FREEPORT-McMoRan
COPPER & GOLD
Sierrita Operations
Environment, Land & Water Department
6200 West Duval Mine Road
PO Box 527
Green Valley, Arizona 85622-0527

August 1, 2013

<u>Via Certified Mail # 7011 1150 0000 0283 9208</u>
<u>Return Receipt Requested</u>

Ms. Danielle Taber
Project Manager
Voluntary Remediation Program
Arizona Department of Environmental Quality
1110 W. Washington St.
Phoenix, AZ 85007

Re: **Response to Comments and Revised Report for Final Voluntary**
        Remediation Soil and Sediment Characterization Report
        <u>**Freeport Sierrita Mine Green Valley, Arizona; Site Code: 100073-03**</u>

Dear Ms. Taber:

This letter provides Freeport-McMoRan Sierrita Inc. (Sierrita) responses to comments presented in Arizona Department Environmental Quality's (ADEQ) January 8, 2013 letter addressing Sierrita's Final Voluntary Remediation Soil and Sediment Characterization Report dated December 2012.

For ease of reference, ADEQ's comments have been restated in italics followed by Sierrita's response.

1.   **ADEQ Comment:** *In accordance with Arizona Revised Statute (A.R.S.) § 49-181, the VRP can issue a No Further Action (NFA) determination or a Conditional NFA determination. A Conditional NFA is issued when remediation levels have been achieved through the use of an institutional control, i.e. Declaration of Environmental Use Restriction (DEUR). DEURs are utilized when property owners elect to leave soil concentrations in place that exceed the respective residential standard. Therefore, ADEQ recommends that the soil data defined in the report be compared to the residential Soil Remediation Levels (RSRLs). It is important to identify all contaminant(s) of concern and their respective area(s), in the early stage of the remedial cleanup process, so a remedial plan can be developed that adequately addresses the environmental issues. This will help alleviate potential misunderstandings that could inhibit the project from moving forward in a timely and efficient manner.*

        Furthermore, Section 4.5 (Conclusions and Recommendations) identifies arsenic as the only contaminant of potential concern, because the concentration levels exceed the respective NRSRL. However, the data presented in the report suggests that soil concentrations for antimony, lead, copper, arsenic, molybdenum, and uranium exceed their respective RSRLs in a number of the subareas on the site. For example, the "Former Laydown Yard Area" has soil concentration levels that exceed the RSRL for copper [3100 milligrams per kilogram (mg/kg)] in 10 of the 17 samples and in 11 of the 17 samples for molybdenum (390 mg/kg). Areas where soil concentrations exceed an applicable RSRL will require further evaluation, which may include the use of a DEUR to obtain closure. If necessary, Table 4-1 will need to be revised to reflect changes to the recommendations column that may occur as a result of the residential standard comparison.

Sierrita's Response to Comment 1: FMI understands and acknowledges that a Conditional NFA may be issued by ADEQ and a DEUR may be required to obtain closure for the sites that are assessed and remediated to NRSRLs. In accordance with Arizona Administrative Code (A.A.C.) R18-7-208, a DEUR is required when a property owner elects to leave contamination on a property that exceeds the applicable residential standard for the property either through the use of the predetermined remediation standards (i.e., r-SRLs) or thru the use of site-specific remediation standards. Site-specific remediation standards will be developed based on a Baseline Human Health Risk Assessment (BHHRA) for soil at the three subareas at the site. Comparison, analysis and discussion of applicability of residential standards will be completed in the BHHRA.

2.   **ADEQ Comment:** *Please provide additional information or references for the rational in determining that the trivalent chromium SRLs should be utilized as the screening level for the site. In addition, if it is intended that both trivalent and hexavalent chromium will be included as contaminants of concern in the NFA, then adequate sampling data will need to be collected in all of the respective areas for the contaminant in order for ADEQ to issue an NFA determination.*

Sierrita's Response to Comment 2:   The soil and sediment characterization report (SSCR) does address the screening for hexavalent chromium and provides rationale for using the SRL for trivalent chromium. In Section 2.5 of the SSCR it states that *"...selected soil samples that exceeded the residential (r)-SRL for hexavalent chromium of 30 mg/kg were also analyzed for hexavalent chromium..."* In subsequent sections to SSCR the total chromium results were screened against the RSRL for hexavalent chromium. In majority of the samples where the total chromium concentration exceeded the RSRL for hexavalent chromium, these samples were analyzed for hexavalent chromium. The corresponding analytical results indicated that hexavalent chromium was not reported above detect limits in any of the samples analyzed. In addition, the SSCR provides justification and rationale for samples with total chromium concentrations that exceeded RSRL for hexavalent chromium but were not analyzed for hexavalent chromium, as well as rationale for use of the SRL for trivalent chromium. As an example, in the Sixth paragraph in Section 2.7.4.2, it states *"Four samples contained chromium at concentrations ranging from 35 to 470 mg/kg exceeding the r-SRL screen for hexavalent chromium (30 mg/kg). These four samples were collected during the 2004 HGC investigation in which the chromium concentrations were significantly less than the r-SRL and nr-SRL for total chromium established at that time of 2,100 and 4,500 mg/kg, respectively. Therefore, none of these samples were analyzed for hexavalent chromium. However, when examining other subareas where hexavalent chromium analysis was performed on selected soil samples with total chromium ranging from 33 to 193 mg/kg (See Sections 2.13.4.2 and 2.14.4.2); hexavalent chromium was not detected in these samples above reporting limits. Therefore, considering that hexavalent chromium has not been used at the Sierrita site and is not likely to be stable in the geochemical environment of the surface and shallow subsurface soils, it is assumed that trivalent chromium is the most likely form of chromium present at the site. Given these considerations, the soil chromium results were compared to the trivalent chromium nr-SRL (1,000,000 mg/kg) in this report."* Similar statements are also made in Sections 2.11.4.2, 2.12.4.2, 2.13.4.2, and 2.14.4.2 of the SSCR.

3.   **ADEQ Comment:** *ADEQ agrees that the data provided in the report identifies the potential contaminants of concerns; however, ADEQ is not convinced that all areas of the site have been adequately characterized. ADEQ will defer to a Sierrita selected risk assessor to review the applicable data and evaluate whether the quantity and quality of the data is adequate to conduct the proposed Human Health Risk Assessment (HHRA). However, it should be noted that the HHRA may not necessarily take into account all PCOC in all specific sub-areas. Therefore there may be areas that will require additional sampling in order to evaluate whether all sub-areas have been adequately characterized. Upon submittal to ADEQ, the HHRA will be reviewed by a third-party risk assessment expert and ADEQ will have final approval authority.*

Sierrita's Response to Comment 3: Comment acknowledged. All data to be used in the BHHRA will be evaluated for usability and adequacy for risk assessment purposes. The steps proposed to complete that assessment are described in the *Voluntary Remediation Program Baseline Human Health Risk Assessment Work Plan* (ARCADIS, 2013). If the analysis identifies the need for additional data, a work plan to collect the data will be developed for ADEQ review and approval at that time. Please note that the SSCR report describes only the soil metal results; other PCOC soil and solid material data will be forthcoming in the VRP groundwater report, currently being drafted.

4. **ADEQ Comment:** *It is unclear as to why Synthetic Precipitation Leaching Procedure (SPLP) samples were not collected for antimony as this was a contaminant, along with lead, that was identified in Section 4.3 as being above the minimum Groundwater Protection Level (GPL). SPLP samples were collected· and analyzed for lead and an alternative GPL was calculated accordingly. In order to be consistent with the process that was conducted for lead it is recommended that SPLP samples be collected in order to calculate an alternative GPL for antimony.*

    Sierrita's Response to Comment 4: For lead, the calculated 95% UCL exceeded the GPL at one site (See Section 4.3 of the SSCR); therefore, conducting SPLP testing for lead and calculating an alternative GPL was appropriate. For antimony, the calculated 95% UCL was below the GPL therefore SPLP testing was not performed. As with direct exposure to soil, the 95% UCL represents a broader range of the concentrations that would likely leach to groundwater because leaching occurs over a generalized area, not at a single location within a site. For antimony, note that the only samples that exceeded the GPL were 3 samples collected during the 2004 investigation.

5. **ADEQ Comment:** *In addition, please provide and include a table that illustrates how the alternative GPLs were calculated. This should include the "total metal" concentration, SPLP, R-value, etc. This information would be helpful for ADEQ to understand how these alternative GPL were derived.*

    Sierrita's Response to Comment 5: The alternate GPL calculation table for lead is attached to this response (see Attachment 1). In addition, per ADEQ's request in Comment 7, an electronic version of the calculation table will be provided by email.

6. **ADEQ Comment:** *Please include the respective Pro UCL worksheet and the calculation sheet illustrating the generated statistical data. This information would be helpful for ADEQ to understand how the data was categorized and evaluated.*

    Sierrita's Response to Comment 6: The Pro UCL worksheets and calculation sheets are attached to this response (see Attachment 2). In addition, per ADEQ's request in Comment 7, an electronic version of the Pro UCL calculations will be provided by email.

7. **ADEQ Comment:** *Please include an electronic copy of all reports that are submitted.*

    Sierrita's Response to Comment 7: Electronic copies will be submitted to ADEQ for all appropriate responses.

Report Cited:

ARCADIS. 2013. Voluntary Remediation Program Baseline Human Health Risk Assessment Work Plan. Freeport Sierrita Mine, Green Valley, Arizona; Site Code: 100073-03. February 1.

If you have any questions, please contact me at (520) 393.2252

Sincerely,

Kanyembo Katapa
Environmental Engineer

KK:ms
20130801_002

cc John Patricki, ADEQ
    John Broderick, Sierrita
    Lana Fretz, Sierrita
    Ned Hall, Freeport-McMoRan Copper & Gold
    Stuart Brown, Freeport-McMoRan Copper & Gold

Attachment 1

Sample ID	Total Lead (mg/kg)	SPLP Lead (mg/L)	Ratio R	Alternative GPLs (mg/kg)
CS-JS-02-10-11	376	0.2	1880	27,532.60
C-JS-05-00-01	477	0.0005	954000	13,971,330.00
C-JS-05-01-03	3740	0.001	3740000	54,772,300.00
RA-JS-02-01-03	349	0.2	1745	25,555.53
EM-JS-02-01-03	576	0.2	2880	42,177.60
EM-JS-08-05-07	999	0.0005	1998000	29,260,710.00
EM-JS-08-10-12	303	0.0005	606000	8,874,870.00

Inorganic GPL Equation $\qquad$ $X = (292.9)RC_w$ $\qquad$ $C_w = 0.05$

Most Conservative Alternative GPL $\qquad$ **25,556 mg/kg**

Attachment 2

	A	B	C	D	E	F	G	H	I	J	K	L
1				General UCL Statistics for Full Data Sets								
2		User Selected Options										
3			From File	P:\WRES\Freeport_McMoRan\24096838_Sierrita\Soil VRP Review\ProUCL\ProUCL worksheet.wst								
4		Full Precision		OFF								
5		Confidence Coefficient		95%								
6		Number of Bootstrap Operations		2000								
7												
8												
9	CP-Antimony											
10												
11						General Statistics						
12				Number of Valid Observations		79			Number of Distinct Observations			25
13				Number of Missing Values		55						
14												
15				Raw Statistics					Log-transformed Statistics			
16				Minimum		0.2			Minimum of Log Data			-1.609
17				Maximum		66			Maximum of Log Data			4.19
18				Mean		2.844			Mean of log Data			-0.0223
19				Median		1			SD of log Data			1.086
20				SD		9.375						
21				Coefficient of Variation		3.296						
22				Skewness		5.925						
23												
24						Relevant UCL Statistics						
25			Normal Distribution Test						Lognormal Distribution Test			
26				Lilliefors Test Statistic		0.409			Lilliefors Test Statistic			0.277
27				Lilliefors Critical Value		0.0997			Lilliefors Critical Value			0.0997
28		Data not Normal at 5% Significance Level						Data not Lognormal at 5% Significance Level				
29												
30			Assuming Normal Distribution						Assuming Lognormal Distribution			
31				95% Student's-t UCL		4.6			95% H-UCL			2.347
32		95% UCLs (Adjusted for Skewness)							95% Chebyshev (MVUE) UCL			2.88
33				95% Adjusted-CLT UCL		5.331			97.5% Chebyshev (MVUE) UCL			3.371
34				95% Modified-t UCL		4.717			99% Chebyshev (MVUE) UCL			4.336
35												
36			Gamma Distribution Test						Data Distribution			
37				k star (bias corrected)		0.568		Data do not follow a Discernable Distribution (0.05)				
38				Theta Star		5.009						
39				nu star		89.71						
40			Approximate Chi Square Value (.05)			68.87			Nonparametric Statistics			
41			Adjusted Level of Significance			0.047			95% CLT UCL			4.579
42			Adjusted Chi Square Value			68.53			95% Jackknife UCL			4.6
43									95% Standard Bootstrap UCL			4.577
44			Anderson-Darling Test Statistic			11.66			95% Bootstrap-t UCL			11.23
45			Anderson-Darling 5% Critical Value			0.81			95% Hall's Bootstrap UCL			11.96
46			Kolmogorov-Smirnov Test Statistic			0.371			95% Percentile Bootstrap UCL			4.686
47			Kolmogorov-Smirnov 5% Critical Value			0.106			95% BCA Bootstrap UCL			5.571
48		Data not Gamma Distributed at 5% Significance Level							95% Chebyshev(Mean, Sd) UCL			7.442
49									97.5% Chebyshev(Mean, Sd) UCL			9.431
50			Assuming Gamma Distribution						99% Chebyshev(Mean, Sd) UCL			13.34

	A	B	C	D	E	F	G	H	I	J	K	L
51				95% Approximate Gamma UCL		3.705						
52				95% Adjusted Gamma UCL		3.723						
53												
54				Potential UCL to Use					Use 97.5% Chebyshev (Mean, Sd) UCL			9.431
55												
56												
57	CP-As											
58												
59						General Statistics						
60				Number of Valid Observations		95			Number of Distinct Observations			71
61				Number of Missing Values		39						
62												
63				Raw Statistics					Log-transformed Statistics			
64				Minimum		0.7			Minimum of Log Data			-0.357
65				Maximum		166			Maximum of Log Data			5.112
66				Mean		10.27			Mean of log Data			1.538
67				Median		4			SD of log Data			1.127
68				SD		21.15						
69				Coefficient of Variation		2.06						
70				Skewness		5.425						
71												
72						Relevant UCL Statistics						
73			Normal Distribution Test						Lognormal Distribution Test			
74				Lilliefors Test Statistic		0.326			Lilliefors Test Statistic			0.117
75				Lilliefors Critical Value		0.0909			Lilliefors Critical Value			0.0909
76			Data not Normal at 5% Significance Level						Data not Lognormal at 5% Significance Level			
77												
78			Assuming Normal Distribution						Assuming Lognormal Distribution			
79				95% Student's-t UCL		13.87			95% H-UCL			11.54
80			95% UCLs (Adjusted for Skewness)						95% Chebyshev (MVUE) UCL			14.15
81				95% Adjusted-CLT UCL		15.13			97.5% Chebyshev (MVUE) UCL			16.51
82				95% Modified-t UCL		14.07			99% Chebyshev (MVUE) UCL			21.14
83												
84			Gamma Distribution Test						Data Distribution			
85				k star (bias corrected)		0.74			Data do not follow a Discernable Distribution (0.05)			
86				Theta Star		13.88						
87				nu star		140.5						
88			Approximate Chi Square Value (.05)			114.1			Nonparametric Statistics			
89				Adjusted Level of Significance		0.0475			95% CLT UCL			13.84
90				Adjusted Chi Square Value		113.8			95% Jackknife UCL			13.87
91									95% Standard Bootstrap UCL			13.87
92			Anderson-Darling Test Statistic			4.937			95% Bootstrap-t UCL			17.34
93			Anderson-Darling 5% Critical Value			0.794			95% Hall's Bootstrap UCL			31.09
94			Kolmogorov-Smirnov Test Statistic			0.214			95% Percentile Bootstrap UCL			14.09
95			Kolmogorov-Smirnov 5% Critical Value			0.0954			95% BCA Bootstrap UCL			15.84
96			Data not Gamma Distributed at 5% Significance Level						95% Chebyshev(Mean, Sd) UCL			19.73
97									97.5% Chebyshev(Mean, Sd) UCL			23.82
98			Assuming Gamma Distribution						99% Chebyshev(Mean, Sd) UCL			31.86
99				95% Approximate Gamma UCL		12.64						
100				95% Adjusted Gamma UCL		12.68						

	A	B	C	D	E	F	G	H	I	J	K	L
101												
102		Potential UCL to Use							Use 97.5% Chebyshev (Mean, Sd) UCL			23.82
103												
104												
105	CP-Cu											
106												
107					General Statistics							
108			Number of Valid Observations			95			Number of Distinct Observations			92
109			Number of Missing Values			39						
110												
111			Raw Statistics						Log-transformed Statistics			
112				Minimum		142			Minimum of Log Data			4.956
113				Maximum		109000			Maximum of Log Data			11.6
114				Mean		5548			Mean of log Data			7.265
115				Median		1100			SD of log Data			1.388
116				SD		15148						
117			Coefficient of Variation			2.73						
118				Skewness		4.731						
119												
120					Relevant UCL Statistics							
121			Normal Distribution Test						Lognormal Distribution Test			
122			Lilliefors Test Statistic			0.392			Lilliefors Test Statistic			0.131
123			Lilliefors Critical Value			0.0909			Lilliefors Critical Value			0.0909
124		Data not Normal at 5% Significance Level						Data not Lognormal at 5% Significance Level				
125												
126			Assuming Normal Distribution						Assuming Lognormal Distribution			
127			95% Student's-t UCL			8130			95% H-UCL			5437
128		95% UCLs (Adjusted for Skewness)						95% Chebyshev (MVUE) UCL				6730
129			95% Adjusted-CLT UCL			8910			97.5% Chebyshev (MVUE) UCL			8053
130			95% Modified-t UCL			8256			99% Chebyshev (MVUE) UCL			10651
131												
132			Gamma Distribution Test						Data Distribution			
133			k star (bias corrected)			0.465		Data do not follow a Discernable Distribution (0.05)					
134				Theta Star		11942						
135				nu star		88.28						
136		Approximate Chi Square Value (.05)				67.61			Nonparametric Statistics			
137		Adjusted Level of Significance				0.0475			95% CLT UCL			8104
138		Adjusted Chi Square Value				67.34			95% Jackknife UCL			8130
139									95% Standard Bootstrap UCL			8089
140		Anderson-Darling Test Statistic				9.996			95% Bootstrap-t UCL			9862
141		Anderson-Darling 5% Critical Value				0.825			95% Hall's Bootstrap UCL			9424
142		Kolmogorov-Smirnov Test Statistic				0.285			95% Percentile Bootstrap UCL			8352
143		Kolmogorov-Smirnov 5% Critical Value				0.0975			95% BCA Bootstrap UCL			9098
144		Data not Gamma Distributed at 5% Significance Level						95% Chebyshev(Mean, Sd) UCL				12322
145									97.5% Chebyshev(Mean, Sd) UCL			15254
146			Assuming Gamma Distribution						99% Chebyshev(Mean, Sd) UCL			21011
147			95% Approximate Gamma UCL			7243						
148			95% Adjusted Gamma UCL			7273						
149												
150			Potential UCL to Use						Use 97.5% Chebyshev (Mean, Sd) UCL			15254

CP-Pb

General Statistics

Number of Valid Observations	95	Number of Distinct Observations	91
Number of Missing Values	39		

Raw Statistics		Log-transformed Statistics	
Minimum	1.2	Minimum of Log Data	0.182
Maximum	1820	Maximum of Log Data	7.507
Mean	68.23	Mean of log Data	2.686
Median	10.1	SD of log Data	1.469
SD	224.1		
Coefficient of Variation	3.285		
Skewness	6.106		

Relevant UCL Statistics

Normal Distribution Test		Lognormal Distribution Test	
Lilliefors Test Statistic	0.393	Lilliefors Test Statistic	0.126
Lilliefors Critical Value	0.0909	Lilliefors Critical Value	0.0909
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	106.4	95% H-UCL	64.89
95% UCLs (Adjusted for Skewness)		95% Chebyshev (MVUE) UCL	80.17
95% Adjusted-CLT UCL	121.5	97.5% Chebyshev (MVUE) UCL	96.61
95% Modified-t UCL	108.8	99% Chebyshev (MVUE) UCL	128.9

Gamma Distribution Test		Data Distribution	
k star (bias corrected)	0.418	Data do not follow a Discernable Distribution (0.05)	
Theta Star	163.3		
nu star	79.37		
Approximate Chi Square Value (.05)	59.85	Nonparametric Statistics	
Adjusted Level of Significance	0.0475	95% CLT UCL	106.1
Adjusted Chi Square Value	59.59	95% Jackknife UCL	106.4
		95% Standard Bootstrap UCL	105.6
Anderson-Darling Test Statistic	9.476	95% Bootstrap-t UCL	160.2
Anderson-Darling 5% Critical Value	0.837	95% Hall's Bootstrap UCL	236.4
Kolmogorov-Smirnov Test Statistic	0.232	95% Percentile Bootstrap UCL	110.7
Kolmogorov-Smirnov 5% Critical Value	0.0981	95% BCA Bootstrap UCL	126.4
Data not Gamma Distributed at 5% Significance Level		95% Chebyshev(Mean, Sd) UCL	168.5
		97.5% Chebyshev(Mean, Sd) UCL	211.9
Assuming Gamma Distribution		99% Chebyshev(Mean, Sd) UCL	297.1
95% Approximate Gamma UCL	90.5		
95% Adjusted Gamma UCL	90.89		

Potential UCL to Use		Use 97.5% Chebyshev (Mean, Sd) UCL	211.9

CP-Sb

General Statistics

Number of Valid Observations	79	Number of Distinct Observations	22
Number of Missing Values	55		

Raw Statistics		Log-transformed Statistics	
Minimum	0.3	Minimum of Log Data	-1.204
Maximum	66	Maximum of Log Data	4.19
Mean	2.996	Mean of log Data	0.245
Median	1	SD of log Data	0.876
SD	9.337		
Coefficient of Variation	3.116		
Skewness	5.949		

Relevant UCL Statistics

Normal Distribution Test		Lognormal Distribution Test	
Lilliefors Test Statistic	0.416	Lilliefors Test Statistic	0.395
Lilliefors Critical Value	0.0997	Lilliefors Critical Value	0.0997
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	4.745	95% H-UCL	2.313
95% UCLs (Adjusted for Skewness)		95% Chebyshev (MVUE) UCL	2.784
95% Adjusted-CLT UCL	5.476	97.5% Chebyshev (MVUE) UCL	3.183
95% Modified-t UCL	4.862	99% Chebyshev (MVUE) UCL	3.967

Gamma Distribution Test		Data Distribution	
k star (bias corrected)	0.69	Data do not follow a Discernable Distribution (0.05)	
Theta Star	4.345		
nu star	108.9		
Approximate Chi Square Value (.05)	85.86	Nonparametric Statistics	
Adjusted Level of Significance	0.047		
Adjusted Chi Square Value	85.48	95% CLT UCL	4.724
		95% Jackknife UCL	4.745
		95% Standard Bootstrap UCL	4.703
Anderson-Darling Test Statistic	18.3	95% Bootstrap-t UCL	11.37
Anderson-Darling 5% Critical Value	0.797	95% Hall's Bootstrap UCL	12.1
Kolmogorov-Smirnov Test Statistic	0.425	95% Percentile Bootstrap UCL	4.911
Kolmogorov-Smirnov 5% Critical Value	0.105	95% BCA Bootstrap UCL	5.794
Data not Gamma Distributed at 5% Significance Level		95% Chebyshev(Mean, Sd) UCL	7.575
		97.5% Chebyshev(Mean, Sd) UCL	9.557
Assuming Gamma Distribution		99% Chebyshev(Mean, Sd) UCL	13.45
95% Approximate Gamma UCL	3.802		
95% Adjusted Gamma UCL	3.819		
Potential UCL to Use		Use 95% Chebyshev (Mean, Sd) UCL	7.575

FEM-Sb

General Statistics

Number of Valid Observations	41	Number of Distinct Observations	13
Number of Missing Values	3		

Raw Statistics		Log-transformed Statistics	
Minimum	0.2	Minimum of Log Data	-1.609
Maximum	69	Maximum of Log Data	4.234
Mean	2.605	Mean of log Data	-0.275
Median	0.7	SD of log Data	1.06
SD	10.67		
Coefficient of Variation	4.096		
Skewness	6.327		

Relevant UCL Statistics

Normal Distribution Test		Lognormal Distribution Test	
Shapiro Wilk Test Statistic	0.211	Shapiro Wilk Test Statistic	0.833
Shapiro Wilk Critical Value	0.941	Shapiro Wilk Critical Value	0.941
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	5.411	95% H-UCL	1.999
95% UCLs (Adjusted for Skewness)		95% Chebyshev (MVUE) UCL	2.42
95% Adjusted-CLT UCL	7.105	97.5% Chebyshev (MVUE) UCL	2.903
95% Modified-t UCL	5.685	99% Chebyshev (MVUE) UCL	3.851

Gamma Distribution Test		Data Distribution	
k star (bias corrected)	0.492	Data do not follow a Discernable Distribution (0.05)	
Theta Star	5.295		
nu star	40.34		
Approximate Chi Square Value (.05)	26.79	Nonparametric Statistics	
Adjusted Level of Significance	0.0441	95% CLT UCL	5.346
Adjusted Chi Square Value	26.38	95% Jackknife UCL	5.411
		95% Standard Bootstrap UCL	5.431
Anderson-Darling Test Statistic	6.587	95% Bootstrap-t UCL	30.59
Anderson-Darling 5% Critical Value	0.812	95% Hall's Bootstrap UCL	17.93
Kolmogorov-Smirnov Test Statistic	0.395	95% Percentile Bootstrap UCL	5.89
Kolmogorov-Smirnov 5% Critical Value	0.146	95% BCA Bootstrap UCL	7.763
Data not Gamma Distributed at 5% Significance Level		95% Chebyshev(Mean, Sd) UCL	9.868
		97.5% Chebyshev(Mean, Sd) UCL	13.01
Assuming Gamma Distribution		99% Chebyshev(Mean, Sd) UCL	19.18
95% Approximate Gamma UCL	3.923		
95% Adjusted Gamma UCL	3.983		

Potential UCL to Use		Use 99% Chebyshev (Mean, Sd) UCL	19.18

FEM-Sb

General Statistics

Number of Valid Observations	41	Number of Distinct Observations	13

	A	B	C	D	E	F	G	H	I	J	K	L
301					Number of Missing Values	3						
302												
303				Raw Statistics					Log-transformed Statistics			
304					Minimum	0.2				Minimum of Log Data		-1.609
305					Maximum	69				Maximum of Log Data		4.234
306					Mean	2.798				Mean of log Data		0.044
307					Median	1				SD of log Data		0.906
308					SD	10.63						
309				Coefficient of Variation		3.801						
310					Skewness	6.339						
311												
312					Relevant UCL Statistics							
313			Normal Distribution Test						Lognormal Distribution Test			
314			Shapiro Wilk Test Statistic			0.204				Shapiro Wilk Test Statistic		0.704
315			Shapiro Wilk Critical Value			0.941				Shapiro Wilk Critical Value		0.941
316		Data not Normal at 5% Significance Level							Data not Lognormal at 5% Significance Level			
317												
318			Assuming Normal Distribution						Assuming Lognormal Distribution			
319				95% Student's-t UCL		5.594					95% H-UCL	2.176
320		95% UCLs (Adjusted for Skewness)							95% Chebyshev (MVUE) UCL			2.649
321			95% Adjusted-CLT UCL			7.285			97.5% Chebyshev (MVUE) UCL			3.122
322			95% Modified-t UCL			5.868			99% Chebyshev (MVUE) UCL			4.053
323												
324			Gamma Distribution Test						Data Distribution			
325				k star (bias corrected)		0.594		Data do not follow a Discernable Distribution (0.05)				
326				Theta Star		4.706						
327				nu star		48.75						
328		Approximate Chi Square Value (.05)				33.72			Nonparametric Statistics			
329		Adjusted Level of Significance				0.0441				95% CLT UCL		5.529
330		Adjusted Chi Square Value				33.26				95% Jackknife UCL		5.594
331									95% Standard Bootstrap UCL			5.493
332		Anderson-Darling Test Statistic				8.86				95% Bootstrap-t UCL		34.82
333		Anderson-Darling 5% Critical Value				0.801				95% Hall's Bootstrap UCL		20.09
334		Kolmogorov-Smirnov Test Statistic				0.451			95% Percentile Bootstrap UCL			6.056
335		Kolmogorov-Smirnov 5% Critical Value				0.145				95% BCA Bootstrap UCL		9.261
336		Data not Gamma Distributed at 5% Significance Level							95% Chebyshev(Mean, Sd) UCL			10.04
337									97.5% Chebyshev(Mean, Sd) UCL			13.17
338			Assuming Gamma Distribution						99% Chebyshev(Mean, Sd) UCL			19.32
339			95% Approximate Gamma UCL			4.044						
340			95% Adjusted Gamma UCL			4.1						
341												
342			Potential UCL to Use						Use 95% Chebyshev (Mean, Sd) UCL			10.04
343												
344												
345	FEM-As											
346												
347					General Statistics							
348			Number of Valid Observations			43			Number of Distinct Observations			39
349			Number of Missing Values			1						
350												

	A	B	C	D	E	F	G	H	I	J	K	L
351				Raw Statistics					Log-transformed Statistics			
352					Minimum	1.1				Minimum of Log Data		0.0953
353					Maximum	101				Maximum of Log Data		4.615
354					Mean	8.543				Mean of log Data		1.565
355					Median	4.09				SD of log Data		0.893
356					SD	16.26						
357				Coefficient of Variation		1.903						
358					Skewness	4.829						
359												
360							Relevant UCL Statistics					
361			Normal Distribution Test						Lognormal Distribution Test			
362				Shapiro Wilk Test Statistic		0.417				Shapiro Wilk Test Statistic		0.903
363				Shapiro Wilk Critical Value		0.943				Shapiro Wilk Critical Value		0.943
364			Data not Normal at 5% Significance Level						Data not Lognormal at 5% Significance Level			
365												
366			Assuming Normal Distribution						Assuming Lognormal Distribution			
367					95% Student's-t UCL	12.71					95% H-UCL	9.685
368			95% UCLs (Adjusted for Skewness)						95% Chebyshev (MVUE) UCL			11.79
369				95% Adjusted-CLT UCL		14.57			97.5% Chebyshev (MVUE) UCL			13.85
370				95% Modified-t UCL		13.02			99% Chebyshev (MVUE) UCL			17.9
371												
372			Gamma Distribution Test						Data Distribution			
373				k star (bias corrected)		0.941			Data do not follow a Discernable Distribution (0.05)			
374					Theta Star	9.079						
375					nu star	80.92						
376			Approximate Chi Square Value (.05)			61.19			Nonparametric Statistics			
377			Adjusted Level of Significance			0.0444				95% CLT UCL		12.62
378				Adjusted Chi Square Value		60.6				95% Jackknife UCL		12.71
379										95% Standard Bootstrap UCL		12.67
380			Anderson-Darling Test Statistic			3.711				95% Bootstrap-t UCL		18.7
381			Anderson-Darling 5% Critical Value			0.778				95% Hall's Bootstrap UCL		25.4
382			Kolmogorov-Smirnov Test Statistic			0.258				95% Percentile Bootstrap UCL		12.82
383			Kolmogorov-Smirnov 5% Critical Value			0.139				95% BCA Bootstrap UCL		15.58
384			Data not Gamma Distributed at 5% Significance Level						95% Chebyshev(Mean, Sd) UCL			19.35
385									97.5% Chebyshev(Mean, Sd) UCL			24.03
386			Assuming Gamma Distribution						99% Chebyshev(Mean, Sd) UCL			33.21
387				95% Approximate Gamma UCL		11.3						
388				95% Adjusted Gamma UCL		11.41						
389												
390			Potential UCL to Use						Use 95% Chebyshev (Mean, Sd) UCL			19.35
391												
392												
393	OD-As											
394												
395							General Statistics					
396			Number of Valid Observations			20			Number of Distinct Observations			20
397			Number of Missing Values			1						
398												
399				Raw Statistics					Log-transformed Statistics			
400					Minimum	0.8				Minimum of Log Data		-0.223

	A	B	C	D	E	F	G	H	I	J	K	L
401					Maximum	10.6				Maximum of Log Data		2.361
402					Mean	3.36				Mean of log Data		1.006
403					Median	2.85				SD of log Data		0.664
404					SD	2.345						
405					Coefficient of Variation	0.698						
406					Skewness	1.724						
407												
408					Relevant UCL Statistics							
409			Normal Distribution Test						Lognormal Distribution Test			
410					Shapiro Wilk Test Statistic	0.847				Shapiro Wilk Test Statistic		0.985
411					Shapiro Wilk Critical Value	0.905				Shapiro Wilk Critical Value		0.905
412		Data not Normal at 5% Significance Level						Data appear Lognormal at 5% Significance Level				
413												
414			Assuming Normal Distribution						Assuming Lognormal Distribution			
415					95% Student's-t UCL	4.267				95% H-UCL		4.74
416		95% UCLs (Adjusted for Skewness)							95% Chebyshev (MVUE) UCL			5.674
417					95% Adjusted-CLT UCL	4.438				97.5% Chebyshev (MVUE) UCL		6.673
418					95% Modified-t UCL	4.3				99% Chebyshev (MVUE) UCL		8.636
419												
420			Gamma Distribution Test						Data Distribution			
421					k star (bias corrected)	2.23		Data appear Gamma Distributed at 5% Significance Level				
422					Theta Star	1.507						
423					nu star	89.21						
424				Approximate Chi Square Value (.05)		68.44			Nonparametric Statistics			
425					Adjusted Level of Significance	0.038				95% CLT UCL		4.222
426					Adjusted Chi Square Value	67				95% Jackknife UCL		4.267
427										95% Standard Bootstrap UCL		4.2
428					Anderson-Darling Test Statistic	0.226				95% Bootstrap-t UCL		4.618
429					Anderson-Darling 5% Critical Value	0.75				95% Hall's Bootstrap UCL		5.006
430					Kolmogorov-Smirnov Test Statistic	0.125				95% Percentile Bootstrap UCL		4.26
431					Kolmogorov-Smirnov 5% Critical Value	0.195				95% BCA Bootstrap UCL		4.46
432		Data appear Gamma Distributed at 5% Significance Level							95% Chebyshev(Mean, Sd) UCL			5.645
433										97.5% Chebyshev(Mean, Sd) UCL		6.634
434			Assuming Gamma Distribution						99% Chebyshev(Mean, Sd) UCL			8.577
435					95% Approximate Gamma UCL	4.38						
436					95% Adjusted Gamma UCL	4.474						
437												
438		Potential UCL to Use							Use 95% Approximate Gamma UCL			4.38
439												
440												
441	CPS-As											
442												
443					General Statistics							
444				Number of Valid Observations		41				Number of Distinct Observations		33
445					Number of Missing Values	3						
446												
447			Raw Statistics						Log-transformed Statistics			
448					Minimum	1.2				Minimum of Log Data		0.182
449					Maximum	23				Maximum of Log Data		3.135
450					Mean	5.02				Mean of log Data		1.365

	A	B	C	D	E	F	G	H	I	J	K	L
451					Median	3.6					SD of log Data	0.679
452					SD	4.308						
453				Coefficient of Variation		0.858						
454					Skewness	2.466						
455												
456						Relevant UCL Statistics						
457			Normal Distribution Test							Lognormal Distribution Test		
458			Shapiro Wilk Test Statistic			0.733				Shapiro Wilk Test Statistic		0.964
459			Shapiro Wilk Critical Value			0.941				Shapiro Wilk Critical Value		0.941
460			Data not Normal at 5% Significance Level						Data appear Lognormal at 5% Significance Level			
461												
462			Assuming Normal Distribution						Assuming Lognormal Distribution			
463				95% Student's-t UCL		6.153				95% H-UCL		6.131
464			95% UCLs (Adjusted for Skewness)						95% Chebyshev (MVUE) UCL			7.348
465				95% Adjusted-CLT UCL		6.404			97.5% Chebyshev (MVUE) UCL			8.409
466				95% Modified-t UCL		6.196			99% Chebyshev (MVUE) UCL			10.49
467												
468			Gamma Distribution Test						Data Distribution			
469			k star (bias corrected)			2.02			Data appear Lognormal at 5% Significance Level			
470				Theta Star		2.486						
471				nu star		165.6						
472			Approximate Chi Square Value (.05)			136.9			Nonparametric Statistics			
473			Adjusted Level of Significance			0.0441				95% CLT UCL		6.127
474			Adjusted Chi Square Value			135.9				95% Jackknife UCL		6.153
475										95% Standard Bootstrap UCL		6.075
476			Anderson-Darling Test Statistic			1.093				95% Bootstrap-t UCL		6.654
477			Anderson-Darling 5% Critical Value			0.759				95% Hall's Bootstrap UCL		6.827
478			Kolmogorov-Smirnov Test Statistic			0.154				95% Percentile Bootstrap UCL		6.236
479			Kolmogorov-Smirnov 5% Critical Value			0.14				95% BCA Bootstrap UCL		6.431
480			Data not Gamma Distributed at 5% Significance Level						95% Chebyshev(Mean, Sd) UCL			7.953
481									97.5% Chebyshev(Mean, Sd) UCL			9.222
482			Assuming Gamma Distribution						99% Chebyshev(Mean, Sd) UCL			11.71
483				95% Approximate Gamma UCL		6.075						
484				95% Adjusted Gamma UCL		6.118						
485												
486			Potential UCL to Use						Use 95% H-UCL			6.131
487												
488												
489	CPS-Pb											
490												
491						General Statistics						
492			Number of Valid Observations			41			Number of Distinct Observations			40
493			Number of Missing Values			3						
494												
495			Raw Statistics						Log-transformed Statistics			
496				Minimum		3.5				Minimum of Log Data		1.253
497				Maximum		3740				Maximum of Log Data		8.227
498				Mean		190				Mean of log Data		4.198
499				Median		56.6				SD of log Data		1.22
500				SD		580						

	A	B	C	D	E	F	G	H	I	J	K	L
501				Coefficient of Variation		3.053						
502				Skewness		6.019						
503												
504					Relevant UCL Statistics							
505			Normal Distribution Test						Lognormal Distribution Test			
506			Shapiro Wilk Test Statistic			0.289				Shapiro Wilk Test Statistic		0.962
507			Shapiro Wilk Critical Value			0.941				Shapiro Wilk Critical Value		0.941
508		Data not Normal at 5% Significance Level						Data appear Lognormal at 5% Significance Level				
509												
510			Assuming Normal Distribution						Assuming Lognormal Distribution			
511			95% Student's-t UCL			342.5				95% H-UCL		231.4
512		95% UCLs (Adjusted for Skewness)							95% Chebyshev (MVUE) UCL			274.4
513			95% Adjusted-CLT UCL			430			97.5% Chebyshev (MVUE) UCL			334.3
514			95% Modified-t UCL			356.7			99% Chebyshev (MVUE) UCL			452.1
515												
516			Gamma Distribution Test						Data Distribution			
517			k star (bias corrected)			0.563		Data appear Lognormal at 5% Significance Level				
518			Theta Star			337.3						
519			nu star			46.2						
520		Approximate Chi Square Value (.05)				31.6			Nonparametric Statistics			
521		Adjusted Level of Significance				0.0441				95% CLT UCL		339
522		Adjusted Chi Square Value				31.16				95% Jackknife UCL		342.5
523									95% Standard Bootstrap UCL			332.5
524		Anderson-Darling Test Statistic				3.381				95% Bootstrap-t UCL		891.8
525		Anderson-Darling 5% Critical Value				0.805				95% Hall's Bootstrap UCL		837.5
526		Kolmogorov-Smirnov Test Statistic				0.249			95% Percentile Bootstrap UCL			361.8
527		Kolmogorov-Smirnov 5% Critical Value				0.145				95% BCA Bootstrap UCL		458.9
528		Data not Gamma Distributed at 5% Significance Level							95% Chebyshev(Mean, Sd) UCL			584.9
529									97.5% Chebyshev(Mean, Sd) UCL			755.7
530			Assuming Gamma Distribution						99% Chebyshev(Mean, Sd) UCL			1091
531			95% Approximate Gamma UCL			277.7						
532			95% Adjusted Gamma UCL			281.7						
533												
534			Potential UCL to Use							Use 95% H-UCL		231.4
535												
536												
537	RP-As-soil-sed											
538												
539					General Statistics							
540		Number of Valid Observations				28			Number of Distinct Observations			28
541		Number of Missing Values				1						
542												
543			Raw Statistics						Log-transformed Statistics			
544			Minimum			1				Minimum of Log Data		0
545			Maximum			89.7				Maximum of Log Data		4.496
546			Mean			25.88				Mean of log Data		2.558
547			Median			19.15				SD of log Data		1.402
548			SD			25.96						
549			Coefficient of Variation			1.003						
550			Skewness			1.156						

Relevant UCL Statistics

Normal Distribution Test		Lognormal Distribution Test	
Shapiro Wilk Test Statistic	0.852	Shapiro Wilk Test Statistic	0.923
Shapiro Wilk Critical Value	0.924	Shapiro Wilk Critical Value	0.924
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	34.24	95% H-UCL	77.25
95% UCLs (Adjusted for Skewness)		95% Chebyshev (MVUE) UCL	78.41
95% Adjusted-CLT UCL	35.1	97.5% Chebyshev (MVUE) UCL	98.34
95% Modified-t UCL	34.42	99% Chebyshev (MVUE) UCL	137.5

Gamma Distribution Test		Data Distribution	
k star (bias corrected)	0.781	**Data appear Gamma Distributed at 5% Significance Level**	
Theta Star	33.16		
nu star	43.71		
Approximate Chi Square Value (.05)	29.55	**Nonparametric Statistics**	
Adjusted Level of Significance	0.0404	95% CLT UCL	33.95
Adjusted Chi Square Value	28.83	95% Jackknife UCL	34.24
		95% Standard Bootstrap UCL	33.78
Anderson-Darling Test Statistic	0.313	95% Bootstrap-t UCL	36.19
Anderson-Darling 5% Critical Value	0.78	95% Hall's Bootstrap UCL	35.07
Kolmogorov-Smirnov Test Statistic	0.0935	95% Percentile Bootstrap UCL	34.05
Kolmogorov-Smirnov 5% Critical Value	0.171	95% BCA Bootstrap UCL	34.88
Data appear Gamma Distributed at 5% Significance Level		95% Chebyshev(Mean, Sd) UCL	47.27
		97.5% Chebyshev(Mean, Sd) UCL	56.52
Assuming Gamma Distribution		99% Chebyshev(Mean, Sd) UCL	74.7
95% Approximate Gamma UCL	38.28		
95% Adjusted Gamma UCL	39.24		
Potential UCL to Use		Use 95% Approximate Gamma UCL	38.28

RP-Cu-soil-sed

General Statistics

Number of Valid Observations	28	Number of Distinct Observations	28
Number of Missing Values	1		

Raw Statistics		Log-transformed Statistics	
Minimum	62	Minimum of Log Data	4.127
Maximum	88000	Maximum of Log Data	11.39
Mean	9517	Mean of log Data	7.884
Median	4195	SD of log Data	1.917
SD	17359		
Coefficient of Variation	1.824		
Skewness	3.748		

Relevant UCL Statistics

	A	B	C	D	E	F	G	H	I	J	K	L
601				Normal Distribution Test					Lognormal Distribution Test			
602				Shapiro Wilk Test Statistic		0.542				Shapiro Wilk Test Statistic		0.936
603				Shapiro Wilk Critical Value		0.924				Shapiro Wilk Critical Value		0.924
604			Data not Normal at 5% Significance Level						Data appear Lognormal at 5% Significance Level			
605												
606				Assuming Normal Distribution					Assuming Lognormal Distribution			
607				95% Student's-t UCL		15105				95% H-UCL		66766
608			95% UCLs (Adjusted for Skewness)						95% Chebyshev (MVUE) UCL			43783
609				95% Adjusted-CLT UCL		17395			97.5% Chebyshev (MVUE) UCL			56577
610				95% Modified-t UCL		15492			99% Chebyshev (MVUE) UCL			81707
611												
612			Gamma Distribution Test						Data Distribution			
613				k star (bias corrected)		0.468			Data appear Gamma Distributed at 5% Significance Level			
614				Theta Star		20321						
615				nu star		26.23						
616			Approximate Chi Square Value (.05)			15.55			Nonparametric Statistics			
617			Adjusted Level of Significance			0.0404				95% CLT UCL		14913
618			Adjusted Chi Square Value			15.04				95% Jackknife UCL		15105
619									95% Standard Bootstrap UCL			14873
620			Anderson-Darling Test Statistic			0.524				95% Bootstrap-t UCL		22637
621			Anderson-Darling 5% Critical Value			0.811			95% Hall's Bootstrap UCL			34530
622			Kolmogorov-Smirnov Test Statistic			0.12			95% Percentile Bootstrap UCL			15166
623			Kolmogorov-Smirnov 5% Critical Value			0.175				95% BCA Bootstrap UCL		18151
624			Data appear Gamma Distributed at 5% Significance Level						95% Chebyshev(Mean, Sd) UCL			23817
625									97.5% Chebyshev(Mean, Sd) UCL			30004
626			Assuming Gamma Distribution						99% Chebyshev(Mean, Sd) UCL			42158
627				95% Approximate Gamma UCL		16047						
628				95% Adjusted Gamma UCL		16589						
629												
630			Potential UCL to Use						Use 95% Adjusted Gamma UCL			16589
631												
632												
633	RP-Pb-soil-sed											
634												
635						General Statistics						
636				Number of Valid Observations		28			Number of Distinct Observations			27
637				Number of Missing Values		1						
638												
639			Raw Statistics						Log-transformed Statistics			
640				Minimum		2.81				Minimum of Log Data		1.033
641				Maximum		349				Maximum of Log Data		5.855
642				Mean		96.03				Mean of log Data		4.03
643				Median		82.75				SD of log Data		1.291
644				SD		86.04						
645				Coefficient of Variation		0.896						
646				Skewness		1.611						
647												
648						Relevant UCL Statistics						
649			Normal Distribution Test						Lognormal Distribution Test			
650				Shapiro Wilk Test Statistic		0.841			Shapiro Wilk Test Statistic			0.878

	A	B	C	D	E	F	G	H	I	J	K	L
651				Shapiro Wilk Critical Value		0.924				Shapiro Wilk Critical Value		0.924
652		Data not Normal at 5% Significance Level						Data not Lognormal at 5% Significance Level				
653												
654		Assuming Normal Distribution						Assuming Lognormal Distribution				
655				95% Student's-t UCL		123.7				95% H-UCL		262
656		95% UCLs (Adjusted for Skewness)						95% Chebyshev (MVUE) UCL				281.5
657				95% Adjusted-CLT UCL		128.1		97.5% Chebyshev (MVUE) UCL				350
658				95% Modified-t UCL		124.6		99% Chebyshev (MVUE) UCL				484.6
659												
660		Gamma Distribution Test						Data Distribution				
661				k star (bias corrected)		0.98		Data appear Gamma Distributed at 5% Significance Level				
662				Theta Star		98						
663				nu star		54.88						
664		Approximate Chi Square Value (.05)				38.85		Nonparametric Statistics				
665		Adjusted Level of Significance				0.0404				95% CLT UCL		122.8
666		Adjusted Chi Square Value				38.02				95% Jackknife UCL		123.7
667										95% Standard Bootstrap UCL		122.4
668		Anderson-Darling Test Statistic				0.542				95% Bootstrap-t UCL		131.7
669		Anderson-Darling 5% Critical Value				0.772				95% Hall's Bootstrap UCL		140.7
670		Kolmogorov-Smirnov Test Statistic				0.153				95% Percentile Bootstrap UCL		122.8
671		Kolmogorov-Smirnov 5% Critical Value				0.17				95% BCA Bootstrap UCL		131.5
672		Data appear Gamma Distributed at 5% Significance Level								95% Chebyshev(Mean, Sd) UCL		166.9
673										97.5% Chebyshev(Mean, Sd) UCL		197.6
674		Assuming Gamma Distribution								99% Chebyshev(Mean, Sd) UCL		257.8
675				95% Approximate Gamma UCL		135.6						
676				95% Adjusted Gamma UCL		138.6						
677												
678		Potential UCL to Use						Use 95% Approximate Gamma UCL				135.6
679												
680												
681	DC-As-soil											
682												
683		General Statistics										
684		Number of Valid Observations				16		Number of Distinct Observations				16
685		Number of Missing Values				2						
686												
687		Raw Statistics						Log-transformed Statistics				
688				Minimum		3.4				Minimum of Log Data		1.224
689				Maximum		64.8				Maximum of Log Data		4.171
690				Mean		13.69				Mean of log Data		2.369
691				Median		10.5				SD of log Data		0.643
692				SD		14.15						
693				Coefficient of Variation		1.034						
694				Skewness		3.511						
695												
696		Relevant UCL Statistics										
697		Normal Distribution Test						Lognormal Distribution Test				
698		Shapiro Wilk Test Statistic				0.532			Shapiro Wilk Test Statistic			0.901
699		Shapiro Wilk Critical Value				0.887			Shapiro Wilk Critical Value			0.887
700		Data not Normal at 5% Significance Level						Data appear Lognormal at 5% Significance Level				

	A	B	C	D	E	F	G	H	I	J	K	L
701												
702			Assuming Normal Distribution						Assuming Lognormal Distribution			
703				95% Student's-t UCL		19.9					95% H-UCL	18.97
704			95% UCLs (Adjusted for Skewness)							95% Chebyshev (MVUE) UCL		22.47
705				95% Adjusted-CLT UCL		22.83				97.5% Chebyshev (MVUE) UCL		26.59
706				95% Modified-t UCL		20.41				99% Chebyshev (MVUE) UCL		34.68
707												
708			Gamma Distribution Test						Data Distribution			
709				k star (bias corrected)		1.806			Data appear Lognormal at 5% Significance Level			
710				Theta Star		7.584						
711				nu star		57.78						
712			Approximate Chi Square Value (.05)			41.31			Nonparametric Statistics			
713			Adjusted Level of Significance			0.0335				95% CLT UCL		19.51
714			Adjusted Chi Square Value			39.72				95% Jackknife UCL		19.9
715										95% Standard Bootstrap UCL		19.33
716			Anderson-Darling Test Statistic			1.107				95% Bootstrap-t UCL		30.55
717			Anderson-Darling 5% Critical Value			0.749				95% Hall's Bootstrap UCL		43.11
718			Kolmogorov-Smirnov Test Statistic			0.257				95% Percentile Bootstrap UCL		20.41
719			Kolmogorov-Smirnov 5% Critical Value			0.218				95% BCA Bootstrap UCL		24.28
720		Data not Gamma Distributed at 5% Significance Level								95% Chebyshev(Mean, Sd) UCL		29.12
721										97.5% Chebyshev(Mean, Sd) UCL		35.79
722			Assuming Gamma Distribution							99% Chebyshev(Mean, Sd) UCL		48.9
723				95% Approximate Gamma UCL		19.16						
724				95% Adjusted Gamma UCL		19.92						
725												
726			Potential UCL to Use							Use 95% H-UCL		18.97
727												
728												
729	DC-Pb-soil											
730												
731						General Statistics						
732				Number of Valid Observations		16				Number of Distinct Observations		16
733				Number of Missing Values		2						
734												
735			Raw Statistics						Log-transformed Statistics			
736					Minimum	33.5				Minimum of Log Data		3.512
737					Maximum	999				Maximum of Log Data		6.907
738					Mean	207.6				Mean of log Data		4.925
739					Median	145.5				SD of log Data		0.863
740					SD	247.6						
741				Coefficient of Variation		1.193						
742					Skewness	2.642						
743												
744						Relevant UCL Statistics						
745			Normal Distribution Test						Lognormal Distribution Test			
746				Shapiro Wilk Test Statistic		0.63				Shapiro Wilk Test Statistic		0.941
747				Shapiro Wilk Critical Value		0.887				Shapiro Wilk Critical Value		0.887
748		Data not Normal at 5% Significance Level							Data appear Lognormal at 5% Significance Level			
749												
750			Assuming Normal Distribution						Assuming Lognormal Distribution			

	A	B	C	D	E	F	G	H	I	J	K	L
751				95% Student's-t UCL		316.2					95% H-UCL	348.7
752			95% UCLs (Adjusted for Skewness)							95% Chebyshev (MVUE) UCL		390.7
753				95% Adjusted-CLT UCL		353.2				97.5% Chebyshev (MVUE) UCL		475.8
754				95% Modified-t UCL		323				99% Chebyshev (MVUE) UCL		643.1
755												
756			Gamma Distribution Test						Data Distribution			
757				k star (bias corrected)		1.147			Data appear Lognormal at 5% Significance Level			
758				Theta Star		181						
759				nu star		36.71						
760			Approximate Chi Square Value (.05)			23.84			Nonparametric Statistics			
761			Adjusted Level of Significance			0.0335					95% CLT UCL	309.5
762			Adjusted Chi Square Value			22.66					95% Jackknife UCL	316.2
763										95% Standard Bootstrap UCL		306.8
764			Anderson-Darling Test Statistic			0.981				95% Bootstrap-t UCL		524.9
765			Anderson-Darling 5% Critical Value			0.757				95% Hall's Bootstrap UCL		761.3
766			Kolmogorov-Smirnov Test Statistic			0.257				95% Percentile Bootstrap UCL		320
767			Kolmogorov-Smirnov 5% Critical Value			0.22				95% BCA Bootstrap UCL		366.2
768		Data not Gamma Distributed at 5% Significance Level								95% Chebyshev(Mean, Sd) UCL		477.5
769										97.5% Chebyshev(Mean, Sd) UCL		594.3
770			Assuming Gamma Distribution							99% Chebyshev(Mean, Sd) UCL		823.6
771			95% Approximate Gamma UCL			319.7						
772			95% Adjusted Gamma UCL			336.3						
773												
774			Potential UCL to Use							Use 95% H-UCL		348.7
775												
776												
777	DC-Mo-soil											
778												
779					General Statistics							
780			Number of Valid Observations			16			Number of Distinct Observations			16
781			Number of Missing Values			2						
782												
783			Raw Statistics						Log-transformed Statistics			
784				Minimum		8				Minimum of Log Data		2.079
785				Maximum		6830				Maximum of Log Data		8.829
786				Mean		2106				Mean of log Data		6.709
787				Median		740.5				SD of log Data		1.714
788				SD		2597						
789			Coefficient of Variation			1.233						
790				Skewness		1.166						
791												
792					Relevant UCL Statistics							
793			Normal Distribution Test						Lognormal Distribution Test			
794			Shapiro Wilk Test Statistic			0.709				Shapiro Wilk Test Statistic		0.865
795			Shapiro Wilk Critical Value			0.887				Shapiro Wilk Critical Value		0.887
796		Data not Normal at 5% Significance Level							Data not Lognormal at 5% Significance Level			
797												
798			Assuming Normal Distribution						Assuming Lognormal Distribution			
799				95% Student's-t UCL		3244					95% H-UCL	20317
800			95% UCLs (Adjusted for Skewness)							95% Chebyshev (MVUE) UCL		9398

	A	B	C	D	E	F	G	H	I	J	K	L
801				95% Adjusted-CLT UCL		3376				97.5% Chebyshev (MVUE) UCL		12184
802				95% Modified-t UCL		3276				99% Chebyshev (MVUE) UCL		17658
803												
804			Gamma Distribution Test						Data Distribution			
805				k star (bias corrected)		0.568		Data Follow Appr. Gamma Distribution at 5% Significance Level				
806				Theta Star		3711						
807				nu star		18.17						
808			Approximate Chi Square Value (.05)			9.511			Nonparametric Statistics			
809			Adjusted Level of Significance			0.0335				95% CLT UCL		3174
810			Adjusted Chi Square Value			8.804				95% Jackknife UCL		3244
811										95% Standard Bootstrap UCL		3162
812			Anderson-Darling Test Statistic			0.838				95% Bootstrap-t UCL		3708
813			Anderson-Darling 5% Critical Value			0.783				95% Hall's Bootstrap UCL		2975
814			Kolmogorov-Smirnov Test Statistic			0.195				95% Percentile Bootstrap UCL		3209
815			Kolmogorov-Smirnov 5% Critical Value			0.225				95% BCA Bootstrap UCL		3269
816		Data follow Appr. Gamma Distribution at 5% Significance Level								95% Chebyshev(Mean, Sd) UCL		4936
817										97.5% Chebyshev(Mean, Sd) UCL		6160
818			Assuming Gamma Distribution							99% Chebyshev(Mean, Sd) UCL		8565
819			95% Approximate Gamma UCL			4023						
820			95% Adjusted Gamma UCL			4346						
821												
822			Potential UCL to Use						Use 95% Approximate Gamma UCL			4023
823												