	A	B	C	D	E	F	G	H	I	J	K	L
1	UCL Statistics for Uncensored Full Data Sets											
2												
3	User Selected Options											
4	Date/Time of Computation			3/10/2015 11:17:32 AM								
5	From File			EPC_080SubR2.xls								
6	Full Precision			OFF								
7	Confidence Coefficient			95%								
8	Number of Bootstrap Operations			2000								
9												
10												
11	Antimony											
12												
13	General Statistics											
14	Total Number of Observations					12	Number of Distinct Observations					4
15							Number of Missing Observations					0
16	Minimum					0.16	Mean					32.12
17	Maximum					96.01	Median					32.12
18	SD					23.59	Std. Error of Mean					6.81
19	Coefficient of Variation					0.734	Skewness					1.625
20												
21	Normal GOF Test											
22	Shapiro Wilk Test Statistic					0.65	Shapiro Wilk GOF Test					
23	5% Shapiro Wilk Critical Value					0.859	Data Not Normal at 5% Significance Level					
24	Lilliefors Test Statistic					0.417	Lilliefors GOF Test					
25	5% Lilliefors Critical Value					0.256	Data Not Normal at 5% Significance Level					
26	Data Not Normal at 5% Significance Level											
27												
28	Assuming Normal Distribution											
29	95% Normal UCL						95% UCLs (Adjusted for Skewness)					
30	95% Student's-t UCL					44.35	95% Adjusted-CLT UCL (Chen-1995)					46.74
31							95% Modified-t UCL (Johnson-1978)					44.89
32												
33	Gamma GOF Test											
34	A-D Test Statistic					2.634	Anderson-Darling Gamma GOF Test					
35	5% A-D Critical Value					0.765	Data Not Gamma Distributed at 5% Significance Level					
36	K-S Test Statistic					0.483	Kolmogrov-Smirnoff Gamma GOF Test					
37	5% K-S Critical Value					0.255	Data Not Gamma Distributed at 5% Significance Level					
38	Data Not Gamma Distributed at 5% Significance Level											
39												
40	Gamma Statistics											
41	k hat (MLE)					0.771	k star (bias corrected MLE)					0.634
42	Theta hat (MLE)					41.68	Theta star (bias corrected MLE)					50.7
43	nu hat (MLE)					18.5	nu star (bias corrected)					15.21
44	MLE Mean (bias corrected)					32.12	MLE Sd (bias corrected)					40.36
45							Approximate Chi Square Value (0.05)					7.405
46	Adjusted Level of Significance					0.029	Adjusted Chi Square Value					6.591
47												
48	Assuming Gamma Distribution											
49	95% Approximate Gamma UCL (use when n>=50))					65.96	95% Adjusted Gamma UCL (use when n<50)					74.11
50												
51	Lognormal GOF Test											
52	Shapiro Wilk Test Statistic					0.562	Shapiro Wilk Lognormal GOF Test					

	A	B	C	D	E	F	G	H	I	J	K	L
53					5% Shapiro Wilk Critical Value	0.859	Data Not Lognormal at 5% Significance Level					
54					Lilliefors Test Statistic	0.478	**Lilliefors Lognormal GOF Test**					
55					5% Lilliefors Critical Value	0.256	Data Not Lognormal at 5% Significance Level					
56	**Data Not Lognormal at 5% Significance Level**											
57												
58	**Lognormal Statistics**											
59					Minimum of Logged Data	-1.833				Mean of logged Data		2.696
60					Maximum of Logged Data	4.564				SD of logged Data		2.087
61												
62	**Assuming Lognormal Distribution**											
63					95% H-UCL	3349				90% Chebyshev (MVUE) UCL		255.3
64					95% Chebyshev (MVUE) UCL	331.6				97.5% Chebyshev (MVUE) UCL		437.7
65					99% Chebyshev (MVUE) UCL	645.9						
66												
67	**Nonparametric Distribution Free UCL Statistics**											
68	**Data do not follow a Discernible Distribution (0.05)**											
69												
70	**Nonparametric Distribution Free UCLs**											
71					95% CLT UCL	43.33				95% Jackknife UCL		44.35
72					95% Standard Bootstrap UCL	N/A				95% Bootstrap-t UCL		N/A
73					95% Hall's Bootstrap UCL	N/A				95% Percentile Bootstrap UCL		N/A
74					95% BCA Bootstrap UCL	N/A						
75					90% Chebyshev(Mean, Sd) UCL	52.55				95% Chebyshev(Mean, Sd) UCL		61.81
76					97.5% Chebyshev(Mean, Sd) UCL	74.65				99% Chebyshev(Mean, Sd) UCL		99.89
77												
78	**Suggested UCL to Use**											
79					99% Chebyshev (Mean, Sd) UCL	99.89						
80												
81	**Recommended UCL exceeds the maximum observation**											
82												
83	Note: Suggestions regarding the selection of a 95% UCL are provided to help the user to select the most appropriate 95% UCL.											
84	These recommendations are based upon the results of the simulation studies summarized in Singh, Singh, and Iaci (2002)											
85	and Singh and Singh (2003). However, simulations results will not cover all Real World data sets.											
86	For additional insight the user may want to consult a statistician.											
87												
88												
89	**Arsenic**											
90												
91	**General Statistics**											
92					Total Number of Observations	12				Number of Distinct Observations		3
93										Number of Missing Observations		0
94					Minimum	7.9				Mean		9.988
95					Maximum	11.95				Median		10
96					SD	0.864				Std. Error of Mean		0.249
97					Coefficient of Variation	0.0865				Skewness		-0.26
98												
99	**Normal GOF Test**											
100					Shapiro Wilk Test Statistic	0.599	**Shapiro Wilk GOF Test**					
101					5% Shapiro Wilk Critical Value	0.859	Data Not Normal at 5% Significance Level					
102					Lilliefors Test Statistic	0.422	**Lilliefors GOF Test**					
103					5% Lilliefors Critical Value	0.256	Data Not Normal at 5% Significance Level					
104	**Data Not Normal at 5% Significance Level**											

	A	B	C	D	E	F	G	H	I	J	K	L
105												
106	**Assuming Normal Distribution**											
107	**95% Normal UCL**						**95% UCLs (Adjusted for Skewness)**					
108					95% Student's-t UCL	10.44				95% Adjusted-CLT UCL (Chen-1995)		10.38
109										95% Modified-t UCL (Johnson-1978)		10.43
110												
111	**Gamma GOF Test**											
112					A-D Test Statistic	2.729	**Anderson-Darling Gamma GOF Test**					
113					5% A-D Critical Value	0.731	Data Not Gamma Distributed at 5% Significance Level					
114					K-S Test Statistic	0.434	**Kolmogrov-Smirnoff Gamma GOF Test**					
115					5% K-S Critical Value	0.245	Data Not Gamma Distributed at 5% Significance Level					
116	**Data Not Gamma Distributed at 5% Significance Level**											
117												
118	**Gamma Statistics**											
119					k hat (MLE)	141.1				k star (bias corrected MLE)		105.9
120					Theta hat (MLE)	0.0708				Theta star (bias corrected MLE)		0.0943
121					nu hat (MLE)	3387				nu star (bias corrected)		2542
122					MLE Mean (bias corrected)	9.988				MLE Sd (bias corrected)		0.971
123										Approximate Chi Square Value (0.05)		2425
124					Adjusted Level of Significance	0.029				Adjusted Chi Square Value		2408
125												
126	**Assuming Gamma Distribution**											
127					95% Approximate Gamma UCL (use when n>=50))	10.47				95% Adjusted Gamma UCL (use when n<50)		10.54
128												
129	**Lognormal GOF Test**											
130					Shapiro Wilk Test Statistic	0.59	**Shapiro Wilk Lognormal GOF Test**					
131					5% Shapiro Wilk Critical Value	0.859	Data Not Lognormal at 5% Significance Level					
132					Lilliefors Test Statistic	0.438	**Lilliefors Lognormal GOF Test**					
133					5% Lilliefors Critical Value	0.256	Data Not Lognormal at 5% Significance Level					
134	**Data Not Lognormal at 5% Significance Level**											
135												
136	**Lognormal Statistics**											
137					Minimum of Logged Data	2.067				Mean of logged Data		2.298
138					Maximum of Logged Data	2.481				SD of logged Data		0.0889
139												
140	**Assuming Lognormal Distribution**											
141					95% H-UCL	N/A				90% Chebyshev (MVUE) UCL		10.76
142					95% Chebyshev (MVUE) UCL	11.11				97.5% Chebyshev (MVUE) UCL		11.59
143					99% Chebyshev (MVUE) UCL	12.54						
144												
145	**Nonparametric Distribution Free UCL Statistics**											
146	**Data do not follow a Discernible Distribution (0.05)**											
147												
148	**Nonparametric Distribution Free UCLs**											
149					95% CLT UCL	10.4				95% Jackknife UCL		10.44
150					95% Standard Bootstrap UCL	N/A				95% Bootstrap-t UCL		N/A
151					95% Hall's Bootstrap UCL	N/A				95% Percentile Bootstrap UCL		N/A
152					95% BCA Bootstrap UCL	N/A						
153					90% Chebyshev(Mean, Sd) UCL	10.74				95% Chebyshev(Mean, Sd) UCL		11.07
154					97.5% Chebyshev(Mean, Sd) UCL	11.55				99% Chebyshev(Mean, Sd) UCL		12.47
155												
156	**Suggested UCL to Use**											

	A	B	C	D	E	F	G	H	I	J	K	L
157					95% Student's-t UCL	10.44				or 95% Modified-t UCL		10.43
158												
159	Note: Suggestions regarding the selection of a 95% UCL are provided to help the user to select the most appropriate 95% UCL.											
160	These recommendations are based upon the results of the simulation studies summarized in Singh, Singh, and Iaci (2002)											
161	and Singh and Singh (2003). However, simulations results will not cover all Real World data sets.											
162	For additional insight the user may want to consult a statistician.											
163												
164	**Note: For highly negatively-skewed data, confidence limits (e.g., Chen, Johnson, Lognormal, and Gamma) may not be**											
165	**reliable. Chen's and Johnson's methods provide adjustments for positvely skewed data sets.**											
166												
167												
168	**Cadmium**											
169												
170	**General Statistics**											
171	Total Number of Observations					12	Number of Distinct Observations					4
172							Number of Missing Observations					0
173	Minimum					0.022	Mean					5.961
174	Maximum					17.69	Median					5.961
175	SD					4.331	Std. Error of Mean					1.25
176	Coefficient of Variation					0.727	Skewness					1.624
177												
178	**Normal GOF Test**											
179	Shapiro Wilk Test Statistic					0.652	**Shapiro Wilk GOF Test**					
180	5% Shapiro Wilk Critical Value					0.859	Data Not Normal at 5% Significance Level					
181	Lilliefors Test Statistic					0.417	**Lilliefors GOF Test**					
182	5% Lilliefors Critical Value					0.256	Data Not Normal at 5% Significance Level					
183	**Data Not Normal at 5% Significance Level**											
184												
185	**Assuming Normal Distribution**											
186	**95% Normal UCL**						**95% UCLs (Adjusted for Skewness)**					
187	95% Student's-t UCL					8.206	95% Adjusted-CLT UCL (Chen-1995)					8.644
188							95% Modified-t UCL (Johnson-1978)					8.304
189												
190	**Gamma GOF Test**											
191	A-D Test Statistic					2.438	**Anderson-Darling Gamma GOF Test**					
192	5% A-D Critical Value					0.761	Data Not Gamma Distributed at 5% Significance Level					
193	K-S Test Statistic					0.474	**Kolmogrov-Smirnoff Gamma GOF Test**					
194	5% K-S Critical Value					0.254	Data Not Gamma Distributed at 5% Significance Level					
195	**Data Not Gamma Distributed at 5% Significance Level**											
196												
197	**Gamma Statistics**											
198	k hat (MLE)					0.873	k star (bias corrected MLE)					0.71
199	Theta hat (MLE)					6.831	Theta star (bias corrected MLE)					8.396
200	nu hat (MLE)					20.94	nu star (bias corrected)					17.04
201	MLE Mean (bias corrected)					5.961	MLE Sd (bias corrected)					7.074
202							Approximate Chi Square Value (0.05)					8.7
203	Adjusted Level of Significance					0.029	Adjusted Chi Square Value					7.807
204												
205	**Assuming Gamma Distribution**											
206	95% Approximate Gamma UCL (use when n>=50))					11.67	95% Adjusted Gamma UCL (use when n<50)					13.01
207												
208	**Lognormal GOF Test**											

	A	B	C	D	E	F	G	H	I	J	K	L
209					Shapiro Wilk Test Statistic	0.59	**Shapiro Wilk Lognormal GOF Test**					
210					5% Shapiro Wilk Critical Value	0.859	Data Not Lognormal at 5% Significance Level					
211					Lilliefors Test Statistic	0.472	**Lilliefors Lognormal GOF Test**					
212					5% Lilliefors Critical Value	0.256	Data Not Lognormal at 5% Significance Level					
213					**Data Not Lognormal at 5% Significance Level**							
214												
215					**Lognormal Statistics**							
216					Minimum of Logged Data	-3.817	Mean of logged Data					1.113
217					Maximum of Logged Data	2.873	SD of logged Data					1.902
218												
219					**Assuming Lognormal Distribution**							
220					95% H-UCL	282.6	90% Chebyshev (MVUE) UCL					37.78
221					95% Chebyshev (MVUE) UCL	48.76	97.5% Chebyshev (MVUE) UCL					64.01
222					99% Chebyshev (MVUE) UCL	93.96						
223												
224					**Nonparametric Distribution Free UCL Statistics**							
225					**Data do not follow a Discernible Distribution (0.05)**							
226												
227					**Nonparametric Distribution Free UCLs**							
228					95% CLT UCL	8.017	95% Jackknife UCL					8.206
229					95% Standard Bootstrap UCL	N/A	95% Bootstrap-t UCL					N/A
230					95% Hall's Bootstrap UCL	N/A	95% Percentile Bootstrap UCL					N/A
231					95% BCA Bootstrap UCL	N/A						
232					90% Chebyshev(Mean, Sd) UCL	9.712	95% Chebyshev(Mean, Sd) UCL					11.41
233					97.5% Chebyshev(Mean, Sd) UCL	13.77	99% Chebyshev(Mean, Sd) UCL					18.4
234												
235					**Suggested UCL to Use**							
236					99% Chebyshev (Mean, Sd) UCL	18.4						
237												
238					**Recommended UCL exceeds the maximum observation**							
239												
240					Note: Suggestions regarding the selection of a 95% UCL are provided to help the user to select the most appropriate 95% UCL.							
241					These recommendations are based upon the results of the simulation studies summarized in Singh, Singh, and Iaci (2002)							
242					and Singh and Singh (2003). However, simulations results will not cover all Real World data sets.							
243					For additional insight the user may want to consult a statistician.							
244												
245												
246	**Iron**											
247												
248					**General Statistics**							
249					Total Number of Observations	12	Number of Distinct Observations					12
250							Number of Missing Observations					0
251					Minimum	15151	Mean					30702
252					Maximum	41269	Median					31620
253					SD	6528	Std. Error of Mean					1884
254					Coefficient of Variation	0.213	Skewness					-0.918
255												
256					**Normal GOF Test**							
257					Shapiro Wilk Test Statistic	0.93	**Shapiro Wilk GOF Test**					
258					5% Shapiro Wilk Critical Value	0.859	Data appear Normal at 5% Significance Level					
259					Lilliefors Test Statistic	0.193	**Lilliefors GOF Test**					
260					5% Lilliefors Critical Value	0.256	Data appear Normal at 5% Significance Level					

	A	B	C	D	E	F	G	H	I	J	K	L
261	Data appear Normal at 5% Significance Level											
262												
263	Assuming Normal Distribution											
264	95% Normal UCL						95% UCLs (Adjusted for Skewness)					
265					95% Student's-t UCL	34086			95% Adjusted-CLT UCL (Chen-1995)			33268
266									95% Modified-t UCL (Johnson-1978)			34003
267												
268	Gamma GOF Test											
269					A-D Test Statistic	0.594	Anderson-Darling Gamma GOF Test					
270					5% A-D Critical Value	0.732	Detected data appear Gamma Distributed at 5% Significance Level					
271					K-S Test Statistic	0.222	Kolmogrov-Smirnoff Gamma GOF Test					
272					5% K-S Critical Value	0.245	Detected data appear Gamma Distributed at 5% Significance Level					
273	Detected data appear Gamma Distributed at 5% Significance Level											
274												
275	Gamma Statistics											
276					k hat (MLE)	19.7			k star (bias corrected MLE)			14.83
277					Theta hat (MLE)	1559			Theta star (bias corrected MLE)			2070
278					nu hat (MLE)	472.8			nu star (bias corrected)			355.9
279					MLE Mean (bias corrected)	30702			MLE Sd (bias corrected)			7973
280									Approximate Chi Square Value (0.05)			313.2
281					Adjusted Level of Significance	0.029			Adjusted Chi Square Value			307.1
282												
283	Assuming Gamma Distribution											
284					95% Approximate Gamma UCL (use when n>=50))	34890			95% Adjusted Gamma UCL (use when n<50)			35585
285												
286	Lognormal GOF Test											
287					Shapiro Wilk Test Statistic	0.829	Shapiro Wilk Lognormal GOF Test					
288					5% Shapiro Wilk Critical Value	0.859	Data Not Lognormal at 5% Significance Level					
289					Lilliefors Test Statistic	0.248	Lilliefors Lognormal GOF Test					
290					5% Lilliefors Critical Value	0.256	Data appear Lognormal at 5% Significance Level					
291	Data appear Approximate Lognormal at 5% Significance Level											
292												
293	Lognormal Statistics											
294					Minimum of Logged Data	9.626			Mean of logged Data			10.31
295					Maximum of Logged Data	10.63			SD of logged Data			0.251
296												
297	Assuming Lognormal Distribution											
298					95% H-UCL	35627			90% Chebyshev (MVUE) UCL			37551
299					95% Chebyshev (MVUE) UCL	40608			97.5% Chebyshev (MVUE) UCL			44850
300					99% Chebyshev (MVUE) UCL	53184						
301												
302	Nonparametric Distribution Free UCL Statistics											
303	Data appear to follow a Discernible Distribution at 5% Significance Level											
304												
305	Nonparametric Distribution Free UCLs											
306					95% CLT UCL	33802			95% Jackknife UCL			34086
307					95% Standard Bootstrap UCL	33606			95% Bootstrap-t UCL			33593
308					95% Hall's Bootstrap UCL	33617			95% Percentile Bootstrap UCL			33511
309					95% BCA Bootstrap UCL	33217						
310					90% Chebyshev(Mean, Sd) UCL	36356			95% Chebyshev(Mean, Sd) UCL			38916
311					97.5% Chebyshev(Mean, Sd) UCL	42470			99% Chebyshev(Mean, Sd) UCL			49452
312												

	A	B	C	D	E	F	G	H	I	J	K	L
313						**Suggested UCL to Use**						
314					95% Student's-t UCL	34086						
315												
316					Note: Suggestions regarding the selection of a 95% UCL are provided to help the user to select the most appropriate 95% UCL.							
317					These recommendations are based upon the results of the simulation studies summarized in Singh, Singh, and Iaci (2002)							
318					and Singh and Singh (2003). However, simulations results will not cover all Real World data sets.							
319					For additional insight the user may want to consult a statistician.							
320												
321					**Note: For highly negatively-skewed data, confidence limits (e.g., Chen, Johnson, Lognormal, and Gamma) may not be**							
322					**reliable. Chen's and Johnson's methods provide adjustments for positvely skewed data sets.**							
323												
324												
325	**Manganese**											
326												
327						**General Statistics**						
328					Total Number of Observations	12	Number of Distinct Observations					12
329							Number of Missing Observations					0
330					Minimum	349.9	Mean					743.9
331					Maximum	2066	Median					521
332					SD	496.2	Std. Error of Mean					143.2
333					Coefficient of Variation	0.667	Skewness					1.944
334												
335						**Normal GOF Test**						
336					Shapiro Wilk Test Statistic	0.772	**Shapiro Wilk GOF Test**					
337					5% Shapiro Wilk Critical Value	0.859	Data Not Normal at 5% Significance Level					
338					Lilliefors Test Statistic	0.25	**Lilliefors GOF Test**					
339					5% Lilliefors Critical Value	0.256	Data appear Normal at 5% Significance Level					
340						**Data appear Approximate Normal at 5% Significance Level**						
341												
342						**Assuming Normal Distribution**						
343					**95% Normal UCL**		**95% UCLs (Adjusted for Skewness)**					
344					95% Student's-t UCL	1001	95% Adjusted-CLT UCL (Chen-1995)					1065
345							95% Modified-t UCL (Johnson-1978)					1015
346												
347						**Gamma GOF Test**						
348					A-D Test Statistic	0.609	**Anderson-Darling Gamma GOF Test**					
349					5% A-D Critical Value	0.738	Detected data appear Gamma Distributed at 5% Significance Level					
350					K-S Test Statistic	0.24	**Kolmogrov-Smirnoff Gamma GOF Test**					
351					5% K-S Critical Value	0.247	Detected data appear Gamma Distributed at 5% Significance Level					
352						**Detected data appear Gamma Distributed at 5% Significance Level**						
353												
354						**Gamma Statistics**						
355					k hat (MLE)	3.38	k star (bias corrected MLE)					2.591
356					Theta hat (MLE)	220.1	Theta star (bias corrected MLE)					287.1
357					nu hat (MLE)	81.13	nu star (bias corrected)					62.18
358					MLE Mean (bias corrected)	743.9	MLE Sd (bias corrected)					462.2
359							Approximate Chi Square Value (0.05)					45.04
360					Adjusted Level of Significance	0.029	Adjusted Chi Square Value					42.82
361												
362						**Assuming Gamma Distribution**						
363					95% Approximate Gamma UCL (use when n>=50))	1027	95% Adjusted Gamma UCL (use when n<50)					1080
364												

	A	B	C	D	E	F	G	H	I	J	K	L
365						Lognormal GOF Test						
366					Shapiro Wilk Test Statistic	0.907	Shapiro Wilk Lognormal GOF Test					
367					5% Shapiro Wilk Critical Value	0.859	Data appear Lognormal at 5% Significance Level					
368					Lilliefors Test Statistic	0.214	Lilliefors Lognormal GOF Test					
369					5% Lilliefors Critical Value	0.256	Data appear Lognormal at 5% Significance Level					
370					Data appear Lognormal at 5% Significance Level							
371												
372					Lognormal Statistics							
373					Minimum of Logged Data	5.858				Mean of logged Data		6.457
374					Maximum of Logged Data	7.633				SD of logged Data		0.549
375												
376					Assuming Lognormal Distribution							
377					95% H-UCL	1067				90% Chebyshev (MVUE) UCL		1088
378					95% Chebyshev (MVUE) UCL	1250				97.5% Chebyshev (MVUE) UCL		1474
379					99% Chebyshev (MVUE) UCL	1915						
380												
381					Nonparametric Distribution Free UCL Statistics							
382					Data appear to follow a Discernible Distribution at 5% Significance Level							
383												
384					Nonparametric Distribution Free UCLs							
385					95% CLT UCL	979.5				95% Jackknife UCL		1001
386					95% Standard Bootstrap UCL	967				95% Bootstrap-t UCL		1183
387					95% Hall's Bootstrap UCL	1846				95% Percentile Bootstrap UCL		988.7
388					95% BCA Bootstrap UCL	1046						
389					90% Chebyshev(Mean, Sd) UCL	1174				95% Chebyshev(Mean, Sd) UCL		1368
390					97.5% Chebyshev(Mean, Sd) UCL	1638				99% Chebyshev(Mean, Sd) UCL		2169
391												
392					Suggested UCL to Use							
393					95% Student's-t UCL	1001						
394												
395					Note: Suggestions regarding the selection of a 95% UCL are provided to help the user to select the most appropriate 95% UCL.							
396					These recommendations are based upon the results of the simulation studies summarized in Singh, Singh, and Iaci (2002)							
397					and Singh and Singh (2003). However, simulations results will not cover all Real World data sets.							
398					For additional insight the user may want to consult a statistician.							
399												
400												
401	Mercury											
402												
403					General Statistics							
404					Total Number of Observations	12				Number of Distinct Observations		4
405										Number of Missing Observations		0
406					Minimum	0.033				Mean		30.58
407					Maximum	40				Median		40
408					SD	17.13				Std. Error of Mean		4.944
409					Coefficient of Variation	0.56				Skewness		-1.363
410												
411					Normal GOF Test							
412					Shapiro Wilk Test Statistic	0.572	Shapiro Wilk GOF Test					
413					5% Shapiro Wilk Critical Value	0.859	Data Not Normal at 5% Significance Level					
414					Lilliefors Test Statistic	0.459	Lilliefors GOF Test					
415					5% Lilliefors Critical Value	0.256	Data Not Normal at 5% Significance Level					
416					Data Not Normal at 5% Significance Level							

	A	B	C	D	E	F	G	H	I	J	K	L
417												
418						Assuming Normal Distribution						
419				95% Normal UCL						95% UCLs (Adjusted for Skewness)		
420					95% Student's-t UCL	39.46				95% Adjusted-CLT UCL (Chen-1995)		36.63
421										95% Modified-t UCL (Johnson-1978)		39.13
422												
423						Gamma GOF Test						
424					A-D Test Statistic	3.016				Anderson-Darling Gamma GOF Test		
425					5% A-D Critical Value	0.778				Data Not Gamma Distributed at 5% Significance Level		
426					K-S Test Statistic	0.491				Kolmogrov-Smirnoff Gamma GOF Test		
427					5% K-S Critical Value	0.257				Data Not Gamma Distributed at 5% Significance Level		
428						Data Not Gamma Distributed at 5% Significance Level						
429												
430						Gamma Statistics						
431					k hat (MLE)	0.594				k star (bias corrected MLE)		0.501
432					Theta hat (MLE)	51.47				Theta star (bias corrected MLE)		61.01
433					nu hat (MLE)	14.26				nu star (bias corrected)		12.03
434					MLE Mean (bias corrected)	30.58				MLE Sd (bias corrected)		43.19
435										Approximate Chi Square Value (0.05)		5.246
436					Adjusted Level of Significance	0.029				Adjusted Chi Square Value		4.581
437												
438						Assuming Gamma Distribution						
439					95% Approximate Gamma UCL (use when n>=50))	70.12				95% Adjusted Gamma UCL (use when n<50)		80.3
440												
441						Lognormal GOF Test						
442					Shapiro Wilk Test Statistic	0.542				Shapiro Wilk Lognormal GOF Test		
443					5% Shapiro Wilk Critical Value	0.859				Data Not Lognormal at 5% Significance Level		
444					Lilliefors Test Statistic	0.436				Lilliefors Lognormal GOF Test		
445					5% Lilliefors Critical Value	0.256				Data Not Lognormal at 5% Significance Level		
446						Data Not Lognormal at 5% Significance Level						
447												
448						Lognormal Statistics						
449					Minimum of Logged Data	-3.411				Mean of logged Data		2.379
450					Maximum of Logged Data	3.689				SD of logged Data		2.696
451												
452						Assuming Lognormal Distribution						
453					95% H-UCL	81019				90% Chebyshev (MVUE) UCL		580.9
454					95% Chebyshev (MVUE) UCL	765.8				97.5% Chebyshev (MVUE) UCL		1022
455					99% Chebyshev (MVUE) UCL	1527						
456												
457						Nonparametric Distribution Free UCL Statistics						
458						Data do not follow a Discernible Distribution (0.05)						
459												
460						Nonparametric Distribution Free UCLs						
461					95% CLT UCL	38.71				95% Jackknife UCL		39.46
462					95% Standard Bootstrap UCL	N/A				95% Bootstrap-t UCL		N/A
463					95% Hall's Bootstrap UCL	N/A				95% Percentile Bootstrap UCL		N/A
464					95% BCA Bootstrap UCL	N/A						
465					90% Chebyshev(Mean, Sd) UCL	45.41				95% Chebyshev(Mean, Sd) UCL		52.13
466					97.5% Chebyshev(Mean, Sd) UCL	61.45				99% Chebyshev(Mean, Sd) UCL		79.77
467												
468						Suggested UCL to Use						

	A	B	C	D	E	F	G	H	I	J	K	L
469					99% Chebyshev (Mean, Sd) UCL	79.77						
470												
471					**Recommended UCL exceeds the maximum observation**							
472												
473					Note: Suggestions regarding the selection of a 95% UCL are provided to help the user to select the most appropriate 95% UCL.							
474					These recommendations are based upon the results of the simulation studies summarized in Singh, Singh, and Iaci (2002)							
475					and Singh and Singh (2003). However, simulations results will not cover all Real World data sets.							
476					For additional insight the user may want to consult a statistician.							
477												
478					**Note: For highly negatively-skewed data, confidence limits (e.g., Chen, Johnson, Lognormal, and Gamma) may not be**							
479					**reliable. Chen's and Johnson's methods provide adjustments for positvely skewed data sets.**							
480												
481												
482	**Molybdenum**											
483												
484					**General Statistics**							
485					Total Number of Observations	12			Number of Distinct Observations			7
486									Number of Missing Observations			0
487					Minimum	0.67			Mean			14.72
488					Maximum	46			Median			3
489					SD	16.55			Std. Error of Mean			4.778
490					Coefficient of Variation	1.124			Skewness			0.93
491												
492					**Normal GOF Test**							
493					Shapiro Wilk Test Statistic	0.772			**Shapiro Wilk GOF Test**			
494					5% Shapiro Wilk Critical Value	0.859			Data Not Normal at 5% Significance Level			
495					Lilliefors Test Statistic	0.344			**Lilliefors GOF Test**			
496					5% Lilliefors Critical Value	0.256			Data Not Normal at 5% Significance Level			
497					**Data Not Normal at 5% Significance Level**							
498												
499					**Assuming Normal Distribution**							
500					**95% Normal UCL**				**95% UCLs (Adjusted for Skewness)**			
501					95% Student's-t UCL	23.3			95% Adjusted-CLT UCL (Chen-1995)			23.95
502									95% Modified-t UCL (Johnson-1978)			23.52
503												
504					**Gamma GOF Test**							
505					A-D Test Statistic	1.094			**Anderson-Darling Gamma GOF Test**			
506					5% A-D Critical Value	0.765			Data Not Gamma Distributed at 5% Significance Level			
507					K-S Test Statistic	0.343			**Kolmogrov-Smirnoff Gamma GOF Test**			
508					5% K-S Critical Value	0.255			Data Not Gamma Distributed at 5% Significance Level			
509					**Data Not Gamma Distributed at 5% Significance Level**							
510												
511					**Gamma Statistics**							
512					k hat (MLE)	0.78			k star (bias corrected MLE)			0.641
513					Theta hat (MLE)	18.87			Theta star (bias corrected MLE)			22.98
514					nu hat (MLE)	18.72			nu star (bias corrected)			15.38
515					MLE Mean (bias corrected)	14.72			MLE Sd (bias corrected)			18.39
516									Approximate Chi Square Value (0.05)			7.524
517					Adjusted Level of Significance	0.029			Adjusted Chi Square Value			6.702
518												
519					**Assuming Gamma Distribution**							
520					95% Approximate Gamma UCL (use when n>=50))	30.09			95% Adjusted Gamma UCL (use when n<50)			33.78

	A	B	C	D	E	F	G	H	I	J	K	L
521												
522						Lognormal GOF Test						
523					Shapiro Wilk Test Statistic	0.848			Shapiro Wilk Lognormal GOF Test			
524					5% Shapiro Wilk Critical Value	0.859			Data Not Lognormal at 5% Significance Level			
525					Lilliefors Test Statistic	0.309			Lilliefors Lognormal GOF Test			
526					5% Lilliefors Critical Value	0.256			Data Not Lognormal at 5% Significance Level			
527						Data Not Lognormal at 5% Significance Level						
528												
529						Lognormal Statistics						
530					Minimum of Logged Data	-0.4			Mean of logged Data			1.926
531					Maximum of Logged Data	3.829			SD of logged Data			1.379
532												
533						Assuming Lognormal Distribution						
534					95% H-UCL	80.88			90% Chebyshev (MVUE) UCL			35.93
535					95% Chebyshev (MVUE) UCL	45.14			97.5% Chebyshev (MVUE) UCL			57.93
536					99% Chebyshev (MVUE) UCL	83.05						
537												
538						Nonparametric Distribution Free UCL Statistics						
539						Data do not follow a Discernible Distribution (0.05)						
540												
541						Nonparametric Distribution Free UCLs						
542					95% CLT UCL	22.58			95% Jackknife UCL			23.3
543					95% Standard Bootstrap UCL	22.09			95% Bootstrap-t UCL			25.9
544					95% Hall's Bootstrap UCL	21.72			95% Percentile Bootstrap UCL			22.64
545					95% BCA Bootstrap UCL	22.97						
546					90% Chebyshev(Mean, Sd) UCL	29.06			95% Chebyshev(Mean, Sd) UCL			35.55
547					97.5% Chebyshev(Mean, Sd) UCL	44.56			99% Chebyshev(Mean, Sd) UCL			62.26
548												
549						Suggested UCL to Use						
550					95% Chebyshev (Mean, Sd) UCL	35.55						
551												
552						Note: Suggestions regarding the selection of a 95% UCL are provided to help the user to select the most appropriate 95% UCL.						
553						These recommendations are based upon the results of the simulation studies summarized in Singh, Singh, and Iaci (2002)						
554						and Singh and Singh (2003). However, simulations results will not cover all Real World data sets.						
555						For additional insight the user may want to consult a statistician.						
556												
557												
558	PAH, Total											
559												
560						General Statistics						
561					Total Number of Observations	12			Number of Distinct Observations			3
562									Number of Missing Observations			0
563					Minimum	0.00495			Mean			0.292
564					Maximum	0.579			Median			0.292
565					SD	0.122			Std. Error of Mean			0.0354
566					Coefficient of Variation	0.419			Skewness			-1.65E-15
567												
568						Normal GOF Test						
569					Shapiro Wilk Test Statistic	0.6			Shapiro Wilk GOF Test			
570					5% Shapiro Wilk Critical Value	0.859			Data Not Normal at 5% Significance Level			
571					Lilliefors Test Statistic	0.417			Lilliefors GOF Test			
572					5% Lilliefors Critical Value	0.256			Data Not Normal at 5% Significance Level			

	A	B	C	D	E	F	G	H	I	J	K	L
573	Data Not Normal at 5% Significance Level											
574												
575	Assuming Normal Distribution											
576	95% Normal UCL						95% UCLs (Adjusted for Skewness)					
577					95% Student's-t UCL	0.356			95% Adjusted-CLT UCL (Chen-1995)			0.35
578									95% Modified-t UCL (Johnson-1978)			0.356
579												
580	Gamma GOF Test											
581					A-D Test Statistic	3.231	Anderson-Darling Gamma GOF Test					
582					5% A-D Critical Value	0.742	Data Not Gamma Distributed at 5% Significance Level					
583					K-S Test Statistic	0.513	Kolmogrov-Smirnoff Gamma GOF Test					
584					5% K-S Critical Value	0.249	Data Not Gamma Distributed at 5% Significance Level					
585	Data Not Gamma Distributed at 5% Significance Level											
586												
587	Gamma Statistics											
588					k hat (MLE)	1.918			k star (bias corrected MLE)			1.494
589					Theta hat (MLE)	0.152			Theta star (bias corrected MLE)			0.196
590					nu hat (MLE)	46.03			nu star (bias corrected)			35.86
591					MLE Mean (bias corrected)	0.292			MLE Sd (bias corrected)			0.239
592									Approximate Chi Square Value (0.05)			23.15
593					Adjusted Level of Significance	0.029			Adjusted Chi Square Value			21.61
594												
595	Assuming Gamma Distribution											
596				95% Approximate Gamma UCL (use when n>=50))		0.453			95% Adjusted Gamma UCL (use when n<50)			0.485
597												
598	Lognormal GOF Test											
599					Shapiro Wilk Test Statistic	0.421	Shapiro Wilk Lognormal GOF Test					
600					5% Shapiro Wilk Critical Value	0.859	Data Not Lognormal at 5% Significance Level					
601					Lilliefors Test Statistic	0.509	Lilliefors Lognormal GOF Test					
602					5% Lilliefors Critical Value	0.256	Data Not Lognormal at 5% Significance Level					
603	Data Not Lognormal at 5% Significance Level											
604												
605	Lognormal Statistics											
606					Minimum of Logged Data	-5.308			Mean of logged Data			-1.513
607					Maximum of Logged Data	-0.546			SD of logged Data			1.211
608												
609	Assuming Lognormal Distribution											
610					95% H-UCL	1.538			90% Chebyshev (MVUE) UCL			0.894
611					95% Chebyshev (MVUE) UCL	1.11			97.5% Chebyshev (MVUE) UCL			1.409
612					99% Chebyshev (MVUE) UCL	1.996						
613												
614	Nonparametric Distribution Free UCL Statistics											
615	Data do not follow a Discernible Distribution (0.05)											
616												
617	Nonparametric Distribution Free UCLs											
618					95% CLT UCL	0.35			95% Jackknife UCL			0.356
619					95% Standard Bootstrap UCL	N/A			95% Bootstrap-t UCL			N/A
620					95% Hall's Bootstrap UCL	N/A			95% Percentile Bootstrap UCL			N/A
621					95% BCA Bootstrap UCL	N/A						
622					90% Chebyshev(Mean, Sd) UCL	0.398			95% Chebyshev(Mean, Sd) UCL			0.446
623					97.5% Chebyshev(Mean, Sd) UCL	0.513			99% Chebyshev(Mean, Sd) UCL			0.644
624												

	A	B	C	D	E	F	G	H	I	J	K	L
625						**Suggested UCL to Use**						
626					95% Chebyshev (Mean, Sd) UCL	0.446						
627												
628					Note: Suggestions regarding the selection of a 95% UCL are provided to help the user to select the most appropriate 95% UCL.							
629					These recommendations are based upon the results of the simulation studies summarized in Singh, Singh, and Iaci (2002)							
630					and Singh and Singh (2003). However, simulations results will not cover all Real World data sets.							
631					For additional insight the user may want to consult a statistician.							
632												
633					**Note: For highly negatively-skewed data, confidence limits (e.g., Chen, Johnson, Lognormal, and Gamma) may not be**							
634					**reliable. Chen's and Johnson's methods provide adjustments for positvely skewed data sets.**							
635												
636												
637	**PCB, Total**											
638												
639						**General Statistics**						
640					Total Number of Observations	12	Number of Distinct Observations					10
641							Number of Missing Observations					0
642					Minimum	0.019	Mean					46.65
643					Maximum	475	Median					5
644					SD	135.6	Std. Error of Mean					39.14
645					Coefficient of Variation	2.907	Skewness					3.403
646												
647						**Normal GOF Test**						
648					Shapiro Wilk Test Statistic	0.39	**Shapiro Wilk GOF Test**					
649					5% Shapiro Wilk Critical Value	0.859	Data Not Normal at 5% Significance Level					
650					Lilliefors Test Statistic	0.44	**Lilliefors GOF Test**					
651					5% Lilliefors Critical Value	0.256	Data Not Normal at 5% Significance Level					
652						**Data Not Normal at 5% Significance Level**						
653												
654						**Assuming Normal Distribution**						
655					**95% Normal UCL**		**95% UCLs (Adjusted for Skewness)**					
656					95% Student's-t UCL	117	95% Adjusted-CLT UCL (Chen-1995)					152.1
657							95% Modified-t UCL (Johnson-1978)					123.4
658												
659						**Gamma GOF Test**						
660					A-D Test Statistic	0.883	**Anderson-Darling Gamma GOF Test**					
661					5% A-D Critical Value	0.862	Data Not Gamma Distributed at 5% Significance Level					
662					K-S Test Statistic	0.28	**Kolmogrov-Smirnoff Gamma GOF Test**					
663					5% K-S Critical Value	0.271	Data Not Gamma Distributed at 5% Significance Level					
664						**Data Not Gamma Distributed at 5% Significance Level**						
665												
666						**Gamma Statistics**						
667					k hat (MLE)	0.221	k star (bias corrected MLE)					0.221
668					Theta hat (MLE)	211.2	Theta star (bias corrected MLE)					210.9
669					nu hat (MLE)	5.302	nu star (bias corrected)					5.31
670					MLE Mean (bias corrected)	46.65	MLE Sd (bias corrected)					99.19
671							Approximate Chi Square Value (0.05)					1.298
672					Adjusted Level of Significance	0.029	Adjusted Chi Square Value					1.023
673												
674						**Assuming Gamma Distribution**						
675					95% Approximate Gamma UCL (use when n>=50))	190.9	95% Adjusted Gamma UCL (use when n<50)					242.2
676												

	A	B	C	D	E	F	G	H	I	J	K	L
677						Lognormal GOF Test						
678					Shapiro Wilk Test Statistic	0.942	Shapiro Wilk Lognormal GOF Test					
679					5% Shapiro Wilk Critical Value	0.859	Data appear Lognormal at 5% Significance Level					
680					Lilliefors Test Statistic	0.216	Lilliefors Lognormal GOF Test					
681					5% Lilliefors Critical Value	0.256	Data appear Lognormal at 5% Significance Level					
682						Data appear Lognormal at 5% Significance Level						
683												
684						Lognormal Statistics						
685					Minimum of Logged Data	-3.963				Mean of logged Data		0.563
686					Maximum of Logged Data	6.163				SD of logged Data		3.08
687												
688						Assuming Lognormal Distribution						
689					95% H-UCL	190007				90% Chebyshev (MVUE) UCL		202.5
690					95% Chebyshev (MVUE) UCL	268.4				97.5% Chebyshev (MVUE) UCL		359.8
691					99% Chebyshev (MVUE) UCL	539.5						
692												
693						Nonparametric Distribution Free UCL Statistics						
694						Data appear to follow a Discernible Distribution at 5% Significance Level						
695												
696						Nonparametric Distribution Free UCLs						
697					95% CLT UCL	111				95% Jackknife UCL		117
698					95% Standard Bootstrap UCL	109.4				95% Bootstrap-t UCL		1618
699					95% Hall's Bootstrap UCL	567.9				95% Percentile Bootstrap UCL		122.1
700					95% BCA Bootstrap UCL	166.1						
701					90% Chebyshev(Mean, Sd) UCL	164.1				95% Chebyshev(Mean, Sd) UCL		217.3
702					97.5% Chebyshev(Mean, Sd) UCL	291.1				99% Chebyshev(Mean, Sd) UCL		436.1
703												
704						Suggested UCL to Use						
705					95% Hall's Bootstrap UCL	567.9						
706												
707						Recommended UCL exceeds the maximum observation						
708												
709						In Case Bootstrap t and/or Hall's Bootstrap yields an unreasonably large UCL value, use 97.5% or 99% Chebyshev (Mean, Sd) UCL						
710												
711						Note: Suggestions regarding the selection of a 95% UCL are provided to help the user to select the most appropriate 95% UCL.						
712						These recommendations are based upon the results of the simulation studies summarized in Singh, Singh, and Iaci (2002)						
713						and Singh and Singh (2003). However, simulations results will not cover all Real World data sets.						
714						For additional insight the user may want to consult a statistician.						
715												
716												
717	Uranium											
718												
719						General Statistics						
720					Total Number of Observations	12				Number of Distinct Observations		5
721										Number of Missing Observations		0
722					Minimum	4.5				Mean		25.69
723					Maximum	108				Median		10
724					SD	37.79				Std. Error of Mean		10.91
725					Coefficient of Variation	1.471				Skewness		2.048
726												
727						Normal GOF Test						
728					Shapiro Wilk Test Statistic	0.498	Shapiro Wilk GOF Test					

	A	B	C	D	E	F	G	H	I	J	K	L
729					5% Shapiro Wilk Critical Value	0.859	Data Not Normal at 5% Significance Level					
730					Lilliefors Test Statistic	0.487	**Lilliefors GOF Test**					
731					5% Lilliefors Critical Value	0.256	Data Not Normal at 5% Significance Level					
732	**Data Not Normal at 5% Significance Level**											
733												
734	**Assuming Normal Distribution**											
735	**95% Normal UCL**						**95% UCLs (Adjusted for Skewness)**					
736					95% Student's-t UCL	45.28	95% Adjusted-CLT UCL (Chen-1995)					50.52
737							95% Modified-t UCL (Johnson-1978)					46.35
738												
739	**Gamma GOF Test**											
740					A-D Test Statistic	2.856	**Anderson-Darling Gamma GOF Test**					
741					5% A-D Critical Value	0.758	Data Not Gamma Distributed at 5% Significance Level					
742					K-S Test Statistic	0.48	**Kolmogrov-Smirnoff Gamma GOF Test**					
743					5% K-S Critical Value	0.253	Data Not Gamma Distributed at 5% Significance Level					
744	**Data Not Gamma Distributed at 5% Significance Level**											
745												
746	**Gamma Statistics**											
747					k hat (MLE)	0.953	k star (bias corrected MLE)					0.77
748					Theta hat (MLE)	26.97	Theta star (bias corrected MLE)					33.37
749					nu hat (MLE)	22.86	nu star (bias corrected)					18.48
750					MLE Mean (bias corrected)	25.69	MLE Sd (bias corrected)					29.28
751							Approximate Chi Square Value (0.05)					9.738
752					Adjusted Level of Significance	0.029	Adjusted Chi Square Value					8.784
753												
754	**Assuming Gamma Distribution**											
755				95% Approximate Gamma UCL (use when n>=50))		48.75	95% Adjusted Gamma UCL (use when n<50)					54.04
756												
757	**Lognormal GOF Test**											
758					Shapiro Wilk Test Statistic	0.615	**Shapiro Wilk Lognormal GOF Test**					
759					5% Shapiro Wilk Critical Value	0.859	Data Not Lognormal at 5% Significance Level					
760					Lilliefors Test Statistic	0.437	**Lilliefors Lognormal GOF Test**					
761					5% Lilliefors Critical Value	0.256	Data Not Lognormal at 5% Significance Level					
762	**Data Not Lognormal at 5% Significance Level**											
763												
764	**Lognormal Statistics**											
765					Minimum of Logged Data	1.504	Mean of logged Data					2.637
766					Maximum of Logged Data	4.682	SD of logged Data					0.977
767												
768	**Assuming Lognormal Distribution**											
769					95% H-UCL	52.45	90% Chebyshev (MVUE) UCL					40.6
770					95% Chebyshev (MVUE) UCL	49.32	97.5% Chebyshev (MVUE) UCL					61.43
771					99% Chebyshev (MVUE) UCL	85.22						
772												
773	**Nonparametric Distribution Free UCL Statistics**											
774	**Data do not follow a Discernible Distribution (0.05)**											
775												
776	**Nonparametric Distribution Free UCLs**											
777					95% CLT UCL	43.63	95% Jackknife UCL					45.28
778					95% Standard Bootstrap UCL	42.36	95% Bootstrap-t UCL					399.8
779					95% Hall's Bootstrap UCL	624.4	95% Percentile Bootstrap UCL					42.43
780					95% BCA Bootstrap UCL	49.63						

	A	B	C	D	E	F	G	H	I	J	K	L
781					90% Chebyshev(Mean, Sd) UCL	58.41				95% Chebyshev(Mean, Sd) UCL		73.24
782					97.5% Chebyshev(Mean, Sd) UCL	93.81				99% Chebyshev(Mean, Sd) UCL		134.2
783												
784					Suggested UCL to Use							
785					95% Chebyshev (Mean, Sd) UCL	73.24						
786												
787					Note: Suggestions regarding the selection of a 95% UCL are provided to help the user to select the most appropriate 95% UCL.							
788					These recommendations are based upon the results of the simulation studies summarized in Singh, Singh, and Iaci (2002)							
789					and Singh and Singh (2003). However, simulations results will not cover all Real World data sets.							
790					For additional insight the user may want to consult a statistician.							
791												
792												
793	Uranium-238											
794												
795					General Statistics							
796					Total Number of Observations	12				Number of Distinct Observations		3
797										Number of Missing Observations		0
798					Minimum	1.59				Mean		2.67
799					Maximum	3.75				Median		2.67
800					SD	0.461				Std. Error of Mean		0.133
801					Coefficient of Variation	0.172				Skewness		-2.73E-15
802												
803					Normal GOF Test							
804					Shapiro Wilk Test Statistic	0.6				Shapiro Wilk GOF Test		
805					5% Shapiro Wilk Critical Value	0.859				Data Not Normal at 5% Significance Level		
806					Lilliefors Test Statistic	0.417				Lilliefors GOF Test		
807					5% Lilliefors Critical Value	0.256				Data Not Normal at 5% Significance Level		
808					Data Not Normal at 5% Significance Level							
809												
810					Assuming Normal Distribution							
811					95% Normal UCL					95% UCLs (Adjusted for Skewness)		
812					95% Student's-t UCL	2.909				95% Adjusted-CLT UCL (Chen-1995)		2.889
813										95% Modified-t UCL (Johnson-1978)		2.909
814												
815					Gamma GOF Test							
816					A-D Test Statistic	2.741				Anderson-Darling Gamma GOF Test		
817					5% A-D Critical Value	0.731				Data Not Gamma Distributed at 5% Significance Level		
818					K-S Test Statistic	0.44				Kolmogrov-Smirnoff Gamma GOF Test		
819					5% K-S Critical Value	0.245				Data Not Gamma Distributed at 5% Significance Level		
820					Data Not Gamma Distributed at 5% Significance Level							
821												
822					Gamma Statistics							
823					k hat (MLE)	33.75				k star (bias corrected MLE)		25.37
824					Theta hat (MLE)	0.0791				Theta star (bias corrected MLE)		0.105
825					nu hat (MLE)	809.9				nu star (bias corrected)		608.8
826					MLE Mean (bias corrected)	2.67				MLE Sd (bias corrected)		0.53
827										Approximate Chi Square Value (0.05)		552.6
828					Adjusted Level of Significance	0.029				Adjusted Chi Square Value		544.4
829												
830					Assuming Gamma Distribution							
831					95% Approximate Gamma UCL (use when n>=50))	2.942				95% Adjusted Gamma UCL (use when n<50)		2.986
832												

	A	B	C	D	E	F	G	H	I	J	K	L
833						Lognormal GOF Test						
834					Shapiro Wilk Test Statistic	0.579	Shapiro Wilk Lognormal GOF Test					
835					5% Shapiro Wilk Critical Value	0.859	Data Not Lognormal at 5% Significance Level					
836					Lilliefors Test Statistic	0.449	Lilliefors Lognormal GOF Test					
837					5% Lilliefors Critical Value	0.256	Data Not Lognormal at 5% Significance Level					
838						Data Not Lognormal at 5% Significance Level						
839												
840						Lognormal Statistics						
841					Minimum of Logged Data	0.464				Mean of logged Data		0.967
842					Maximum of Logged Data	1.322				SD of logged Data		0.186
843												
844						Assuming Lognormal Distribution						
845					95% H-UCL	2.967				90% Chebyshev (MVUE) UCL		3.105
846					95% Chebyshev (MVUE) UCL	3.301				97.5% Chebyshev (MVUE) UCL		3.573
847					99% Chebyshev (MVUE) UCL	4.107						
848												
849						Nonparametric Distribution Free UCL Statistics						
850						Data do not follow a Discernible Distribution (0.05)						
851												
852						Nonparametric Distribution Free UCLs						
853					95% CLT UCL	2.889				95% Jackknife UCL		2.909
854					95% Standard Bootstrap UCL	N/A				95% Bootstrap-t UCL		N/A
855					95% Hall's Bootstrap UCL	N/A				95% Percentile Bootstrap UCL		N/A
856					95% BCA Bootstrap UCL	N/A						
857					90% Chebyshev(Mean, Sd) UCL	3.069				95% Chebyshev(Mean, Sd) UCL		3.249
858					97.5% Chebyshev(Mean, Sd) UCL	3.5				99% Chebyshev(Mean, Sd) UCL		3.993
859												
860						Suggested UCL to Use						
861					95% Student's-t UCL	2.909				or 95% Modified-t UCL		2.909
862												
863						Note: Suggestions regarding the selection of a 95% UCL are provided to help the user to select the most appropriate 95% UCL.						
864						These recommendations are based upon the results of the simulation studies summarized in Singh, Singh, and Iaci (2002)						
865						and Singh and Singh (2003). However, simulations results will not cover all Real World data sets.						
866						For additional insight the user may want to consult a statistician.						
867												
868						Note: For highly negatively-skewed data, confidence limits (e.g., Chen, Johnson, Lognormal, and Gamma) may not be						
869						reliable. Chen's and Johnson's methods provide adjustments for positvely skewed data sets.						
870												
871												
872	Vanadium											
873												
874						General Statistics						
875					Total Number of Observations	12				Number of Distinct Observations		11
876										Number of Missing Observations		0
877					Minimum	70				Mean		116.8
878					Maximum	138				Median		120
879					SD	19.13				Std. Error of Mean		5.521
880					Coefficient of Variation	0.164				Skewness		-1.394
881												
882						Normal GOF Test						
883					Shapiro Wilk Test Statistic	0.876	Shapiro Wilk GOF Test					
884					5% Shapiro Wilk Critical Value	0.859	Data appear Normal at 5% Significance Level					

	A	B	C	D	E	F	G	H	I	J	K	L
885					Lilliefors Test Statistic	0.234	**Lilliefors GOF Test**					
886					5% Lilliefors Critical Value	0.256	Data appear Normal at 5% Significance Level					
887	**Data appear Normal at 5% Significance Level**											
888												
889	**Assuming Normal Distribution**											
890	**95% Normal UCL**						**95% UCLs (Adjusted for Skewness)**					
891					95% Student's-t UCL	126.7	95% Adjusted-CLT UCL (Chen-1995)					123.5
892							95% Modified-t UCL (Johnson-1978)					126.3
893												
894	**Gamma GOF Test**											
895					A-D Test Statistic	0.762	**Anderson-Darling Gamma GOF Test**					
896					5% A-D Critical Value	0.731	Data Not Gamma Distributed at 5% Significance Level					
897					K-S Test Statistic	0.258	**Kolmogrov-Smirnoff Gamma GOF Test**					
898					5% K-S Critical Value	0.245	Data Not Gamma Distributed at 5% Significance Level					
899	**Data Not Gamma Distributed at 5% Significance Level**											
900												
901	**Gamma Statistics**											
902					k hat (MLE)	34.12	k star (bias corrected MLE)					25.65
903					Theta hat (MLE)	3.422	Theta star (bias corrected MLE)					4.552
904					nu hat (MLE)	818.9	nu star (bias corrected)					615.5
905					MLE Mean (bias corrected)	116.8	MLE Sd (bias corrected)					23.05
906							Approximate Chi Square Value (0.05)					559
907					Adjusted Level of Significance	0.029	Adjusted Chi Square Value					550.7
908												
909	**Assuming Gamma Distribution**											
910					95% Approximate Gamma UCL (use when n>=50))	128.6	95% Adjusted Gamma UCL (use when n<50)					130.5
911												
912	**Lognormal GOF Test**											
913					Shapiro Wilk Test Statistic	0.81	**Shapiro Wilk Lognormal GOF Test**					
914					5% Shapiro Wilk Critical Value	0.859	Data Not Lognormal at 5% Significance Level					
915					Lilliefors Test Statistic	0.268	**Lilliefors Lognormal GOF Test**					
916					5% Lilliefors Critical Value	0.256	Data Not Lognormal at 5% Significance Level					
917	**Data Not Lognormal at 5% Significance Level**											
918												
919	**Lognormal Statistics**											
920					Minimum of Logged Data	4.248	Mean of logged Data					4.745
921					Maximum of Logged Data	4.927	SD of logged Data					0.188
922												
923	**Assuming Lognormal Distribution**											
924					95% H-UCL	129.9	90% Chebyshev (MVUE) UCL					136
925					95% Chebyshev (MVUE) UCL	144.7	97.5% Chebyshev (MVUE) UCL					156.7
926					99% Chebyshev (MVUE) UCL	180.3						
927												
928	**Nonparametric Distribution Free UCL Statistics**											
929	**Data appear to follow a Discernible Distribution at 5% Significance Level**											
930												
931	**Nonparametric Distribution Free UCLs**											
932					95% CLT UCL	125.8	95% Jackknife UCL					126.7
933					95% Standard Bootstrap UCL	125.4	95% Bootstrap-t UCL					125.1
934					95% Hall's Bootstrap UCL	123.9	95% Percentile Bootstrap UCL					124.8
935					95% BCA Bootstrap UCL	124						
936					90% Chebyshev(Mean, Sd) UCL	133.3	95% Chebyshev(Mean, Sd) UCL					140.8

	A	B	C	D	E	F	G	H	I	J	K	L
937					97.5% Chebyshev(Mean, Sd) UCL	151.2					99% Chebyshev(Mean, Sd) UCL	171.7
938												
939						**Suggested UCL to Use**						
940					95% Student's-t UCL	126.7						
941												
942	Note: Suggestions regarding the selection of a 95% UCL are provided to help the user to select the most appropriate 95% UCL.											
943	These recommendations are based upon the results of the simulation studies summarized in Singh, Singh, and Iaci (2002)											
944	and Singh and Singh (2003). However, simulations results will not cover all Real World data sets.											
945	For additional insight the user may want to consult a statistician.											
946												
947	**Note: For highly negatively-skewed data, confidence limits (e.g., Chen, Johnson, Lognormal, and Gamma) may not be**											
948	**reliable. Chen's and Johnson's methods provide adjustments for positvely skewed data sets.**											
949												