

APPENDIX F
STATISTICAL EVALUATION

	Sb	D_Sb	As	D_As	Be	D_Be	Cd	D_Cd	Cr	D_Cr	Co	D_Co	Pb	D_Pb
SS-125	0.71	1	0.23	0	0.56	1	1	1	18.3	1	20.7	1	10.8	1
SS-126	0.8	1	0.24	0	0.55	1	0.82	1	19.2	1	6.6	1	12.6	1
SS-127	0.66	1	0.33	0	0.6	1	0.4	1	9.6	1	7.2	1	16.1	1
SS-128	0.29	0	0.33	0	0.93	1	0.16	1	6.4	1	4.5	1	5.9	1
SS-129	0.33	0	0.38	0	0.61	1	0.21	1	16.8	1	15.6	1	19.2	1
FD-17	1.7	0	1.9	0	1.3	1	0.36	0	18.2	1	3.7	1	5	1
FD-22	4.4	0	5.1	0	1.4	1	0.95	0	18	1	1.6	1	7.6	0
FD-28	1.3	0	1.5	0	1.1	1	0.29	0	12.6	1	13.3	1	5	1
SS-105B	1.1	0	1.3	0	1.1	1	0.24	0	14.8	1	3.3	1	3.3	1
SS-105C	3.1	0	6.1	1	2.5	1	0.66	0	30.1	1	8.9	1	15.9	1
SS-105D	2.5	0	2.8	0	1.4	1	0.53	0	12.8	1	7.1	1	4.2	0
SS-106A	1.1	0	1.4	1	0.95	1	0.23	0	16.7	1	12.4	1	7.8	1
SS-106B	2.1	0	2.4	0	1.4	1	0.46	0	20.2	1	8.5	1	5.3	1
SS-106C	2.5	0	2.9	0	1.4	1	0.54	0	16.3	1	3.5	1	5.2	1
SS-106D	2.3	0	2.6	0	1.2	1	0.49	0	17.3	1	10.7	1	5.1	1
SS-106E	2.7	0	3.1	0	1.5	1	0.59	0	14.3	1	4.2	1	4.7	0
SS-107B	1.2	0	1.4	1	1.2	1	0.27	0	13.3	1	2.7	1	11.3	1
SS-107C	2.4	0	3.7	1	1.3	1	0.51	0	21	1	8.5	1	5.4	1
SS-107D	3.1	0	3.5	0	1.8	1	0.65	0	19.5	1	7.3	1	5.2	0
SS-107E	2.2	0	2.5	0	1.3	1	0.47	0	21.4	1	1.7	1	3.8	0
SS-108A	1.2	0	1.3	0	0.79	1	0.25	0	17.5	1	11.2	1	6.7	1
SS-108B	2.2	0	2.6	0	1.5	1	0.48	0	20.2	1	9.7	1	9.5	1
SS-108C	2.8	0	4.6	1	1.8	1	0.61	0	27.3	1	4.3	1	9.5	1
SS-108D	2.2	0	2.9	1	1.8	1	0.48	0	23.6	1	7	1	4.1	1
SS-108E	2.4	0	4	1	1.5	1	0.51	0	17.5	1	2.4	1	7.4	1
SS-110A	1.6	0	1.9	0	0.81	1	0.35	0	23	1	4.2	1	8	1
SS-110B	3	0	3.5	0	1.3	1	0.65	0	18.4	1	0.51	1	5.2	0
SS-110C	3	0	3.4	0	1.6	1	0.64	0	23.1	1	10.9	1	6.3	1
SS-110D	3.9	0	4.4	0	1.5	1	0.83	0	24.7	1	5.8	1	6.7	0
SS-111A	0.6	0	0.69	0	0.58	1	0.26	1	19.9	1	5.3	1	11.8	1
SS-111B	1.3	0	1.5	1	0.89	1	0.28	0	15.3	1	2.5	1	9.1	1
SS-111C	1.2	0	1.8	1	0.86	1	0.26	0	16.8	1	2.5	1	6.4	1
SS-111D	2.9	0	4.4	1	1.2	1	0.62	0	13.6	1	5.9	1	7.3	1
SS-111E	2.3	0	4	1	1.2	1	0.48	0	16.4	1	13.5	1	4	1
SS-112A	1.1	0	1.7	1	0.7	1	0.23	0	15.2	1	3.3	1	3.7	1
SS-112B	1.8	0	2.1	0	0.74	1	0.39	0	15.7	1	11.4	1	6.3	1
SS-112C	1.2	0	2	1	1.4	1	0.26	0	16.1	1	7.7	1	5.1	1
SS-112D	1	0	1.5	1	0.88	1	0.22	0	17.1	1	20.2	1	6.2	1
SS-112E	1.4	0	1.9	1	0.87	1	0.29	0	18.3	1	11.6	1	5.5	1
SS-124	0.25	1	0.35	1	0.54	1	0.051	0	15.4	1	13.3	1	6.7	1
SS-130	0.39	1	0.26	0	0.67	1	0.79	1	14.8	1	20.6	1	6.2	1
SS-133	0.22	0	0.25	0	0.33	1	0.064	1	8.8	1	5.8	1	11.4	1
SS-134	1.2	1	1.2	0	0.82	1	0.22	0	18.2	1	3.5	1	6.6	1
SS-123	0.32	1	0.3	0	0.87	1	0.2	1	16	1	26.4	1	8.3	1
SS-1	0.31	1	2	1	0.92	1	0.36	1	16	1	2.6	1	7.7	1

	Mn	D_Mn	Hg	D_Hg	Ni	D_Ni	Se	D_Se	Ag	D_Ag	TI	D_TI	Zn	D_Zn
SS-125	564	1	0.0032	1	15.8	1	0.6	1	0.082	1	0.8	1	50	1
SS-126	384	1	0.015	1	10.2	1	0.36	1	0.023	0	0.4	1	47.6	1
SS-127	232	1	0.025	1	5.7	1	0.46	1	0.031	0	0.58	1	21.9	1
SS-128	2160	1	0.025	1	8.1	1	0.41	1	0.031	0	0.27	0	19.1	1
SS-129	307	1	0.028	1	7.4	1	0.74	1	0.036	0	0.31	0	23.8	1
FD-17	370	1	0.0061	1	11.8	1	2.3	0	0.18	0	1.5	0	72.4	1
FD-22	249	1	0.001	1	14.6	1	6	0	0.47	0	4.1	0	90.1	1
FD-28	681	1	0.000086	0	8.7	1	1.8	0	0.14	0	1.5	1	82.5	1
SS-105B	266	1	0.01	1	12.1	1	1.5	0	0.12	0	1	0	52.7	1
SS-105C	3130	1	0.0016	1	24.6	1	4.2	0	0.33	0	2.9	0	128	1
SS-105D	2030	1	0.000087	0	8.7	1	3.3	0	0.26	0	2.4	1	45.5	1
SS-106A	306	1	0.022	1	9.1	1	1.5	0	0.14	1	1	0	47.8	1
SS-106B	546	1	0.0074	1	10.9	1	2.9	0	0.23	0	2.4	1	85.8	1
SS-106C	354	1	0.00073	1	9.8	1	3.4	0	0.27	0	2.3	0	75.4	1
SS-106D	813	1	0.000092	0	9.1	1	3.1	0	0.25	0	2.1	0	46	1
SS-106E	426	1	0.00014	1	9.5	1	3.7	0	0.29	0	2.5	0	66.4	1
SS-107B	2510	1	0.01	1	10.4	1	1.7	0	0.13	0	2.1	1	59.2	1
SS-107C	284	1	0.00018	1	20.6	1	3.3	0	0.26	0	2.2	0	81.7	1
SS-107D	257	1	0.000068	0	11.8	1	4.1	0	0.33	0	2.8	0	77.1	1
SS-107E	294	1	0.000056	0	15.5	1	3	0	0.24	0	2.1	0	74.5	1
SS-108A	116	1	0.051	1	8.5	1	1.6	0	0.12	0	1.1	0	59.2	1
SS-108B	393	1	0.0075	1	17.6	1	3	0	0.24	0	2.1	0	115	1
SS-108C	664	1	0.0046	1	17.5	1	3.9	0	0.31	0	2.6	0	93.5	1
SS-108D	509	1	0.000087	0	16	1	3.5	1	0.24	0			88	1
SS-108E	502	1	0.00011	0	15.5	1	3.3	0	0.26	0	2.2	0	61.4	1
SS-110A	228	1	0.041	1	10.6	1	2.2	0	0.18	0	1.5	0	49.1	1
SS-110B	221	1	0.0031	1	14.6	1	4.1	0	0.33	0	2.8	0	84.1	1
SS-110C	599	1	0.00047	1	13.8	1	4.1	0	0.32	0	2.8	0	90	1
SS-110D	380	1	0.00037	1	11.1	1	5.3	0	0.42	0	3.6	0	67.5	1
SS-111A	134	1	0.069	1	6.1	1	0.81	0	0.064	0	0.56	0	25.1	1
SS-111B	586	1	0.0031	1	11.7	1	1.7	0	0.14	0	1.2	0	77	1
SS-111C	269	1	0.0011	1	12.2	1	1.7	0	0.13	0	1.1	0	78.9	1
SS-111D	552	1	0.00011	0	8.5	1	3.9	0	0.31	0	2.7	0	56.7	1
SS-111E	304	1	0.00066	1	12.3	1	3.1	0	0.24	0	2.4	1	88.8	1
SS-112A	150	1	0.0096	1	14.4	1	1.5	0	0.11	0	1	0	53.2	1
SS-112B	230	1	0.000068	0	10.1	1	2.5	0	0.19	0	2	1	73.6	1
SS-112C	368	1	0.00063	1	10.1	1	1.7	0	0.13	0	1.1	0	61.5	1
SS-112D	240	1	0.000074	0	10.6	1	1.4	0	0.11	0	0.93	0	63.1	1
SS-112E	209	1	0.0001	0	9.8	1	1.8	0	0.15	0	1.3	0	60.1	1
SS-124	394	1	0.0051	1	9.2	1	0.32	0	0.025	0	0.22	0	45.8	1
SS-130	244	1	0.013	1	9.7	1	0.63	1	0.024	0	0.21	0	51.5	1
SS-133	104	1	0.021	1	4.1	1	0.29	0	0.023	0	0.2	0	16.8	1
SS-134	210	1	0.0041	1	10.5	1	2.6	1	0.11	0	0.97	0	49.5	1
SS-123	458	1	0.0034	1	7.6	1	0.87	1	0.028	0	0.24	0	19.3	1
SS-1	560	1	0.0025	0	14	1	0.1	0	0.84	1	0.094	0	59	1

Summary Statistics for Raw Data Sets with NDs using Detected Data Only

Variable	Raw Statistics using Detected Observations									
	Num Ds	NumNDs	% NDs	Minimum	Maximum	Mean	Median	SD	MAD/0.67 σ	Skewness CV
Antimony	8	37	82.22%	0.25	1.2	0.58	0.525	0.325	0.311	0.948
Arsenic	17	28	62.22%	0.35	6.1	2.662	2	1.534	0.89	0.726
Beryllium	45	0	0.00%	0.33	2.5	1.115	1.1	0.434	0.445	0.389
Cadmium	10	35	77.78%	0.064	1	0.426	0.31	0.325	0.193	0.762
Chromium	45	0	0.00%	6.4	30.1	17.46	17.1	4.414	3.113	0.321
Copper	45	0	0.00%	0.51	26.4	8.091	7	5.83	5.486	1.244
Lead	38	7	15.56%	3.3	19.2	7.834	6.65	3.618	2.298	1.446
Manganese	45	0	0.00%	104	3130	550.8	368	636.6	204.6	1.156
Mercury	33	12	26.67%	1.40E-04	0.069	0.0119	0.0051	0.016	0.00667	2.106
Nickel	45	0	0.00%	4.1	24.6	11.57	10.6	3.913	2.817	1.041
Selenium	9	36	80.00%	0.36	3.5	1.13	0.63	1.123	0.326	1.703
Silver	3	42	93.33%	0.082	0.84	0.354	0.14	0.422	0.086	1.695
Thallium	9	35	79.55%	0.4	2.4	1.62	2	0.826	0.593	-0.543
Zinc	45	0	0.00%	16.8	128	63	61.4	24.52	22.83	0.131

* Thallium outlier of 17.5 removed.

Antimony**General Statistics**

Number of Valid Data	45	Number of Detected Data	8
Number of Distinct Detected Data	8	Number of Non-Detect Data	37
		Percent Non-Detects	82.22%

Raw Statistics**Log-transformed Statistics**

Minimum Detected	0.25	Minimum Detected	-1.386
Maximum Detected	1.2	Maximum Detected	0.182
Mean of Detected	0.58	Mean of Detected	-0.68
SD of Detected	0.325	SD of Detected	0.555
Minimum Non-Detect	0.22	Minimum Non-Detect	-1.514
Maximum Non-Detect	4.4	Maximum Non-Detect	1.482

Data with Multiple Detection Limits**Single Detection Limit Scenario**

Note: Data have multiple DLs - Use of KM Method is recommended	Number treated as Non-Detect with Single DL	45
For all methods (except KM, DL/2, and ROS Methods),	Number treated as Detected with Single DL	0
Observations < Largest ND are treated as NDs	Single DL Non-Detect Percentage	100.00%

Warning: There are only 8 Detected Values in this data

**Note: It should be noted that even though bootstrap may be performed on this data set
the resulting calculations may not be reliable enough to draw conclusions**

It is recommended to have 10-15 or more distinct observations for accurate and meaningful results.

Background Statistics**Normal Distribution Test with Detected Values Only****Lognormal Distribution Test with Detected Values Only**

Shapiro Wilk Test Statistic	0.891	Shapiro Wilk Test Statistic	0.932
5% Shapiro Wilk Critical Value	0.818	5% Shapiro Wilk Critical Value	0.818
Data appear Normal at 5% Significance Level		Data appear Lognormal at 5% Significance Level	

Assuming Normal Distribution**Assuming Lognormal Distribution**

DL/2 Substitution Method		DL/2 Substitution Method	
Mean	0.899	Mean (Log Scale)	-0.294
SD	0.489	SD (Log Scale)	0.687
95% UTL 90% Coverage	1.712	95% UTL 90% Coverage	2.336
95% UPL (t)	1.73	95% UPL (t)	2.395
90% Percentile (z)	1.526	90% Percentile (z)	1.798
95% Percentile (z)	1.704	95% Percentile (z)	2.308
99% Percentile (z)	2.037	99% Percentile (z)	3.687
Maximum Likelihood Estimate(MLE) Method	N/A	Log ROS Method	
		Mean in Original Scale	0.387
		SD in Original Scale	0.184
		Mean in Log Scale	-1.032
		SD in Log Scale	0.396
		95% UTL 90% Coverage	0.688
		95% UPL (t)	0.698
		90% Percentile (z)	0.592
		95% Percentile (z)	0.683
		99% Percentile (z)	0.894

Gamma Distribution Test with Detected Values Only		Data Distribution Test with Detected Values Only	
k star (bias corrected)	2.498	Data appear Normal at 5% Significance Level	
Theta Star	0.232		
nu star	39.97		
A-D Test Statistic	0.367	Nonparametric Statistics	
5% A-D Critical Value	0.719	Kaplan-Meier (KM) Method	
K-S Test Statistic	0.211	Mean	0.449
5% K-S Critical Value	0.295	SD	0.259
Data appear Gamma Distributed at 5% Significance Level		SE of Mean	0.0738
		95% KM UTL with 90% Coverage	0.88
Assuming Gamma Distribution		95% KM Chebyshev UPL	1.592
Gamma ROS Statistics with Extrapolated Data		95% KM UPL (t) 0.89	
Mean	0.669	90% Percentile (z)	0.782
Median	0.73	95% Percentile (z)	0.876
SD	0.189	99% Percentile (z)	1.053
k star	10.09		
Theta star	0.0663	Gamma ROS Limits with Extrapolated Data	
Nu star	907.9	95% Wilson Hilferty (WH) Approx. Gamma UPL	1.055
95% Percentile of Chisquare (2k)	31.63	95% Hawkins Wixley (HW) Approx. Gamma UPL	1.068
		95% WH Approx. Gamma UTL with 90% Coverage	1.045
90% Percentile	0.949	95% HW Approx. Gamma UTL with 90% Coverage	1.057
95% Percentile	1.049		
99% Percentile	1.253		
Note: DL/2 is not a recommended method.			

Arsenic

General Statistics

Number of Valid Data	45	Number of Detected Data	17
Number of Distinct Detected Data	13	Number of Non-Detect Data	28
		Percent Non-Detects	62.22%

Raw Statistics

Log-transformed Statistics

Minimum Detected	0.35	Minimum Detected	-1.05
Maximum Detected	6.1	Maximum Detected	1.808
Mean of Detected	2.662	Mean of Detected	0.797
SD of Detected	1.534	SD of Detected	0.678
Minimum Non-Detect	0.23	Minimum Non-Detect	-1.47
Maximum Non-Detect	5.1	Maximum Non-Detect	1.629

Data with Multiple Detection Limits

Single Detection Limit Scenario

Note: Data have multiple DLs - Use of KM Method is recommended	Number treated as Non-Detect with Single DL	44
For all methods (except KM, DL/2, and ROS Methods),	Number treated as Detected with Single DL	1
Observations < Largest ND are treated as NDs	Single DL Non-Detect Percentage	97.78%

Background Statistics

Normal Distribution Test with Detected Values Only

Lognormal Distribution Test with Detected Values Only

Shapiro Wilk Test Statistic	0.908	Shapiro Wilk Test Statistic	0.896
5% Shapiro Wilk Critical Value	0.892	5% Shapiro Wilk Critical Value	0.892
Data appear Normal at 5% Significance Level		Data appear Lognormal at 5% Significance Level	

Assuming Normal Distribution

Assuming Lognormal Distribution

DL/2 Substitution Method		DL/2 Substitution Method	
Mean	1.595	Mean (Log Scale)	0.0145
SD	1.364	SD (Log Scale)	1.103
95% UTL 90% Coverage	3.862	95% UTL 90% Coverage	6.352
95% UPL (t)	3.912	95% UPL (t)	6.612
90% Percentile (z)	3.343	90% Percentile (z)	4.172
95% Percentile (z)	3.838	95% Percentile (z)	6.23
99% Percentile (z)	4.768	99% Percentile (z)	13.21
Maximum Likelihood Estimate(MLE) Method	N/A	Log ROS Method	
		Mean in Original Scale	1.429
		SD in Original Scale	1.352
		Mean in Log Scale	0.0318
		SD in Log Scale	0.769
		95% UTL 90% Coverage	3.705
		95% UPL (t)	3.81
		90% Percentile (z)	2.765
		95% Percentile (z)	3.655
		99% Percentile (z)	6.172

Gamma Distribution Test with Detected Values Only			Data Distribution Test with Detected Values Only		
k star (bias corrected)	2.425		Data appear Normal at 5% Significance Level		
Theta Star	1.098				
nu star	82.46				
A-D Test Statistic	0.556		Nonparametric Statistics		
5% A-D Critical Value	0.746		Kaplan-Meier (KM) Method		
K-S Test Statistic	0.192			Mean	1.414
5% K-S Critical Value	0.211			SD	1.425
Data appear Gamma Distributed at 5% Significance Level				SE of Mean	0.234
			95% KM UTL with 90% Coverage		
Assuming Gamma Distribution			95% KM Chebyshev UPL		
Gamma ROS Statistics with Extrapolated Data			95% KM UPL (t)		
Mean	2.795		90% Percentile (z)		
Median	2.572		95% Percentile (z)		
SD	1.151		99% Percentile (z)		
k star	4.89				
Theta star	0.572		Gamma ROS Limits with Extrapolated Data		
Nu star	440.1		95% Wilson Hilferty (WH) Approx. Gamma UPL		
95% Percentile of Chisquare (2k)	18		95% Hawkins Wixley (HW) Approx. Gamma UPL		
			95% WH Approx. Gamma UTL with 90% Coverage		
90% Percentile	4.488		95% HW Approx. Gamma UTL with 90% Coverage		
95% Percentile	5.145				
99% Percentile	6.537				
Note: DL/2 is not a recommended method.					

Beryllium**General Statistics**

Total Number of Observations 45

Number of Distinct Observations 28

Raw Statistics**Log-Transformed Statistics**

Minimum 0.33

Minimum -1.109

Maximum 2.5

Maximum 0.916

Second Largest 1.8

Second Largest 0.588

First Quartile 0.81

First Quartile -0.211

Median 1.1

Median 0.0953

Third Quartile 1.4

Third Quartile 0.336

Mean 1.115

Mean 0.0308

SD 0.434

SD 0.411

Coefficient of Variation 0.389

Skewness 0.662

Background Statistics**Normal Distribution Test****Lognormal Distribution Test**

Shapiro Wilk Test Statistic 0.957

Shapiro Wilk Test Statistic 0.97

Shapiro Wilk Critical Value 0.945

Shapiro Wilk Critical Value 0.945

Data appear Normal at 5% Significance Level**Data appear Lognormal at 5% Significance Level****Assuming Normal Distribution****Assuming Lognormal Distribution**

95% UTL with 90% Coverage 1.837

95% UTL with 90% Coverage 2.042

95% UPL (t) 1.852

95% UPL (t) 2.073

90% Percentile (z) 1.671

90% Percentile (z) 1.746

95% Percentile (z) 1.829

95% Percentile (z) 2.028

99% Percentile (z) 2.125

99% Percentile (z) 2.683

Gamma Distribution Test**Data Distribution Test**

k star 6.154

Data appear Normal at 5% Significance Level

Theta Star 0.181

MLE of Mean 1.115

MLE of Standard Deviation 0.449

nu star 553.8

A-D Test Statistic 0.455

Nonparametric Statistics

5% A-D Critical Value 0.752

90% Percentile 1.56

K-S Test Statistic 0.115

95% Percentile 1.8

5% K-S Critical Value 0.132

99% Percentile 2.192

Data appear Gamma Distributed at 5% Significance Level**Assuming Gamma Distribution**

95% UTL with 90% Coverage 1.8

90% Percentile 1.716

95% Percentile Bootstrap UTL with 90% Coverage 1.8

95% Percentile 1.942

95% BCA Bootstrap UTL with 90% Coverage 1.8

99% Percentile 2.416

95% UPL 1.8

95% Chebyshev UPL 3.028

95% WH Approx. Gamma UPL 1.958

Upper Threshold Limit Based upon IQR 2.285

95% HW Approx. Gamma UPL 1.981

95% WH Approx. Gamma UTL with 90% Coverage 1.934

95% HW Approx. Gamma UTL with 90% Coverage 1.956

Cadmium**General Statistics**

Number of Valid Data	45	Number of Detected Data	10
Number of Distinct Detected Data	10	Number of Non-Detect Data	35
		Percent Non-Detects	77.78%

Raw Statistics**Log-transformed Statistics**

Minimum Detected	0.064	Minimum Detected	-2.749
Maximum Detected	1	Maximum Detected	0
Mean of Detected	0.426	Mean of Detected	-1.147
SD of Detected	0.325	SD of Detected	0.855
Minimum Non-Detect	0.051	Minimum Non-Detect	-2.976
Maximum Non-Detect	0.95	Maximum Non-Detect	-0.0513

Data with Multiple Detection Limits**Single Detection Limit Scenario**

Note: Data have multiple DLs - Use of KM Method is recommended	Number treated as Non-Detect with Single DL	44
For all methods (except KM, DL/2, and ROS Methods),	Number treated as Detected with Single DL	1
Observations < Largest ND are treated as NDs	Single DL Non-Detect Percentage	97.78%

Background Statistics**Normal Distribution Test with Detected Values Only****Lognormal Distribution Test with Detected Values Only**

Shapiro Wilk Test Statistic	0.868	Shapiro Wilk Test Statistic	0.951
5% Shapiro Wilk Critical Value	0.842	5% Shapiro Wilk Critical Value	0.842
Data appear Normal at 5% Significance Level		Data appear Lognormal at 5% Significance Level	

Assuming Normal Distribution**Assuming Lognormal Distribution**

DL/2 Substitution Method		DL/2 Substitution Method	
Mean	0.265	Mean (Log Scale)	-1.528
SD	0.191	SD (Log Scale)	0.65
95% UTL 90% Coverage	0.583	95% UTL 90% Coverage	0.639
95% UPL (t)	0.59	95% UPL (t)	0.654
90% Percentile (z)	0.51	90% Percentile (z)	0.499
95% Percentile (z)	0.58	95% Percentile (z)	0.632
99% Percentile (z)	0.71	99% Percentile (z)	0.984
Maximum Likelihood Estimate(MLE) Method	N/A	Log ROS Method	
		Mean in Original Scale	0.195
		SD in Original Scale	0.196
		Mean in Log Scale	-1.882
		SD in Log Scale	0.619
		95% UTL 90% Coverage	0.426
		95% UPL (t)	0.436
		90% Percentile (z)	0.337
		95% Percentile (z)	0.421
		99% Percentile (z)	0.642

Gamma Distribution Test with Detected Values Only			Data Distribution Test with Detected Values Only		
k star (bias corrected)	1.359		Data appear Normal at 5% Significance Level		
Theta Star	0.314				
nu star	27.18				
A-D Test Statistic	0.328		Nonparametric Statistics		
5% A-D Critical Value	0.737		Kaplan-Meier (KM) Method		
K-S Test Statistic	0.179			Mean	0.217
5% K-S Critical Value	0.27			SD	0.2
Data appear Gamma Distributed at 5% Significance Level				SE of Mean	0.0402
			95% KM UTL with 90% Coverage		
Assuming Gamma Distribution			95% KM Chebyshev UPL		
Gamma ROS Statistics with Extrapolated Data			95% KM UPL (t)		
Mean	0.437		90% Percentile (z)		
Median	0.452		95% Percentile (z)		
SD	0.151		99% Percentile (z)		
k star	6.941				
Theta star	0.063		Gamma ROS Limits with Extrapolated Data		
Nu star	624.7		95% Wilson Hilferty (WH) Approx. Gamma UPL		
95% Percentile of Chisquare (2k)	23.53		95% Hawkins Wixley (HW) Approx. Gamma UPL		
			95% WH Approx. Gamma UTL with 90% Coverage		
90% Percentile	0.658		95% HW Approx. Gamma UTL with 90% Coverage		
95% Percentile	0.741				
99% Percentile	0.912				
Note: DL/2 is not a recommended method.					

Chromium**General Statistics**

Total Number of Observations 45

Number of Distinct Observations 38

Raw Statistics**Log-Transformed Statistics**

Minimum 6.4

Minimum 1.856

Maximum 30.1

Maximum 3.405

Second Largest 27.3

Second Largest 3.307

First Quartile 15.3

First Quartile 2.728

Median 17.1

Median 2.839

Third Quartile 19.5

Third Quartile 2.97

Mean 17.46

Mean 2.826

SD 4.414

SD 0.276

Coefficient of Variation 0.253

Skewness 0.321

Background Statistics**Normal Distribution Test****Lognormal Distribution Test**

Shapiro Wilk Test Statistic 0.97

Shapiro Wilk Test Statistic 0.93

Shapiro Wilk Critical Value 0.945

Shapiro Wilk Critical Value 0.945

Data appear Normal at 5% Significance Level**Data not Lognormal at 5% Significance Level****Assuming Normal Distribution****Assuming Lognormal Distribution**

95% UTL with 90% Coverage 24.8

95% UTL with 90% Coverage 26.68

95% UPL (t) 24.96

95% UPL (t) 26.95

90% Percentile (z) 23.12

90% Percentile (z) 24.02

95% Percentile (z) 24.72

95% Percentile (z) 26.55

99% Percentile (z) 27.73

99% Percentile (z) 32.04

Gamma Distribution Test**Data Distribution Test**

k star 13.79

Data appear Normal at 5% Significance Level

Theta Star 1.266

MLE of Mean 17.46

MLE of Standard Deviation 4.701

nu star 1241

A-D Test Statistic 0.749

Nonparametric Statistics

5% A-D Critical Value 0.748

90% Percentile 23.06

K-S Test Statistic 0.12

95% Percentile 24.48

5% K-S Critical Value 0.132

99% Percentile 28.87

Data follow Appx. Gamma Distribution at 5% Significance Level**Assuming Gamma Distribution**

95% UTL with 90% Coverage 24.7

90% Percentile 23.69

95% Percentile Bootstrap UTL with 90% Coverage 24.7

95% Percentile 25.84

95% BCA Bootstrap UTL with 90% Coverage 25.82

99% Percentile 30.21

95% UPL 26.52

95% Chebyshev UPL 36.91

95% WH Approx. Gamma UPL 25.96

Upper Threshold Limit Based upon IQR 25.8

95% HW Approx. Gamma UPL 26.17

95% WH Approx. Gamma UTL with 90% Coverage 25.75

95% HW Approx. Gamma UTL with 90% Coverage 25.94

Copper**General Statistics**

Total Number of Observations 45

Number of Distinct Observations 38

Raw Statistics**Log-Transformed Statistics**

Minimum 0.51

Minimum -0.673

Maximum 26.4

Maximum 3.273

Second Largest 20.7

Second Largest 3.03

First Quartile 3.5

First Quartile 1.253

Median 7

Median 1.946

Third Quartile 11.2

Third Quartile 2.416

Mean 8.091

Mean 1.821

SD 5.83

SD 0.797

Coefficient of Variation 0.721

Skewness 1.244

Background Statistics**Normal Distribution Test****Lognormal Distribution Test**

Shapiro Wilk Test Statistic 0.889

Shapiro Wilk Test Statistic 0.971

Shapiro Wilk Critical Value 0.945

Shapiro Wilk Critical Value 0.945

Data not Normal at 5% Significance Level**Data appear Lognormal at 5% Significance Level****Assuming Normal Distribution****Assuming Lognormal Distribution**

95% UTL with 90% Coverage 17.78

95% UTL with 90% Coverage 23.23

95% UPL (t) 18

95% UPL (t) 23.91

90% Percentile (z) 15.56

90% Percentile (z) 17.15

95% Percentile (z) 17.68

95% Percentile (z) 22.91

99% Percentile (z) 21.65

99% Percentile (z) 39.42

Gamma Distribution Test**Data Distribution Test**

k star 1.886

Data appear Gamma Distributed at 5% Significance Level

Theta Star 4.291

MLE of Mean 8.091

MLE of Standard Deviation 5.892

nu star 169.7

A-D Test Statistic 0.218

Nonparametric Statistics

5% A-D Critical Value 0.761

90% Percentile 14.76

K-S Test Statistic 0.0727

95% Percentile 20.52

5% K-S Critical Value 0.133

99% Percentile 23.89

Data appear Gamma Distributed at 5% Significance Level**Assuming Gamma Distribution**

95% UTL with 90% Coverage 20.6

90% Percentile 15.96

95% Percentile Bootstrap UTL with 90% Coverage 20.6

95% Percentile 19.56

95% BCA Bootstrap UTL with 90% Coverage 20.6

99% Percentile 27.56

95% UPL 20.67

95% Chebyshev UPL 33.78

95% WH Approx. Gamma UPL 19.77

Upper Threshold Limit Based upon IQR 22.75

95% HW Approx. Gamma UPL 20.4

95% WH Approx. Gamma UTL with 90% Coverage 19.4

95% HW Approx. Gamma UTL with 90% Coverage 19.98

Lead**General Statistics**

Number of Valid Data	45	Number of Detected Data	38
Number of Distinct Detected Data	32	Number of Non-Detect Data	7
		Percent Non-Detects	15.56%

Raw Statistics**Log-transformed Statistics**

Minimum Detected	3.3	Minimum Detected	1.194
Maximum Detected	19.2	Maximum Detected	2.955
Mean of Detected	7.834	Mean of Detected	1.97
SD of Detected	3.618	SD of Detected	0.414
Minimum Non-Detect	3.8	Minimum Non-Detect	1.335
Maximum Non-Detect	7.6	Maximum Non-Detect	2.028

Data with Multiple Detection Limits**Single Detection Limit Scenario**

Note: Data have multiple DLs - Use of KM Method is recommended	Number treated as Non-Detect with Single DL	30
For all methods (except KM, DL/2, and ROS Methods),	Number treated as Detected with Single DL	15
Observations < Largest ND are treated as NDs	Single DL Non-Detect Percentage	66.67%

Background Statistics**Normal Distribution Test with Detected Values Only****Lognormal Distribution Test with Detected Values Only**

Shapiro Wilk Test Statistic	0.865	Shapiro Wilk Test Statistic	0.968
5% Shapiro Wilk Critical Value	0.938	5% Shapiro Wilk Critical Value	0.938
Data not Normal at 5% Significance Level		Data appear Lognormal at 5% Significance Level	

Assuming Normal Distribution**Assuming Lognormal Distribution**

DL/2 Substitution Method		DL/2 Substitution Method	
Mean	7.031	Mean (Log Scale)	1.812
SD	3.828	SD (Log Scale)	0.539
95% UTL 90% Coverage	13.39	95% UTL 90% Coverage	15.01
95% UPL (t)	13.53	95% UPL (t)	15.31
90% Percentile (z)	11.94	90% Percentile (z)	12.22
95% Percentile (z)	13.33	95% Percentile (z)	14.87
99% Percentile (z)	15.94	99% Percentile (z)	21.47
Maximum Likelihood Estimate(MLE) Method		Log ROS Method	
Mean	5.001	Mean in Original Scale	7.252
SD	5.83	SD in Original Scale	3.604
95% UTL with 90% Coverage	14.69	95% UTL with 90% Coverage	13.65
		95% BCA UTL with 90% Coverage	15.9
		95% Bootstrap (%) UTL with 90% Coverage	15.9
95% UPL (t)	14.9	95% UPL (t)	13.87
90% Percentile (z)	12.47	90% Percentile (z)	11.54
95% Percentile (z)	14.59	95% Percentile (z)	13.55
99% Percentile (z)	18.56	99% Percentile (z)	18.3

Gamma Distribution Test with Detected Values Only		Data Distribution Test with Detected Values Only	
k star (bias corrected)	5.383	Data appear Gamma Distributed at 5% Significance Level	
Theta Star	1.455		
nu star	409.1		
A-D Test Statistic	0.728	Nonparametric Statistics	
5% A-D Critical Value	0.75	Kaplan-Meier (KM) Method	
K-S Test Statistic	0.143	Mean	7.274
5% K-S Critical Value	0.143	SD	3.552
Data appear Gamma Distributed at 5% Significance Level		SE of Mean	0.539
		95% KM UTL with 90% Coverage	13.18
Assuming Gamma Distribution		95% KM Chebyshev UPL	22.93
Gamma ROS Statistics with Extrapolated Data		95% KM UPL (t)	13.31
Mean	7.353	90% Percentile (z)	11.83
Median	6.4	95% Percentile (z)	13.12
SD	3.584	99% Percentile (z)	15.54
k star	4.745		
Theta star	1.55	Gamma ROS Limits with Extrapolated Data	
Nu star	427	95% Wilson Hilferty (WH) Approx. Gamma UPL	13.74
95% Percentile of Chisquare (2k)	17.6	95% Hawkins Wixley (HW) Approx. Gamma UPL	13.84
		95% WH Approx. Gamma UTL with 90% Coverage	13.56
90% Percentile	11.87	95% HW Approx. Gamma UTL with 90% Coverage	13.65
95% Percentile	13.64		
99% Percentile	17.38		
Note: DL/2 is not a recommended method.			

Manganese**General Statistics**

Total Number of Observations 45

Number of Distinct Observations 45

Raw Statistics**Log-Transformed Statistics**

Minimum 104

Minimum 4.644

Maximum 3130

Maximum 8.049

Second Largest 2510

Second Largest 7.828

First Quartile 244

First Quartile 5.497

Median 368

Median 5.908

Third Quartile 552

Third Quartile 6.314

Mean 550.8

Mean 5.967

SD 636.6

SD 0.743

Coefficient of Variation 1.156

Skewness 2.886

Background Statistics**Normal Distribution Test****Lognormal Distribution Test**

Shapiro Wilk Test Statistic 0.577

Shapiro Wilk Test Statistic 0.91

Shapiro Wilk Critical Value 0.945

Shapiro Wilk Critical Value 0.945

Data not Normal at 5% Significance Level**Data not Lognormal at 5% Significance Level****Assuming Normal Distribution****Assuming Lognormal Distribution**

95% UTL with 90% Coverage 1609

95% UTL with 90% Coverage 1343

95% UPL (t) 1632

95% UPL (t) 1380

90% Percentile (z) 1367

90% Percentile (z) 1012

95% Percentile (z) 1598

95% Percentile (z) 1326

99% Percentile (z) 2032

99% Percentile (z) 2200

Gamma Distribution Test**Data Distribution Test**

k star 1.508

Data do not follow a Discernable Distribution (0.05)

Theta Star 365.2

MLE of Mean 550.8

MLE of Standard Deviation 448.5

nu star 135.7

A-D Test Statistic 3.019

Nonparametric Statistics

5% A-D Critical Value 0.766

90% Percentile 760.2

K-S Test Statistic 0.199

95% Percentile 2134

5% K-S Critical Value 0.134

99% Percentile 2857

Data not Gamma Distributed at 5% Significance Level**Assuming Gamma Distribution**

95% UTL with 90% Coverage 2160

90% Percentile 1146

95% Percentile Bootstrap UTL with 90% Coverage 2160

95% Percentile 1432

95% BCA Bootstrap UTL with 90% Coverage 2160

99% Percentile 2078

95% UPL 2405

95% Chebyshev UPL 3356

95% WH Approx. Gamma UPL 1410

Upper Threshold Limit Based upon IQR 1014

95% HW Approx. Gamma UPL 1394

95% WH Approx. Gamma UTL with 90% Coverage 1381

95% HW Approx. Gamma UTL with 90% Coverage 1364

Mercury**General Statistics**

Number of Valid Data	45	Number of Detected Data	33
Number of Distinct Detected Data	30	Number of Non-Detect Data	12
		Percent Non-Detects	26.67%

Raw Statistics**Log-transformed Statistics**

Minimum Detected	0.00014	Minimum Detected	-8.874
Maximum Detected	0.069	Maximum Detected	-2.674
Mean of Detected	0.0119	Mean of Detected	-5.426
SD of Detected	0.016	SD of Detected	1.656
Minimum Non-Detect	0.000056	Minimum Non-Detect	-9.79
Maximum Non-Detect	0.0025	Maximum Non-Detect	-5.991

Data with Multiple Detection Limits**Single Detection Limit Scenario**

Note: Data have multiple DLs - Use of KM Method is recommended	Number treated as Non-Detect with Single DL	22
For all methods (except KM, DL/2, and ROS Methods),	Number treated as Detected with Single DL	23
Observations < Largest ND are treated as NDs	Single DL Non-Detect Percentage	48.89%

Background Statistics**Normal Distribution Test with Detected Values Only****Lognormal Distribution Test with Detected Values Only**

Shapiro Wilk Test Statistic	0.732	Shapiro Wilk Test Statistic	0.962
5% Shapiro Wilk Critical Value	0.931	5% Shapiro Wilk Critical Value	0.931
Data not Normal at 5% Significance Level		Data appear Lognormal at 5% Significance Level	

Assuming Normal Distribution**Assuming Lognormal Distribution**

DL/2 Substitution Method		DL/2 Substitution Method	
Mean	0.0088	Mean (Log Scale)	-6.592
SD	0.0147	SD (Log Scale)	2.464
95% UTL 90% Coverage	0.0332	95% UTL 90% Coverage	0.0825
95% UPL (t)	0.0337	95% UPL (t)	0.0902
90% Percentile (z)	0.0276	90% Percentile (z)	0.0323
95% Percentile (z)	0.0329	95% Percentile (z)	0.079
99% Percentile (z)	0.0429	99% Percentile (z)	0.423
Maximum Likelihood Estimate(MLE) Method		Log ROS Method	
Mean	0.0006786	Mean in Original Scale	0.00879
SD	0.0226	SD in Original Scale	0.0147
95% UTL with 90% Coverage	0.0383	95% UTL with 90% Coverage	0.0601
		95% BCA UTL with 90% Coverage	0.0358
		95% Bootstrap (%) UTL with 90% Coverage	0.041
95% UPL (t)	0.0391	95% UPL (t)	0.065
90% Percentile (z)	0.0296	90% Percentile (z)	0.0266
95% Percentile (z)	0.0379	95% Percentile (z)	0.0579
99% Percentile (z)	0.0533	99% Percentile (z)	0.25

Gamma Distribution Test with Detected Values Only			Data Distribution Test with Detected Values Only		
k star (bias corrected)	0.581		Data appear Gamma Distributed at 5% Significance Level		
Theta Star	0.0206				
nu star	38.33				
A-D Test Statistic	0.303		Nonparametric Statistics		
5% A-D Critical Value	0.8		Kaplan-Meier (KM) Method		
K-S Test Statistic	0.0863			Mean	0.0088
5% K-S Critical Value	0.161			SD	0.0145
Data appear Gamma Distributed at 5% Significance Level				SE of Mean	0.0022
			95% KM UTL with 90% Coverage		
Assuming Gamma Distribution			95% KM Chebyshev UPL		
Gamma ROS Statistics with Extrapolated Data			95% KM UPL (t)		
Mean	0.0088		90% Percentile (z)		
Median	0.0031		95% Percentile (z)		
SD	0.0147		99% Percentile (z)		
k star	0.134				
Theta star	0.0655		Gamma ROS Limits with Extrapolated Data		
Nu star	12.09		95% Wilson Hilferty (WH) Approx. Gamma UPL		
95% Percentile of Chisquare (2k)	1.508		95% Hawkins Wixley (HW) Approx. Gamma UPL		
			95% WH Approx. Gamma UTL with 90% Coverage		
90% Percentile	0.0256		95% HW Approx. Gamma UTL with 90% Coverage		
95% Percentile	0.0494				
99% Percentile	0.12				
Note: DL/2 is not a recommended method.					

Nickel**General Statistics**

Total Number of Observations 45

Number of Distinct Observations 36

Raw Statistics**Log-Transformed Statistics**

Minimum 4.1

Minimum 1.411

Maximum 24.6

Maximum 3.203

Second Largest 20.6

Second Largest 3.025

First Quartile 9.1

First Quartile 2.208

Median 10.6

Median 2.361

Third Quartile 14

Third Quartile 2.639

Mean 11.57

Mean 2.394

SD 3.913

SD 0.336

Coefficient of Variation 0.338

Skewness 1.041

Background Statistics**Normal Distribution Test****Lognormal Distribution Test**

Shapiro Wilk Test Statistic 0.941

Shapiro Wilk Test Statistic 0.982

Shapiro Wilk Critical Value 0.945

Shapiro Wilk Critical Value 0.945

Data not Normal at 5% Significance Level**Data appear Lognormal at 5% Significance Level****Assuming Normal Distribution****Assuming Lognormal Distribution**

95% UTL with 90% Coverage 18.07

95% UTL with 90% Coverage 19.14

95% UPL (t) 18.21

95% UPL (t) 19.38

90% Percentile (z) 16.58

90% Percentile (z) 16.85

95% Percentile (z) 18

95% Percentile (z) 19.03

99% Percentile (z) 20.67

99% Percentile (z) 23.92

Gamma Distribution Test**Data Distribution Test**

k star 8.808

Data appear Gamma Distributed at 5% Significance Level

Theta Star 1.313

MLE of Mean 11.57

MLE of Standard Deviation 3.897

nu star 792.8

A-D Test Statistic 0.416

Nonparametric Statistics

5% A-D Critical Value 0.749

90% Percentile 15.92

K-S Test Statistic 0.0947

95% Percentile 17.58

5% K-S Critical Value 0.132

99% Percentile 22.84

Data appear Gamma Distributed at 5% Significance Level**Assuming Gamma Distribution**

95% UTL with 90% Coverage 17.6

90% Percentile 16.76

95% Percentile Bootstrap UTL with 90% Coverage 19.36

95% Percentile 18.63

95% BCA Bootstrap UTL with 90% Coverage 17.6

99% Percentile 22.5

95% UPL 19.7

95% Chebyshev UPL 28.81

95% WH Approx. Gamma UPL 18.74

Upper Threshold Limit Based upon IQR 21.35

95% HW Approx. Gamma UPL 18.87

95% WH Approx. Gamma UTL with 90% Coverage 18.55

95% HW Approx. Gamma UTL with 90% Coverage 18.67

Selenium

General Statistics

Number of Valid Data	45	Number of Detected Data	9
Number of Distinct Detected Data	9	Number of Non-Detect Data	36
		Percent Non-Detects	80.00%

Raw Statistics

Log-transformed Statistics

Minimum Detected	0.36	Minimum Detected	-1.022
Maximum Detected	3.5	Maximum Detected	1.253
Mean of Detected	1.13	Mean of Detected	-0.211
SD of Detected	1.123	SD of Detected	0.799
Minimum Non-Detect	0.1	Minimum Non-Detect	-2.303
Maximum Non-Detect	6	Maximum Non-Detect	1.792

Data with Multiple Detection Limits

Single Detection Limit Scenario

Note: Data have multiple DLs - Use of KM Method is recommended	Number treated as Non-Detect with Single DL	45
For all methods (except KM, DL/2, and ROS Methods),	Number treated as Detected with Single DL	0
Observations < Largest ND are treated as NDs	Single DL Non-Detect Percentage	100.00%

Warning: There are only 9 Detected Values in this data

**Note: It should be noted that even though bootstrap may be performed on this data set
the resulting calculations may not be reliable enough to draw conclusions**

It is recommended to have 10-15 or more distinct observations for accurate and meaningful results.

Background Statistics

Normal Distribution Test with Detected Values Only

Lognormal Distribution Test with Detected Values Only

Shapiro Wilk Test Statistic	0.698	Shapiro Wilk Test Statistic	0.85
5% Shapiro Wilk Critical Value	0.829	5% Shapiro Wilk Critical Value	0.829
Data not Normal at 5% Significance Level		Data appear Lognormal at 5% Significance Level	

Assuming Normal Distribution

Assuming Lognormal Distribution

DL/2 Substitution Method		DL/2 Substitution Method	
Mean	1.272	Mean (Log Scale)	-0.00871
SD	0.783	SD (Log Scale)	0.832
95% UTL 90% Coverage	2.573	95% UTL 90% Coverage	3.95
95% UPL (t)	2.602	95% UPL (t)	4.071
90% Percentile (z)	2.275	90% Percentile (z)	2.878
95% Percentile (z)	2.559	95% Percentile (z)	3.892
99% Percentile (z)	3.093	99% Percentile (z)	6.86
Maximum Likelihood Estimate(MLE) Method	N/A	Log ROS Method	
		Mean in Original Scale	0.562
		SD in Original Scale	0.58
		Mean in Log Scale	-0.806
		SD in Log Scale	0.598
		95% UTL 90% Coverage	1.207
		95% UPL (t)	1.233
		90% Percentile (z)	0.961
		95% Percentile (z)	1.194
		99% Percentile (z)	1.794

Gamma Distribution Test with Detected Values Only		Data Distribution Test with Detected Values Only	
k star (bias corrected)	1.174	Data appear Lognormal at 5% Significance Level	
Theta Star	0.963		
nu star	21.13		
A-D Test Statistic	0.912	Nonparametric Statistics	
5% A-D Critical Value	0.733	Kaplan-Meier (KM) Method	
K-S Test Statistic	0.3	Mean	0.673
5% K-S Critical Value	0.284	SD	0.643
Data not Gamma Distributed at 5% Significance Level		SE of Mean	0.129
		95% KM UTL with 90% Coverage	1.741
Assuming Gamma Distribution		95% KM Chebyshev UPL	3.505
Gamma ROS Statistics with Extrapolated Data		95% KM UPL (t)	1.764
Mean	1.219	90% Percentile (z)	1.496
Median	1.313	95% Percentile (z)	1.73
SD	0.735	99% Percentile (z)	2.168
k star	1.981		
Theta star	0.616	Gamma ROS Limits with Extrapolated Data	
Nu star	178.3	95% Wilson Hilferty (WH) Approx. Gamma UPL	2.94
95% Percentile of Chisquare (2k)	9.425	95% Hawkins Wixley (HW) Approx. Gamma UPL	3.095
		95% WH Approx. Gamma UTL with 90% Coverage	2.885
90% Percentile	2.377	95% HW Approx. Gamma UTL with 90% Coverage	3.032
95% Percentile	2.901		
99% Percentile	4.064		
Note: DL/2 is not a recommended method.			

Silver

General Statistics

Number of Valid Data	45	Number of Detected Data	3
Number of Distinct Detected Data	3	Number of Non-Detect Data	42
		Percent Non-Detects	93.33%

Raw Statistics

Log-transformed Statistics

Minimum Detected	0.082	Minimum Detected	-2.501
Maximum Detected	0.84	Maximum Detected	-0.174
Mean of Detected	0.354	Mean of Detected	-1.547
SD of Detected	0.422	SD of Detected	1.219
Minimum Non-Detect	0.023	Minimum Non-Detect	-3.772
Maximum Non-Detect	0.47	Maximum Non-Detect	-0.755

Data with Multiple Detection Limits

Single Detection Limit Scenario

Note: Data have multiple DLs - Use of KM Method is recommended	Number treated as Non-Detect with Single DL	44
For all methods (except KM, DL/2, and ROS Methods),	Number treated as Detected with Single DL	1
Observations < Largest ND are treated as NDs	Single DL Non-Detect Percentage	97.78%

Warning: There are only 3 Distinct Detected Values in this data set

The number of detected data may not be adequate enough to perform GOF tests, bootstrap, and ROS methods.

Those methods will return a 'N/A' value on your output display!

It is necessary to have 4 or more Distinct Values for bootstrap methods.

However, results obtained using 4 to 9 distinct values may not be reliable.

It is recommended to have 10 to 15 or more observations for accurate and meaningful results and estimates.

Background Statistics

Normal Distribution Test with Detected Values Only

Lognormal Distribution Test with Detected Values Only

Shapiro Wilk Test Statistic	0.807	Shapiro Wilk Test Statistic	0.911
5% Shapiro Wilk Critical Value	0.767	5% Shapiro Wilk Critical Value	0.767
Data appear Normal at 5% Significance Level		Data appear Lognormal at 5% Significance Level	

Assuming Normal Distribution

Assuming Lognormal Distribution

DL/2 Substitution Method		DL/2 Substitution Method	
Mean	0.111	Mean (Log Scale)	-2.596
SD	0.125	SD (Log Scale)	0.952
95% UTL 90% Coverage	0.318	95% UTL 90% Coverage	0.363
95% UPL (t)	0.323	95% UPL (t)	0.376
90% Percentile (z)	0.27	90% Percentile (z)	0.253
95% Percentile (z)	0.316	95% Percentile (z)	0.357
99% Percentile (z)	0.401	99% Percentile (z)	0.683
Maximum Likelihood Estimate(MLE) Method	N/A	Log ROS Method	
		Mean in Original Scale	0.0293
		SD in Original Scale	0.126
		Mean in Log Scale	-5.211
		SD in Log Scale	1.335
		95% UTL 90% Coverage	0.0502
		95% UPL (t)	0.0527
		90% Percentile (z)	0.0302
		95% Percentile (z)	0.049
		99% Percentile (z)	0.122

Gamma Distribution Test with Detected Values Only		Data Distribution Test with Detected Values Only	
k star (bias corrected)	N/A	Data appear Normal at 5% Significance Level	
Theta Star	N/A		
nu star	N/A		
A-D Test Statistic	N/A	Nonparametric Statistics	
5% A-D Critical Value	N/A	Kaplan-Meier (KM) Method	
K-S Test Statistic	N/A	Mean	0.102
5% K-S Critical Value	N/A	SD	0.112
Data not Gamma Distributed at 5% Significance Level		SE of Mean	0.0206
		95% KM UTL with 90% Coverage	0.288
Assuming Gamma Distribution		95% KM Chebyshev UPL	0.595
Gamma ROS Statistics with Extrapolated Data		95% KM UPL (t)	0.292
Mean	N/A	90% Percentile (z)	0.245
Median	N/A	95% Percentile (z)	0.286
SD	N/A	99% Percentile (z)	0.362
k star	N/A		
Theta star	N/A	Gamma ROS Limits with Extrapolated Data	
Nu star	N/A	95% Wilson Hilferty (WH) Approx. Gamma UPL	N/A
95% Percentile of Chisquare (2k)	N/A	95% Hawkins Wixley (HW) Approx. Gamma UPL	N/A
		95% WH Approx. Gamma UTL with 90% Coverage	N/A
90% Percentile	N/A	95% HW Approx. Gamma UTL with 90% Coverage	N/A
95% Percentile	N/A		
99% Percentile	N/A		
Note: DL/2 is not a recommended method.			

Thallium

General Statistics

Number of Valid Data	44	Number of Detected Data	9
Number of Distinct Detected Data	7	Number of Non-Detect Data	35
Number of Missing Values	1	Percent Non-Detects	79.55%

Raw Statistics

Log-transformed Statistics

Minimum Detected	0.4	Minimum Detected	-0.916
Maximum Detected	2.4	Maximum Detected	0.875
Mean of Detected	1.62	Mean of Detected	0.309
SD of Detected	0.826	SD of Detected	0.691
Minimum Non-Detect	0.094	Minimum Non-Detect	-2.364
Maximum Non-Detect	4.1	Maximum Non-Detect	1.411

Data with Multiple Detection Limits

Single Detection Limit Scenario

Note: Data have multiple DLs - Use of KM Method is recommended	Number treated as Non-Detect with Single DL	44
For all methods (except KM, DL/2, and ROS Methods),	Number treated as Detected with Single DL	0
Observations < Largest ND are treated as NDs	Single DL Non-Detect Percentage	100.00%

Warning: There are only 9 Detected Values in this data

**Note: It should be noted that even though bootstrap may be performed on this data set
the resulting calculations may not be reliable enough to draw conclusions**

It is recommended to have 10-15 or more distinct observations for accurate and meaningful results.

Background Statistics

Normal Distribution Test with Detected Values Only

Lognormal Distribution Test with Detected Values Only

Shapiro Wilk Test Statistic	0.84	Shapiro Wilk Test Statistic	0.815
5% Shapiro Wilk Critical Value	0.829	5% Shapiro Wilk Critical Value	0.829
Data appear Normal at 5% Significance Level		Data not Lognormal at 5% Significance Level	

Assuming Normal Distribution

Assuming Lognormal Distribution

DL/2 Substitution Method		DL/2 Substitution Method	
Mean	0.963	Mean (Log Scale)	-0.392
SD	0.682	SD (Log Scale)	0.988
95% UTL 90% Coverage	2.1	95% UTL 90% Coverage	3.511
95% UPL (t)	2.122	95% UPL (t)	3.625
90% Percentile (z)	1.837	90% Percentile (z)	2.398
95% Percentile (z)	2.085	95% Percentile (z)	3.433
99% Percentile (z)	2.549	99% Percentile (z)	6.731
Maximum Likelihood Estimate(MLE) Method	N/A	Log ROS Method	
		Mean in Original Scale	0.589
		SD in Original Scale	0.651
		Mean in Log Scale	-0.901
		SD in Log Scale	0.781
		95% UTL 90% Coverage	1.494
		95% UPL (t)	1.533
		90% Percentile (z)	1.105
		95% Percentile (z)	1.468
		99% Percentile (z)	2.501

Gamma Distribution Test with Detected Values Only		Data Distribution Test with Detected Values Only	
k star (bias corrected)	2.103	Data appear Normal at 5% Significance Level	
Theta Star	0.77		
nu star	37.85		
A-D Test Statistic	0.759	Nonparametric Statistics	
5% A-D Critical Value	0.727	Kaplan-Meier (KM) Method	
K-S Test Statistic	0.271	Mean	0.763
5% K-S Critical Value	0.281	SD	0.67
Data follow Appx. Gamma Distribution at 5% Significance Level		SE of Mean	0.127
		95% KM UTL with 90% Coverage	1.881
Assuming Gamma Distribution		95% KM Chebyshev UPL	3.718
Gamma ROS Statistics with Extrapolated Data		95% KM UPL (t)	1.903
Mean	1.822	90% Percentile (z)	1.622
Median	1.888	95% Percentile (z)	1.866
SD	0.54	99% Percentile (z)	2.323
k star	8.009		
Theta star	0.227	Gamma ROS Limits with Extrapolated Data	
Nu star	704.8	95% Wilson Hilferty (WH) Approx. Gamma UPL	3.013
95% Percentile of Chisquare (2k)	26.32	95% Hawkins Wixley (HW) Approx. Gamma UPL	3.072
		95% WH Approx. Gamma UTL with 90% Coverage	2.985
90% Percentile	2.68	95% HW Approx. Gamma UTL with 90% Coverage	3.041
95% Percentile	2.993		
99% Percentile	3.642		
Note: DL/2 is not a recommended method.			

Zinc

General Statistics

Total Number of Observations 45

Number of Distinct Observations 44

Raw Statistics

Log-Transformed Statistics

Minimum 16.8

Minimum 2.821

Maximum 128

Maximum 4.852

Second Largest 115

Second Largest 4.745

First Quartile 49.1

First Quartile 3.894

Median 61.4

Median 4.117

Third Quartile 78.9

Third Quartile 4.368

Mean 63

Mean 4.05

SD 24.52

SD 0.475

Coefficient of Variation 0.389

Skewness 0.131

Background Statistics

Normal Distribution Test

Lognormal Distribution Test

Shapiro Wilk Test Statistic 0.965

Shapiro Wilk Test Statistic 0.885

Shapiro Wilk Critical Value 0.945

Shapiro Wilk Critical Value 0.945

Data appear Normal at 5% Significance Level

Data not Lognormal at 5% Significance Level

Assuming Normal Distribution

Assuming Lognormal Distribution

95% UTL with 90% Coverage 103.8

95% UTL with 90% Coverage 126.3

95% UPL (t) 104.7

95% UPL (t) 128.5

90% Percentile (z) 94.42

90% Percentile (z) 105.4

95% Percentile (z) 103.3

95% Percentile (z) 125.3

99% Percentile (z) 120

99% Percentile (z) 173.1

Gamma Distribution Test

Data Distribution Test

k star 5.151

Data appear Normal at 5% Significance Level

Theta Star 12.23

MLE of Mean 63

MLE of Standard Deviation 27.76

nu star 463.5

A-D Test Statistic 1.12

Nonparametric Statistics

5% A-D Critical Value 0.753

90% Percentile 89.52

K-S Test Statistic 0.148

95% Percentile 92.82

5% K-S Critical Value 0.132

99% Percentile 122.3

Data not Gamma Distributed at 5% Significance Level

Assuming Gamma Distribution

95% UTL with 90% Coverage 93.5

90% Percentile 100.2

95% Percentile Bootstrap UTL with 90% Coverage 93.5

95% Percentile 114.5

95% BCA Bootstrap UTL with 90% Coverage 93.5

99% Percentile 144.8

95% UPL 108.6

95% Chebyshev UPL 171

95% WH Approx. Gamma UPL 115.6

Upper Threshold Limit Based upon IQR 123.6

95% HW Approx. Gamma UPL 118.1

95% WH Approx. Gamma UTL with 90% Coverage 114.1

95% HW Approx. Gamma UTL with 90% Coverage 116.5