MW-101S TCE

General Statistics

Total Number of Observations	18	Number of Distinct Observations	15
Number of Detects	16	Number of Non-Detects	2
Number of Distinct Detects	14	Number of Distinct Non-Detects	1
Minimum Detect	0.31	Minimum Non-Detect	0.3
Maximum Detect	0.76	Maximum Non-Detect	0.3
Variance Detects	0.0214	Percent Non-Detects	11.11%
Mean Detects	0.531	SD Detects	0.146
Median Detects	0.565	CV Detects	0.275
Skewness Detects	-0.154	Kurtosis Detects	-1.191
Mean of Logged Detects	-0.672	SD of Logged Detects	0.296

Normal GOF Test on Detects Only

Shapiro Wilk Test Statistic	0.926	Shapiro Wilk GOF Test
1% Shapiro Wilk Critical Value	0.844	Detected Data appear Normal at 1% Significance Level
Lilliefors Test Statistic	0.205	Lilliefors GOF Test
1% Lilliefors Critical Value	0.248	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	0.506	KM Standard Error of Mean	0.037
90KM SD	0.152	95% KM (BCA) UCL	0.567
95% KM (t) UCL	0.57	95% KM (Percentile Bootstrap) UCL	0.566
95% KM (z) UCL	0.566	95% KM Bootstrap t UCL	0.57
90% KM Chebyshev UCL	0.617	95% KM Chebyshev UCL	0.667
97.5% KM Chebyshev UCL	0.737	99% KM Chebyshev UCL	0.874

Gamma GOF Tests on Detected Observations Only

A-D Test Statistic	0.595	Anderson-Darling GOF Test
5% A-D Critical Value	0.738	Detected data appear Gamma Distributed at 5% Significance Level
K-S Test Statistic	0.226	Kolmogorov-Smirnov GOF
5% K-S Critical Value	0.215	Detected Data Not Gamma Distributed at 5% Significance Level

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

Gamma Statistics on Detected Data Only

k hat (MLE)	12.98	k star (bias corrected MLE)	10.59
Theta hat (MLE)	0.0409	Theta star (bias corrected MLE)	0.0502
nu hat (MLE)	415.5	nu star (bias corrected)	338.9
Mean (detects)	0.531		

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	0.223	Mean	0.499
Maximum	0.76	Median	0.51
SD	0.166	CV	0.332
k hat (MLE)	8.582	k star (bias corrected MLE)	7.189
Theta hat (MLE)	0.0582	Theta star (bias corrected MLE)	0.0695
nu hat (MLE)	309	nu star (bias corrected)	258.8
Adjusted Level of Significance (β)	0.0357		
Approximate Chi Square Value (258.80, α)	222.5	Adjusted Chi Square Value (258.80, β)	219.3
95% Gamma Approximate UCL	0.581	95% Gamma Adjusted UCL	0.589

Estimates of Gamma Parameters using KM Estimates

Mean (KM)	0.506	SD (KM)	0.152
Variance (KM)	0.0231	SE of Mean (KM)	0.037
k hat (KM)	11.06	k star (KM)	9.256
nu hat (KM)	398.3	nu star (KM)	333.2
theta hat (KM)	0.0457	theta star (KM)	0.0546
80% gamma percentile (KM)	0.638	90% gamma percentile (KM)	0.727
95% gamma percentile (KM)	0.806	99% gamma percentile (KM)	0.97

Gamma Kaplan-Meier (KM) Statistics

Approximate Chi Square Value (333.23, α)	291.9	Adjusted Chi Square Value (333.23, β)	288.2
95% KM Approximate Gamma UCL	0.577	95% KM Adjusted Gamma UCL	0.584

Lognormal GOF Test on Detected Observations Only

Shapiro Wilk Test Statistic	0.908	Shapiro Wilk GOF Test	
10% Shapiro Wilk Critical Value	0.906	Detected Data appear Lognormal at 10% Significance Level	
Lilliefors Test Statistic	0.225	Lilliefors GOF Test	
10% Lilliefors Critical Value	0.196	Detected Data Not Lognormal at 10% Significance Level	

Detected Data appear Approximate Lognormal at 10% Significance Level

Lognormal ROS Statistics Using Imputed Non-Detects

Mean in Original Scale	0.501	Mean in Log Scale	-0.747
SD in Original Scale	0.163	SD in Log Scale	0.354
95% t UCL (assumes normality of ROS data)	0.568	95% Percentile Bootstrap UCL	0.562
95% BCA Bootstrap UCL	0.561	95% Bootstrap t UCL	0.567
95% H-UCL (Log ROS)	0.594		

Statistics using KM estimates on Logged Data and Assuming Lognormal Distribution

KM Mean (logged)	-0.731	KM Geo Mean	0.482
KM SD (logged)	0.318	95% Critical H Value (KM-Log)	1.866
KM Standard Error of Mean (logged)	0.0773	95% H-UCL (KM -Log)	0.585
KM SD (logged)	0.318	95% Critical H Value (KM-Log)	1.866
KM Standard Error of Mean (logged)	0.0773		

DL/2 Statistics

DL/2 Normal		DL/2 Log-Transformed	
Mean in Original Scale	0.489	Mean in Log Scale	-0.808
SD in Original Scale	0.185	SD in Log Scale	0.484
95% t UCL (Assumes normality)	0.565	95% H-Stat UCL	0.634

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	0.57

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-101S Cis-1,2 DCE

General Statistics

Total Number of Observations	18	Number of Distinct Observations	13
Number of Detects	14	Number of Non-Detects	4
Number of Distinct Detects	13	Number of Distinct Non-Detects	1
Minimum Detect	0.18	Minimum Non-Detect	0.3
Maximum Detect	0.7	Maximum Non-Detect	0.3
Variance Detects	0.0197	Percent Non-Detects	22.22%
Mean Detects	0.428	SD Detects	0.14
Median Detects	0.425	CV Detects	0.328
Skewness Detects	0.362	Kurtosis Detects	0.12
Mean of Logged Detects	-0.903	SD of Logged Detects	0.351

Normal GOF Test on Detects Only

Shapiro Wilk Test Statistic	0.969	Shapiro Wilk GOF Test
1% Shapiro Wilk Critical Value	0.825	Detected Data appear Normal at 1% Significance Level
Lilliefors Test Statistic	0.113	Lilliefors GOF Test
1% Lilliefors Critical Value	0.263	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	0.373	KM Standard Error of Mean	0.0385
90KM SD	0.158	95% KM (BCA) UCL	0.458
95% KM (t) UCL	0.44	95% KM (Percentile Bootstrap) UCL	0.446
95% KM (z) UCL	0.436	95% KM Bootstrap t UCL	0.438
90% KM Chebyshev UCL	0.488	95% KM Chebyshev UCL	0.541
97.5% KM Chebyshev UCL	0.613	99% KM Chebyshev UCL	0.756

Gamma GOF Tests on Detected Observations Only

A-D Test Statistic	0.211	Anderson-Darling GOF Test
5% A-D Critical Value	0.735	Detected data appear Gamma Distributed at 5% Significance Level
K-S Test Statistic	0.107	Kolmogorov-Smirnov GOF
5% K-S Critical Value	0.229	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)	9.466	k star (bias corrected MLE)	7.485
Theta hat (MLE)	0.0452	Theta star (bias corrected MLE)	0.0572
nu hat (MLE)	265	nu star (bias corrected)	209.6
Mean (detects)	0.428		

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	0.124	Mean	0.374
Maximum	0.7	Median	0.365
SD	0.162	CV	0.435
k hat (MLE)	5.144	k star (bias corrected MLE)	4.324
Theta hat (MLE)	0.0726	Theta star (bias corrected MLE)	0.0864
nu hat (MLE)	185.2	nu star (bias corrected)	155.7
Adjusted Level of Significance (β)	0.0357		
Approximate Chi Square Value (155.66, α)	127.8	Adjusted Chi Square Value (155.66, β)	125.4
95% Gamma Approximate UCL	0.455	95% Gamma Adjusted UCL	0.464

Estimates of Gamma Parameters using KM Estimates

Mean (KM)	0.373	SD (KM)	0.158
Variance (KM)	0.0248	SE of Mean (KM)	0.0385
k hat (KM)	5.599	k star (KM)	4.703
nu hat (KM)	201.6	nu star (KM)	169.3
theta hat (KM)	0.0666	theta star (KM)	0.0793
80% gamma percentile (KM)	0.505	90% gamma percentile (KM)	0.603
95% gamma percentile (KM)	0.693	99% gamma percentile (KM)	0.884

Gamma Kaplan-Meier (KM) Statistics

Approximate Chi Square Value (169.30, α)	140.2	Adjusted Chi Square Value (169.30, β)	137.7
95% KM Approximate Gamma UCL	0.45	95% KM Adjusted Gamma UCL	0.458

Lognormal GOF Test on Detected Observations Only

Shapiro Wilk Test Statistic	0.957	Shapiro Wilk GOF Test	
10% Shapiro Wilk Critical Value	0.895	Detected Data appear Lognormal at 10% Significance Level	
Lilliefors Test Statistic	0.124	Lilliefors GOF Test	
10% Lilliefors Critical Value	0.208	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	0.378	Mean in Log Scale	-1.057
SD in Original Scale	0.156	SD in Log Scale	0.433
95% t UCL (assumes normality of ROS data)	0.442	95% Percentile Bootstrap UCL	0.438
95% BCA Bootstrap UCL	0.441	95% Bootstrap t UCL	0.448
95% H-UCL (Log ROS)	0.469		

Statistics using KM estimates on Logged Data and Assuming Lognormal Distribution

KM Mean (logged)	-1.083	KM Geo Mean	0.339
KM SD (logged)	0.451	95% Critical H Value (KM-Log)	1.975
KM Standard Error of Mean (logged)	0.11	95% H-UCL (KM -Log)	0.465
KM SD (logged)	0.451	95% Critical H Value (KM-Log)	1.975
KM Standard Error of Mean (logged)	0.11		

DL/2 Statistics

DL/2 Normal		DL/2 Log-Transformed	
Mean in Original Scale	0.366	Mean in Log Scale	-1.124
SD in Original Scale	0.171	SD in Log Scale	0.525
95% t UCL (Assumes normality)	0.436	95% H-Stat UCL	0.484

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	0.44

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-101D Benzene

General Statistics

Total Number of Observations	18	Number of Distinct Observations	5
Number of Detects	4	Number of Non-Detects	14
Number of Distinct Detects	4	Number of Distinct Non-Detects	1
Minimum Detect	0.33	Minimum Non-Detect	0.3
Maximum Detect	1.6	Maximum Non-Detect	0.3
Variance Detects	0.316	Percent Non-Detects	77.78%
Mean Detects	0.78	SD Detects	0.563
Median Detects	0.595	CV Detects	0.721
Skewness Detects	1.663	Kurtosis Detects	3.033
Mean of Logged Detects	-0.421	SD of Logged Detects	0.66

Normal GOF Test on Detects Only

Shapiro Wilk Test Statistic	0.837	Shapiro Wilk GOF Test	
1% Shapiro Wilk Critical Value	0.687	Detected Data appear Normal at 1% Significance Level	
Lilliefors Test Statistic	0.341	Lilliefors GOF Test	
1% Lilliefors Critical Value	0.413	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	0.407	KM Standard Error of Mean	0.0828
90KM SD	0.304	95% KM (BCA) UCL	N/A
95% KM (t) UCL	0.551	95% KM (Percentile Bootstrap) UCL	N/A
95% KM (z) UCL	0.543	95% KM Bootstrap t UCL	N/A
90% KM Chebyshev UCL	0.655	95% KM Chebyshev UCL	0.768
97.5% KM Chebyshev UCL	0.924	99% KM Chebyshev UCL	1.231

Gamma GOF Tests on Detected Observations Only

A-D Test Statistic	0.348	Anderson-Darling GOF Test	
5% A-D Critical Value	0.659	Detected data appear Gamma Distributed at 5% Significance Level	
K-S Test Statistic	0.295	Kolmogorov-Smirnov GOF	
5% K-S Critical Value	0.397	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)	3.048	k star (bias corrected MLE)	0.929
Theta hat (MLE)	0.256	Theta star (bias corrected MLE)	0.84
nu hat (MLE)	24.38	nu star (bias corrected)	7.428
Mean (detects)	0.78		

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	0.181
Maximum	1.6	Median	0.01
SD	0.405	CV	2.238
k hat (MLE)	0.343	k star (bias corrected MLE)	0.323
Theta hat (MLE)	0.528	Theta star (bias corrected MLE)	0.561
nu hat (MLE)	12.35	nu star (bias corrected)	11.62
Adjusted Level of Significance (β)	0.0357		
Approximate Chi Square Value (11.62, α)	4.98	Adjusted Chi Square Value (11.62, β)	4.569
95% Gamma Approximate UCL	0.423	95% Gamma Adjusted UCL	N/A

Estimates of Gamma Parameters using KM Estimates

Mean (KM)	0.407	SD (KM)	0.304
Variance (KM)	0.0926	SE of Mean (KM)	0.0828
k hat (KM)	1.787	k star (KM)	1.526
nu hat (KM)	64.32	nu star (KM)	54.93
theta hat (KM)	0.228	theta star (KM)	0.267

80% gamma percentile (KM)	0.628	90% gamma percentile (KM)	0.844
95% gamma percentile (KM)	1.053	99% gamma percentile (KM)	1.526

Gamma Kaplan-Meier (KM) Statistics

Approximate Chi Square Value (54.93, α)	38.9	Adjusted Chi Square Value (54.93, β)	37.61
95% KM Approximate Gamma UCL	0.574	95% KM Adjusted Gamma UCL	0.594

Lognormal GOF Test on Detected Observations Only

Shapiro Wilk Test Statistic	0.954	Shapiro Wilk GOF Test	
10% Shapiro Wilk Critical Value	0.792	Detected Data appear Lognormal at 10% Significance Level	
Lilliefors Test Statistic	0.256	Lilliefors GOF Test	
10% Lilliefors Critical Value	0.346	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	0.214	Mean in Log Scale	-2.863
SD in Original Scale	0.394	SD in Log Scale	1.773
95% t UCL (assumes normality of ROS data)	0.376	95% Percentile Bootstrap UCL	0.38
95% BCA Bootstrap UCL	0.443	95% Bootstrap t UCL	0.585
95% H-UCL (Log ROS)	1.475		

Statistics using KM estimates on Logged Data and Assuming Lognormal Distribution

KM Mean (logged)	-1.03	KM Geo Mean	0.357
KM SD (logged)	0.422	95% Critical H Value (KM-Log)	1.95
KM Standard Error of Mean (logged)	0.115	95% H-UCL (KM -Log)	0.477
KM SD (logged)	0.422	95% Critical H Value (KM-Log)	1.95
KM Standard Error of Mean (logged)	0.115		

DL/2 Statistics

DL/2 Normal		DL/2 Log-Transformed	
Mean in Original Scale	0.29	Mean in Log Scale	-1.569
SD in Original Scale	0.358	SD in Log Scale	0.689
95% t UCL (Assumes normality)	0.437	95% H-Stat UCL	0.383

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	0.551

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.