Tabla B1 - UCL95 de concentraciones en suelos en zona agrícola

General UCL Statistics for Full Data SetsUser Selected OptionsFrom FileWorkSheet_d.wstFull PrecisionOFFConfidence Coefficient95%Number of Bootstrap Operations2000

As

General Statistics		
Number of Valid Observations	5 Number of Distinct Observations	5
Raw Statistics	Log-transformed Statistics	
Minimum	14.3 Minimum of Log Data	2.66
Maximum	31.2 Maximum of Log Data	3.44
Mean	23.26 Mean of log Data	3.115
Median	23.5 SD of log Data	0.292
SD	6.259	
Coefficient of Variation	0.269	
Skewness	-0.346	

Warning: A sample size of 'n' = 5 may not adequate enough to compute meaningful and reliable test statistics and estimates!

It is suggested to collect at least 8 to 10 observations using these statistical methods! If possible compute and collect Data Quality Objectives (DQO) based sample size and analytical results.

Warning: There are only 5 Values in this data

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

The literature suggests to use bootstrap methods on data sets having more than 10-15 observations.

Relevant UCL Statistics			
Normal Distribution Test		Lognormal Distribution Test	
Shapiro Wilk Test Statistic	0.991	Shapiro Wilk Test Statistic	0.954
Shapiro Wilk Critical Value	0.762	Shapiro Wilk Critical Value	0.762
Data appear Normal at 5% Significance Level		Data appear Lognormal at 5% Significa	ance Level
Assuming Normal Distribution		Assuming Lognormal Distribution	
95% Student's-t UCL	29.23	95% H-UCL	33.3
95% UCLs (Adjusted for Skewness)		95% Chebyshev (MVUE) UCL	36.53
95% Adjusted-CLT UCL (Chen-1995)	27.4	97.5% Chebyshev (MVUE) UCL	42.26
95% Modified-t UCL (Johnson-1978)	29.15	99% Chebyshev (MVUE) UCL	53.51
Gamma Distribution Test		Data Distribution	
k star (bias corrected)	6.412	Data appear Normal at 5% Significanc	e Level
Theta Star	3.628		
MLE of Mean	23.26		
MLE of Standard Deviation	9.186		
nu star	64.12		
Approximate Chi Square Value (.05)	46.7	Nonparametric Statistics	
Adjusted Level of Significance	0.0086	95% CLT UCL	27.86
Adjusted Chi Square Value	40.28	95% Jackknife UCL	29.23
		95% Standard Bootstrap UCL	27.35
Anderson-Darling Test Statistic	0.225	95% Bootstrap-t UCL	28.75
Anderson-Darling 5% Critical Value	0.679	95% Hall's Bootstrap UCL	27.68
Kolmogorov-Smirnov Test Statistic	0.184	95% Percentile Bootstrap UCL	27.18
Kolmogorov-Smirnov 5% Critical Value	0.357	95% BCA Bootstrap UCL	27.18
Data appear Gamma Distributed at 5% Significance Level		95% Chebyshev(Mean, Sd) UCL	35.46
		97.5% Chebyshev(Mean, Sd) UCL	40.74

99% Chebyshev(Mean, Sd) UCL

51.11

Assuming Gamma Distribution

95% Approximate Gamma UCL	31.94
95% Adjusted Gamma UCL	37.03

Use 95% Student's-t UCL 29.23

Note: Suggestions regarding the selection of a 95% UCL are provided to help the user to select the most appropriate 95% UCL. These recommendations are based upon the results of the simulation studies summarized in Singh, Singh, and Iaci (2002) and Singh and Singh (2003). For additional insight, the user may want to consult a statistician.

Cd

General Statistics Number of Valid Observations	5 Number of Distinct Observations	5
Raw Statistics	Log-transformed Statistics	
Minimum	0.578 Minimum of Log Data	-0.548
Maximum	1.04 Maximum of Log Data	0.0392
Mean	0.897 Mean of log Data	-0.13
Median	0.969 SD of log Data	0.243
SD	0.189	
Coefficient of Variation	0.211	
Skewness	-1.68	

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Warning: There are only 5 Values in this data

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

Relevant UCL Statistics			
Normal Distribution Test		Lognormal Distribution Test	
Shapiro Wilk Test Statistic	0.816	Shapiro Wilk Test Statistic	0.773
Shapiro Wilk Critical Value	0.762	Shapiro Wilk Critical Value	0.762
Data appear Normal at 5% Significance Level		Data appear Lognormal at 5% Significa	ance Level
Assuming Normal Distribution		Assuming Lognormal Distribution	
95% Student's-t UCL	1.077	95% H-UCL	1.192
95% UCLs (Adjusted for Skewness)		95% Chebyshev (MVUE) UCL	1.323
95% Adjusted-CLT UCL (Chen-1995)	0.968	97.5% Chebyshev (MVUE) UCL	1.507
95% Modified-t UCL (Johnson-1978)	1.066	99% Chebyshev (MVUE) UCL	1.867
Gamma Distribution Test		Data Distribution	
k star (bias corrected)	9.52	Data appear Normal at 5% Significanc	e Level
Theta Star	0.0942		
MLE of Mean	0.897		
MLE of Standard Deviation	0.291		
nu star	95.2		
Approximate Chi Square Value (.05)	73.7	Nonparametric Statistics	
Adjusted Level of Significance	0.0086	95% CLT UCL	1.036
Adjusted Chi Square Value	65.47	95% Jackknife UCL	1.077
		95% Standard Bootstrap UCL	1.02
Anderson-Darling Test Statistic	0.621	95% Bootstrap-t UCL	1.021
Anderson-Darling 5% Critical Value	0.679	95% Hall's Bootstrap UCL	0.976
Kolmogorov-Smirnov Test Statistic	0.285	95% Percentile Bootstrap UCL	1.004
Kolmogorov-Smirnov 5% Critical Value	0.357	95% BCA Bootstrap UCL	0.989
Data appear Gamma Distributed at 5% Significance Level		95% Chebyshev(Mean, Sd) UCL	1.265
		97.5% Chebyshev(Mean, Sd) UCL	1.425
Assuming Gamma Distribution		99% Chebyshev(Mean, Sd) UCL	1.738
95% Approximate Gamma UCL	1.158		

95% Adjusted Gamma UCL	1.304	
Potential UCL to Use	Use 95% Student's-t UCL	1.077
Recommended UCL exceeds the maximum observation		

Cu

General Statistics Number of Valid Observations	5 Number of Distinct Observations	5
Raw Statistics	Log-transformed Statistics	
Minimum	18.1 Minimum of Log Data	2.896
Maximum	23.1 Maximum of Log Data	3.14
Mean	20.6 Mean of log Data	3.022
Median	21.1 SD of log Data	0.0964
SD	1.97	
Coefficient of Variation	0.0956	
Skewness	-0.103	

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

Relevant UCL Statistics			
Normal Distribution Test		Lognormal Distribution Test	
Shapiro Wilk Test Statistic	0.969	Shapiro Wilk Test Statistic	0.966
Shapiro Wilk Critical Value	0.762	Shapiro Wilk Critical Value	0.762
Data appear Normal at 5% Significance Level		Data appear Lognormal at 5% Significa	ance Level
Assuming Normal Distribution		Assuming Lognormal Distribution	
95% Student's-t UCL	22.48	95% H-UCL	N/A
95% UCLs (Adjusted for Skewness)		95% Chebyshev (MVUE) UCL	24.47
95% Adjusted-CLT UCL (Chen-1995)	22.01	97.5% Chebyshev (MVUE) UCL	26.14
95% Modified-t UCL (Johnson-1978)	22.47	99% Chebyshev (MVUE) UCL	29.43
Gamma Distribution Test		Data Distribution	
k star (bias corrected)	54.33	Data appear Normal at 5% Significance	e Level
Theta Star	0.379		
MLE of Mean	20.6		
MLE of Standard Deviation	2.795		
nu star	543.3		
Approximate Chi Square Value (.05)	490.2	Nonparametric Statistics	
Adjusted Level of Significance	0.0086	95% CLT UCL	22.05
Adjusted Chi Square Value	467.9	95% Jackknife UCL	22.48
		95% Standard Bootstrap UCL	21.87
Anderson-Darling Test Statistic	0.24	95% Bootstrap-t UCL	22.56
Anderson-Darling 5% Critical Value	0.678	95% Hall's Bootstrap UCL	21.83
Kolmogorov-Smirnov Test Statistic	0.221	95% Percentile Bootstrap UCL	21.92
Kolmogorov-Smirnov 5% Critical Value	0.357	95% BCA Bootstrap UCL	21.78
Data appear Gamma Distributed at 5% Significance Level		95% Chebyshev(Mean, Sd) UCL	24.44
		97.5% Chebyshev(Mean, Sd) UCL	26.1
Assuming Gamma Distribution		99% Chebyshev(Mean, Sd) UCL	29.36
95% Approximate Gamma UCL	22.83		

95% Adjusted Gamma UCL	23.92	
Potential UCL to Use	Use 95% Student's-t UCL	22.48

Hg

General Statistics Number of Valid Observations	5 Number of Distinct Observations	5
Raw Statistics	Log-transformed Statistics	
Minimum	0.351 Minimum of Log Data	-1.047
Maximum	1.38 Maximum of Log Data	0.322
Mean	0.921 Mean of log Data	-0.183
Median	0.836 SD of log Data	0.539
SD	0.406	
Coefficient of Variation	0.441	
Skewness	-0.364	

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Warning: There are only 5 Values in this data

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

Relevant UCL Statistics	
Normal Distribution Test	Lognormal Distribution Test
Shapiro Wilk Test Statistic 0.94	7 Shapiro Wilk Test Statistic 0.889
Shapiro Wilk Critical Value 0.76	2 Shapiro Wilk Critical Value 0.762
Data appear Normal at 5% Significance Level	Data appear Lognormal at 5% Significance Level
Assuming Normal Distribution	Assuming Lognormal Distribution
95% Student's-t LICI 1 30	8 95% H-UCI 2 205
95% UCLs (Adjusted for Skewness)	95% Chebyshev (MVUF) UCI 1.904
95% Adjusted-CLT UCL (Chen-1995) 1.18	8 97.5% Chebyshev (MVUE) UCL 2.324
95% Modified-t UCL (Johnson-1978) 1.30	3 99% Chebyshev (MVUE) UCL 3.148
Gamma Distribution Test	Data Distribution
k star (bias corrected) 2.18	5 Data appear Normal at 5% Significance Level
Theta Star 0.42	1
MLE of Mean 0.92	1
MLE of Standard Deviation 0.62	3
nu star 21.8	5
Approximate Chi Square Value (.05) 12.2	3 Nonparametric Statistics
Adjusted Level of Significance 0.008	6 95% CLT UCL 1.22
Adjusted Chi Square Value 9.24	2 95% Jackknife UCL 1.308
	95% Standard Bootstrap UCL 1.186
Anderson-Darling Test Statistic 0.33	8 95% Bootstrap-t UCL 1.327
Anderson-Darling 5% Critical Value 0.68	1 95% Hall's Bootstrap UCL 1.405
Kolmogorov-Smirnov Test Statistic 0.23	3 95% Percentile Bootstrap UCL 1.187
Kolmogorov-Smirnov 5% Critical Value 0.35	8 95% BCA Bootstrap UCL 1.187
Data appear Gamma Distributed at 5% Significance Level	95% Chebyshev(Mean, Sd) UCL 1.713
	97.5% Chebyshev(Mean, Sd) UCL 2.055
Assuming Gamma Distribution	99% Chebyshev(Mean, Sd) UCL 2.728
95% Approximate Gamma UCL 1.64	6
95% Adjusted Gamma UCL 2.17	8

Use 95% Student's-t UCL

1.308

Note: Suggestions regarding the selection of a 95% UCL are provided to help the user to select the most appropriate 95% UCL. These recommendations are based upon the results of the simulation studies summarized in Singh, Singh, and Iaci (2002) and Singh and Singh (2003). For additional insight, the user may want to consult a statistician.

Pb

General Statistics		
Number of Valid Observations	5 Number of Distinct Observations	5
Raw Statistics	Log-transformed Statistics	
Minimum	13 Minimum of Log Data	2.565
Maximum	19.7 Maximum of Log Data	2.981
Mean	16.24 Mean of log Data	2.777
Median	15.4 SD of log Data	0.164
SD	2.654	
Coefficient of Variation	0.163	
Skewness	0.253	

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Normal Distribution TestLognormal Distribution TestLognormal Distribution TestShapiro Wilk Test Statistic0.96Shapiro Wilk Test Statistic0.965Shapiro Wilk Test Statistic0.762Shapiro Wilk Test Statistic0.762Data appear Normal at 5% Significance LevelData appear Lognormal DistributionData appear Lognormal Distribution18.7795% Student's-t UCL18.7795% H-UCL19.3995% VLCLs (Adjusted for Skewness)95% Chebyshev (MVUE) UCL21.4295% Adjusted-CLT UCL (Chen-1995)18.3497.5% Chebyshev (MVUE) UCL23.6695% Modified-t UCL (Johnson-1978)18.7999% Chebyshev (MVUE) UCL23.6695% State (bias corrected)18.9Data appear Normal at 5% Significance Level18.9NLE of Mean16.24	Relevant UCL Statistics		
Shapiro Wilk Test Statistic0.96Shapiro Wilk Test Statistic0.965Shapiro Wilk Critical Value0.762Shapiro Wilk Critical Value0.762Data appear Normal at 5% Significance LevelData appear Lognormal at 5% Significance Level0.762Assuming Normal DistributionAssuming Lognormal Distribution19.7795% Student's-t UCL18.7795% (H-UCL19.3995% OfLic (Adjusted for Skewness)95% (Chebyshev (MVUE) UCL23.6695% Modified-t UCL (Ichen-1995)18.7999% Chebyshev (MVUE) UCL23.6695% Modified-t UCL (Johnson-1978)18.7999% Chebyshev (MVUE) UCL28.06Gamma Distribution TestData Distribution2525Katar (bias corrected)18.9Data appear Normal at 5% Significance Level28.06MLE of Standard Deviation3.73637.3637.3637.36nu star189Data appear Normal at 5% Significance Level18.19Adjusted Chi Square Value (.05)15.82.Nonparametric Statistics40.95%Adjusted Chi Square Value (.05)15.82.95% Standard Bootstrap UCL18.7795% Standard Bootstrap UCL18.7995% Standard Bootstrap UCL23.75Anderson-Darling Test Statistic0.24995% Bootstrap + UCL20.58Anderson-Darling Test Statistic0.24995% Chebyshev(Mean, Sd) UCL23.75Anderson-Darling Test Statistic0.24995% Chebyshev(Mean, Sd) UCL23.75Anderson-Darling Test Statistic0.25795% Chebyshev(Mean, Sd) UCL23.75	Normal Distribution Test	Lognormal Distribution Test	
Shapiro Wilk Critical Value 0.762 Shapiro Wilk Critical Value 0.762 Data appear Normal at 5% Significance Level Data appear Lognormal at 5% Significance Level 19.39 Assuming Normal Distribution Assuming Lognormal Distribution 19.39 95% Student's-t UCL 18.77 95% H-UCL 19.39 95% UCLS (Adjusted for Skewness) 95% Chebyshev (MVUE) UCL 21.42 95% Modified-t UCL (Ichen-1995) 18.34 97.5% Chebyshev (MVUE) UCL 23.66 95% Modified-t UCL (Iohnson-1978) 18.79 99% Chebyshev (MVUE) UCL 28.06 Gamma Distribution Test Data appear Normal at 5% Significance Level 28.06 MLE of Mean 16.24 18.90 24.5 MLE of Standard Deviation 3.736 18.92 18.19 Approximate Chi Square Value (.05) 158.2 Nonparametric Statistics 18.19 Adjusted Level of Significance 0.249 95% Standard Bootstrap UCL 18.77 Adjusted Level of Significance 0.249 95% Standard Bootstrap UCL 18.77 Adjusted Level of Significance 0.249 95% Moltified TUCL 18.19 Adjusted Chi Square Value 0.57 95% Sta	Shapiro Wilk Test Statistic	0.96 Shapiro Wilk Test Statistic	0.965
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95% Modified-t UCL (Johnson-1978)18.7999% Chebyshev (MVUE) UCL28.06Gamma Distribution Test k star (bias corrected)18.9Data appear Normal at 5% Significance Level18.9Theta Star0.8590.8590.8590.8590.859MLE of Mean16.240.8590.8590.8590.8590.859MLE of Standard Deviation3.7360.859	95% Adjusted-CLT UCL (Chen-1995)	18.34 97.5% Chebyshev (MVUE) UCL	23.66
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nu star189Approximate Chi Square Value (.05)158.2Nonparametric StatisticsAdjusted Level of Significance0.008695% CLT UCL18.19Adjusted Chi Square Value145.895% Jackknife UCL18.77Anderson-Darling Test Statistic0.24995% Bootstrap UCL20.58Anderson-Darling 5% Critical Value0.67895% Hall's Bootstrap UCL23.75Kolmogorov-Smirnov Test Statistic0.22295% Percentile Bootstrap UCL18.04Volmogorov-Smirnov 5% Critical Value0.35795% BCA Bootstrap UCL18.04Data appear Gamma Distributed at 5% Significance Level95% Chebyshev(Mean, Sd) UCL21.0595% Approximate Gamma UCL19.495% Adjusted Gamma UCL21.05	MLE of Standard Deviation	3.736	
Approximate Chi Square Value (.05)158.2 Nonparametric StatisticsAdjusted Level of Significance0.008695% CLT UCL18.19Adjusted Chi Square Value145.895% Jackknife UCL18.77Anderson-Darling Test Statistic0.24995% Bootstrap UCL20.58Anderson-Darling 5% Critical Value0.67895% Hall's Bootstrap UCL23.75Kolmogorov-Smirnov Test Statistic0.22295% Percentile Bootstrap UCL18.04Data appear Gamma Distributed at 5% Significance Level95% Chebyshev(Mean, Sd) UCL21.4195% Approximate Gamma UCL19.421.05	nu star	189	
Adjusted Level of Significance0.008695% CLT UCL18.19Adjusted Chi Square Value145.895% Jackknife UCL18.77Anderson-Darling Test Statistic0.24995% Bootstrap UCL20.58Anderson-Darling 5% Critical Value0.67895% Hall's Bootstrap UCL23.75Kolmogorov-Smirnov Test Statistic0.22295% Percentile Bootstrap UCL18.04Kolmogorov-Smirnov 5% Critical Value0.35795% BCA Bootstrap UCL18.04Data appear Gamma Distributed at 5% Significance Level95% Chebyshev(Mean, Sd) UCL21.0595% Approximate Gamma UCL19.421.0524.0595% Adjusted Gamma UCL21.0521.0524.05	Approximate Chi Square Value (.05)	158.2 Nonparametric Statistics	
Adjusted Chi Square Value145.895% Jackknife UCL18.7795% Standard Bootstrap UCL17.97Anderson-Darling Test Statistic0.24995% Bootstrap-t UCL20.58Anderson-Darling 5% Critical Value0.67895% Hall's Bootstrap UCL23.75Kolmogorov-Smirnov Test Statistic0.22295% Percentile Bootstrap UCL18.04Kolmogorov-Smirnov S% Critical Value0.35795% BCA Bootstrap UCL18.04Data appear Gamma Distributed at 5% Significance Level95% Chebyshev(Mean, Sd) UCL21.4195% Approximate Gamma UCL99% Chebyshev(Mean, Sd) UCL28.0595% Adjusted Gamma UCL19.421.05	Adjusted Level of Significance	0.0086 95% CLT UCL	18.19
Anderson-Darling Test Statistic 0.249 95% Bootstrap-t UCL 20.58 Anderson-Darling 5% Critical Value 0.678 95% Hall's Bootstrap UCL 23.75 Kolmogorov-Smirnov Test Statistic 0.222 95% Percentile Bootstrap UCL 18.04 Kolmogorov-Smirnov 5% Critical Value 0.357 95% BCA Bootstrap UCL 18.04 Data appear Gamma Distributed at 5% Significance Level 95% Chebyshev(Mean, Sd) UCL 21.41 97.5% Chebyshev(Mean, Sd) UCL 23.65 99% Approximate Gamma UCL 95% Adjusted Gamma UCL 21.05	Adjusted Chi Square Value	145.8 95% Jackknife UCL	18.77
Anderson-Darling Test Statistic0.24995% Bootstrap-t UCL20.58Anderson-Darling 5% Critical Value0.67895% Hall's Bootstrap UCL23.75Kolmogorov-Smirnov Test Statistic0.22295% Percentile Bootstrap UCL18.04Kolmogorov-Smirnov 5% Critical Value0.35795% BCA Bootstrap UCL18.04Data appear Gamma Distributed at 5% Significance Level95% Chebyshev(Mean, Sd) UCL21.4197.5% Chebyshev(Mean, Sd) UCL23.6599% Chebyshev(Mean, Sd) UCL23.6595% Approximate Gamma UCL19.495% Adjusted Gamma UCL21.05		95% Standard Bootstrap UCL	17.97
Anderson-Darling 5% Critical Value0.67895% Hall's Bootstrap UCL23.75Kolmogorov-Smirnov Test Statistic0.22295% Percentile Bootstrap UCL18.04Kolmogorov-Smirnov 5% Critical Value0.35795% BCA Bootstrap UCL18.04Data appear Gamma Distributed at 5% Significance Level95% Chebyshev(Mean, Sd) UCL21.4197.5% Chebyshev(Mean, Sd) UCL23.6599% Chebyshev(Mean, Sd) UCL23.6595% Approximate Gamma UCL19.495% Adjusted Gamma UCL21.05	Anderson-Darling Test Statistic	0.249 95% Bootstrap-t UCL	20.58
Kolmogorov-Smirnov Test Statistic0.22295% Percentile Bootstrap UCL18.04Kolmogorov-Smirnov 5% Critical Value0.35795% BCA Bootstrap UCL18.04Data appear Gamma Distributed at 5% Significance Level95% Chebyshev(Mean, Sd) UCL21.4197.5% Chebyshev(Mean, Sd) UCL23.6595% Approximate Gamma UCL19.421.05	Anderson-Darling 5% Critical Value	0.678 95% Hall's Bootstrap UCL	23.75
Kolmogorov-Smirnov 5% Critical Value0.35795% BCA Bootstrap UCL18.04Data appear Gamma Distributed at 5% Significance Level95% Chebyshev(Mean, Sd) UCL21.4197.5% Chebyshev(Mean, Sd) UCL23.6599% Chebyshev(Mean, Sd) UCL28.0595% Approximate Gamma UCL19.495% Adjusted Gamma UCL21.05	Kolmogorov-Smirnov Test Statistic	0.222 95% Percentile Bootstrap UCL	18.04
Data appear Gamma Distributed at 5% Significance Level95% Chebyshev(Mean, Sd) UCL21.4197.5% Chebyshev(Mean, Sd) UCL23.6595% Approximate Gamma UCL99% Chebyshev(Mean, Sd) UCL28.0595% Adjusted Gamma UCL19.425% Adjusted Gamma UCL21.05	Kolmogorov-Smirnov 5% Critical Value	0.357 95% BCA Bootstrap UCL	18.04
97.5% Chebyshev(Mean, Sd) UCL23.65Assuming Gamma Distribution99% Chebyshev(Mean, Sd) UCL28.0595% Approximate Gamma UCL19.495% Adjusted Gamma UCL21.05	Data appear Gamma Distributed at 5% Significance Level	95% Chebyshev(Mean, Sd) UCL	21.41
Assuming Gamma Distribution99% Chebyshev(Mean, Sd) UCL28.0595% Approximate Gamma UCL19.495% Adjusted Gamma UCL21.05		97.5% Chebyshev(Mean, Sd) UCL	23.65
95% Approximate Gamma UCL19.495% Adjusted Gamma UCL21.05	Assuming Gamma Distribution	99% Chebyshev(Mean, Sd) UCL	28.05
95% Adjusted Gamma UCL 21.05	95% Approximate Gamma UCL	19.4	
	95% Adjusted Gamma UCL	21.05	

Note: Suggestions regarding the selection of a 95% UCL are provided to help the user to select the most appropriate 95% UCL. These recommendations are based upon the results of the simulation studies summarized in Singh, Singh, and Iaci (2002) and Singh and Singh (2003). For additional insight, the user may want to consult a statistician.

Sb

General Statistics		
Number of Valid Observations	5 Number of Distinct Observations	5
Raw Statistics	Log-transformed Statistics	
Minimum	0.661 Minimum of Log Data	0.414
Maximum	1.94 Maximum of Log Data	0.663
Mean	1.268 Mean of log Data	0.18
Median	1.27 SD of log Data	0.39
SD	0.461	
Coefficient of Variation	0.363	
Skewness	0.327	

Warning: A sample size of 'n' = 5 may not adequate enough to compute meaningful and reliable test statistics and estimates!

It is suggested to collect at least 8 to 10 observations using these statistical methods! If possible compute and collect Data Quality Objectives (DQO) based sample size and analytical results.

Warning: There are only 5 Values in this data

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

The literature suggests to use bootstrap methods on data sets having more than 10-15 observations.

Relevant UCL Statistics			
Normal Distribution Test		Lognormal Distribution Test	
Shapiro Wilk Test Statistic	0.966	Shapiro Wilk Test Statistic	0.951
Shapiro Wilk Critical Value	0.762	Shapiro Wilk Critical Value	0.762
Data appear Normal at 5% Significance Level		Data appear Lognormal at 5% Significar	nce Level
Assuming Normal Distribution		Assuming Lognormal Distribution	
95% Student's-t UCL	1.707	95% H-UCL	2.155
95% UCLs (Adjusted for Skewness)		95% Chebyshev (MVUE) UCL	2.233
95% Adjusted-CLT UCL (Chen-1995)	1.639	97.5% Chebyshev (MVUE) UCL	2.649
95% Modified-t UCL (Johnson-1978)	1.712	99% Chebyshev (MVUE) UCL	3.467
Gamma Distribution Test		Data Distribution	
k star (bias corrected)	3.685	Data appear Normal at 5% Significance	Level
Theta Star	0.344		
MLE of Mean	1.268		
MLE of Standard Deviation	0.661		
nu star	36.85		
Approximate Chi Square Value (.05)	23.95	Nonparametric Statistics	
Adjusted Level of Significance	0.0086	95% CLT UCL	1.607
Adjusted Chi Square Value	19.54	95% Jackknife UCL	1.707
		95% Standard Bootstrap UCL	1.573
Anderson-Darling Test Statistic	0.264	95% Bootstrap-t UCL	1.696
Anderson-Darling 5% Critical Value	0.679	95% Hall's Bootstrap UCL	1.799
Kolmogorov-Smirnov Test Statistic	0.201	95% Percentile Bootstrap UCL	1.554
Kolmogorov-Smirnov 5% Critical Value	0.358	95% BCA Bootstrap UCL	1.55
Data appear Gamma Distributed at 5% Significance Level		95% Chebyshev(Mean, Sd) UCL	2.166
		97.5% Chebyshev(Mean, Sd) UCL	2.555
Assuming Gamma Distribution		99% Chebyshev(Mean, Sd) UCL	3.318
95% Approximate Gamma UCL	1.951		
95% Adjusted Gamma UCL	2.392		
Potential UCL to Use		Use 95% Student's-t UCL	1.707

18.77

	Con	en mg/kg			
As	Cd	Cu	Hg	Pb	Sb
14.3	0.578	19.2	1.24	19.7	0.661
21.1	0.877	21.1	0.351	15	1.12
26.2	1.02	21.5	0.798	18.1	1.27
23.5	0.969	18.1	0.836	13	1.35
31.2	1.04	23.1	1.38	15.4	1.94

Tabla B2 - UCL95 de concentraciones en suelos superficiales de la zona industrial histórica

General UCL Statistics for Full Data SetsUser Selected OptionsFrom FileWorkSheet.wstFull PrecisionOFFConfidence Coefficient95%Number of Bootstrap Operations2000

As

General Statistics		
Number of Valid Observations	26 Number of Distinct Observations	26
Number of Missing Values	2	
Raw Statistics	Log-transformed Statistics	
Minimum	12 Minimum of Log Data	2.485
Maximum	861 Maximum of Log Data	6.758
Mean	255.3 Mean of log Data	4.908
Median	138 SD of log Data	1.266
SD	258.2	
Coefficient of Variation	1.011	
Skewness	1.04	
Relevant UCL Statistics		
Normal Distribution Test	Lognormal Distribution Test	
Shapiro Wilk Test Statistic	0.835 Shapiro Wilk Test Statistic	0.946
Shapiro Wilk Critical Value	0.92 Shapiro Wilk Critical Value	0.92
Data not Normal at 5% Significance Level	Data appear Lognormal at 5% Significance Lev	/el
Assuming Normal Distribution	Assuming Lognormal Distribution	
95% Student's-t UCL	341.8 95% H-UCL	624.2
95% UCLs (Adjusted for Skewness)	95% Chebyshev (MVUE) UCL	657.6
95% Adjusted-CLT UCL (Chen-1995)	349.7 97.5% Chebyshev (MVUE) UCL	818.1
95% Modified-t UCL (Johnson-1978)	343.6 99% Chebyshev (MVUE) UCL	1133
Gamma Distribution Test	Data Distribution	
k star (bias corrected)	0.839 Data appear Gamma Distributed at 5% Signific	cance Level
Theta Star	304.5	
MLE of Mean	255.3	
MLE of Standard Deviation	278.8	
nu star	43.6	
Approximate Chi Square Value (.05)	29.46 Nonparametric Statistics	
Adjusted Level of Significance	0.0398 95% CLT UCL	338.6
Adjusted Chi Square Value	28.69 95% Jackknife UCL	341.8
	95% Standard Bootstrap UCL	338.9
Anderson-Darling Test Statistic	0.522 95% Bootstrap-t UCL	356.8
Anderson-Darling 5% Critical Value	0.777 95% Hall's Bootstrap UCL	342.5
Kolmogorov-Smirnov Test Statistic	0.115 95% Percentile Bootstrap UCL	340.2
Kolmogorov-Smirnov 5% Critical Value	0.177 95% BCA Bootstrap UCL	347.7
Data appear Gamma Distributed at 5% Significance Level	95% Chebyshev(Mean, Sd) UCL	476.1
	97.5% Chebyshev(Mean, Sd) UCL	571.6
Assuming Gamma Distribution	99% Chebyshev(Mean, Sd) UCL	759.2
95% Approximate Gamma UCL	377.9	
95% Adjusted Gamma UCL	388	
Potential UCL to Use	Use 95% Approximate Gamma UCL	377.9

Note: Suggestions regarding the selection of a 95% UCL are provided to help the user to select the most appropriate 95% UCL. These recommendations are based upon the results of the simulation studies summarized in Singh, Singh, and Iaci (2002) and Singh and Singh (2003). For additional insight, the user may want to consult a statistician.

General Statistics		
Number of Valid Observations	27 Number of Distinct Observations	27
Number of Missing Values	1	
David Chahishing	Les transformed Statistics	
Kdw Statistics	Log-transformed Statistics	0 722
Maximum	12.2 Maximum of Log Data	-0.732
Maan	13.3 Maximum of Log Data	2.588
Media	4.027 Mean of log Data	0.948
Median	3.06 SD of log Data	1.019
SD	3.628	
Coefficient of Variation	0.901	
Skewness	1.053	
Relevant UCL Statistics		
Normal Distribution Test	Lognormal Distribution Test	
Shapiro Wilk Test Statistic	0.849 Shapiro Wilk Test Statistic	0.94
Shapiro Wilk Critical Value	0.923 Shapiro Wilk Critical Value	0.923
Data not Normal at 5% Significance Level	Data appear Lognormal at 5% Significance Leve	el
Assuming Normal Distribution	Assuming Lognormal Distribution	
95% Student's-t IIC	5 218 95% H-UCI	7 215
95% LICEs (Adjusted for Skewness)	95% Chebyshev (MV/UE) UCI	8 352
95% Octs (Adjusted for Skewness)	5 227 97 5% Chebyshev (MVUE) UC	10 14
95% Aujusted-CLI OCL (Chen-1955)	5.327 97.3% Chebyshev (MVUE) UCL	12.65
55% Moumeu-t OCE (Johnson-1978)	5.242 55% Chebysnev (WWDE) OCL	15.05
Gamma Distribution Test	Data Distribution	
k star (bias corrected)	1.147 Data appear Gamma Distributed at 5% Significa	ance Level
Theta Star	3.51	
MLE of Mean	4.027	
MLE of Standard Deviation	3.76	
nu star	61.96	
Approximate Chi Square Value (.05)	44.85 Nonparametric Statistics	
Adjusted Level of Significance	0.0401 95% CLT UCL	5.176
Adjusted Chi Square Value	43.92 95% Jackknife UCL	5.218
	95% Standard Bootstrap UCL	5.153
Anderson-Darling Test Statistic	0.562 95% Bootstrap-t UCL	5.372
Anderson-Darling 5% Critical Value	0.768 95% Hall's Bootstrap UCL	5.342
Kolmogorov-Smirnov Test Statistic	0.125 95% Percentile Bootstrap UCL	5.187
Kolmogorov-Smirnov 5% Critical Value	0.172 95% BCA Bootstrap UCL	5.313
Data appear Gamma Distributed at 5% Significance Level	95% Chebyshev(Mean, Sd) UCL	7.07
	97.5% Chebyshev(Mean, Sd) UCL	8.387
Assuming Gamma Distribution	99% Chebyshev(Mean. Sd) UCL	10.97
95% Approximate Gamma UCL	5.563	
95% Adjusted Gamma UCL	5.681	
Potential LICL to Lise	Use 95% Approximate Gamma UCI	5 563
		5.505

۰.	 4

General Statistics		
Number of Valid Observations	28 Number of Distinct Observations	28
Raw Statistics	Log-transformed Statistics	
Minimum	16.7 Minimum of Log Data	2.815
Maximum	1868 Maximum of Log Data	7.533
Mean	212.9 Mean of log Data	4.754
Median	144 SD of log Data	1.086
SD	345.8	
Coefficient of Variation	1.624	
Skewness	4.35	

Relevant UCL Statistics

Normal Distribution Test		Lognormal Distribution Test	
Shapiro Wilk Test Statistic	0.487	Shapiro Wilk Test Statistic	0.965
Shapiro Wilk Critical Value	0.924	Shapiro Wilk Critical Value	0.924
Data not Normal at 5% Significance Level		Data appear Lognormal at 5% Significance Level	
Assuming Normal Distribution		Assuming Lognormal Distribution	
95% Student's-t UCL	324.2	95% H-UCL	357.5
95% UCLs (Adjusted for Skewness)		95% Chebyshev (MVUE) UCL	413.8
95% Adjusted-CLT UCL (Chen-1995)	377.8	97.5% Chebyshev (MVUE) UCL	505.1
95% Modified-t UCL (Johnson-1978)	333.1	99% Chebyshev (MVUE) UCL	684.5
Gamma Distribution Test		Data Distribution	
k star (bias corrected)	0.877	Data Follow Appr. Gamma Distribution at 5% Sign	ificance Level
Theta Star	242.7		
MLE of Mean	212.9	1	
MLE of Standard Deviation	227.3		
nu star	49.13		
Approximate Chi Square Value (.05)	34.03	Nonparametric Statistics	
Adjusted Level of Significance	0.0404	95% CLT UCL	320.4
Adjusted Chi Square Value	33.26	95% Jackknife UCL	324.2
		95% Standard Bootstrap UCL	318
Anderson-Darling Test Statistic	0.795	95% Bootstrap-t UCL	503.3
Anderson-Darling 5% Critical Value	0.776	95% Hall's Bootstrap UCL	741
Kolmogorov-Smirnov Test Statistic	0.144	95% Percentile Bootstrap UCL	338
Kolmogorov-Smirnov 5% Critical Value	0.171	95% BCA Bootstrap UCL	395
Data follow Appr. Gamma Distribution at 5% Significance Level		95% Chebyshev(Mean, Sd) UCL	497.7
		97.5% Chebyshev(Mean, Sd) UCL	621
Assuming Gamma Distribution		99% Chebyshev(Mean, Sd) UCL	863.1
95% Approximate Gamma UCL	307.3		
95% Adjusted Gamma UCL	314.5		
Potential UCL to Use		Use 95% Approximate Gamma UCL	307.3

Hg

General Statistics		
Number of Valid Observations	32 Number of Distinct Observations	31
Raw Statistics	Log-transformed Statistics	
Minimum	0.873 Minimum of Log Data	-0.136
Maximum	408 Maximum of Log Data	6.011
Mean	60.4 Mean of log Data	3.324
Median	36.95 SD of log Data	1.413
SD	81.7	
Coefficient of Variation	1.353	
Skewness	2.9	
Relevant UCL Statistics		
Normal Distribution Test	Lognormal Distribution Test	
Shapiro Wilk Test Statistic	0.679 Shapiro Wilk Test Statistic	0.976
Shapiro Wilk Critical Value	0.93 Shapiro Wilk Critical Value	0.93
Data not Normal at 5% Significance Level	Data appear Lognormal at 5% Significance I	evel
Assuming Normal Distribution	Assuming Lognormal Distribution	
95% Student's-t UCL	84.89 95% H-UCL	160.1
95% UCLs (Adjusted for Skewness)	95% Chebyshev (MVUE) UCL	168.1
95% Adjusted-CLT UCL (Chen-1995)	92.07 97.5% Chebyshev (MVUE) UCL	210.1
95% Modified-t UCL (Johnson-1978)	86.12 99% Chebyshev (MVUE) UCL	292.5
Gamma Distribution Test	Data Distribution	
k star (bias corrected)	0.717 Data appear Gamma Distributed at 5% Sign	ificance Level
Theta Star	84.27	

MLE of Mean	60.4	
MLE of Standard Deviation	71.34	
nu star	45.87	
Approximate Chi Square Value (.05)	31.33 Nonparametric Statistics	
Adjusted Level of Significance	0.0416 95% CLT UCL	84.16
Adjusted Chi Square Value	30.69 95% Jackknife UCL	84.89
	95% Standard Bootstrap UCL	83.96
Anderson-Darling Test Statistic	0.245 95% Bootstrap-t UCL	103.6
Anderson-Darling 5% Critical Value	0.787 95% Hall's Bootstrap UCL	173.1
Kolmogorov-Smirnov Test Statistic	0.077 95% Percentile Bootstrap UCL	85.8
Kolmogorov-Smirnov 5% Critical Value	0.161 95% BCA Bootstrap UCL	92.35
Data appear Gamma Distributed at 5% Significance Level	95% Chebyshev(Mean, Sd) UCL	123.4
	97.5% Chebyshev(Mean, Sd) UCL	150.6
Assuming Gamma Distribution	99% Chebyshev(Mean, Sd) UCL	204.1
95% Approximate Gamma UCL	88.43	
95% Adjusted Gamma UCL	90.28	
Potential UCL to Use	Use 95% Approximate Gamma UCL	88.43

Pb

General Statistics		
Number of Valid Observations	25 Number of Distinct Observations	25
Number of Missing Values	3	
Raw Statistics	Log-transformed Statistics	
Minimum	16.5 Minimum of Log Data	2.803
Maximum	828 Maximum of Log Data	6.719
Mean	295.8 Mean of log Data	5.13
Median	214 SD of log Data	1.236
SD	264	
Coefficient of Variation	0.893	
Skewness	0.809	
Relevant UCL Statistics		
Normal Distribution Test	Lognormal Distribution Test	
Shapiro Wilk Test Statistic	0.872 Shapiro Wilk Test Statistic	0.915
Shapiro Wilk Critical Value	0.918 Shapiro Wilk Critical Value	0.918
Data not Normal at 5% Significance Level	Data not Lognormal at 5% Significance L	.evel
Assuming Normal Distribution	Assuming Lognormal Distribution	
95% Student's-t UCL	386.1 95% H-UCL	737.8
95% UCLs (Adjusted for Skewness)	95% Chebyshev (MVUE) UCL	786.3
95% Adjusted-CLT UCL (Chen-1995)	391.8 97.5% Chebyshev (MVUE) UCL	977.2
95% Modified-t UCL (Johnson-1978)	387.5 99% Chebyshev (MVUE) UCL	1352
Gamma Distribution Test	Data Distribution	
k star (bias corrected)	0.932 Data appear Gamma Distributed at 5% S	Significance Level
Theta Star	317.5	
MLE of Mean	295.8	
MLE of Standard Deviation	306.5	
nu star	46.58	
Approximate Chi Square Value (.05)	31.92 Nonparametric Statistics	
Adjusted Level of Significance	0.0395 95% CLT UCL	382.6
Adjusted Chi Square Value	31.09 95% Jackknife UCL	386.1
	95% Standard Bootstrap UCL	381.2
Anderson-Darling Test Statistic	0.476 95% Bootstrap-t UCL	395.1
Anderson-Darling 5% Critical Value	0.772 95% Hall's Bootstrap UCL	387.4
Kolmogorov-Smirnov Test Statistic	0.115 95% Percentile Bootstrap UCL	384.2
Kolmogorov-Smirnov 5% Critical Value	0.179 95% BCA Bootstrap UCL	395.8
Data appear Gamma Distributed at 5% Significance Level	95% Chebyshev(Mean, Sd) UCL	525.9
	97.5% Chebyshev(Mean, Sd) UCL	625.5

Assuming Gamma Distribution	99% Chebyshev(Mean, Sd) UCL	821.1
95% Approximate Gamma UCL	431.6	
95% Adjusted Gamma UCL	443.1	
Potential UCL to Use	Use 95% Approximate Gamma UCL	431.6

Sb

General Statistics		
Number of Valid Observations	28 Number of Distinct Observations	28
Raw Statistics	Log-transformed Statistics	
Minimum	0.452 Minimum of Log Data	-0.794
Maximum	14 Maximum of Log Data	2.639
Mean	3.266 Mean of log Data	0.786
Median	2.335 SD of log Data	0.889
SD	3.434	
Coefficient of Variation	1.051	
Skewness	2.278	
Relevant UCL Statistics		
Normal Distribution Test	Lognormal Distribution Test	
Shapiro Wilk Test Statistic	0.706 Shapiro Wilk Test Statistic	0.974
Shapiro Wilk Critical Value	0.924 Shapiro Wilk Critical Value	0.924
Data not Normal at 5% Significance Level	Data appear Lognormal at 5% Significance Lev	vel
Assuming Normal Distribution	Assuming Lognormal Distribution	
95% Student's-t UCL	4.372 95% H-UCL	4.851
95% UCLs (Adjusted for Skewness)	95% Chebyshev (MVUE) UCL	5.82
95% Adjusted-CLT UCL (Chen-1995)	4.632 97.5% Chebyshev (MVUE) UCL	6.955
95% Modified-t UCL (Johnson-1978)	4.418 99% Chebyshev (MVUE) UCL	9.183
Gamma Distribution Test	Data Distribution	
k star (bias corrected)	1.276 Data appear Gamma Distributed at 5% Signific	cance Level
Theta Star	2.56	
MLE of Mean	3.266	
MLE of Standard Deviation	2.892	
nu star	71.44	
Approximate Chi Square Value (.05)	52.98 Nonparametric Statistics	
Adjusted Level of Significance	0.0404 95% CLT UCL	4.334
Adjusted Chi Square Value	52 95% Jackknife UCL	4.372
	95% Standard Bootstrap UCL	4.301
Anderson-Darling Test Statistic	0.632 95% Bootstrap-t UCL	5.017
Anderson-Darling 5% Critical Value	0.765 95% Hall's Bootstrap UCL	5.871
Kolmogorov-Smirnov Test Statistic	0.133 95% Percentile Bootstrap UCL	4.4
Kolmogorov-Smirnov 5% Critical Value	0.169 95% BCA Bootstrap UCL	4.76
Data appear Gamma Distributed at 5% Significance Level	95% Chebyshev(Mean, Sd) UCL	6.095
	97.5% Chebyshev(Mean, Sd) UCL	7.319
Assuming Gamma Distribution	99% Chebyshev(Mean, Sd) UCL	9.723
95% Approximate Gamma UCL	4.404	
95% Adjusted Gamma UCL	4.488	
Potential UCL to Use	Use 95% Approximate Gamma UCL	4.404

Note: Suggestions regarding the selection of a 95% UCL are provided to help the user to select the most appropriate 95% UCL. These recommendations are based upon the results of the simulation studies summarized in Singh, Singh, and Iaci (2002) and Singh and Singh (2003). For additional insight, the user may want to consult a statistician.

Number of Valid Observations	28 Number of Distinct Observations	26
Raw Statistics	Log-transformed Statistics	
Minimum	18.9 Minimum of Log Data	2.939
Maximum	368 Maximum of Log Data	5.908
Mean	103.9 Mean of log Data	4.342
Median	79.75 SD of log Data	0.802
SD	86.36	
Coefficient of Variation	0.831	
Skewness	1.62	
Relevant UCL Statistics		
Normal Distribution Test	Lognormal Distribution Test	
Shapiro Wilk Test Statistic	0.824 Shapiro Wilk Test Statistic	0.97
Shapiro Wilk Critical Value	0.924 Shapiro Wilk Critical Value	0.924
Data not Normal at 5% Significance Level	Data appear Lognormal at 5% Significance Level	
Assuming Normal Distribution	Assuming Lognormal Distribution	
95% Student's-t UCL	131.7 95% H-UCL	149.5
95% UCLs (Adjusted for Skewness)	95% Chebyshev (MVUE) UCL	180.4
95% Adjusted-CLT UCL (Chen-1995)	136.1 97.5% Chebyshev (MVUE) UCL	213.3
95% Modified-t UCL (Johnson-1978)	132.6 99% Chebyshev (MVUE) UCL	277.9
Gamma Distribution Test	Data Distribution	
k star (bias corrected)	1.635 Data appear Gamma Distributed at 5% Significar	ice Level
Theta Star	63.58	
MLE of Mean	103.9	
MLE of Standard Deviation	81.29	
nu star	91.54	
Approximate Chi Square Value (.05)	70.48 Nonparametric Statistics	
Adjusted Level of Significance	0.0404 95% CLT UCL	130.8
Adjusted Chi Square Value	69.34 95% Jackknife UCL	131.7
	95% Standard Bootstrap UCL	129.8
Anderson-Darling Test Statistic	0.394 95% Bootstrap-t UCL	139.8
Anderson-Darling 5% Critical Value	0.76 95% Hall's Bootstrap UCL	139.8
Kolmogorov-Smirnov Test Statistic	0.113 95% Percentile Bootstrap UCL	130.6
Kolmogorov-Smirnov 5% Critical Value	0.168 95% BCA Bootstrap UCL	134.3
Data appear Gamma Distributed at 5% Significance Level	95% Chebyshev(Mean, Sd) UCL	175.1
	97.5% Chebyshev(Mean, Sd) UCL	205.9
Assuming Gamma Distribution	99% Chebyshev(Mean, Sd) UCL	266.3
95% Approximate Gamma UCL	135	
95% Adjusted Gamma UCL	137.2	
Potential UCL to Use	Use 95% Approximate Gamma UCL	135

Concentraciones en mg/kg As Cd Cu Hg Pb Sb Zn 40.1 0.802 33.1 1.28 29.2 62.2 6.34 231 2.1 21.9 1.22 58.4 240 1.98 21.6 1.18 56.2 25.3 0.649 42.7 3.87 32.5 0.656 27.2 19.9 0.513 18.6 0.873 20.6 0.582 20 8.59 161 84 6.44 211 9.11 159 88.7 1 440 6.46 223 31.4 1.72 47.1 11.5 206 1.71 48.9 808 13.3 422 207 1 890 13.7 368 106 1.58 58.1 48.2 123 0.988 79.8 116 3.59 90.3 12.4 202 103 1.94 424.2 126 23.5 1868 14 105.7 <1 2.4 124 118 1.38 62.3 81.3 3.57 37 99.1 306 3.39 470 28.5 0.669 38.1 32.6 2.51 25.6 3.44 145 6.05 2.6 95.3

193	3.67	142	25.3	296	2.63	103
35.4	0.78	28.2	70.9	41.3	0.75	69.1
87.5	10.4	160	113	828	3.05	298
334	3.06	165	25.3	410	2.9	79.7
475	9.22	297	4.62	714	6.02	211
12	0.481	16.7	67.2	16.5	0.452	18.9
99.4	1.41	64.2	43.5	96.4	1.76	44.9
56.2	0.851	21.5	130	55.4	0.779	29.4
1 840	3.32	491	2.18	214	2.16	58.5
1 410	8.44	213	45.3	752	3.81	130
861	6.76	143	12.9	637	4.24	112
617	6.33	206	4.46	777	2.87	143
			36.9			

<u>38.2</u>

Tabla B3 - UCL95 de concentraciones en suelos profundos de la zona industrial histórica

General UCL Statistics for Full Data Sets

User Selected Options	
From File	WorkSheet.wst
Full Precision	OFF
Confidence Coefficient	95%
Number of Bootstrap Operations	2000

As

General Statistics	
Number of Valid Observations 7	Number of Distinct Observations 7
Raw Statistics	Log-transformed Statistics
Minimum 20.4	Minimum of Log Data 3.016
Maximum 635	Maximum of Log Data 6.454
Mean 260.2	Mean of log Data 4.767
Median 129	SD of log Data 1.532
SD 274.2	
Coefficient of Variation 1.053	
Skewness 0.598	

Warning: A sample size of 'n' = 7 may not adequate enough to compute meaningful and reliable test statistics and estimates!

It is suggested to collect at least 8 to 10 observations using these statistical methods! If possible compute and collect Data Quality Objectives (DQO) based sample size and analytical results.

Warning: There are only 7 Values in this data

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

Relevant UCL Statistics		
Normal Distribution Test	Lognormal Distribution Test	
Shapiro Wilk Test Statistic	0.814 Shapiro Wilk Test Statistic	0.856
Shapiro Wilk Critical Value	0.803 Shapiro Wilk Critical Value	0.803
Data appear Normal at 5% Significance Level	Data appear Lognormal at 5% Significance Level	
Assuming Normal Distribution	Assuming Lognormal Distribution	
95% Student's-t UCL	461.6 95% H-UCL	10330
95% UCLs (Adjusted for Skewness)	95% Chebyshev (MVUE) UCL	1004
95% Adjusted-CLT UCL (Chen-1995)	455.7 97.5% Chebyshev (MVUE) UCL	1313
95% Modified-t UCL (Johnson-1978)	465.5 99% Chebyshev (MVUE) UCL	1920
Gamma Distribution Test	Data Distribution	
k star (bias corrected)	0.525 Data appear Normal at 5% Significance Level	
Theta Star	495.2	
MLE of Mean	260.2	
MLE of Standard Deviation	359	
nu star	7.357	
Approximate Chi Square Value (.05)	2.369 Nonparametric Statistics	
Adjusted Level of Significance	0.0158 95% CLT UCL	430.7
Adjusted Chi Square Value	1.606 95% Jackknife UCL	461.6
	95% Standard Bootstrap UCL	416.6
Anderson-Darling Test Statistic	0.507 95% Bootstrap-t UCL	567.3
Anderson-Darling 5% Critical Value	0.736 95% Hall's Bootstrap UCL	424.4
Kolmogorov-Smirnov Test Statistic	0.234 95% Percentile Bootstrap UCL	418.4
Kolmogorov-Smirnov 5% Critical Value	0.323 95% BCA Bootstrap UCL	433.4
Data appear Gamma Distributed at 5% Significance Level	95% Chebyshev(Mean, Sd) UCL	711.9
	97.5% Chebyshev(Mean, Sd) UCL	907.4
Assuming Gamma Distribution	99% Chebyshev(Mean, Sd) UCL	1291

Potential UCL to Use	Use 95% Student's-t UCL	461.6
95% Adjusted Gamma UCL	1192	
95% Approximate Gamma UCL	808.3	

Cd

General StatisticsNumber of Valid Observations7	Number of Distinct Observations 7
Raw Statistics	Log-transformed Statistics
Minimum 0.569	Minimum of Log Data -0.564
Maximum 10.5	Maximum of Log Data 2.351
Mean 3.389	Mean of log Data 0.723
Median 2.41	SD of log Data 1.114
SD 3.543	
Coefficient of Variation 1.045	
Skewness 1.586	

Warning: A sample size of 'n' = 7 may not adequate enough to compute meaningful and reliable test statistics and estimates!

It is suggested to collect at least 8 to 10 observations using these statistical methods! If possible compute and collect Data Quality Objectives (DQO) based sample size and analytical results.

Warning: There are only 7 Values in this data

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

Relevant UCL Statistics		
Normal Distribution Test	Lognormal Distribution Test	
Shapiro Wilk Test Statistic	0.815 Shapiro Wilk Test Statistic	0.913
Shapiro Wilk Critical Value	0.803 Shapiro Wilk Critical Value	0.803
Data appear Normal at 5% Significance Level	Data appear Lognormal at 5% Significance Level	
Assuming Normal Distribution	Assuming Lognormal Distribution	
95% Student's-t UCL	5.991 95% H-UCL	23.93
95% UCLs (Adjusted for Skewness)	95% Chebyshev (MVUE) UCL	9.647
95% Adjusted-CLT UCL (Chen-1995)	6.449 97.5% Chebyshev (MVUE) UCL	12.35
95% Modified-t UCL (Johnson-1978)	6.124 99% Chebyshev (MVUE) UCL	17.66
Gamma Distribution Test	Data Distribution	
k star (bias corrected)	0.748 Data appear Normal at 5% Significance Level	
Theta Star	4.529	
MLE of Mean	3.389	
MLE of Standard Deviation	3.918	
nu star	10.48	
Approximate Chi Square Value (.05)	4.242 Nonparametric Statistics	
Adjusted Level of Significance	0.0158 95% CLT UCL	5.591
Adjusted Chi Square Value	3.13 95% Jackknife UCL	5.991
	95% Standard Bootstrap UCL	5.449
Anderson-Darling Test Statistic	0.372 95% Bootstrap-t UCL	7.823
Anderson-Darling 5% Critical Value	0.726 95% Hall's Bootstrap UCL	13.84
Kolmogorov-Smirnov Test Statistic	0.246 95% Percentile Bootstrap UCL	5.594
Kolmogorov-Smirnov 5% Critical Value	0.319 95% BCA Bootstrap UCL	6.193
Data appear Gamma Distributed at 5% Significance Level	95% Chebyshev(Mean, Sd) UCL	9.225
	97.5% Chebyshev(Mean, Sd) UCL	11.75
Assuming Gamma Distribution	99% Chebyshev(Mean, Sd) UCL	16.71
95% Approximate Gamma UCL	8.37	

95% Adjusted Gamma UCL	11.34	
Potential UCL to Use	Use 95% Student's-t UCL	5.991

Cu

General StatisticsNumber of Valid Observations7	Number of Distinct Observations 7
Raw Statistics	Log-transformed Statistics
Minimum 18.3	Minimum of Log Data 2.907
Maximum 639	Maximum of Log Data 6.46
Mean 199.1	Mean of log Data 4.538
Median 128	SD of log Data 1.422
SD 235.9	
Coefficient of Variation 1.185	
Skewness 1.361	

Warning: A sample size of 'n' = 7 may not adequate enough to compute meaningful and reliable test statistics and estimates!

It is suggested to collect at least 8 to 10 observations using these statistical methods! If possible compute and collect Data Quality Objectives (DQO) based sample size and analytical results.

Warning: There are only 7 Values in this data

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

Relevant UCL Statistics	
Normal Distribution Test	Lognormal Distribution Test
Shapiro Wilk Test Statistic 0.806 S	Shapiro Wilk Test Statistic 0.896
Shapiro Wilk Critical Value 0.803 S	Shapiro Wilk Critical Value 0.803
Data appear Normal at 5% Significance Level	Data appear Lognormal at 5% Significance Level
Assuming Normal Distribution	Assuming Lognormal Distribution
95% Student's-t UCL 372.4	95% H-UCL 4546
95% UCLs (Adjusted for Skewness)	95% Chebyshev (MVUE) UCL 680.7
95% Adjusted-CLT UCL (Chen-1995) 394.8	97.5% Chebyshev (MVUE) UCL 886
95% Modified-t UCL (Johnson-1978) 380	99% Chebyshev (MVUE) UCL 1289
Gamma Distribution Test	Data Distribution
k star (bias corrected) 0.545 M	Data appear Normal at 5% Significance Level
Theta Star 365.5	
MLE of Mean 199.1	
MLE of Standard Deviation 269.8	
nu star 7.629	
Approximate Chi Square Value (.05)2.522	Nonparametric Statistics
Adjusted Level of Significance 0.0158	95% CLT UCL 345.8
Adjusted Chi Square Value 1.727	95% Jackknife UCL 372.4
	95% Standard Bootstrap UCL 330.3
Anderson-Darling Test Statistic0.412	95% Bootstrap-t UCL 685.8
Anderson-Darling 5% Critical Value 0.735	95% Hall's Bootstrap UCL 1301
Kolmogorov-Smirnov Test Statistic 0.257	95% Percentile Bootstrap UCL 341.4
Kolmogorov-Smirnov 5% Critical Value0.322	95% BCA Bootstrap UCL 360.9
Data appear Gamma Distributed at 5% Significance Level	95% Chebyshev(Mean, Sd) UCL 587.8
	97.5% Chebyshev(Mean, Sd) UCL 756
Assuming Gamma Distribution	99% Chebyshev(Mean, Sd) UCL 1086
95% Approximate Gamma UCL 602.4	
95% Adjusted Gamma UCL 879.6	

Use 95% Student's-t UCL

Note: Suggestions regarding the selection of a 95% UCL are provided to help the user to select the most appropriate 95% UCL. These recommendations are based upon the results of the simulation studies summarized in Singh, Singh, and Iaci (2002) and Singh and Singh (2003). For additional insight, the user may want to consult a statistician.

Hg

General Statistics		
Number of Valid Observations	7 Number of Distinct Observations	7
Raw Statistics	Log-transformed Statistics	
Minimum	1.38 Minimum of Log Data	0.322
Maximum	409 Maximum of Log Data	6.014
Mean	89.92 Mean of log Data	3.102
Median	35.1 SD of log Data	2.082
SD	145.7	
Coefficient of Variation	1.62	
Skewness	2.292	

Warning: A sample size of 'n' = 7 may not adequate enough to compute meaningful and reliable test statistics and estimates!

It is suggested to collect at least 8 to 10 observations using these statistical methods! If possible compute and collect Data Quality Objectives (DQO) based sample size and analytical results.

Warning: There are only 7 Values in this data

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

The literature suggests to use bootstrap methods on data sets having more than 10-15 observations.

Relevant UCL Statistics		
Normal Distribution Test	Lognormal Distribution Test	
Shapiro Wilk Test Statistic	0.672 Shapiro Wilk Test Statistic	0.951
Shapiro Wilk Critical Value	0.803 Shapiro Wilk Critical Value	0.803
Data not Normal at 5% Significance Level	Data appear Lognormal at 5% Significance Level	
Assuming Normal Distribution	Assuming Lognormal Distribution	
95% Student's-t UCL	196.9 95% H-UCL	74925
95% UCLs (Adjusted for Skewness)	95% Chebyshev (MVUE) UCL	436.8
95% Adjusted-CLT UCL (Chen-1995)	231.5 97.5% Chebyshev (MVUE) UCL	580
95% Modified-t UCL (Johnson-1978)	204.9 99% Chebyshev (MVUE) UCL	861.2
Gamma Distribution Test	Data Distribution	
k star (bias corrected)	0.358 Data appear Gamma Distributed at 5% Significa	nce Level
Theta Star	250.8	
MLE of Mean	89.92	
MLE of Standard Deviation	150.2	
nu star	5.019	
Approximate Chi Square Value (.05)	1.161 Nonparametric Statistics	
Adjusted Level of Significance	0.0158 95% CLT UCL	180.5
Adjusted Chi Square Value	0.697 95% Jackknife UCL	196.9
	95% Standard Bootstrap UCL	174.3
Anderson-Darling Test Statistic	0.283 95% Bootstrap-t UCL	433
Anderson-Darling 5% Critical Value	0.758 95% Hall's Bootstrap UCL	512.8
Kolmogorov-Smirnov Test Statistic	0.194 95% Percentile Bootstrap UCL	190.6
Kolmogorov-Smirnov 5% Critical Value	0.329 95% BCA Bootstrap UCL	227.9
Data appear Gamma Distributed at 5% Significance Level	95% Chebyshev(Mean, Sd) UCL	330
	97.5% Chebyshev(Mean, Sd) UCL	433.9
Assuming Gamma Distribution	99% Chebyshev(Mean, Sd) UCL	637.9
95% Approximate Gamma UCL	388.7	
95% Adjusted Gamma UCL	647.3	

372.4

Note: Suggestions regarding the selection of a 95% UCL are provided to help the user to select the most appropriate 95% UCL. These recommendations are based upon the results of the simulation studies summarized in Singh, Singh, and Iaci (2002) and Singh and Singh (2003). For additional insight, the user may want to consult a statistician.

Pb

General Statistics		
Number of Valid Observations	7 Number of Distinct Observations	7
Raw Statistics	Log-transformed Statistics	
Minimum	27.3 Minimum of Log Data	3.307
Maximum	1680 Maximum of Log Data	7.427
Mean	387.6 Mean of log Data	4.969
Median	115 SD of log Data	1.559
SD	594.9	
Coefficient of Variation	1.535	
Skewness	2.225	

Warning: A sample size of 'n' = 7 may not adequate enough to compute meaningful and reliable test statistics and estimates!

It is suggested to collect at least 8 to 10 observations using these statistical methods! If possible compute and collect Data Quality Objectives (DQO) based sample size and analytical results.

Warning: There are only 7 Values in this data

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

Relevant UCL Statistics			
Normal Distribution Test	Lognormal Distribution Test		
Shapiro Wilk Test Statistic	0.682 Shapiro Wilk Test Statistic 0.924		
Shapiro Wilk Critical Value	0.803 Shapiro Wilk Critical Value 0.803		
Data not Normal at 5% Significance Level	Data appear Lognormal at 5% Significance Level		
Assuming Normal Distribution	Assuming Lognormal Distribution		
95% Student's-t UCL	824.5 95% H-UCL 14745		
95% UCLs (Adjusted for Skewness)	95% Chebyshev (MVUE) UCL 1279		
95% Adjusted-CLT UCL (Chen-1995)	959.5 97.5% Chebyshev (MVUE) UCL 1674		
95% Modified-t UCL (Johnson-1978)	856.1 99% Chebyshev (MVUE) UCL 2450		
Gamma Distribution Test	Data Distribution		
k star (bias corrected)	0.45 Data appear Gamma Distributed at 5% Significance Level		
Theta Star	862		
MLE of Mean	387.6		
MLE of Standard Deviation	578		
nu star	6.296		
Approximate Chi Square Value (.05)	1.793 Nonparametric Statistics		
Adjusted Level of Significance	0.0158 95% CLT UCL 757.5		
Adjusted Chi Square Value	1.161 95% Jackknife UCL 824.5		
	95% Standard Bootstrap UCL 727.5		
Anderson-Darling Test Statistic	0.42 95% Bootstrap-t UCL 1856		
Anderson-Darling 5% Critical Value	0.744 95% Hall's Bootstrap UCL 2035		
Kolmogorov-Smirnov Test Statistic	0.207 95% Percentile Bootstrap UCL 788.1		
Kolmogorov-Smirnov 5% Critical Value	0.325 95% BCA Bootstrap UCL 905.8		
Distributed at 5% Significance Level	95% Chebyshev(Mean, Sd) UCL 1368		
	97.5% Chebyshev(Mean, Sd) UCL 1792		
Assuming Gamma Distribution	99% Chebyshev(Mean, Sd) UCL 2625		
95% Approximate Gamma UCL	1361		
95% Adjusted Gamma UCL	2101		

Note: Suggestions regarding the selection of a 95% UCL are provided to help the user to select the most appropriate 95% UCL. These recommendations are based upon the results of the simulation studies summarized in Singh, Singh, and Iaci (2002) and Singh and Singh (2003). For additional insight, the user may want to consult a statistician.

Sb

General Statistics		
Number of Valid Observations	7 Number of Distinct Observations	7
Raw Statistics	Log-transformed Statistics	
Minimum	0.556 Minimum of Log Data	-0.587
Maximum	8.32 Maximum of Log Data	2.119
Mean	3.139 Mean of log Data	0.638
Median	1.34 SD of log Data	1.11
SD	3.233	
Coefficient of Variation	1.03	
Skewness	1.056	

Warning: A sample size of 'n' = 7 may not adequate enough to compute meaningful and reliable test statistics and estimates!

It is suggested to collect at least 8 to 10 observations using these statistical methods! If possible compute and collect Data Quality Objectives (DQO) based sample size and analytical results.

Warning: There are only 7 Values in this data

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

Relevant UCL Statistics			
al Distribution Test	Lognormal Distribution Test		
Test Statistic	0.793 Test Statistic	0.897	
Shapiro Wilk Critical Value	0.803 Shapiro Wilk Critical Value	0.803	
Data not Normal at 5% Significance Level	Data appear Lognormal at 5% Significance Leve	el .	
Assuming Normal Distribution	Assuming Lognormal Distribution		
95% Student's-t UCL	5.513 95% H-UCL	21.63	
95% UCLs (Adjusted for Skewness)	95% Chebyshev (MVUE) UCL	8.81	
95% Adjusted-CLT UCL (Chen-1995)	5.67 97.5% Chebyshev (MVUE) UCL	11.28	
95% Modified-t UCL (Johnson-1978)	5.595 99% Chebyshev (MVUE) UCL	16.12	
Gamma Distribution Test	Data Distribution		
k star (bias corrected)	0.738 Data appear Gamma Distributed at 5% Significance Level		
Theta Star	4.252		
MLE of Mean	3.139		
MLE of Standard Deviation	3.653		
nu star	10.34		
Approximate Chi Square Value (.05)	4.153 Nonparametric Statistics		
Adjusted Level of Significance	0.0158 95% CLT UCL	5.149	
Adjusted Chi Square Value	3.057 95% Jackknife UCL	5.513	
	95% Standard Bootstrap UCL	5.025	
Anderson-Darling Test Statistic	0.466 95% Bootstrap-t UCL	10.63	
Anderson-Darling 5% Critical Value	0.726 95% Hall's Bootstrap UCL	7.204	
Kolmogorov-Smirnov Test Statistic	0.248 95% Percentile Bootstrap UCL	5.019	
Kolmogorov-Smirnov 5% Critical Value	0.319 95% BCA Bootstrap UCL	5.573	
Data appear Gamma Distributed at 5% Significance Level	95% Chebyshev(Mean, Sd) UCL	8.465	
	97.5% Chebyshev(Mean, Sd) UCL	10.77	
Assuming Gamma Distribution	99% Chebyshev(Mean, Sd) UCL	15.3	
95% Approximate Gamma UCL	7.813		
95% Adjusted Gamma UCL	10.62		
Potential UCL to Use	Use 95% Approximate Gamma UCL	7.813	

Zn

General Statistics		
Number of Valid Observations	7 Number of Distinct Observations	7
Raw Statistics	Log-transformed Statistics	
Minimum	22.9 Minimum of Log Data	3.131
Maximum	328 Maximum of Log Data	5.793
Mean	97.26 Mean of log Data	4.174
Median	59.7 SD of log Data	0.926
SD	107.2	
Coefficient of Variation	1.102	
Skewness	2.14	

Warning: A sample size of 'n' = 7 may not adequate enough to compute meaningful and reliable test statistics and estimates!

It is suggested to collect at least 8 to 10 observations using these statistical methods! If possible compute and collect Data Quality Objectives (DQO) based sample size and analytical results.

Warning: There are only 7 Values in this data

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

The literature suggests to use bootstrap methods on data sets having more than 10-15 observations.

Relevant UCL Statistics				
Normal Distribution Test	Lognormal Distribution Test			
Shapiro Wilk Test Statistic	0.727 Shapiro Wilk Test Statistic	0.947		
Shapiro Wilk Critical Value	0.803 Shapiro Wilk Critical Value	0.803		
Data not Normal at 5% Significance Level	Data appear Lognormal at 5% Significance Level			
Assuming Normal Distribution	Assuming Lognormal Distribution			
95% Student's-t UCL	176 95% H-UCL	373.7		
95% UCLs (Adjusted for Skewness)	95% Chebyshev (MVUE) UCL	234.1		
95% Adjusted-CLT UCL (Chen-1995)	198.9 97.5% Chebyshev (MVUE) UCL	295.5		
95% Modified-t UCL (Johnson-1978)	181.4 99% Chebyshev (MVUE) UCL	416		
Gamma Distribution Test	Data Distribution			
k star (bias corrected)	0.885 Data appear Gamma Distributed at 5% Significan	0.885 Data appear Gamma Distributed at 5% Significance Level		
Theta Star	110			
MLE of Mean	97.26			
MLE of Standard Deviation	103.4			
nu star	12.38			
Approximate Chi Square Value (.05)	5.481 Nonparametric Statistics			
Adjusted Level of Significance	0.0158 95% CLT UCL	163.9		
Adjusted Chi Square Value	4.178 95% Jackknife UCL	176		
	95% Standard Bootstrap UCL	159.6		
Anderson-Darling Test Statistic	0.39 95% Bootstrap-t UCL	281.6		
Anderson-Darling 5% Critical Value	0.723 95% Hall's Bootstrap UCL	419.3		
Kolmogorov-Smirnov Test Statistic	0.172 95% Percentile Bootstrap UCL	167.5		
Kolmogorov-Smirnov 5% Critical Value	0.318 95% BCA Bootstrap UCL	200.1		
Data appear Gamma Distributed at 5% Significance Level	95% Chebyshev(Mean, Sd) UCL	273.8		
	97.5% Chebyshev(Mean, Sd) UCL	350.2		
Assuming Gamma Distribution	99% Chebyshev(Mean, Sd) UCL	500.2		
95% Approximate Gamma UCL	219.8			
95% Adjusted Gamma UCL	288.3			

Potential UCL to Use

219.8

Concentraciones en mg/kg						
As	cd Cd	Cu	Hg	Pb	Sb	Zn
20.4	0.569	18.3	1.38	27.3	1.2	22.9
37.4	0.803	25.7	6.6	50.3	0.556	37.9
129	2.41	128	35.1	115	1.34	59.7
378	4.11	401	77.9	349	7.08	115
600	10.5	639	409	1 680	8.32	328
635	4.61	156	96.7	462	2.91	89.4
21.9	0.72	26	2.74	29.8	0.567	27.9

Tabla B4 - UCL95 de concentraciones en suelos de la zona urbana

General UCL Statistics for Full Data Sets

User Selected Options	
From File	Sheet1_a.wst
Full Precision	OFF
Confidence Coefficient	95%
Number of Bootstrap Operations	2000

As

General Statistics		
Number of Valid Observations	22 Number of Distinct Observations	22
Raw Statistics	Log-transformed Statistics	
Minimum	9.72 Minimum of Log Data	2.274
Maximum	348.9 Maximum of Log Data	5.855
Mean	46.28 Mean of log Data	3.336
Median	24.2 SD of log Data	0.885
SD	71.74	
Coefficient of Variation	1.55	
Skewness	3.901	
Relevant UCL Statistics		
Normal Distribution Test	Lognormal Distribution Test	
Shapiro Wilk Test Statistic	0.489 Shapiro Wilk Test Statistic	0.912
Shapiro Wilk Critical Value	0.911 Shapiro Wilk Critical Value	0.911
Data not Normal at 5% Significance Level	Data appear Lognormal at 5% Significa	nce Level
Assuming Normal Distribution	Assuming Lognormal Distribution	
95% Student's-t UCL	72.6 95% H-UCL	66.45
95% UCLs (Adjusted for Skewness)	95% Chebyshev (MVUE) UCL	77.49
95% Adjusted-CLT UCL (Chen-1995)	85.03 97.5% Chebyshev (MVUE) UCL	93.45
95% Modified-t UCL (Johnson-1978)	74.72 99% Chebyshev (MVUE) UCL	124.8
Gamma Distribution Test	Data Distribution	
k star (bias corrected)	1.015 Data Follow Appr. Gamma Distrib. at 5	% Significance Level
Theta Star	45.61	
MLE of Mean	46.28	
MLE of Standard Deviation	45.94	
nu star	44.65	
Approximate Chi Square Value (.05)	30.32 Nonparametric Statistics	
Adjusted Level of Significance	0.0386 95% CLT UCL	71.44
Adjusted Chi Square Value	29.44 95% Jackknife UCL	72.6
	95% Standard Bootstrap UCL	71.28
Anderson-Darling Test Statistic	1.359 95% Bootstrap-t UCL	122.5
Anderson-Darling 5% Critical Value	0.767 95% Hall's Bootstrap UCL	158.7
Kolmogorov-Smirnov Test Statistic	0.181 95% Percentile Bootstrap UCL	73.75
Kolmogorov-Smirnov 5% Critical Value	0.19 95% BCA Bootstrap UCL	86.29
Data follow Appr. Gamma Distribution at 5% Significance Level	95% Chebyshev(Mean, Sd) UCL	113
	97.5% Chebyshev(Mean, Sd) UCL	141.8
Assuming Gamma Distribution	99% Chebyshev(Mean, Sd) UCL	198.5
95% Approximate Gamma UCL	68.15	
95% Adjusted Gamma UCL	70.19	
Potential UCL to Use	Use 95% Approximate Gamma UCL	68.15

Note: Suggestions regarding the selection of a 95% UCL are provided to help the user to select the most appropriate 95% UCL. These recommendations are based upon the results of the simulation studies summarized in Singh, Singh, and Iaci (2002) and Singh and Singh (2003). For additional insight, the user may want to consult a statistician.

Cd

General Statistics

Number of Valid Observations	22	Number of Distinct Observations	22
Raw Statistics		Log-transformed Statistics	
Minimum	0.418	Minimum of Log Data	-0.872
Maximum	1.75	Maximum of Log Data	0.56
Mean	0.78	Mean of log Data	-0.314
Median	0.683	SD of log Data	0.361
SD	0.315		
Coefficient of Variation	0.404		
Skewness	1.589		
Relevant UCL Statistics			
Normal Distribution Test		Lognormal Distribution Test	
Shapiro Wilk Test Statistic	0.859	Shapiro Wilk Test Statistic	0.956
Shapiro Wilk Critical Value	0.911	Shapiro Wilk Critical Value	0.911
Data not Normal at 5% Significance Level		Data appear Lognormal at 5% Significa	nce Level
Assuming Normal Distribution		Assuming Lognormal Distribution	
95% Student's-t UCL	0.896	95% H-UCL	0.904
95% UCLs (Adjusted for Skewness)		95% Chebyshev (MVUE) UCL	1.043
95% Adjusted-CLT UCL (Chen-1995)	0.915	97.5% Chebyshev (MVUE) UCL	1.158
95% Modified-t UCL (Johnson-1978)	0.9	99% Chebyshev (MVUE) UCL	1.384
Gamma Distribution Test		Data Distribution	
k star (bias corrected)	6.72	Data appear Gamma Distributed at 5%	Significance Level
Theta Star	0.116		
MLE of Mean	0.78		
MLE of Standard Deviation	0.301		
nu star	295.7		
Approximate Chi Square Value (.05)	256.9	Nonparametric Statistics	
Adjusted Level of Significance	0.0386	95% CLT UCL	0.891
Adjusted Chi Square Value	254.2	95% Jackknife UCL	0.896
		95% Standard Bootstrap UCL	0.887
Anderson-Darling Test Statistic	0.527	95% Bootstrap-t UCL	0.933
Anderson-Darling 5% Critical Value	0.745	95% Hall's Bootstrap UCL	0.959
Kolmogorov-Smirnov Test Statistic	0.179	95% Percentile Bootstrap UCL	0.9
Kolmogorov-Smirnov 5% Critical Value	0.186	95% BCA Bootstrap UCL	0.909
Data appear Gamma Distributed at 5% Significance Level		95% Chebyshev(Mean, Sd) UCL	1.073
		97.5% Chebyshev(Mean, Sd) UCL	1.2
Assuming Gamma Distribution		99% Chebyshev(Mean, Sd) UCL	1.449
95% Approximate Gamma UCL	0.898		
95% Adjusted Gamma UCL	0.908		
Potential UCL to Use		Use 95% Approximate Gamma UCL	0.898

Cu

General Statistics		
Number of Valid Observations	22 Number of Distinct Observations	22
Raw Statistics	Log-transformed Statistics	
Minimum	16.8 Minimum of Log Data	2.821
Maximum	161.3 Maximum of Log Data	5.083
Mean	44.73 Mean of log Data	3.669
Median	40.3 SD of log Data	0.484
SD	29.77	
Coefficient of Variation	0.666	
Skewness	3.092	
Relevant UCL Statistics		

Normal Distribution TestLognormal Distribution TestShapiro Wilk Test Statistic0.668 Shapiro Wilk Test Statistic0.938

Shapiro Wilk Critical Value	0.911 Shapiro Wilk Critical Value	0.911
Data not Normal at 5% Significance Level	Data appear Lognormal at 5% Signif	icance Level
Assuming Normal Distribution	Assuming Lognormal Distribution	
95% Student's-t UCL	55.65 95% H-UCL	54.37
95% UCLs (Adjusted for Skewness)	95% Chebyshev (MVUE) UCL	64.28
95% Adjusted-CLT UCL (Chen-1995)	59.64 97.5% Chebyshev (MVUE) UCL	73.13
95% Modified-t UCL (Johnson-1978)	56.35 99% Chebyshev (MVUE) UCL	90.5
Gamma Distribution Test	Data Distribution	
k star (bias corrected)	3.447 Data Follow Appr. Gamma Distrib. a	t 5% Significance Level
Theta Star	12.98	
MLE of Mean	44.73	
MLE of Standard Deviation	24.09	
nu star	151.7	
Approximate Chi Square Value (.05)	124.2 Nonparametric Statistics	
Adjusted Level of Significance	0.0386 95% CLT UCL	55.17
Adjusted Chi Square Value	122.4 95% Jackknife UCL	55.65
	95% Standard Bootstrap UCL	54.76
Anderson-Darling Test Statistic	0.793 95% Bootstrap-t UCL	66.5
Anderson-Darling 5% Critical Value	0.747 95% Hall's Bootstrap UCL	102.1
Kolmogorov-Smirnov Test Statistic	0.164 95% Percentile Bootstrap UCL	55.54
Kolmogorov-Smirnov 5% Critical Value	0.186 95% BCA Bootstrap UCL	61
Data follow Appr. Gamma Distribution at 5% Significance Level	95% Chebyshev(Mean, Sd) UCL	72.4
	97.5% Chebyshev(Mean, Sd) UCL	84.37
Assuming Gamma Distribution	99% Chebyshev(Mean, Sd) UCL	107.9
95% Approximate Gamma UCL	54.62	
95% Adjusted Gamma UCL	55.45	
Potential UCL to Use	Use 95% Approximate Gamma UCL	54.62

Use 95% Approximate Gamma UCL

Note: Suggestions regarding the selection of a 95% UCL are provided to help the user to select the most appropriate 95% UCL. These recommendations are based upon the results of the simulation studies summarized in Singh, Singh, and Iaci (2002) and Singh and Singh (2003). For additional insight, the user may want to consult a statistician.

Hg

General Statistics		
Number of Valid Observations	22 Number of Distinct Observations	14
Raw Statistics	Log-transformed Statistics	
Minimum	<0.04 Minimum of Log Data -3	.912
Maximum	19.4 Maximum of Log Data 2	.965
Mean	3.057 Mean of log Data -0	.966
Median	1.38 SD of log Data 2	.642
SD	5.43	
Coefficient of Variation	1.776	
Skewness	2.472	
Relevant UCL Statistics		
Normal Distribution Test	Lognormal Distribution Test	
Shapiro Wilk Test Statistic	0.592 Shapiro Wilk Test Statistic	0.81
Shapiro Wilk Critical Value	0.911 Shapiro Wilk Critical Value 0	.911
Data not Normal at 5% Significance Level	Data not Lognormal at 5% Significance Level	
Assuming Normal Distribution	Assuming Lognormal Distribution	
95% Student's-t UCL	5.049 95% H-UCL	269
95% UCLs (Adjusted for Skewness)	95% Chebyshev (MVUE) UCL	30.2
95% Adjusted-CLT UCL (Chen-1995)	5.613 97.5% Chebyshev (MVUE) UCL 4	0.06
95% Modified-t UCL (Johnson-1978)	5.151 99% Chebyshev (MVUE) UCL 5	9.44
Gamma Distribution Test	Data Distribution	
k star (bias corrected)	0.312 Data do not follow a Discernable Distribution	(0.05)
Theta Star	9.789	
MLE of Mean	3.057	
MLE of Standard Deviation	5.47	

nu star	13.74		
Approximate Chi Square Value (.05)	6.394	Nonparametric Statistics	
Adjusted Level of Significance	0.0386	95% CLT UCL	4.961
Adjusted Chi Square Value	6.022	95% Jackknife UCL	5.049
		95% Standard Bootstrap UCL	4.93
Anderson-Darling Test Statistic	1.272	95% Bootstrap-t UCL	7.707
Anderson-Darling 5% Critical Value	0.842	95% Hall's Bootstrap UCL	12.76
Kolmogorov-Smirnov Test Statistic	0.259	95% Percentile Bootstrap UCL	5.029
Kolmogorov-Smirnov 5% Critical Value	0.2	95% BCA Bootstrap UCL	5.599
Data not Gamma Distributed at 5% Significance Level		95% Chebyshev(Mean, Sd) UCL	8.104
		97.5% Chebyshev(Mean, Sd) UCL	10.29
Assuming Gamma Distribution		99% Chebyshev(Mean, Sd) UCL	14.58
95% Approximate Gamma UCL	6.569		
95% Adjusted Gamma UCL	6.975		
Potential UCL to Use		Use 99% Chebyshev (Mean, Sd) UCL	14.58

Pb

General Statistics		
Number of Valid Observations	22 Number of Distinct Observations	22
Raw Statistics	Log-transformed Statistics	
Minimum	6.18 Minimum of Log Data	1.821
Maximum	332.2 Maximum of Log Data	5.806
Mean	37.62 Mean of log Data	2.84
Median	10.45 SD of log Data	1.095
SD	71.72	
Coefficient of Variation	1.906	
Skewness	3.69	
Relevant UCL Statistics		
Normal Distribution Test	Lognormal Distribution Test	
Shapiro Wilk Test Statistic	0.474 Shapiro Wilk Test Statistic	0.828
Shapiro Wilk Critical Value	0.911 Shapiro Wilk Critical Value	0.911
Data not Normal at 5% Significance Level	Data not Lognormal at 5% Significand	e Level
Assuming Normal Distribution	Assuming Lognormal Distribution	
95% Student's-t UCL	63.93 95% H-UCL	59.7
95% UCLs (Adjusted for Skewness)	95% Chebyshev (MVUE) UCL	64.82
95% Adjusted-CLT UCL (Chen-1995)	75.62 97.5% Chebyshev (MVUE) UCL	79.91
95% Modified-t UCL (Johnson-1978)	65.93 99% Chebyshev (MVUE) UCL	109.6
Gamma Distribution Test	Data Distribution	
k star (bias corrected)	0.686 Data do not follow a Discernable Dist	ribution (0.05)
Theta Star	54.84	
MLE of Mean	37.62	
MLE of Standard Deviation	45.42	
nu star	30.18	
Approximate Chi Square Value (.05)	18.64 Nonparametric Statistics	
Adjusted Level of Significance	0.0386 95% CLT UCL	62.77
Adjusted Chi Square Value	17.96 95% Jackknife UCL	63.93
	95% Standard Bootstrap UCL	62.26
Anderson-Darling Test Statistic	2.266 95% Bootstrap-t UCL	126.6
Anderson-Darling 5% Critical Value	0.783 95% Hall's Bootstrap UCL	158.8
Kolmogorov-Smirnov Test Statistic	0.283 95% Percentile Bootstrap UCL	66.73
Kolmogorov-Smirnov 5% Critical Value	0.193 95% BCA Bootstrap UCL	80.66
Data not Gamma Distributed at 5% Significance Level	95% Chebyshev(Mean, Sd) UCL	104.3
-	97.5% Chebyshev(Mean, Sd) UCL	133.1
Assuming Gamma Distribution	99% Chebyshev(Mean, Sd) UCL	189.8
95% Approximate Gamma UCL	60.92	
95% Adjusted Gamma UCL	63.22	

Note: Suggestions regarding the selection of a 95% UCL are provided to help the user to select the most appropriate 95% UCL. These recommendations are based upon the results of the simulation studies summarized in Singh, Singh, and Iaci (2002) and Singh and Singh (2003). For additional insight, the user may want to consult a statistician.

Sb

General Statistics				
Number of Valid Observations	rvations 22 Number of Distinct Observations			
Raw Statistics	Log-transformed Statistics			
Minimum	0.423 Minimum of Log Data	-0.86		
Maximum	3.67 Maximum of Log Data	1.3		
Mean	1.439 Mean of log Data	0.215		
Median	1.34 SD of log Data	0.58		
SD	0.79			
Coefficient of Variation	0.549			
Skewness	1.1			
Relevant UCL Statistics				
Normal Distribution Test	Lognormal Distribution Test			
Shapiro Wilk Test Statistic	0.911 Shapiro Wilk Test Statistic	0.945		
Shapiro Wilk Critical Value	0.911 Shapiro Wilk Critical Value	0.911		
Data not Normal at 5% Significance Level	Data appear Lognormal at 5% Sigr	nificance Level		
Assuming Normal Distribution	Assuming Lognormal Distribution			
95% Student's-t UCL	1.729 95% H-UCL	1.907		
95% UCLs (Adjusted for Skewness)	95% Chebyshev (MVUE) UCL	2.277		
95% Adjusted-CLT UCL (Chen-1995)	1.758 97.5% Chebyshev (MVUE) UCL	2.633		
95% Modified-t UCL (Johnson-1978)	1.735 99% Chebyshev (MVUE) UCL	3.332		
Gamma Distribution Test	Data Distribution			
k star (bias corrected)	3.069 Data appear Gamma Distributed a	at 5% Significance Level		
Theta Star	0.469			
MLE of Mean	1.439			
MLE of Standard Deviation	0.821			
nu star	135			
Approximate Chi Square Value (.05)	109.2 Nonparametric Statistics			
Adjusted Level of Significance	0.0386 95% CLT UCL	1.716		
Adjusted Chi Square Value	107.4 95% Jackknife UCL	1.729		
	95% Standard Bootstrap UCL	1.705		
Anderson-Darling Test Statistic	0.377 95% Bootstrap-t UCL	1.786		
Anderson-Darling 5% Critical Value	0.748 95% Hall's Bootstrap UCL	1.818		
Kolmogorov-Smirnov Test Statistic	0.125 95% Percentile Bootstrap UCL	1.72		
Kolmogorov-Smirnov 5% Critical Value	0.186 95% BCA Bootstrap UCL	1.756		
Data appear Gamma Distributed at 5% Significance Level	95% Chebyshev(Mean, Sd) UCL	2.173		
	97.5% Chebyshev(Mean, Sd) UCL	2.49		
Assuming Gamma Distribution	99% Chebyshev(Mean, Sd) UCL	3.114		
95% Approximate Gamma UCL	1.779			
95% Adjusted Gamma UCL	1.808			
Potential UCL to Use	Use 95% Approximate Gamma UC	CL 1.779		

Note: Suggestions regarding the selection of a 95% UCL are provided to help the user to select the most appropriate 95% UCL. These recommendations are based upon the results of the simulation studies summarized in Singh, Singh, and Iaci (2002) and Singh and Singh (2003). For additional insight, the user may want to consult a statistician.

Zn

General Statistics Number of Valid Observations

22 Number of Distinct Observations

Maximum215Maximum of Log Data5.37Mean47.1Mean of log Data3.55Median30.05SD of log Data0.70SD53.011.1255Coefficient of Variation1.1255Skewness2.8037Relevant UCL Statistics0.545Shapiro Wilk Test Statistic0.86Normal Distribution TestLognormal Distribution Test0.91Shapiro Wilk Critical Value0.911Shapiro Wilk Critical Value0.91Data not Normal at 5% Significance Level66.5595% H-UCL61.895% Kudent's-t UCL66.5595% H-UCL61.895% Modified-t UCL (Chen-1995)7.9197.5% Chebyshev (MVUE) UCL73.995% Modified-t UCL (Chen-1995)7.9197.5% Chebyshev (MVUE) UCL87.195% Modified-t UCL (Chen-1995)7.9197.5% Chebyshev (MVUE) UCL13.3Gamma Distribution TestData Distribution8.041.533k star (bias corrected)1.533Data do not follow a Discernable Distribution (0.77.45HLE of Mean47.14.154.154.15MLE of Standard Deviation38.041.533Data do not follow a Discernable Distribution (0.7Theta Star30.734.154.154.154.15Approximate Chi Square Value (.05)4.55Nonparametric Statistics4.15Adjusted Level of Significance0.038695% CLT UCL65.5Adjusted Level of Significance6.5595% Standard Bootstrap UCL<	Maximum Mean Median SD	215 47.1 30.05	Maximum of Log Data Mean of log Data	5.371
Mean47.1 Mean of log Data3.55Median30.05 SD of log Data0.70SD53.01Coefficient of Variation1.125Skewness2.8032.803Relevant UCL Statistics0.545 Shapiro Wilk Test Statistic0.86Normal Distribution TestLognormal Distribution Test0.86Shapiro Wilk Critical Value0.911 Shapiro Wilk Critical Value0.91Data not Normal at 5% Significance Level0.911 Shapiro Wilk Critical Value0.91Assuming Normal DistributionAssuming Lognormal Distribution66.5595% Student's-t UCL66.5595% H-UCL61.895% Student's-t UCL66.5595% H-UCL61.895% Modified-t UCL (Chen-1995)72.9197.5% Chebyshev (MVUE) UCL73.595% Adjusted for Skewness)95% Chebyshev (MVUE) UCL73.595% Modified-t UCL (Johnson-1978)67.6899% Chebyshev (MVUE) UCL87.195% Modified-t UCL (Johnson-1978)77.6%91.513.7Gamma Distribution TestData Distribution13.31411.3Gamma Distribution TestData Distribution13.31410.5K star (bias corrected)1.533 Data do not follow a Discernable Distribution on tract5.45.4Approximate Chi Square Value (.05)49.55Nonparametric Statistics4.1Approximate Chi Square Value (.05)49.55Standard Bootstrap UCL65.5Adjusted Level of Significance0.038695% CLT UCL65.5Adjusted Level of Significance	Mean Median SD	47.1 30.05	Mean of log Data	2 5 2 9
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Relevant UCL Statistics Normal Distribution Test Shapiro Wilk Test Statistic O.545 Shapiro Wilk Test Statistic O.545 Shapiro Wilk Critical Value O.911 Shapiro Wilk Critical Value O.911 Data not Normal at 5% Significance Level Assuming Normal Distribution 95% Student's-t UCL 66.55 95% H-UCL 66.55 95% H-UCL 61.8 95% UCLs (Adjusted for Skewness) 95% Chebyshev (MVUE) UCL 73.9 95% Modified-t UCL (Ichen-1995) 72.91 97.5% Chebyshev (MVUE) UCL 73.9 95% Modified-t UCL (Johnson-1978) 67.68 99% Chebyshev (MVUE) UCL 113. Gamma Distribution test k star (bias corrected) 1.533 Data do not follow a Discernable Distribution NLE of Standard Deviation 38.04 nu star 67.45 Approximate Chi Square Value (.05) Adjusted Level 64.8.14 95% Jackknife UCL 65. 40.386 95% CLT UCL 64. Anderson-Darling Test Statistic 1.912 95% Bootstrap UCL 117. Anderson-Darling 5% Critical Value 0.757 95% Hall's Bootstrap UCL 177.	Skewness	2.803		
Normal Distribution TestLognormal Distribution TestShapiro Wilk Test Statistic0.545Shapiro Wilk Test Statistic0.86Shapiro Wilk Critical Value0.911Shapiro Wilk Critical Value0.91Data not Normal at 5% Significance LevelData not Lognormal at 5% Significance Level0.86Assuming Normal DistributionAssuming Lognormal Distribution66.5595% H-UCL61.895% Student's-t UCL66.5595% H-UCL61.895% Chebyshev (MVUE) UCL73.995% Adjusted-CLT UCL (Chen-1995)72.9197.5% Chebyshev (MVUE) UCL87.195% Modified-t UCL (Johnson-1978)67.6899% Chebyshev (MVUE) UCL1136amma Distribution TestData Distribution1.533Data do not follow a Discernable Distribution (0.7 Theta Star30.7330.7330.7330.73MLE of Standard Deviation38.0447.141.41.MLE of Square Value (.05)49.55Nonparametric Statistics65.5Adjusted Chi Square Value (.05)49.55Nonparametric Statistics65.5Adjusted Chi Square Value (.05)49.55Sundard Bootstrap UCL65.5Adjusted Chi Square Value0.3895% standard Bootstrap UCL65.595% Standard Bootstrap UCL64.595% standard Bootstrap UCL64.5Adjusted Level of Significance0.3895% chardard Bootstrap UCL65.5Adjusted Level of Significance95% standard Bootstrap UCL65.5Adjusted Chi Square Value0.5795% Bootstrap-t UCL117 <td>Relevant UCL Statistics</td> <td></td> <td></td> <td></td>	Relevant UCL Statistics			
Shapiro Wilk Test Statistic0.545Shapiro Wilk Test Statistic0.86Shapiro Wilk Critical Value0.911Shapiro Wilk Critical Value0.91Data not Normal at 5% Significance LevelData not Lognormal at 5% Significance Level0.911Assuming Normal DistributionAssuming Lognormal Distribution66.5595% H-UCL61.695% Student's-t UCL66.5595% H-UCL61.673.995% Adjusted-CLT UCL (Chen-1995)72.9197.5% Chebyshev (MVUE) UCL87.195% Modified-t UCL (Johnson-1978)67.6899% Chebyshev (MVUE) UCL113.Gamma Distribution TestData do not follow a Discernable Distribution (0.k star (bias corrected)1.533Data do not follow a Discernable Distribution (0.Theta Star30.73MLE of Mean47.1MLE of Standard Deviation38.04nu star67.45Approximate Chi Square Value (.05)49.55Adjusted Level of Significance0.038695% Standard Bootstrap UCL65.595% Standard Bootstrap UCL64.Anderson-Darling Test Statistic1.91295% Standard Bootstrap UCL117.Anderson-Darling 5% Critical Value0.75795% Hall's Bootstrap UCL177.	Normal Distribution Test		Lognormal Distribution Test	
Shapiro Wilk Critical Value0.911Shapiro Wilk Critical Value0.91Data not Normal at 5% Significance LevelData not Lognormal at 5% Significance LevelData not Lognormal at 5% Significance LevelAssuming Normal Distribution4ssuming Lognormal Distribution95% Student's-t UCL61.895% UCLs (Adjusted for Skewness)95% Chebyshev (MVUE) UCL73.995% Adjusted-CLT UCL (Chen-1995)72.9197.5% Chebyshev (MVUE) UCL87.195% Modified-t UCL (Johnson-1978)67.6899% Chebyshev (MVUE) UCL81.3Gamma Distribution TestData Distribution11.33Data do not follow a Discernable Distribution (0.Nthea Star30.73MLE of Mean47.11MLE of Standard Deviation38.041.533Data do not follow a Discernable Distribution (0.10 star69.5% CLT UCL65.595% Studard Bootstrap UCL65.5Adjusted Level of Significance0.038695% CLT UCL65.5Adjusted Level of Significance0.038695% Standard Bootstrap UCL64.5Anderson-Darling Test Statistic1.91295% Bootstrap-t UCL117.5Anderson-Darling 5% Critical Value0.75795% Hall's Bootstrap UCL177.5	Shapiro Wilk Test Statistic	0.545	Shapiro Wilk Test Statistic	0.867
Data not Normal at 5% Significance LevelData not Lognormal at 5% Significance LevelAssuming Normal Distribution95% Student's-t UCL66.5595% H-UCL61.895% UCLs (Adjusted for Skewness)95% Chebyshev (MVUE) UCL73.995% Adjusted-CLT UCL (Chen-1995)72.9197.5% Chebyshev (MVUE) UCL87.195% Modified-t UCL (Johnson-1978)67.6899% Chebyshev (MVUE) UCL113.Gamma Distribution TestData Distribution1.533Data do not follow a Discernable Distribution (0.Nte of Mean47.147.147.1MLE of Standard Deviation38.041.535Nonparametric StatisticsAdjusted Level of Significance0.038695% CLT UCL65.Adjusted Chi Square Value (.05)49.55Nonparametric Statistics65.5Adjusted Chi Square Value64.5195% Jackknife UCL65.5Adjusted Chi Square Value64.5195% Standard Bootstrap UCL64.Anderson-Darling Test Statistic1.91295% Bootstrap-t UCL117.Anderson-Darling 5% Critical Value0.75795% Hall's Bootstrap UCL177.	Shapiro Wilk Critical Value	0.911	Shapiro Wilk Critical Value	0.911
Assuming Normal Distribution 95% Student's-t UCL 66.55 95% H-UCL 66.55 95% H-UCL 66.5 95% Chebyshev (MVUE) UCL 73.5 95% Adjusted for Skewness) 95% Adjusted-CLT UCL (Chen-1995) 72.91 97.5% Chebyshev (MVUE) UCL 87.1 95% Modified-t UCL (Johnson-1978) 67.68 99% Chebyshev (MVUE) UCL 113. 67.68 99% Chebyshev (MVUE) UCL 114. 66.5 95% Standard Bootstrap UCL 115. 64. 64.65 95% Standard Bootstrap UCL 117. 64. 64.65 95% Standard Bootstrap UCL 117. 64. 64.65 95% Standard Bootstrap UCL 117. 65. 65.69% Standard Bootstrap UCL 117. 65.79% Hall's Bootstr	Data not Normal at 5% Significance Level		Data not Lognormal at 5% Significance	Level
95% Student's-t UCL66.5595% H-UCL61.895% UCLs (Adjusted for Skewness)95% Chebyshev (MVUE) UCL73.595% Adjusted-CLT UCL (Chen-1995)72.9197.5% Chebyshev (MVUE) UCL87.195% Modified-t UCL (Johnson-1978)67.6899% Chebyshev (MVUE) UCL113.Gamma Distribution TestData Distribution1.533Data do not follow a Discernable Distribution (0.k star (bias corrected)1.533Data do not follow a Discernable Distribution (0.30.73MLE of Mean47.147.147.1MLE of Standard Deviation38.0447.1nu star67.45Nonparametric StatisticsAdjusted Level of Significance0.038695% CLT UCL65.Adjusted Chi Square Value48.4195% Jackknife UCL66.5595% Standard Bootstrap UCL64.48.4195% Standard Bootstrap UCL64.Anderson-Darling Test Statistic1.91295% Bootstrap-t UCL117.Anderson-Darling 5% Critical Value0.75795% Hall's Bootstrap UCL177.	Assuming Normal Distribution		Assuming Lognormal Distribution	
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95% Adjusted-CLT UCL (Chen-1995)72.9197.5% Chebyshev (MVUE) UCL87.195% Modified-t UCL (Johnson-1978)67.6899% Chebyshev (MVUE) UCL113Gamma Distribution TestData Distribution113k star (bias corrected)1.533Data do not follow a Discernable Distribution (0.Theta Star30.73MLE of Mean47.1MLE of Standard Deviation38.04nu star67.45Approximate Chi Square Value (.05)49.55Adjusted Level of Significance0.038695% Standard Bootstrap UCL65.Adjusted Chi Square Value48.4195% Standard Bootstrap UCL64.Anderson-Darling Test Statistic1.91295% Goritical Value0.75795% Hall's Bootstrap UCL177.	95% UCLs (Adjusted for Skewness)		95% Chebyshev (MVUE) UCL	73.98
95% Modified-t UCL (Johnson-1978)67.6899% Chebyshev (MVUE) UCL113Gamma Distribution TestData Distributionk star (bias corrected)1.533Data do not follow a Discernable Distribution (0.Theta Star30.73MLE of Mean47.1MLE of Standard Deviation38.04nu star67.45Approximate Chi Square Value (.05)49.55Adjusted Level of Significance0.038695% CLT UCL65.Adjusted Chi Square Value48.4195% Standard Bootstrap UCL64.Anderson-Darling Test Statistic1.91295% Bootstrap-t UCL117.Anderson-Darling 5% Critical Value0.75795% Hall's Bootstrap UCL177.	95% Adjusted-CLT UCL (Chen-1995)	72.91	97.5% Chebyshev (MVUE) UCL	87.17
Gamma Distribution TestData Distributionk star (bias corrected)1.533Data do not follow a Discernable Distribution (0.Theta Star30.73MLE of Mean47.1MLE of Standard Deviation38.04nu star67.45Approximate Chi Square Value (.05)49.55Adjusted Level of Significance0.038695% CLT UCL65.Adjusted Chi Square Value64.Anderson-Darling Test Statistic1.91295% Bootstrap-t UCL117.Anderson-Darling 5% Critical Value0.75795% Hall's Bootstrap UCL177.	95% Modified-t UCL (Johnson-1978)	67.68	99% Chebyshev (MVUE) UCL	113.1
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nu star67.45Approximate Chi Square Value (.05)49.55Nonparametric StatisticsAdjusted Level of Significance0.038695% CLT UCL65.Adjusted Chi Square Value48.4195% Jackknife UCL66.5	MLE of Standard Deviation	38.04		
Approximate Chi Square Value (.05)49.55Nonparametric StatisticsAdjusted Level of Significance0.038695% CLT UCL65.Adjusted Chi Square Value48.4195% Jackknife UCL66.5	nu star	67.45		
Adjusted Level of Significance0.038695% CLT UCL65Adjusted Chi Square Value48.4195% Jackknife UCL66.595% Standard Bootstrap UCL64.Anderson-Darling Test Statistic1.91295% Bootstrap-t UCL117.Anderson-Darling 5% Critical Value0.75795% Hall's Bootstrap UCL177.	Approximate Chi Square Value (.05)	49.55	Nonparametric Statistics	
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Anderson-Darling Test Statistic95% Standard Bootstrap UCL64.Anderson-Darling 5% Critical Value1.91295% Bootstrap-t UCL117.O.75795% Hall's Bootstrap UCL177.	Adjusted Chi Square Value	48.41	95% Jackknife UCL	66.55
Anderson-Darling Test Statistic1.91295% Bootstrap-t UCL117Anderson-Darling 5% Critical Value0.75795% Hall's Bootstrap UCL177			95% Standard Bootstrap UCL	64.7
Anderson-Darling 5% Critical Value0.75795% Hall's Bootstrap UCL177.	Anderson-Darling Test Statistic	1.912	95% Bootstrap-t UCL	117.6
	Anderson-Darling 5% Critical Value	0.757	95% Hall's Bootstrap UCL	177.1
Kolmogorov-Smirnov Test Statistic0.24595% Percentile Bootstrap UCL66.2	Kolmogorov-Smirnov Test Statistic	0.245	95% Percentile Bootstrap UCL	66.25
Kolmogorov-Smirnov 5% Critical Value0.18895% BCA Bootstrap UCL74.7	Kolmogorov-Smirnov 5% Critical Value	0.188	95% BCA Bootstrap UCL	74.71
Data not Gamma Distributed at 5% Significance Level 95% Chebyshev(Mean, Sd) UCL 96.3	Data not Gamma Distributed at 5% Significance Level		95% Chebyshev(Mean, Sd) UCL	96.37
97.5% Chebyshev(Mean, Sd) UCL 117			97.5% Chebyshev(Mean, Sd) UCL	117.7
Assuming Gamma Distribution 99% Chebyshev(Mean, Sd) UCL 159				150.0
95% Approximate Gamma UCL 64.12	Assuming Gamma Distribution		99% Chebyshev(Mean, Sd) UCL	159.0
95% Adjusted Gamma UCL 65.64	Assuming Gamma Distribution 95% Approximate Gamma UCL	64.12	99% Chebyshev(Mean, Sd) UCL	159.0

Use 95% Chebyshev (Mean, Sd) UCL 96.37

Note: Suggestions regarding the selection of a 95% UCL are provided to help the user to select the most appropriate 95% UCL. These recommendations are based upon the results of the simulation studies summarized in Singh, Singh, and Iaci (2002) and Singh and Singh (2003). For additional insight, the user may want to consult a statistician.

	Concer	traciones en	mg/kg			
As	Cd	Cu	Hg	Pb	Sb	Zn
20.4	0.569	18.3	1.38	27.3	1.2	39.8
129	2.41	128	35.1	115	1.34	55.9
126	2.4	124	37	118	1.38	23.2
378	4.11	401	77.9	349	7.08	12.5
37.4	0.803	25.7	6.6	50.3	0.556	47.1
600	10.5	639	409	1680	8.32	27.8
21.9	0.72	26	2.74	29.8	0.567	17.7
635	4.61	156	96.7	462	2.91	198.2
38.2	0.718	51.4	1.4	23.3	1.29	38.1
18.4	0.604	43	0.02	10.8	0.931	22.5
90.6	1.75	77.2	19.4	128	2.35	215
25.3	0.454	42.5	0.02	6.81	1.01	19.6
47.7	0.69	28.1	2.43	36.5	1.19	48.8
16.5	0.466	28.3	0.02	7.42	1.34	14.5
15	0.625	42.2	2.86	6.46	1.55	22.7
33.7	1.01	62.8	3.47	7.75	2.49	26.6
79.7	0.74	35.5	8.3	41.4	1.34	44.5
13.2	0.675	35.7	0.02	6.18	1.49	27.7

20.1	0.749	24.6	0.02	10.1	1.51	32.3
15.8	0.919	42.6	0.02	8.76	1.6	36.1
23.1	1.13	57.9	0.02	7.53	3.67	43.1
10.8	0.67	21.9	3.19	13.1	0.958	22.6