However, simulations results will not cover all Real World data sets; for additional insight the user may want to consult a statistician.

MW-111 Cis-1,2 DCE

General Statistics

Total Number of Observations	7	Number of Distinct Observations	7
Number of Detects	6	Number of Non-Detects	1
Number of Distinct Detects	6	Number of Distinct Non-Detects	1
Minimum Detect	2.7	Minimum Non-Detect	0.2
Maximum Detect	8.6	Maximum Non-Detect	0.2
Variance Detects	4.667	Percent Non-Detects	14.29%
Mean Detects	6.05	SD Detects	2.16
Median Detects	6.35	CV Detects	0.357
Skewness Detects	-0.565	Kurtosis Detects	-0.446
Mean of Logged Detects	1.734	SD of Logged Detects	0.424

Note: Sample size is small (e.g., <10), if data are collected using incremental sampling methodology (ISM) approach, refer also to ITRC Tech Reg Guide on ISM (ITRC 2020 and ITRC 2012) for additional guidance,

but note that ITRC may recommend the t-UCL or the Chebyshev UCL for small sample sizes ($n < 7$).

The Chebyshev UCL often results in gross overestimates of the mean.

Refer to the ProUCL 5.2 Technical Guide for a discussion of the Chebyshev UCL.

Normal GOF Test on Detects Only

Shapiro Wilk Test Statistic	0.971	Shapiro Wilk GOF Test	
1% Shapiro Wilk Critical Value	0.713	Detected Data appear Normal at 1% Significance Level	
Lilliefors Test Statistic	0.153	Lilliefors GOF Test	
1% Lilliefors Critical Value	0.373	Detected Data appear Normal at 1% Significance Level	
Detected Data appear Normal at 1% Significance Level			
Note GOF tests may be unreliable for small sample sizes			

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

KM Mean	5.214	KM Standard Error of Mean	1.136
90KM SD	2.743	95% KM (BCA) UCL	6.771
95% KM (t) UCL	7.421	95% KM (Percentile Bootstrap) UCL	6.857
95% KM (z) UCL	7.082	95% KM Bootstrap t UCL	6.945
90% KM Chebyshev UCL	8.621	95% KM Chebyshev UCL	10.16
97.5% KM Chebyshev UCL	12.31	99% KM Chebyshev UCL	16.51

Gamma GOF Tests on Detected Observations Only

A-D Test Statistic	0.28	Anderson-Darling GOF Test	
5% A-D Critical Value	0.698	Detected data appear Gamma Distributed at 5% Significance Level	
K-S Test Statistic	0.189	Kolmogorov-Smirnov GOF	
5% K-S Critical Value	0.333	Detected data appear Gamma Distributed at 5% Significance Level	
Detected data appear Gamma Distributed at 5% Significance Level			
Note GOF tests may be unreliable for small sample sizes			

Gamma Statistics on Detected Data Only

k hat (MLE)	7.688	k star (bias corrected MLE)	3.955
Theta hat (MLE)	0.787	Theta star (bias corrected MLE)	1.53
nu hat (MLE)	92.25	nu star (bias corrected)	47.46
Mean (detects)	6.05		

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 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	1.648	Mean	5.421
Maximum	8.6	Median	5.8
SD	2.58	CV	0.476
k hat (MLE)	3.918	k star (bias corrected MLE)	2.334
Theta hat (MLE)	1.384	Theta star (bias corrected MLE)	2.322
nu hat (MLE)	54.86	nu star (bias corrected)	32.68
Adjusted Level of Significance (β)	0.0158		
Approximate Chi Square Value (32.68, α)	20.61	Adjusted Chi Square Value (32.68, β)	17.78
95% Gamma Approximate UCL	8.595	95% Gamma Adjusted UCL	9.965

Estimates of Gamma Parameters using KM Estimates

Mean (KM)	5.214	SD (KM)	2.743
Variance (KM)	7.524	SE of Mean (KM)	1.136
k hat (KM)	3.614	k star (KM)	2.16
nu hat (KM)	50.59	nu star (KM)	30.24
theta hat (KM)	1.443	theta star (KM)	2.414
80% gamma percentile (KM)	7.736	90% gamma percentile (KM)	9.96
95% gamma percentile (KM)	12.07	99% gamma percentile (KM)	16.74

Gamma Kaplan-Meier (KM) Statistics

Approximate Chi Square Value (30.24, α)	18.68	Adjusted Chi Square Value (30.24, β)	16
95% KM Approximate Gamma UCL	8.44	95% KM Adjusted Gamma UCL	9.854

Lognormal GOF Test on Detected Observations Only

Shapiro Wilk Test Statistic	0.909	Shapiro Wilk GOF Test	
10% Shapiro Wilk Critical Value	0.826	Detected Data appear Lognormal at 10% Significance Level	
Lilliefors Test Statistic	0.189	Lilliefors GOF Test	
10% Lilliefors Critical Value	0.298	Detected Data appear Lognormal at 10% Significance Level	
Detected Data appear Lognormal at 10% Significance Level			
Note GOF tests may be unreliable for small sample sizes			

Lognormal ROS Statistics Using Imputed Non-Detects

Mean in Original Scale	5.478	Mean in Log Scale	1.588
SD in Original Scale	2.485	SD in Log Scale	0.546
95% t UCL (assumes normality of ROS data)	7.304	95% Percentile Bootstrap UCL	6.857
95% BCA Bootstrap UCL	6.735	95% Bootstrap t UCL	7.248
95% H-UCL (Log ROS)	10.04		

Statistics using KM estimates on Logged Data and Assuming Lognormal Distribution

KM Mean (logged)	1.256	KM Geo Mean	3.511
KM SD (logged)	1.224	95% Critical H Value (KM-Log)	4.347
KM Standard Error of Mean (logged)	0.507	95% H-UCL (KM -Log)	65.1
KM SD (logged)	1.224	95% Critical H Value (KM-Log)	4.347
KM Standard Error of Mean (logged)	0.507		

DL/2 Statistics

DL/2 Normal	DL/2 Log-Transformed		
Mean in Original Scale	5.2	Mean in Log Scale	1.157
SD in Original Scale	2.991	SD in Log Scale	1.574
95% t UCL (Assumes normality)	7.397	95% H-Stat UCL	355.3

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

Nonparametric Distribution Free UCL Statistics

Detected Data appear Normal Distributed at 1% Significance Level

Suggested UCL to Use

95% KM (t) UCL	7.421
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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 using results from simulation studies.

However, simulations results will not cover all Real World data sets; for additional insight the user may want to consult a statistician.

MW-115 Vinyl Chloride

General Statistics

Total Number of Observations	7	Number of Distinct Observations	7
		Number of Missing Observations	0
Minimum	67	Mean	83.29
Maximum	95	Median	85
SD	9.032	Std. Error of Mean	3.414
Coefficient of Variation	0.108	Skewness	-0.801

Note: Sample size is small (e.g., <10), if data are collected using incremental sampling methodology (ISM) approach, refer also to ITRC Tech Reg Guide on ISM (ITRC 2020 and ITRC 2012) for additional guidance, but note that ITRC may recommend the t-UCL or the Chebyshev UCL for small sample sizes ($n < 7$). The Chebyshev UCL often results in gross overestimates of the mean. Refer to the ProUCL 5.2 Technical Guide for a discussion of the Chebyshev UCL.

Normal GOF Test

Shapiro Wilk Test Statistic	0.954	Shapiro Wilk GOF Test	
1% Shapiro Wilk Critical Value	0.73	Data appear Normal at 1% Significance Level	
Lilliefors Test Statistic	0.175	Lilliefors GOF Test	
1% Lilliefors Critical Value	0.35	Data appear Normal at 1% Significance Level	
Data appear Normal at 1% Significance Level			
Note GOF tests may be unreliable for small sample sizes			

Assuming Normal Distribution

95% Normal UCL		95% UCLs (Adjusted for Skewness)	
95% Student's-t UCL	89.92	95% Adjusted-CLT UCL (Chen-1995)	87.8
		95% Modified-t UCL (Johnson-1978)	89.75

Gamma GOF Test

A-D Test Statistic	0.294	Anderson-Darling Gamma GOF Test	
5% A-D Critical Value	0.708	Detected data appear Gamma Distributed at 5% Significance Level	
K-S Test Statistic	0.175	Kolmogorov-Smirnov Gamma GOF Test	
5% K-S Critical Value	0.311	Detected data appear Gamma Distributed at 5% Significance Level	
Detected data appear Gamma Distributed at 5% Significance Level			
Note GOF tests may be unreliable for small sample sizes			

Gamma Statistics

k hat (MLE)	94.07	k star (bias corrected MLE)	53.85
Theta hat (MLE)	0.885	Theta star (bias corrected MLE)	1.547
nu hat (MLE)	1317	nu star (bias corrected)	753.9
MLE Mean (bias corrected)	83.29	MLE Sd (bias corrected)	11.35
		Approximate Chi Square Value (0.05)	691.2
Adjusted Level of Significance	0.0158	Adjusted Chi Square Value	672.9

Assuming Gamma Distribution

95% Approximate Gamma UCL	90.84	95% Adjusted Gamma UCL	93.31
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Lognormal GOF Test

Shapiro Wilk Test Statistic	0.93	Shapiro Wilk Lognormal GOF Test	
10% Shapiro Wilk Critical Value	0.838	Data appear Lognormal at 10% Significance Level	
Lilliefors Test Statistic	0.194	Lilliefors Lognormal GOF Test	
10% Lilliefors Critical Value	0.28	Data appear Lognormal at 10% Significance Level	
Data appear Lognormal at 10% Significance Level			
Note GOF tests may be unreliable for small sample sizes			

Lognormal Statistics

Minimum of Logged Data	4.205	Mean of logged Data	4.417
Maximum of Logged Data	4.554	SD of logged Data	0.113

Assuming Lognormal Distribution

95% H-UCL	90.99	90% Chebyshev (MVUE) UCL	93.98
95% Chebyshev (MVUE) UCL	98.82	97.5% Chebyshev (MVUE) UCL	105.5
99% Chebyshev (MVUE) UCL	118.7		

Nonparametric Distribution Free UCL Statistics

Data appear to follow a Discernible Distribution

Nonparametric Distribution Free UCLs			
95% CLT UCL	88.9	95% BCA Bootstrap UCL	88
95% Standard Bootstrap UCL	88.65	95% Bootstrap-t UCL	89.09
95% Hall's Bootstrap UCL	88.34	95% Percentile Bootstrap UCL	88.71
90% Chebyshev(Mean, Sd) UCL	93.53	95% Chebyshev(Mean, Sd) UCL	98.17
97.5% Chebyshev(Mean, Sd) UCL	104.6	99% Chebyshev(Mean, Sd) UCL	117.3

Suggested UCL to Use

95% Student's-t UCL 89.92

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 using results from simulation studies. 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 positively skewed data sets.