

	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	Date/Time of Computation			9/1/2015 12:03:12 PM									
5	From File			ProUCLinput_15-014(h)_0-10.xls									
6	Full Precision			OFF									
7	Confidence Coefficient			95%									
8	Number of Bootstrap Operations			2000									
9													
10	Acenaphthene												
11													
12	General Statistics												
13	Total Number of Observations				52	Number of Distinct Observations				43			
14	Number of Detects				6	Number of Non-Detects				46			
15	Number of Distinct Detects				6	Number of Distinct Non-Detects				39			
16	Minimum Detect				0.02	Minimum Non-Detect				0.03			
17	Maximum Detect				0.23	Maximum Non-Detect				0.34			
18	Variance Detects				0.006	Percent Non-Detects				88.4			
19	Mean Detects				0.08	SD Detects				0.07			
20	Median Detects				0.04	CV Detects				0.93			
21	Skewness Detects				1.66	Kurtosis Detects				2.32			
22	Mean of Logged Detects				-2.77	SD of Logged Detects				0.82			
23													
24	Normal GOF Test on Detects Only												
25	Shapiro Wilk Test Statistic				0.77	Shapiro Wilk GOF Test							
26	5% Shapiro Wilk Critical Value				0.78	Detected Data Not Normal at 5% Significance Level							
27	Lilliefors Test Statistic				0.32	Lilliefors GOF Test							
28	5% Lilliefors Critical Value				0.36	Detected Data appear Normal at 5% Significance Level							
29	Detected Data appear Approximate Normal at 5% Significance Level												
30													
31	Kaplan-Meier (KM) Statistics using Normal Critical Values and other Nonparametric UCLs												
32	Mean				0.03	Standard Error of Mean				0.004			
33	SD				0.03	95% KM (BCA) UCL				0.05			
34	95% KM (t) UCL				0.04	95% KM (Percentile Bootstrap) UCL				0.04			
35	95% KM (z) UCL				0.04	95% KM Bootstrap t UCL				0.05			
36	90% KM Chebyshev UCL				0.04	95% KM Chebyshev UCL				0.05			
37	97.5% KM Chebyshev UCL				0.06	99% KM Chebyshev UCL				0.08			
38													
39	Gamma GOF Tests on Detected Observations Only												
40	A-D Test Statistic				0.51	Anderson-Darling GOF Test							
41	5% A-D Critical Value				0.70	Detected data appear Gamma Distributed at 5% Significance Level							
42	K-S Test Statistic				0.29	Kolmogorov-Smirnov GOF							
43	5% K-S Critical Value				0.33	Detected data appear Gamma Distributed at 5% Significance Level							
44	Detected data appear Gamma Distributed at 5% Significance Level												
45													
46	Gamma Statistics on Detected Data Only												
47	k hat (MLE)				1.75	k star (bias corrected MLE)				0.99			
48	Theta hat (MLE)				0.04	Theta star (bias corrected MLE)				0.08			
49	nu hat (MLE)				21.0	nu star (bias corrected)				11.8			
50	MLE Mean (bias corrected)				0.08	MLE Sd (bias corrected)				0.08			
51													
52	Gamma Kaplan-Meier (KM) Statistics												
53	k hat (KM)				1.20	nu hat (KM)				125.8			
54	Approximate Chi Square Value (125.76, α)				100.9	Adjusted Chi Square Value (125.76, β)				100.2			
55	Approximate KM-UCL (use when n>=50)				0.04	Gamma Adjusted KM-UCL (use when n<50)				0.04			
56													
57	Gamma ROS Statistics using Imputed Non-Detects												
58	GROS may not be used when data set has > 50% NDs with many tied observations at multiple DLs												
59	GROS may not be used when kstar of detected data is small such as < 0.1												
60	For such situations, GROS method tends to yield inflated values of UCLs and BTVs												
61	Gamma distributed detected data, BTVs and UCLs may be computed using gamma distribution on KM estimate												
62	Minimum				0.01	Mean				0.01			
63	Maximum				0.23	Median				0.01			

	A	B	C	D	E	F	G	H	I	J	K	L
64					SD	0.034					CV	1.86
65					k hat (MLE)	1.35					k star (bias corrected MLE)	1.29
66					Theta hat (MLE)	0.013					Theta star (bias corrected MLE)	0.014
67					nu hat (MLE)	141.2					nu star (bias corrected)	134.4
68					MLE Mean (bias corrected)	0.014					MLE Sd (bias corrected)	0.014
69											Adjusted Level of Significance (β)	0.04
70					pproximate Chi Square Value (134.37, α)	108.6					Adjusted Chi Square Value (134.37, β)	107.9
71					Gamma Approximate UCL (use when n>=50)	0.023					Gamma Adjusted UCL (use when n<50)	0.023
72												
73					Lognormal GOF Test on Detected Observations Only							
74					Shapiro Wilk Test Statistic	0.89					Shapiro Wilk GOF Test	
75					5% Shapiro Wilk Critical Value	0.78					Detected Data appear Lognormal at 5% Significance Level	
76					Lilliefors Test Statistic	0.24					Lilliefors GOF Test	
77					5% Lilliefors Critical Value	0.36					Detected Data appear Lognormal at 5% Significance Level	
78					Detected Data appear Lognormal at 5% Significance Level							
79												
80					Lognormal ROS Statistics Using Imputed Non-Detects							
81					Mean in Original Scale	0.027					Mean in Log Scale	-3.81
82					SD in Original Scale	0.032					SD in Log Scale	0.48
83					95% t UCL (assumes normality of ROS data)	0.034					95% Percentile Bootstrap UCL	0.034
84					95% BCA Bootstrap UCL	0.040					95% Bootstrap t UCL	0.06
85					95% H-UCL (Log ROS)	0.023						
86												
87					UCLs using Lognormal Distribution and KM Estimates when Detected data are Lognormally Distributed							
88					KM Mean (logged)	-3.5					95% H-UCL (KM -Log)	0.034
89					KM SD (logged)	0.37					95% Critical H Value (KM-Log)	1.78
90					KM Standard Error of Mean (logged)	0.06						
91												
92					DL/2 Statistics							
93					DL/2 Normal				DL/2 Log-Transformed			
94					Mean in Original Scale	0.03					Mean in Log Scale	-3.71
95					SD in Original Scale	0.039					SD in Log Scale	0.56
96					95% t UCL (Assumes normality)	0.040					95% H-Stat UCL	0.034
97					DL/2 is not a recommended method, provided for comparisons and historical reasons							
98												
99					Nonparametric Distribution Free UCL Statistics							
100					Detected Data appear Approximate Normal Distributed at 5% Significance Level							
101												
102					Suggested UCL to Use							
103					95% KM (t) UCL	0.042					95% KM (Percentile Bootstrap) UCL	0.042
104												
105					Recommendations regarding the selection of a 95% UCL are provided to help the user to select the most appropriate							
106					Recommendations are based upon data size, data distribution, and skewness.							
107					Recommendations are based upon the results of the simulation studies summarized in Singh, Maichle, and							
108					Recommendations results will not cover all Real World data sets; for additional insight the user may want to consult							
109												
110					Acetone							
111												
112					General Statistics							
113					Total Number of Observations	52					Number of Distinct Observations	46
114					Number of Detects	6					Number of Non-Detects	46
115					Number of Distinct Detects	6					Number of Distinct Non-Detects	41
116					Minimum Detect	0.003					Minimum Non-Detect	0.005
117					Maximum Detect	0.029					Maximum Non-Detect	0.007
118					Variance Detects	1.0143E					Percent Non-Detects	88.4
119					Mean Detects	0.009					SD Detects	0.01
120					Median Detects	0.005					CV Detects	1.08
121					Skewness Detects	2.28					Kurtosis Detects	5.33
122					Mean of Logged Detects	-5.01					SD of Logged Detects	0.79
123												
124					Normal GOF Test on Detects Only							
125					Shapiro Wilk Test Statistic	0.64					Shapiro Wilk GOF Test	
126					5% Shapiro Wilk Critical Value	0.78					Detected Data Not Normal at 5% Significance Level	

	A	B	C	D	E	F	G	H	I	J	K	L							
127	Lilliefors Test Statistic					0.36	Lilliefors GOF Test												
128	5% Lilliefors Critical Value					0.36	Detected Data Not Normal at 5% Significance Level												
129	Detected Data Not Normal at 5% Significance Level																		
130																			
131	Kaplan-Meier (KM) Statistics using Normal Critical Values and other Nonparametric UCLs																		
132	Mean					0.004	Standard Error of Mean					6.7449E-05							
133	SD					0.003	95% KM (BCA) UCL					0.006							
134	95% KM (t) UCL					0.005	95% KM (Percentile Bootstrap) UCL					0.006							
135	95% KM (z) UCL					0.005	95% KM Bootstrap t UCL					0.006							
136	90% KM Chebyshev UCL					0.006	95% KM Chebyshev UCL					0.007							
137	97.5% KM Chebyshev UCL					0.008	99% KM Chebyshev UCL					0.01							
138																			
139	Gamma GOF Tests on Detected Observations Only																		
140	A-D Test Statistic					0.74	Anderson-Darling GOF Test												
141	5% A-D Critical Value					0.70	Detected Data Not Gamma Distributed at 5% Significance Level												
142	K-S Test Statistic					0.31							Kolmogrov-Smirnoff GOF						
143	5% K-S Critical Value					0.33							Detected data appear Gamma Distributed at 5% Significance Level						
144	Detected data follow Appr. Gamma Distribution at 5% Significance Level																		
145																			
146	Gamma Statistics on Detected Data Only																		
147	k hat (MLE)					1.66	k star (bias corrected MLE)					0.94							
148	Theta hat (MLE)					0.005	Theta star (bias corrected MLE)					0.009							
149	nu hat (MLE)					19.9	nu star (bias corrected)					11.2							
150	MLE Mean (bias corrected)					0.009	MLE Sd (bias corrected)					0.009							
151																			
152	Gamma Kaplan-Meier (KM) Statistics																		
153	k hat (KM)					1.73	nu hat (KM)					180.8							
154	Approximate Chi Square Value (180.83, α)					150.7	Adjusted Chi Square Value (180.83, β)					149.9							
155	Approximate KM-UCL (use when $n \geq 50$)					0.005	Gamma Adjusted KM-UCL (use when $n < 50$)					0.005							
156																			
157	Gamma ROS Statistics using Imputed Non-Detects																		
158	GROS may not be used when data set has > 50% NDs with many tied observations at multiple DLs																		
159	GROS may not be used when kstar of detected data is small such as < 0.1																		
160	For such situations, GROS method tends to yield inflated values of UCLs and BTVs																		
161	Gamma distributed detected data, BTVs and UCLs may be computed using gamma distribution on KM estimates																		
162	Minimum					0.003	Mean					0.009							
163	Maximum					0.029	Median					0.01							
164	SD					0.003	CV					0.31							
165	k hat (MLE)					13.1	k star (bias corrected MLE)					12.4							
166	Theta hat (MLE)					7.5253E-05	Theta star (bias corrected MLE)					7.9778E-05							
167	nu hat (MLE)					1370	nu star (bias corrected)					1293							
168	MLE Mean (bias corrected)					0.009	MLE Sd (bias corrected)					0.002							
169							Adjusted Level of Significance (β)					0.04							
170	Approximate Chi Square Value (N/A, α)					1210	Adjusted Chi Square Value (N/A, β)					1208							
171	Gamma Approximate UCL (use when $n \geq 50$)					0.016	Gamma Adjusted UCL (use when $n < 50$)					0.01							
172																			
173	Lognormal GOF Test on Detected Observations Only																		
174	Shapiro Wilk Test Statistic					0.83	Shapiro Wilk GOF Test												
175	5% Shapiro Wilk Critical Value					0.78	Detected Data appear Lognormal at 5% Significance Level												
176	Lilliefors Test Statistic					0.27							Lilliefors GOF Test						
177	5% Lilliefors Critical Value					0.36							Detected Data appear Lognormal at 5% Significance Level						
178	Detected Data appear Lognormal at 5% Significance Level																		
179																			
180	Lognormal ROS Statistics Using Imputed Non-Detects																		
181	Mean in Original Scale					0.004	Mean in Log Scale					-5.43							
182	SD in Original Scale					0.003	SD in Log Scale					0.31							
183	95% t UCL (assumes normality of ROS data)					0.005	95% Percentile Bootstrap UCL					0.005							
184	95% BCA Bootstrap UCL					0.006	95% Bootstrap t UCL					0.008							
185	95% H-UCL (Log ROS)					0.004													
186																			
187	UCLs using Lognormal Distribution and KM Estimates when Detected data are Lognormally Distributed																		
188	KM Mean (logged)					-5.44	95% H-UCL (KM -Log)					0.005							
189	KM SD (logged)					0.34	95% Critical H Value (KM-Log)					1.74							

	A	B	C	D	E	F	G	H	I	J	K	L	
190	KM Standard Error of Mean (logged)					0.10							
191													
192	DL/2 Statistics												
193	DL/2 Normal					DL/2 Log-Transformed							
194	Mean in Original Scale					0.003	Mean in Log Scale					-5.72	
195	SD in Original Scale					0.003	SD in Log Scale					0.36	
196	95% t UCL (Assumes normality)					0.004	95% H-Stat UCL					0.003	
197	DL/2 is not a recommended method, provided for comparisons and historical reasons												
198													
199	Nonparametric Distribution Free UCL Statistics												
200	Detected Data appear Approximate Gamma Distributed at 5% Significance Level												
201													
202	Suggested UCL to Use												
203	95% KM (t) UCL					0.005	95% GROS Approximate Gamma UCL					0.01	
204	95% Approximate Gamma KM-UCL					0.005							
205													
206	Recommendations regarding the selection of a 95% UCL are provided to help the user to select the most appropriate												
207	Recommendations are based upon data size, data distribution, and skewness.												
208	Recommendations are based upon the results of the simulation studies summarized in Singh, Maichle, and												
209	Recommendations results will not cover all Real World data sets; for additional insight the user may want to consult												
210													
211													
212	Aluminum												
213													
214	General Statistics												
215	Total Number of Observations					52	Number of Distinct Observations					47	
216							Number of Missing Observations					0	
217	Minimum					3840	Mean					9193	
218	Maximum					16100	Median					9285	
219	SD					2365	Std. Error of Mean					328	
220	Coefficient of Variation					0.25	Skewness					-0.074	
221													
222	Normal GOF Test												
223	Shapiro Wilk Test Statistic					0.97	Shapiro Wilk GOF Test						
224	5% Shapiro Wilk P Value					0.35	Data appear Normal at 5% Significance Level						
225	Lilliefors Test Statistic					0.12	Lilliefors GOF Test						
226	5% Lilliefors Critical Value					0.12	Data Not Normal at 5% Significance Level						
227	Data appear Approximate Normal at 5% Significance Level												
228													
229	Assuming Normal Distribution												
230	95% Normal UCL					95% UCLs (Adjusted for Skewness)							
231	95% Student's-t UCL					9742	95% Adjusted-CLT UCL (Chen-1995)					9728	
232							95% Modified-t UCL (Johnson-1978)					9741	
233													
234	Gamma GOF Test												
235	A-D Test Statistic					1.25	Anderson-Darling Gamma GOF Test						
236	5% A-D Critical Value					0.74	Data Not Gamma Distributed at 5% Significance Level						
237	K-S Test Statistic					0.16	Kolmogorov-Smirnov Gamma GOF Test						
238	5% K-S Critical Value					0.12	Data Not Gamma Distributed at 5% Significance Level						
239	Data Not Gamma Distributed at 5% Significance Level												
240													
241	Gamma Statistics												
242	k hat (MLE)					13.54	k star (bias corrected MLE)					12.7	
243	Theta hat (MLE)					678.8	Theta star (bias corrected MLE)					719.6	
244	nu hat (MLE)					1408	nu star (bias corrected)					1329	
245	MLE Mean (bias corrected)					9193	MLE Sd (bias corrected)					2572	
246							Approximate Chi Square Value (0.05)					1245	
247	Adjusted Level of Significance					0.04	Adjusted Chi Square Value					1243	
248													
249	Assuming Gamma Distribution												
250	Approximate Gamma UCL (use when n>=50)					9810	Adjusted Gamma UCL (use when n<50)					9828	
251													
252	Lognormal GOF Test												

	A	B	C	D	E	F	G	H	I	J	K	L	
253	Shapiro Wilk Test Statistic					0.91	Shapiro Wilk Lognormal GOF Test						
254	5% Shapiro Wilk P Value					8.0930E	Data Not Lognormal at 5% Significance Level						
255	Lilliefors Test Statistic					0.18	Lilliefors Lognormal GOF Test						
256	5% Lilliefors Critical Value					0.12	Data Not Lognormal at 5% Significance Level						
257	Data Not Lognormal at 5% Significance Level												
258													
259	Lognormal Statistics												
260	Minimum of Logged Data					8.25	Mean of logged Data					9.08	
261	Maximum of Logged Data					9.68	SD of logged Data					0.28	
262													
263	Assuming Lognormal Distribution												
264	95% H-UCL					9898	90% Chebyshev (MVUE) UCL					10356	
265	95% Chebyshev (MVUE) UCL					10868	97.5% Chebyshev (MVUE) UCL					11579	
266	99% Chebyshev (MVUE) UCL					12974							
267													
268	Nonparametric Distribution Free UCL Statistics												
269	Data appear to follow a Discernible Distribution at 5% Significance Level												
270													
271	Nonparametric Distribution Free UCLs												
272	95% CLT UCL					9732	95% Jackknife UCL					9742	
273	95% Standard Bootstrap UCL					9733	95% Bootstrap-t UCL					9755	
274	95% Hall's Bootstrap UCL					9719	95% Percentile Bootstrap UCL					9734	
275	95% BCA Bootstrap UCL					9726							
276	90% Chebyshev(Mean, Sd) UCL					10176	95% Chebyshev(Mean, Sd) UCL					10622	
277	97.5% Chebyshev(Mean, Sd) UCL					11241	99% Chebyshev(Mean, Sd) UCL					12456	
278													
279	Suggested UCL to Use												
280	95% Student's-t UCL					9742							
281													
282	itions regarding the selection of a 95% UCL are provided to help the user to select the most appropriate												
283	ommendations are based upon the results of the simulation studies summarized in Singh, Singh, and												
284	and Singh and Singh (2003). However, simulations results will not cover all Real World data sets												
285	For additional insight the user may want to consult a statistician.												
286													
287	highly negatively-skewed data, confidence limits (e.g., Chen, Johnson, Lognormal, and Gamma) may												
288	reliable. Chen's and Johnson's methods provide adjustments for positively skewed data sets.												
289													
290	Arsenic												
291													
292	General Statistics												
293	Total Number of Observations					52	Number of Distinct Observations					50	
294	Number of Detects					40	Number of Non-Detects					12	
295	Number of Distinct Detects					39	Number of Distinct Non-Detects					12	
296	Minimum Detect					0.52	Minimum Non-Detect					1.45	
297	Maximum Detect					4.45	Maximum Non-Detect					3.18	
298	Variance Detects					0.52	Percent Non-Detects					23.04	
299	Mean Detects					2.03	SD Detects					0.72	
300	Median Detects					1.92	CV Detects					0.35	
301	Skewness Detects					1.37	Kurtosis Detects					3.41	
302	Mean of Logged Detects					0.65	SD of Logged Detects					0.35	
303													
304	Normal GOF Test on Detects Only												
305	Shapiro Wilk Test Statistic					0.89	Shapiro Wilk GOF Test						
306	5% Shapiro Wilk Critical Value					0.94	Detected Data Not Normal at 5% Significance Level						
307	Lilliefors Test Statistic					0.15	Lilliefors GOF Test						
308	5% Lilliefors Critical Value					0.14	Detected Data Not Normal at 5% Significance Level						
309	Detected Data Not Normal at 5% Significance Level												
310													
311	Kaplan-Meier (KM) Statistics using Normal Critical Values and other Nonparametric UCLs												
312	Mean					1.92	Standard Error of Mean					0.10	
313	SD					0.68	95% KM (BCA) UCL					2.11	
314	95% KM (t) UCL					2.09	95% KM (Percentile Bootstrap) UCL					2.09	
315	95% KM (z) UCL					2.09	95% KM Bootstrap t UCL					2.11	

	A	B	C	D	E	F	G	H	I	J	K	L
316			90% KM Chebyshev UCL		2.23		95% KM Chebyshev UCL		2.36			
317			97.5% KM Chebyshev UCL		2.56		99% KM Chebyshev UCL		2.93			
318												
319			Gamma GOF Tests on Detected Observations Only									
320			A-D Test Statistic		0.69		Anderson-Darling GOF Test					
321			5% A-D Critical Value		0.74		data appear Gamma Distributed at 5% Significance Level					
322			K-S Test Statistic		0.10		Kolmogrov-Smirnoff GOF					
323			5% K-S Critical Value		0.14		data appear Gamma Distributed at 5% Significance Level					
324			Detected data appear Gamma Distributed at 5% Significance Level									
325												
326			Gamma Statistics on Detected Data Only									
327			k hat (MLE)		8.61		k star (bias corrected MLE)		7.98			
328			Theta hat (MLE)		0.23		Theta star (bias corrected MLE)		0.25			
329			nu hat (MLE)		688.9		nu star (bias corrected)		638.6			
330			MLE Mean (bias corrected)		2.03		MLE Sd (bias corrected)		0.71			
331												
332			Gamma Kaplan-Meier (KM) Statistics									
333			k hat (KM)		7.85		nu hat (KM)		816.8			
334			Approximate Chi Square Value (816.78, α)		751.5		Adjusted Chi Square Value (816.78, β)		749.7			
335			Approximate KM-UCL (use when $n \geq 50$)		2.09		Gamma Adjusted KM-UCL (use when $n < 50$)		2.1			
336												
337			Gamma ROS Statistics using Imputed Non-Detects									
338			GROS may not be used when data set has > 50% NDs with many tied observations at multiple DLs									
339			GROS may not be used when kstar of detected data is small such as < 0.1									
340			For such situations, GROS method tends to yield inflated values of UCLs and BTVs									
341			Gamma distributed detected data, BTVs and UCLs may be computed using gamma distribution on KM estimates									
342			Minimum		0.52		Mean		1.92			
343			Maximum		4.45		Median		1.76			
344			SD		0.67		CV		0.35			
345			k hat (MLE)		9.28		k star (bias corrected MLE)		8.76			
346			Theta hat (MLE)		0.20		Theta star (bias corrected MLE)		0.21			
347			nu hat (MLE)		966.1		nu star (bias corrected)		911.7			
348			MLE Mean (bias corrected)		1.92		MLE Sd (bias corrected)		0.64			
349							Adjusted Level of Significance (β)		0.04			
350			Approximate Chi Square Value (911.66, α)		842.6		Adjusted Chi Square Value (911.66, β)		840.7			
351			Gamma Approximate UCL (use when $n \geq 50$)		2.07		Gamma Adjusted UCL (use when $n < 50$)		2.08			
352												
353			Lognormal GOF Test on Detected Observations Only									
354			Shapiro Wilk Test Statistic		0.93		Shapiro Wilk GOF Test					
355			5% Shapiro Wilk Critical Value		0.94		Detected Data Not Lognormal at 5% Significance Level					
356			Lilliefors Test Statistic		0.11		Lilliefors GOF Test					
357			5% Lilliefors Critical Value		0.14		Detected Data appear Lognormal at 5% Significance Level					
358			Detected Data appear Approximate Lognormal at 5% Significance Level									
359												
360			Lognormal ROS Statistics Using Imputed Non-Detects									
361			Mean in Original Scale		1.91		Mean in Log Scale		0.59			
362			SD in Original Scale		0.67		SD in Log Scale		0.33			
363			5% t UCL (assumes normality of ROS data)		2.07		95% Percentile Bootstrap UCL		2.07			
364			95% BCA Bootstrap UCL		2.09		95% Bootstrap t UCL		2.10			
365			95% H-UCL (Log ROS)		2.08							
366												
367			DLs using Lognormal Distribution and KM Estimates when Detected data are Lognormally Distributed									
368			KM Mean (logged)		0.59		95% H-UCL (KM -Log)		2.11			
369			KM SD (logged)		0.36		95% Critical H Value (KM-Log)		1.76			
370			KM Standard Error of Mean (logged)		0.05							
371												
372			DL/2 Statistics									
373			DL/2 Normal					DL/2 Log-Transformed				
374			Mean in Original Scale		1.82		Mean in Log Scale		0.52			
375			SD in Original Scale		0.75		SD in Log Scale		0.41			
376			95% t UCL (Assumes normality)		1.99		95% H-Stat UCL		2.03			
377			DL/2 is not a recommended method, provided for comparisons and historical reasons									
378												

	A	B	C	D	E	F	G	H	I	J	K	L
379	Nonparametric Distribution Free UCL Statistics											
380	Detected Data appear Gamma Distributed at 5% Significance Level											
381												
382	Suggested UCL to Use											
383	95% KM (Percentile Bootstrap) UCL				2.09		95% GROS Approximate Gamma UCL				2.07	
384	95% Approximate Gamma KM-UCL				2.09							
385												
386	Recommendations regarding the selection of a 95% UCL are provided to help the user to select the most appropriate											
387	Recommendations are based upon data size, data distribution, and skewness.											
388	Recommendations are based upon the results of the simulation studies summarized in Singh, Maichle, and											
389	Recommendations results will not cover all Real World data sets; for additional insight the user may want to consult											
390												
391												
392	Barium											
393												
394	General Statistics											
395	Total Number of Observations				52		Number of Distinct Observations				44	
396							Number of Missing Observations				0	
397	Minimum				46.5		Mean				131.5	
398	Maximum				195		Median				138	
399	SD				38.26		Std. Error of Mean				5.30	
400	Coefficient of Variation				0.29		Skewness				-0.62	
401												
402	Normal GOF Test											
403	Shapiro Wilk Test Statistic				0.94		Shapiro Wilk GOF Test					
404	5% Shapiro Wilk P Value				0.018		Data Not Normal at 5% Significance Level					
405	Lilliefors Test Statistic				0.095		Lilliefors GOF Test					
406	5% Lilliefors Critical Value				0.12		Data appear Normal at 5% Significance Level					
407	Data appear Approximate Normal at 5% Significance Level											
408												
409	Assuming Normal Distribution											
410	95% Normal UCL				95% UCLs (Adjusted for Skewness)							
411	95% Student's-t UCL				140.4		95% Adjusted-CLT UCL (Chen-1995)				139.7	
412							95% Modified-t UCL (Johnson-1978)				140.3	
413												
414	Gamma GOF Test											
415	A-D Test Statistic				1.67		Anderson-Darling Gamma GOF Test					
416	5% A-D Critical Value				0.75		Data Not Gamma Distributed at 5% Significance Level					
417	K-S Test Statistic				0.13		Kolmogrov-Smirnov Gamma GOF Test					
418	5% K-S Critical Value				0.12		Data Not Gamma Distributed at 5% Significance Level					
419	Data Not Gamma Distributed at 5% Significance Level											
420												
421	Gamma Statistics											
422	k hat (MLE)				9.34		k star (bias corrected MLE)				8.82	
423	Theta hat (MLE)				14.0		Theta star (bias corrected MLE)				14.9	
424	nu hat (MLE)				972.2		nu star (bias corrected)				917.4	
425	MLE Mean (bias corrected)				131.5		MLE Sd (bias corrected)				44.2	
426							Approximate Chi Square Value (0.05)				848.1	
427	Adjusted Level of Significance				0.045		Adjusted Chi Square Value				846.2	
428												
429	Assuming Gamma Distribution											
430	Approximate Gamma UCL (use when n>=50)				142.2		Adjusted Gamma UCL (use when n<50)				142.6	
431												
432	Lognormal GOF Test											
433	Shapiro Wilk Test Statistic				0.84		Shapiro Wilk Lognormal GOF Test					
434	5% Shapiro Wilk P Value				5.6948E-05		Data Not Lognormal at 5% Significance Level					
435	Lilliefors Test Statistic				0.14		Lilliefors Lognormal GOF Test					
436	5% Lilliefors Critical Value				0.12		Data Not Lognormal at 5% Significance Level					
437	Data Not Lognormal at 5% Significance Level											
438												
439	Lognormal Statistics											
440	Minimum of Logged Data				3.83		Mean of logged Data				4.82	
441	Maximum of Logged Data				5.27		SD of logged Data				0.36	

A	B	C	D	E	F	G	H	I	J	K	L
442											
443	Assuming Lognormal Distribution										
444	95% H-UCL			145.2	90% Chebyshev (MVUE) UCL			153.1			
445	95% Chebyshev (MVUE) UCL			162.4	97.5% Chebyshev (MVUE) UCL			175.2			
446	99% Chebyshev (MVUE) UCL			200.5							
447											
448	Nonparametric Distribution Free UCL Statistics										
449	Data appear to follow a Discernible Distribution at 5% Significance Level										
450											
451	Nonparametric Distribution Free UCLs										
452	95% CLT UCL			140.2	95% Jackknife UCL			140.4			
453	95% Standard Bootstrap UCL			140.2	95% Bootstrap-t UCL			140.1			
454	95% Hall's Bootstrap UCL			139.9	95% Percentile Bootstrap UCL			140			
455	95% BCA Bootstrap UCL			139							
456	90% Chebyshev(Mean, Sd) UCL			147.4	95% Chebyshev(Mean, Sd) UCL			154.6			
457	97.5% Chebyshev(Mean, Sd) UCL			164.6	99% Chebyshev(Mean, Sd) UCL			184.3			
458											
459	Suggested UCL to Use										
460	95% Student's-t UCL			140.4							
461											
462	tions regarding the selection of a 95% UCL are provided to help the user to select the most appropriate										
463	ommendations are based upon the results of the simulation studies summarized in Singh, Singh, and										
464	and Singh and Singh (2003). However, simulations results will not cover all Real World data sets										
465	For additional insight the user may want to consult a statistician.										
466											
467	highly negatively-skewed data, confidence limits (e.g., Chen, Johnson, Lognormal, and Gamma) may										
468	reliable. Chen's and Johnson's methods provide adjustments for positively skewed data sets.										
469											
470											
471	Beryllium										
472											
473	General Statistics										
474	Total Number of Observations			52	Number of Distinct Observations			48			
475					Number of Missing Observations			0			
476	Minimum			0.27	Mean			0.86			
477	Maximum			1.33	Median			0.85			
478	SD			0.22	Std. Error of Mean			0.03			
479	Coefficient of Variation			0.25	Skewness			0.20			
480											
481	Normal GOF Test										
482	Shapiro Wilk Test Statistic			0.96	Shapiro Wilk GOF Test						
483	5% Shapiro Wilk P Value			0.28	Data appear Normal at 5% Significance Level						
484	Lilliefors Test Statistic			0.08	Lilliefors GOF Test						
485	5% Lilliefors Critical Value			0.12	Data appear Normal at 5% Significance Level						
486	Data appear Normal at 5% Significance Level										
487											
488	Assuming Normal Distribution										
489	95% Normal UCL				95% UCLs (Adjusted for Skewness)						
490	95% Student's-t UCL			0.92	95% Adjusted-CLT UCL (Chen-1995)			0.92			
491					95% Modified-t UCL (Johnson-1978)			0.92			
492											
493	Gamma GOF Test										
494	A-D Test Statistic			0.39	Anderson-Darling Gamma GOF Test						
495	5% A-D Critical Value			0.74	data appear Gamma Distributed at 5% Significance Level						
496	K-S Test Statistic			0.09	Kolmogorov-Smirnov Gamma GOF Test						
497	5% K-S Critical Value			0.12	data appear Gamma Distributed at 5% Significance Level						
498	Detected data appear Gamma Distributed at 5% Significance Level										
499											
500	Gamma Statistics										
501	k hat (MLE)			14.14	k star (bias corrected MLE)			13.3			
502	Theta hat (MLE)			0.06	Theta star (bias corrected MLE)			0.06			
503	nu hat (MLE)			1470	nu star (bias corrected)			1387			
504	MLE Mean (bias corrected)			0.86	MLE Sd (bias corrected)			0.23			

	A	B	C	D	E	F	G	H	I	J	K	L	
505							Approximate Chi Square Value (0.05)					1301	
506	Adjusted Level of Significance						0.04	Adjusted Chi Square Value					1299
507													
508	Assuming Gamma Distribution												
509	roximate Gamma UCL (use when n>=50))						0.92	Adjusted Gamma UCL (use when n<50)					0.92
510													
511	Lognormal GOF Test												
512	Shapiro Wilk Test Statistic						0.93	Shapiro Wilk Lognormal GOF Test					
513	5% Shapiro Wilk P Value						0.01	Data Not Lognormal at 5% Significance Level					
514	Lilliefors Test Statistic						0.11	Lilliefors Lognormal GOF Test					
515	5% Lilliefors Critical Value						0.12	Data appear Lognormal at 5% Significance Level					
516	Data appear Approximate Lognormal at 5% Significance Level												
517													
518	Lognormal Statistics												
519	Minimum of Logged Data						-1.28	Mean of logged Data					-0.17
520	Maximum of Logged Data						0.28	SD of logged Data					0.28
521													
522	Assuming Lognormal Distribution												
523	95% H-UCL						0.93	90% Chebyshev (MVUE) UCL					0.97
524	95% Chebyshev (MVUE) UCL						1.02	97.5% Chebyshev (MVUE) UCL					1.08
525	99% Chebyshev (MVUE) UCL						1.21						
526													
527	Nonparametric Distribution Free UCL Statistics												
528	Data appear to follow a Discernible Distribution at 5% Significance Level												
529													
530	Nonparametric Distribution Free UCLs												
531	95% CLT UCL						0.91	95% Jackknife UCL					0.92
532	95% Standard Bootstrap UCL						0.91	95% Bootstrap-t UCL					0.92
533	95% Hall's Bootstrap UCL						0.92	95% Percentile Bootstrap UCL					0.91
534	95% BCA Bootstrap UCL						0.91						
535	90% Chebyshev(Mean, Sd) UCL						0.96	95% Chebyshev(Mean, Sd) UCL					1.00
536	97.5% Chebyshev(Mean, Sd) UCL						1.06	99% Chebyshev(Mean, Sd) UCL					1.17
537													
538	Suggested UCL to Use												
539	95% Student's-t UCL						0.92						
540													
541	ations regarding the selection of a 95% UCL are provided to help the user to select the most appropriate												
542	ommendations are based upon the results of the simulation studies summarized in Singh, Singh, and												
543	and Singh and Singh (2003). However, simulations results will not cover all Real World data sets												
544	For additional insight the user may want to consult a statistician.												
545													
546	Cadmium												
547													
548	General Statistics												
549	Total Number of Observations						52	Number of Distinct Observations					49
550	Number of Detects						9	Number of Non-Detects					43
551	Number of Distinct Detects						9	Number of Distinct Non-Detects					40
552	Minimum Detect						0.11	Minimum Non-Detect					0.51
553	Maximum Detect						1.54	Maximum Non-Detect					0.71
554	Variance Detects						0.23	Percent Non-Detects					82.6
555	Mean Detects						0.44	SD Detects					0.48
556	Median Detects						0.17	CV Detects					1.11
557	Skewness Detects						1.81	Kurtosis Detects					2.79
558	Mean of Logged Detects						-1.25	SD of Logged Detects					0.93
559													
560	Normal GOF Test on Detects Only												
561	Shapiro Wilk Test Statistic						0.72	Shapiro Wilk GOF Test					
562	5% Shapiro Wilk Critical Value						0.82	Detected Data Not Normal at 5% Significance Level					
563	Lilliefors Test Statistic						0.27	Lilliefors GOF Test					
564	5% Lilliefors Critical Value						0.29	Detected Data appear Normal at 5% Significance Level					
565	Detected Data appear Approximate Normal at 5% Significance Level												
566													
567	Kaplan-Meier (KM) Statistics using Normal Critical Values and other Nonparametric UCLs												

	A	B	C	D	E	F	G	H	I	J	K	L
568	Mean					0.25	Standard Error of Mean					0.054
569	SD					0.23	95% KM (BCA) UCL					0.35
570	95% KM (t) UCL					0.34	95% KM (Percentile Bootstrap) UCL					0.35
571	95% KM (z) UCL					0.34	95% KM Bootstrap t UCL					0.40
572	90% KM Chebyshev UCL					0.41	95% KM Chebyshev UCL					0.49
573	97.5% KM Chebyshev UCL					0.59	99% KM Chebyshev UCL					0.79
574												
575	Gamma GOF Tests on Detected Observations Only											
576	A-D Test Statistic					0.75	Anderson-Darling GOF Test					
577	5% A-D Critical Value					0.73	Detected Data Not Gamma Distributed at 5% Significance Level					
578	K-S Test Statistic					0.28	Kolmogrov-Smirnoff GOF					
579	5% K-S Critical Value					0.28	Detected data appear Gamma Distributed at 5% Significance Level					
580	Detected data follow Appr. Gamma Distribution at 5% Significance Level											
581												
582	Gamma Statistics on Detected Data Only											
583	k hat (MLE)					1.28	k star (bias corrected MLE)					0.93
584	Theta hat (MLE)					0.34	Theta star (bias corrected MLE)					0.47
585	nu hat (MLE)					23.1	nu star (bias corrected)					16.7
586	MLE Mean (bias corrected)					0.44	MLE Sd (bias corrected)					0.45
587												
588	Gamma Kaplan-Meier (KM) Statistics											
589	k hat (KM)					1.14	nu hat (KM)					119.1
590	Approximate Chi Square Value (119.10, α)					94.9	Adjusted Chi Square Value (119.10, β)					94.2
591	Approximate KM-UCL (use when $n \geq 50$)					0.31	Gamma Adjusted KM-UCL (use when $n < 50$)					0.31
592												
593	Gamma ROS Statistics using Imputed Non-Detects											
594	GROS may not be used when data set has > 50% NDs with many tied observations at multiple DLs											
595	GROS may not be used when kstar of detected data is small such as < 0.1											
596	For such situations, GROS method tends to yield inflated values of UCLs and BTVs											
597	Gamma distributed detected data, BTVs and UCLs may be computed using gamma distribution on KM estimates											
598	Minimum					0.084	Mean					0.22
599	Maximum					1.54	Median					0.18
600	SD					0.22	CV					0.96
601	k hat (MLE)					3.26	k star (bias corrected MLE)					3.08
602	Theta hat (MLE)					0.07	Theta star (bias corrected MLE)					0.074
603	nu hat (MLE)					339.4	nu star (bias corrected)					321.2
604	MLE Mean (bias corrected)					0.22	MLE Sd (bias corrected)					0.13
605							Adjusted Level of Significance (β)					0.044
606	Approximate Chi Square Value (321.16, α)					280.6	Adjusted Chi Square Value (321.16, β)					279.6
607	Gamma Approximate UCL (use when $n \geq 50$)					0.26	Gamma Adjusted UCL (use when $n < 50$)					0.26
608												
609	Lognormal GOF Test on Detected Observations Only											
610	Shapiro Wilk Test Statistic					0.86	Shapiro Wilk GOF Test					
611	5% Shapiro Wilk Critical Value					0.82	Detected Data appear Lognormal at 5% Significance Level					
612	Lilliefors Test Statistic					0.25	Lilliefors GOF Test					
613	5% Lilliefors Critical Value					0.29	Detected Data appear Lognormal at 5% Significance Level					
614	Detected Data appear Lognormal at 5% Significance Level											
615												
616	Lognormal ROS Statistics Using Imputed Non-Detects											
617	Mean in Original Scale					0.24	Mean in Log Scale					-1.56
618	SD in Original Scale					0.21	SD in Log Scale					0.41
619	95% t UCL (assumes normality of ROS data)					0.29	95% Percentile Bootstrap UCL					0.29
620	95% BCA Bootstrap UCL					0.33	95% Bootstrap t UCL					0.43
621	95% H-UCL (Log ROS)					0.25						
622												
623	UCLs using Lognormal Distribution and KM Estimates when Detected data are Lognormally Distributed											
624	KM Mean (logged)					-1.59	95% H-UCL (KM -Log)					0.28
625	KM SD (logged)					0.58	95% Critical H Value (KM-Log)					1.93
626	KM Standard Error of Mean (logged)					0.18						
627												
628	DL/2 Statistics											
629	DL/2 Normal						DL/2 Log-Transformed					
630	Mean in Original Scale					0.31	Mean in Log Scale					-1.23

	A	B	C	D	E	F	G	H	I	J	K	L
631	SD in Original Scale					0.20	SD in Log Scale					0.37
632	95% t UCL (Assumes normality)					0.36	95% H-Stat UCL					0.34
633	DL/2 is not a recommended method, provided for comparisons and historical reasons											
634												
635	Nonparametric Distribution Free UCL Statistics											
636	Detected Data appear Approximate Normal Distributed at 5% Significance Level											
637												
638	Suggested UCL to Use											
639	95% KM (t) UCL					0.34	95% KM (Percentile Bootstrap) UCL					0.35
640												
641	ations regarding the selection of a 95% UCL are provided to help the user to select the most appropriate											
642	Recommendations are based upon data size, data distribution, and skewness.											
643	Recommendations are based upon the results of the simulation studies summarized in Singh, Maichle, and											
644	ations results will not cover all Real World data sets; for additional insight the user may want to cons											
645												
646												
647	Calcium											
648												
649	General Statistics											
650	Total Number of Observations					52	Number of Distinct Observations					46
651							Number of Missing Observations					0
652	Minimum					839	Mean					2396
653	Maximum					8490	Median					2140
654	SD					1163	Std. Error of Mean					161.2
655	Coefficient of Variation					0.48	Skewness					3.39
656												
657	Normal GOF Test											
658	Shapiro Wilk Test Statistic					0.68	Shapiro Wilk GOF Test					
659	5% Shapiro Wilk P Value					1.423E-	Data Not Normal at 5% Significance Level					
660	Lilliefors Test Statistic					0.24	Lilliefors GOF Test					
661	5% Lilliefors Critical Value					0.12	Data Not Normal at 5% Significance Level					
662	Data Not Normal at 5% Significance Level											
663												
664	Assuming Normal Distribution											
665	95% Normal UCL						95% UCLs (Adjusted for Skewness)					
666	95% Student's-t UCL					2666	95% Adjusted-CLT UCL (Chen-1995)					2742
667							95% Modified-t UCL (Johnson-1978)					2678
668												
669	Gamma GOF Test											
670	A-D Test Statistic					2.22	Anderson-Darling Gamma GOF Test					
671	5% A-D Critical Value					0.75	Data Not Gamma Distributed at 5% Significance Level					
672	K-S Test Statistic					0.19	Kolmogorov-Smirnov Gamma GOF Test					
673	5% K-S Critical Value					0.12	Data Not Gamma Distributed at 5% Significance Level					
674	Data Not Gamma Distributed at 5% Significance Level											
675												
676	Gamma Statistics											
677	k hat (MLE)					6.75	k star (bias corrected MLE)					6.38
678	Theta hat (MLE)					354.4	Theta star (bias corrected MLE)					375.4
679	nu hat (MLE)					703	nu star (bias corrected)					663.7
680	MLE Mean (bias corrected)					2396	MLE Sd (bias corrected)					948.3
681							Approximate Chi Square Value (0.05)					605
682	Adjusted Level of Significance					0.04	Adjusted Chi Square Value					603.4
683												
684	Assuming Gamma Distribution											
685	Approximate Gamma UCL (use when n>=50)					2628	Adjusted Gamma UCL (use when n<50)					2635
686												
687	Lognormal GOF Test											
688	Shapiro Wilk Test Statistic					0.92	Shapiro Wilk Lognormal GOF Test					
689	5% Shapiro Wilk P Value					0.002	Data Not Lognormal at 5% Significance Level					
690	Lilliefors Test Statistic					0.16	Lilliefors Lognormal GOF Test					
691	5% Lilliefors Critical Value					0.12	Data Not Lognormal at 5% Significance Level					
692	Data Not Lognormal at 5% Significance Level											
693												

	A	B	C	D	E	F	G	H	I	J	K	L
694	Lognormal Statistics											
695	Minimum of Logged Data					6.73	Mean of logged Data					7.70
696	Maximum of Logged Data					9.04	SD of logged Data					0.36
697												
698	Assuming Lognormal Distribution											
699	95% H-UCL					2605	90% Chebyshev (MVUE) UCL					2749
700	95% Chebyshev (MVUE) UCL					2919	97.5% Chebyshev (MVUE) UCL					3154
701	99% Chebyshev (MVUE) UCL					3617						
702												
703	Nonparametric Distribution Free UCL Statistics											
704	Data do not follow a Discernible Distribution (0.05)											
705												
706	Nonparametric Distribution Free UCLs											
707	95% CLT UCL					2661	95% Jackknife UCL					2666
708	95% Standard Bootstrap UCL					2654	95% Bootstrap-t UCL					2807
709	95% Hall's Bootstrap UCL					4026	95% Percentile Bootstrap UCL					2669
710	95% BCA Bootstrap UCL					2766						
711	90% Chebyshev(Mean, Sd) UCL					2879	95% Chebyshev(Mean, Sd) UCL					3098
712	97.5% Chebyshev(Mean, Sd) UCL					3403	99% Chebyshev(Mean, Sd) UCL					4000
713												
714	Suggested UCL to Use											
715	95% Student's-t UCL					2666	or 95% Modified-t UCL					2678
716												
717	Directions regarding the selection of a 95% UCL are provided to help the user to select the most appropriate											
718	Recommendations are based upon the results of the simulation studies summarized in Singh, Singh, and											
719	and Singh and Singh (2003). However, simulations results will not cover all Real World data sets											
720	For additional insight the user may want to consult a statistician.											
721												
722	Cesium-137											
723												
724	General Statistics											
725	Total Number of Observations					51	Number of Distinct Observations					51
726	Number of Detects					25	Number of Non-Detects					26
727	Number of Distinct Detects					25	Number of Distinct Non-Detects					26
728	Minimum Detect					0.13	Minimum Non-Detect					-0.033
729	Maximum Detect					1.53	Maximum Non-Detect					0.10
730	Variance Detects					0.09	Percent Non-Detects					50.9
731	Mean Detects					0.46	SD Detects					0.30
732	Median Detects					0.42	CV Detects					0.65
733	Skewness Detects					1.92	Kurtosis Detects					5.02
734												
735	Normal GOF Test on Detects Only											
736	Shapiro Wilk Test Statistic					0.83	Shapiro Wilk GOF Test					
737	5% Shapiro Wilk Critical Value					0.91	Detected Data Not Normal at 5% Significance Level					
738	Lilliefors Test Statistic					0.17	Lilliefors GOF Test					
739	5% Lilliefors Critical Value					0.17	Detected Data appear Normal at 5% Significance Level					
740	Detected Data appear Approximate Normal at 5% Significance Level											
741												
742	Kaplan-Meier (KM) Statistics using Normal Critical Values and other Nonparametric UCLs											
743	Mean					0.21	Standard Error of Mean					0.04
744	SD					0.32	95% KM (BCA) UCL					0.29
745	95% KM (t) UCL					0.29	95% KM (Percentile Bootstrap) UCL					0.29
746	95% KM (z) UCL					0.29	95% KM Bootstrap t UCL					0.30
747	90% KM Chebyshev UCL					0.35	95% KM Chebyshev UCL					0.41
748	97.5% KM Chebyshev UCL					0.50	99% KM Chebyshev UCL					0.68
749												
750	Gamma GOF Tests on Detected Observations Only											
751	A-D Test Statistic					0.24	Anderson-Darling GOF Test					
752	5% A-D Critical Value					0.75	Detected data appear Gamma Distributed at 5% Significance Level					
753	K-S Test Statistic					0.09	Kolmogorov-Smirnov GOF					
754	5% K-S Critical Value					0.17	Detected data appear Gamma Distributed at 5% Significance Level					
755	Detected data appear Gamma Distributed at 5% Significance Level											
756												

	A	B	C	D	E	F	G	H	I	J	K	L
757	Gamma Statistics on Detected Data Only											
758	k hat (MLE)				2.97		k star (bias corrected MLE)				2.64	
759	Theta hat (MLE)				0.15		Theta star (bias corrected MLE)				0.17	
760	nu hat (MLE)				148.5		nu star (bias corrected)				132	
761	MLE Mean (bias corrected)				0.46		MLE Sd (bias corrected)				0.28	
762												
763	Gamma Kaplan-Meier (KM) Statistics											
764	k hat (KM)				0.41		nu hat (KM)				42.7	
765							Adjusted Level of Significance (β)				0.04	
766	Approximate Chi Square Value (42.70, α)				28.7		Adjusted Chi Square Value (42.70, β)				28.3	
767	Approximate KM-UCL (use when $n \geq 50$)				0.31		Gamma Adjusted KM-UCL (use when $n < 50$)				0.32	
768												
769	DL/2 Statistics											
770	Mean in Original Scale				0.23		SD in Original Scale				0.31	
771	95% t UCL (Assumes normality)				0.30							
772	DL/2 is not a recommended method, provided for comparisons and historical reasons											
773												
774	Nonparametric Distribution Free UCL Statistics											
775	Detected Data appear Approximate Normal Distributed at 5% Significance Level											
776												
777	Suggested UCL to Use											
778	95% KM (t) UCL				0.29		95% KM (Percentile Bootstrap) UCL				0.29	
779												
780	Recommendations regarding the selection of a 95% UCL are provided to help the user to select the most appropriate											
781	Recommendations are based upon data size, data distribution, and skewness.											
782	Recommendations are based upon the results of the simulation studies summarized in Singh, Maichle, and											
783	Recommendations results will not cover all Real World data sets; for additional insight the user may want to consult											
784												
785												
786	Chromium											
787												
788	General Statistics											
789	Total Number of Observations				52		Number of Distinct Observations				51	
790							Number of Missing Observations				0	
791	Minimum				4.45		Mean				16.0	
792	Maximum				48.9		Median				12.9	
793	SD				8.87		Std. Error of Mean				1.23	
794	Coefficient of Variation				0.55		Skewness				1.85	
795												
796	Normal GOF Test											
797	Shapiro Wilk Test Statistic				0.82		Shapiro Wilk GOF Test					
798	5% Shapiro Wilk P Value				3.6308E-05		Data Not Normal at 5% Significance Level					
799	Lilliefors Test Statistic				0.22		Lilliefors GOF Test					
800	5% Lilliefors Critical Value				0.12		Data Not Normal at 5% Significance Level					
801	Data Not Normal at 5% Significance Level											
802												
803	Assuming Normal Distribution											
804	95% Normal UCL						95% UCLs (Adjusted for Skewness)					
805	95% Student's-t UCL				18.1		95% Adjusted-CLT UCL (Chen-1995)				18.4	
806							95% Modified-t UCL (Johnson-1978)				18.2	
807												
808	Gamma GOF Test											
809	A-D Test Statistic				1.21		Anderson-Darling Gamma GOF Test					
810	5% A-D Critical Value				0.75		Data Not Gamma Distributed at 5% Significance Level					
811	K-S Test Statistic				0.15		Kolmogrov-Smirnoff Gamma GOF Test					
812	5% K-S Critical Value				0.12		Data Not Gamma Distributed at 5% Significance Level					
813	Data Not Gamma Distributed at 5% Significance Level											
814												
815	Gamma Statistics											
816	k hat (MLE)				4.39		k star (bias corrected MLE)				4.15	
817	Theta hat (MLE)				3.66		Theta star (bias corrected MLE)				3.87	
818	nu hat (MLE)				456.9		nu star (bias corrected)				431.9	
819	MLE Mean (bias corrected)				16.0		MLE Sd (bias corrected)				7.89	

	A	B	C	D	E	F	G	H	I	J	K	L
820							Approximate Chi Square Value (0.05)					384.7
821	Adjusted Level of Significance					0.04	Adjusted Chi Square Value					383.4
822												
823	Assuming Gamma Distribution											
824	Approximate Gamma UCL (use when n>=50))					18.0%	Adjusted Gamma UCL (use when n<50)					18.1
825												
826	Lognormal GOF Test											
827	Shapiro Wilk Test Statistic					0.96	Shapiro Wilk Lognormal GOF Test					
828	5% Shapiro Wilk P Value					0.34	Data appear Lognormal at 5% Significance Level					
829	Lilliefors Test Statistic					0.12	Lilliefors Lognormal GOF Test					
830	5% Lilliefors Critical Value					0.12	Data appear Lognormal at 5% Significance Level					
831	Data appear Lognormal at 5% Significance Level											
832												
833	Lognormal Statistics											
834	Minimum of Logged Data					1.49	Mean of logged Data					2.66
835	Maximum of Logged Data					3.89	SD of logged Data					0.47
836												
837	Assuming Lognormal Distribution											
838	95% H-UCL					18.1	90% Chebyshev (MVUE) UCL					19.2
839	95% Chebyshev (MVUE) UCL					20.7	97.5% Chebyshev (MVUE) UCL					22.8
840	99% Chebyshev (MVUE) UCL					26.8						
841												
842	Nonparametric Distribution Free UCL Statistics											
843	Data appear to follow a Discernible Distribution at 5% Significance Level											
844												
845	Nonparametric Distribution Free UCLs											
846	95% CLT UCL					18.1	95% Jackknife UCL					18.1
847	95% Standard Bootstrap UCL					18.0	95% Bootstrap-t UCL					18.6
848	95% Hall's Bootstrap UCL					18.5	95% Percentile Bootstrap UCL					18.2
849	95% BCA Bootstrap UCL					18.5						
850	90% Chebyshev(Mean, Sd) UCL					19.7	95% Chebyshev(Mean, Sd) UCL					21.4
851	97.5% Chebyshev(Mean, Sd) UCL					23.7	99% Chebyshev(Mean, Sd) UCL					28.3
852												
853	Suggested UCL to Use											
854	95% Student's-t UCL					18.1	or 95% Modified-t UCL					18.2
855	or 95% H-UCL					18.1						
856												
857	Recommendations regarding the selection of a 95% UCL are provided to help the user to select the most appropriate											
858	Recommendations are based upon the results of the simulation studies summarized in Singh, Singh, and Singh											
859	and Singh and Singh (2003). However, simulations results will not cover all Real World data sets											
860	For additional insight the user may want to consult a statistician.											
861												
862	ProUCL computes and outputs H-statistic based UCLs for historical reasons only.											
863	often results in unstable (both high and low) values of UCL95 as shown in examples in the Technical Manual.											
864	It is therefore recommended to avoid the use of H-statistic based 95% UCLs.											
865	Metric methods are preferred to compute UCL95 for skewed data sets which do not follow a gamma distribution.											
866												
867	Chrysene											
868												
869	General Statistics											
870	Total Number of Observations					52	Number of Distinct Observations					44
871	Number of Detects					5	Number of Non-Detects					47
872	Number of Distinct Detects					5	Number of Distinct Non-Detects					39
873	Minimum Detect					0.01	Minimum Non-Detect					0.03
874	Maximum Detect					0.10	Maximum Non-Detect					0.34
875	Variance Detects					0.001	Percent Non-Detects					90.3
876	Mean Detects					0.03	SD Detects					0.03
877	Median Detects					0.02	CV Detects					1.00
878	Skewness Detects					2.01	Kurtosis Detects					4.25
879	Mean of Logged Detects					-3.57	SD of Logged Detects					0.84
880												
881	Normal GOF Test on Detects Only											
882	Shapiro Wilk Test Statistic					0.73	Shapiro Wilk GOF Test					

	A	B	C	D	E	F	G	H	I	J	K	L	
883	5% Shapiro Wilk Critical Value					0.76	Detected Data Not Normal at 5% Significance Level						
884	Lilliefors Test Statistic					0.38	Lilliefors GOF Test						
885	5% Lilliefors Critical Value					0.39	Detected Data appear Normal at 5% Significance Level						
886	Detected Data appear Approximate Normal at 5% Significance Level												
887													
888	Kaplan-Meier (KM) Statistics using Normal Critical Values and other Nonparametric UCLs												
889	Mean					0.02	Standard Error of Mean					0.004	
890	SD					0.01	95% KM (BCA) UCL					0.03	
891	95% KM (t) UCL					0.03	95% KM (Percentile Bootstrap) UCL					0.03	
892	95% KM (z) UCL					0.03	95% KM Bootstrap t UCL					0.03	
893	90% KM Chebyshev UCL					0.03	95% KM Chebyshev UCL					0.04	
894	97.5% KM Chebyshev UCL					0.05	99% KM Chebyshev UCL					0.06	
895													
896	Gamma GOF Tests on Detected Observations Only												
897	A-D Test Statistic					0.46	Anderson-Darling GOF Test						
898	5% A-D Critical Value					0.68	data appear Gamma Distributed at 5% Significance Level						
899	K-S Test Statistic					0.32	Kolmogrov-Smirnoff GOF						
900	5% K-S Critical Value					0.36	data appear Gamma Distributed at 5% Significance Level						
901	Detected data appear Gamma Distributed at 5% Significance Level												
902													
903	Gamma Statistics on Detected Data Only												
904	k hat (MLE)					1.69	k star (bias corrected MLE)					0.81	
905	Theta hat (MLE)					0.02	Theta star (bias corrected MLE)					0.04	
906	nu hat (MLE)					16.9	nu star (bias corrected)					8.13	
907	MLE Mean (bias corrected)					0.03	MLE Sd (bias corrected)					0.04	
908													
909	Gamma Kaplan-Meier (KM) Statistics												
910	k hat (KM)					2.69	nu hat (KM)					280	
911	Approximate Chi Square Value (279.97, α)					242.2	Adjusted Chi Square Value (279.97, β)					241.2	
912	Approximate KM-UCL (use when n>=50)					0.02	Gamma Adjusted KM-UCL (use when n<50)					0.02	
913													
914	Gamma ROS Statistics using Imputed Non-Detects												
915	GROS may not be used when data set has > 50% NDs with many tied observations at multiple DLs												
916	GROS may not be used when kstar of detected data is small such as < 0.1												
917	For such situations, GROS method tends to yield inflated values of UCLs and BTVs												
918	Gamma distributed detected data, BTVs and UCLs may be computed using gamma distribution on KM estimates												
919	Minimum					0.01	Mean					0.02	
920	Maximum					0.10	Median					0.02	
921	SD					0.01	CV					0.58	
922	k hat (MLE)					6.51	k star (bias corrected MLE)					6.15	
923	Theta hat (MLE)					0.003	Theta star (bias corrected MLE)					0.003	
924	nu hat (MLE)					677.9	nu star (bias corrected)					640.1	
925	MLE Mean (bias corrected)					0.02	MLE Sd (bias corrected)					0.009	
926							Adjusted Level of Significance (β)					0.04	
927	Approximate Chi Square Value (640.13, α)					582.4	Adjusted Chi Square Value (640.13, β)					580.9	
928	Gamma Approximate UCL (use when n>=50)					0.02	Gamma Adjusted UCL (use when n<50)					0.02	
929													
930	Lognormal GOF Test on Detected Observations Only												
931	Shapiro Wilk Test Statistic					0.92	Shapiro Wilk GOF Test						
932	5% Shapiro Wilk Critical Value					0.76	Detected Data appear Lognormal at 5% Significance Level						
933	Lilliefors Test Statistic					0.26	Lilliefors GOF Test						
934	5% Lilliefors Critical Value					0.39	Detected Data appear Lognormal at 5% Significance Level						
935	Detected Data appear Lognormal at 5% Significance Level												
936													
937	Lognormal ROS Statistics Using Imputed Non-Detects												
938	Mean in Original Scale					0.02	Mean in Log Scale					-3.86	
939	SD in Original Scale					0.01	SD in Log Scale					0.30	
940	95% t UCL (assumes normality of ROS data)					0.02	95% Percentile Bootstrap UCL					0.02	
941	95% BCA Bootstrap UCL					0.02	95% Bootstrap t UCL					0.02	
942	95% H-UCL (Log ROS)					0.02							
943													
944	Estimates using Lognormal Distribution and KM Estimates when Detected data are Lognormally Distributed												
945	KM Mean (logged)					-3.87	95% H-UCL (KM -Log)					0.02	

	A	B	C	D	E	F	G	H	I	J	K	L
946	KM SD (logged)					0.45	95% Critical H Value (KM-Log)					1.85
947	KM Standard Error of Mean (logged)					0.22						
948												
949	DL/2 Statistics											
950	DL/2 Normal					DL/2 Log-Transformed						
951	Mean in Original Scale					0.02	Mean in Log Scale					-3.81
952	SD in Original Scale					0.02	SD in Log Scale					0.44
953	95% t UCL (Assumes normality)					0.03	95% H-Stat UCL					0.02
954	DL/2 is not a recommended method, provided for comparisons and historical reasons											
955												
956	Nonparametric Distribution Free UCL Statistics											
957	Detected Data appear Approximate Normal Distributed at 5% Significance Level											
958												
959	Suggested UCL to Use											
960	95% KM (t) UCL					0.03	95% KM (Percentile Bootstrap) UCL					0.03
961												
962	Recommendations regarding the selection of a 95% UCL are provided to help the user to select the most appropriate											
963	Recommendations are based upon data size, data distribution, and skewness.											
964	Recommendations are based upon the results of the simulation studies summarized in Singh, Maichle, and											
965	Recommendations results will not cover all Real World data sets; for additional insight the user may want to consult											
966												
967												
968	Cobalt											
969												
970	General Statistics											
971	Total Number of Observations					52	Number of Distinct Observations					49
972							Number of Missing Observations					0
973	Minimum					1.07	Mean					4.62
974	Maximum					9.41	Median					4.78
975	SD					1.57	Std. Error of Mean					0.21
976	Coefficient of Variation					0.34	Skewness					0.24
977												
978	Normal GOF Test											
979	Shapiro Wilk Test Statistic					0.97	Shapiro Wilk GOF Test					
980	5% Shapiro Wilk P Value					0.56	Data appear Normal at 5% Significance Level					
981	Lilliefors Test Statistic					0.09	Lilliefors GOF Test					
982	5% Lilliefors Critical Value					0.12	Data appear Normal at 5% Significance Level					
983	Data appear Normal at 5% Significance Level											
984												
985	Assuming Normal Distribution											
986	95% Normal UCL					95% UCLs (Adjusted for Skewness)						
987	95% Student's-t UCL					4.98	95% Adjusted-CLT UCL (Chen-1995)					4.98
988							95% Modified-t UCL (Johnson-1978)					4.98
989												
990	Gamma GOF Test											
991	A-D Test Statistic					1.02	Anderson-Darling Gamma GOF Test					
992	5% A-D Critical Value					0.75	Data Not Gamma Distributed at 5% Significance Level					
993	K-S Test Statistic					0.12	Kolmogorov-Smirnov Gamma GOF Test					
994	5% K-S Critical Value					0.12	Data Not Gamma Distributed at 5% Significance Level					
995	Data Not Gamma Distributed at 5% Significance Level											
996												
997	Gamma Statistics											
998	k hat (MLE)					7.27	k star (bias corrected MLE)					6.87
999	Theta hat (MLE)					0.63	Theta star (bias corrected MLE)					0.67
1000	nu hat (MLE)					756.9	nu star (bias corrected)					714.6
1001	MLE Mean (bias corrected)					4.62	MLE Sd (bias corrected)					1.76
1002							Approximate Chi Square Value (0.05)					653.6
1003	Adjusted Level of Significance					0.04	Adjusted Chi Square Value					651.9
1004												
1005	Assuming Gamma Distribution											
1006	Approximate Gamma UCL (use when n>=50)					5.05	Adjusted Gamma UCL (use when n<50)					5.06
1007												
1008	Lognormal GOF Test											

	A	B	C	D	E	F	G	H	I	J	K	L	
1009	Shapiro Wilk Test Statistic					0.89	Shapiro Wilk Lognormal GOF Test						
1010	5% Shapiro Wilk P Value					1.6285E	Data Not Lognormal at 5% Significance Level						
1011	Lilliefors Test Statistic					0.15	Lilliefors Lognormal GOF Test						
1012	5% Lilliefors Critical Value					0.12	Data Not Lognormal at 5% Significance Level						
1013	Data Not Lognormal at 5% Significance Level												
1014													
1015	Lognormal Statistics												
1016	Minimum of Logged Data					0.06	Mean of logged Data					1.46	
1017	Maximum of Logged Data					2.24	SD of logged Data					0.41	
1018													
1019	Assuming Lognormal Distribution												
1020	95% H-UCL					5.20	90% Chebyshev (MVUE) UCL					5.50	
1021	95% Chebyshev (MVUE) UCL					5.87	97.5% Chebyshev (MVUE) UCL					6.39	
1022	99% Chebyshev (MVUE) UCL					7.41							
1023													
1024	Nonparametric Distribution Free UCL Statistics												
1025	Data appear to follow a Discernible Distribution at 5% Significance Level												
1026													
1027	Nonparametric Distribution Free UCLs												
1028	95% CLT UCL					4.98	95% Jackknife UCL					4.98	
1029	95% Standard Bootstrap UCL					4.96	95% Bootstrap-t UCL					5.00	
1030	95% Hall's Bootstrap UCL					5.01	95% Percentile Bootstrap UCL					4.97	
1031	95% BCA Bootstrap UCL					5.00							
1032	90% Chebyshev(Mean, Sd) UCL					5.27	95% Chebyshev(Mean, Sd) UCL					5.57	
1033	97.5% Chebyshev(Mean, Sd) UCL					5.98	99% Chebyshev(Mean, Sd) UCL					6.79	
1034													
1035	Suggested UCL to Use												
1036	95% Student's-t UCL					4.98							
1037													
1038	Directions regarding the selection of a 95% UCL are provided to help the user to select the most appropriate												
1039	recommendations are based upon the results of the simulation studies summarized in Singh, Singh, and												
1040	and Singh and Singh (2003). However, simulations results will not cover all Real World data sets												
1041	For additional insight the user may want to consult a statistician.												
1042													
1043													
1044	Copper												
1045													
1046	General Statistics												
1047	Total Number of Observations					52	Number of Distinct Observations					49	
1048							Number of Missing Observations					0	
1049	Minimum					2.2	Mean					9.61	
1050	Maximum					53.6	Median					7.34	
1051	SD					8.37	Std. Error of Mean					1.16	
1052	Coefficient of Variation					0.87	Skewness					3.69	
1053													
1054	Normal GOF Test												
1055	Shapiro Wilk Test Statistic					0.57	Shapiro Wilk GOF Test						
1056	5% Shapiro Wilk P Value					0	Data Not Normal at 5% Significance Level						
1057	Lilliefors Test Statistic					0.30	Lilliefors GOF Test						
1058	5% Lilliefors Critical Value					0.12	Data Not Normal at 5% Significance Level						
1059	Data Not Normal at 5% Significance Level												
1060													
1061	Assuming Normal Distribution												
1062	95% Normal UCL						95% UCLs (Adjusted for Skewness)						
1063	95% Student's-t UCL					11.56	95% Adjusted-CLT UCL (Chen-1995)					12.1	
1064							95% Modified-t UCL (Johnson-1978)					11.6	
1065													
1066	Gamma GOF Test												
1067	A-D Test Statistic					3.38	Anderson-Darling Gamma GOF Test						
1068	5% A-D Critical Value					0.75	Data Not Gamma Distributed at 5% Significance Level						
1069	K-S Test Statistic					0.21	Kolmogrov-Smirnoff Gamma GOF Test						
1070	5% K-S Critical Value					0.12	Data Not Gamma Distributed at 5% Significance Level						
1071	Data Not Gamma Distributed at 5% Significance Level												

A	B	C	D	E	F	G	H	I	J	K	L
1072											
1073	Gamma Statistics										
1074	k hat (MLE)				2.82	k star (bias corrected MLE)				2.67	
1075	Theta hat (MLE)				3.40	Theta star (bias corrected MLE)				3.59	
1076	nu hat (MLE)				294	nu star (bias corrected)				278.3	
1077	MLE Mean (bias corrected)				9.61	MLE Sd (bias corrected)				5.87	
1078						Approximate Chi Square Value (0.05)				240.7	
1079	Adjusted Level of Significance				0.04	Adjusted Chi Square Value				239.7	
1080											
1081	Assuming Gamma Distribution										
1082	Approximate Gamma UCL (use when n>=50)				11.14	Adjusted Gamma UCL (use when n<50)				11.14	
1083											
1084	Lognormal GOF Test										
1085	Shapiro Wilk Test Statistic				0.90	Shapiro Wilk Lognormal GOF Test					
1086	5% Shapiro Wilk P Value				2.9153E-05	Data Not Lognormal at 5% Significance Level					
1087	Lilliefors Test Statistic				0.16	Lilliefors Lognormal GOF Test					
1088	5% Lilliefors Critical Value				0.12	Data Not Lognormal at 5% Significance Level					
1089	Data Not Lognormal at 5% Significance Level										
1090											
1091	Lognormal Statistics										
1092	Minimum of Logged Data				0.78	Mean of logged Data				2.07	
1093	Maximum of Logged Data				3.98	SD of logged Data				0.54	
1094											
1095	Assuming Lognormal Distribution										
1096	95% H-UCL				10.74	90% Chebyshev (MVUE) UCL				11.44	
1097	95% Chebyshev (MVUE) UCL				12.44	97.5% Chebyshev (MVUE) UCL				13.84	
1098	99% Chebyshev (MVUE) UCL				16.64						
1099											
1100	Nonparametric Distribution Free UCL Statistics										
1101	Data do not follow a Discernible Distribution (0.05)										
1102											
1103	Nonparametric Distribution Free UCLs										
1104	95% CLT UCL				11.54	95% Jackknife UCL				11.54	
1105	95% Standard Bootstrap UCL				11.54	95% Bootstrap-t UCL				13.24	
1106	95% Hall's Bootstrap UCL				18.54	95% Percentile Bootstrap UCL				11.54	
1107	95% BCA Bootstrap UCL				12.14						
1108	90% Chebyshev(Mean, Sd) UCL				13.14	95% Chebyshev(Mean, Sd) UCL				14.64	
1109	97.5% Chebyshev(Mean, Sd) UCL				16.84	99% Chebyshev(Mean, Sd) UCL				21.14	
1110											
1111	Suggested UCL to Use										
1112	95% Chebyshev (Mean, Sd) UCL				14.64						
1113											
1114	Recommendations regarding the selection of a 95% UCL are provided to help the user to select the most appropriate										
1115	Recommendations are based upon the results of the simulation studies summarized in Singh, Singh, and Singh										
1116	and Singh and Singh (2003). However, simulations results will not cover all Real World data sets										
1117	For additional insight the user may want to consult a statistician.										
1118											
1119	Cyanide (Total)										
1120											
1121	General Statistics										
1122	Total Number of Observations				52	Number of Distinct Observations				45	
1123	Number of Detects				19	Number of Non-Detects				33	
1124	Number of Distinct Detects				19	Number of Distinct Non-Detects				27	
1125	Minimum Detect				0.09	Minimum Non-Detect				0.23	
1126	Maximum Detect				3.25	Maximum Non-Detect				0.38	
1127	Variance Detects				0.80	Percent Non-Detects				63.4	
1128	Mean Detects				0.53	SD Detects				0.89	
1129	Median Detects				0.23	CV Detects				1.68	
1130	Skewness Detects				2.72	Kurtosis Detects				6.38	
1131	Mean of Logged Detects				-1.29	SD of Logged Detects				0.99	
1132											
1133	Normal GOF Test on Detects Only										
1134	Shapiro Wilk Test Statistic				0.49	Shapiro Wilk GOF Test					

	A	B	C	D	E	F	G	H	I	J	K	L	
1135	5% Shapiro Wilk Critical Value					0.90	Detected Data Not Normal at 5% Significance Level						
1136	Lilliefors Test Statistic					0.40	Lilliefors GOF Test						
1137	5% Lilliefors Critical Value					0.20	Detected Data Not Normal at 5% Significance Level						
1138	Detected Data Not Normal at 5% Significance Level												
1139													
1140	Kaplan-Meier (KM) Statistics using Normal Critical Values and other Nonparametric UCLs												
1141	Mean					0.29	Standard Error of Mean					0.08	
1142	SD					0.55	95% KM (BCA) UCL					0.42	
1143	95% KM (t) UCL					0.43	95% KM (Percentile Bootstrap) UCL					0.43	
1144	95% KM (z) UCL					0.42	95% KM Bootstrap t UCL					0.84	
1145	90% KM Chebyshev UCL					0.53	95% KM Chebyshev UCL					0.64	
1146	97.5% KM Chebyshev UCL					0.79	99% KM Chebyshev UCL					1.09	
1147													
1148	Gamma GOF Tests on Detected Observations Only												
1149	A-D Test Statistic					2.33	Anderson-Darling GOF Test						
1150	5% A-D Critical Value					0.77	ed Data Not Gamma Distributed at 5% Significance Level						
1151	K-S Test Statistic					0.32	Kolmogrov-Smirnoff GOF						
1152	5% K-S Critical Value					0.20	ed Data Not Gamma Distributed at 5% Significance Level						
1153	Detected Data Not Gamma Distributed at 5% Significance Level												
1154													
1155	Gamma Statistics on Detected Data Only												
1156	k hat (MLE)					0.87	k star (bias corrected MLE)					0.77	
1157	Theta hat (MLE)					0.60	Theta star (bias corrected MLE)					0.68	
1158	nu hat (MLE)					33.4	nu star (bias corrected)					29.4	
1159	MLE Mean (bias corrected)					0.53	MLE Sd (bias corrected)					0.60	
1160													
1161	Gamma Kaplan-Meier (KM) Statistics												
1162	k hat (KM)					0.27	nu hat (KM)					29.0	
1163	Approximate Chi Square Value (29.02, α)					17.7	Adjusted Chi Square Value (29.02, β)					17.4	
1164	Approximate KM-UCL (use when n>=50)					0.48	Gamma Adjusted KM-UCL (use when n<50)					0.49	
1165													
1166	Gamma ROS Statistics using Imputed Non-Detects												
1167	GROS may not be used when data set has > 50% NDs with many tied observations at multiple DLs												
1168	GROS may not be used when kstar of detected data is small such as < 0.1												
1169	For such situations, GROS method tends to yield inflated values of UCLs and BTVs												
1170	Gamma distributed detected data, BTVs and UCLs may be computed using gamma distribution on KM estimates												
1171	Minimum					0.01	Mean					0.21	
1172	Maximum					3.25	Median					0.01	
1173	SD					0.58	CV					2.77	
1174	k hat (MLE)					0.40	k star (bias corrected MLE)					0.39	
1175	Theta hat (MLE)					0.51	Theta star (bias corrected MLE)					0.53	
1176	nu hat (MLE)					42.5	nu star (bias corrected)					41.4	
1177	MLE Mean (bias corrected)					0.21	MLE Sd (bias corrected)					0.33	
1178							Adjusted Level of Significance (β)					0.04	
1179	Approximate Chi Square Value (41.40, α)					27.6	Adjusted Chi Square Value (41.40, β)					27.3	
1180	Gamma Approximate UCL (use when n>=50)					0.31	Gamma Adjusted UCL (use when n<50)					0.32	
1181													
1182	Lognormal GOF Test on Detected Observations Only												
1183	Shapiro Wilk Test Statistic					0.83	Shapiro Wilk GOF Test						
1184	5% Shapiro Wilk Critical Value					0.90	Detected Data Not Lognormal at 5% Significance Level						
1185	Lilliefors Test Statistic					0.23	Lilliefors GOF Test						
1186	5% Lilliefors Critical Value					0.20	Detected Data Not Lognormal at 5% Significance Level						
1187	Detected Data Not Lognormal at 5% Significance Level												
1188													
1189	Lognormal ROS Statistics Using Imputed Non-Detects												
1190	Mean in Original Scale					0.29	Mean in Log Scale					-1.66	
1191	SD in Original Scale					0.56	SD in Log Scale					0.67	
1192	95% t UCL (assumes normality of ROS data)					0.42	95% Percentile Bootstrap UCL					0.42	
1193	95% BCA Bootstrap UCL					0.50	95% Bootstrap t UCL					1.07	
1194	95% H-UCL (Log ROS)					0.28							
1195													
1196	DL/2 Statistics												
1197	DL/2 Normal						DL/2 Log-Transformed						

	A	B	C	D	E	F	G	H	I	J	K	L
1198	Mean in Original Scale					0.28	Mean in Log Scale					-1.72
1199	SD in Original Scale					0.56	SD in Log Scale					0.67
1200	95% t UCL (Assumes normality)					0.41	95% H-Stat UCL					0.27
1201	DL/2 is not a recommended method, provided for comparisons and historical reasons											
1202												
1203	Nonparametric Distribution Free UCL Statistics											
1204	Data do not follow a Discernible Distribution at 5% Significance Level											
1205												
1206	Suggested UCL to Use											
1207	95% KM (t) UCL					0.43	95% KM (% Bootstrap) UCL					0.43
1208												
1209	Recommendations regarding the selection of a 95% UCL are provided to help the user to select the most appropriate											
1210	Recommendations are based upon data size, data distribution, and skewness.											
1211	Recommendations are based upon the results of the simulation studies summarized in Singh, Maichle, and											
1212	Recommendations results will not cover all Real World data sets; for additional insight the user may want to consult											
1213												
1214	Fluoranthene											
1215												
1216	General Statistics											
1217	Total Number of Observations					52	Number of Distinct Observations					44
1218	Number of Detects					6	Number of Non-Detects					46
1219	Number of Distinct Detects					6	Number of Distinct Non-Detects					38
1220	Minimum Detect					0.01	Minimum Non-Detect					0.03
1221	Maximum Detect					0.04	Maximum Non-Detect					0.34
1222	Variance Detects					1.3719E	Percent Non-Detects					88.4%
1223	Mean Detects					0.02	SD Detects					0.01
1224	Median Detects					0.02	CV Detects					0.48
1225	Skewness Detects					1.85	Kurtosis Detects					3.85
1226	Mean of Logged Detects					-3.79	SD of Logged Detects					0.41
1227												
1228	Normal GOF Test on Detects Only											
1229	Shapiro Wilk Test Statistic					0.80	Shapiro Wilk GOF Test					
1230	5% Shapiro Wilk Critical Value					0.78	Detected Data appear Normal at 5% Significance Level					
1231	Lilliefors Test Statistic					0.30	Lilliefors GOF Test					
1232	5% Lilliefors Critical Value					0.36	Detected Data appear Normal at 5% Significance Level					
1233	Detected Data appear Normal at 5% Significance Level											
1234												
1235	Kaplan-Meier (KM) Statistics using Normal Critical Values and other Nonparametric UCLs											
1236	Mean					0.02	Standard Error of Mean					0.001
1237	SD					0.005	95% KM (BCA) UCL					0.02
1238	95% KM (t) UCL					0.02	95% KM (Percentile Bootstrap) UCL					0.02
1239	95% KM (z) UCL					0.02	95% KM Bootstrap t UCL					0.02
1240	90% KM Chebyshev UCL					0.02	95% KM Chebyshev UCL					0.02
1241	97.5% KM Chebyshev UCL					0.03	99% KM Chebyshev UCL					0.04
1242												
1243	Gamma GOF Tests on Detected Observations Only											
1244	A-D Test Statistic					0.44	Anderson-Darling GOF Test					
1245	5% A-D Critical Value					0.69	Detected data appear Gamma Distributed at 5% Significance Level					
1246	K-S Test Statistic					0.25	Kolmogorov-Smirnov GOF					
1247	5% K-S Critical Value					0.33	Detected data appear Gamma Distributed at 5% Significance Level					
1248	Detected data appear Gamma Distributed at 5% Significance Level											
1249												
1250	Gamma Statistics on Detected Data Only											
1251	k hat (MLE)					6.49	k star (bias corrected MLE)					3.36
1252	Theta hat (MLE)					0.003	Theta star (bias corrected MLE)					0.007
1253	nu hat (MLE)					77.98	nu star (bias corrected)					40.3
1254	MLE Mean (bias corrected)					0.02	MLE Sd (bias corrected)					0.01
1255												
1256	Gamma Kaplan-Meier (KM) Statistics											
1257	k hat (KM)					13.8	nu hat (KM)					1435
1258	Approximate Chi Square Value (N/A, α)					1348	Adjusted Chi Square Value (N/A, β)					1346
1259	Approximate KM-UCL (use when n>=50)					0.02	Gamma Adjusted KM-UCL (use when n<50)					0.02
1260												

A	B	C	D	E	F	G	H	I	J	K	L
1261	Gamma ROS Statistics using Imputed Non-Detects										
1262	GROS may not be used when data set has > 50% NDs with many tied observations at multiple DLs										
1263	GROS may not be used when kstar of detected data is small such as < 0.1										
1264	For such situations, GROS method tends to yield inflated values of UCLs and BTVs										
1265	Gamma distributed detected data, BTVs and UCLs may be computed using gamma distribution on KM estimates										
1266	Minimum				0.01	Mean				0.02	
1267	Maximum				0.04	Median				0.01	
1268	SD				0.004	CV				0.21	
1269	k hat (MLE)				30.7	k star (bias corrected MLE)				29.0	
1270	Theta hat (MLE)				6.5900E	Theta star (bias corrected MLE)				6.9903E	
1271	nu hat (MLE)				3200	nu star (bias corrected)				3017	
1272	MLE Mean (bias corrected)				0.02	MLE Sd (bias corrected)				0.003	
1273						Adjusted Level of Significance (β)				0.04	
1274	Approximate Chi Square Value (N/A, α)				2890	Adjusted Chi Square Value (N/A, β)				2887	
1275	Gamma Approximate UCL (use when n>=50)				0.02	Gamma Adjusted UCL (use when n<50)				0.02	
1276											
1277	Lognormal GOF Test on Detected Observations Only										
1278	Shapiro Wilk Test Statistic				0.91	Shapiro Wilk GOF Test					
1279	5% Shapiro Wilk Critical Value				0.78	Detected Data appear Lognormal at 5% Significance Level					
1280	Lilliefors Test Statistic				0.23	Lilliefors GOF Test					
1281	5% Lilliefors Critical Value				0.36	Detected Data appear Lognormal at 5% Significance Level					
1282	Detected Data appear Lognormal at 5% Significance Level										
1283											
1284	Lognormal ROS Statistics Using Imputed Non-Detects										
1285	Mean in Original Scale				0.02	Mean in Log Scale				-3.91	
1286	SD in Original Scale				0.004	SD in Log Scale				0.16	
1287	95% t UCL (assumes normality of ROS data)				0.02	95% Percentile Bootstrap UCL				0.02	
1288	95% BCA Bootstrap UCL				0.02	95% Bootstrap t UCL				0.02	
1289	95% H-UCL (Log ROS)				0.02						
1290											
1291	ROS Statistics using Lognormal Distribution and KM Estimates when Detected data are Lognormally Distributed										
1292	KM Mean (logged)				-3.92	95% H-UCL (KM -Log)				0.02	
1293	KM SD (logged)				0.23	95% Critical H Value (KM-Log)				1.72	
1294	KM Standard Error of Mean (logged)				0.10						
1295											
1296	DL/2 Statistics										
1297	DL/2 Normal					DL/2 Log-Transformed					
1298	Mean in Original Scale				0.02	Mean in Log Scale				-3.83	
1299	SD in Original Scale				0.02	SD in Log Scale				0.38	
1300	95% t UCL (Assumes normality)				0.03	95% H-Stat UCL				0.02	
1301	DL/2 is not a recommended method, provided for comparisons and historical reasons										
1302											
1303	Nonparametric Distribution Free UCL Statistics										
1304	Detected Data appear Normal Distributed at 5% Significance Level										
1305											
1306	Suggested UCL to Use										
1307	95% KM (t) UCL				0.02	95% KM (Percentile Bootstrap) UCL				0.02	
1308											
1309	Recommendations regarding the selection of a 95% UCL are provided to help the user to select the most appropriate										
1310	Recommendations are based upon data size, data distribution, and skewness.										
1311	Recommendations are based upon the results of the simulation studies summarized in Singh, Maichle, and										
1312	Recommendations results will not cover all Real World data sets; for additional insight the user may want to consult										
1313											
1314											
1315	Iron										
1316											
1317	General Statistics										
1318	Total Number of Observations				52	Number of Distinct Observations				39	
1319						Number of Missing Observations				0	
1320	Minimum				7860	Mean				12595	
1321	Maximum				16900	Median				12550	
1322	SD				2000	Std. Error of Mean				277.4	
1323	Coefficient of Variation				0.15	Skewness				-0.049	

	A	B	C	D	E	F	G	H	I	J	K	L
1324												
1325	Normal GOF Test											
1326	Shapiro Wilk Test Statistic					0.98	Shapiro Wilk GOF Test					
1327	5% Shapiro Wilk P Value					0.9	Data appear Normal at 5% Significance Level					
1328	Lilliefors Test Statistic					0.07	Lilliefors GOF Test					
1329	5% Lilliefors Critical Value					0.12	Data appear Normal at 5% Significance Level					
1330	Data appear Normal at 5% Significance Level											
1331												
1332	Assuming Normal Distribution											
1333	95% Normal UCL						95% UCLs (Adjusted for Skewness)					
1334	95% Student's-t UCL					13060	95% Adjusted-CLT UCL (Chen-1995)					13050
1335							95% Modified-t UCL (Johnson-1978)					13060
1336												
1337	Gamma GOF Test											
1338	A-D Test Statistic					0.24	Anderson-Darling Gamma GOF Test					
1339	5% A-D Critical Value					0.74	data appear Gamma Distributed at 5% Significance Level					
1340	K-S Test Statistic					0.08	Kolmogorov-Smirnov Gamma GOF Test					
1341	5% K-S Critical Value					0.12	data appear Gamma Distributed at 5% Significance Level					
1342	Detected data appear Gamma Distributed at 5% Significance Level											
1343												
1344	Gamma Statistics											
1345	k hat (MLE)					39.0	k star (bias corrected MLE)					36.8
1346	Theta hat (MLE)					322.4	Theta star (bias corrected MLE)					342
1347	nu hat (MLE)					4063	nu star (bias corrected)					3830
1348	MLE Mean (bias corrected)					12595	MLE Sd (bias corrected)					2076
1349							Approximate Chi Square Value (0.05)					3687
1350	Adjusted Level of Significance					0.04	Adjusted Chi Square Value					3683
1351												
1352	Assuming Gamma Distribution											
1353	Approximate Gamma UCL (use when n>=50)					13083	Adjusted Gamma UCL (use when n<50)					13097
1354												
1355	Lognormal GOF Test											
1356	Shapiro Wilk Test Statistic					0.97	Shapiro Wilk Lognormal GOF Test					
1357	5% Shapiro Wilk P Value					0.59	Data appear Lognormal at 5% Significance Level					
1358	Lilliefors Test Statistic					0.08	Lilliefors Lognormal GOF Test					
1359	5% Lilliefors Critical Value					0.12	Data appear Lognormal at 5% Significance Level					
1360	Data appear Lognormal at 5% Significance Level											
1361												
1362	Lognormal Statistics											
1363	Minimum of Logged Data					8.97	Mean of logged Data					9.42
1364	Maximum of Logged Data					9.73	SD of logged Data					0.16
1365												
1366	Assuming Lognormal Distribution											
1367	95% H-UCL					13107	90% Chebyshev (MVUE) UCL					13463
1368	95% Chebyshev (MVUE) UCL					13854	97.5% Chebyshev (MVUE) UCL					14398
1369	99% Chebyshev (MVUE) UCL					15464						
1370												
1371	Nonparametric Distribution Free UCL Statistics											
1372	Data appear to follow a Discernible Distribution at 5% Significance Level											
1373												
1374	Nonparametric Distribution Free UCLs											
1375	95% CLT UCL					13052	95% Jackknife UCL					13060
1376	95% Standard Bootstrap UCL					13043	95% Bootstrap-t UCL					13056
1377	95% Hall's Bootstrap UCL					13056	95% Percentile Bootstrap UCL					13045
1378	95% BCA Bootstrap UCL					13062						
1379	90% Chebyshev(Mean, Sd) UCL					13428	95% Chebyshev(Mean, Sd) UCL					13804
1380	97.5% Chebyshev(Mean, Sd) UCL					14328	99% Chebyshev(Mean, Sd) UCL					15355
1381												
1382	Suggested UCL to Use											
1383	95% Student's-t UCL					13060						
1384												
1385	Recommendations regarding the selection of a 95% UCL are provided to help the user to select the most appropriate UCL.											
1386	Recommendations are based upon the results of the simulation studies summarized in Singh, Singh, and Singh (2010).											

	A	B	C	D	E	F	G	H	I	J	K	L
1387	and Singh and Singh (2003). However, simulations results will not cover all Real World data sets											
1388	For additional insight the user may want to consult a statistician.											
1389												
1390	highly negatively-skewed data, confidence limits (e.g., Chen, Johnson, Lognormal, and Gamma) may											
1391	reliable. Chen's and Johnson's methods provide adjustments for positively skewed data sets.											
1392												
1393	Isopropyltoluene[4-]											
1394												
1395	General Statistics											
1396	Total Number of Observations				52	Number of Distinct Observations				29		
1397	Number of Detects				6	Number of Non-Detects				46		
1398	Number of Distinct Detects				6	Number of Distinct Non-Detects				23		
1399	Minimum Detect				4.4700E	Minimum Non-Detect				0.001		
1400	Maximum Detect				0.04	Maximum Non-Detect				0.001		
1401	Variance Detects				2.8454E	Percent Non-Detects				88.4		
1402	Mean Detects				0.008	SD Detects				0.01		
1403	Median Detects				8.0100E	CV Detects				2.06		
1404	Skewness Detects				2.42	Kurtosis Detects				5.89		
1405	Mean of Logged Detects				-6.32	SD of Logged Detects				1.70		
1406												
1407	Normal GOF Test on Detects Only											
1408	Shapiro Wilk Test Statistic				0.54	Shapiro Wilk GOF Test						
1409	5% Shapiro Wilk Critical Value				0.78	Detected Data Not Normal at 5% Significance Level						
1410	Lilliefors Test Statistic				0.43	Lilliefors GOF Test						
1411	5% Lilliefors Critical Value				0.36	Detected Data Not Normal at 5% Significance Level						
1412	Detected Data Not Normal at 5% Significance Level											
1413												
1414	Kaplan-Meier (KM) Statistics using Normal Critical Values and other Nonparametric UCLs											
1415	Mean				0.001	Standard Error of Mean				8.7647E		
1416	SD				0.005	95% KM (BCA) UCL				0.003		
1417	95% KM (t) UCL				0.003	95% KM (Percentile Bootstrap) UCL				0.003		
1418	95% KM (z) UCL				0.003	95% KM Bootstrap t UCL				0.01		
1419	90% KM Chebyshev UCL				0.004	95% KM Chebyshev UCL				0.005		
1420	97.5% KM Chebyshev UCL				0.007	99% KM Chebyshev UCL				0.01		
1421												
1422	Gamma GOF Tests on Detected Observations Only											
1423	A-D Test Statistic				1.00	Anderson-Darling GOF Test						
1424	5% A-D Critical Value				0.74	Detected Data Not Gamma Distributed at 5% Significance Level						
1425	K-S Test Statistic				0.37	Kolmogorov-Smirnov GOF						
1426	5% K-S Critical Value				0.35	Detected Data Not Gamma Distributed at 5% Significance Level						
1427	Detected Data Not Gamma Distributed at 5% Significance Level											
1428												
1429	Gamma Statistics on Detected Data Only											
1430	k hat (MLE)				0.42	k star (bias corrected MLE)				0.32		
1431	Theta hat (MLE)				0.01	Theta star (bias corrected MLE)				0.02		
1432	nu hat (MLE)				5.14	nu star (bias corrected)				3.90		
1433	MLE Mean (bias corrected)				0.008	MLE Sd (bias corrected)				0.01		
1434												
1435	Gamma Kaplan-Meier (KM) Statistics											
1436	k hat (KM)				0.07	nu hat (KM)				7.63		
1437	Approximate Chi Square Value (7.63, α)				2.52	Adjusted Chi Square Value (7.63, β)				2.44		
1438	Approximate KM-UCL (use when $n \geq 50$)				0.004	Gamma Adjusted KM-UCL (use when $n < 50$)				0.004		
1439	Gamma (KM) may not be used when k hat (KM) is < 0.1											
1440												
1441	Gamma ROS Statistics using Imputed Non-Detects											
1442	GROS may not be used when data set has > 50% NDs with many tied observations at multiple DLs											
1443	GROS may not be used when kstar of detected data is small such as < 0.1											
1444	For such situations, GROS method tends to yield inflated values of UCLs and BTVs											
1445	Gamma distributed detected data, BTVs and UCLs may be computed using gamma distribution on KM estimate											
1446	Minimum				4.4700E	Mean				0.009		
1447	Maximum				0.04	Median				0.01		
1448	SD				0.005	CV				0.54		
1449	k hat (MLE)				2.98	k star (bias corrected MLE)				2.82		

	A	B	C	D	E	F	G	H	I	J	K	L
1450	Theta hat (MLE)					0.003	Theta star (bias corrected MLE)					0.003
1451	nu hat (MLE)					309.9	nu star (bias corrected)					293.4
1452	MLE Mean (bias corrected)					0.009	MLE Sd (bias corrected)					0.005
1453							Adjusted Level of Significance (β)					0.04
1454	Approximate Chi Square Value (293.38, α)					254.7	Adjusted Chi Square Value (293.38, β)					253.7
1455	Gamma Approximate UCL (use when $n \geq 50$)					0.01	Gamma Adjusted UCL (use when $n < 50$)					0.01
1456												
1457	Lognormal GOF Test on Detected Observations Only											
1458	Shapiro Wilk Test Statistic					0.78	Shapiro Wilk GOF Test					
1459	5% Shapiro Wilk Critical Value					0.78	Detected Data Not Lognormal at 5% Significance Level					
1460	Lilliefors Test Statistic					0.34	Lilliefors GOF Test					
1461	5% Lilliefors Critical Value					0.36	Detected Data appear Lognormal at 5% Significance Level					
1462	Detected Data appear Approximate Lognormal at 5% Significance Level											
1463												
1464	Lognormal ROS Statistics Using Imputed Non-Detects											
1465	Mean in Original Scale					0.001	Mean in Log Scale					-7.08
1466	SD in Original Scale					0.005	SD in Log Scale					0.00
1467	95% t UCL (assumes normality of ROS data)					0.003	95% Percentile Bootstrap UCL					0.83
1468	95% BCA Bootstrap UCL					0.004	95% Bootstrap t UCL					0.01
1469	95% H-UCL (Log ROS)					0.001						
1470												
1471	UCLs using Lognormal Distribution and KM Estimates when Detected data are Lognormally Distributed											
1472	KM Mean (logged)					-7.18	95% H-UCL (KM -Log)					0.001
1473	KM SD (logged)					0.65	95% Critical H Value (KM-Log)					1.98
1474	KM Standard Error of Mean (logged)					0.15						
1475												
1476	DL/2 Statistics											
1477	DL/2 Normal						DL/2 Log-Transformed					
1478	Mean in Original Scale					0.001	Mean in Log Scale					-7.31
1479	SD in Original Scale					0.005	SD in Log Scale					0.64
1480	95% t UCL (Assumes normality)					0.002	95% H-Stat UCL					9.8556E
1481	DL/2 is not a recommended method, provided for comparisons and historical reasons											
1482												
1483	Nonparametric Distribution Free UCL Statistics											
1484	Detected Data appear Approximate Lognormal Distributed at 5% Significance Level											
1485												
1486	Suggested UCL to Use											
1487	95% KM (Chebyshev) UCL					0.005						
1488												
1489	Recommendations regarding the selection of a 95% UCL are provided to help the user to select the most appropriate											
1490	Recommendations are based upon data size, data distribution, and skewness.											
1491	Recommendations are based upon the results of the simulation studies summarized in Singh, Maichle, and											
1492	Simulation results will not cover all Real World data sets; for additional insight the user may want to consult											
1493												
1494												
1495	Lead											
1496												
1497	General Statistics											
1498	Total Number of Observations					52	Number of Distinct Observations					48
1499							Number of Missing Observations					0
1500	Minimum					6.65	Mean					16.6
1501	Maximum					80.2	Median					13.2
1502	SD					11.7	Std. Error of Mean					1.62
1503	Coefficient of Variation					0.70	Skewness					3.73
1504												
1505	Normal GOF Test											
1506	Shapiro Wilk Test Statistic					0.62	Shapiro Wilk GOF Test					
1507	5% Shapiro Wilk P Value					6.661E-	Data Not Normal at 5% Significance Level					
1508	Lilliefors Test Statistic					0.26	Lilliefors GOF Test					
1509	5% Lilliefors Critical Value					0.12	Data Not Normal at 5% Significance Level					
1510	Data Not Normal at 5% Significance Level											
1511												
1512	Assuming Normal Distribution											

	A	B	C	D	E	F	G	H	I	J	K	L
1513	95% Normal UCL						95% UCLs (Adjusted for Skewness)					
1514	95% Student's-t UCL					19.3	95% Adjusted-CLT UCL (Chen-1995)					20.1
1515							95% Modified-t UCL (Johnson-1978)					19.4
1516												
1517	Gamma GOF Test											
1518	A-D Test Statistic					2.56	Anderson-Darling Gamma GOF Test					
1519	5% A-D Critical Value					0.75	Data Not Gamma Distributed at 5% Significance Level					
1520	K-S Test Statistic					0.20	Kolmogrov-Smirnoff Gamma GOF Test					
1521	5% K-S Critical Value					0.12	Data Not Gamma Distributed at 5% Significance Level					
1522	Data Not Gamma Distributed at 5% Significance Level											
1523												
1524	Gamma Statistics											
1525	k hat (MLE)					3.88	k star (bias corrected MLE)					3.67
1526	Theta hat (MLE)					4.27	Theta star (bias corrected MLE)					4.51
1527	nu hat (MLE)					404.1	nu star (bias corrected)					382.1
1528	MLE Mean (bias corrected)					16.6	MLE Sd (bias corrected)					8.65
1529							Approximate Chi Square Value (0.05)					337.8
1530	Adjusted Level of Significance					0.04	Adjusted Chi Square Value					336.6
1531												
1532	Assuming Gamma Distribution											
1533	Approximate Gamma UCL (use when n>=50))					18.7	Adjusted Gamma UCL (use when n<50)					18.8
1534												
1535	Lognormal GOF Test											
1536	Shapiro Wilk Test Statistic					0.91	Shapiro Wilk Lognormal GOF Test					
1537	5% Shapiro Wilk P Value					6.7599E	Data Not Lognormal at 5% Significance Level					
1538	Lilliefors Test Statistic					0.15	Lilliefors Lognormal GOF Test					
1539	5% Lilliefors Critical Value					0.12	Data Not Lognormal at 5% Significance Level					
1540	Data Not Lognormal at 5% Significance Level											
1541												
1542	Lognormal Statistics											
1543	Minimum of Logged Data					1.89	Mean of logged Data					2.67
1544	Maximum of Logged Data					4.38	SD of logged Data					0.47
1545												
1546	Assuming Lognormal Distribution											
1547	95% H-UCL					18.3	90% Chebyshev (MVUE) UCL					19.4
1548	95% Chebyshev (MVUE) UCL					20.9	97.5% Chebyshev (MVUE) UCL					23.0
1549	99% Chebyshev (MVUE) UCL					27.1						
1550												
1551	Nonparametric Distribution Free UCL Statistics											
1552	Data do not follow a Discernible Distribution (0.05)											
1553												
1554	Nonparametric Distribution Free UCLs											
1555	95% CLT UCL					19.2	95% Jackknife UCL					19.3
1556	95% Standard Bootstrap UCL					19.2	95% Bootstrap-t UCL					21.2
1557	95% Hall's Bootstrap UCL					31.9	95% Percentile Bootstrap UCL					19.4
1558	95% BCA Bootstrap UCL					20.3						
1559	90% Chebyshev(Mean, Sd) UCL					21.4	95% Chebyshev(Mean, Sd) UCL					23.6
1560	97.5% Chebyshev(Mean, Sd) UCL					26.7	99% Chebyshev(Mean, Sd) UCL					32.7
1561												
1562	Suggested UCL to Use											
1563	95% Student's-t UCL					19.3	or 95% Modified-t UCL					19.4
1564												
1565	Recommendations regarding the selection of a 95% UCL are provided to help the user to select the most appropriate											
1566	Recommendations are based upon the results of the simulation studies summarized in Singh, Singh, and											
1567	Singh and Singh and Singh (2003). However, simulations results will not cover all Real World data sets											
1568	For additional insight the user may want to consult a statistician.											
1569												
1570												
1571	Magnesium											
1572												
1573	General Statistics											
1574	Total Number of Observations					52	Number of Distinct Observations					41
1575							Number of Missing Observations					0

	A	B	C	D	E	F	G	H	I	J	K	L
1576					Minimum	697					Mean	1649
1577					Maximum	2270					Median	1700
1578					SD	340.3					Std. Error of Mean	47.11
1579					Coefficient of Variation	0.20					Skewness	-0.57
1580												
1581					Normal GOF Test							
1582					Shapiro Wilk Test Statistic	0.95					Shapiro Wilk GOF Test	
1583					5% Shapiro Wilk P Value	0.12					Data appear Normal at 5% Significance Level	
1584					Lilliefors Test Statistic	0.09					Lilliefors GOF Test	
1585					5% Lilliefors Critical Value	0.12					Data appear Normal at 5% Significance Level	
1586					Data appear Normal at 5% Significance Level							
1587												
1588					Assuming Normal Distribution							
1589					95% Normal UCL					95% UCLs (Adjusted for Skewness)		
1590					95% Student's-t UCL	1728				95% Adjusted-CLT UCL (Chen-1995)		1722
1591										95% Modified-t UCL (Johnson-1978)		1727
1592												
1593					Gamma GOF Test							
1594					A-D Test Statistic	1.22					Anderson-Darling Gamma GOF Test	
1595					5% A-D Critical Value	0.74					Data Not Gamma Distributed at 5% Significance Level	
1596					K-S Test Statistic	0.12					Kolmogrov-Smirnov Gamma GOF Test	
1597					5% K-S Critical Value	0.12					Data Not Gamma Distributed at 5% Significance Level	
1598					Data Not Gamma Distributed at 5% Significance Level							
1599												
1600					Gamma Statistics							
1601					k hat (MLE)	20.4					k star (bias corrected MLE)	19.2
1602					Theta hat (MLE)	80.6					Theta star (bias corrected MLE)	85.5
1603					nu hat (MLE)	2125					nu star (bias corrected)	2004
1604					MLE Mean (bias corrected)	1649					MLE Sd (bias corrected)	375.6
1605											Approximate Chi Square Value (0.05)	1901
1606					Adjusted Level of Significance	0.04					Adjusted Chi Square Value	1898
1607												
1608					Assuming Gamma Distribution							
1609					Approximate Gamma UCL (use when n>=50))	1738					Adjusted Gamma UCL (use when n<50)	1741
1610												
1611					Lognormal GOF Test							
1612					Shapiro Wilk Test Statistic	0.89					Shapiro Wilk Lognormal GOF Test	
1613					5% Shapiro Wilk P Value	7.5467E-					Data Not Lognormal at 5% Significance Level	
1614					Lilliefors Test Statistic	0.14					Lilliefors Lognormal GOF Test	
1615					5% Lilliefors Critical Value	0.12					Data Not Lognormal at 5% Significance Level	
1616					Data Not Lognormal at 5% Significance Level							
1617												
1618					Lognormal Statistics							
1619					Minimum of Logged Data	6.54					Mean of logged Data	7.38
1620					Maximum of Logged Data	7.72					SD of logged Data	0.23
1621												
1622					Assuming Lognormal Distribution							
1623					95% H-UCL	1751					90% Chebyshev (MVUE) UCL	1817
1624					95% Chebyshev (MVUE) UCL	1892					97.5% Chebyshev (MVUE) UCL	1995
1625					99% Chebyshev (MVUE) UCL	2197						
1626												
1627					Nonparametric Distribution Free UCL Statistics							
1628					Data appear to follow a Discernible Distribution at 5% Significance Level							
1629												
1630					Nonparametric Distribution Free UCLs							
1631					95% CLT UCL	1726					95% Jackknife UCL	1728
1632					95% Standard Bootstrap UCL	1726					95% Bootstrap-t UCL	1723
1633					95% Hall's Bootstrap UCL	1724					95% Percentile Bootstrap UCL	1727
1634					95% BCA Bootstrap UCL	1723						
1635					90% Chebyshev(Mean, Sd) UCL	1790					95% Chebyshev(Mean, Sd) UCL	1854
1636					97.5% Chebyshev(Mean, Sd) UCL	1943					99% Chebyshev(Mean, Sd) UCL	2118
1637												
1638					Suggested UCL to Use							

	A	B	C	D	E	F	G	H	I	J	K	L	
1639	95% Student's-t UCL					1728							
1640													
1641	Instructions regarding the selection of a 95% UCL are provided to help the user to select the most appropriate												
1642	recommendations are based upon the results of the simulation studies summarized in Singh, Singh, and												
1643	Singh and Singh and Singh (2003). However, simulations results will not cover all Real World data sets												
1644	For additional insight the user may want to consult a statistician.												
1645													
1646	Highly negatively-skewed data, confidence limits (e.g., Chen, Johnson, Lognormal, and Gamma) may												
1647	be unreliable. Chen's and Johnson's methods provide adjustments for positively skewed data sets.												
1648													
1649													
1650	Manganese												
1651													
1652	General Statistics												
1653	Total Number of Observations					52	Number of Distinct Observations					49	
1654							Number of Missing Observations					0	
1655	Minimum					140	Mean					320.5	
1656	Maximum					610	Median					315	
1657	SD					98.9	Std. Error of Mean					13.7	
1658	Coefficient of Variation					0.30	Skewness					0.77	
1659													
1660	Normal GOF Test												
1661	Shapiro Wilk Test Statistic					0.95	Shapiro Wilk GOF Test						
1662	5% Shapiro Wilk P Value					0.07	Data appear Normal at 5% Significance Level						
1663	Lilliefors Test Statistic					0.08	Lilliefors GOF Test						
1664	5% Lilliefors Critical Value					0.12	Data appear Normal at 5% Significance Level						
1665	Data appear Normal at 5% Significance Level												
1666													
1667	Assuming Normal Distribution												
1668	95% Normal UCL						95% UCLs (Adjusted for Skewness)						
1669	95% Student's-t UCL					343.5	95% Adjusted-CLT UCL (Chen-1995)					344.7	
1670							95% Modified-t UCL (Johnson-1978)					343.7	
1671													
1672	Gamma GOF Test												
1673	A-D Test Statistic					0.31	Anderson-Darling Gamma GOF Test						
1674	5% A-D Critical Value					0.75	data appear Gamma Distributed at 5% Significance Level						
1675	K-S Test Statistic					0.08	Kolmogorov-Smirnov Gamma GOF Test						
1676	5% K-S Critical Value					0.12	data appear Gamma Distributed at 5% Significance Level						
1677	Detected data appear Gamma Distributed at 5% Significance Level												
1678													
1679	Gamma Statistics												
1680	k hat (MLE)					10.9	k star (bias corrected MLE)					10.2	
1681	Theta hat (MLE)					29.3	Theta star (bias corrected MLE)					31.1	
1682	nu hat (MLE)					1135	nu star (bias corrected)					1070	
1683	MLE Mean (bias corrected)					320.5	MLE Sd (bias corrected)					99.9	
1684							Approximate Chi Square Value (0.05)					995.5	
1685	Adjusted Level of Significance					0.04	Adjusted Chi Square Value					993.4	
1686													
1687	Assuming Gamma Distribution												
1688	Approximate Gamma UCL (use when n>=50))					344.7	Adjusted Gamma UCL (use when n<50)					345.4	
1689													
1690	Lognormal GOF Test												
1691	Shapiro Wilk Test Statistic					0.97	Shapiro Wilk Lognormal GOF Test						
1692	5% Shapiro Wilk P Value					0.59	Data appear Lognormal at 5% Significance Level						
1693	Lilliefors Test Statistic					0.10	Lilliefors Lognormal GOF Test						
1694	5% Lilliefors Critical Value					0.12	Data appear Lognormal at 5% Significance Level						
1695	Data appear Lognormal at 5% Significance Level												
1696													
1697	Lognormal Statistics												
1698	Minimum of Logged Data					4.94	Mean of logged Data					5.72	
1699	Maximum of Logged Data					6.41	SD of logged Data					0.31	
1700													
1701	Assuming Lognormal Distribution												

	A	B	C	D	E	F	G	H	I	J	K	L
1702	95% H-UCL					346.2	90% Chebyshev (MVUE) UCL					363.3
1703	95% Chebyshev (MVUE) UCL					382.6	97.5% Chebyshev (MVUE) UCL					409.3
1704	99% Chebyshev (MVUE) UCL					461.7						
1705												
1706	Nonparametric Distribution Free UCL Statistics											
1707	Data appear to follow a Discernible Distribution at 5% Significance Level											
1708												
1709	Nonparametric Distribution Free UCLs											
1710	95% CLT UCL					343.1	95% Jackknife UCL					343.5
1711	95% Standard Bootstrap UCL					343.1	95% Bootstrap-t UCL					346.6
1712	95% Hall's Bootstrap UCL					346.1	95% Percentile Bootstrap UCL					343.8
1713	95% BCA Bootstrap UCL					342.8						
1714	90% Chebyshev(Mean, Sd) UCL					361.7	95% Chebyshev(Mean, Sd) UCL					380.3
1715	97.5% Chebyshev(Mean, Sd) UCL					406.2	99% Chebyshev(Mean, Sd) UCL					457
1716												
1717	Suggested UCL to Use											
1718	95% Student's-t UCL					343.5						
1719												
1720	Recommendations regarding the selection of a 95% UCL are provided to help the user to select the most appropriate											
1721	recommendations are based upon the results of the simulation studies summarized in Singh, Singh, and Singh											
1722	and Singh and Singh (2003). However, simulations results will not cover all Real World data sets											
1723	For additional insight the user may want to consult a statistician.											
1724												
1725												
1726	Mercury											
1727												
1728	General Statistics											
1729	Total Number of Observations					52	Number of Distinct Observations					50
1730							Number of Missing Observations					0
1731	Minimum					0.008	Mean					0.13
1732	Maximum					1.54	Median					0.02
1733	SD					0.31	Std. Error of Mean					0.04
1734	Coefficient of Variation					2.37	Skewness					3.32
1735												
1736	Normal GOF Test											
1737	Shapiro Wilk Test Statistic					0.44	Shapiro Wilk GOF Test					
1738	5% Shapiro Wilk P Value					0	Data Not Normal at 5% Significance Level					
1739	Lilliefors Test Statistic					0.41	Lilliefors GOF Test					
1740	5% Lilliefors Critical Value					0.12	Data Not Normal at 5% Significance Level					
1741	Data Not Normal at 5% Significance Level											
1742												
1743	Assuming Normal Distribution											
1744	95% Normal UCL						95% UCLs (Adjusted for Skewness)					
1745	95% Student's-t UCL					0.20	95% Adjusted-CLT UCL (Chen-1995)					0.22
1746							95% Modified-t UCL (Johnson-1978)					0.20
1747												
1748	Gamma GOF Test											
1749	A-D Test Statistic					8.33	Anderson-Darling Gamma GOF Test					
1750	5% A-D Critical Value					0.82	Data Not Gamma Distributed at 5% Significance Level					
1751	K-S Test Statistic					0.36	Kolmogrov-Smirnoff Gamma GOF Test					
1752	5% K-S Critical Value					0.13	Data Not Gamma Distributed at 5% Significance Level					
1753	Data Not Gamma Distributed at 5% Significance Level											
1754												
1755	Gamma Statistics											
1756	k hat (MLE)					0.47	k star (bias corrected MLE)					0.45
1757	Theta hat (MLE)					0.28	Theta star (bias corrected MLE)					0.29
1758	nu hat (MLE)					48.8	nu star (bias corrected)					47.3
1759	MLE Mean (bias corrected)					0.13	MLE Sd (bias corrected)					0.19
1760							Approximate Chi Square Value (0.05)					32.5
1761	Adjusted Level of Significance					0.04	Adjusted Chi Square Value					32.2
1762												
1763	Assuming Gamma Distribution											
1764	Approximate Gamma UCL (use when n>=50))					0.19	Adjusted Gamma UCL (use when n<50)					0.19

	A	B	C	D	E	F	G	H	I	J	K	L
1765												
1766	Lognormal GOF Test											
1767	Shapiro Wilk Test Statistic				0.76	Shapiro Wilk Lognormal GOF Test						
1768	5% Shapiro Wilk P Value				1.257E-	Data Not Lognormal at 5% Significance Level						
1769	Lilliefors Test Statistic				0.25	Lilliefors Lognormal GOF Test						
1770	5% Lilliefors Critical Value				0.12	Data Not Lognormal at 5% Significance Level						
1771	Data Not Lognormal at 5% Significance Level											
1772												
1773	Lognormal Statistics											
1774	Minimum of Logged Data				-4.76	Mean of logged Data						-3.38
1775	Maximum of Logged Data				0.43	SD of logged Data						1.35
1776												
1777	Assuming Lognormal Distribution											
1778	95% H-UCL				0.14	90% Chebyshev (MVUE) UCL						0.14
1779	95% Chebyshev (MVUE) UCL				0.16	97.5% Chebyshev (MVUE) UCL						0.20
1780	99% Chebyshev (MVUE) UCL				0.27							
1781												
1782	Nonparametric Distribution Free UCL Statistics											
1783	Data do not follow a Discernible Distribution (0.05)											
1784												
1785	Nonparametric Distribution Free UCLs											
1786	95% CLT UCL				0.20	95% Jackknife UCL						0.20
1787	95% Standard Bootstrap UCL				0.20	95% Bootstrap-t UCL						0.26
1788	95% Hall's Bootstrap UCL				0.24	95% Percentile Bootstrap UCL						0.21
1789	95% BCA Bootstrap UCL				0.22							
1790	90% Chebyshev(Mean, Sd) UCL				0.26	95% Chebyshev(Mean, Sd) UCL						0.32
1791	97.5% Chebyshev(Mean, Sd) UCL				0.40	99% Chebyshev(Mean, Sd) UCL						0.56
1792												
1793	Suggested UCL to Use											
1794	95% Chebyshev (Mean, Sd) UCL				0.32							
1795												
1796	tions regarding the selection of a 95% UCL are provided to help the user to select the most appropriate											
1797	mmendations are based upon the results of the simulation studies summarized in Singh, Singh, and											
1798	and Singh and Singh (2003). However, simulations results will not cover all Real World data sets											
1799	For additional insight the user may want to consult a statistician.											
1800												
1801	Methylene Chloride											
1802												
1803	General Statistics											
1804	Total Number of Observations				52	Number of Distinct Observations						45
1805	Number of Detects				7	Number of Non-Detects						45
1806	Number of Distinct Detects				7	Number of Distinct Non-Detects						38
1807	Minimum Detect				0.003	Minimum Non-Detect						0.005
1808	Maximum Detect				0.009	Maximum Non-Detect						0.007
1809	Variance Detects				4.4161E	Percent Non-Detects						86.5
1810	Mean Detects				0.005	SD Detects						0.002
1811	Median Detects				0.004	CV Detects						0.41
1812	Skewness Detects				1.73	Kurtosis Detects						3.43
1813	Mean of Logged Detects				-5.34	SD of Logged Detects						0.36
1814												
1815	Normal GOF Test on Detects Only											
1816	Shapiro Wilk Test Statistic				0.82	Shapiro Wilk GOF Test						
1817	5% Shapiro Wilk Critical Value				0.80	ected Data appear Normal at 5% Significance Le						
1818	Lilliefors Test Statistic				0.28	Lilliefors GOF Test						
1819	5% Lilliefors Critical Value				0.33	ected Data appear Normal at 5% Significance Le						
1820	Detected Data appear Normal at 5% Significance Level											
1821												
1822	Kaplan-Meier (KM) Statistics using Normal Critical Values and other Nonparametric UCLs											
1823	Mean				0.004	Standard Error of Mean						3.1968E
1824	SD				0.001	95% KM (BCA) UCL						0.004
1825	95% KM (t) UCL				0.004	95% KM (Percentile Bootstrap) UCL						0.004
1826	95% KM (z) UCL				0.004	95% KM Bootstrap t UCL						0.004
1827	90% KM Chebyshev UCL				0.005	95% KM Chebyshev UCL						0.005

	A	B	C	D	E	F	G	H	I	J	K	L	
1828	97.5% KM Chebyshev UCL					0.006	99% KM Chebyshev UCL					0.007	
1829													
1830	Gamma GOF Tests on Detected Observations Only												
1831	A-D Test Statistic					0.43	Anderson-Darling GOF Test						
1832	5% A-D Critical Value					0.70	data appear Gamma Distributed at 5% Significance Level						
1833	K-S Test Statistic					0.25	Kolmogrov-Smirnoff GOF						
1834	5% K-S Critical Value					0.31	data appear Gamma Distributed at 5% Significance Level						
1835	Detected data appear Gamma Distributed at 5% Significance Level												
1836													
1837	Gamma Statistics on Detected Data Only												
1838	k hat (MLE)					8.38	k star (bias corrected MLE)					4.88	
1839	Theta hat (MLE)					6.0767E	Theta star (bias corrected MLE)					0.001	
1840	nu hat (MLE)					117.3	nu star (bias corrected)					68.3	
1841	MLE Mean (bias corrected)					0.005	MLE Sd (bias corrected)					0.002	
1842													
1843	Gamma Kaplan-Meier (KM) Statistics												
1844	k hat (KM)					17.6	nu hat (KM)					1837	
1845	Approximate Chi Square Value (N/A, α)					1738	Adjusted Chi Square Value (N/A, β)					1736	
1846	Approximate KM-UCL (use when $n \geq 50$)					0.004	Gamma Adjusted KM-UCL (use when $n < 50$)					0.004	
1847													
1848	Gamma ROS Statistics using Imputed Non-Detects												
1849	GROS may not be used when data set has > 50% NDs with many tied observations at multiple DLs												
1850	GROS may not be used when kstar of detected data is small such as < 0.1												
1851	For such situations, GROS method tends to yield inflated values of UCLs and BTVs												
1852	Gamma distributed detected data, BTVs and UCLs may be computed using gamma distribution on KM estimates												
1853	Minimum					0.003	Mean					0.009	
1854	Maximum					0.01	Median					0.01	
1855	SD					0.001	CV					0.19	
1856	k hat (MLE)					16.4	k star (bias corrected MLE)					15.5	
1857	Theta hat (MLE)					5.6735E	Theta star (bias corrected MLE)					6.0158E	
1858	nu hat (MLE)					1712	nu star (bias corrected)					1615	
1859	MLE Mean (bias corrected)					0.009	MLE Sd (bias corrected)					0.002	
1860							Adjusted Level of Significance (β)					0.04	
1861	Approximate Chi Square Value (N/A, α)					1522	Adjusted Chi Square Value (N/A, β)					1520	
1862	Gamma Approximate UCL (use when $n \geq 50$)					0.009	Gamma Adjusted UCL (use when $n < 50$)					0.009	
1863													
1864	Lognormal GOF Test on Detected Observations Only												
1865	Shapiro Wilk Test Statistic					0.91	Shapiro Wilk GOF Test						
1866	5% Shapiro Wilk Critical Value					0.80	Detected Data appear Lognormal at 5% Significance Level						
1867	Lilliefors Test Statistic					0.23	Lilliefors GOF Test						
1868	5% Lilliefors Critical Value					0.33	Detected Data appear Lognormal at 5% Significance Level						
1869	Detected Data appear Lognormal at 5% Significance Level												
1870													
1871	Lognormal ROS Statistics Using Imputed Non-Detects												
1872	Mean in Original Scale					0.004	Mean in Log Scale					-5.48	
1873	SD in Original Scale					8.4170E	SD in Log Scale					0.15	
1874	95% t UCL (assumes normality of ROS data)					0.004	95% Percentile Bootstrap UCL					0.004	
1875	95% BCA Bootstrap UCL					0.004	95% Bootstrap t UCL					0.004	
1876	95% H-UCL (Log ROS)					0.004							
1877													
1878	DLs using Lognormal Distribution and KM Estimates when Detected data are Lognormally Distributed												
1879	KM Mean (logged)					-5.48	95% H-UCL (KM -Log)					0.004	
1880	KM SD (logged)					0.20	95% Critical H Value (KM-Log)					1.72	
1881	KM Standard Error of Mean (logged)					0.074							
1882													
1883	DL/2 Statistics												
1884	DL/2 Normal						DL/2 Log-Transformed						
1885	Mean in Original Scale					0.003	Mean in Log Scale					-5.76	
1886	SD in Original Scale					0.001	SD in Log Scale					0.22	
1887	95% t UCL (Assumes normality)					0.003	95% H-Stat UCL					0.003	
1888	DL/2 is not a recommended method, provided for comparisons and historical reasons												
1889													
1890	Nonparametric Distribution Free UCL Statistics												

	A	B	C	D	E	F	G	H	I	J	K	L
1891	Detected Data appear Normal Distributed at 5% Significance Level											
1892												
1893	Suggested UCL to Use											
1894	95% KM (t) UCL				0.004	95% KM (Percentile Bootstrap) UCL				0.004		
1895												
1896	Directions regarding the selection of a 95% UCL are provided to help the user to select the most appropriate											
1897	Recommendations are based upon data size, data distribution, and skewness.											
1898	Recommendations are based upon the results of the simulation studies summarized in Singh, Maichle, and											
1899	Simulation results will not cover all Real World data sets; for additional insight the user may want to consult											
1900												
1901												
1902	Nickel											
1903												
1904	General Statistics											
1905	Total Number of Observations				52	Number of Distinct Observations				50		
1906						Number of Missing Observations				0		
1907	Minimum				2.85	Mean				7.82		
1908	Maximum				12.1	Median				7.92		
1909	SD				1.81	Std. Error of Mean				0.25		
1910	Coefficient of Variation				0.23	Skewness				-0.36		
1911												
1912	Normal GOF Test											
1913	Shapiro Wilk Test Statistic				0.98	Shapiro Wilk GOF Test						
1914	5% Shapiro Wilk P Value				0.93	Data appear Normal at 5% Significance Level						
1915	Lilliefors Test Statistic				0.06	Lilliefors GOF Test						
1916	5% Lilliefors Critical Value				0.12	Data appear Normal at 5% Significance Level						
1917	Data appear Normal at 5% Significance Level											
1918												
1919	Assuming Normal Distribution											
1920	95% Normal UCL					95% UCLs (Adjusted for Skewness)						
1921	95% Student's-t UCL				8.24	95% Adjusted-CLT UCL (Chen-1995)				8.22		
1922						95% Modified-t UCL (Johnson-1978)				8.24		
1923												
1924	Gamma GOF Test											
1925	A-D Test Statistic				0.73	Anderson-Darling Gamma GOF Test						
1926	5% A-D Critical Value				0.74	Data appear Gamma Distributed at 5% Significance Level						
1927	K-S Test Statistic				0.09	Kolmogorov-Smirnov Gamma GOF Test						
1928	5% K-S Critical Value				0.12	Data appear Gamma Distributed at 5% Significance Level						
1929	Detected data appear Gamma Distributed at 5% Significance Level											
1930												
1931	Gamma Statistics											
1932	k hat (MLE)				16.24	k star (bias corrected MLE)				15.3		
1933	Theta hat (MLE)				0.48	Theta star (bias corrected MLE)				0.51		
1934	nu hat (MLE)				1694	nu star (bias corrected)				1598		
1935	MLE Mean (bias corrected)				7.82	MLE Sd (bias corrected)				1.99		
1936						Approximate Chi Square Value (0.05)				1506		
1937	Adjusted Level of Significance				0.04	Adjusted Chi Square Value				1503		
1938												
1939	Assuming Gamma Distribution											
1940	Approximate Gamma UCL (use when n>=50)				8.30	Adjusted Gamma UCL (use when n<50)				8.32		
1941												
1942	Lognormal GOF Test											
1943	Shapiro Wilk Test Statistic				0.91	Shapiro Wilk Lognormal GOF Test						
1944	5% Shapiro Wilk P Value				0.001	Data Not Lognormal at 5% Significance Level						
1945	Lilliefors Test Statistic				0.11	Lilliefors Lognormal GOF Test						
1946	5% Lilliefors Critical Value				0.12	Data appear Lognormal at 5% Significance Level						
1947	Data appear Approximate Lognormal at 5% Significance Level											
1948												
1949	Lognormal Statistics											
1950	Minimum of Logged Data				1.04	Mean of logged Data				2.02		
1951	Maximum of Logged Data				2.49	SD of logged Data				0.26		
1952												
1953	Assuming Lognormal Distribution											

	A	B	C	D	E	F	G	H	I	J	K	L
1954	95% H-UCL					8.38	90% Chebyshev (MVUE) UCL					8.73
1955	95% Chebyshev (MVUE) UCL					9.13	97.5% Chebyshev (MVUE) UCL					9.68
1956	99% Chebyshev (MVUE) UCL					10.7						
1957												
1958	Nonparametric Distribution Free UCL Statistics											
1959	Data appear to follow a Discernible Distribution at 5% Significance Level											
1960												
1961	Nonparametric Distribution Free UCLs											
1962	95% CLT UCL					8.24	95% Jackknife UCL					8.24
1963	95% Standard Bootstrap UCL					8.24	95% Bootstrap-t UCL					8.22
1964	95% Hall's Bootstrap UCL					8.23	95% Percentile Bootstrap UCL					8.23
1965	95% BCA Bootstrap UCL					8.22						
1966	90% Chebyshev(Mean, Sd) UCL					8.58	95% Chebyshev(Mean, Sd) UCL					8.92
1967	97.5% Chebyshev(Mean, Sd) UCL					9.39	99% Chebyshev(Mean, Sd) UCL					10.3
1968												
1969	Suggested UCL to Use											
1970	95% Student's-t UCL					8.24						
1971												
1972	Options regarding the selection of a 95% UCL are provided to help the user to select the most appropriate											
1973	Recommendations are based upon the results of the simulation studies summarized in Singh, Singh, and											
1974	and Singh and Singh (2003). However, simulations results will not cover all Real World data sets											
1975	For additional insight the user may want to consult a statistician.											
1976												
1977	highly negatively-skewed data, confidence limits (e.g., Chen, Johnson, Lognormal, and Gamma) may											
1978	reliable. Chen's and Johnson's methods provide adjustments for positively skewed data sets.											
1979												
1980	Plutonium-239/240											
1981												
1982	General Statistics											
1983	Total Number of Observations					52	Number of Distinct Observations					48
1984	Number of Detects					13	Number of Non-Detects					39
1985	Number of Distinct Detects					13	Number of Distinct Non-Detects					35
1986	Minimum Detect					0.014	Minimum Non-Detect					-0.008
1987	Maximum Detect					0.062	Maximum Non-Detect					0.022
1988	Variance Detects					1.9683E	Percent Non-Detects					75%
1989	Mean Detects					0.03	SD Detects					0.014
1990	Median Detects					0.029	CV Detects					0.44
1991	Skewness Detects					0.95	Kurtosis Detects					0.40
1992												
1993	Normal GOF Test on Detects Only											
1994	Shapiro Wilk Test Statistic					0.93	Shapiro Wilk GOF Test					
1995	5% Shapiro Wilk Critical Value					0.86	Detected Data appear Normal at 5% Significance Level					
1996	Lilliefors Test Statistic					0.14	Lilliefors GOF Test					
1997	5% Lilliefors Critical Value					0.24	Detected Data appear Normal at 5% Significance Level					
1998	Detected Data appear Normal at 5% Significance Level											
1999												
2000	Kaplan-Meier (KM) Statistics using Normal Critical Values and other Nonparametric UCLs											
2001	Mean					0.001	Standard Error of Mean					0.002
2002	SD					0.018	95% KM (BCA) UCL					0.018
2003	95% KM (t) UCL					0.006	95% KM (Percentile Bootstrap) UCL					0.008
2004	95% KM (z) UCL					0.005	95% KM Bootstrap t UCL					0.006
2005	90% KM Chebyshev UCL					0.009	95% KM Chebyshev UCL					0.013
2006	97.5% KM Chebyshev UCL					0.018	99% KM Chebyshev UCL					0.028
2007												
2008	Gamma GOF Tests on Detected Observations Only											
2009	A-D Test Statistic					0.15	Anderson-Darling GOF Test					
2010	5% A-D Critical Value					0.73	Detected data appear Gamma Distributed at 5% Significance Level					
2011	K-S Test Statistic					0.11	Kolmogrov-Smirnoff GOF					
2012	5% K-S Critical Value					0.23	Detected data appear Gamma Distributed at 5% Significance Level					
2013	Detected data appear Gamma Distributed at 5% Significance Level											
2014												
2015	Gamma Statistics on Detected Data Only											
2016	k hat (MLE)					5.95	k star (bias corrected MLE)					4.63

A	B	C	D	E	F	G	H	I	J	K	L
2017	Theta hat (MLE)				0.005	Theta star (bias corrected MLE)				0.006	
2018	nu hat (MLE)				154.9	nu star (bias corrected)				120.5	
2019	MLE Mean (bias corrected)				0.03	MLE Sd (bias corrected)				0.01	
2020											
2021	Gamma Kaplan-Meier (KM) Statistics										
2022	k hat (KM)				0.006	nu hat (KM)				0.67	
2023						Adjusted Level of Significance (β)				0.04	
2024	Approximate Chi Square Value (0.67, α)				0.25	Adjusted Chi Square Value (0.67, β)				0.24	
2025	Approximate KM-UCL (use when $n \geq 50$)				0.003	Gamma Adjusted KM-UCL (use when $n < 50$)				0.004	
2026	Gamma (KM) may not be used when k hat (KM) is < 0.1										
2027											
2028	DL/2 Statistics										
2029	Mean in Original Scale				0.009	SD in Original Scale				0.01	
2030	95% t UCL (Assumes normality)				0.01						
2031	DL/2 is not a recommended method, provided for comparisons and historical reasons										
2032											
2033	Nonparametric Distribution Free UCL Statistics										
2034	Detected Data appear Normal Distributed at 5% Significance Level										
2035											
2036	Suggested UCL to Use										
2037	95% KM (t) UCL				0.006	95% KM (Percentile Bootstrap) UCL				0.008	
2038											
2039	Recommendations regarding the selection of a 95% UCL are provided to help the user to select the most appropriate										
2040	Recommendations are based upon data size, data distribution, and skewness.										
2041	Recommendations are based upon the results of the simulation studies summarized in Singh, Maichle, and										
2042	Recommendations results will not cover all Real World data sets; for additional insight the user may want to consult										
2043											
2044	Pyrene										
2045											
2046	General Statistics										
2047	Total Number of Observations				52	Number of Distinct Observations				44	
2048	Number of Detects				5	Number of Non-Detects				47	
2049	Number of Distinct Detects				5	Number of Distinct Non-Detects				39	
2050	Minimum Detect				0.01	Minimum Non-Detect				0.03	
2051	Maximum Detect				0.07	Maximum Non-Detect				0.34	
2052	Variance Detects				5.4197E	Percent Non-Detects				90.3	
2053	Mean Detects				0.03	SD Detects				0.02	
2054	Median Detects				0.02	CV Detects				0.69	
2055	Skewness Detects				1.80	Kurtosis Detects				3.39	
2056	Mean of Logged Detects				-3.55	SD of Logged Detects				0.6	
2057											
2058	Normal GOF Test on Detects Only										
2059	Shapiro Wilk Test Statistic				0.79	Shapiro Wilk GOF Test					
2060	5% Shapiro Wilk Critical Value				0.76	Detected Data appear Normal at 5% Significance Level					
2061	Lilliefors Test Statistic				0.31	Lilliefors GOF Test					
2062	5% Lilliefors Critical Value				0.39	Detected Data appear Normal at 5% Significance Level					
2063	Detected Data appear Normal at 5% Significance Level										
2064											
2065	Kaplan-Meier (KM) Statistics using Normal Critical Values and other Nonparametric UCLs										
2066	Mean				0.02	Standard Error of Mean				0.003	
2067	SD				0.009	95% KM (BCA) UCL				0.03	
2068	95% KM (t) UCL				0.03	95% KM (Percentile Bootstrap) UCL				0.03	
2069	95% KM (z) UCL				0.03	95% KM Bootstrap t UCL				0.03	
2070	90% KM Chebyshev UCL				0.03	95% KM Chebyshev UCL				0.04	
2071	97.5% KM Chebyshev UCL				0.04	99% KM Chebyshev UCL				0.06	
2072											
2073	Gamma GOF Tests on Detected Observations Only										
2074	A-D Test Statistic				0.41	Anderson-Darling GOF Test					
2075	5% A-D Critical Value				0.68	Detected data appear Gamma Distributed at 5% Significance Level					
2076	K-S Test Statistic				0.24	Kolmogorov-Smirnov GOF					
2077	5% K-S Critical Value				0.35	Detected data appear Gamma Distributed at 5% Significance Level					
2078	Detected data appear Gamma Distributed at 5% Significance Level										
2079											

	A	B	C	D	E	F	G	H	I	J	K	L
2080	Gamma Statistics on Detected Data Only											
2081	k hat (MLE)				3.30	k star (bias corrected MLE)				1.45		
2082	Theta hat (MLE)				0.01	Theta star (bias corrected MLE)				0.02		
2083	nu hat (MLE)				33.0	nu star (bias corrected)				14.5		
2084	MLE Mean (bias corrected)				0.03	MLE Sd (bias corrected)				0.02		
2085												
2086	Gamma Kaplan-Meier (KM) Statistics											
2087	k hat (KM)				6.46	nu hat (KM)				671.9		
2088	Approximate Chi Square Value (671.86, α)				612.7	Adjusted Chi Square Value (671.86, β)				611.1		
2089	Approximate KM-UCL (use when $n \geq 50$)				0.02	Gamma Adjusted KM-UCL (use when $n < 50$)				0.02		
2090												
2091	Gamma ROS Statistics using Imputed Non-Detects											
2092	GROS may not be used when data set has > 50% NDs with many tied observations at multiple DLs											
2093	GROS may not be used when kstar of detected data is small such as < 0.1											
2094	For such situations, GROS method tends to yield inflated values of UCLs and BTVs											
2095	Gamma distributed detected data, BTVs and UCLs may be computed using gamma distribution on KM estimates											
2096	Minimum				0.01	Mean				0.02		
2097	Maximum				0.07	Median				0.02		
2098	SD				0.007	CV				0.33		
2099	k hat (MLE)				15.5	k star (bias corrected MLE)				14.6		
2100	Theta hat (MLE)				0.001	Theta star (bias corrected MLE)				0.001		
2101	nu hat (MLE)				1613	nu star (bias corrected)				1522		
2102	MLE Mean (bias corrected)				0.02	MLE Sd (bias corrected)				0.006		
2103						Adjusted Level of Significance (β)				0.04		
2104	Approximate Chi Square Value (N/A, α)				1432	Adjusted Chi Square Value (N/A, β)				1430		
2105	Gamma Approximate UCL (use when $n \geq 50$)				0.02	Gamma Adjusted UCL (use when $n < 50$)				0.02		
2106												
2107	Lognormal GOF Test on Detected Observations Only											
2108	Shapiro Wilk Test Statistic				0.90	Shapiro Wilk GOF Test						
2109	5% Shapiro Wilk Critical Value				0.76	Detected Data appear Lognormal at 5% Significance Level						
2110	Lilliefors Test Statistic				0.20	Lilliefors GOF Test						
2111	5% Lilliefors Critical Value				0.39	Detected Data appear Lognormal at 5% Significance Level						
2112	Detected Data appear Lognormal at 5% Significance Level											
2113												
2114	Lognormal ROS Statistics Using Imputed Non-Detects											
2115	Mean in Original Scale				0.02	Mean in Log Scale				-3.76		
2116	SD in Original Scale				0.007	SD in Log Scale				0.21		
2117	95% t UCL (assumes normality of ROS data)				0.02	95% Percentile Bootstrap UCL				0.02		
2118	95% BCA Bootstrap UCL				0.02	95% Bootstrap t UCL				0.02		
2119	95% H-UCL (Log ROS)				0.02							
2120												
2121	UCLs using Lognormal Distribution and KM Estimates when Detected data are Lognormally Distributed											
2122	KM Mean (logged)				-3.77	95% H-UCL (KM -Log)				0.02		
2123	KM SD (logged)				0.32	95% Critical H Value (KM-Log)				1.72		
2124	KM Standard Error of Mean (logged)				0.15							
2125												
2126	DL/2 Statistics											
2127	DL/2 Normal					DL/2 Log-Transformed						
2128	Mean in Original Scale				0.02	Mean in Log Scale				-3.81		
2129	SD in Original Scale				0.02	SD in Log Scale				0.40		
2130	95% t UCL (Assumes normality)				0.03	95% H-Stat UCL				0.02		
2131	DL/2 is not a recommended method, provided for comparisons and historical reasons											
2132												
2133	Nonparametric Distribution Free UCL Statistics											
2134	Detected Data appear Normal Distributed at 5% Significance Level											
2135												
2136	Suggested UCL to Use											
2137	95% KM (t) UCL				0.03	95% KM (Percentile Bootstrap) UCL				0.03		
2138												
2139	Considerations regarding the selection of a 95% UCL are provided to help the user to select the most appropriate											
2140	Recommendations are based upon data size, data distribution, and skewness.											
2141	Recommendations are based upon the results of the simulation studies summarized in Singh, Maichle, and											
2142	Recommendations results will not cover all Real World data sets; for additional insight the user may want to consult											

	A	B	C	D	E	F	G	H	I	J	K	L
2143												
2144	Silver											
2145												
2146	General Statistics											
2147	Total Number of Observations					52	Number of Distinct Observations					50
2148	Number of Detects					35	Number of Non-Detects					17
2149	Number of Distinct Detects					35	Number of Distinct Non-Detects					17
2150	Minimum Detect					0.19	Minimum Non-Detect					0.52
2151	Maximum Detect					21	Maximum Non-Detect					0.71
2152	Variance Detects					14.6	Percent Non-Detects					32.6
2153	Mean Detects					2.17	SD Detects					3.83
2154	Median Detects					0.85	CV Detects					1.76
2155	Skewness Detects					3.91	Kurtosis Detects					17.6
2156	Mean of Logged Detects					0.09	SD of Logged Detects					1.02
2157												
2158	Normal GOF Test on Detects Only											
2159	Shapiro Wilk Test Statistic					0.50	Shapiro Wilk GOF Test					
2160	5% Shapiro Wilk Critical Value					0.93	Detected Data Not Normal at 5% Significance Level					
2161	Lilliefors Test Statistic					0.32	Lilliefors GOF Test					
2162	5% Lilliefors Critical Value					0.15	Detected Data Not Normal at 5% Significance Level					
2163	Detected Data Not Normal at 5% Significance Level											
2164												
2165	Kaplan-Meier (KM) Statistics using Normal Critical Values and other Nonparametric UCLs											
2166	Mean					1.60	Standard Error of Mean					0.45
2167	SD					3.20	95% KM (BCA) UCL					2.48
2168	95% KM (t) UCL					2.35	95% KM (Percentile Bootstrap) UCL					2.38
2169	95% KM (z) UCL					2.34	95% KM Bootstrap t UCL					3.24
2170	90% KM Chebyshev UCL					2.95	95% KM Chebyshev UCL					3.56
2171	97.5% KM Chebyshev UCL					4.41	99% KM Chebyshev UCL					6.08
2172												
2173	Gamma GOF Tests on Detected Observations Only											
2174	A-D Test Statistic					2.94	Anderson-Darling GOF Test					
2175	5% A-D Critical Value					0.78	Detected Data Not Gamma Distributed at 5% Significance Level					
2176	K-S Test Statistic					0.27	Kolmogorov-Smirnov GOF					
2177	5% K-S Critical Value					0.15	Detected Data Not Gamma Distributed at 5% Significance Level					
2178	Detected Data Not Gamma Distributed at 5% Significance Level											
2179												
2180	Gamma Statistics on Detected Data Only											
2181	k hat (MLE)					0.86	k star (bias corrected MLE)					0.80
2182	Theta hat (MLE)					2.52	Theta star (bias corrected MLE)					2.69
2183	nu hat (MLE)					60.1	nu star (bias corrected)					56.3
2184	MLE Mean (bias corrected)					2.17	MLE Sd (bias corrected)					2.42
2185												
2186	Gamma Kaplan-Meier (KM) Statistics											
2187	k hat (KM)					0.24	nu hat (KM)					25.9
2188	Approximate Chi Square Value (25.94, α)					15.3	Adjusted Chi Square Value (25.94, β)					15.1
2189	Approximate KM-UCL (use when $n \geq 50$)					2.70	Gamma Adjusted KM-UCL (use when $n < 50$)					2.75
2190												
2191	Gamma ROS Statistics using Imputed Non-Detects											
2192	GROS may not be used when data set has > 50% NDs with many tied observations at multiple DLs											
2193	GROS may not be used when kstar of detected data is small such as < 0.1											
2194	For such situations, GROS method tends to yield inflated values of UCLs and BTVs											
2195	Gamma distributed detected data, BTVs and UCLs may be computed using gamma distribution on KM e											
2196	Minimum					0.01	Mean					1.46
2197	Maximum					21	Median					0.55
2198	SD					3.29	CV					2.24
2199	k hat (MLE)					0.36	k star (bias corrected MLE)					0.35
2200	Theta hat (MLE)					4.00	Theta star (bias corrected MLE)					4.10
2201	nu hat (MLE)					38.0	nu star (bias corrected)					37.1
2202	MLE Mean (bias corrected)					1.46	MLE Sd (bias corrected)					2.45
2203							Adjusted Level of Significance (β)					0.04
2204	Approximate Chi Square Value (37.17, α)					24.2	Adjusted Chi Square Value (37.17, β)					23.9
2205	Gamma Approximate UCL (use when $n \geq 50$)					2.25	Gamma Adjusted UCL (use when $n < 50$)					2.27

	A	B	C	D	E	F	G	H	I	J	K	L	
2206													
2207	Lognormal GOF Test on Detected Observations Only												
2208	Shapiro Wilk Test Statistic					0.90	Shapiro Wilk GOF Test						
2209	5% Shapiro Wilk Critical Value					0.93	Detected Data Not Lognormal at 5% Significance Level						
2210	Lilliefors Test Statistic					0.19	Lilliefors GOF Test						
2211	5% Lilliefors Critical Value					0.15	Detected Data Not Lognormal at 5% Significance Level						
2212	Detected Data Not Lognormal at 5% Significance Level												
2213													
2214	Lognormal ROS Statistics Using Imputed Non-Detects												
2215	Mean in Original Scale					1.57	Mean in Log Scale					-0.29	
2216	SD in Original Scale					3.24	SD in Log Scale					1.01	
2217	95% t UCL (assumes normality of ROS data)					2.32	95% Percentile Bootstrap UCL					2.37	
2218	95% BCA Bootstrap UCL					2.72	95% Bootstrap t UCL					3.31	
2219	95% H-UCL (Log ROS)					1.72							
2220													
2221	DL/2 Statistics												
2222	DL/2 Normal					DL/2 Log-Transformed							
2223	Mean in Original Scale					1.55	Mean in Log Scale					-0.34	
2224	SD in Original Scale					3.25	SD in Log Scale					1.05	
2225	95% t UCL (Assumes normality)					2.31	95% H-Stat UCL					1.74	
2226	DL/2 is not a recommended method, provided for comparisons and historical reasons												
2227													
2228	Nonparametric Distribution Free UCL Statistics												
2229	Data do not follow a Discernible Distribution at 5% Significance Level												
2230													
2231	Suggested UCL to Use												
2232	95% KM (Chebyshev) UCL					3.56							
2233													
2234	Recommendations regarding the selection of a 95% UCL are provided to help the user to select the most appropriate												
2235	Recommendations are based upon data size, data distribution, and skewness.												
2236	Recommendations are based upon the results of the simulation studies summarized in Singh, Maichle, and												
2237	Simulation results will not cover all Real World data sets; for additional insight the user may want to consult												
2238													
2239	Tetrachloroethene												
2240													
2241	General Statistics												
2242	Total Number of Observations					52	Number of Distinct Observations					36	
2243	Number of Detects					14	Number of Non-Detects					38	
2244	Number of Distinct Detects					14	Number of Distinct Non-Detects					22	
2245	Minimum Detect					4.0400E	Minimum Non-Detect					0.001E	
2246	Maximum Detect					0.001E	Maximum Non-Detect					0.001E	
2247	Variance Detects					1.0467E	Percent Non-Detects					73.0%	
2248	Mean Detects					6.7000E	SD Detects					3.2352E	
2249	Median Detects					5.4150E	CV Detects					0.48	
2250	Skewness Detects					1.75	Kurtosis Detects					3.33	
2251	Mean of Logged Detects					-7.39	SD of Logged Detects					0.41	
2252													
2253	Normal GOF Test on Detects Only												
2254	Shapiro Wilk Test Statistic					0.79	Shapiro Wilk GOF Test						
2255	5% Shapiro Wilk Critical Value					0.87	Detected Data Not Normal at 5% Significance Level						
2256	Lilliefors Test Statistic					0.20	Lilliefors GOF Test						
2257	5% Lilliefors Critical Value					0.23	Detected Data appear Normal at 5% Significance Level						
2258	Detected Data appear Approximate Normal at 5% Significance Level												
2259													
2260	Kaplan-Meier (KM) Statistics using Normal Critical Values and other Nonparametric UCLs												
2261	Mean					6.2053E	Standard Error of Mean					5.9827E	
2262	SD					2.3807E	95% KM (BCA) UCL					7.1410E	
2263	95% KM (t) UCL					7.2076E	95% KM (Percentile Bootstrap) UCL					7.2606E	
2264	95% KM (z) UCL					7.1894E	95% KM Bootstrap t UCL					7.5510E	
2265	90% KM Chebyshev UCL					8.0001E	95% KM Chebyshev UCL					8.8131E	
2266	97.5% KM Chebyshev UCL					9.9415E	99% KM Chebyshev UCL					0.001E	
2267													
2268	Gamma GOF Tests on Detected Observations Only												

	A	B	C	D	E	F	G	H	I	J	K	L	
2269	A-D Test Statistic					0.70	Anderson-Darling GOF Test						
2270	5% A-D Critical Value					0.73	Detected data appear Gamma Distributed at 5% Significance Level						
2271	K-S Test Statistic					0.19	Kolmogrov-Smirnoff GOF						
2272	5% K-S Critical Value					0.22	Detected data appear Gamma Distributed at 5% Significance Level						
2273	Detected data appear Gamma Distributed at 5% Significance Level												
2274													
2275	Gamma Statistics on Detected Data Only												
2276	k hat (MLE)					5.96	k star (bias corrected MLE)					4.73	
2277	Theta hat (MLE)					1.1227E	Theta star (bias corrected MLE)					1.4145E	
2278	nu hat (MLE)					167.1	nu star (bias corrected)					132.6	
2279	MLE Mean (bias corrected)					6.7000E	MLE Sd (bias corrected)					3.0785E	
2280													
2281	Gamma Kaplan-Meier (KM) Statistics												
2282	k hat (KM)					6.79	nu hat (KM)					706.6	
2283	Approximate Chi Square Value (706.59, α)					645.9	Adjusted Chi Square Value (706.59, β)					644.3	
2284	Approximate KM-UCL (use when $n \geq 50$)					6.7882E	Gamma Adjusted KM-UCL (use when $n < 50$)					6.8056E	
2285													
2286	Gamma ROS Statistics using Imputed Non-Detects												
2287	GROS may not be used when data set has > 50% NDs with many tied observations at multiple DLs												
2288	GROS may not be used when kstar of detected data is small such as < 0.1												
2289	For such situations, GROS method tends to yield inflated values of UCLs and BTVs												
2290	Gamma distributed detected data, BTVs and UCLs may be computed using gamma distribution on KM estimates												
2291	Minimum					4.0400E	Mean					0.007	
2292	Maximum					0.01	Median					0.01	
2293	SD					0.004	CV					0.55	
2294	k hat (MLE)					1.22	k star (bias corrected MLE)					1.16	
2295	Theta hat (MLE)					0.006	Theta star (bias corrected MLE)					0.006	
2296	nu hat (MLE)					127.2	nu star (bias corrected)					121.2	
2297	MLE Mean (bias corrected)					0.007	MLE Sd (bias corrected)					0.006	
2298							Adjusted Level of Significance (β)					0.04	
2299	Approximate Chi Square Value (121.17, α)					96.7	Adjusted Chi Square Value (121.17, β)					96.1	
2300	Gamma Approximate UCL (use when $n \geq 50$)					0.009	Gamma Adjusted UCL (use when $n < 50$)					0.009	
2301													
2302	Lognormal GOF Test on Detected Observations Only												
2303	Shapiro Wilk Test Statistic					0.89	Shapiro Wilk GOF Test						
2304	5% Shapiro Wilk Critical Value					0.87	Detected Data appear Lognormal at 5% Significance Level						
2305	Lilliefors Test Statistic					0.19	Lilliefors GOF Test						
2306	5% Lilliefors Critical Value					0.23	Detected Data appear Lognormal at 5% Significance Level						
2307	Detected Data appear Lognormal at 5% Significance Level												
2308													
2309	Lognormal ROS Statistics Using Imputed Non-Detects												
2310	Mean in Original Scale					6.0809E	Mean in Log Scale					-7.44	
2311	SD in Original Scale					1.8755E	SD in Log Scale					0.25	
2312	95% t UCL (assumes normality of ROS data)					6.5166E	95% Percentile Bootstrap UCL					6.5385E	
2313	95% BCA Bootstrap UCL					6.5815E	95% Bootstrap t UCL					6.6842E	
2314	95% H-UCL (Log ROS)					6.4440E							
2315													
2316	UCLs using Lognormal Distribution and KM Estimates when Detected data are Lognormally Distributed												
2317	KM Mean (logged)					-7.44	95% H-UCL (KM -Log)					6.7054E	
2318	KM SD (logged)					0.33	95% Critical H Value (KM-Log)					1.73	
2319	KM Standard Error of Mean (logged)					0.09							
2320													
2321	DL/2 Statistics												
2322	DL/2 Normal						DL/2 Log-Transformed						
2323	Mean in Original Scale					6.1625E	Mean in Log Scale					-7.41	
2324	SD in Original Scale					1.7256E	SD in Log Scale					0.22	
2325	95% t UCL (Assumes normality)					6.5634E	95% H-Stat UCL					6.4776E	
2326	DL/2 is not a recommended method, provided for comparisons and historical reasons												
2327													
2328	Nonparametric Distribution Free UCL Statistics												
2329	Detected Data appear Approximate Normal Distributed at 5% Significance Level												
2330													
2331	Suggested UCL to Use												

	A	B	C	D	E	F	G	H	I	J	K	L	
2332	95% KM (t) UCL					7.2076E	95% KM (Percentile Bootstrap) UCL					7.2606E	
2333													
2334	ations regarding the selection of a 95% UCL are provided to help the user to select the most appropriate												
2335	Recommendations are based upon data size, data distribution, and skewness.												
2336	Recommendations are based upon the results of the simulation studies summarized in Singh, Maichle, and												
2337	ations results will not cover all Real World data sets; for additional insight the user may want to cons												
2338													
2339	Toluene												
2340													
2341	General Statistics												
2342	Total Number of Observations					52	Number of Distinct Observations					34	
2343	Number of Detects					15	Number of Non-Detects					37	
2344	Number of Distinct Detects					15	Number of Distinct Non-Detects					20	
2345	Minimum Detect					3.9400E	Minimum Non-Detect					0.001	
2346	Maximum Detect					0.002	Maximum Non-Detect					0.001	
2347	Variance Detects					3.2999E	Percent Non-Detects					71.1	
2348	Mean Detects					8.5700E	SD Detects					5.7445E	
2349	Median Detects					6.3500E	CV Detects					0.67	
2350	Skewness Detects					1.75	Kurtosis Detects					3.10	
2351	Mean of Logged Detects					-7.22	SD of Logged Detects					0.56	
2352													
2353	Normal GOF Test on Detects Only												
2354	Shapiro Wilk Test Statistic					0.78	Shapiro Wilk GOF Test						
2355	5% Shapiro Wilk Critical Value					0.88	Detected Data Not Normal at 5% Significance Level						
2356	Lilliefors Test Statistic					0.21	Lilliefors GOF Test						
2357	5% Lilliefors Critical Value					0.22	Detected Data appear Normal at 5% Significance Level						
2358	Detected Data appear Approximate Normal at 5% Significance Level												
2359													
2360	Kaplan-Meier (KM) Statistics using Normal Critical Values and other Nonparametric UCLs												
2361	Mean					6.5894E	Standard Error of Mean					6.6845E	
2362	SD					3.5770E	95% KM (BCA) UCL					7.7142E	
2363	95% KM (t) UCL					7.7092E	95% KM (Percentile Bootstrap) UCL					7.6847E	
2364	95% KM (z) UCL					7.6889E	95% KM Bootstrap t UCL					8.0761E	
2365	90% KM Chebyshev UCL					8.5947E	95% KM Chebyshev UCL					9.5031E	
2366	97.5% KM Chebyshev UCL					0.001	99% KM Chebyshev UCL					0.001	
2367													
2368	Gamma GOF Tests on Detected Observations Only												
2369	A-D Test Statistic					0.71	Anderson-Darling GOF Test						
2370	5% A-D Critical Value					0.74	Data appear Gamma Distributed at 5% Significance Level						
2371	K-S Test Statistic					0.17	Kolmogrov-Smirnoff GOF						
2372	5% K-S Critical Value					0.22	Data appear Gamma Distributed at 5% Significance Level						
2373	Detected data appear Gamma Distributed at 5% Significance Level												
2374													
2375	Gamma Statistics on Detected Data Only												
2376	k hat (MLE)					3.21	k star (bias corrected MLE)					2.61	
2377	Theta hat (MLE)					2.6701E	Theta star (bias corrected MLE)					3.2808E	
2378	nu hat (MLE)					96.2	nu star (bias corrected)					78.3	
2379	MLE Mean (bias corrected)					8.5700E	MLE Sd (bias corrected)					5.3025E	
2380													
2381	Gamma Kaplan-Meier (KM) Statistics												
2382	k hat (KM)					3.39	nu hat (KM)					352.9	
2383	Approximate Chi Square Value (352.92, α)					310.4	Adjusted Chi Square Value (352.92, β)					309.3	
2384	Approximate KM-UCL (use when $n \geq 50$)					7.4923E	Gamma Adjusted KM-UCL (use when $n < 50$)					7.5198E	
2385													
2386	Gamma ROS Statistics using Imputed Non-Detects												
2387	GROS may not be used when data set has > 50% NDs with many tied observations at multiple DLs												
2388	GROS may not be used when kstar of detected data is small such as < 0.1												
2389	For such situations, GROS method tends to yield inflated values of UCLs and BTVs												
2390	Gamma distributed detected data, BTVs and UCLs may be computed using gamma distribution on KM e												
2391	Minimum					3.9400E	Mean					0.007	
2392	Maximum					0.01	Median					0.01	
2393	SD					0.004	CV					0.57	
2394	k hat (MLE)					1.25	k star (bias corrected MLE)					1.19	

	A	B	C	D	E	F	G	H	I	J	K	L
2395	Theta hat (MLE)					0.005	Theta star (bias corrected MLE)					0.006
2396	nu hat (MLE)					130.2	nu star (bias corrected)					124
2397	MLE Mean (bias corrected)					0.007	MLE Sd (bias corrected)					0.006
2398							Adjusted Level of Significance (β)					0.04
2399	Approximate Chi Square Value (124.03, α)					99.3	Adjusted Chi Square Value (124.03, β)					98.6
2400	Gamma Approximate UCL (use when $n \geq 50$)					0.009	Gamma Adjusted UCL (use when $n < 50$)					0.009
2401												
2402	Lognormal GOF Test on Detected Observations Only											
2403	Shapiro Wilk Test Statistic					0.90	Shapiro Wilk GOF Test					
2404	5% Shapiro Wilk Critical Value					0.88	Detected Data appear Lognormal at 5% Significance Level					
2405	Lilliefors Test Statistic					0.16	Lilliefors GOF Test					
2406	5% Lilliefors Critical Value					0.22	Detected Data appear Lognormal at 5% Significance Level					
2407	Detected Data appear Lognormal at 5% Significance Level											
2408												
2409	Lognormal ROS Statistics Using Imputed Non-Detects											
2410	Mean in Original Scale					6.6483E	Mean in Log Scale					-7.39
2411	SD in Original Scale					3.4110E	SD in Log Scale					0.36
2412	95% t UCL (assumes normality of ROS data)					7.4407E	95% Percentile Bootstrap UCL					7.4971E
2413	95% BCA Bootstrap UCL					7.7543E	95% Bootstrap t UCL					7.9249E
2414	95% H-UCL (Log ROS)					7.1698E						
2415												
2416	UCLs using Lognormal Distribution and KM Estimates when Detected data are Lognormally Distributed											
2417	KM Mean (logged)					-7.41	95% H-UCL (KM -Log)					7.1770E
2418	KM SD (logged)					0.39	95% Critical H Value (KM-Log)					1.81
2419	KM Standard Error of Mean (logged)					0.08						
2420												
2421	DL/2 Statistics											
2422	DL/2 Normal						DL/2 Log-Transformed					
2423	Mean in Original Scale					6.6731E	Mean in Log Scale					-7.37
2424	SD in Original Scale					3.2716E	SD in Log Scale					0.31
2425	95% t UCL (Assumes normality)					7.4331E	95% H-Stat UCL					7.1007E
2426	DL/2 is not a recommended method, provided for comparisons and historical reasons											
2427												
2428	Nonparametric Distribution Free UCL Statistics											
2429	Detected Data appear Approximate Normal Distributed at 5% Significance Level											
2430												
2431	Suggested UCL to Use											
2432	95% KM (t) UCL					7.7092E	95% KM (Percentile Bootstrap) UCL					7.6847E
2433												
2434	Recommendations regarding the selection of a 95% UCL are provided to help the user to select the most appropriate											
2435	Recommendations are based upon data size, data distribution, and skewness.											
2436	Recommendations are based upon the results of the simulation studies summarized in Singh, Maichle, and											
2437	Recommendations results will not cover all Real World data sets; for additional insight the user may want to consult											
2438												
2439	Tritium											
2440												
2441	General Statistics											
2442	Total Number of Observations					52	Number of Distinct Observations					52
2443	Number of Detects					11	Number of Non-Detects					41
2444	Number of Distinct Detects					11	Number of Distinct Non-Detects					41
2445	Minimum Detect					0.01	Minimum Non-Detect					-0.023
2446	Maximum Detect					0.88	Maximum Non-Detect					0.05
2447	Variance Detects					0.06	Percent Non-Detects					78.8
2448	Mean Detects					0.12	SD Detects					0.25
2449	Median Detects					0.03	CV Detects					2.12
2450	Skewness Detects					3.24	Kurtosis Detects					10.6
2451												
2452	Normal GOF Test on Detects Only											
2453	Shapiro Wilk Test Statistic					0.43	Shapiro Wilk GOF Test					
2454	5% Shapiro Wilk Critical Value					0.85	Detected Data Not Normal at 5% Significance Level					
2455	Lilliefors Test Statistic					0.44	Lilliefors GOF Test					
2456	5% Lilliefors Critical Value					0.26	Detected Data Not Normal at 5% Significance Level					
2457	Detected Data Not Normal at 5% Significance Level											

	A	B	C	D	E	F	G	H	I	J	K	L
2458												
2459	Kaplan-Meier (KM) Statistics using Normal Critical Values and other Nonparametric UCLs											
2460	Mean				0.008	Standard Error of Mean				0.01		
2461	SD				0.12	95% KM (BCA) UCL				0.05		
2462	95% KM (t) UCL				0.03	95% KM (Percentile Bootstrap) UCL				0.04		
2463	95% KM (z) UCL				0.03	95% KM Bootstrap t UCL				0.10		
2464	90% KM Chebyshev UCL				0.06	95% KM Chebyshev UCL				0.08		
2465	97.5% KM Chebyshev UCL				0.12	99% KM Chebyshev UCL				0.19		
2466												
2467	Gamma GOF Tests on Detected Observations Only											
2468	A-D Test Statistic				1.63	Anderson-Darling GOF Test						
2469	5% A-D Critical Value				0.76	Data Not Gamma Distributed at 5% Significance Level						
2470	K-S Test Statistic				0.33	Kolmogorov-Smirnov GOF						
2471	5% K-S Critical Value				0.26	Data Not Gamma Distributed at 5% Significance Level						
2472	Detected Data Not Gamma Distributed at 5% Significance Level											
2473												
2474	Gamma Statistics on Detected Data Only											
2475	k hat (MLE)				0.67	k star (bias corrected MLE)				0.55		
2476	Theta hat (MLE)				0.17	Theta star (bias corrected MLE)				0.21		
2477	nu hat (MLE)				14.8	nu star (bias corrected)				12.1		
2478	MLE Mean (bias corrected)				0.12	MLE Sd (bias corrected)				0.16		
2479												
2480	Gamma Kaplan-Meier (KM) Statistics											
2481	k hat (KM)				0.004	nu hat (KM)				0.43		
2482						Adjusted Level of Significance (β)				0.04		
2483	Approximate Chi Square Value (0.44, α)				0.32	Adjusted Chi Square Value (0.44, β)				0.28		
2484	Approximate KM-UCL (use when $n \geq 50$)				0.01	Gamma Adjusted KM-UCL (use when $n < 50$)				0.01		
2485	Gamma (KM) may not be used when k hat (KM) is < 0.1											
2486												
2487	DL/2 Statistics											
2488	Mean in Original Scale				0.02	SD in Original Scale				0.12		
2489	95% t UCL (Assumes normality)				0.05							
2490	DL/2 is not a recommended method, provided for comparisons and historical reasons											
2491												
2492	Nonparametric Distribution Free UCL Statistics											
2493	Data do not follow a Discernible Distribution at 5% Significance Level											
2494												
2495	Suggested UCL to Use											
2496	99% KM (Chebyshev) UCL				0.19							
2497												
2498	Recommendations regarding the selection of a 95% UCL are provided to help the user to select the most appropriate UCL.											
2499	Recommendations are based upon data size, data distribution, and skewness.											
2500	Recommendations are based upon the results of the simulation studies summarized in Singh, Maichle, and Singh (2004).											
2501	Recommendations results will not cover all Real World data sets; for additional insight the user may want to consult the literature.											
2502												
2503												
2504	Uranium											
2505												
2506	General Statistics											
2507	Total Number of Observations				52	Number of Distinct Observations				51		
2508						Number of Missing Observations				0		
2509	Minimum				0.26	Mean				2.70		
2510	Maximum				13.9	Median				1.18		
2511	SD				2.83	Std. Error of Mean				0.39		
2512	Coefficient of Variation				1.04	Skewness				2.14		
2513												
2514	Normal GOF Test											
2515	Shapiro Wilk Test Statistic				0.74	Shapiro Wilk GOF Test						
2516	5% Shapiro Wilk P Value				1.402E-05	Data Not Normal at 5% Significance Level						
2517	Lilliefors Test Statistic				0.23	Lilliefors GOF Test						
2518	5% Lilliefors Critical Value				0.12	Data Not Normal at 5% Significance Level						
2519	Data Not Normal at 5% Significance Level											
2520												

	A	B	C	D	E	F	G	H	I	J	K	L
2521	Assuming Normal Distribution											
2522	95% Normal UCL					95% UCLs (Adjusted for Skewness)						
2523	95% Student's-t UCL					3.36	95% Adjusted-CLT UCL (Chen-1995)					3.47
2524							95% Modified-t UCL (Johnson-1978)					3.38
2525												
2526	Gamma GOF Test											
2527	A-D Test Statistic					2.00	Anderson-Darling Gamma GOF Test					
2528	5% A-D Critical Value					0.77	Data Not Gamma Distributed at 5% Significance Level					
2529	K-S Test Statistic					0.21	Kolmogrov-Smirnoff Gamma GOF Test					
2530	5% K-S Critical Value					0.12	Data Not Gamma Distributed at 5% Significance Level					
2531	Data Not Gamma Distributed at 5% Significance Level											
2532												
2533	Gamma Statistics											
2534	k hat (MLE)					1.32	k star (bias corrected MLE)					1.26
2535	Theta hat (MLE)					2.04	Theta star (bias corrected MLE)					2.14
2536	nu hat (MLE)					137.7	nu star (bias corrected)					131.1
2537	MLE Mean (bias corrected)					2.70	MLE Sd (bias corrected)					2.40
2538							Approximate Chi Square Value (0.05)					105.6
2539	Adjusted Level of Significance					0.045	Adjusted Chi Square Value					105
2540												
2541	Assuming Gamma Distribution											
2542	Approximate Gamma UCL (use when n>=50))					3.35	Adjusted Gamma UCL (use when n<50)					3.37
2543												
2544	Lognormal GOF Test											
2545	Shapiro Wilk Test Statistic					0.94	Shapiro Wilk Lognormal GOF Test					
2546	5% Shapiro Wilk P Value					0.02	Data Not Lognormal at 5% Significance Level					
2547	Lilliefors Test Statistic					0.18	Lilliefors Lognormal GOF Test					
2548	5% Lilliefors Critical Value					0.12	Data Not Lognormal at 5% Significance Level					
2549	Data Not Lognormal at 5% Significance Level											
2550												
2551	Lognormal Statistics											
2552	Minimum of Logged Data					-1.34	Mean of logged Data					0.57
2553	Maximum of Logged Data					2.63	SD of logged Data					0.91
2554												
2555	Assuming Lognormal Distribution											
2556	95% H-UCL					3.55	90% Chebyshev (MVUE) UCL					3.80
2557	95% Chebyshev (MVUE) UCL					4.32	97.5% Chebyshev (MVUE) UCL					5.05
2558	99% Chebyshev (MVUE) UCL					6.47						
2559												
2560	Nonparametric Distribution Free UCL Statistics											
2561	Data do not follow a Discernible Distribution (0.05)											
2562												
2563	Nonparametric Distribution Free UCLs											
2564	95% CLT UCL					3.34	95% Jackknife UCL					3.36
2565	95% Standard Bootstrap UCL					3.34	95% Bootstrap-t UCL					3.53
2566	95% Hall's Bootstrap UCL					3.49	95% Percentile Bootstrap UCL					3.36
2567	95% BCA Bootstrap UCL					3.54						
2568	90% Chebyshev(Mean, Sd) UCL					3.88	95% Chebyshev(Mean, Sd) UCL					4.41
2569	97.5% Chebyshev(Mean, Sd) UCL					5.15	99% Chebyshev(Mean, Sd) UCL					6.60
2570												
2571	Suggested UCL to Use											
2572	95% Chebyshev (Mean, Sd) UCL					4.41						
2573												
2574	Recommendations regarding the selection of a 95% UCL are provided to help the user to select the most appropriate											
2575	Recommendations are based upon the results of the simulation studies summarized in Singh, Singh, and											
2576	Singh and Singh (2003). However, simulations results will not cover all Real World data sets											
2577	For additional insight the user may want to consult a statistician.											
2578												
2579												
2580	Uranium-234											
2581												
2582	General Statistics											
2583	Total Number of Observations					52	Number of Distinct Observations					48

	A	B	C	D	E	F	G	H	I	J	K	L
2584							Number of Missing Observations					0
2585					Minimum	0.46					Mean	1.49
2586					Maximum	4.17					Median	1.18
2587					SD	0.79					Std. Error of Mean	0.11
2588					Coefficient of Variation	0.52					Skewness	1.33
2589												
2590					Normal GOF Test							
2591					Shapiro Wilk Test Statistic	0.88					Shapiro Wilk GOF Test	
2592					5% Shapiro Wilk P Value	2.4727E-05					Data Not Normal at 5% Significance Level	
2593					Lilliefors Test Statistic	0.16					Lilliefors GOF Test	
2594					5% Lilliefors Critical Value	0.12					Data Not Normal at 5% Significance Level	
2595					Data Not Normal at 5% Significance Level							
2596												
2597					Assuming Normal Distribution							
2598					95% Normal UCL						95% UCLs (Adjusted for Skewness)	
2599					95% Student's-t UCL	1.68					95% Adjusted-CLT UCL (Chen-1995)	1.7
2600											95% Modified-t UCL (Johnson-1978)	1.68
2601												
2602					Gamma GOF Test							
2603					A-D Test Statistic	0.71					Anderson-Darling Gamma GOF Test	
2604					5% A-D Critical Value	0.75					data appear Gamma Distributed at 5% Significance Level	
2605					K-S Test Statistic	0.13					Kolmogrov-Smirnoff Gamma GOF Test	
2606					5% K-S Critical Value	0.12					data Not Gamma Distributed at 5% Significance Level	
2607					Detected data follow Appr. Gamma Distribution at 5% Significance Level							
2608												
2609					Gamma Statistics							
2610					k hat (MLE)	4.26					k star (bias corrected MLE)	4.03
2611					Theta hat (MLE)	0.35					Theta star (bias corrected MLE)	0.37
2612					nu hat (MLE)	443.7					nu star (bias corrected)	419.4
2613					MLE Mean (bias corrected)	1.49					MLE Sd (bias corrected)	0.74
2614											Approximate Chi Square Value (0.05)	372.9
2615					Adjusted Level of Significance	0.04					Adjusted Chi Square Value	371.7
2616												
2617					Assuming Gamma Distribution							
2618					Proximate Gamma UCL (use when n>=50)	1.68					Adjusted Gamma UCL (use when n<50)	1.69
2619												
2620					Lognormal GOF Test							
2621					Shapiro Wilk Test Statistic	0.97					Shapiro Wilk Lognormal GOF Test	
2622					5% Shapiro Wilk P Value	0.59					Data appear Lognormal at 5% Significance Level	
2623					Lilliefors Test Statistic	0.10					Lilliefors Lognormal GOF Test	
2624					5% Lilliefors Critical Value	0.12					Data appear Lognormal at 5% Significance Level	
2625					Data appear Lognormal at 5% Significance Level							
2626												
2627					Lognormal Statistics							
2628					Minimum of Logged Data	-0.77					Mean of logged Data	0.28
2629					Maximum of Logged Data	1.42					SD of logged Data	0.49
2630												
2631					Assuming Lognormal Distribution							
2632					95% H-UCL	1.70					90% Chebyshev (MVUE) UCL	1.81
2633					95% Chebyshev (MVUE) UCL	1.96					97.5% Chebyshev (MVUE) UCL	2.16
2634					99% Chebyshev (MVUE) UCL	2.56						
2635												
2636					Nonparametric Distribution Free UCL Statistics							
2637					Data appear to follow a Discernible Distribution at 5% Significance Level							
2638												
2639					Nonparametric Distribution Free UCLs							
2640					95% CLT UCL	1.67					95% Jackknife UCL	1.68
2641					95% Standard Bootstrap UCL	1.67					95% Bootstrap-t UCL	1.69
2642					95% Hall's Bootstrap UCL	1.71					95% Percentile Bootstrap UCL	1.68
2643					95% BCA Bootstrap UCL	1.68						
2644					90% Chebyshev(Mean, Sd) UCL	1.82					95% Chebyshev(Mean, Sd) UCL	1.97
2645					97.5% Chebyshev(Mean, Sd) UCL	2.18					99% Chebyshev(Mean, Sd) UCL	2.58
2646												

	A	B	C	D	E	F	G	H	I	J	K	L	
2647	Suggested UCL to Use												
2648	95% Approximate Gamma UCL					1.68							
2649													
2650	ptions regarding the selection of a 95% UCL are provided to help the user to select the most appropriate												
2651	ommendations are based upon the results of the simulation studies summarized in Singh, Singh, and												
2652	and Singh and Singh (2003). However, simulations results will not cover all Real World data sets												
2653	For additional insight the user may want to consult a statistician.												
2654													
2655	Uranium-235/236												
2656													
2657	General Statistics												
2658	Total Number of Observations					52	Number of Distinct Observations					50	
2659	Number of Detects					34	Number of Non-Detects					18	
2660	Number of Distinct Detects					32	Number of Distinct Non-Detects					18	
2661	Minimum Detect					0.068	Minimum Non-Detect					0.017	
2662	Maximum Detect					0.23	Maximum Non-Detect					0.083	
2663	Variance Detects					0.001	Percent Non-Detects					34.6%	
2664	Mean Detects					0.11	SD Detects					0.043	
2665	Median Detects					0.10	CV Detects					0.36	
2666	Skewness Detects					0.98	Kurtosis Detects					0.37	
2667	Mean of Logged Detects					-2.18	SD of Logged Detects					0.34	
2668													
2669	Normal GOF Test on Detects Only												
2670	Shapiro Wilk Test Statistic					0.89	Shapiro Wilk GOF Test						
2671	5% Shapiro Wilk Critical Value					0.93	Detected Data Not Normal at 5% Significance Level						
2672	Lilliefors Test Statistic					0.14	Lilliefors GOF Test						
2673	5% Lilliefors Critical Value					0.15	Detected Data appear Normal at 5% Significance Level						
2674	Detected Data appear Approximate Normal at 5% Significance Level												
2675													
2676	Kaplan-Meier (KM) Statistics using Normal Critical Values and other Nonparametric UCLs												
2677	Mean					0.082	Standard Error of Mean					0.008	
2678	SD					0.066	95% KM (BCA) UCL					0.10	
2679	95% KM (t) UCL					0.097	95% KM (Percentile Bootstrap) UCL					0.10	
2680	95% KM (z) UCL					0.096	95% KM Bootstrap t UCL					0.099	
2681	90% KM Chebyshev UCL					0.10	95% KM Chebyshev UCL					0.12	
2682	97.5% KM Chebyshev UCL					0.13	99% KM Chebyshev UCL					0.16	
2683													
2684	Gamma GOF Tests on Detected Observations Only												
2685	A-D Test Statistic					0.60	Anderson-Darling GOF Test						
2686	5% A-D Critical Value					0.74	data appear Gamma Distributed at 5% Significance Level						
2687	K-S Test Statistic					0.12	Kolmogrov-Smirnoff GOF						
2688	5% K-S Critical Value					0.15	data appear Gamma Distributed at 5% Significance Level						
2689	Detected data appear Gamma Distributed at 5% Significance Level												
2690													
2691	Gamma Statistics on Detected Data Only												
2692	k hat (MLE)					8.72	k star (bias corrected MLE)					7.97	
2693	Theta hat (MLE)					0.013	Theta star (bias corrected MLE)					0.014	
2694	nu hat (MLE)					593	nu star (bias corrected)					542	
2695	MLE Mean (bias corrected)					0.11	MLE Sd (bias corrected)					0.043	
2696													
2697	Gamma Kaplan-Meier (KM) Statistics												
2698	k hat (KM)					1.87	nu hat (KM)					194.7	
2699	Approximate Chi Square Value (194.72, α)					163.4	Adjusted Chi Square Value (194.72, β)					162.6	
2700	Approximate KM-UCL (use when n>=50)					0.09	Gamma Adjusted KM-UCL (use when n<50)					0.09	
2701													
2702	Gamma ROS Statistics using Imputed Non-Detects												
2703	GROS may not be used when data set has > 50% NDs with many tied observations at multiple DLs												
2704	GROS may not be used when kstar of detected data is small such as < 0.1												
2705	For such situations, GROS method tends to yield inflated values of UCLs and BTVs												
2706	Gamma distributed detected data, BTVs and UCLs may be computed using gamma distribution on KM estimate												
2707	Minimum					0.034	Mean					0.09	
2708	Maximum					0.23	Median					0.083	
2709	SD					0.052	CV					0.58	

	A	B	C	D	E	F	G	H	I	J	K	L
2710	k hat (MLE)					2.98	k star (bias corrected MLE)					2.82
2711	Theta hat (MLE)					0.03	Theta star (bias corrected MLE)					0.03
2712	nu hat (MLE)					310.7	nu star (bias corrected)					294.1
2713	MLE Mean (bias corrected)					0.09	MLE Sd (bias corrected)					0.05
2714							Adjusted Level of Significance (β)					0.04
2715	Approximate Chi Square Value (294.11, α)					255.4	Adjusted Chi Square Value (294.11, β)					254.4
2716	Gamma Approximate UCL (use when $n \geq 50$)					0.10	Gamma Adjusted UCL (use when $n < 50$)					0.10
2717												
2718	Lognormal GOF Test on Detected Observations Only											
2719	Shapiro Wilk Test Statistic					0.94	Shapiro Wilk GOF Test					
2720	5% Shapiro Wilk Critical Value					0.93	Detected Data appear Lognormal at 5% Significance Level					
2721	Lilliefors Test Statistic					0.10	Lilliefors GOF Test					
2722	5% Lilliefors Critical Value					0.15	Detected Data appear Lognormal at 5% Significance Level					
2723	Detected Data appear Lognormal at 5% Significance Level											
2724												
2725	Lognormal ROS Statistics Using Imputed Non-Detects											
2726	Mean in Original Scale					0.09	Mean in Log Scale					-2.45
2727	SD in Original Scale					0.04	SD in Log Scale					0.46
2728	95% t UCL (assumes normality of ROS data)					0.10	95% Percentile Bootstrap UCL					0.10
2729	95% BCA Bootstrap UCL					0.10	95% Bootstrap t UCL					0.10
2730	95% H-UCL (Log ROS)					0.10						
2731												
2732	PLs using Lognormal Distribution and KM Estimates when Detected data are Lognormally Distributed											
2733	KM Mean (logged)					-2.92	95% H-UCL (KM -Log)					0.13
2734	KM SD (logged)					1.06	95% Critical H Value (KM-Log)					2.38
2735	KM Standard Error of Mean (logged)					0.15						
2736												
2737	DL/2 Statistics											
2738	DL/2 Normal						DL/2 Log-Transformed					
2739	Mean in Original Scale					0.08	Mean in Log Scale					-2.71
2740	SD in Original Scale					0.05	SD in Log Scale					0.82
2741	95% t UCL (Assumes normality)					0.09	95% H-Stat UCL					0.11
2742	DL/2 is not a recommended method, provided for comparisons and historical reasons											
2743												
2744	Nonparametric Distribution Free UCL Statistics											
2745	Detected Data appear Approximate Normal Distributed at 5% Significance Level											
2746												
2747	Suggested UCL to Use											
2748	95% KM (t) UCL					0.09	95% KM (Percentile Bootstrap) UCL					0.10
2749												
2750	Recommendations regarding the selection of a 95% UCL are provided to help the user to select the most appropriate											
2751	Recommendations are based upon data size, data distribution, and skewness.											
2752	Recommendations are based upon the results of the simulation studies summarized in Singh, Maichle, and											
2753	Recommendations results will not cover all Real World data sets; for additional insight the user may want to consult											
2754												
2755												
2756	Uranium-238											
2757												
2758	General Statistics											
2759	Total Number of Observations					52	Number of Distinct Observations					48
2760							Number of Missing Observations					0
2761	Minimum					0.39	Mean					1.79
2762	Maximum					5.21	Median					1.39
2763	SD					1.09	Std. Error of Mean					0.15
2764	Coefficient of Variation					0.60	Skewness					1.21
2765												
2766	Normal GOF Test											
2767	Shapiro Wilk Test Statistic					0.87	Shapiro Wilk GOF Test					
2768	5% Shapiro Wilk P Value					1.1650E	Data Not Normal at 5% Significance Level					
2769	Lilliefors Test Statistic					0.16	Lilliefors GOF Test					
2770	5% Lilliefors Critical Value					0.12	Data Not Normal at 5% Significance Level					
2771	Data Not Normal at 5% Significance Level											
2772												

A	B	C	D	E	F	G	H	I	J	K	L	
2773	Assuming Normal Distribution											
2774	95% Normal UCL					95% UCLs (Adjusted for Skewness)						
2775	95% Student's-t UCL					2.05	95% Adjusted-CLT UCL (Chen-1995)					2.07
2776							95% Modified-t UCL (Johnson-1978)					2.05
2777												
2778	Gamma GOF Test											
2779	A-D Test Statistic					0.89	Anderson-Darling Gamma GOF Test					
2780	5% A-D Critical Value					0.75	Data Not Gamma Distributed at 5% Significance Level					
2781	K-S Test Statistic					0.13	Kolmogrov-Smirnoff Gamma GOF Test					
2782	5% K-S Critical Value					0.12	Data Not Gamma Distributed at 5% Significance Level					
2783	Data Not Gamma Distributed at 5% Significance Level											
2784												
2785	Gamma Statistics											
2786	k hat (MLE)					3.14	k star (bias corrected MLE)					2.98
2787	Theta hat (MLE)					0.57	Theta star (bias corrected MLE)					0.60
2788	nu hat (MLE)					327.5	nu star (bias corrected)					309.9
2789	MLE Mean (bias corrected)					1.79	MLE Sd (bias corrected)					1.04
2790							Approximate Chi Square Value (0.05)					270.1
2791	Adjusted Level of Significance					0.04	Adjusted Chi Square Value					269.1
2792												
2793	Assuming Gamma Distribution											
2794	Approximate Gamma UCL (use when n>=50))					2.06	Adjusted Gamma UCL (use when n<50)					2.06
2795												
2796	Lognormal GOF Test											
2797	Shapiro Wilk Test Statistic					0.97	Shapiro Wilk Lognormal GOF Test					
2798	5% Shapiro Wilk P Value					0.41	Data appear Lognormal at 5% Significance Level					
2799	Lilliefors Test Statistic					0.11	Lilliefors Lognormal GOF Test					
2800	5% Lilliefors Critical Value					0.12	Data appear Lognormal at 5% Significance Level					
2801	Data appear Lognormal at 5% Significance Level											
2802												
2803	Lognormal Statistics											
2804	Minimum of Logged Data					-0.93	Mean of logged Data					0.41
2805	Maximum of Logged Data					1.65	SD of logged Data					0.58
2806												
2807	Assuming Lognormal Distribution											
2808	95% H-UCL					2.10	90% Chebyshev (MVUE) UCL					2.25
2809	95% Chebyshev (MVUE) UCL					2.46	97.5% Chebyshev (MVUE) UCL					2.75
2810	99% Chebyshev (MVUE) UCL					3.33						
2811												
2812	Nonparametric Distribution Free UCL Statistics											
2813	Data appear to follow a Discernible Distribution at 5% Significance Level											
2814												
2815	Nonparametric Distribution Free UCLs											
2816	95% CLT UCL					2.04	95% Jackknife UCL					2.05
2817	95% Standard Bootstrap UCL					2.04	95% Bootstrap-t UCL					2.10
2818	95% Hall's Bootstrap UCL					2.08	95% Percentile Bootstrap UCL					2.05
2819	95% BCA Bootstrap UCL					2.07						
2820	90% Chebyshev(Mean, Sd) UCL					2.25	95% Chebyshev(Mean, Sd) UCL					2.45
2821	97.5% Chebyshev(Mean, Sd) UCL					2.74	99% Chebyshev(Mean, Sd) UCL					3.30
2822												
2823	Suggested UCL to Use											
2824	95% H-UCL					2.10						
2825												
2826	Recommendations regarding the selection of a 95% UCL are provided to help the user to select the most appropriate											
2827	Recommendations are based upon the results of the simulation studies summarized in Singh, Singh, and											
2828	Singh and Singh (2003). However, simulation results will not cover all Real World data sets											
2829	For additional insight the user may want to consult a statistician.											
2830												
2831	ProUCL computes and outputs H-statistic based UCLs for historical reasons only.											
2832	ProUCL often results in unstable (both high and low) values of UCL95 as shown in examples in the Technical Manual.											
2833	It is therefore recommended to avoid the use of H-statistic based 95% UCLs.											
2834	Nonparametric methods are preferred to compute UCL95 for skewed data sets which do not follow a gamma distribution.											
2835												

	A	B	C	D	E	F	G	H	I	J	K	L
2836												
2837	Vanadium											
2838												
2839	General Statistics											
2840	Total Number of Observations					52	Number of Distinct Observations					44
2841							Number of Missing Observations					0
2842	Minimum					7.65	Mean					22.5
2843	Maximum					31.2	Median					23.8
2844	SD					5.70	Std. Error of Mean					0.79
2845	Coefficient of Variation					0.25	Skewness					-0.67
2846												
2847	Normal GOF Test											
2848	Shapiro Wilk Test Statistic					0.94	Shapiro Wilk GOF Test					
2849	5% Shapiro Wilk P Value					0.02	Data Not Normal at 5% Significance Level					
2850	Lilliefors Test Statistic					0.10	Lilliefors GOF Test					
2851	5% Lilliefors Critical Value					0.12	Data appear Normal at 5% Significance Level					
2852	Data appear Approximate Normal at 5% Significance Level											
2853												
2854	Assuming Normal Distribution											
2855	95% Normal UCL						95% UCLs (Adjusted for Skewness)					
2856	95% Student's-t UCL					23.9	95% Adjusted-CLT UCL (Chen-1995)					23.8
2857							95% Modified-t UCL (Johnson-1978)					23.8
2858												
2859	Gamma GOF Test											
2860	A-D Test Statistic					1.44	Anderson-Darling Gamma GOF Test					
2861	5% A-D Critical Value					0.74	Data Not Gamma Distributed at 5% Significance Level					
2862	K-S Test Statistic					0.13	Kolmogrov-Smirnoff Gamma GOF Test					
2863	5% K-S Critical Value					0.12	Data Not Gamma Distributed at 5% Significance Level					
2864	Data Not Gamma Distributed at 5% Significance Level											
2865												
2866	Gamma Statistics											
2867	k hat (MLE)					12.8	k star (bias corrected MLE)					12.1
2868	Theta hat (MLE)					1.75	Theta star (bias corrected MLE)					1.86
2869	nu hat (MLE)					1337	nu star (bias corrected)					1261
2870	MLE Mean (bias corrected)					22.5	MLE Sd (bias corrected)					6.48
2871							Approximate Chi Square Value (0.05)					1180
2872	Adjusted Level of Significance					0.04	Adjusted Chi Square Value					1177
2873												
2874	Assuming Gamma Distribution											
2875	Approximate Gamma UCL (use when n>=50)					24.1	Adjusted Gamma UCL (use when n<50)					24.1
2876												
2877	Lognormal GOF Test											
2878	Shapiro Wilk Test Statistic					0.87	Shapiro Wilk Lognormal GOF Test					
2879	5% Shapiro Wilk P Value					7.1178E-05	Data Not Lognormal at 5% Significance Level					
2880	Lilliefors Test Statistic					0.15	Lilliefors Lognormal GOF Test					
2881	5% Lilliefors Critical Value					0.12	Data Not Lognormal at 5% Significance Level					
2882	Data Not Lognormal at 5% Significance Level											
2883												
2884	Lognormal Statistics											
2885	Minimum of Logged Data					2.03	Mean of logged Data					3.07
2886	Maximum of Logged Data					3.44	SD of logged Data					0.30
2887												
2888	Assuming Lognormal Distribution											
2889	95% H-UCL					24.4	90% Chebyshev (MVUE) UCL					25.6
2890	95% Chebyshev (MVUE) UCL					26.9	97.5% Chebyshev (MVUE) UCL					28.7
2891	99% Chebyshev (MVUE) UCL					32.3						
2892												
2893	Nonparametric Distribution Free UCL Statistics											
2894	Data appear to follow a Discernible Distribution at 5% Significance Level											
2895												
2896	Nonparametric Distribution Free UCLs											
2897	95% CLT UCL					23.8	95% Jackknife UCL					23.9
2898	95% Standard Bootstrap UCL					23.8	95% Bootstrap-t UCL					23.8

	A	B	C	D	E	F	G	H	I	J	K	L
2899	95% Hall's Bootstrap UCL					23.74	95% Percentile Bootstrap UCL					23.80
2900	95% BCA Bootstrap UCL					23.84						
2901	90% Chebyshev(Mean, Sd) UCL					24.94	95% Chebyshev(Mean, Sd) UCL					26.04
2902	97.5% Chebyshev(Mean, Sd) UCL					27.54	99% Chebyshev(Mean, Sd) UCL					30.44
2903												
2904	Suggested UCL to Use											
2905	95% Student's-t UCL					23.94						
2906												
2907	Directions regarding the selection of a 95% UCL are provided to help the user to select the most appropriate											
2908	recommendations are based upon the results of the simulation studies summarized in Singh, Singh, and											
2909	and Singh and Singh (2003). However, simulations results will not cover all Real World data sets.											
2910	For additional insight the user may want to consult a statistician.											
2911												
2912	highly negatively-skewed data, confidence limits (e.g., Chen, Johnson, Lognormal, and Gamma) may											
2913	reliable. Chen's and Johnson's methods provide adjustments for positively skewed data sets.											
2914												
2915	Xylene[1,3-]+Xylene[1,4-]											
2916												
2917	General Statistics											
2918	Total Number of Observations					52	Number of Distinct Observations					44
2919	Number of Detects					19	Number of Non-Detects					33
2920	Number of Distinct Detects					19	Number of Distinct Non-Detects					25
2921	Minimum Detect					3.6900E	Minimum Non-Detect					0.0024
2922	Maximum Detect					0.0014	Maximum Non-Detect					0.0034
2923	Variance Detects					5.6963E	Percent Non-Detects					63.4%
2924	Mean Detects					6.5674E	SD Detects					2.3867E
2925	Median Detects					6.1900E	CV Detects					0.36
2926	Skewness Detects					0.57	Kurtosis Detects					-0.64
2927	Mean of Logged Detects					-7.39	SD of Logged Detects					0.36
2928												
2929	Normal GOF Test on Detects Only											
2930	Shapiro Wilk Test Statistic					0.92	Shapiro Wilk GOF Test					
2931	5% Shapiro Wilk Critical Value					0.90	Detected Data appear Normal at 5% Significance Level					
2932	Lilliefors Test Statistic					0.13	Lilliefors GOF Test					
2933	5% Lilliefors Critical Value					0.20	Detected Data appear Normal at 5% Significance Level					
2934	Detected Data appear Normal at 5% Significance Level											
2935												
2936	Kaplan-Meier (KM) Statistics using Normal Critical Values and other Nonparametric UCLs											
2937	Mean					6.5674E	Standard Error of Mean					5.4754E
2938	SD					2.3230E	95% KM (BCA) UCL					7.5200E
2939	95% KM (t) UCL					7.4847E	95% KM (Percentile Bootstrap) UCL					7.4450E
2940	95% KM (z) UCL					7.4680E	95% KM Bootstrap t UCL					7.6102E
2941	90% KM Chebyshev UCL					8.2100E	95% KM Chebyshev UCL					8.9541E
2942	97.5% KM Chebyshev UCL					9.9868E	99% KM Chebyshev UCL					0.0014
2943												
2944	Gamma GOF Tests on Detected Observations Only											
2945	A-D Test Statistic					0.36	Anderson-Darling GOF Test					
2946	5% A-D Critical Value					0.74	Detected data appear Gamma Distributed at 5% Significance Level					
2947	K-S Test Statistic					0.13	Kolmogorov-Smirnoff GOF					
2948	5% K-S Critical Value					0.19	Detected data appear Gamma Distributed at 5% Significance Level					
2949	Detected data appear Gamma Distributed at 5% Significance Level											
2950												
2951	Gamma Statistics on Detected Data Only											
2952	k hat (MLE)					8.21	k star (bias corrected MLE)					6.95
2953	Theta hat (MLE)					7.9951E	Theta star (bias corrected MLE)					9.4462E
2954	nu hat (MLE)					312.1	nu star (bias corrected)					264.2
2955	MLE Mean (bias corrected)					6.5674E	MLE Sd (bias corrected)					2.4907E
2956												
2957	Gamma Kaplan-Meier (KM) Statistics											
2958	k hat (KM)					7.99	nu hat (KM)					831.2
2959	Approximate Chi Square Value (831.20, α)					765.3	Adjusted Chi Square Value (831.20, β)					763.5
2960	Approximate KM-UCL (use when n>=50)					7.1330E	Gamma Adjusted KM-UCL (use when n<50)					7.1497E
2961												

	A	B	C	D	E	F	G	H	I	J	K	L
2962	Gamma ROS Statistics using Imputed Non-Detects											
2963	GROS may not be used when data set has > 50% NDs with many tied observations at multiple DLs											
2964	GROS may not be used when kstar of detected data is small such as < 0.1											
2965	For such situations, GROS method tends to yield inflated values of UCLs and BTVs											
2966	Gamma distributed detected data, BTVs and UCLs may be computed using gamma distribution on KM estimates											
2967	Minimum			3.6900E			Mean			0.006		
2968	Maximum			0.01			Median			0.01		
2969	SD			0.004			CV			0.69		
2970	k hat (MLE)			0.96			k star (bias corrected MLE)			0.92		
2971	Theta hat (MLE)			0.006			Theta star (bias corrected MLE)			0.007		
2972	nu hat (MLE)			100.5			nu star (bias corrected)			95.9		
2973	MLE Mean (bias corrected)			0.006			MLE Sd (bias corrected)			0.006		
2974							Adjusted Level of Significance (β)			0.04		
2975	Approximate Chi Square Value (95.99, α)			74.4			Adjusted Chi Square Value (95.99, β)			73.8		
2976	Gamma Approximate UCL (use when n>=50)			0.008			Gamma Adjusted UCL (use when n<50)			0.008		
2977												
2978	Lognormal GOF Test on Detected Observations Only											
2979	Shapiro Wilk Test Statistic			0.94			Shapiro Wilk GOF Test					
2980	5% Shapiro Wilk Critical Value			0.90			Detected Data appear Lognormal at 5% Significance Level					
2981	Lilliefors Test Statistic			0.11			Lilliefors GOF Test					
2982	5% Lilliefors Critical Value			0.20			Detected Data appear Lognormal at 5% Significance Level					
2983	Detected Data appear Lognormal at 5% Significance Level											
2984												
2985	Lognormal ROS Statistics Using Imputed Non-Detects											
2986	Mean in Original Scale			6.3483E			Mean in Log Scale			-7.39		
2987	SD in Original Scale			1.5651E			SD in Log Scale			0.23		
2988	95% t UCL (assumes normality of ROS data)			6.7119E			95% Percentile Bootstrap UCL			6.7122E		
2989	95% BCA Bootstrap UCL			6.7443E			95% Bootstrap t UCL			6.7452E		
2990	95% H-UCL (Log ROS)			6.7258E								
2991												
2992	Estimates using Lognormal Distribution and KM Estimates when Detected data are Lognormally Distributed											
2993	KM Mean (logged)			-7.39			95% H-UCL (KM -Log)			7.1629E		
2994	KM SD (logged)			0.35			95% Critical H Value (KM-Log)			1.75		
2995	KM Standard Error of Mean (logged)			0.08								
2996												
2997	DL/2 Statistics											
2998	DL/2 Normal						DL/2 Log-Transformed					
2999	Mean in Original Scale			0.001			Mean in Log Scale			-6.96		
3000	SD in Original Scale			3.1105E			SD in Log Scale			0.39		
3001	95% t UCL (Assumes normality)			0.001			95% H-Stat UCL			0.001		
3002	DL/2 is not a recommended method, provided for comparisons and historical reasons											
3003												
3004	Nonparametric Distribution Free UCL Statistics											
3005	Detected Data appear Normal Distributed at 5% Significance Level											
3006												
3007	Suggested UCL to Use											
3008	95% KM (t) UCL			7.4847E			95% KM (Percentile Bootstrap) UCL			7.4450E		
3009												
3010	Recommendations regarding the selection of a 95% UCL are provided to help the user to select the most appropriate											
3011	Recommendations are based upon data size, data distribution, and skewness.											
3012	Recommendations are based upon the results of the simulation studies summarized in Singh, Maichle, and											
3013	Recommendations results will not cover all Real World data sets; for additional insight the user may want to consult											
3014												
3015												
3016	Zinc											
3017												
3018	General Statistics											
3019	Total Number of Observations			52			Number of Distinct Observations			47		
3020							Number of Missing Observations			0		
3021	Minimum			21.2			Mean			37.0		
3022	Maximum			126			Median			31.5		
3023	SD			20.1			Std. Error of Mean			2.78		
3024	Coefficient of Variation			0.54			Skewness			3.49		

	A	B	C	D	E	F	G	H	I	J	K	L
3025												
3026	Normal GOF Test											
3027	Shapiro Wilk Test Statistic					0.59	Shapiro Wilk GOF Test					
3028	5% Shapiro Wilk P Value					0	Data Not Normal at 5% Significance Level					
3029	Lilliefors Test Statistic					0.25	Lilliefors GOF Test					
3030	5% Lilliefors Critical Value					0.12	Data Not Normal at 5% Significance Level					
3031	Data Not Normal at 5% Significance Level											
3032												
3033	Assuming Normal Distribution											
3034	95% Normal UCL						95% UCLs (Adjusted for Skewness)					
3035	95% Student's-t UCL					41.74	95% Adjusted-CLT UCL (Chen-1995)					43.1
3036							95% Modified-t UCL (Johnson-1978)					41.9
3037												
3038	Gamma GOF Test											
3039	A-D Test Statistic					3.18	Anderson-Darling Gamma GOF Test					
3040	5% A-D Critical Value					0.75	Data Not Gamma Distributed at 5% Significance Level					
3041	K-S Test Statistic					0.17	Kolmogrov-Smirnoff Gamma GOF Test					
3042	5% K-S Critical Value					0.12	Data Not Gamma Distributed at 5% Significance Level					
3043	Data Not Gamma Distributed at 5% Significance Level											
3044												
3045	Gamma Statistics											
3046	k hat (MLE)					6.26	k star (bias corrected MLE)					5.92
3047	Theta hat (MLE)					5.91	Theta star (bias corrected MLE)					6.26
3048	nu hat (MLE)					651.9	nu star (bias corrected)					615.6
3049	MLE Mean (bias corrected)					37.0	MLE Sd (bias corrected)					15.2
3050							Approximate Chi Square Value (0.05)					559.1
3051	Adjusted Level of Significance					0.04	Adjusted Chi Square Value					557.5
3052												
3053	Assuming Gamma Distribution											
3054	Approximate Gamma UCL (use when n>=50)					40.84	Adjusted Gamma UCL (use when n<50)					40.9
3055												
3056	Lognormal GOF Test											
3057	Shapiro Wilk Test Statistic					0.83	Shapiro Wilk Lognormal GOF Test					
3058	5% Shapiro Wilk P Value					2.0991E-05	Data Not Lognormal at 5% Significance Level					
3059	Lilliefors Test Statistic					0.13	Lilliefors Lognormal GOF Test					
3060	5% Lilliefors Critical Value					0.12	Data Not Lognormal at 5% Significance Level					
3061	Data Not Lognormal at 5% Significance Level											
3062												
3063	Lognormal Statistics											
3064	Minimum of Logged Data					3.05	Mean of logged Data					3.53
3065	Maximum of Logged Data					4.83	SD of logged Data					0.36
3066												
3067	Assuming Lognormal Distribution											
3068	95% H-UCL					39.9	90% Chebyshev (MVUE) UCL					42.0
3069	95% Chebyshev (MVUE) UCL					44.64	97.5% Chebyshev (MVUE) UCL					48.1
3070	99% Chebyshev (MVUE) UCL					55.14						
3071												
3072	Nonparametric Distribution Free UCL Statistics											
3073	Data do not follow a Discernible Distribution (0.05)											
3074												
3075	Nonparametric Distribution Free UCLs											
3076	95% CLT UCL					41.64	95% Jackknife UCL					41.74
3077	95% Standard Bootstrap UCL					41.5	95% Bootstrap-t UCL					46.1
3078	95% Hall's Bootstrap UCL					65.3	95% Percentile Bootstrap UCL					42.2
3079	95% BCA Bootstrap UCL					43.2						
3080	90% Chebyshev(Mean, Sd) UCL					45.44	95% Chebyshev(Mean, Sd) UCL					49.2
3081	97.5% Chebyshev(Mean, Sd) UCL					54.44	99% Chebyshev(Mean, Sd) UCL					64.8
3082												
3083	Suggested UCL to Use											
3084	95% Student's-t UCL					41.74	or 95% Modified-t UCL					41.9
3085												
3086	Conditions regarding the selection of a 95% UCL are provided to help the user to select the most appropriate											
3087	Recommendations are based upon the results of the simulation studies summarized in Singh, Singh, and											

	A	B	C	D	E	F	G	H	I	J	K	L
3088	and Singh and Singh (2003). However, simulations results will not cover all Real World data sets											
3089	For additional insight the user may want to consult a statistician.											
3090												