

	A	B	C	D	E	F	G	H	I	J	K	L
1	UCL Statistics for Data Sets with Non-Detects											
2												
3	User Selected Options											
4	Time of Computation			8/13/2015 2:17:52 PM								
5	From File			ProUCLinput_15-009(h)_0-10.xls								
6	Full Precision			OFF								
7	Confidence Coefficient			95%								
8	Bootstrap Operations			2000								
9												
10												
11	Barium											
12												
13	General Statistics											
14	Total Number of Observations				12		Number of Distinct Observations				11	
15							Number of Missing Observations				0	
16	Minimum				39.1		Mean				104	
17	Maximum				164		Median				109	
18	SD				38.04		Std. Error of Mean				10.95	
19	Coefficient of Variation				0.36		Skewness				-0.14	
20												
21	Normal GOF Test											
22	Shapiro Wilk Test Statistic				0.95		Shapiro Wilk GOF Test					
23	5% Shapiro Wilk Critical Value				0.85		Data appear Normal at 5% Significance Level					
24	Lilliefors Test Statistic				0.17		Lilliefors GOF Test					
25	5% Lilliefors Critical Value				0.25		Data appear Normal at 5% Significance Level					
26	Data appear 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				123.7		95% Adjusted-CLT UCL (Chen-1995)				121.5	
31							95% Modified-t UCL (Johnson-1978)				123.6	
32												
33	Gamma GOF Test											
34	A-D Test Statistic				0.40		Anderson-Darling Gamma GOF Test					
35	5% A-D Critical Value				0.73		data appear Gamma Distributed at 5% Significance Level					
36	K-S Test Statistic				0.22		Kolmogrov-Smirnov Gamma GOF Test					
37	5% K-S Critical Value				0.24		data appear Gamma Distributed at 5% Significance Level					
38	Detected data appear Gamma Distributed at 5% Significance Level											
39												
40	Gamma Statistics											
41	k hat (MLE)				6.92		k star (bias corrected MLE)				5.24	
42	Theta hat (MLE)				15.02		Theta star (bias corrected MLE)				19.82	
43	nu hat (MLE)				166.1		nu star (bias corrected)				125.9	
44	MLE Mean (bias corrected)				104		MLE Sd (bias corrected)				45.39	
45							Approximate Chi Square Value (0.05)				101	
46	Adjusted Level of Significance				0.025		Adjusted Chi Square Value				97.58	
47												
48	Assuming Gamma Distribution											
49	Approximate Gamma UCL (use when n>=50))				129.63		Adjusted Gamma UCL (use when n<50)				134.1	
50												
51	Lognormal GOF Test											
52	Shapiro Wilk Test Statistic				0.91		Shapiro Wilk Lognormal GOF Test					
53	5% Shapiro Wilk Critical Value				0.85		Data appear Lognormal at 5% Significance Level					
54	Lilliefors Test Statistic				0.24		Lilliefors Lognormal GOF Test					
55	5% Lilliefors Critical Value				0.25		Data appear Lognormal at 5% Significance Level					
56	Data appear Lognormal at 5% Significance Level											
57												
58	Lognormal Statistics											
59	Minimum of Logged Data				3.66		Mean of logged Data				4.57	
60	Maximum of Logged Data				5.1		SD of logged Data				0.42	
61												
62	Assuming Lognormal Distribution											
63	95% H-UCL				137.4		90% Chebyshev (MVUE) UCL				144	

	A	B	C	D	E	F	G	H	I	J	K	L
64	95% Chebyshev (MVUE) UCL				161.8	97.5% Chebyshev (MVUE) UCL				186.4		
65	99% Chebyshev (MVUE) UCL				234.8							
66												
67	Nonparametric Distribution Free UCL Statistics											
68	Data appear to follow a Discernible Distribution at 5% Significance Level											
69												
70	Nonparametric Distribution Free UCLs											
71	95% CLT UCL				122	95% Jackknife UCL				123.7		
72	95% Standard Bootstrap UCL				120.7	95% Bootstrap-t UCL				123		
73	95% Hall's Bootstrap UCL				121.3	95% Percentile Bootstrap UCL				120.7		
74	95% BCA Bootstrap UCL				121.9							
75	90% Chebyshev(Mean, Sd) UCL				136.9	95% Chebyshev(Mean, Sd) UCL				151.9		
76	97.5% Chebyshev(Mean, Sd) UCL				172.6	99% Chebyshev(Mean, Sd) UCL				213.3		
77												
78	Suggested UCL to Use											
79	95% Student's-t UCL				123.7							
80												
81	ations regarding the selection of a 95% UCL are provided to help the user to select the most appropriate											
82	ommendations are based upon the results of the simulation studies summarized in Singh, Singh, and											
83	and Singh and Singh (2003). However, simulations results will not cover all Real World data sets											
84	For additional insight the user may want to consult a statistician.											
85												
86	highly negatively-skewed data, confidence limits (e.g., Chen, Johnson, Lognormal, and Gamma) may											
87	reliable. Chen's and Johnson's methods provide adjustments for positively skewed data sets.											
88												
89												
90	Calcium											
91												
92	General Statistics											
93	Total Number of Observations				12	Number of Distinct Observations				12		
94						Number of Missing Observations				0		
95	Minimum				1040	Mean				5663		
96	Maximum				45400	Median				1940		
97	SD				12535	Std. Error of Mean				3619		
98	Coefficient of Variation				2.21	Skewness				3.44		
99												
100	Normal GOF Test											
101	Shapiro Wilk Test Statistic				0.37	Shapiro Wilk GOF Test						
102	5% Shapiro Wilk Critical Value				0.85	Data Not Normal at 5% Significance Level						
103	Lilliefors Test Statistic				0.49	Lilliefors GOF Test						
104	5% Lilliefors Critical Value				0.25	Data Not Normal at 5% Significance Level						
105	Data Not Normal at 5% Significance Level											
106												
107	Assuming Normal Distribution											
108	95% Normal UCL					95% UCLs (Adjusted for Skewness)						
109	95% Student's-t UCL				12161	95% Adjusted-CLT UCL (Chen-1995)				15458		
110						95% Modified-t UCL (Johnson-1978)				12761		
111												
112	Gamma GOF Test											
113	A-D Test Statistic				2.51	Anderson-Darling Gamma GOF Test						
114	5% A-D Critical Value				0.76	Data Not Gamma Distributed at 5% Significance Level						
115	K-S Test Statistic				0.43	Kolmogorov-Smirnov Gamma GOF Test						
116	5% K-S Critical Value				0.25	Data Not Gamma Distributed at 5% Significance Level						
117	Data Not Gamma Distributed at 5% Significance Level											
118												
119	Gamma Statistics											
120	k hat (MLE)				0.73	k star (bias corrected MLE)				0.60		
121	Theta hat (MLE)				7691	Theta star (bias corrected MLE)				9317		
122	nu hat (MLE)				17.6	nu star (bias corrected)				14.5		
123	MLE Mean (bias corrected)				5663	MLE Sd (bias corrected)				7263		
124						Approximate Chi Square Value (0.05)				6.97		
125	Adjusted Level of Significance				0.025	Adjusted Chi Square Value				6.18		
126												

	A	B	C	D	E	F	G	H	I	J	K	L
127	Assuming Gamma Distribution											
128	Approximate Gamma UCL (use when n>=50)				11842	Adjusted Gamma UCL (use when n<50)				13347		
129												
130	Lognormal GOF Test											
131	Shapiro Wilk Test Statistic				0.67	Shapiro Wilk Lognormal GOF Test						
132	5% Shapiro Wilk Critical Value				0.85	Data Not Lognormal at 5% Significance Level						
133	Lilliefors Test Statistic				0.31	Lilliefors Lognormal GOF Test						
134	5% Lilliefors Critical Value				0.25	Data Not Lognormal at 5% Significance Level						
135	Data Not Lognormal at 5% Significance Level											
136												
137	Lognormal Statistics											
138	Minimum of Logged Data				6.94	Mean of logged Data				7.82		
139	Maximum of Logged Data				10.74	SD of logged Data				0.97		
140												
141	Assuming Lognormal Distribution											
142	95% H-UCL				9446	90% Chebyshev (MVUE) UCL				7300		
143	95% Chebyshev (MVUE) UCL				8871	97.5% Chebyshev (MVUE) UCL				11050		
144	99% Chebyshev (MVUE) UCL				15332							
145												
146	Nonparametric Distribution Free UCL Statistics											
147	Data do not follow a Discernible Distribution (0.05)											
148												
149	Nonparametric Distribution Free UCLs											
150	95% CLT UCL				11615	95% Jackknife UCL				12161		
151	95% Standard Bootstrap UCL				11391	95% Bootstrap-t UCL				85667		
152	95% Hall's Bootstrap UCL				46763	95% Percentile Bootstrap UCL				12873		
153	95% BCA Bootstrap UCL				16478							
154	90% Chebyshev(Mean, Sd) UCL				16518	95% Chebyshev(Mean, Sd) UCL				21436		
155	97.5% Chebyshev(Mean, Sd) UCL				28261	99% Chebyshev(Mean, Sd) UCL				41667		
156												
157	Suggested UCL to Use											
158	95% Chebyshev (Mean, Sd) UCL				21436							
159												
160	Recommendations regarding the selection of a 95% UCL are provided to help the user to select the most appropriate											
161	Recommendations are based upon the results of the simulation studies summarized in Singh, Singh, and Singh											
162	and Singh and Singh (2003). However, simulations results will not cover all Real World data sets											
163	For additional insight the user may want to consult a statistician.											
164												
165												
166	Chromium											
167												
168	General Statistics											
169	Total Number of Observations				12	Number of Distinct Observations				11		
170						Number of Missing Observations				0		
171	Minimum				9.26	Mean				18.4		
172	Maximum				36.1	Median				16.6		
173	SD				8.40	Std. Error of Mean				2.42		
174	Coefficient of Variation				0.45	Skewness				1.11		
175												
176	Normal GOF Test											
177	Shapiro Wilk Test Statistic				0.88	Shapiro Wilk GOF Test						
178	5% Shapiro Wilk Critical Value				0.85	Data appear Normal at 5% Significance Level						
179	Lilliefors Test Statistic				0.18	Lilliefors GOF Test						
180	5% Lilliefors Critical Value				0.25	Data appear Normal at 5% Significance Level						
181	Data appear Normal at 5% Significance Level											
182												
183	Assuming Normal Distribution											
184	95% Normal UCL					95% UCLs (Adjusted for Skewness)						
185	95% Student's-t UCL				22.84	95% Adjusted-CLT UCL (Chen-1995)				23.3		
186						95% Modified-t UCL (Johnson-1978)				22.9		
187												
188	Gamma GOF Test											
189	A-D Test Statistic				0.31	Anderson-Darling Gamma GOF Test						

	A	B	C	D	E	F	G	H	I	J	K	L							
190	5% A-D Critical Value					0.73	data appear Gamma Distributed at 5% Significance Level												
191	K-S Test Statistic					0.16	Kolmogrov-Smirnoff Gamma GOF Test												
192	5% K-S Critical Value					0.24	data appear Gamma Distributed at 5% Significance Level												
193	Detected data appear Gamma Distributed at 5% Significance Level																		
194																			
195	Gamma Statistics																		
196	k hat (MLE)					5.95	k star (bias corrected MLE)					4.52							
197	Theta hat (MLE)					3.10	Theta star (bias corrected MLE)					4.08							
198	nu hat (MLE)					143	nu star (bias corrected)					108.6							
199	MLE Mean (bias corrected)					18.45	MLE Sd (bias corrected)					8.69							
200							Approximate Chi Square Value (0.05)					85.5							
201	Adjusted Level of Significance					0.025	Adjusted Chi Square Value					82.4							
202																			
203	Assuming Gamma Distribution																		
204	Approximate Gamma UCL (use when n>=50))					23.45	Adjusted Gamma UCL (use when n<50)					24.3							
205																			
206	Lognormal GOF Test																		
207	Shapiro Wilk Test Statistic					0.95	Shapiro Wilk Lognormal GOF Test												
208	5% Shapiro Wilk Critical Value					0.85	Data appear Lognormal at 5% Significance Level												
209	Lilliefors Test Statistic					0.13	Lilliefors Lognormal GOF Test												
210	5% Lilliefors Critical Value					0.25	Data appear Lognormal at 5% Significance Level												
211	Data appear Lognormal at 5% Significance Level																		
212																			
213	Lognormal Statistics																		
214	Minimum of Logged Data					2.22	Mean of logged Data					2.83							
215	Maximum of Logged Data					3.58	SD of logged Data					0.42							
216																			
217	Assuming Lognormal Distribution																		
218	95% H-UCL					24.2	90% Chebyshev (MVUE) UCL					25.3							
219	95% Chebyshev (MVUE) UCL					28.45	97.5% Chebyshev (MVUE) UCL					32.8							
220	99% Chebyshev (MVUE) UCL					41.4													
221																			
222	Nonparametric Distribution Free UCL Statistics																		
223	Data appear to follow a Discernible Distribution at 5% Significance Level																		
224																			
225	Nonparametric Distribution Free UCLs																		
226	95% CLT UCL					22.45	95% Jackknife UCL					22.8							
227	95% Standard Bootstrap UCL					22.3	95% Bootstrap-t UCL					24.9							
228	95% Hall's Bootstrap UCL					27.15	95% Percentile Bootstrap UCL					22.6							
229	95% BCA Bootstrap UCL					23.4													
230	90% Chebyshev(Mean, Sd) UCL					25.7	95% Chebyshev(Mean, Sd) UCL					29.0							
231	97.5% Chebyshev(Mean, Sd) UCL					33.6	99% Chebyshev(Mean, Sd) UCL					42.6							
232																			
233	Suggested UCL to Use																		
234	95% Student's-t UCL					22.85													
235																			
236	Recommendations regarding the selection of a 95% UCL are provided to help the user to select the most appropriate																		
237	Recommendations are based upon the results of the simulation studies summarized in Singh, Singh, and																		
238	Singh and Singh (2003). However, simulations results will not cover all Real World data sets																		
239	For additional insight the user may want to consult a statistician.																		
240																			
241	Mercury																		
242																			
243	General Statistics																		
244	Total Number of Observations					12	Number of Distinct Observations					12							
245	Number of Detects					11	Number of Non-Detects					1							
246	Number of Distinct Detects					11	Number of Distinct Non-Detects					1							
247	Minimum Detect					0.008	Minimum Non-Detect					0.01							
248	Maximum Detect					0.11	Maximum Non-Detect					0.01							
249	Variance Detects					0.001	Percent Non-Detects					8.33							
250	Mean Detects					0.024	SD Detects					0.03							
251	Median Detects					0.014	CV Detects					1.33							
252	Skewness Detects					3.00	Kurtosis Detects					9.33							

	A	B	C	D	E	F	G	H	I	J	K	L
253	Mean of Logged Detects					-4.12	SD of Logged Detects					0.77
254												
255	Normal GOF Test on Detects Only											
256	Shapiro Wilk Test Statistic					0.51	Shapiro Wilk GOF Test					
257	5% Shapiro Wilk Critical Value					0.85	Detected Data Not Normal at 5% Significance Level					
258	Lilliefors Test Statistic					0.41	Lilliefors GOF Test					
259	5% Lilliefors Critical Value					0.26	Detected Data Not Normal at 5% Significance Level					
260	Detected Data Not Normal at 5% Significance Level											
261												
262	Kaplan-Meier (KM) Statistics using Normal Critical Values and other Nonparametric UCLs											
263	Mean					0.022	Standard Error of Mean					0.008
264	SD					0.023	95% KM (BCA) UCL					0.039
265	95% KM (t) UCL					0.033	95% KM (Percentile Bootstrap) UCL					0.039
266	95% KM (z) UCL					0.033	95% KM Bootstrap t UCL					0.13
267	90% KM Chebyshev UCL					0.044	95% KM Chebyshev UCL					0.06
268	97.5% KM Chebyshev UCL					0.073	99% KM Chebyshev UCL					0.11
269												
270	Gamma GOF Tests on Detected Observations Only											
271	A-D Test Statistic					1.57	Anderson-Darling GOF Test					
272	5% A-D Critical Value					0.74	Detected Data Not Gamma Distributed at 5% Significance Level					
273	K-S Test Statistic					0.38	Kolmogrov-Smirnoff GOF					
274	5% K-S Critical Value					0.26	Detected Data Not Gamma Distributed at 5% Significance Level					
275	Detected Data Not Gamma Distributed at 5% Significance Level											
276												
277	Gamma Statistics on Detected Data Only											
278	k hat (MLE)					1.41	k star (bias corrected MLE)					1.08
279	Theta hat (MLE)					0.011	Theta star (bias corrected MLE)					0.023
280	nu hat (MLE)					31.06	nu star (bias corrected)					23.9
281	MLE Mean (bias corrected)					0.023	MLE Sd (bias corrected)					0.023
282												
283	Gamma Kaplan-Meier (KM) Statistics											
284	k hat (KM)					0.59	nu hat (KM)					14.13
285	Approximate Chi Square Value (14.18, α)					6.69	Adjusted Chi Square Value (14.18, β)					5.92
286	Approximate KM-UCL (use when n>=50)					0.043	Gamma Adjusted KM-UCL (use when n<50)					0.05
287												
288	Gamma ROS Statistics using Imputed Non-Detects											
289	GROS may not be used when data set has > 50% NDs with many tied observations at multiple DLs											
290	GROS may not be used when kstar of detected data is small such as < 0.1											
291	For such situations, GROS method tends to yield inflated values of UCLs and BTVs											
292	Gamma distributed detected data, BTVs and UCLs may be computed using gamma distribution on KM estimates											
293	Minimum					0.008	Mean					0.023
294	Maximum					0.11	Median					0.013
295	SD					0.036	CV					1.34
296	k hat (MLE)					1.44	k star (bias corrected MLE)					1.13
297	Theta hat (MLE)					0.013	Theta star (bias corrected MLE)					0.023
298	nu hat (MLE)					34.66	nu star (bias corrected)					27.3
299	MLE Mean (bias corrected)					0.023	MLE Sd (bias corrected)					0.023
300							Adjusted Level of Significance (β)					0.023
301	Approximate Chi Square Value (27.33, α)					16.41	Adjusted Chi Square Value (27.33, β)					15.1
302	Gamma Approximate UCL (use when n>=50)					0.036	Gamma Adjusted UCL (use when n<50)					0.043
303												
304	Lognormal GOF Test on Detected Observations Only											
305	Shapiro Wilk Test Statistic					0.76	Shapiro Wilk GOF Test					
306	5% Shapiro Wilk Critical Value					0.85	Detected Data Not Lognormal at 5% Significance Level					
307	Lilliefors Test Statistic					0.32	Lilliefors GOF Test					
308	5% Lilliefors Critical Value					0.26	Detected Data Not Lognormal at 5% Significance Level					
309	Detected Data Not Lognormal at 5% Significance Level											
310												
311	Lognormal ROS Statistics Using Imputed Non-Detects											
312	Mean in Original Scale					0.023	Mean in Log Scale					-4.18
313	SD in Original Scale					0.033	SD in Log Scale					0.77
314	95% t UCL (assumes normality of ROS data)					0.033	95% Percentile Bootstrap UCL					0.039
315	95% BCA Bootstrap UCL					0.044	95% Bootstrap t UCL					0.13

	A	B	C	D	E	F	G	H	I	J	K	L
316	95% H-UCL (Log ROS)					0.03						
317												
318	DL/2 Statistics											
319	DL/2 Normal					DL/2 Log-Transformed						
320	Mean in Original Scale					0.02	Mean in Log Scale					-4.20
321	SD in Original Scale					0.03	SD in Log Scale					0.79
322	95% t UCL (Assumes normality)					0.03	95% H-Stat UCL					0.03
323	DL/2 is not a recommended method, provided for comparisons and historical reasons											
324												
325	Nonparametric Distribution Free UCL Statistics											
326	Data do not follow a Discernible Distribution at 5% Significance Level											
327												
328	Suggested UCL to Use											
329	95% KM (Chebyshev) UCL					0.06						
330												
331	Instructions regarding the selection of a 95% UCL are provided to help the user to select the most appropriate											
332	Recommendations are based upon data size, data distribution, and skewness.											
333	Recommendations are based upon the results of the simulation studies summarized in Singh, Maichle, and											
334	Simulation results will not cover all Real World data sets; for additional insight the user may want to consult											
335												
336												
337	Nickel											
338												
339	General Statistics											
340	Total Number of Observations					12	Number of Distinct Observations					12
341							Number of Missing Observations					0
342	Minimum					4.65	Mean					7.21
343	Maximum					9.68	Median					7.38
344	SD					1.34	Std. Error of Mean					0.38
345	Coefficient of Variation					0.18	Skewness					-0.25
346												
347	Normal GOF Test											
348	Shapiro Wilk Test Statistic					0.95	Shapiro Wilk GOF Test					
349	5% Shapiro Wilk Critical Value					0.85	Data appear Normal at 5% Significance Level					
350	Lilliefors Test Statistic					0.19	Lilliefors GOF Test					
351	5% Lilliefors Critical Value					0.25	Data appear Normal at 5% Significance Level					
352	Data appear Normal at 5% Significance Level											
353												
354	Assuming Normal Distribution											
355	95% Normal UCL					95% UCLs (Adjusted for Skewness)						
356	95% Student's-t UCL					7.91	95% Adjusted-CLT UCL (Chen-1995)					7.82
357							95% Modified-t UCL (Johnson-1978)					7.90
358												
359	Gamma GOF Test											
360	A-D Test Statistic					0.48	Anderson-Darling Gamma GOF Test					
361	5% A-D Critical Value					0.73	Data appear Gamma Distributed at 5% Significance Level					
362	K-S Test Statistic					0.22	Kolmogorov-Smirnov Gamma GOF Test					
363	5% K-S Critical Value					0.24	Data appear Gamma Distributed at 5% Significance Level					
364	Detected data appear Gamma Distributed at 5% Significance Level											
365												
366	Gamma Statistics											
367	k hat (MLE)					29.09	k star (bias corrected MLE)					21.81
368	Theta hat (MLE)					0.24	Theta star (bias corrected MLE)					0.33
369	nu hat (MLE)					698.1	nu star (bias corrected)					524.9
370	MLE Mean (bias corrected)					7.21	MLE Sd (bias corrected)					1.54
371							Approximate Chi Square Value (0.05)					472.8
372	Adjusted Level of Significance					0.02	Adjusted Chi Square Value					465.2
373												
374	Assuming Gamma Distribution											
375	Approximate Gamma UCL (use when n>=50))					8.00	Adjusted Gamma UCL (use when n<50)					8.13
376												
377	Lognormal GOF Test											
378	Shapiro Wilk Test Statistic					0.92	Shapiro Wilk Lognormal GOF Test					

	A	B	C	D	E	F	G	H	I	J	K	L								
379		5% Shapiro Wilk Critical Value				0.85	Data appear Lognormal at 5% Significance Level													
380		Lilliefors Test Statistic				0.22	Lilliefors Lognormal GOF Test													
381		5% Lilliefors Critical Value				0.25	Data appear Lognormal at 5% Significance Level													
382		Data appear Lognormal at 5% Significance Level																		
383																				
384		Lognormal Statistics																		
385		Minimum of Logged Data				1.53	Mean of logged Data				1.95									
386		Maximum of Logged Data				2.27	SD of logged Data				0.19									
387																				
388		Assuming Lognormal Distribution																		
389		95% H-UCL				8.07	90% Chebyshev (MVUE) UCL				8.46									
390		95% Chebyshev (MVUE) UCL				9.02	97.5% Chebyshev (MVUE) UCL				9.81									
391		99% Chebyshev (MVUE) UCL				11.34														
392																				
393		Nonparametric Distribution Free UCL Statistics																		
394		Data appear to follow a Discernible Distribution at 5% Significance Level																		
395																				
396		Nonparametric Distribution Free UCLs																		
397		95% CLT UCL				7.85							95% Jackknife UCL				7.91			
398		95% Standard Bootstrap UCL				7.82	95% Bootstrap-t UCL				7.88									
399		95% Hall's Bootstrap UCL				7.89	95% Percentile Bootstrap UCL				7.84									
400		95% BCA Bootstrap UCL				7.81														
401		90% Chebyshev(Mean, Sd) UCL				8.38							95% Chebyshev(Mean, Sd) UCL				8.91			
402		97.5% Chebyshev(Mean, Sd) UCL				9.64	99% Chebyshev(Mean, Sd) UCL				11.09									
403																				
404		Suggested UCL to Use																		
405		95% Student's-t UCL				7.91														
406																				
407		Questions regarding the selection of a 95% UCL are provided to help the user to select the most appropriate																		
408		Recommendations are based upon the results of the simulation studies summarized in Singh, Singh, and																		
409		Singh and Singh (2003). However, simulations results will not cover all Real World data sets																		
410		For additional insight the user may want to consult a statistician.																		
411																				
412		Highly negatively-skewed data, confidence limits (e.g., Chen, Johnson, Lognormal, and Gamma) may																		
413		be unreliable. Chen's and Johnson's methods provide adjustments for positively skewed data sets.																		
414																				
415		Tritium																		
416																				
417		General Statistics																		
418		Total Number of Observations				12	Number of Distinct Observations				12									
419		Number of Detects				6	Number of Non-Detects				6									
420		Number of Distinct Detects				6	Number of Distinct Non-Detects				6									
421		Minimum Detect				0.014	Minimum Non-Detect				-0.027									
422		Maximum Detect				19.58	Maximum Non-Detect				0.023									
423		Variance Detects				63.68	Percent Non-Detects				50%									
424		Mean Detects				3.29	SD Detects				7.98									
425		Median Detects				0.033	CV Detects				2.42									
426		Skewness Detects				2.44	Kurtosis Detects				6									
427																				
428		Normal GOF Test on Detects Only																		
429		Shapiro Wilk Test Statistic				0.49	Shapiro Wilk GOF Test													
430		5% Shapiro Wilk Critical Value				0.78	Detected Data Not Normal at 5% Significance Level													
431		Lilliefors Test Statistic				0.49	Lilliefors GOF Test													
432		5% Lilliefors Critical Value				0.36	Detected Data Not Normal at 5% Significance Level													
433		Detected Data Not Normal at 5% Significance Level																		
434																				
435		Kaplan-Meier (KM) Statistics using Normal Critical Values and other Nonparametric UCLs																		
436		Mean				1.63	Standard Error of Mean				1.71									
437		SD				5.41	95% KM (BCA) UCL				4.91									
438		95% KM (t) UCL				4.70	95% KM (Percentile Bootstrap) UCL				4.89									
439		95% KM (z) UCL				4.44	95% KM Bootstrap t UCL				635.4									
440		90% KM Chebyshev UCL				6.76	95% KM Chebyshev UCL				9.09									
441		97.5% KM Chebyshev UCL				12.31	99% KM Chebyshev UCL				18.61									

A	B	C	D	E	F	G	H	I	J	K	L
442											
443	Gamma GOF Tests on Detected Observations Only										
444	A-D Test Statistic			1.43	Anderson-Darling GOF Test						
445	5% A-D Critical Value			0.8	ed Data Not Gamma Distributed at 5% Significance Level						
446	K-S Test Statistic			0.50	Kolmogrov-Smirnoff GOF						
447	5% K-S Critical Value			0.36	ed Data Not Gamma Distributed at 5% Significance Level						
448	Detected Data Not Gamma Distributed at 5% Significance Level										
449											
450	Gamma Statistics on Detected Data Only										
451	k hat (MLE)			0.20	k star (bias corrected MLE)						0.21
452	Theta hat (MLE)			16.14	Theta star (bias corrected MLE)						15.4
453	nu hat (MLE)			2.44	nu star (bias corrected)						2.55
454	MLE Mean (bias corrected)			3.29	MLE Sd (bias corrected)						7.13
455											
456	Gamma Kaplan-Meier (KM) Statistics										
457	k hat (KM)			0.09	nu hat (KM)						2.19
458					Adjusted Level of Significance (β)						0.02
459	Approximate Chi Square Value (2.19, α)			0.18	Adjusted Chi Square Value (2.19, β)						0.13
460	Approximate KM-UCL (use when n>=50)			19.94	Gamma Adjusted KM-UCL (use when n<50)						26.4
461	Gamma (KM) may not be used when k hat (KM) is < 0.1										
462											
463	DL/2 Statistics										
464	Mean in Original Scale			1.64	SD in Original Scale						5.64
465	95% t UCL (Assumes normality)			4.57							
466	DL/2 is not a recommended method, provided for comparisons and historical reasons										
467											
468	Nonparametric Distribution Free UCL Statistics										
469	Data do not follow a Discernible Distribution at 5% Significance Level										
470											
471	Suggested UCL to Use										
472	99% KM (Chebyshev) UCL			18.64							
473											
474	utions regarding the selection of a 95% UCL are provided to help the user to select the most appropriate										
475	Recommendations are based upon data size, data distribution, and skewness.										
476	Recommendations are based upon the results of the simulation studies summarized in Singh, Maichle, and										
477	Recommendations results will not cover all Real World data sets; for additional insight the user may want to consult										
478											
479											
480	Uranium										
481											
482	General Statistics										
483	Total Number of Observations			12	Number of Distinct Observations						12
484					Number of Missing Observations						0
485	Minimum			0.50	Mean						2.94
486	Maximum			6.41	Median						2.47
487	SD			2.08	Std. Error of Mean						0.60
488	Coefficient of Variation			0.70	Skewness						0.42
489											
490	Normal GOF Test										
491	Shapiro Wilk Test Statistic			0.90	Shapiro Wilk GOF Test						
492	5% Shapiro Wilk Critical Value			0.85	Data appear Normal at 5% Significance Level						
493	Lilliefors Test Statistic			0.21	Lilliefors GOF Test						
494	5% Lilliefors Critical Value			0.25	Data appear Normal at 5% Significance Level						
495	Data appear Normal at 5% Significance Level										
496											
497	Assuming Normal Distribution										
498	95% Normal UCL				95% UCLs (Adjusted for Skewness)						
499	95% Student's-t UCL			4.02	95% Adjusted-CLT UCL (Chen-1995)						4.01
500					95% Modified-t UCL (Johnson-1978)						4.03
501											
502	Gamma GOF Test										
503	A-D Test Statistic			0.38	Anderson-Darling Gamma GOF Test						
504	5% A-D Critical Value			0.74	Data appear Gamma Distributed at 5% Significance Level						

	A	B	C	D	E	F	G	H	I	J	K	L							
505	K-S Test Statistic					0.15	Kolmogrov-Smirnoff Gamma GOF Test												
506	5% K-S Critical Value					0.24	Data appear Gamma Distributed at 5% Significance Level												
507	Detected data appear Gamma Distributed at 5% Significance Level																		
508																			
509	Gamma Statistics																		
510	k hat (MLE)					1.87	k star (bias corrected MLE)					1.46							
511	Theta hat (MLE)					1.57	Theta star (bias corrected MLE)					2.01							
512	nu hat (MLE)					44.98	nu star (bias corrected)					35.01							
513	MLE Mean (bias corrected)					2.94	MLE Sd (bias corrected)					2.43							
514							Approximate Chi Square Value (0.05)					22.51							
515	Adjusted Level of Significance					0.025	Adjusted Chi Square Value					21							
516																			
517	Assuming Gamma Distribution																		
518	Approximate Gamma UCL (use when n>=50))					4.58	Adjusted Gamma UCL (use when n<50)					4.92							
519																			
520	Lognormal GOF Test																		
521	Shapiro Wilk Test Statistic					0.92	Shapiro Wilk Lognormal GOF Test												
522	5% Shapiro Wilk Critical Value					0.85	Data appear Lognormal at 5% Significance Level												
523	Lilliefors Test Statistic					0.16	Lilliefors Lognormal GOF Test												
524	5% Lilliefors Critical Value					0.25	Data appear Lognormal at 5% Significance Level												
525	Data appear Lognormal at 5% Significance Level																		
526																			
527	Lognormal Statistics																		
528	Minimum of Logged Data					-0.67	Mean of logged Data					0.79							
529	Maximum of Logged Data					1.85	SD of logged Data					0.85							
530																			
531	Assuming Lognormal Distribution																		
532	95% H-UCL					6.25	90% Chebyshev (MVUE) UCL					5.42							
533	95% Chebyshev (MVUE) UCL					6.49	97.5% Chebyshev (MVUE) UCL					7.98							
534	99% Chebyshev (MVUE) UCL					10.91													
535																			
536	Nonparametric Distribution Free UCL Statistics																		
537	Data appear to follow a Discernible Distribution at 5% Significance Level																		
538																			
539	Nonparametric Distribution Free UCLs																		
540	95% CLT UCL					3.93	95% Jackknife UCL					4.02							
541	95% Standard Bootstrap UCL					3.88	95% Bootstrap-t UCL					4.13							
542	95% Hall's Bootstrap UCL					3.95	95% Percentile Bootstrap UCL					3.92							
543	95% BCA Bootstrap UCL					3.94													
544	90% Chebyshev(Mean, Sd) UCL					4.74	95% Chebyshev(Mean, Sd) UCL					5.56							
545	97.5% Chebyshev(Mean, Sd) UCL					6.69	99% Chebyshev(Mean, Sd) UCL					8.92							
546																			
547	Suggested UCL to Use																		
548	95% Student's-t UCL					4.02													
549																			
550	Recommendations regarding the selection of a 95% UCL are provided to help the user to select the most appropriate																		
551	Recommendations are based upon the results of the simulation studies summarized in Singh, Singh, and Singh																		
552	and Singh and Singh (2003). However, simulations results will not cover all Real World data sets																		
553	For additional insight the user may want to consult a statistician.																		
554																			
555																			
556	Uranium-234																		
557																			
558	General Statistics																		
559	Total Number of Observations					12	Number of Distinct Observations					12							
560							Number of Missing Observations					0							
561	Minimum					0.41	Mean					1.19							
562	Maximum					2.74	Median					0.87							
563	SD					0.74	Std. Error of Mean					0.21							
564	Coefficient of Variation					0.62	Skewness					0.95							
565																			
566	Normal GOF Test																		
567	Shapiro Wilk Test Statistic					0.88	Shapiro Wilk GOF Test												

	A	B	C	D	E	F	G	H	I	J	K	L
568			5% Shapiro Wilk Critical Value		0.85		Data appear Normal at 5% Significance Level					
569			Lilliefors Test Statistic		0.22		Lilliefors GOF Test					
570			5% Lilliefors Critical Value		0.25		Data appear Normal at 5% Significance Level					
571			Data appear Normal at 5% Significance Level									
572												
573			Assuming Normal Distribution									
574			95% Normal UCL				95% UCLs (Adjusted for Skewness)					
575			95% Student's-t UCL		1.58		95% Adjusted-CLT UCL (Chen-1995)				1.61	
576							95% Modified-t UCL (Johnson-1978)				1.59	
577												
578			Gamma GOF Test									
579			A-D Test Statistic		0.41		Anderson-Darling Gamma GOF Test					
580			5% A-D Critical Value		0.73		data appear Gamma Distributed at 5% Significance Level					
581			K-S Test Statistic		0.17		Kolmogrov-Smirnoff Gamma GOF Test					
582			5% K-S Critical Value		0.24		data appear Gamma Distributed at 5% Significance Level					
583			Detected data appear Gamma Distributed at 5% Significance Level									
584												
585			Gamma Statistics									
586			k hat (MLE)		3.04		k star (bias corrected MLE)				2.33	
587			Theta hat (MLE)		0.39		Theta star (bias corrected MLE)				0.51	
588			nu hat (MLE)		72.99		nu star (bias corrected)				56.03	
589			MLE Mean (bias corrected)		1.19		MLE Sd (bias corrected)				0.78	
590							Approximate Chi Square Value (0.05)				39.8	
591			Adjusted Level of Significance		0.025		Adjusted Chi Square Value				37.78	
592												
593			Assuming Gamma Distribution									
594			Approximate Gamma UCL (use when n>=50)		1.68		Adjusted Gamma UCL (use when n<50)				1.77	
595												
596			Lognormal GOF Test									
597			Shapiro Wilk Test Statistic		0.94		Shapiro Wilk Lognormal GOF Test					
598			5% Shapiro Wilk Critical Value		0.85		Data appear Lognormal at 5% Significance Level					
599			Lilliefors Test Statistic		0.14		Lilliefors Lognormal GOF Test					
600			5% Lilliefors Critical Value		0.25		Data appear Lognormal at 5% Significance Level					
601			Data appear Lognormal at 5% Significance Level									
602												
603			Lognormal Statistics									
604			Minimum of Logged Data		-0.87		Mean of logged Data				0.004	
605			Maximum of Logged Data		1.00		SD of logged Data				0.61	
606												
607			Assuming Lognormal Distribution									
608			95% H-UCL		1.84		90% Chebyshev (MVUE) UCL				1.84	
609			95% Chebyshev (MVUE) UCL		2.13		97.5% Chebyshev (MVUE) UCL				2.54	
610			99% Chebyshev (MVUE) UCL		3.35							
611												
612			Nonparametric Distribution Free UCL Statistics									
613			Data appear to follow a Discernible Distribution at 5% Significance Level									
614												
615			Nonparametric Distribution Free UCLs									
616			95% CLT UCL		1.55		95% Jackknife UCL				1.58	
617			95% Standard Bootstrap UCL		1.53		95% Bootstrap-t UCL				1.71	
618			95% Hall's Bootstrap UCL		1.65		95% Percentile Bootstrap UCL				1.54	
619			95% BCA Bootstrap UCL		1.61							
620			90% Chebyshev(Mean, Sd) UCL		1.84		95% Chebyshev(Mean, Sd) UCL				2.13	
621			97.5% Chebyshev(Mean, Sd) UCL		2.54		99% Chebyshev(Mean, Sd) UCL				3.34	
622												
623			Suggested UCL to Use									
624			95% Student's-t UCL		1.58							
625												
626			Recommendations regarding the selection of a 95% UCL are provided to help the user to select the most appropriate									
627			Recommendations are based upon the results of the simulation studies summarized in Singh, Singh, and Singh									
628			and Singh and Singh (2003). However, simulations results will not cover all Real World data sets									
629			For additional insight the user may want to consult a statistician.									
630												

	A	B	C	D	E	F	G	H	I	J	K	L
631	Uranium-235/236											
632												
633	General Statistics											
634	Total Number of Observations				12	Number of Distinct Observations				12		
635	Number of Detects				7	Number of Non-Detects				5		
636	Number of Distinct Detects				7	Number of Distinct Non-Detects				5		
637	Minimum Detect				0.063	Minimum Non-Detect				0.01		
638	Maximum Detect				0.29	Maximum Non-Detect				0.06		
639	Variance Detects				0.006	Percent Non-Detects				41.6		
640	Mean Detects				0.13	SD Detects				0.08		
641	Median Detects				0.11	CV Detects				0.60		
642	Skewness Detects				1.52	Kurtosis Detects				2.26		
643	Mean of Logged Detects				-2.15	SD of Logged Detects				0.54		
644												
645	Normal GOF Test on Detects Only											
646	Shapiro Wilk Test Statistic				0.83	Shapiro Wilk GOF Test						
647	5% Shapiro Wilk Critical Value				0.80	Detected Data appear Normal at 5% Significance Level						
648	Lilliefors Test Statistic				0.28	Lilliefors GOF Test						
649	5% Lilliefors Critical Value				0.33	Detected Data appear Normal at 5% Significance Level						
650	Detected Data appear Normal at 5% Significance Level											
651												
652	Kaplan-Meier (KM) Statistics using Normal Critical Values and other Nonparametric UCLs											
653	Mean				0.084	Standard Error of Mean				0.02		
654	SD				0.080	95% KM (BCA) UCL				0.12		
655	95% KM (t) UCL				0.13	95% KM (Percentile Bootstrap) UCL				0.12		
656	95% KM (z) UCL				0.12	95% KM Bootstrap t UCL				0.14		
657	90% KM Chebyshev UCL				0.16	95% KM Chebyshev UCL				0.19		
658	97.5% KM Chebyshev UCL				0.24	99% KM Chebyshev UCL				0.33		
659												
660	Gamma GOF Tests on Detected Observations Only											
661	A-D Test Statistic				0.35	Anderson-Darling GOF Test						
662	5% A-D Critical Value				0.71	Detected data appear Gamma Distributed at 5% Significance Level						
663	K-S Test Statistic				0.23	Kolmogorov-Smirnov GOF						
664	5% K-S Critical Value				0.31	Detected data appear Gamma Distributed at 5% Significance Level						
665	Detected data appear Gamma Distributed at 5% Significance Level											
666												
667	Gamma Statistics on Detected Data Only											
668	k hat (MLE)				3.87	k star (bias corrected MLE)				2.30		
669	Theta hat (MLE)				0.034	Theta star (bias corrected MLE)				0.05		
670	nu hat (MLE)				54.2	nu star (bias corrected)				32.3		
671	MLE Mean (bias corrected)				0.13	MLE Sd (bias corrected)				0.08		
672												
673	Gamma Kaplan-Meier (KM) Statistics											
674	k hat (KM)				1.09	nu hat (KM)				26.3		
675	Approximate Chi Square Value (26.32, α)				15.62	Adjusted Chi Square Value (26.32, β)				14.3		
676	Approximate KM-UCL (use when $n \geq 50$)				0.14	Gamma Adjusted KM-UCL (use when $n < 50$)				0.15		
677												
678	Gamma ROS Statistics using Imputed Non-Detects											
679	GROS may not be used when data set has > 50% NDs with many tied observations at multiple DLs											
680	GROS may not be used when kstar of detected data is small such as < 0.1											
681	For such situations, GROS method tends to yield inflated values of UCLs and BTVs											
682	Gamma distributed detected data, BTVs and UCLs may be computed using gamma distribution on KM estimates											
683	Minimum				0.01	Mean				0.08		
684	Maximum				0.29	Median				0.06		
685	SD				0.080	CV				1.06		
686	k hat (MLE)				0.87	k star (bias corrected MLE)				0.71		
687	Theta hat (MLE)				0.093	Theta star (bias corrected MLE)				0.11		
688	nu hat (MLE)				21.0	nu star (bias corrected)				17.1		
689	MLE Mean (bias corrected)				0.08	MLE Sd (bias corrected)				0.09		
690						Adjusted Level of Significance (β)				0.02		
691	Approximate Chi Square Value (17.10, α)				8.74	Adjusted Chi Square Value (17.10, β)				7.85		
692	Gamma Approximate UCL (use when $n \geq 50$)				0.16	Gamma Adjusted UCL (use when $n < 50$)				0.17		
693												

	A	B	C	D	E	F	G	H	I	J	K	L	
694	Lognormal GOF Test on Detected Observations Only												
695	Shapiro Wilk Test Statistic					0.93	Shapiro Wilk GOF Test						
696	5% Shapiro Wilk Critical Value					0.80	Detected Data appear Lognormal at 5% Significance Level						
697	Lilliefors Test Statistic					0.20	Lilliefors GOF Test						
698	5% Lilliefors Critical Value					0.33	Detected Data appear Lognormal at 5% Significance Level						
699	Detected Data appear Lognormal at 5% Significance Level												
700													
701	Lognormal ROS Statistics Using Imputed Non-Detects												
702	Mean in Original Scale					0.08	Mean in Log Scale					-2.76	
703	SD in Original Scale					0.08	SD in Log Scale					0.85	
704	95% t UCL (assumes normality of ROS data)					0.13	95% Percentile Bootstrap UCL					0.12	
705	95% BCA Bootstrap UCL					0.14	95% Bootstrap t UCL					0.15	
706	95% H-UCL (Log ROS)					0.18							
707													
708	UCLs using Lognormal Distribution and KM Estimates when Detected data are Lognormally Distributed												
709	KM Mean (logged)					-2.96	95% H-UCL (KM -Log)					0.22	
710	KM SD (logged)					1.03	95% Critical H Value (KM-Log)					2.97	
711	KM Standard Error of Mean (logged)					0.32							
712													
713	DL/2 Statistics												
714	DL/2 Normal						DL/2 Log-Transformed						
715	Mean in Original Scale					0.08	Mean in Log Scale					-2.97	
716	SD in Original Scale					0.08	SD in Log Scale					1.13	
717	95% t UCL (Assumes normality)					0.12	95% H-Stat UCL					0.28	
718	DL/2 is not a recommended method, provided for comparisons and historical reasons												
719													
720	Nonparametric Distribution Free UCL Statistics												
721	Detected Data appear Normal Distributed at 5% Significance Level												
722													
723	Suggested UCL to Use												
724	95% KM (t) UCL					0.13	95% KM (Percentile Bootstrap) UCL					0.12	
725													
726	Recommendations regarding the selection of a 95% UCL are provided to help the user to select the most appropriate												
727	Recommendations are based upon data size, data distribution, and skewness.												
728	Recommendations are based upon the results of the simulation studies summarized in Singh, Maichle, and												
729	Recommendations results will not cover all Real World data sets; for additional insight the user may want to consult												
730													
731													
732	Uranium-238												
733													
734	General Statistics												
735	Total Number of Observations					12	Number of Distinct Observations					12	
736							Number of Missing Observations					0	
737	Minimum					0.46	Mean					1.54	
738	Maximum					3.96	Median					1.03	
739	SD					1.14	Std. Error of Mean					0.33	
740	Coefficient of Variation					0.73	Skewness					1.03	
741													
742	Normal GOF Test												
743	Shapiro Wilk Test Statistic					0.85	Shapiro Wilk GOF Test						
744	5% Shapiro Wilk Critical Value					0.85	Data Not Normal at 5% Significance Level						
745	Lilliefors Test Statistic					0.22	Lilliefors GOF Test						
746	5% Lilliefors Critical Value					0.25	Data appear Normal at 5% Significance Level						
747	Data appear Approximate Normal at 5% Significance Level												
748													
749	Assuming Normal Distribution												
750	95% Normal UCL						95% UCLs (Adjusted for Skewness)						
751	95% Student's-t UCL					2.13	95% Adjusted-CLT UCL (Chen-1995)					2.19	
752							95% Modified-t UCL (Johnson-1978)					2.15	
753													
754	Gamma GOF Test												
755	A-D Test Statistic					0.51	Anderson-Darling Gamma GOF Test						
756	5% A-D Critical Value					0.74	Data appear Gamma Distributed at 5% Significance Level						

	A	B	C	D	E	F	G	H	I	J	K	L							
757	K-S Test Statistic					0.19	Kolmogrov-Smirnoff Gamma GOF Test												
758	5% K-S Critical Value					0.24	Data appear Gamma Distributed at 5% Significance Level												
759	Detected data appear Gamma Distributed at 5% Significance Level																		
760																			
761	Gamma Statistics																		
762	k hat (MLE)					2.19	k star (bias corrected MLE)					1.69							
763	Theta hat (MLE)					0.70	Theta star (bias corrected MLE)					0.91							
764	nu hat (MLE)					52.54	nu star (bias corrected)					40.71							
765	MLE Mean (bias corrected)					1.54	MLE Sd (bias corrected)					1.18							
766							Approximate Chi Square Value (0.05)					27.14							
767	Adjusted Level of Significance					0.025	Adjusted Chi Square Value					25.42							
768																			
769	Assuming Gamma Distribution																		
770	Approximate Gamma UCL (use when n>=50))					2.32	Adjusted Gamma UCL (use when n<50)					2.47							
771																			
772	Lognormal GOF Test																		
773	Shapiro Wilk Test Statistic					0.92	Shapiro Wilk Lognormal GOF Test												
774	5% Shapiro Wilk Critical Value					0.85	Data appear Lognormal at 5% Significance Level												
775	Lilliefors Test Statistic					0.17	Lilliefors Lognormal GOF Test												
776	5% Lilliefors Critical Value					0.25	Data appear Lognormal at 5% Significance Level												
777	Data appear Lognormal at 5% Significance Level																		
778																			
779	Lognormal Statistics																		
780	Minimum of Logged Data					-0.77	Mean of logged Data					0.19							
781	Maximum of Logged Data					1.37	SD of logged Data					0.72							
782																			
783	Assuming Lognormal Distribution																		
784	95% H-UCL					2.71	90% Chebyshev (MVUE) UCL					2.55							
785	95% Chebyshev (MVUE) UCL					3.01	97.5% Chebyshev (MVUE) UCL					3.64							
786	99% Chebyshev (MVUE) UCL					4.9													
787																			
788	Nonparametric Distribution Free UCL Statistics																		
789	Data appear to follow a Discernible Distribution at 5% Significance Level																		
790																			
791	Nonparametric Distribution Free UCLs																		
792	95% CLT UCL					2.08	95% Jackknife UCL					2.13							
793	95% Standard Bootstrap UCL					2.06	95% Bootstrap-t UCL					2.32							
794	95% Hall's Bootstrap UCL					2.15	95% Percentile Bootstrap UCL					2.06							
795	95% BCA Bootstrap UCL					2.21													
796	90% Chebyshev(Mean, Sd) UCL					2.53	95% Chebyshev(Mean, Sd) UCL					2.98							
797	97.5% Chebyshev(Mean, Sd) UCL					3.60	99% Chebyshev(Mean, Sd) UCL					4.82							
798																			
799	Suggested UCL to Use																		
800	95% Student's-t UCL					2.13													
801																			
802	Recommendations regarding the selection of a 95% UCL are provided to help the user to select the most appropriate																		
803	Recommendations are based upon the results of the simulation studies summarized in Singh, Singh, and Singh																		
804	and Singh and Singh (2003). However, simulations results will not cover all Real World data sets																		
805	For additional insight the user may want to consult a statistician.																		
806																			
807																			
808	Zinc																		
809																			
810	General Statistics																		
811	Total Number of Observations					12	Number of Distinct Observations					12							
812							Number of Missing Observations					0							
813	Minimum					27.4	Mean					33.44							
814	Maximum					40.5	Median					32.92							
815	SD					4.66	Std. Error of Mean					1.34							
816	Coefficient of Variation					0.14	Skewness					0.30							
817																			
818	Normal GOF Test																		
819	Shapiro Wilk Test Statistic					0.92	Shapiro Wilk GOF Test												

	A	B	C	D	E	F	G	H	I	J	K	L
820			5% Shapiro Wilk Critical Value			0.85	Data appear Normal at 5% Significance Level					
821			Lilliefors Test Statistic			0.15	Lilliefors GOF Test					
822			5% Lilliefors Critical Value			0.25	Data appear Normal at 5% Significance Level					
823			Data appear Normal at 5% Significance Level									
824												
825			Assuming Normal Distribution									
826			95% Normal UCL				95% UCLs (Adjusted for Skewness)					
827			95% Student's-t UCL			35.84	95% Adjusted-CLT UCL (Chen-1995)				35.79	
828							95% Modified-t UCL (Johnson-1978)				35.84	
829												
830			Gamma GOF Test									
831			A-D Test Statistic			0.34	Anderson-Darling Gamma GOF Test					
832			5% A-D Critical Value			0.73	data appear Gamma Distributed at 5% Significance Level					
833			K-S Test Statistic			0.15	Kolmogrov-Smirnoff Gamma GOF Test					
834			5% K-S Critical Value			0.24	data appear Gamma Distributed at 5% Significance Level					
835			Detected data appear Gamma Distributed at 5% Significance Level									
836												
837			Gamma Statistics									
838			k hat (MLE)			56.64	k star (bias corrected MLE)				42.50	
839			Theta hat (MLE)			0.59	Theta star (bias corrected MLE)				0.78	
840			nu hat (MLE)			1360	nu star (bias corrected)				1021	
841			MLE Mean (bias corrected)			33.42	MLE Sd (bias corrected)				5.12	
842							Approximate Chi Square Value (0.05)				947.8	
843			Adjusted Level of Significance			0.025	Adjusted Chi Square Value				937	
844												
845			Assuming Gamma Distribution									
846			Approximate Gamma UCL (use when n>=50)			36	Adjusted Gamma UCL (use when n<50)				36.4	
847												
848			Lognormal GOF Test									
849			Shapiro Wilk Test Statistic			0.93	Shapiro Wilk Lognormal GOF Test					
850			5% Shapiro Wilk Critical Value			0.85	Data appear Lognormal at 5% Significance Level					
851			Lilliefors Test Statistic			0.14	Lilliefors Lognormal GOF Test					
852			5% Lilliefors Critical Value			0.25	Data appear Lognormal at 5% Significance Level					
853			Data appear Lognormal at 5% Significance Level									
854												
855			Lognormal Statistics									
856			Minimum of Logged Data			3.31	Mean of logged Data				3.5	
857			Maximum of Logged Data			3.70	SD of logged Data				0.13	
858												
859			Assuming Lognormal Distribution									
860			95% H-UCL			36.04	90% Chebyshev (MVUE) UCL				37.4	
861			95% Chebyshev (MVUE) UCL			39.26	97.5% Chebyshev (MVUE) UCL				41.7	
862			99% Chebyshev (MVUE) UCL			46.74						
863												
864			Nonparametric Distribution Free UCL Statistics									
865			Data appear to follow a Discernible Distribution at 5% Significance Level									
866												
867			Nonparametric Distribution Free UCLs									
868			95% CLT UCL			35.61	95% Jackknife UCL				35.84	
869			95% Standard Bootstrap UCL			35.5	95% Bootstrap-t UCL				35.9	
870			95% Hall's Bootstrap UCL			35.5	95% Percentile Bootstrap UCL				35.6	
871			95% BCA Bootstrap UCL			35.6						
872			90% Chebyshev(Mean, Sd) UCL			37.4	95% Chebyshev(Mean, Sd) UCL				39.2	
873			97.5% Chebyshev(Mean, Sd) UCL			41.8	99% Chebyshev(Mean, Sd) UCL				46.8	
874												
875			Suggested UCL to Use									
876			95% Student's-t UCL			35.84						
877												
878			Recommendations regarding the selection of a 95% UCL are provided to help the user to select the most appropriate									
879			Recommendations are based upon the results of the simulation studies summarized in Singh, Singh, and									
880			Singh and Singh (2003). However, simulations results will not cover all Real World data sets									
881			For additional insight the user may want to consult a statistician.									
882												