

	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	e/Time of Computation			8/13/2015 2:01:58 PM												
5	From File			ProUCLinput_15-008(b)_0-1.xls												
6	Full Precision			OFF												
7	Confidence Coefficient			95%												
8	f Bootstrap Operations			2000												
9																
10																
11	Aluminum															
12																
13	General Statistics															
14	Total Number of Observations					87		Number of Distinct Observations					85			
15								Number of Missing Observations					0			
16	Minimum					1320		Mean					5578			
17	Maximum					12600		Median					5160			
18	SD					2334		Std. Error of Mean					250.3			
19	Coefficient of Variation					0.41		Skewness					1.06			
20																
21	Normal GOF Test															
22	Shapiro Wilk Test Statistic					0.92		Shapiro Wilk GOF Test								
23	5% Shapiro Wilk P Value					1.0913E		Data Not Normal at 5% Significance Level								
24	Lilliefors Test Statistic					0.11		Lilliefors GOF Test								
25	5% Lilliefors Critical Value					0.09		Data Not Normal at 5% Significance Level								
26	Data Not Normal at 5% Significance Level															
27																
28	Assuming Normal Distribution															
29	95% Normal UCL						95% UCLs (Adjusted for Skewness)									
30	95% Student's-t UCL						5994		95% Adjusted-CLT UCL (Chen-1995)					6020		
31									95% Modified-t UCL (Johnson-1978)					5999		
32																
33	Gamma GOF Test															
34	A-D Test Statistic					0.43		Anderson-Darling Gamma GOF Test								
35	5% A-D Critical Value					0.75		data appear Gamma Distributed at 5% Significance Level								
36	K-S Test Statistic					0.05		Kolmogrov-Smirnoff Gamma GOF Test								
37	5% K-S Critical Value					0.09		data appear Gamma Distributed at 5% Significance Level								
38	Detected data appear Gamma Distributed at 5% Significance Level															
39																
40	Gamma Statistics															
41	k hat (MLE)					6.16		k star (bias corrected MLE)					5.95			
42	Theta hat (MLE)					905.3		Theta star (bias corrected MLE)					936.4			
43	nu hat (MLE)					1072		nu star (bias corrected)					1036			
44	MLE Mean (bias corrected)					5578		MLE Sd (bias corrected)					2285			
45								Approximate Chi Square Value (0.05)					962.7			
46	Adjusted Level of Significance					0.04		Adjusted Chi Square Value					961.6			
47																
48	Assuming Gamma Distribution															
49	roximate Gamma UCL (use when n>=50)						6005		Adjusted Gamma UCL (use when n<50)						6012	
50																
51	Lognormal GOF Test															
52	Shapiro Wilk Test Statistic					0.98		Shapiro Wilk Lognormal GOF Test								
53	5% Shapiro Wilk P Value					0.72		Data appear Lognormal at 5% Significance Level								
54	Lilliefors Test Statistic					0.04		Lilliefors Lognormal GOF Test								
55	5% Lilliefors Critical Value					0.09		Data appear Lognormal at 5% Significance Level								
56	Data appear Lognormal at 5% Significance Level															
57																
58	Lognormal Statistics															
59	Minimum of Logged Data					7.18		Mean of logged Data					8.54			
60	Maximum of Logged Data					9.44		SD of logged Data					0.41			
61																
62	Assuming Lognormal Distribution															
63	95% H-UCL					6067		90% Chebyshev (MVUE) UCL					6367			
64	95% Chebyshev (MVUE) UCL					6719		97.5% Chebyshev (MVUE) UCL					7208			
65	99% Chebyshev (MVUE) UCL					8167										
66																
67	Nonparametric Distribution Free UCL Statistics															
68	Data appear to follow a Discernible Distribution at 5% Significance Level															
69																
70	Nonparametric Distribution Free UCLs															
71	95% CLT UCL					5989		95% Jackknife UCL					5994			
72	95% Standard Bootstrap UCL					5984		95% Bootstrap-t UCL					6018			
73	95% Hall's Bootstrap UCL					6046		95% Percentile Bootstrap UCL					5997			
74	95% BCA Bootstrap UCL					6013										
75	90% Chebyshev(Mean, Sd) UCL					6329		95% Chebyshev(Mean, Sd) UCL					6669			
76	97.5% Chebyshev(Mean, Sd) UCL					7141		99% Chebyshev(Mean, Sd) UCL					8068			
77																
78	Suggested UCL to Use															
79	95% Approximate Gamma UCL					6005										
80																
81	ations regarding the selection of a 95% UCL are provided to help the user to select the most appropriate															
82	ommendations are based upon the results of the simulation studies summarized in Singh, Singh, and															

	A	B	C	D	E	F	G	H	I	J	K	L
83	and Singh and Singh (2003). However, simulations results will not cover all Real World data sets											
84	For additional insight the user may want to consult a statistician.											
85												
86	Americium-241											
87												
88	General Statistics											
89	Total Number of Observations				83		Number of Distinct Observations				78	
90	Number of Detects				6		Number of Non-Detects				77	
91	Number of Distinct Detects				6		Number of Distinct Non-Detects				72	
92	Minimum Detect				0.02		Minimum Non-Detect				-0.010	
93	Maximum Detect				0.07		Maximum Non-Detect				0.03	
94	Variance Detects				5.2082E		Percent Non-Detects				92.7	
95	Mean Detects				0.04		SD Detects				0.02	
96	Median Detects				0.02		CV Detects				0.56	
97	Skewness Detects				1.08		Kurtosis Detects				-0.69	
98												
99	Normal GOF Test on Detects Only											
100	Shapiro Wilk Test Statistic				0.81		Shapiro Wilk GOF Test					
101	5% Shapiro Wilk Critical Value				0.78		Detected Data appear Normal at 5% Significance Le					
102	Lilliefors Test Statistic				0.32		Lilliefors GOF Test					
103	5% Lilliefors Critical Value				0.36		Detected Data appear Normal at 5% Significance Le					
104	Detected Data appear Normal at 5% Significance Level											
105												
106	Kaplan-Meier (KM) Statistics using Normal Critical Values and other Nonparametric UCLs											
107	Mean				-0.007		Standard Error of Mean				0.001	
108	SD				0.01		95% KM (BCA) UCL				0.001	
109	95% KM (t) UCL				-0.004		95% KM (Percentile Bootstrap) UCL				6.7626E	
110	95% KM (z) UCL				-0.004		95% KM Bootstrap t UCL				-0.005	
111	90% KM Chebyshev UCL				-0.001		95% KM Chebyshev UCL				5.2728E	
112	97.5% KM Chebyshev UCL				0.003		99% KM Chebyshev UCL				0.01	
113												
114	Gamma GOF Tests on Detected Observations Only											
115	A-D Test Statistic				0.55		Anderson-Darling GOF Test					
116	5% A-D Critical Value				0.69		data appear Gamma Distributed at 5% Significar					
117	K-S Test Statistic				0.30		Kolmogrov-Smirnoff GOF					
118	5% K-S Critical Value				0.33		data appear Gamma Distributed at 5% Significar					
119	Detected data appear Gamma Distributed at 5% Significance Level											
120												
121	Gamma Statistics on Detected Data Only											
122	k hat (MLE)				4.34		k star (bias corrected MLE)				2.28	
123	Theta hat (MLE)				0.009		Theta star (bias corrected MLE)				0.01	
124	nu hat (MLE)				52.1		nu star (bias corrected)				27.4	
125	MLE Mean (bias corrected)				0.04		MLE Sd (bias corrected)				0.02	
126												
127	Gamma Kaplan-Meier (KM) Statistics											
128	k hat (KM)				0.23		nu hat (KM)				39.6	
129							Adjusted Level of Significance (β)				0.04	
130	Approximate Chi Square Value (39.64, α)				26.2		Adjusted Chi Square Value (39.64, β)				26.0	
131	Approximate KM-UCL (use when n>=50)				-0.01		Gamma Adjusted KM-UCL (use when n<50)				-0.01	
132												
133	DL/2 Statistics											
134	Mean in Original Scale				0.006		SD in Original Scale				0.01	
135	95% t UCL (Assumes normality)				0.008							
136	DL/2 is not a recommended method, provided for comparisons and historical reasons											
137												
138	Nonparametric Distribution Free UCL Statistics											
139	Detected Data appear Normal Distributed at 5% Significance Level											
140												
141	Suggested UCL to Use											
142	95% KM (t) UCL				-0.004		95% KM (Percentile Bootstrap) UCL				6.7626E	
143												
144	ations regarding the selection of a 95% UCL are provided to help the user to select the most appropri											
145	Recommendations are based upon data size, data distribution, and skewness.											
146	hmentations are based upon the results of the simulation studies summarized in Singh, Maichle, and											
147	ations results will not cover all Real World data sets; for additional insight the user may want to cons											
148												
149	Antimony											
150												
151	General Statistics											
152	Total Number of Observations				87		Number of Distinct Observations				71	
153	Number of Detects				29		Number of Non-Detects				58	
154	Number of Distinct Detects				28		Number of Distinct Non-Detects				47	
155	Minimum Detect				0.67		Minimum Non-Detect				0.56	
156	Maximum Detect				256		Maximum Non-Detect				8.6	
157	Variance Detects				2216		Percent Non-Detects				66.6	
158	Mean Detects				11.5		SD Detects				47.0	
159	Median Detects				1.91		CV Detects				4.07	
160	Skewness Detects				5.36		Kurtosis Detects				28.8	
161	Mean of Logged Detects				0.88		SD of Logged Detects				1.19	
162												
163	Normal GOF Test on Detects Only											
164	Shapiro Wilk Test Statistic				0.22		Shapiro Wilk GOF Test					

	A	B	C	D	E	F	G	H	I	J	K	L	
165	5% Shapiro Wilk Critical Value					0.92	Detected Data Not Normal at 5% Significance Level						
166	Lilliefors Test Statistic					0.48	Lilliefors GOF Test						
167	5% Lilliefors Critical Value					0.16	Detected Data Not Normal at 5% Significance Level						
168	Detected Data Not Normal at 5% Significance Level												
169													
170	Kaplan-Meier (KM) Statistics using Normal Critical Values and other Nonparametric UCLs												
171	Mean					4.37	Standard Error of Mean					2.96	
172	SD					27.14	95% KM (BCA) UCL					10.24	
173	95% KM (t) UCL					9.30	95% KM (Percentile Bootstrap) UCL					10.24	
174	95% KM (z) UCL					9.25	95% KM Bootstrap t UCL					67.81	
175	90% KM Chebyshev UCL					13.21	95% KM Chebyshev UCL					17.34	
176	97.5% KM Chebyshev UCL					22.91	99% KM Chebyshev UCL					33.89	
177													
178	Gamma GOF Tests on Detected Observations Only												
179	A-D Test Statistic					5.14	Anderson-Darling GOF Test						
180	5% A-D Critical Value					0.83	Detected Data Not Gamma Distributed at 5% Significance Level						
181	K-S Test Statistic					0.35	Kolmogorov-Smirnov GOF						
182	5% K-S Critical Value					0.17	Detected Data Not Gamma Distributed at 5% Significance Level						
183	Detected Data Not Gamma Distributed at 5% Significance Level												
184													
185	Gamma Statistics on Detected Data Only												
186	k hat (MLE)					0.41	k star (bias corrected MLE)					0.39	
187	Theta hat (MLE)					27.61	Theta star (bias corrected MLE)					29.01	
188	nu hat (MLE)					24.21	nu star (bias corrected)					23.01	
189	MLE Mean (bias corrected)					11.54	MLE Sd (bias corrected)					18.34	
190													
191	Gamma Kaplan-Meier (KM) Statistics												
192	k hat (KM)					0.024	nu hat (KM)					4.50	
193	Approximate Chi Square Value (4.51, α)					0.93	Adjusted Chi Square Value (4.51, β)					0.90	
194	Approximate KM-UCL (use when n>=50)					21.14	Gamma Adjusted KM-UCL (use when n<50)					21.74	
195	Gamma (KM) may not be used when k hat (KM) is < 0.1												
196													
197	Gamma ROS Statistics using Imputed Non-Detects												
198	GROS may not be used when data set has > 50% NDs with many tied observations at multiple DLs												
199	GROS may not be used when kstar of detected data is small such as < 0.1												
200	For such situations, GROS method tends to yield inflated values of UCLs and BTVs												
201	Gamma distributed detected data, BTVs and UCLs may be computed using gamma distribution on KM estimate												
202	Minimum					0.01	Mean					3.85	
203	Maximum					256	Median					0.01	
204	SD					27.41	CV					7.10	
205	k hat (MLE)					0.18	k star (bias corrected MLE)					0.18	
206	Theta hat (MLE)					21.24	Theta star (bias corrected MLE)					21.14	
207	nu hat (MLE)					31.54	nu star (bias corrected)					31.74	
208	MLE Mean (bias corrected)					3.85	MLE Sd (bias corrected)					9.02	
209							Adjusted Level of Significance (β)					0.04	
210	Approximate Chi Square Value (31.77, α)					19.84	Adjusted Chi Square Value (31.77, β)					19.74	
211	Gamma Approximate UCL (use when n>=50)					6.16	Gamma Adjusted UCL (use when n<50)					6.21	
212													
213	Lognormal GOF Test on Detected Observations Only												
214	Shapiro Wilk Test Statistic					0.81	Shapiro Wilk GOF Test						
215	5% Shapiro Wilk Critical Value					0.92	Detected Data Not Lognormal at 5% Significance Level						
216	Lilliefors Test Statistic					0.14	Lilliefors GOF Test						
217	5% Lilliefors Critical Value					0.16	Detected Data appear Lognormal at 5% Significance Level						
218	Detected Data appear Approximate Lognormal at 5% Significance Level												
219													
220	Lognormal ROS Statistics Using Imputed Non-Detects												
221	Mean in Original Scale					4.16	Mean in Log Scale					-0.25	
222	SD in Original Scale					27.34	SD in Log Scale					1.11	
223	95% t UCL (assumes normality of ROS data)					9.04	95% Percentile Bootstrap UCL					10.04	
224	95% BCA Bootstrap UCL					13.34	95% Bootstrap t UCL					67.14	
225	95% H-UCL (Log ROS)					1.92							
226													
227	UCLs using Lognormal Distribution and KM Estimates when Detected data are Lognormally Distributed												
228	KM Mean (logged)					0.10	95% H-UCL (KM -Log)					2.05	
229	KM SD (logged)					0.89	95% Critical H Value (KM-Log)					2.14	
230	KM Standard Error of Mean (logged)					0.10							
231													
232	DL/2 Statistics												
233	DL/2 Normal						DL/2 Log-Transformed						
234	Mean in Original Scale					4.36	Mean in Log Scale					0.03	
235	SD in Original Scale					27.34	SD in Log Scale					0.98	
236	95% t UCL (Assumes normality)					9.24	95% H-Stat UCL					2.13	
237	DL/2 is not a recommended method, provided for comparisons and historical reasons												
238													
239	Nonparametric Distribution Free UCL Statistics												
240	Detected Data appear Approximate Lognormal Distributed at 5% Significance Level												
241													
242	Suggested UCL to Use												
243	95% KM (BCA) UCL					10.24							
244													
245	Instructions regarding the selection of a 95% UCL are provided to help the user to select the most appropriate												
246	Recommendations are based upon data size, data distribution, and skewness.												

	A	B	C	D	E	F	G	H	I	J	K	L
247	Recommendations are based upon the results of the simulation studies summarized in Singh, Maichle, and											
248	Simulations results will not cover all Real World data sets; for additional insight the user may want to cons											
249												
250	Aroclor-1254											
251												
252	General Statistics											
253	Total Number of Observations				20	Number of Distinct Observations				20		
254	Number of Detects				13	Number of Non-Detects				7		
255	Number of Distinct Detects				13	Number of Distinct Non-Detects				7		
256	Minimum Detect				0.003	Minimum Non-Detect				0.003		
257	Maximum Detect				0.14	Maximum Non-Detect				0.005		
258	Variance Detects				0.001	Percent Non-Detects				35%		
259	Mean Detects				0.024	SD Detects				0.03		
260	Median Detects				0.01	CV Detects				1.55		
261	Skewness Detects				3.13	Kurtosis Detects				10.4		
262	Mean of Logged Detects				-4.32	SD of Logged Detects				1.01		
263												
264	Normal GOF Test on Detects Only											
265	Shapiro Wilk Test Statistic				0.54	Shapiro Wilk GOF Test						
266	5% Shapiro Wilk Critical Value				0.86	Detected Data Not Normal at 5% Significance Level						
267	Lilliefors Test Statistic				0.31	Lilliefors GOF Test						
268	5% Lilliefors Critical Value				0.24	Detected Data Not Normal at 5% Significance Level						
269	Detected Data Not Normal at 5% Significance Level											
270												
271	Kaplan-Meier (KM) Statistics using Normal Critical Values and other Nonparametric UCLs											
272	Mean				0.014	Standard Error of Mean				0.007		
273	SD				0.036	95% KM (BCA) UCL				0.03		
274	95% KM (t) UCL				0.029	95% KM (Percentile Bootstrap) UCL				0.03		
275	95% KM (z) UCL				0.024	95% KM Bootstrap t UCL				0.05		
276	90% KM Chebyshev UCL				0.038	95% KM Chebyshev UCL				0.04		
277	97.5% KM Chebyshev UCL				0.06	99% KM Chebyshev UCL				0.08		
278												
279	Gamma GOF Tests on Detected Observations Only											
280	A-D Test Statistic				0.92	Anderson-Darling GOF Test						
281	5% A-D Critical Value				0.75	Detected Data Not Gamma Distributed at 5% Significance Level						
282	K-S Test Statistic				0.27	Kolmogrov-Smirnoff GOF						
283	5% K-S Critical Value				0.24	Detected Data Not Gamma Distributed at 5% Significance Level						
284	Detected Data Not Gamma Distributed at 5% Significance Level											
285												
286	Gamma Statistics on Detected Data Only											
287	k hat (MLE)				0.97	k star (bias corrected MLE)				0.80		
288	Theta hat (MLE)				0.024	Theta star (bias corrected MLE)				0.03		
289	nu hat (MLE)				25.3	nu star (bias corrected)				20.8		
290	MLE Mean (bias corrected)				0.024	MLE Sd (bias corrected)				0.02		
291												
292	Gamma Kaplan-Meier (KM) Statistics											
293	k hat (KM)				0.30	nu hat (KM)				12.2		
294	Approximate Chi Square Value (12.23, α)				5.37	Adjusted Chi Square Value (12.23, β)				5.02		
295	Approximate KM-UCL (use when n>=50)				0.03	Gamma Adjusted KM-UCL (use when n<50)				0.04		
296												
297	Gamma ROS Statistics using Imputed Non-Detects											
298	GROS may not be used when data set has > 50% NDs with many tied observations at multiple DLs											
299	GROS may not be used when kstar of detected data is small such as < 0.1											
300	For such situations, GROS method tends to yield inflated values of UCLs and BTVs											
301	Gamma distributed detected data, BTVs and UCLs may be computed using gamma distribution on KM e											
302	Minimum				0.003	Mean				0.01		
303	Maximum				0.14	Median				0.01		
304	SD				0.036	CV				1.59		
305	k hat (MLE)				1.21	k star (bias corrected MLE)				1.06		
306	Theta hat (MLE)				0.015	Theta star (bias corrected MLE)				0.01		
307	nu hat (MLE)				48.7	nu star (bias corrected)				42.7		
308	MLE Mean (bias corrected)				0.015	MLE Sd (bias corrected)				0.01		
309						Adjusted Level of Significance (β)				0.03		
310	Approximate Chi Square Value (42.74, α)				28.75	Adjusted Chi Square Value (42.74, β)				27.8		
311	Gamma Approximate UCL (use when n>=50)				0.025	Gamma Adjusted UCL (use when n<50)				0.02		
312												
313	Lognormal GOF Test on Detected Observations Only											
314	Shapiro Wilk Test Statistic				0.93	Shapiro Wilk GOF Test						
315	5% Shapiro Wilk Critical Value				0.86	Detected Data appear Lognormal at 5% Significance Level						
316	Lilliefors Test Statistic				0.20	Lilliefors GOF Test						
317	5% Lilliefors Critical Value				0.24	Detected Data appear Lognormal at 5% Significance Level						
318	Detected Data appear Lognormal at 5% Significance Level											
319												
320	Lognormal ROS Statistics Using Imputed Non-Detects											
321	Mean in Original Scale				0.014	Mean in Log Scale				-4.91		
322	SD in Original Scale				0.03	SD in Log Scale				1.15		
323	95% t UCL (assumes normality of ROS data)				0.028	95% Percentile Bootstrap UCL				0.02		
324	95% BCA Bootstrap UCL				0.03	95% Bootstrap t UCL				0.05		
325	95% H-UCL (Log ROS)				0.036							
326												
327	UCLs using Lognormal Distribution and KM Estimates when Detected data are Lognormally Distributed											
328	KM Mean (logged)				-4.78	95% H-UCL (KM -Log)				0.02		

A	B	C	D	E	F	G	H	I	J	K	L
329	KM SD (logged)				1.00	95% Critical H Value (KM-Log)					2.64
330	KM Standard Error of Mean (logged)				0.23						
331											
332	DL/2 Statistics										
333	DL/2 Normal				DL/2 Log-Transformed						
334	Mean in Original Scale				0.014	Mean in Log Scale				-4.94	
335	SD in Original Scale				0.034	SD in Log Scale				1.18	
336	95% t UCL (Assumes normality)				0.024	95% H-Stat UCL				0.03	
337	DL/2 is not a recommended method, provided for comparisons and historical reasons										
338											
339	Nonparametric Distribution Free UCL Statistics										
340	Detected Data appear Lognormal Distributed at 5% Significance Level										
341											
342	Suggested UCL to Use										
343	97.5% KM (Chebyshev) UCL				0.064						
344											
345	Recommendations regarding the selection of a 95% UCL are provided to help the user to select the most appropriate										
346	Recommendations are based upon data size, data distribution, and skewness.										
347	Recommendations are based upon the results of the simulation studies summarized in Singh, Maichle, and										
348	Recommendations results will not cover all Real World data sets; for additional insight the user may want to consult										
349											
350	Aroclor-1260										
351											
352	General Statistics										
353	Total Number of Observations				20	Number of Distinct Observations				20	
354	Number of Detects				11	Number of Non-Detects				9	
355	Number of Distinct Detects				11	Number of Distinct Non-Detects				9	
356	Minimum Detect				0.005	Minimum Non-Detect				0.003	
357	Maximum Detect				0.064	Maximum Non-Detect				0.005	
358	Variance Detects				3.7774E	Percent Non-Detects				45%	
359	Mean Detects				0.014	SD Detects				0.014	
360	Median Detects				0.008	CV Detects				1.04	
361	Skewness Detects				1.68	Kurtosis Detects				1.6	
362	Mean of Logged Detects				-4.37	SD of Logged Detects				0.84	
363											
364	Normal GOF Test on Detects Only										
365	Shapiro Wilk Test Statistic				0.69	Shapiro Wilk GOF Test					
366	5% Shapiro Wilk Critical Value				0.85	Detected Data Not Normal at 5% Significance Level					
367	Lilliefors Test Statistic				0.30	Lilliefors GOF Test					
368	5% Lilliefors Critical Value				0.26	Detected Data Not Normal at 5% Significance Level					
369	Detected Data Not Normal at 5% Significance Level										
370											
371	Kaplan-Meier (KM) Statistics using Normal Critical Values and other Nonparametric UCLs										
372	Mean				0.014	Standard Error of Mean				0.003	
373	SD				0.014	95% KM (BCA) UCL				0.014	
374	95% KM (t) UCL				0.014	95% KM (Percentile Bootstrap) UCL				0.014	
375	95% KM (z) UCL				0.014	95% KM Bootstrap t UCL				0.034	
376	90% KM Chebyshev UCL				0.024	95% KM Chebyshev UCL				0.024	
377	97.5% KM Chebyshev UCL				0.034	99% KM Chebyshev UCL				0.044	
378											
379	Gamma GOF Tests on Detected Observations Only										
380	A-D Test Statistic				1.09	Anderson-Darling GOF Test					
381	5% A-D Critical Value				0.74	Detected Data Not Gamma Distributed at 5% Significance Level					
382	K-S Test Statistic				0.28	Kolmogrov-Smirnoff GOF					
383	5% K-S Critical Value				0.26	Detected Data Not Gamma Distributed at 5% Significance Level					
384	Detected Data Not Gamma Distributed at 5% Significance Level										
385											
386	Gamma Statistics on Detected Data Only										
387	k hat (MLE)				1.45	k star (bias corrected MLE)				1.11	
388	Theta hat (MLE)				0.014	Theta star (bias corrected MLE)				0.014	
389	nu hat (MLE)				31.91	nu star (bias corrected)				24.5	
390	MLE Mean (bias corrected)				0.014	MLE Sd (bias corrected)				0.014	
391											
392	Gamma Kaplan-Meier (KM) Statistics										
393	k hat (KM)				0.57	nu hat (KM)				23.1	
394	Approximate Chi Square Value (23.10, α)				13.14	Adjusted Chi Square Value (23.10, β)				12.5	
395	Approximate KM-UCL (use when n>=50)				0.024	Gamma Adjusted KM-UCL (use when n<50)				0.024	
396											
397	Gamma ROS Statistics using Imputed Non-Detects										
398	GROS may not be used when data set has > 50% NDs with many tied observations at multiple DLs										
399	GROS may not be used when kstar of detected data is small such as < 0.1										
400	For such situations, GROS method tends to yield inflated values of UCLs and BTVs										
401	Gamma distributed detected data, BTVs and UCLs may be computed using gamma distribution on KM e										
402	Minimum				0.005	Mean				0.014	
403	Maximum				0.064	Median				0.014	
404	SD				0.014	CV				1.00	
405	k hat (MLE)				2.10	k star (bias corrected MLE)				1.82	
406	Theta hat (MLE)				0.006	Theta star (bias corrected MLE)				0.008	
407	nu hat (MLE)				84.24	nu star (bias corrected)				72.9	
408	MLE Mean (bias corrected)				0.014	MLE Sd (bias corrected)				0.014	
409						Adjusted Level of Significance (β)				0.034	
410	Approximate Chi Square Value (72.93, α)				54.2	Adjusted Chi Square Value (72.93, β)				53	

A	B	C	D	E	F	G	H	I	J	K	L
411	Gamma Approximate UCL (use when n>=50)				0.015	Gamma Adjusted UCL (use when n<50)				0.020	
412											
413	Lognormal GOF Test on Detected Observations Only										
414	Shapiro Wilk Test Statistic				0.83	Shapiro Wilk GOF Test					
415	5% Shapiro Wilk Critical Value				0.85	Detected Data Not Lognormal at 5% Significance Level					
416	Lilliefors Test Statistic				0.24	Lilliefors GOF Test					
417	5% Lilliefors Critical Value				0.26	Detected Data appear Lognormal at 5% Significance Level					
418	Detected Data appear Approximate Lognormal at 5% Significance Level										
419											
420	Lognormal ROS Statistics Using Imputed Non-Detects										
421	Mean in Original Scale				0.010	Mean in Log Scale				-5.36	
422	SD in Original Scale				0.010	SD in Log Scale				1.28	
423	95% t UCL (assumes normality of ROS data)				0.011	95% Percentile Bootstrap UCL				0.011	
424	95% BCA Bootstrap UCL				0.011	95% Bootstrap t UCL				0.020	
425	95% H-UCL (Log ROS)				0.020						
426											
427	Estimates using Lognormal Distribution and KM Estimates when Detected data are Lognormally Distributed										
428	KM Mean (logged)				-4.92	95% H-UCL (KM -Log)				0.011	
429	KM SD (logged)				0.85	95% Critical H Value (KM-Log)				2.43	
430	KM Standard Error of Mean (logged)				0.20						
431											
432	DL/2 Statistics										
433	DL/2 Normal					DL/2 Log-Transformed					
434	Mean in Original Scale				0.010	Mean in Log Scale				-5.13	
435	SD in Original Scale				0.010	SD in Log Scale				1.06	
436	95% t UCL (Assumes normality)				0.011	95% H-Stat UCL				0.020	
437	DL/2 is not a recommended method, provided for comparisons and historical reasons										
438											
439	Nonparametric Distribution Free UCL Statistics										
440	Detected Data appear Approximate Lognormal Distributed at 5% Significance Level										
441											
442	Suggested UCL to Use										
443	95% KM (t) UCL				0.011	95% KM (% Bootstrap) UCL				0.011	
444											
445	Recommendations regarding the selection of a 95% UCL are provided to help the user to select the most appropriate UCL.										
446	Recommendations are based upon data size, data distribution, and skewness.										
447	Recommendations are based upon the results of the simulation studies summarized in Singh, Maichle, and Singh (2003).										
448	These recommendations results will not cover all Real World data sets; for additional insight the user may want to consult the literature.										
449											
450	Arsenic										
451											
452	General Statistics										
453	Total Number of Observations				87	Number of Distinct Observations				69	
454	Number of Detects				86	Number of Non-Detects				1	
455	Number of Distinct Detects				69	Number of Distinct Non-Detects				1	
456	Minimum Detect				0.82	Minimum Non-Detect				1.8	
457	Maximum Detect				6.6	Maximum Non-Detect				1.8	
458	Variance Detects				0.77	Percent Non-Detects				1.14	
459	Mean Detects				2.10	SD Detects				0.87	
460	Median Detects				1.84	CV Detects				0.41	
461	Skewness Detects				2.25	Kurtosis Detects				8.01	
462	Mean of Logged Detects				0.67	SD of Logged Detects				0.35	
463											
464	Normal GOF Test on Detects Only										
465	Shapiro Wilk Test Statistic				0.83	Normal GOF Test on Detected Observations Only					
466	5% Shapiro Wilk P Value				4.996E-05	Detected Data Not Normal at 5% Significance Level					
467	Lilliefors Test Statistic				0.15	Lilliefors GOF Test					
468	5% Lilliefors Critical Value				0.090	Detected Data Not Normal at 5% Significance Level					
469	Detected Data Not Normal at 5% Significance Level										
470											
471	Kaplan-Meier (KM) Statistics using Normal Critical Values and other Nonparametric UCLs										
472	Mean				2.09	Standard Error of Mean				0.090	
473	SD				0.87	95% KM (BCA) UCL				2.25	
474	95% KM (t) UCL				2.25	95% KM (Percentile Bootstrap) UCL				2.25	
475	95% KM (z) UCL				2.24	95% KM Bootstrap t UCL				2.28	
476	90% KM Chebyshev UCL				2.37	95% KM Chebyshev UCL				2.50	
477	97.5% KM Chebyshev UCL				2.68	99% KM Chebyshev UCL				3.02	
478											
479	Gamma GOF Tests on Detected Observations Only										
480	A-D Test Statistic				1.54	Anderson-Darling GOF Test					
481	5% A-D Critical Value				0.750	Detected Data Not Gamma Distributed at 5% Significance Level					
482	K-S Test Statistic				0.11	Kolmogrov-Smirnoff GOF					
483	5% K-S Critical Value				0.090	Detected Data Not Gamma Distributed at 5% Significance Level					
484	Detected Data Not Gamma Distributed at 5% Significance Level										
485											
486	Gamma Statistics on Detected Data Only										
487	k hat (MLE)				7.54	k star (bias corrected MLE)				7.28	
488	Theta hat (MLE)				0.27	Theta star (bias corrected MLE)				0.28	
489	nu hat (MLE)				1297	nu star (bias corrected)				1253	
490	MLE Mean (bias corrected)				2.10	MLE Sd (bias corrected)				0.77	
491											
492	Gamma Kaplan-Meier (KM) Statistics										

	A	B	C	D	E	F	G	H	I	J	K	L
493	k hat (KM)					5.79	nu hat (KM)					1008
494	Approximate Chi Square Value (N/A, α)					934.9	Adjusted Chi Square Value (N/A, β)					933.8
495	Approximate KM-UCL (use when n>=50)					2.25	Gamma Adjusted KM-UCL (use when n<50)					2.26
496												
497	Gamma ROS Statistics using Imputed Non-Detects											
498	GROS may not be used when data set has > 50% NDs with many tied observations at multiple DLs											
499	GROS may not be used when kstar of detected data is small such as < 0.1											
500	For such situations, GROS method tends to yield inflated values of UCLs and BTVs											
501	Gamma distributed detected data, BTVs and UCLs may be computed using gamma distribution on KM estimates											
502	Minimum					0.82	Mean					2.09
503	Maximum					6.6	Median					1.84
504	SD					0.87	CV					0.41
505	k hat (MLE)					7.54	k star (bias corrected MLE)					7.29
506	Theta hat (MLE)					0.27	Theta star (bias corrected MLE)					0.28
507	nu hat (MLE)					1313	nu star (bias corrected)					1269
508	MLE Mean (bias corrected)					2.09	MLE Sd (bias corrected)					0.77
509							Adjusted Level of Significance (β)					0.04
510	Approximate Chi Square Value (N/A, α)					1187	Adjusted Chi Square Value (N/A, β)					1186
511	Gamma Approximate UCL (use when n>=50)					2.23	Gamma Adjusted UCL (use when n<50)					2.24
512												
513	Lognormal GOF Test on Detected Observations Only											
514	Lilliefors Test Statistic					0.08	Lilliefors GOF Test					
515	5% Lilliefors Critical Value					0.09	Detected Data appear Lognormal at 5% Significance Level					
516	Detected Data appear Lognormal at 5% Significance Level											
517												
518	Lognormal ROS Statistics Using Imputed Non-Detects											
519	Mean in Original Scale					2.09	Mean in Log Scale					0.67
520	SD in Original Scale					0.87	SD in Log Scale					0.35
521	95% t UCL (assumes normality of ROS data)					2.25	95% Percentile Bootstrap UCL					2.25
522	95% BCA Bootstrap UCL					2.26	95% Bootstrap t UCL					2.27
523	95% H-UCL (Log ROS)					2.23						
524												
525	UCLs using Lognormal Distribution and KM Estimates when Detected data are Lognormally Distributed											
526	KM Mean (logged)					0.67	95% H-UCL (KM -Log)					2.23
527	KM SD (logged)					0.35	95% Critical H Value (KM-Log)					1.76
528	KM Standard Error of Mean (logged)					0.03						
529												
530	DL/2 Statistics											
531	DL/2 Normal						DL/2 Log-Transformed					
532	Mean in Original Scale					2.08	Mean in Log Scale					0.66
533	SD in Original Scale					0.88	SD in Log Scale					0.36
534	95% t UCL (Assumes normality)					2.24	95% H-Stat UCL					2.23
535	DL/2 is not a recommended method, provided for comparisons and historical reasons											
536												
537	Nonparametric Distribution Free UCL Statistics											
538	Detected Data appear Lognormal Distributed at 5% Significance Level											
539												
540	Suggested UCL to Use											
541	95% KM (BCA) UCL					2.25						
542												
543	Recommendations regarding the selection of a 95% UCL are provided to help the user to select the most appropriate UCL.											
544	Recommendations are based upon data size, data distribution, and skewness.											
545	Recommendations are based upon the results of the simulation studies summarized in Singh, Maichle, and others.											
546	Recommendations results will not cover all Real World data sets; for additional insight the user may want to consult other sources.											
547												
548												
549	Barium											
550												
551	General Statistics											
552	Total Number of Observations					87	Number of Distinct Observations					81
553							Number of Missing Observations					0
554	Minimum					17.2	Mean					79.1
555	Maximum					195	Median					76.7
556	SD					34.1	Std. Error of Mean					3.66
557	Coefficient of Variation					0.43	Skewness					1.04
558												
559	Normal GOF Test											
560	Shapiro Wilk Test Statistic					0.93	Shapiro Wilk GOF Test					
561	5% Shapiro Wilk P Value					1.1207E-05	Data Not Normal at 5% Significance Level					
562	Lilliefors Test Statistic					0.07	Lilliefors GOF Test					
563	5% Lilliefors Critical Value					0.09	Data appear Normal at 5% Significance Level					
564	Data appear Approximate Normal at 5% Significance Level											
565												
566	Assuming Normal Distribution											
567	95% Normal UCL						95% UCLs (Adjusted for Skewness)					
568	95% Student's-t UCL					85.2	95% Adjusted-CLT UCL (Chen-1995)					85.6
569							95% Modified-t UCL (Johnson-1978)					85.3
570												
571	Gamma GOF Test											
572	A-D Test Statistic					0.34	Anderson-Darling Gamma GOF Test					
573	5% A-D Critical Value					0.75	Data appear Gamma Distributed at 5% Significance Level					
574	K-S Test Statistic					0.05	Kolmogorov-Smirnov Gamma GOF Test					

	A	B	C	D	E	F	G	H	I	J	K	L		
575	5% K-S Critical Value					0.094	Data appear Gamma Distributed at 5% Significance Level							
576	Detected data appear Gamma Distributed at 5% Significance Level													
577														
578	Gamma Statistics													
579	k hat (MLE)				5.66	k star (bias corrected MLE)				5.47				
580	Theta hat (MLE)				13.95	Theta star (bias corrected MLE)				14.41				
581	nu hat (MLE)				985	nu star (bias corrected)				952.4				
582	MLE Mean (bias corrected)				79.17	MLE Sd (bias corrected)				33.84				
583						Approximate Chi Square Value (0.05)					881.7			
584	Adjusted Level of Significance				0.04	Adjusted Chi Square Value					880.6			
585														
586	Assuming Gamma Distribution													
587	Approximate Gamma UCL (use when n>=50))					85.54	Adjusted Gamma UCL (use when n<50)					85.61		
588														
589	Lognormal GOF Test													
590	Shapiro Wilk Test Statistic				0.98	Shapiro Wilk Lognormal GOF Test								
591	5% Shapiro Wilk P Value				0.73	Data appear Lognormal at 5% Significance Level								
592	Lilliefors Test Statistic				0.075	Lilliefors Lognormal GOF Test								
593	5% Lilliefors Critical Value				0.094	Data appear Lognormal at 5% Significance Level								
594	Data appear Lognormal at 5% Significance Level													
595														
596	Lognormal Statistics													
597	Minimum of Logged Data				2.84	Mean of logged Data				4.28				
598	Maximum of Logged Data				5.27	SD of logged Data				0.43				
599														
600	Assuming Lognormal Distribution													
601	95% H-UCL				86.66	90% Chebyshev (MVUE) UCL				91.11				
602	95% Chebyshev (MVUE) UCL				96.42	97.5% Chebyshev (MVUE) UCL				103.8				
603	99% Chebyshev (MVUE) UCL				118.2									
604														
605	Nonparametric Distribution Free UCL Statistics													
606	Data appear to follow a Discernible Distribution at 5% Significance Level													
607														
608	Nonparametric Distribution Free UCLs													
609	95% CLT UCL				85.2	95% Jackknife UCL				85.2				
610	95% Standard Bootstrap UCL				85.11	95% Bootstrap-t UCL				85.61				
611	95% Hall's Bootstrap UCL				85.61	95% Percentile Bootstrap UCL				85.04				
612	95% BCA Bootstrap UCL				85.8									
613	90% Chebyshev(Mean, Sd) UCL				90.17	95% Chebyshev(Mean, Sd) UCL				95.14				
614	97.5% Chebyshev(Mean, Sd) UCL				102.1	99% Chebyshev(Mean, Sd) UCL				115.6				
615														
616	Suggested UCL to Use													
617	95% Student's-t UCL				85.21									
618														
619	Recommendations regarding the selection of a 95% UCL are provided to help the user to select the most appropriate													
620	Recommendations are based upon the results of the simulation studies summarized in Singh, Singh, and													
621	Singh and Singh (2003). However, simulations results will not cover all Real World data sets													
622	For additional insight the user may want to consult a statistician.													
623														
624														
625	Beryllium													
626														
627	General Statistics													
628	Total Number of Observations				87	Number of Distinct Observations				83				
629						Number of Missing Observations				0				
630	Minimum				0.32	Mean				3.78				
631	Maximum				47.5	Median				1.67				
632	SD				6.78	Std. Error of Mean				0.72				
633	Coefficient of Variation				1.79	Skewness				4.58				
634														
635	Normal GOF Test													
636	Shapiro Wilk Test Statistic				0.49	Shapiro Wilk GOF Test								
637	5% Shapiro Wilk P Value				0	Data Not Normal at 5% Significance Level								
638	Lilliefors Test Statistic				0.30	Lilliefors GOF Test								
639	5% Lilliefors Critical Value				0.094	Data Not Normal at 5% Significance Level								
640	Data Not Normal at 5% Significance Level													
641														
642	Assuming Normal Distribution													
643	95% Normal UCL					95% UCLs (Adjusted for Skewness)								
644	95% Student's-t UCL				4.99	95% Adjusted-CLT UCL (Chen-1995)				5.36				
645						95% Modified-t UCL (Johnson-1978)				5.05				
646														
647	Gamma GOF Test													
648	A-D Test Statistic				4.16	Anderson-Darling Gamma GOF Test								
649	5% A-D Critical Value				0.79	Data Not Gamma Distributed at 5% Significance Level								
650	K-S Test Statistic				0.15	Kolmogrov-Smirnoff Gamma GOF Test								
651	5% K-S Critical Value				0.094	Data Not Gamma Distributed at 5% Significance Level								
652	Data Not Gamma Distributed at 5% Significance Level													
653														
654	Gamma Statistics													
655	k hat (MLE)				0.83	k star (bias corrected MLE)				0.81				
656	Theta hat (MLE)				4.50	Theta star (bias corrected MLE)				4.62				

	A	B	C	D	E	F	G	H	I	J	K	L
657	nu hat (MLE)					146	nu star (bias corrected)					142.3
658	MLE Mean (bias corrected)					3.78	MLE Sd (bias corrected)					4.18
659							Approximate Chi Square Value (0.05)					115.8
660	Adjusted Level of Significance					0.04	Adjusted Chi Square Value					115.4
661												
662	Assuming Gamma Distribution											
663	roximate Gamma UCL (use when n>=50))					4.64	Adjusted Gamma UCL (use when n<50)					4.66
664												
665	Lognormal GOF Test											
666	Shapiro Wilk Test Statistic					0.93	Shapiro Wilk Lognormal GOF Test					
667	5% Shapiro Wilk P Value					3.0043E	Data Not Lognormal at 5% Significance Level					
668	Lilliefors Test Statistic					0.12	Lilliefors Lognormal GOF Test					
669	5% Lilliefors Critical Value					0.094	Data Not Lognormal at 5% Significance Level					
670	Data Not Lognormal at 5% Significance Level											
671												
672	Lognormal Statistics											
673	Minimum of Logged Data					-1.12	Mean of logged Data					0.62
674	Maximum of Logged Data					3.86	SD of logged Data					1.07
675												
676	Assuming Lognormal Distribution											
677	95% H-UCL					4.37	90% Chebyshev (MVUE) UCL					4.71
678	95% Chebyshev (MVUE) UCL					5.34	97.5% Chebyshev (MVUE) UCL					6.22
679	99% Chebyshev (MVUE) UCL					7.95						
680												
681	Nonparametric Distribution Free UCL Statistics											
682	Data do not follow a Discernible Distribution (0.05)											
683												
684	Nonparametric Distribution Free UCLs											
685	95% CLT UCL					4.97	95% Jackknife UCL					4.99
686	95% Standard Bootstrap UCL					4.93	95% Bootstrap-t UCL					6.06
687	95% Hall's Bootstrap UCL					10.2	95% Percentile Bootstrap UCL					5.07
688	95% BCA Bootstrap UCL					5.47						
689	90% Chebyshev(Mean, Sd) UCL					5.96	95% Chebyshev(Mean, Sd) UCL					6.95
690	97.5% Chebyshev(Mean, Sd) UCL					8.32	99% Chebyshev(Mean, Sd) UCL					11.02
691												
692	Suggested UCL to Use											
693	95% Chebyshev (Mean, Sd) UCL					6.95						
694												
695	ations regarding the selection of a 95% UCL are provided to help the user to select the most appropriate											
696	ommendations are based upon the results of the simulation studies summarized in Singh, Singh, and											
697	and Singh and Singh (2003). However, simulations results will not cover all Real World data sets											
698	For additional insight the user may want to consult a statistician.											
699												
700	Cadmium											
701												
702	General Statistics											
703	Total Number of Observations					87	Number of Distinct Observations					83
704	Number of Detects					39	Number of Non-Detects					48
705	Number of Distinct Detects					38	Number of Distinct Non-Detects					45
706	Minimum Detect					0.12	Minimum Non-Detect					0.40
707	Maximum Detect					7.98	Maximum Non-Detect					0.76
708	Variance Detects					1.58	Percent Non-Detects					55.1
709	Mean Detects					0.59	SD Detects					1.25
710	Median Detects					0.28	CV Detects					2.10
711	Skewness Detects					5.62	Kurtosis Detects					33.44
712	Mean of Logged Detects					-1.06	SD of Logged Detects					0.83
713												
714	Normal GOF Test on Detects Only											
715	Shapiro Wilk Test Statistic					0.34	Shapiro Wilk GOF Test					
716	5% Shapiro Wilk Critical Value					0.93	Detected Data Not Normal at 5% Significance Level					
717	Lilliefors Test Statistic					0.35	Lilliefors GOF Test					
718	5% Lilliefors Critical Value					0.14	Detected Data Not Normal at 5% Significance Level					
719	Detected Data Not Normal at 5% Significance Level											
720												
721	Kaplan-Meier (KM) Statistics using Normal Critical Values and other Nonparametric UCLs											
722	Mean					0.41	Standard Error of Mean					0.09
723	SD					0.85	95% KM (BCA) UCL					0.58
724	95% KM (t) UCL					0.56	95% KM (Percentile Bootstrap) UCL					0.57
725	95% KM (z) UCL					0.56	95% KM Bootstrap t UCL					0.85
726	90% KM Chebyshev UCL					0.69	95% KM Chebyshev UCL					0.82
727	97.5% KM Chebyshev UCL					0.99	99% KM Chebyshev UCL					1.34
728												
729	Gamma GOF Tests on Detected Observations Only											
730	A-D Test Statistic					3.36	Anderson-Darling GOF Test					
731	5% A-D Critical Value					0.77	ed Data Not Gamma Distributed at 5% Significance Level					
732	K-S Test Statistic					0.24	Kolmogrov-Smirnoff GOF					
733	5% K-S Critical Value					0.14	ed Data Not Gamma Distributed at 5% Significance Level					
734	Detected Data Not Gamma Distributed at 5% Significance Level											
735												
736	Gamma Statistics on Detected Data Only											
737	k hat (MLE)					1.04	k star (bias corrected MLE)					0.98
738	Theta hat (MLE)					0.57	Theta star (bias corrected MLE)					0.60

	A	B	C	D	E	F	G	H	I	J	K	L
739	nu hat (MLE)					81.64	nu star (bias corrected)					76.69
740	MLE Mean (bias corrected)					0.59	MLE Sd (bias corrected)					0.60
741												
742	Gamma Kaplan-Meier (KM) Statistics											
743	k hat (KM)					0.23	nu hat (KM)					41.24
744	Approximate Chi Square Value (41.24, α)					27.51	Adjusted Chi Square Value (41.24, β)					27.39
745	Approximate KM-UCL (use when n>=50)					0.62	Gamma Adjusted KM-UCL (use when n<50)					0.62
746												
747	Gamma ROS Statistics using Imputed Non-Detects											
748	GROS may not be used when data set has > 50% NDs with many tied observations at multiple DLs											
749	GROS may not be used when kstar of detected data is small such as < 0.1											
750	For such situations, GROS method tends to yield inflated values of UCLs and BTVs											
751	Gamma distributed detected data, BTVs and UCLs may be computed using gamma distribution on KM estimate											
752	Minimum					0.01	Mean					0.34
753	Maximum					7.98	Median					0.14
754	SD					0.86	CV					2.55
755	k hat (MLE)					0.93	k star (bias corrected MLE)					0.91
756	Theta hat (MLE)					0.36	Theta star (bias corrected MLE)					0.37
757	nu hat (MLE)					163.4	nu star (bias corrected)					159.1
758	MLE Mean (bias corrected)					0.34	MLE Sd (bias corrected)					0.35
759							Adjusted Level of Significance (β)					0.04
760	Approximate Chi Square Value (159.10, α)					130.9	Adjusted Chi Square Value (159.10, β)					130.5
761	Gamma Approximate UCL (use when n>=50)					0.41	Gamma Adjusted UCL (use when n<50)					0.41
762												
763	Lognormal GOF Test on Detected Observations Only											
764	Shapiro Wilk Test Statistic					0.88	Shapiro Wilk GOF Test					
765	5% Shapiro Wilk Critical Value					0.93	Detected Data Not Lognormal at 5% Significance Level					
766	Lilliefors Test Statistic					0.14	Lilliefors GOF Test					
767	5% Lilliefors Critical Value					0.14	Detected Data Not Lognormal at 5% Significance Level					
768	Detected Data Not Lognormal at 5% Significance Level											
769												
770	Lognormal ROS Statistics Using Imputed Non-Detects											
771	Mean in Original Scale					0.41	Mean in Log Scale					-1.21
772	SD in Original Scale					0.85	SD in Log Scale					0.57
773	95% t UCL (assumes normality of ROS data)					0.56	95% Percentile Bootstrap UCL					0.58
774	95% BCA Bootstrap UCL					0.73	95% Bootstrap t UCL					0.96
775	95% H-UCL (Log ROS)					0.39						
776												
777	DL/2 Statistics											
778	DL/2 Normal						DL/2 Log-Transformed					
779	Mean in Original Scale					0.42	Mean in Log Scale					-1.16
780	SD in Original Scale					0.85	SD in Log Scale					0.57
781	95% t UCL (Assumes normality)					0.58	95% H-Stat UCL					0.41
782	DL/2 is not a recommended method, provided for comparisons and historical reasons											
783												
784	Nonparametric Distribution Free UCL Statistics											
785	Data do not follow a Discernible Distribution at 5% Significance Level											
786												
787	Suggested UCL to Use											
788	95% KM (t) UCL					0.56	95% KM (% Bootstrap) UCL					0.57
789												
790	Recommendations regarding the selection of a 95% UCL are provided to help the user to select the most appropriate											
791	Recommendations are based upon data size, data distribution, and skewness.											
792	Recommendations are based upon the results of the simulation studies summarized in Singh, Maichle, and											
793	Recommendations results will not cover all Real World data sets; for additional insight the user may want to consult											
794												
795												
796	Calcium											
797												
798	General Statistics											
799	Total Number of Observations					87	Number of Distinct Observations					79
800							Number of Missing Observations					0
801	Minimum					292	Mean					2206
802	Maximum					27600	Median					1700
803	SD					3019	Std. Error of Mean					323.6
804	Coefficient of Variation					1.36	Skewness					7.29
805												
806	Normal GOF Test											
807	Shapiro Wilk Test Statistic					0.36	Shapiro Wilk GOF Test					
808	5% Shapiro Wilk P Value					0	Data Not Normal at 5% Significance Level					
809	Lilliefors Test Statistic					0.30	Lilliefors GOF Test					
810	5% Lilliefors Critical Value					0.094	Data Not Normal at 5% Significance Level					
811	Data Not Normal at 5% Significance Level											
812												
813	Assuming Normal Distribution											
814	95% Normal UCL						95% UCLs (Adjusted for Skewness)					
815	95% Student's-t UCL					2744	95% Adjusted-CLT UCL (Chen-1995)					3009
816							95% Modified-t UCL (Johnson-1978)					2787
817												
818	Gamma GOF Test											
819	A-D Test Statistic					5.72	Anderson-Darling Gamma GOF Test					
820	5% A-D Critical Value					0.76	Data Not Gamma Distributed at 5% Significance Level					

	A	B	C	D	E	F	G	H	I	J	K	L							
821	K-S Test Statistic					0.18	Kolmogrov-Smirnoff Gamma GOF Test												
822	5% K-S Critical Value					0.09	Data Not Gamma Distributed at 5% Significance Level												
823																			
824																			
825	Gamma Statistics																		
826	k hat (MLE)					2.21	k star (bias corrected MLE)					2.14							
827	Theta hat (MLE)					998	Theta star (bias corrected MLE)					1030							
828	nu hat (MLE)					384.6	nu star (bias corrected)					372.7							
829	MLE Mean (bias corrected)					2206	MLE Sd (bias corrected)					1507							
830							Approximate Chi Square Value (0.05)					329							
831	Adjusted Level of Significance					0.04	Adjusted Chi Square Value					328.3							
832																			
833	Assuming Gamma Distribution																		
834	Approximate Gamma UCL (use when n>=50))					2500	Adjusted Gamma UCL (use when n<50)					2505							
835																			
836	Lognormal GOF Test																		
837	Shapiro Wilk Test Statistic					0.90	Shapiro Wilk Lognormal GOF Test												
838	5% Shapiro Wilk P Value					1.0275E-05	Data Not Lognormal at 5% Significance Level												
839	Lilliefors Test Statistic					0.11	Lilliefors Lognormal GOF Test												
840	5% Lilliefors Critical Value					0.09	Data Not Lognormal at 5% Significance Level												
841	Data Not Lognormal at 5% Significance Level																		
842																			
843	Lognormal Statistics																		
844	Minimum of Logged Data					5.67	Mean of logged Data					7.45							
845	Maximum of Logged Data					10.2	SD of logged Data					0.57							
846																			
847	Assuming Lognormal Distribution																		
848	95% H-UCL					2298	90% Chebyshev (MVUE) UCL					2443							
849	95% Chebyshev (MVUE) UCL					2626	97.5% Chebyshev (MVUE) UCL					2880							
850	99% Chebyshev (MVUE) UCL					3380													
851																			
852	Nonparametric Distribution Free UCL Statistics																		
853	Data do not follow a Discernible Distribution (0.05)																		
854																			
855	Nonparametric Distribution Free UCLs																		
856	95% CLT UCL					2739	95% Jackknife UCL					2744							
857	95% Standard Bootstrap UCL					2743	95% Bootstrap-t UCL					3650							
858	95% Hall's Bootstrap UCL					4772	95% Percentile Bootstrap UCL					2782							
859	95% BCA Bootstrap UCL					3268													
860	90% Chebyshev(Mean, Sd) UCL					3177	95% Chebyshev(Mean, Sd) UCL					3617							
861	97.5% Chebyshev(Mean, Sd) UCL					4227	99% Chebyshev(Mean, Sd) UCL					5426							
862																			
863	Suggested UCL to Use																		
864	95% Chebyshev (Mean, Sd) UCL					3617													
865																			
866	Recommendations regarding the selection of a 95% UCL are provided to help the user to select the most appropriate UCL.																		
867	Recommendations are based upon the results of the simulation studies summarized in Singh, Singh, and Singh (2003). However, simulations results will not cover all Real World data sets.																		
868	For additional insight the user may want to consult a statistician.																		
869																			
870																			
871	Cesium-137																		
872																			
873	General Statistics																		
874	Total Number of Observations					79	Number of Distinct Observations					77							
875	Number of Detects					51	Number of Non-Detects					28							
876	Number of Distinct Detects					50	Number of Distinct Non-Detects					28							
877	Minimum Detect					0.07	Minimum Non-Detect					-0.026							
878	Maximum Detect					1.96	Maximum Non-Detect					0.11							
879	Variance Detects					0.13	Percent Non-Detects					35.4							
880	Mean Detects					0.42	SD Detects					0.36							
881	Median Detects					0.31	CV Detects					0.87							
882	Skewness Detects					2.35	Kurtosis Detects					7.29							
883																			
884	Normal GOF Test on Detects Only																		
885	Shapiro Wilk Test Statistic					0.76	Normal GOF Test on Detected Observations Only												
886	5% Shapiro Wilk P Value					3.228E-05	Detected Data Not Normal at 5% Significance Level												
887	Lilliefors Test Statistic					0.17	Lilliefors GOF Test												
888	5% Lilliefors Critical Value					0.12	Detected Data Not Normal at 5% Significance Level												
889	Detected Data Not Normal at 5% Significance Level																		
890																			
891	Kaplan-Meier (KM) Statistics using Normal Critical Values and other Nonparametric UCLs																		
892	Mean					0.26	Standard Error of Mean					0.04							
893	SD					0.36	95% KM (BCA) UCL					0.34							
894	95% KM (t) UCL					0.33	95% KM (Percentile Bootstrap) UCL					0.33							
895	95% KM (z) UCL					0.33	95% KM Bootstrap t UCL					0.34							
896	90% KM Chebyshev UCL					0.38	95% KM Chebyshev UCL					0.44							
897	97.5% KM Chebyshev UCL					0.52	99% KM Chebyshev UCL					0.67							
898																			
899	Gamma GOF Tests on Detected Observations Only																		
900	A-D Test Statistic					0.69	Anderson-Darling GOF Test												
901	5% A-D Critical Value					0.76	Data appear Gamma Distributed at 5% Significance Level												
902	K-S Test Statistic					0.11	Kolmogorov-Smirnoff GOF Test												

	A	B	C	D	E	F	G	H	I	J	K	L	
903	5% K-S Critical Value					0.12	data appear Gamma Distributed at 5% Significance Level						
904	Detected data appear Gamma Distributed at 5% Significance Level												
905													
906	Gamma Statistics on Detected Data Only												
907	k hat (MLE)					1.83	k star (bias corrected MLE)					1.73	
908	Theta hat (MLE)					0.23	Theta star (bias corrected MLE)					0.24	
909	nu hat (MLE)					186.9	nu star (bias corrected)					177.3	
910	MLE Mean (bias corrected)					0.42	MLE Sd (bias corrected)					0.32	
911													
912	Gamma Kaplan-Meier (KM) Statistics												
913	k hat (KM)					0.53	nu hat (KM)					83.9	
914							Adjusted Level of Significance (β)					0.04	
915	Approximate Chi Square Value (83.93, α)					63.8	Adjusted Chi Square Value (83.93, β)					63.4	
916	Approximate KM-UCL (use when n>=50)					0.34	Gamma Adjusted KM-UCL (use when n<50)					0.34	
917													
918	DL/2 Statistics												
919	Mean in Original Scale					0.27	SD in Original Scale					0.35	
920	95% t UCL (Assumes normality)					0.34							
921	DL/2 is not a recommended method, provided for comparisons and historical reasons												
922													
923	Nonparametric Distribution Free UCL Statistics												
924	Detected Data appear Gamma Distributed at 5% Significance Level												
925													
926	Suggested UCL to Use												
927	95% KM (Percentile Bootstrap) UCL					0.33	95% GROS Approximate Gamma UCL					N/A	
928	95% Approximate Gamma KM-UCL					0.34							
929	Warning: One or more Recommended UCL(s) not available!												
930													
931	Recommendations regarding the selection of a 95% UCL are provided to help the user to select the most appropriate												
932	Recommendations are based upon data size, data distribution, and skewness.												
933	Recommendations are based upon the results of the simulation studies summarized in Singh, Maichle, and												
934	Simulation results will not cover all Real World data sets; for additional insight the user may want to consult												
935													
936													
937	Chromium												
938													
939	General Statistics												
940	Total Number of Observations					87	Number of Distinct Observations					82	
941							Number of Missing Observations					0	
942	Minimum					3.69	Mean					12.4	
943	Maximum					55.8	Median					10.3	
944	SD					8.32	Std. Error of Mean					0.89	
945	Coefficient of Variation					0.67	Skewness					2.50	
946													
947	Normal GOF Test												
948	Shapiro Wilk Test Statistic					0.77	Shapiro Wilk GOF Test						
949	5% Shapiro Wilk P Value					0	Data Not Normal at 5% Significance Level						
950	Lilliefors Test Statistic					0.18	Lilliefors GOF Test						
951	5% Lilliefors Critical Value					0.09	Data Not Normal at 5% Significance Level						
952	Data Not Normal at 5% Significance Level												
953													
954	Assuming Normal Distribution												
955	95% Normal UCL						95% UCLs (Adjusted for Skewness)						
956	95% Student's-t UCL					13.9	95% Adjusted-CLT UCL (Chen-1995)					14.1	
957							95% Modified-t UCL (Johnson-1978)					13.9	
958													
959	Gamma GOF Test												
960	A-D Test Statistic					1.78	Anderson-Darling Gamma GOF Test						
961	5% A-D Critical Value					0.75	Data Not Gamma Distributed at 5% Significance Level						
962	K-S Test Statistic					0.11	Kolmogorov-Smirnov Gamma GOF Test						
963	5% K-S Critical Value					0.09	Data Not Gamma Distributed at 5% Significance Level						
964	Data Not Gamma Distributed at 5% Significance Level												
965													
966	Gamma Statistics												
967	k hat (MLE)					3.34	k star (bias corrected MLE)					3.23	
968	Theta hat (MLE)					3.71	Theta star (bias corrected MLE)					3.83	
969	nu hat (MLE)					582	nu star (bias corrected)					563.3	
970	MLE Mean (bias corrected)					12.4	MLE Sd (bias corrected)					6.90	
971							Approximate Chi Square Value (0.05)					509.2	
972	Adjusted Level of Significance					0.04	Adjusted Chi Square Value					508.4	
973													
974	Assuming Gamma Distribution												
975	Approximate Gamma UCL (use when n>=50)					13.7	Adjusted Gamma UCL (use when n<50)					13.7	
976													
977	Lognormal GOF Test												
978	Shapiro Wilk Test Statistic					0.96	Shapiro Wilk Lognormal GOF Test						
979	5% Shapiro Wilk P Value					0.12	Data appear Lognormal at 5% Significance Level						
980	Lilliefors Test Statistic					0.07	Lilliefors Lognormal GOF Test						
981	5% Lilliefors Critical Value					0.09	Data appear Lognormal at 5% Significance Level						
982	Data appear Lognormal at 5% Significance Level												
983													
984	Lognormal Statistics												

	A	B	C	D	E	F	G	H	I	J	K	L
985	Minimum of Logged Data					1.30	Mean of logged Data					2.36
986	Maximum of Logged Data					4.02	SD of logged Data					0.53
987												
988	Assuming Lognormal Distribution											
989	95% H-UCL					13.64	90% Chebyshev (MVUE) UCL					14.44
990	95% Chebyshev (MVUE) UCL					15.44	97.5% Chebyshev (MVUE) UCL					16.84
991	99% Chebyshev (MVUE) UCL					19.64						
992												
993	Nonparametric Distribution Free UCL Statistics											
994	Data appear to follow a Discernible Distribution at 5% Significance Level											
995												
996	Nonparametric Distribution Free UCLs											
997	95% CLT UCL					13.84	95% Jackknife UCL					13.94
998	95% Standard Bootstrap UCL					13.84	95% Bootstrap-t UCL					14.34
999	95% Hall's Bootstrap UCL					14.34	95% Percentile Bootstrap UCL					13.94
1000	95% BCA Bootstrap UCL					14.24						
1001	90% Chebyshev(Mean, Sd) UCL					15.14	95% Chebyshev(Mean, Sd) UCL					16.34
1002	97.5% Chebyshev(Mean, Sd) UCL					17.94	99% Chebyshev(Mean, Sd) UCL					21.34
1003												
1004	Suggested UCL to Use											
1005	95% H-UCL					13.64						
1006												
1007	Directions regarding the selection of a 95% UCL are provided to help the user to select the most appropriate											
1008	Recommendations are based upon the results of the simulation studies summarized in Singh, Singh, and											
1009	and Singh and Singh (2003). However, simulations results will not cover all Real World data sets											
1010	For additional insight the user may want to consult a statistician.											
1011												
1012	ProUCL computes and outputs H-statistic based UCLs for historical reasons only.											
1013	often results in unstable (both high and low) values of UCL95 as shown in examples in the Technical											
1014	It is therefore recommended to avoid the use of H-statistic based 95% UCLs.											
1015	Metric methods are preferred to compute UCL95 for skewed data sets which do not follow a gamma											
1016												
1017	Cobalt											
1018												
1019	General Statistics											
1020	Total Number of Observations					87	Number of Distinct Observations					76
1021	Number of Detects					83	Number of Non-Detects					4
1022	Number of Distinct Detects					74	Number of Distinct Non-Detects					3
1023	Minimum Detect					0.95	Minimum Non-Detect					1.4
1024	Maximum Detect					12.9	Maximum Non-Detect					2.2
1025	Variance Detects					5.68	Percent Non-Detects					4.59
1026	Mean Detects					4.08	SD Detects					2.38
1027	Median Detects					3.53	CV Detects					0.58
1028	Skewness Detects					1.57	Kurtosis Detects					2.80
1029	Mean of Logged Detects					1.25	SD of Logged Detects					0.54
1030												
1031	Normal GOF Test on Detects Only											
1032	Shapiro Wilk Test Statistic					0.86	Normal GOF Test on Detected Observations Only					
1033	5% Shapiro Wilk P Value					1.253E-05	Detected Data Not Normal at 5% Significance Level					
1034	Lilliefors Test Statistic					0.16	Lilliefors GOF Test					
1035	5% Lilliefors Critical Value					0.09	Detected Data Not Normal at 5% Significance Level					
1036	Detected Data Not Normal at 5% Significance Level											
1037												
1038	Kaplan-Meier (KM) Statistics using Normal Critical Values and other Nonparametric UCLs											
1039	Mean					3.95	Standard Error of Mean					0.25
1040	SD					2.38	95% KM (BCA) UCL					4.40
1041	95% KM (t) UCL					4.38	95% KM (Percentile Bootstrap) UCL					4.38
1042	95% KM (z) UCL					4.38	95% KM Bootstrap t UCL					4.44
1043	90% KM Chebyshev UCL					4.72	95% KM Chebyshev UCL					5.07
1044	97.5% KM Chebyshev UCL					5.56	99% KM Chebyshev UCL					6.51
1045												
1046	Gamma GOF Tests on Detected Observations Only											
1047	A-D Test Statistic					0.64	Anderson-Darling GOF Test					
1048	5% A-D Critical Value					0.75	data appear Gamma Distributed at 5% Significance Level					
1049	K-S Test Statistic					0.094	Kolmogrov-Smirnoff GOF					
1050	5% K-S Critical Value					0.094	data appear Gamma Distributed at 5% Significance Level					
1051	Detected data appear Gamma Distributed at 5% Significance Level											
1052												
1053	Gamma Statistics on Detected Data Only											
1054	k hat (MLE)					3.55	k star (bias corrected MLE)					3.43
1055	Theta hat (MLE)					1.14	Theta star (bias corrected MLE)					1.18
1056	nu hat (MLE)					590.3	nu star (bias corrected)					570.3
1057	MLE Mean (bias corrected)					4.08	MLE Sd (bias corrected)					2.20
1058												
1059	Gamma Kaplan-Meier (KM) Statistics											
1060	k hat (KM)					2.75	nu hat (KM)					480.1
1061	Approximate Chi Square Value (480.15, α)					430.3	Adjusted Chi Square Value (480.15, β)					429.6
1062	Approximate KM-UCL (use when n>=50)					4.41	Gamma Adjusted KM-UCL (use when n<50)					4.42
1063												
1064	Gamma ROS Statistics using Imputed Non-Detects											
1065	GROS may not be used when data set has > 50% NDs with many tied observations at multiple DLs											
1066	GROS may not be used when kstar of detected data is small such as < 0.1											

	A	B	C	D	E	F	G	H	I	J	K	L
1067	For such situations, GROS method tends to yield inflated values of UCLs and BTVs											
1068	Gamma distributed detected data, BTVs and UCLs may be computed using gamma distribution on KM estimates											
1069			Minimum		0.57					Mean	3.93	
1070			Maximum		12.9					Median	3.45	
1071			SD		2.42					CV	0.61	
1072			k hat (MLE)		3.03				k star (bias corrected MLE)		2.93	
1073			Theta hat (MLE)		1.29				Theta star (bias corrected MLE)		1.34	
1074			nu hat (MLE)		527.9				nu star (bias corrected)		511	
1075			MLE Mean (bias corrected)		3.93				MLE Sd (bias corrected)		2.29	
1076									Adjusted Level of Significance (β)		0.04	
1077			Approximate Chi Square Value (510.99, α)		459.6				Adjusted Chi Square Value (510.99, β)		458.8	
1078			Gamma Approximate UCL (use when $n \geq 50$)		4.37				Gamma Adjusted UCL (use when $n < 50$)		4.38	
1079												
1080	Lognormal GOF Test on Detected Observations Only											
1081			Lilliefors Test Statistic		0.06				Lilliefors GOF Test			
1082			5% Lilliefors Critical Value		0.09				Detected Data appear Lognormal at 5% Significance Level			
1083	Detected Data appear Lognormal at 5% Significance Level											
1084												
1085	Lognormal ROS Statistics Using Imputed Non-Detects											
1086			Mean in Original Scale		3.95				Mean in Log Scale		1.21	
1087			SD in Original Scale		2.39				SD in Log Scale		0.56	
1088			95% t UCL (assumes normality of ROS data)		4.38				95% Percentile Bootstrap UCL		4.40	
1089			95% BCA Bootstrap UCL		4.41				95% Bootstrap t UCL		4.46	
1090			95% H-UCL (Log ROS)		4.44							
1091												
1092	KMs using Lognormal Distribution and KM Estimates when Detected data are Lognormally Distributed											
1093			KM Mean (logged)		1.21				95% H-UCL (KM -Log)		4.44	
1094			KM SD (logged)		0.56				95% Critical H Value (KM-Log)		1.88	
1095			KM Standard Error of Mean (logged)		0.06							
1096												
1097	DL/2 Statistics											
1098			DL/2 Normal						DL/2 Log-Transformed			
1099			Mean in Original Scale		3.93				Mean in Log Scale		1.19	
1100			SD in Original Scale		2.42				SD in Log Scale		0.60	
1101			95% t UCL (Assumes normality)		4.36				95% H-Stat UCL		4.50	
1102	DL/2 is not a recommended method, provided for comparisons and historical reasons											
1103												
1104	Nonparametric Distribution Free UCL Statistics											
1105	Detected Data appear Gamma Distributed at 5% Significance Level											
1106												
1107	Suggested UCL to Use											
1108			95% KM (BCA) UCL		4.40			95% GROS Approximate Gamma UCL		4.37		
1109			95% Approximate Gamma KM-UCL		4.41							
1110												
1111	Recommendations regarding the selection of a 95% UCL are provided to help the user to select the most appropriate											
1112	Recommendations are based upon data size, data distribution, and skewness.											
1113	Recommendations are based upon the results of the simulation studies summarized in Singh, Maichle, and											
1114	Recommendations results will not cover all Real World data sets; for additional insight the user may want to consult											
1115												
1116												
1117	Copper											
1118												
1119	General Statistics											
1120			Total Number of Observations		79			Number of Distinct Observations		78		
1121								Number of Missing Observations		0		
1122			Minimum		1.73				Mean	697.5		
1123			Maximum		36400				Median	33		
1124			SD		4108				Std. Error of Mean	462.1		
1125			Coefficient of Variation		5.88				Skewness	8.64		
1126												
1127	Normal GOF Test											
1128			Shapiro Wilk Test Statistic		0.17				Shapiro Wilk GOF Test			
1129			5% Shapiro Wilk P Value		0				Data Not Normal at 5% Significance Level			
1130			Lilliefors Test Statistic		0.43				Lilliefors GOF Test			
1131			5% Lilliefors Critical Value		0.09				Data Not Normal at 5% Significance Level			
1132	Data Not Normal at 5% Significance Level											
1133												
1134	Assuming Normal Distribution											
1135			95% Normal UCL					95% UCLs (Adjusted for Skewness)				
1136			95% Student's-t UCL		1467			95% Adjusted-CLT UCL (Chen-1995)		1938		
1137								95% Modified-t UCL (Johnson-1978)		1542		
1138												
1139	Gamma GOF Test											
1140			A-D Test Statistic		8.71				Anderson-Darling Gamma GOF Test			
1141			5% A-D Critical Value		0.88				Data Not Gamma Distributed at 5% Significance Level			
1142			K-S Test Statistic		0.22				Kolmogrov-Smirnoff Gamma GOF Test			
1143			5% K-S Critical Value		0.11				Data Not Gamma Distributed at 5% Significance Level			
1144	Data Not Gamma Distributed at 5% Significance Level											
1145												
1146	Gamma Statistics											
1147			k hat (MLE)		0.26				k star (bias corrected MLE)		0.26	
1148			Theta hat (MLE)		2593				Theta star (bias corrected MLE)		2610	

	A	B	C	D	E	F	G	H	I	J	K	L
1149	nu hat (MLE)					42.5	nu star (bias corrected)					42.2
1150	MLE Mean (bias corrected)					697.5	MLE Sd (bias corrected)					1349
1151							Approximate Chi Square Value (0.05)					28.3
1152	Adjusted Level of Significance					0.04	Adjusted Chi Square Value					28.1
1153												
1154	Assuming Gamma Distribution											
1155	Approximate Gamma UCL (use when n>=50))					1040	Adjusted Gamma UCL (use when n<50)					1048
1156												
1157	Lognormal GOF Test											
1158	Shapiro Wilk Test Statistic					0.93	Shapiro Wilk Lognormal GOF Test					
1159	5% Shapiro Wilk P Value					3.1762E	Data Not Lognormal at 5% Significance Level					
1160	Lilliefors Test Statistic					0.13	Lilliefors Lognormal GOF Test					
1161	5% Lilliefors Critical Value					0.09	Data Not Lognormal at 5% Significance Level					
1162	Data Not Lognormal at 5% Significance Level											
1163												
1164	Lognormal Statistics											
1165	Minimum of Logged Data					0.54	Mean of logged Data					3.93
1166	Maximum of Logged Data					10.5	SD of logged Data					1.93
1167												
1168	Assuming Lognormal Distribution											
1169	95% H-UCL					694.6	90% Chebyshev (MVUE) UCL					623.2
1170	95% Chebyshev (MVUE) UCL					763.8	97.5% Chebyshev (MVUE) UCL					959
1171	99% Chebyshev (MVUE) UCL					1342						
1172												
1173	Nonparametric Distribution Free UCL Statistics											
1174	Data do not follow a Discernible Distribution (0.05)											
1175												
1176	Nonparametric Distribution Free UCLs											
1177	95% CLT UCL					1458	95% Jackknife UCL					1467
1178	95% Standard Bootstrap UCL					1435	95% Bootstrap-t UCL					7413
1179	95% Hall's Bootstrap UCL					4271	95% Percentile Bootstrap UCL					1608
1180	95% BCA Bootstrap UCL					2448						
1181	90% Chebyshev(Mean, Sd) UCL					2084	95% Chebyshev(Mean, Sd) UCL					2712
1182	97.5% Chebyshev(Mean, Sd) UCL					3584	99% Chebyshev(Mean, Sd) UCL					5296
1183												
1184	Suggested UCL to Use											
1185	95% Chebyshev (Mean, Sd) UCL					2712						
1186												
1187	Recommendations regarding the selection of a 95% UCL are provided to help the user to select the most appropriate											
1188	Recommendations are based upon the results of the simulation studies summarized in Singh, Singh, and											
1189	Singh and Singh (2003). However, simulations results will not cover all Real World data sets											
1190	For additional insight the user may want to consult a statistician.											
1191												
1192	Cyanide (Total)											
1193												
1194	General Statistics											
1195	Total Number of Observations					83	Number of Distinct Observations					67
1196	Number of Detects					18	Number of Non-Detects					65
1197	Number of Distinct Detects					18	Number of Distinct Non-Detects					51
1198	Minimum Detect					0.08	Minimum Non-Detect					0.07
1199	Maximum Detect					0.55	Maximum Non-Detect					0.42
1200	Variance Detects					0.01	Percent Non-Detects					78.3
1201	Mean Detects					0.19	SD Detects					0.11
1202	Median Detects					0.15	CV Detects					0.58
1203	Skewness Detects					2.01	Kurtosis Detects					5.01
1204	Mean of Logged Detects					-1.75	SD of Logged Detects					0.48
1205												
1206	Normal GOF Test on Detects Only											
1207	Shapiro Wilk Test Statistic					0.79	Shapiro Wilk GOF Test					
1208	5% Shapiro Wilk Critical Value					0.89	Detected Data Not Normal at 5% Significance Level					
1209	Lilliefors Test Statistic					0.19	Lilliefors GOF Test					
1210	5% Lilliefors Critical Value					0.20	Detected Data appear Normal at 5% Significance Level					
1211	Detected Data appear Approximate Normal at 5% Significance Level											
1212												
1213	Kaplan-Meier (KM) Statistics using Normal Critical Values and other Nonparametric UCLs											
1214	Mean					0.15	Standard Error of Mean					0.01
1215	SD					0.07	95% KM (BCA) UCL					0.17
1216	95% KM (t) UCL					0.17	95% KM (Percentile Bootstrap) UCL					0.17
1217	95% KM (z) UCL					0.17	95% KM Bootstrap t UCL					0.17
1218	90% KM Chebyshev UCL					0.18	95% KM Chebyshev UCL					0.20
1219	97.5% KM Chebyshev UCL					0.23	99% KM Chebyshev UCL					0.28
1220												
1221	Gamma GOF Tests on Detected Observations Only											
1222	A-D Test Statistic					0.52	Anderson-Darling GOF Test					
1223	5% A-D Critical Value					0.74	data appear Gamma Distributed at 5% Significance Level					
1224	K-S Test Statistic					0.17	Kolmogrov-Smirnoff GOF					
1225	5% K-S Critical Value					0.20	data appear Gamma Distributed at 5% Significance Level					
1226	Detected data appear Gamma Distributed at 5% Significance Level											
1227												
1228	Gamma Statistics on Detected Data Only											
1229	k hat (MLE)					4.18	k star (bias corrected MLE)					3.52
1230	Theta hat (MLE)					0.04	Theta star (bias corrected MLE)					0.05

A	B	C	D	E	F	G	H	I	J	K	L
1231	nu hat (MLE)				150.7	nu star (bias corrected)				126.9	
1232	MLE Mean (bias corrected)				0.19	MLE Sd (bias corrected)				0.10	
1233											
1234	Gamma Kaplan-Meier (KM) Statistics										
1235	k hat (KM)				4.14	nu hat (KM)				688.1	
1236	Approximate Chi Square Value (688.15, α)				628.3	Adjusted Chi Square Value (688.15, β)				627.3	
1237	Approximate KM-UCL (use when n>=50)				0.16	Gamma Adjusted KM-UCL (use when n<50)				0.16	
1238											
1239	Gamma ROS Statistics using Imputed Non-Detects										
1240	GROS may not be used when data set has > 50% NDs with many tied observations at multiple DLs										
1241	GROS may not be used when kstar of detected data is small such as < 0.1										
1242	For such situations, GROS method tends to yield inflated values of UCLs and BTVs										
1243	Gamma distributed detected data, BTVs and UCLs may be computed using gamma distribution on KM estimates										
1244	Minimum				0.02	Mean				0.13	
1245	Maximum				0.55	Median				0.12	
1246	SD				0.06	CV				0.47	
1247	k hat (MLE)				6.64	k star (bias corrected MLE)				6.41	
1248	Theta hat (MLE)				0.02	Theta star (bias corrected MLE)				0.02	
1249	nu hat (MLE)				1103	nu star (bias corrected)				1064	
1250	MLE Mean (bias corrected)				0.13	MLE Sd (bias corrected)				0.05	
1251						Adjusted Level of Significance (β)				0.04	
1252	Approximate Chi Square Value (N/A, α)				989.4	Adjusted Chi Square Value (N/A, β)				988.1	
1253	Gamma Approximate UCL (use when n>=50)				0.14	Gamma Adjusted UCL (use when n<50)				0.14	
1254											
1255	Lognormal GOF Test on Detected Observations Only										
1256	Shapiro Wilk Test Statistic				0.95	Shapiro Wilk GOF Test					
1257	5% Shapiro Wilk Critical Value				0.89	Detected Data appear Lognormal at 5% Significance Level					
1258	Lilliefors Test Statistic				0.14	Lilliefors GOF Test					
1259	5% Lilliefors Critical Value				0.20	Detected Data appear Lognormal at 5% Significance Level					
1260	Detected Data appear Lognormal at 5% Significance Level										
1261											
1262	Lognormal ROS Statistics Using Imputed Non-Detects										
1263	Mean in Original Scale				0.14	Mean in Log Scale				-2.00	
1264	SD in Original Scale				0.06	SD in Log Scale				0.30	
1265	5% t UCL (assumes normality of ROS data)				0.15	95% Percentile Bootstrap UCL				0.15	
1266	95% BCA Bootstrap UCL				0.15	95% Bootstrap t UCL				0.15	
1267	95% H-UCL (Log ROS)				0.15						
1268											
1269	DLs using Lognormal Distribution and KM Estimates when Detected data are Lognormally Distributed										
1270	KM Mean (logged)				-1.98	95% H-UCL (KM -Log)				0.16	
1271	KM SD (logged)				0.40	95% Critical H Value (KM-Log)				1.78	
1272	KM Standard Error of Mean (logged)				0.08						
1273											
1274	DL/2 Statistics										
1275	DL/2 Normal					DL/2 Log-Transformed					
1276	Mean in Original Scale				0.15	Mean in Log Scale				-1.91	
1277	SD in Original Scale				0.06	SD in Log Scale				0.33	
1278	95% t UCL (Assumes normality)				0.16	95% H-Stat UCL				0.16	
1279	DL/2 is not a recommended method, provided for comparisons and historical reasons										
1280											
1281	Nonparametric Distribution Free UCL Statistics										
1282	Detected Data appear Approximate Normal Distributed at 5% Significance Level										
1283											
1284	Suggested UCL to Use										
1285	95% KM (t) UCL				0.17	95% KM (Percentile Bootstrap) UCL				0.17	
1286											
1287	Recommendations regarding the selection of a 95% UCL are provided to help the user to select the most appropriate										
1288	Recommendations are based upon data size, data distribution, and skewness.										
1289	Recommendations are based upon the results of the simulation studies summarized in Singh, Maichle, and										
1290	Recommendations results will not cover all Real World data sets; for additional insight the user may want to consult										
1291											
1292	HMX										
1293											
1294	General Statistics										
1295	Total Number of Observations				83	Number of Distinct Observations				14	
1296	Number of Detects				13	Number of Non-Detects				70	
1297	Number of Distinct Detects				13	Number of Distinct Non-Detects				1	
1298	Minimum Detect				0.19	Minimum Non-Detect				0.5	
1299	Maximum Detect				35.3	Maximum Non-Detect				0.5	
1300	Variance Detects				108.4	Percent Non-Detects				84.3	
1301	Mean Detects				7.12	SD Detects				10.4	
1302	Median Detects				1.22	CV Detects				1.46	
1303	Skewness Detects				1.87	Kurtosis Detects				3.78	
1304	Mean of Logged Detects				0.55	SD of Logged Detects				1.95	
1305											
1306	Normal GOF Test on Detects Only										
1307	Shapiro Wilk Test Statistic				0.72	Shapiro Wilk GOF Test					
1308	5% Shapiro Wilk Critical Value				0.86	Detected Data Not Normal at 5% Significance Level					
1309	Lilliefors Test Statistic				0.29	Lilliefors GOF Test					
1310	5% Lilliefors Critical Value				0.24	Detected Data Not Normal at 5% Significance Level					
1311	Detected Data Not Normal at 5% Significance Level										
1312											

A	B	C	D	E	F	G	H	I	J	K	L
1313	Kaplan-Meier (KM) Statistics using Normal Critical Values and other Nonparametric UCLs										
1314	Mean				1.32	Standard Error of Mean				0.53	
1315	SD				4.68	95% KM (BCA) UCL				2.25	
1316	95% KM (t) UCL				2.21	95% KM (Percentile Bootstrap) UCL				2.25	
1317	95% KM (z) UCL				2.20	95% KM Bootstrap t UCL				3.16	
1318	90% KM Chebyshev UCL				2.93	95% KM Chebyshev UCL				3.65	
1319	97.5% KM Chebyshev UCL				4.66	99% KM Chebyshev UCL				6.65	
1320											
1321	Gamma GOF Tests on Detected Observations Only										
1322	A-D Test Statistic				0.80	Anderson-Darling GOF Test					
1323	5% A-D Critical Value				0.79	Detected Data Not Gamma Distributed at 5% Significance Level					
1324	K-S Test Statistic				0.21	Kolmogrov-Smirnoff GOF					
1325	5% K-S Critical Value				0.25	Detected data appear Gamma Distributed at 5% Significance Level					
1326	Detected data follow Appr. Gamma Distribution at 5% Significance Level										
1327											
1328	Gamma Statistics on Detected Data Only										
1329	k hat (MLE)				0.45	k star (bias corrected MLE)				0.40	
1330	Theta hat (MLE)				15.5	Theta star (bias corrected MLE)				17.6	
1331	nu hat (MLE)				11.8	nu star (bias corrected)				10.4	
1332	MLE Mean (bias corrected)				7.12	MLE Sd (bias corrected)				11.2	
1333											
1334	Gamma Kaplan-Meier (KM) Statistics										
1335	k hat (KM)				0.08	nu hat (KM)				13.3	
1336	Approximate Chi Square Value (13.35, α)				6.12	Adjusted Chi Square Value (13.35, β)				6.04	
1337	Approximate KM-UCL (use when $n \geq 50$)				2.89	Gamma Adjusted KM-UCL (use when $n < 50$)				2.93	
1338	Gamma (KM) may not be used when k hat (KM) is < 0.1										
1339											
1340	Gamma ROS Statistics using Imputed Non-Detects										
1341	GROS may not be used when data set has $> 50\%$ NDs with many tied observations at multiple DLs										
1342	GROS may not be used when kstar of detected data is small such as < 0.1										
1343	For such situations, GROS method tends to yield inflated values of UCLs and BTVs										
1344	Gamma distributed detected data, BTVs and UCLs may be computed using gamma distribution on KM estimates										
1345	Minimum				0.01	Mean				1.57	
1346	Maximum				35.3	Median				0.01	
1347	SD				4.81	CV				3.04	
1348	k hat (MLE)				0.21	k star (bias corrected MLE)				0.21	
1349	Theta hat (MLE)				7.25	Theta star (bias corrected MLE)				7.24	
1350	nu hat (MLE)				36.1	nu star (bias corrected)				36.1	
1351	MLE Mean (bias corrected)				1.57	MLE Sd (bias corrected)				3.38	
1352						Adjusted Level of Significance (β)				0.04	
1353	Approximate Chi Square Value (36.18, α)				23.4	Adjusted Chi Square Value (36.18, β)				23.2	
1354	Gamma Approximate UCL (use when $n \geq 50$)				2.44	Gamma Adjusted UCL (use when $n < 50$)				2.45	
1355											
1356	Lognormal GOF Test on Detected Observations Only										
1357	Shapiro Wilk Test Statistic				0.86	Shapiro Wilk GOF Test					
1358	5% Shapiro Wilk Critical Value				0.86	Detected Data appear Lognormal at 5% Significance Level					
1359	Lilliefors Test Statistic				0.19	Lilliefors GOF Test					
1360	5% Lilliefors Critical Value				0.24	Detected Data appear Lognormal at 5% Significance Level					
1361	Detected Data appear Lognormal at 5% Significance Level										
1362											
1363	Lognormal ROS Statistics Using Imputed Non-Detects										
1364	Mean in Original Scale				1.54	Mean in Log Scale				-1.08	
1365	SD in Original Scale				4.68	SD in Log Scale				1.60	
1366	95% t UCL (assumes normality of ROS data)				2.40	95% Percentile Bootstrap UCL				2.46	
1367	95% BCA Bootstrap UCL				2.98	95% Bootstrap t UCL				3.26	
1368	95% H-UCL (Log ROS)				2.03						
1369											
1370	Estimates using Lognormal Distribution and KM Estimates when Detected data are Lognormally Distributed										
1371	KM Mean (logged)				-1.09	95% H-UCL (KM -Log)				0.74	
1372	KM SD (logged)				1.04	95% Critical H Value (KM-Log)				2.27	
1373	KM Standard Error of Mean (logged)				0.14						
1374											
1375	DL/2 Statistics										
1376	DL/2 Normal					DL/2 Log-Transformed					
1377	Mean in Original Scale				1.32	Mean in Log Scale				-1.08	
1378	SD in Original Scale				4.70	SD in Log Scale				1.03	
1379	95% t UCL (Assumes normality)				2.18	95% H-Stat UCL				0.74	
1380	DL/2 is not a recommended method, provided for comparisons and historical reasons										
1381											
1382	Nonparametric Distribution Free UCL Statistics										
1383	Detected Data appear Approximate Gamma Distributed at 5% Significance Level										
1384											
1385	Suggested UCL to Use										
1386	95% KM (t) UCL				2.21	95% GROS Approximate Gamma UCL				2.44	
1387	95% Approximate Gamma KM-UCL				2.89						
1388											
1389	Recommendations regarding the selection of a 95% UCL are provided to help the user to select the most appropriate										
1390	Recommendations are based upon data size, data distribution, and skewness.										
1391	Recommendations are based upon the results of the simulation studies summarized in Singh, Maichle, and										
1392	Recommendations results will not cover all Real World data sets; for additional insight the user may want to consult										
1393											
1394											

	A	B	C	D	E	F	G	H	I	J	K	L
1395	Iron											
1396												
1397	General Statistics											
1398	Total Number of Observations					87	Number of Distinct Observations					71
1399							Number of Missing Observations					0
1400	Minimum					5260	Mean					10150
1401	Maximum					22300	Median					9790
1402	SD					2971	Std. Error of Mean					318.6
1403	Coefficient of Variation					0.29	Skewness					1.63
1404												
1405	Normal GOF Test											
1406	Shapiro Wilk Test Statistic					0.88	Shapiro Wilk GOF Test					
1407	5% Shapiro Wilk P Value					1.8010E	Data Not Normal at 5% Significance Level					
1408	Lilliefors Test Statistic					0.14	Lilliefors GOF Test					
1409	5% Lilliefors Critical Value					0.091	Data Not Normal at 5% Significance Level					
1410	Data Not Normal at 5% Significance Level											
1411												
1412	Assuming Normal Distribution											
1413	95% Normal UCL						95% UCLs (Adjusted for Skewness)					
1414	95% Student's-t UCL					10680	95% Adjusted-CLT UCL (Chen-1995)					10734
1415							95% Modified-t UCL (Johnson-1978)					10689
1416												
1417	Gamma GOF Test											
1418	A-D Test Statistic					1.15	Anderson-Darling Gamma GOF Test					
1419	5% A-D Critical Value					0.75	Data Not Gamma Distributed at 5% Significance Level					
1420	K-S Test Statistic					0.10	Kolmogrov-Smirnoff Gamma GOF Test					
1421	5% K-S Critical Value					0.091	Data Not Gamma Distributed at 5% Significance Level					
1422	Data Not Gamma Distributed at 5% Significance Level											
1423												
1424	Gamma Statistics											
1425	k hat (MLE)					13.64	k star (bias corrected MLE)					13.11
1426	Theta hat (MLE)					744.2	Theta star (bias corrected MLE)					770.3
1427	nu hat (MLE)					2373	nu star (bias corrected)					2293
1428	MLE Mean (bias corrected)					10150	MLE Sd (bias corrected)					2796
1429							Approximate Chi Square Value (0.05)					2183
1430	Adjusted Level of Significance					0.04	Adjusted Chi Square Value					2181
1431												
1432	Assuming Gamma Distribution											
1433	Approximate Gamma UCL (use when n>=50)					10663	Adjusted Gamma UCL (use when n<50)					10672
1434												
1435	Lognormal GOF Test											
1436	Shapiro Wilk Test Statistic					0.96	Shapiro Wilk Lognormal GOF Test					
1437	5% Shapiro Wilk P Value					0.084	Data appear Lognormal at 5% Significance Level					
1438	Lilliefors Test Statistic					0.084	Lilliefors Lognormal GOF Test					
1439	5% Lilliefors Critical Value					0.091	Data appear Lognormal at 5% Significance Level					
1440	Data appear Lognormal at 5% Significance Level											
1441												
1442	Lognormal Statistics											
1443	Minimum of Logged Data					8.56	Mean of logged Data					9.18
1444	Maximum of Logged Data					10.0	SD of logged Data					0.26
1445												
1446	Assuming Lognormal Distribution											
1447	95% H-UCL					10663	90% Chebyshev (MVUE) UCL					11028
1448	95% Chebyshev (MVUE) UCL					11432	97.5% Chebyshev (MVUE) UCL					11993
1449	99% Chebyshev (MVUE) UCL					13094						
1450												
1451	Nonparametric Distribution Free UCL Statistics											
1452	Data appear to follow a Discernible Distribution at 5% Significance Level											
1453												
1454	Nonparametric Distribution Free UCLs											
1455	95% CLT UCL					10674	95% Jackknife UCL					10680
1456	95% Standard Bootstrap UCL					10666	95% Bootstrap-t UCL					10777
1457	95% Hall's Bootstrap UCL					10763	95% Percentile Bootstrap UCL					10674
1458	95% BCA Bootstrap UCL					10735						
1459	90% Chebyshev(Mean, Sd) UCL					11106	95% Chebyshev(Mean, Sd) UCL					11539
1460	97.5% Chebyshev(Mean, Sd) UCL					12140	99% Chebyshev(Mean, Sd) UCL					13320
1461												
1462	Suggested UCL to Use											
1463	95% Student's-t UCL					10680	or 95% Modified-t UCL					10689
1464	or 95% H-UCL					10663						
1465												
1466	Recommendations regarding the selection of a 95% UCL are provided to help the user to select the most appropriate											
1467	Recommendations are based upon the results of the simulation studies summarized in Singh, Singh, and											
1468	Singh and Singh and Singh (2003). However, simulations results will not cover all Real World data sets											
1469	For additional insight the user may want to consult a statistician.											
1470												
1471	ProUCL computes and outputs H-statistic based UCLs for historical reasons only.											
1472	It often results in unstable (both high and low) values of UCL95 as shown in examples in the Technical											
1473	It is therefore recommended to avoid the use of H-statistic based 95% UCLs.											
1474	Nonparametric methods are preferred to compute UCL95 for skewed data sets which do not follow a gamma											
1475												
1476												

	A	B	C	D	E	F	G	H	I	J	K	L	
1477	Lead												
1478													
1479	General Statistics												
1480	Total Number of Observations				87	Number of Distinct Observations				82			
1481						Number of Missing Observations				0			
1482	Minimum				2.48	Mean				1701			
1483	Maximum				138000	Median				34.8			
1484	SD				14784	Std. Error of Mean				1585			
1485	Coefficient of Variation				8.69	Skewness				9.32			
1486													
1487	Normal GOF Test												
1488	Shapiro Wilk Test Statistic				0.11	Shapiro Wilk GOF Test							
1489	5% Shapiro Wilk P Value				0	Data Not Normal at 5% Significance Level							
1490	Lilliefors Test Statistic				0.50	Lilliefors GOF Test							
1491	5% Lilliefors Critical Value				0.09	Data Not Normal at 5% Significance Level							
1492	Data Not Normal at 5% Significance Level												
1493													
1494	Assuming Normal Distribution												
1495	95% Normal UCL					95% UCLs (Adjusted for Skewness)							
1496	95% Student's-t UCL				4336	95% Adjusted-CLT UCL (Chen-1995)					6001		
1497						95% Modified-t UCL (Johnson-1978)					4600		
1498													
1499	Gamma GOF Test												
1500	A-D Test Statistic				19.34	Anderson-Darling Gamma GOF Test							
1501	5% A-D Critical Value				0.91	Data Not Gamma Distributed at 5% Significance Level							
1502	K-S Test Statistic				0.35	Kolmogrov-Smirnoff Gamma GOF Test							
1503	5% K-S Critical Value				0.10	Data Not Gamma Distributed at 5% Significance Level							
1504	Data Not Gamma Distributed at 5% Significance Level												
1505													
1506	Gamma Statistics												
1507	k hat (MLE)				0.20	k star (bias corrected MLE)					0.20		
1508	Theta hat (MLE)				8233	Theta star (bias corrected MLE)					8212		
1509	nu hat (MLE)				35.94	nu star (bias corrected)					36.04		
1510	MLE Mean (bias corrected)				1701	MLE Sd (bias corrected)					3737		
1511						Approximate Chi Square Value (0.05)					23.3		
1512	Adjusted Level of Significance				0.04	Adjusted Chi Square Value					23.17		
1513													
1514	Assuming Gamma Distribution												
1515	Approximate Gamma UCL (use when n>=50))				2631	Adjusted Gamma UCL (use when n<50)					2650		
1516													
1517	Lognormal GOF Test												
1518	Shapiro Wilk Test Statistic				0.90	Shapiro Wilk Lognormal GOF Test							
1519	5% Shapiro Wilk P Value				8.6918E-05	Data Not Lognormal at 5% Significance Level							
1520	Lilliefors Test Statistic				0.09	Lilliefors Lognormal GOF Test							
1521	5% Lilliefors Critical Value				0.09	Data appear Lognormal at 5% Significance Level							
1522	Data appear Approximate Lognormal at 5% Significance Level												
1523													
1524	Lognormal Statistics												
1525	Minimum of Logged Data				0.90	Mean of logged Data					3.89		
1526	Maximum of Logged Data				11.84	SD of logged Data					1.58		
1527													
1528	Assuming Lognormal Distribution												
1529	95% H-UCL				282.4	90% Chebyshev (MVUE) UCL					287.8		
1530	95% Chebyshev (MVUE) UCL				342.3	97.5% Chebyshev (MVUE) UCL					418		
1531	99% Chebyshev (MVUE) UCL				566.6								
1532													
1533	Nonparametric Distribution Free UCL Statistics												
1534	Data appear to follow a Discernible Distribution at 5% Significance Level												
1535													
1536	Nonparametric Distribution Free UCLs												
1537	95% CLT UCL				4308	95% Jackknife UCL					4336		
1538	95% Standard Bootstrap UCL				4287	95% Bootstrap-t UCL					158175		
1539	95% Hall's Bootstrap UCL				80856	95% Percentile Bootstrap UCL					4863		
1540	95% BCA Bootstrap UCL				6489								
1541	90% Chebyshev(Mean, Sd) UCL				6456	95% Chebyshev(Mean, Sd) UCL					8610		
1542	97.5% Chebyshev(Mean, Sd) UCL				11599	99% Chebyshev(Mean, Sd) UCL					17472		
1543													
1544	Suggested UCL to Use												
1545	95% Chebyshev (Mean, Sd) UCL				8610								
1546													
1547	Recommendations regarding the selection of a 95% UCL are provided to help the user to select the most appropriate												
1548	Recommendations are based upon the results of the simulation studies summarized in Singh, Singh, and												
1549	Singh and Singh (2003). However, simulations results will not cover all Real World data sets												
1550	For additional insight the user may want to consult a statistician.												
1551													
1552	Magnesium												
1553													
1554	General Statistics												
1555	Total Number of Observations				87	Number of Distinct Observations				78			
1556	Number of Detects				83	Number of Non-Detects				4			
1557	Number of Distinct Detects				74	Number of Distinct Non-Detects				4			
1558	Minimum Detect				197	Minimum Non-Detect				863			

	A	B	C	D	E	F	G	H	I	J	K	L
1559					Maximum Detect	2870				Maximum Non-Detect		940
1560					Variance Detects	256008				Percent Non-Detects		4.59
1561					Mean Detects	1129				SD Detects		506
1562					Median Detects	1020				CV Detects		0.44
1563					Skewness Detects	1.48				Kurtosis Detects		2.80
1564					Mean of Logged Detects	6.93				SD of Logged Detects		0.43
1565												
1566					Normal GOF Test on Detects Only							
1567					Shapiro Wilk Test Statistic	0.87				Normal GOF Test on Detected Observations Only		
1568					5% Shapiro Wilk P Value	3.2943E-05				Detected Data Not Normal at 5% Significance Level		
1569					Lilliefors Test Statistic	0.13				Lilliefors GOF Test		
1570					5% Lilliefors Critical Value	0.09				Detected Data Not Normal at 5% Significance Level		
1571					Detected Data Not Normal at 5% Significance Level							
1572												
1573					Kaplan-Meier (KM) Statistics using Normal Critical Values and other Nonparametric UCLs							
1574					Mean	1111				Standard Error of Mean		54.0
1575					SD	499.5				95% KM (BCA) UCL		1207
1576					95% KM (t) UCL	1201				95% KM (Percentile Bootstrap) UCL		1202
1577					95% KM (z) UCL	1200				95% KM Bootstrap t UCL		1209
1578					90% KM Chebyshev UCL	1273				95% KM Chebyshev UCL		1346
1579					97.5% KM Chebyshev UCL	1448				99% KM Chebyshev UCL		1648
1580												
1581					Gamma GOF Tests on Detected Observations Only							
1582					A-D Test Statistic	1.08				Anderson-Darling GOF Test		
1583					5% A-D Critical Value	0.75				Data Not Gamma Distributed at 5% Significance Level		
1584					K-S Test Statistic	0.09				Kolmogrov-Smirnoff GOF		
1585					5% K-S Critical Value	0.09				Data appear Gamma Distributed at 5% Significance Level		
1586					Detected data follow Appr. Gamma Distribution at 5% Significance Level							
1587												
1588					Gamma Statistics on Detected Data Only							
1589					k hat (MLE)	5.68				k star (bias corrected MLE)		5.48
1590					Theta hat (MLE)	198.7				Theta star (bias corrected MLE)		205.9
1591					nu hat (MLE)	943.3				nu star (bias corrected)		910.6
1592					MLE Mean (bias corrected)	1129				MLE Sd (bias corrected)		482.2
1593												
1594					Gamma Kaplan-Meier (KM) Statistics							
1595					k hat (KM)	4.94				nu hat (KM)		860.5
1596					Approximate Chi Square Value (860.46, α)	793.4				Adjusted Chi Square Value (860.46, β)		792.3
1597					Approximate KM-UCL (use when n>=50)	1205				Gamma Adjusted KM-UCL (use when n<50)		1206
1598												
1599					Gamma ROS Statistics using Imputed Non-Detects							
1600					GROS may not be used when data set has > 50% NDs with many tied observations at multiple DLs							
1601					GROS may not be used when kstar of detected data is small such as < 0.1							
1602					For such situations, GROS method tends to yield inflated values of UCLs and BTVs							
1603					Gamma distributed detected data, BTVs and UCLs may be computed using gamma distribution on KM estimates							
1604					Minimum	197				Mean		1109
1605					Maximum	2870				Median		968
1606					SD	502.7				CV		0.45
1607					k hat (MLE)	5.65				k star (bias corrected MLE)		5.46
1608					Theta hat (MLE)	196.2				Theta star (bias corrected MLE)		203
1609					nu hat (MLE)	983.4				nu star (bias corrected)		950.9
1610					MLE Mean (bias corrected)	1109				MLE Sd (bias corrected)		474.5
1611										Adjusted Level of Significance (β)		0.04
1612					Approximate Chi Square Value (950.87, α)	880.3				Adjusted Chi Square Value (950.87, β)		879.2
1613					Gamma Approximate UCL (use when n>=50)	1198				Gamma Adjusted UCL (use when n<50)		1200
1614												
1615					Lognormal GOF Test on Detected Observations Only							
1616					Lilliefors Test Statistic	0.09				Lilliefors GOF Test		
1617					5% Lilliefors Critical Value	0.09				Detected Data appear Lognormal at 5% Significance Level		
1618					Detected Data appear Approximate Lognormal at 5% Significance Level							
1619												
1620					Lognormal ROS Statistics Using Imputed Non-Detects							
1621					Mean in Original Scale	1110				Mean in Log Scale		6.92
1622					SD in Original Scale	501.9				SD in Log Scale		0.43
1623					95% t UCL (assumes normality of ROS data)	1200				95% Percentile Bootstrap UCL		1202
1624					95% BCA Bootstrap UCL	1218				95% Bootstrap t UCL		1210
1625					95% H-UCL (Log ROS)	1211						
1626												
1627					Estimates using Lognormal Distribution and KM Estimates when Detected data are Lognormally Distributed							
1628					KM Mean (logged)	6.92				95% H-UCL (KM -Log)		1213
1629					KM SD (logged)	0.43				95% Critical H Value (KM-Log)		1.80
1630					KM Standard Error of Mean (logged)	0.04						
1631												
1632					DL/2 Statistics							
1633					DL/2 Normal				DL/2 Log-Transformed			
1634					Mean in Original Scale	1098				Mean in Log Scale		6.90
1635					SD in Original Scale	514.3				SD in Log Scale		0.45
1636					95% t UCL (Assumes normality)	1190				95% H-Stat UCL		1208
1637					DL/2 is not a recommended method, provided for comparisons and historical reasons							
1638												
1639					Nonparametric Distribution Free UCL Statistics							
1640					Detected Data appear Approximate Gamma Distributed at 5% Significance Level							

A	B	C	D	E	F	G	H	I	J	K	L
1641											
1642	Suggested UCL to Use										
1643	95% KM (BCA) UCL				1207	95% GROS Approximate Gamma UCL				1198	
1644	95% Approximate Gamma KM-UCL				1205						
1645											
1646	ations regarding the selection of a 95% UCL are provided to help the user to select the most appropriate										
1647	Recommendations are based upon data size, data distribution, and skewness.										
1648	Recommendations are based upon the results of the simulation studies summarized in Singh, Maichle, and										
1649	Simulation results will not cover all Real World data sets; for additional insight the user may want to consult										
1650											
1651											
1652	Manganese										
1653											
1654	General Statistics										
1655	Total Number of Observations				87	Number of Distinct Observations				75	
1656						Number of Missing Observations				0	
1657	Minimum				102	Mean				271.2	
1658	Maximum				765	Median				249	
1659	SD				114	Std. Error of Mean				12.2	
1660	Coefficient of Variation				0.42	Skewness				2.01	
1661											
1662	Normal GOF Test										
1663	Shapiro Wilk Test Statistic				0.84	Shapiro Wilk GOF Test					
1664	5% Shapiro Wilk P Value				5.949E-	Data Not Normal at 5% Significance Level					
1665	Lilliefors Test Statistic				0.16	Lilliefors GOF Test					
1666	5% Lilliefors Critical Value				0.094	Data Not Normal at 5% Significance Level					
1667	Data Not Normal at 5% Significance Level										
1668											
1669	Assuming Normal Distribution										
1670	95% Normal UCL					95% UCLs (Adjusted for Skewness)					
1671	95% Student's-t UCL				291.5	95% Adjusted-CLT UCL (Chen-1995)				294.1	
1672						95% Modified-t UCL (Johnson-1978)				292	
1673											
1674	Gamma GOF Test										
1675	A-D Test Statistic				0.98	Anderson-Darling Gamma GOF Test					
1676	5% A-D Critical Value				0.75	Data Not Gamma Distributed at 5% Significance Level					
1677	K-S Test Statistic				0.11	Kolmogorov-Smirnoff Gamma GOF Test					
1678	5% K-S Critical Value				0.09	Data Not Gamma Distributed at 5% Significance Level					
1679	Data Not Gamma Distributed at 5% Significance Level										
1680											
1681	Gamma Statistics										
1682	k hat (MLE)				7.16	k star (bias corrected MLE)				6.92	
1683	Theta hat (MLE)				37.84	Theta star (bias corrected MLE)				39.14	
1684	nu hat (MLE)				1247	nu star (bias corrected)				1205	
1685	MLE Mean (bias corrected)				271.2	MLE Sd (bias corrected)				103	
1686						Approximate Chi Square Value (0.05)				1126	
1687	Adjusted Level of Significance				0.04	Adjusted Chi Square Value				1125	
1688											
1689	Assuming Gamma Distribution										
1690	Approximate Gamma UCL (use when n>=50))				290.4	Adjusted Gamma UCL (use when n<50)				290.7	
1691											
1692	Lognormal GOF Test										
1693	Shapiro Wilk Test Statistic				0.97	Shapiro Wilk Lognormal GOF Test					
1694	5% Shapiro Wilk P Value				0.46	Data appear Lognormal at 5% Significance Level					
1695	Lilliefors Test Statistic				0.084	Lilliefors Lognormal GOF Test					
1696	5% Lilliefors Critical Value				0.094	Data appear Lognormal at 5% Significance Level					
1697	Data appear Lognormal at 5% Significance Level										
1698											
1699	Lognormal Statistics										
1700	Minimum of Logged Data				4.62	Mean of logged Data				5.53	
1701	Maximum of Logged Data				6.64	SD of logged Data				0.37	
1702											
1703	Assuming Lognormal Distribution										
1704	95% H-UCL				290.3	90% Chebyshev (MVUE) UCL				303.4	
1705	95% Chebyshev (MVUE) UCL				318.4	97.5% Chebyshev (MVUE) UCL				339.3	
1706	99% Chebyshev (MVUE) UCL				380.3						
1707											
1708	Nonparametric Distribution Free UCL Statistics										
1709	Data appear to follow a Discernible Distribution at 5% Significance Level										
1710											
1711	Nonparametric Distribution Free UCLs										
1712	95% CLT UCL				291.3	95% Jackknife UCL				291.5	
1713	95% Standard Bootstrap UCL				291.5	95% Bootstrap-t UCL				294.9	
1714	95% Hall's Bootstrap UCL				296.5	95% Percentile Bootstrap UCL				291.8	
1715	95% BCA Bootstrap UCL				294.4						
1716	90% Chebyshev(Mean, Sd) UCL				307.9	95% Chebyshev(Mean, Sd) UCL				324.5	
1717	97.5% Chebyshev(Mean, Sd) UCL				347.6	99% Chebyshev(Mean, Sd) UCL				392.9	
1718											
1719	Suggested UCL to Use										
1720	95% Student's-t UCL				291.5	or 95% Modified-t UCL				292	
1721	or 95% H-UCL				290.3						
1722											

	A	B	C	D	E	F	G	H	I	J	K	L
1723	tions regarding the selection of a 95% UCL are provided to help the user to select the most appropriate											
1724	mmendations are based upon the results of the simulation studies summarized in Singh, Singh, and											
1725	and Singh and Singh (2003). However, simulations results will not cover all Real World data sets											
1726	For additional insight the user may want to consult a statistician.											
1727												
1728	ProUCL computes and outputs H-statistic based UCLs for historical reasons only.											
1729	often results in unstable (both high and low) values of UCL95 as shown in examples in the Technical											
1730	It is therefore recommended to avoid the use of H-statistic based 95% UCLs.											
1731	metric methods are preferred to compute UCL95 for skewed data sets which do not follow a gamma											
1732												
1733	Mercury											
1734												
1735	General Statistics											
1736	Total Number of Observations				87		Number of Distinct Observations				78	
1737	Number of Detects				67		Number of Non-Detects				20	
1738	Number of Distinct Detects				65		Number of Distinct Non-Detects				16	
1739	Minimum Detect				0.004		Minimum Non-Detect				0.01	
1740	Maximum Detect				0.12		Maximum Non-Detect				0.11	
1741	Variance Detects				2.2249E		Percent Non-Detects				22.9%	
1742	Mean Detects				0.01		SD Detects				0.01	
1743	Median Detects				0.01		CV Detects				0.95	
1744	Skewness Detects				5.44		Kurtosis Detects				37.0%	
1745	Mean of Logged Detects				-4.36		SD of Logged Detects				0.57	
1746												
1747	Normal GOF Test on Detects Only											
1748	Shapiro Wilk Test Statistic				0.53		Normal GOF Test on Detected Observations Only					
1749	5% Shapiro Wilk P Value				0		Detected Data Not Normal at 5% Significance Level					
1750	Lilliefors Test Statistic				0.23		Lilliefors GOF Test					
1751	5% Lilliefors Critical Value				0.10		Detected Data Not Normal at 5% Significance Level					
1752	Detected Data Not Normal at 5% Significance Level											
1753												
1754	Kaplan-Meier (KM) Statistics using Normal Critical Values and other Nonparametric UCLs											
1755	Mean		0.01		Standard Error of Mean		0.001					
1756	SD		0.01		95% KM (BCA) UCL		0.01					
1757	95% KM (t) UCL		0.01		95% KM (Percentile Bootstrap) UCL		0.01					
1758	95% KM (z) UCL		0.01		95% KM Bootstrap t UCL		0.01					
1759	90% KM Chebyshev UCL		0.01		95% KM Chebyshev UCL		0.02					
1760	97.5% KM Chebyshev UCL		0.02		99% KM Chebyshev UCL		0.02					
1761												
1762	Gamma GOF Tests on Detected Observations Only											
1763	A-D Test Statistic		1.47		Anderson-Darling GOF Test							
1764	5% A-D Critical Value		0.76		ed Data Not Gamma Distributed at 5% Significance Level							
1765	K-S Test Statistic		0.09		Kolmogrov-Smirnoff GOF							
1766	5% K-S Critical Value		0.11		data appear Gamma Distributed at 5% Significance Level							
1767	Detected data follow Appr. Gamma Distribution at 5% Significance Level											
1768												
1769	Gamma Statistics on Detected Data Only											
1770	k hat (MLE)		2.63		k star (bias corrected MLE)		2.52					
1771	Theta hat (MLE)		0.005		Theta star (bias corrected MLE)		0.006					
1772	nu hat (MLE)		352.8		nu star (bias corrected)		338.4					
1773	MLE Mean (bias corrected)		0.01		MLE Sd (bias corrected)		0.009					
1774												
1775	Gamma Kaplan-Meier (KM) Statistics											
1776	k hat (KM)		1.12		nu hat (KM)		195.7					
1777	pproximate Chi Square Value (195.66, α)		164.3		Adjusted Chi Square Value (195.66, β)		163.8					
1778	Approximate KM-UCL (use when n>=50)		0.01		Gamma Adjusted KM-UCL (use when n<50)		0.01					
1779												
1780	Gamma ROS Statistics using Imputed Non-Detects											
1781	GROS may not be used when data set has > 50% NDs with many tied observations at multiple DLs											
1782	GROS may not be used when kstar of detected data is small such as < 0.1											
1783	For such situations, GROS method tends to yield inflated values of UCLs and BTVs											
1784	Gamma distributed detected data, BTVs and UCLs may be computed using gamma distribution on KM e											
1785	Minimum		0.004		Mean		0.01					
1786	Maximum		0.12		Median		0.01					
1787	SD		0.01		CV		0.92					
1788	k hat (MLE)		3.10		k star (bias corrected MLE)		3.00					
1789	Theta hat (MLE)		0.004		Theta star (bias corrected MLE)		0.004					
1790	nu hat (MLE)		539.6		nu star (bias corrected)		522.4					
1791	MLE Mean (bias corrected)		0.01		MLE Sd (bias corrected)		0.008					
1792					Adjusted Level of Significance (β)		0.04					
1793	pproximate Chi Square Value (522.36, α)		470.4		Adjusted Chi Square Value (522.36, β)		469.5					
1794	Gamma Approximate UCL (use when n>=50)		0.01		Gamma Adjusted UCL (use when n<50)		0.01					
1795												
1796	Lognormal GOF Test on Detected Observations Only											
1797	Lilliefors Test Statistic		0.08		Lilliefors GOF Test							
1798	5% Lilliefors Critical Value		0.10		ected Data appear Lognormal at 5% Significance Level							
1799	Detected Data appear Approximate Lognormal at 5% Significance Level											
1800												
1801	Lognormal ROS Statistics Using Imputed Non-Detects											
1802	Mean in Original Scale		0.01		Mean in Log Scale		-4.43					
1803	SD in Original Scale		0.01		SD in Log Scale		0.52					
1804	t UCL (assumes normality of ROS data)		0.01		95% Percentile Bootstrap UCL		0.01					

	A	B	C	D	E	F	G	H	I	J	K	L	
1805	95% BCA Bootstrap UCL					0.014	95% Bootstrap t UCL					0.014	
1806	95% H-UCL (Log ROS)					0.014							
1807													
1808	DLs using Lognormal Distribution and KM Estimates when Detected data are Lognormally Distributed												
1809	KM Mean (logged)					-4.44	95% H-UCL (KM -Log)					0.014	
1810	KM SD (logged)					0.54	95% Critical H Value (KM-Log)					1.87	
1811	KM Standard Error of Mean (logged)					0.062							
1812													
1813	DL/2 Statistics												
1814	DL/2 Normal						DL/2 Log-Transformed						
1815	Mean in Original Scale					0.014	Mean in Log Scale					-4.42	
1816	SD in Original Scale					0.014	SD in Log Scale					0.62	
1817	95% t UCL (Assumes normality)					0.014	95% H-Stat UCL					0.014	
1818	DL/2 is not a recommended method, provided for comparisons and historical reasons												
1819													
1820	Nonparametric Distribution Free UCL Statistics												
1821	Detected Data appear Approximate Gamma Distributed at 5% Significance Level												
1822													
1823	Suggested UCL to Use												
1824	95% KM (Percentile Bootstrap) UCL					0.014	95% GROS Approximate Gamma UCL					0.014	
1825	95% Approximate Gamma KM-UCL					0.014							
1826													
1827	Directions regarding the selection of a 95% UCL are provided to help the user to select the most appropriate												
1828	Recommendations are based upon data size, data distribution, and skewness.												
1829	Recommendations are based upon the results of the simulation studies summarized in Singh, Maichle, and												
1830	Recommendations results will not cover all Real World data sets; for additional insight the user may want to consult												
1831													
1832	Nickel												
1833													
1834	General Statistics												
1835	Total Number of Observations					87	Number of Distinct Observations					82	
1836	Number of Detects					85	Number of Non-Detects					2	
1837	Number of Distinct Detects					80	Number of Distinct Non-Detects					2	
1838	Minimum Detect					2.67	Minimum Non-Detect					7	
1839	Maximum Detect					21	Maximum Non-Detect					8.4	
1840	Variance Detects					8.75	Percent Non-Detects					2.29	
1841	Mean Detects					6.62	SD Detects					2.95	
1842	Median Detects					6.05	CV Detects					0.44	
1843	Skewness Detects					2.23	Kurtosis Detects					7.31	
1844	Mean of Logged Detects					1.81	SD of Logged Detects					0.37	
1845													
1846	Normal GOF Test on Detects Only												
1847	Shapiro Wilk Test Statistic					0.82	Normal GOF Test on Detected Observations Only						
1848	5% Shapiro Wilk P Value					2.454E-05	Detected Data Not Normal at 5% Significance Level						
1849	Lilliefors Test Statistic					0.15	Lilliefors GOF Test						
1850	5% Lilliefors Critical Value					0.090	Detected Data Not Normal at 5% Significance Level						
1851	Detected Data Not Normal at 5% Significance Level												
1852													
1853	Kaplan-Meier (KM) Statistics using Normal Critical Values and other Nonparametric UCLs												
1854	Mean					6.59	Standard Error of Mean					0.31	
1855	SD					2.92	95% KM (BCA) UCL					7.16	
1856	95% KM (t) UCL					7.11	95% KM (Percentile Bootstrap) UCL					7.12	
1857	95% KM (z) UCL					7.11	95% KM Bootstrap t UCL					7.21	
1858	90% KM Chebyshev UCL					7.53	95% KM Chebyshev UCL					7.96	
1859	97.5% KM Chebyshev UCL					8.56	99% KM Chebyshev UCL					9.73	
1860													
1861	Gamma GOF Tests on Detected Observations Only												
1862	A-D Test Statistic					1.06	Anderson-Darling GOF Test						
1863	5% A-D Critical Value					0.75	Detected Data Not Gamma Distributed at 5% Significance Level						
1864	K-S Test Statistic					0.094	Kolmogrov-Smirnoff GOF						
1865	5% K-S Critical Value					0.094	Detected Data Not Gamma Distributed at 5% Significance Level						
1866	Detected Data Not Gamma Distributed at 5% Significance Level												
1867													
1868	Gamma Statistics on Detected Data Only												
1869	k hat (MLE)					6.68	k star (bias corrected MLE)					6.45	
1870	Theta hat (MLE)					0.99	Theta star (bias corrected MLE)					1.02	
1871	nu hat (MLE)					1137	nu star (bias corrected)					1098	
1872	MLE Mean (bias corrected)					6.62	MLE Sd (bias corrected)					2.60	
1873													
1874	Gamma Kaplan-Meier (KM) Statistics												
1875	k hat (KM)					5.09	nu hat (KM)					887	
1876	Approximate Chi Square Value (886.97, α)					818.8	Adjusted Chi Square Value (886.97, β)					817.8	
1877	Approximate KM-UCL (use when n>=50)					7.14	Gamma Adjusted KM-UCL (use when n<50)					7.15	
1878													
1879	Gamma ROS Statistics using Imputed Non-Detects												
1880	GROS may not be used when data set has > 50% NDs with many tied observations at multiple DLs												
1881	GROS may not be used when kstar of detected data is small such as < 0.1												
1882	For such situations, GROS method tends to yield inflated values of UCLs and BTVs												
1883	Gamma distributed detected data, BTVs and UCLs may be computed using gamma distribution on KM estimates												
1884	Minimum					2.67	Mean					6.59	
1885	Maximum					21	Median					6.03	
1886	SD					2.93	CV					0.44	

	A	B	C	D	E	F	G	H	I	J	K	L
1887	k hat (MLE)					6.8	k star (bias corrected MLE)					6.57
1888	Theta hat (MLE)					0.97	Theta star (bias corrected MLE)					1.00
1889	nu hat (MLE)					1183	nu star (bias corrected)					1144
1890	MLE Mean (bias corrected)					6.59	MLE Sd (bias corrected)					2.57
1891							Adjusted Level of Significance (β)					0.04
1892	Approximate Chi Square Value (N/A, α)					1066	Adjusted Chi Square Value (N/A, β)					1065
1893	Gamma Approximate UCL (use when n>=50)					7.07	Gamma Adjusted UCL (use when n<50)					7.08
1894												
1895	Lognormal GOF Test on Detected Observations Only											
1896	Lilliefors Test Statistic					0.06	Lilliefors GOF Test					
1897	5% Lilliefors Critical Value					0.09	Detected Data appear Lognormal at 5% Significance Level					
1898	Detected Data appear Lognormal at 5% Significance Level											
1899												
1900	Lognormal ROS Statistics Using Imputed Non-Detects											
1901	Mean in Original Scale					6.59	Mean in Log Scale					1.81
1902	SD in Original Scale					2.93	SD in Log Scale					0.37
1903	95% t UCL (assumes normality of ROS data)					7.11	95% Percentile Bootstrap UCL					7.11
1904	95% BCA Bootstrap UCL					7.22	95% Bootstrap t UCL					7.21
1905	95% H-UCL (Log ROS)					7.04						
1906												
1907	PLs using Lognormal Distribution and KM Estimates when Detected data are Lognormally Distributed											
1908	KM Mean (logged)					1.81	95% H-UCL (KM -Log)					7.04
1909	KM SD (logged)					0.37	95% Critical H Value (KM-Log)					1.77
1910	KM Standard Error of Mean (logged)					0.04						
1911												
1912	DL/2 Statistics											
1913	DL/2 Normal						DL/2 Log-Transformed					
1914	Mean in Original Scale					6.55	Mean in Log Scale					1.80
1915	SD in Original Scale					2.95	SD in Log Scale					0.38
1916	95% t UCL (Assumes normality)					7.08	95% H-Stat UCL					7.02
1917	DL/2 is not a recommended method, provided for comparisons and historical reasons											
1918												
1919	Nonparametric Distribution Free UCL Statistics											
1920	Detected Data appear Lognormal Distributed at 5% Significance Level											
1921												
1922	Suggested UCL to Use											
1923	95% KM (BCA) UCL					7.16						
1924												
1925	Recommendations regarding the selection of a 95% UCL are provided to help the user to select the most appropriate											
1926	Recommendations are based upon data size, data distribution, and skewness.											
1927	Recommendations are based upon the results of the simulation studies summarized in Singh, Maichle, and											
1928	Simulation results will not cover all Real World data sets; for additional insight the user may want to consult											
1929												
1930	Plutonium-239/240											
1931												
1932	General Statistics											
1933	Total Number of Observations					83	Number of Distinct Observations					81
1934	Number of Detects					34	Number of Non-Detects					49
1935	Number of Distinct Detects					34	Number of Distinct Non-Detects					47
1936	Minimum Detect					0.02	Minimum Non-Detect					-0.002
1937	Maximum Detect					0.33	Maximum Non-Detect					0.02
1938	Variance Detects					0.004	Percent Non-Detects					59.0
1939	Mean Detects					0.06	SD Detects					0.06
1940	Median Detects					0.04	CV Detects					1.02
1941	Skewness Detects					3.44	Kurtosis Detects					12.1
1942												
1943	Normal GOF Test on Detects Only											
1944	Shapiro Wilk Test Statistic					0.52	Shapiro Wilk GOF Test					
1945	5% Shapiro Wilk Critical Value					0.93	Detected Data Not Normal at 5% Significance Level					
1946	Lilliefors Test Statistic					0.32	Lilliefors GOF Test					
1947	5% Lilliefors Critical Value					0.15	Detected Data Not Normal at 5% Significance Level					
1948	Detected Data Not Normal at 5% Significance Level											
1949												
1950	Kaplan-Meier (KM) Statistics using Normal Critical Values and other Nonparametric UCLs											
1951	Mean					0.02	Standard Error of Mean					0.005
1952	SD					0.05	95% KM (BCA) UCL					0.03
1953	95% KM (t) UCL					0.03	95% KM (Percentile Bootstrap) UCL					0.03
1954	95% KM (z) UCL					0.03	95% KM Bootstrap t UCL					0.03
1955	90% KM Chebyshev UCL					0.04	95% KM Chebyshev UCL					0.04
1956	97.5% KM Chebyshev UCL					0.05	99% KM Chebyshev UCL					0.08
1957												
1958	Gamma GOF Tests on Detected Observations Only											
1959	A-D Test Statistic					2.79	Anderson-Darling GOF Test					
1960	5% A-D Critical Value					0.75	Detected Data Not Gamma Distributed at 5% Significance Level					
1961	K-S Test Statistic					0.25	Kolmogrov-Smirnoff GOF					
1962	5% K-S Critical Value					0.15	Detected Data Not Gamma Distributed at 5% Significance Level					
1963	Detected Data Not Gamma Distributed at 5% Significance Level											
1964												
1965	Gamma Statistics on Detected Data Only											
1966	k hat (MLE)					2.25	k star (bias corrected MLE)					2.07
1967	Theta hat (MLE)					0.02	Theta star (bias corrected MLE)					0.03
1968	nu hat (MLE)					153.4	nu star (bias corrected)					141.2

	A	B	C	D	E	F	G	H	I	J	K	L
1969	MLE Mean (bias corrected)					0.062	MLE Sd (bias corrected)					0.042
1970												
1971	Gamma Kaplan-Meier (KM) Statistics											
1972	k hat (KM)					0.21	nu hat (KM)					35.6
1973						Adjusted Level of Significance (β)					0.042	
1974	Approximate Chi Square Value (35.60, α)					22.95	Adjusted Chi Square Value (35.60, β)					22.7
1975	Approximate KM-UCL (use when $n \geq 50$)					0.03	Gamma Adjusted KM-UCL (use when $n < 50$)					0.03
1976												
1977	DL/2 Statistics											
1978	Mean in Original Scale					0.024	SD in Original Scale					0.042
1979	95% t UCL (Assumes normality)					0.03						
1980	DL/2 is not a recommended method, provided for comparisons and historical reasons											
1981												
1982	Nonparametric Distribution Free UCL Statistics											
1983	Data do not follow a Discernible Distribution at 5% Significance Level											
1984												
1985	Suggested UCL to Use											
1986	97.5% KM (Chebyshev) UCL					0.054						
1987												
1988	Directions regarding the selection of a 95% UCL are provided to help the user to select the most appropriate UCL.											
1989	Recommendations are based upon data size, data distribution, and skewness.											
1990	Recommendations are based upon the results of the simulation studies summarized in Singh, Maichle, and Singh (2004).											
1991	Simulation results will not cover all Real World data sets; for additional insight the user may want to consult the literature.											
1992												
1993	Silver											
1994												
1995	General Statistics											
1996	Total Number of Observations					87	Number of Distinct Observations					82
1997	Number of Detects					45	Number of Non-Detects					42
1998	Number of Distinct Detects					42	Number of Distinct Non-Detects					41
1999	Minimum Detect					0.12	Minimum Non-Detect					0.35
2000	Maximum Detect					6.95	Maximum Non-Detect					0.85
2001	Variance Detects					1.33	Percent Non-Detects					48.2
2002	Mean Detects					0.79	SD Detects					1.15
2003	Median Detects					0.49	CV Detects					1.45
2004	Skewness Detects					3.89	Kurtosis Detects					18.5
2005	Mean of Logged Detects					-0.79	SD of Logged Detects					0.99
2006												
2007	Normal GOF Test on Detects Only											
2008	Shapiro Wilk Test Statistic					0.57	Shapiro Wilk GOF Test					
2009	5% Shapiro Wilk Critical Value					0.94	Detected Data Not Normal at 5% Significance Level					
2010	Lilliefors Test Statistic					0.28	Lilliefors GOF Test					
2011	5% Lilliefors Critical Value					0.13	Detected Data Not Normal at 5% Significance Level					
2012	Detected Data Not Normal at 5% Significance Level											
2013												
2014	Kaplan-Meier (KM) Statistics using Normal Critical Values and other Nonparametric UCLs											
2015	Mean					0.53	Standard Error of Mean					0.095
2016	SD					0.87	95% KM (BCA) UCL					0.71
2017	95% KM (t) UCL					0.69	95% KM (Percentile Bootstrap) UCL					0.69
2018	95% KM (z) UCL					0.68	95% KM Bootstrap t UCL					0.80
2019	90% KM Chebyshev UCL					0.81	95% KM Chebyshev UCL					0.94
2020	97.5% KM Chebyshev UCL					1.12	99% KM Chebyshev UCL					1.48
2021												
2022	Gamma GOF Tests on Detected Observations Only											
2023	A-D Test Statistic					1.75	Anderson-Darling GOF Test					
2024	5% A-D Critical Value					0.77	Detected Data Not Gamma Distributed at 5% Significance Level					
2025	K-S Test Statistic					0.15	Kolmogorov-Smirnoff GOF					
2026	5% K-S Critical Value					0.13	Detected Data Not Gamma Distributed at 5% Significance Level					
2027	Detected Data Not Gamma Distributed at 5% Significance Level											
2028												
2029	Gamma Statistics on Detected Data Only											
2030	k hat (MLE)					1.03	k star (bias corrected MLE)					0.97
2031	Theta hat (MLE)					0.76	Theta star (bias corrected MLE)					0.81
2032	nu hat (MLE)					92.84	nu star (bias corrected)					88
2033	MLE Mean (bias corrected)					0.79	MLE Sd (bias corrected)					0.80
2034												
2035	Gamma Kaplan-Meier (KM) Statistics											
2036	k hat (KM)					0.37	nu hat (KM)					64.7
2037	Approximate Chi Square Value (64.78, α)					47.24	Adjusted Chi Square Value (64.78, β)					47.0
2038	Approximate KM-UCL (use when $n \geq 50$)					0.72	Gamma Adjusted KM-UCL (use when $n < 50$)					0.73
2039												
2040	Gamma ROS Statistics using Imputed Non-Detects											
2041	GROS may not be used when data set has > 50% NDs with many tied observations at multiple DLs											
2042	GROS may not be used when kstar of detected data is small such as < 0.1											
2043	For such situations, GROS method tends to yield inflated values of UCLs and BTVs											
2044	Gamma distributed detected data, BTVs and UCLs may be computed using gamma distribution on KM estimate											
2045	Minimum					0.01	Mean					0.43
2046	Maximum					6.95	Median					0.13
2047	SD					0.90	CV					2.10
2048	k hat (MLE)					0.51	k star (bias corrected MLE)					0.50
2049	Theta hat (MLE)					0.83	Theta star (bias corrected MLE)					0.84
2050	nu hat (MLE)					90.34	nu star (bias corrected)					88.6

	A	B	C	D	E	F	G	H	I	J	K	L
2051	MLE Mean (bias corrected)					0.43	MLE Sd (bias corrected)					0.60
2052							Adjusted Level of Significance (β)					0.04
2053	Approximate Chi Square Value (88.61, α)					67.9	Adjusted Chi Square Value (88.61, β)					67.6
2054	Gamma Approximate UCL (use when $n \geq 50$)					0.56	Gamma Adjusted UCL (use when $n < 50$)					0.56
2055												
2056	Lognormal GOF Test on Detected Observations Only											
2057	Shapiro Wilk Test Statistic					0.92	Shapiro Wilk GOF Test					
2058	5% Shapiro Wilk Critical Value					0.94	Detected Data Not Lognormal at 5% Significance Level					
2059	Lilliefors Test Statistic					0.12	Lilliefors GOF Test					
2060	5% Lilliefors Critical Value					0.13	Detected Data appear Lognormal at 5% Significance Level					
2061	Detected Data appear Approximate Lognormal at 5% Significance Level											
2062												
2063	Lognormal ROS Statistics Using Imputed Non-Detects											
2064	Mean in Original Scale					0.53	Mean in Log Scale					-1.07
2065	SD in Original Scale					0.87	SD in Log Scale					0.77
2066	95% t UCL (assumes normality of ROS data)					0.68	95% Percentile Bootstrap UCL					0.68
2067	95% BCA Bootstrap UCL					0.78	95% Bootstrap t UCL					0.80
2068	95% H-UCL (Log ROS)					0.54						
2069												
2070	Estimates using Lognormal Distribution and KM Estimates when Detected data are Lognormally Distributed											
2071	KM Mean (logged)					-1.13	95% H-UCL (KM -Log)					0.56
2072	KM SD (logged)					0.85	95% Critical H Value (KM-Log)					2.10
2073	KM Standard Error of Mean (logged)					0.10						
2074												
2075	DL/2 Statistics											
2076	DL/2 Normal						DL/2 Log-Transformed					
2077	Mean in Original Scale					0.56	Mean in Log Scale					-0.96
2078	SD in Original Scale					0.86	SD in Log Scale					0.74
2079	95% t UCL (Assumes normality)					0.71	95% H-Stat UCL					0.59
2080	DL/2 is not a recommended method, provided for comparisons and historical reasons											
2081												
2082	Nonparametric Distribution Free UCL Statistics											
2083	Detected Data appear Approximate Lognormal Distributed at 5% Significance Level											
2084												
2085	Suggested UCL to Use											
2086	95% KM (t) UCL					0.69	95% KM (% Bootstrap) UCL					0.69
2087												
2088	Recommendations regarding the selection of a 95% UCL are provided to help the user to select the most appropriate											
2089	Recommendations are based upon data size, data distribution, and skewness.											
2090	Recommendations are based upon the results of the simulation studies summarized in Singh, Maichle, and											
2091	Simulation results will not cover all Real World data sets; for additional insight the user may want to consult											
2092												
2093	TATB											
2094												
2095	General Statistics											
2096	Total Number of Observations					83	Number of Distinct Observations					11
2097	Number of Detects					10	Number of Non-Detects					73
2098	Number of Distinct Detects					10	Number of Distinct Non-Detects					1
2099	Minimum Detect					0.5	Minimum Non-Detect					1
2100	Maximum Detect					28.6	Maximum Non-Detect					1
2101	Variance Detects					70.8	Percent Non-Detects					87.9
2102	Mean Detects					7.44	SD Detects					8.41
2103	Median Detects					5.68	CV Detects					1.13
2104	Skewness Detects					2.00	Kurtosis Detects					4.70
2105	Mean of Logged Detects					1.34	SD of Logged Detects					1.36
2106												
2107	Normal GOF Test on Detects Only											
2108	Shapiro Wilk Test Statistic					0.77	Shapiro Wilk GOF Test					
2109	5% Shapiro Wilk Critical Value					0.84	Detected Data Not Normal at 5% Significance Level					
2110	Lilliefors Test Statistic					0.25	Lilliefors GOF Test					
2111	5% Lilliefors Critical Value					0.28	Detected Data appear Normal at 5% Significance Level					
2112	Detected Data appear Approximate Normal at 5% Significance Level											
2113												
2114	Kaplan-Meier (KM) Statistics using Normal Critical Values and other Nonparametric UCLs											
2115	Mean					1.45	Standard Error of Mean					0.41
2116	SD					3.55	95% KM (BCA) UCL					2.27
2117	95% KM (t) UCL					2.14	95% KM (Percentile Bootstrap) UCL					2.18
2118	95% KM (z) UCL					2.13	95% KM Bootstrap t UCL					2.84
2119	90% KM Chebyshev UCL					2.70	95% KM Chebyshev UCL					3.26
2120	97.5% KM Chebyshev UCL					4.05	99% KM Chebyshev UCL					5.59
2121												
2122	Gamma GOF Tests on Detected Observations Only											
2123	A-D Test Statistic					0.32	Anderson-Darling GOF Test					
2124	5% A-D Critical Value					0.75	Detected Data appear Gamma Distributed at 5% Significance Level					
2125	K-S Test Statistic					0.17	Kolmogorov-Smirnov GOF					
2126	5% K-S Critical Value					0.27	Detected Data appear Gamma Distributed at 5% Significance Level					
2127	Detected data appear Gamma Distributed at 5% Significance Level											
2128												
2129	Gamma Statistics on Detected Data Only											
2130	k hat (MLE)					0.88	k star (bias corrected MLE)					0.68
2131	Theta hat (MLE)					8.42	Theta star (bias corrected MLE)					10.8
2132	nu hat (MLE)					17.6	nu star (bias corrected)					13.7

	A	B	C	D	E	F	G	H	I	J	K	L
2133	MLE Mean (bias corrected)					7.44	MLE Sd (bias corrected)					8.99
2134												
2135	Gamma Kaplan-Meier (KM) Statistics											
2136	k hat (KM)					0.16	nu hat (KM)					27.9
2137	Approximate Chi Square Value (27.92, α)					16.86	Adjusted Chi Square Value (27.92, β)					16.7
2138	Approximate KM-UCL (use when n>=50)					2.41	Gamma Adjusted KM-UCL (use when n<50)					2.43
2139												
2140	Gamma ROS Statistics using Imputed Non-Detects											
2141	GROS may not be used when data set has > 50% NDs with many tied observations at multiple DLs											
2142	GROS may not be used when kstar of detected data is small such as < 0.1											
2143	For such situations, GROS method tends to yield inflated values of UCLs and BTVs											
2144	Gamma distributed detected data, BTVs and UCLs may be computed using gamma distribution on KM estimate											
2145	Minimum					0.01	Mean					1.57
2146	Maximum					28.6	Median					0.01
2147	SD					3.83	CV					2.43
2148	k hat (MLE)					0.23	k star (bias corrected MLE)					0.23
2149	Theta hat (MLE)					6.61	Theta star (bias corrected MLE)					6.63
2150	nu hat (MLE)					39.5	nu star (bias corrected)					39.4
2151	MLE Mean (bias corrected)					1.57	MLE Sd (bias corrected)					3.23
2152							Adjusted Level of Significance (β)					0.04
2153	Approximate Chi Square Value (39.43, α)					26.0	Adjusted Chi Square Value (39.43, β)					25.8
2154	Gamma Approximate UCL (use when n>=50)					2.38	Gamma Adjusted UCL (use when n<50)					2.40
2155												
2156	Lognormal GOF Test on Detected Observations Only											
2157	Shapiro Wilk Test Statistic					0.91	Shapiro Wilk GOF Test					
2158	5% Shapiro Wilk Critical Value					0.84	Detected Data appear Lognormal at 5% Significance Level					
2159	Lilliefors Test Statistic					0.19	Lilliefors GOF Test					
2160	5% Lilliefors Critical Value					0.28	Detected Data appear Lognormal at 5% Significance Level					
2161	Detected Data appear Lognormal at 5% Significance Level											
2162												
2163	Lognormal ROS Statistics Using Imputed Non-Detects											
2164	Mean in Original Scale					1.80	Mean in Log Scale					-0.25
2165	SD in Original Scale					3.61	SD in Log Scale					1.27
2166	95% t UCL (assumes normality of ROS data)					2.46	95% Percentile Bootstrap UCL					2.49
2167	95% BCA Bootstrap UCL					2.83	95% Bootstrap t UCL					3.14
2168	95% H-UCL (Log ROS)					2.48						
2169												
2170	DLs using Lognormal Distribution and KM Estimates when Detected data are Lognormally Distributed											
2171	KM Mean (logged)					-0.25	95% H-UCL (KM -Log)					1.23
2172	KM SD (logged)					0.76	95% Critical H Value (KM-Log)					2.04
2173	KM Standard Error of Mean (logged)					0.13						
2174												
2175	DL/2 Statistics											
2176	DL/2 Normal						DL/2 Log-Transformed					
2177	Mean in Original Scale					1.33	Mean in Log Scale					-0.44
2178	SD in Original Scale					3.59	SD in Log Scale					0.80
2179	95% t UCL (Assumes normality)					1.99	95% H-Stat UCL					1.06
2180	DL/2 is not a recommended method, provided for comparisons and historical reasons											
2181												
2182	Nonparametric Distribution Free UCL Statistics											
2183	Detected Data appear Approximate Normal Distributed at 5% Significance Level											
2184												
2185	Suggested UCL to Use											
2186	95% KM (t) UCL					2.14	95% KM (Percentile Bootstrap) UCL					2.18
2187												
2188	Recommendations regarding the selection of a 95% UCL are provided to help the user to select the most appropriate											
2189	Recommendations are based upon data size, data distribution, and skewness.											
2190	Recommendations are based upon the results of the simulation studies summarized in Singh, Maichle, and											
2191	Recommendations results will not cover all Real World data sets; for additional insight the user may want to consult											
2192												
2193	Tritium											
2194												
2195	General Statistics											
2196	Total Number of Observations					83	Number of Distinct Observations					83
2197	Number of Detects					73	Number of Non-Detects					10
2198	Number of Distinct Detects					73	Number of Distinct Non-Detects					10
2199	Minimum Detect					0.04	Minimum Non-Detect					0.004
2200	Maximum Detect					73.2	Maximum Non-Detect					0.09
2201	Variance Detects					187.2	Percent Non-Detects					12.0
2202	Mean Detects					5.87	SD Detects					13.6
2203	Median Detects					0.75	CV Detects					2.32
2204	Skewness Detects					3.63	Kurtosis Detects					14.3
2205	Mean of Logged Detects					-0.089	SD of Logged Detects					1.98
2206												
2207	Normal GOF Test on Detects Only											
2208	Shapiro Wilk Test Statistic					0.47	Normal GOF Test on Detected Observations Only					

	A	B	C	D	E	F	G	H	I	J	K	L
2215	Mean					5.17	Standard Error of Mean					1.42
2216	SD					12.84	95% KM (BCA) UCL					7.68
2217	95% KM (t) UCL					7.54	95% KM (Percentile Bootstrap) UCL					7.57
2218	95% KM (z) UCL					7.51	95% KM Bootstrap t UCL					8.73
2219	90% KM Chebyshev UCL					9.44	95% KM Chebyshev UCL					11.31
2220	97.5% KM Chebyshev UCL					14.04	99% KM Chebyshev UCL					19.34
2221												
2222	Gamma GOF Tests on Detected Observations Only											
2223	A-D Test Statistic					3.92	Anderson-Darling GOF Test					
2224	5% A-D Critical Value					0.85	Detected Data Not Gamma Distributed at 5% Significance Level					
2225	K-S Test Statistic					0.17	Kolmogorov-Smirnov GOF					
2226	5% K-S Critical Value					0.11	Detected Data Not Gamma Distributed at 5% Significance Level					
2227	Detected Data Not Gamma Distributed at 5% Significance Level											
2228												
2229	Gamma Statistics on Detected Data Only											
2230	k hat (MLE)					0.36	k star (bias corrected MLE)					0.35
2231	Theta hat (MLE)					16.34	Theta star (bias corrected MLE)					16.61
2232	nu hat (MLE)					52.51	nu star (bias corrected)					51.71
2233	MLE Mean (bias corrected)					5.87	MLE Sd (bias corrected)					9.87
2234												
2235	Gamma Kaplan-Meier (KM) Statistics											
2236	k hat (KM)					0.16	nu hat (KM)					26.74
2237	Approximate Chi Square Value (26.74, α)					15.94	Adjusted Chi Square Value (26.74, β)					15.81
2238	Approximate KM-UCL (use when $n \geq 50$)					8.66	Gamma Adjusted KM-UCL (use when $n < 50$)					8.75
2239												
2240	Gamma ROS Statistics using Imputed Non-Detects											
2241	GROS may not be used when data set has > 50% NDs with many tied observations at multiple DLs											
2242	GROS may not be used when kstar of detected data is small such as < 0.1											
2243	For such situations, GROS method tends to yield inflated values of UCLs and BTVs											
2244	Gamma distributed detected data, BTVs and UCLs may be computed using gamma distribution on KM estimate											
2245	Minimum					0.01	Mean					5.17
2246	Maximum					73.24	Median					0.41
2247	SD					12.94	CV					2.50
2248	k hat (MLE)					0.30	k star (bias corrected MLE)					0.31
2249	Theta hat (MLE)					17.04	Theta star (bias corrected MLE)					17.24
2250	nu hat (MLE)					50.21	nu star (bias corrected)					49.71
2251	MLE Mean (bias corrected)					5.17	MLE Sd (bias corrected)					9.44
2252							Adjusted Level of Significance (β)					0.04
2253	Approximate Chi Square Value (49.73, α)					34.54	Adjusted Chi Square Value (49.73, β)					34.31
2254	Gamma Approximate UCL (use when $n \geq 50$)					7.44	Gamma Adjusted UCL (use when $n < 50$)					7.49
2255												
2256	Lognormal GOF Test on Detected Observations Only											
2257	Lilliefors Test Statistic					0.10	Lilliefors GOF Test					
2258	5% Lilliefors Critical Value					0.10	Detected Data Not Lognormal at 5% Significance Level					
2259	Detected Data Not Lognormal at 5% Significance Level											
2260												
2261	Lognormal ROS Statistics Using Imputed Non-Detects											
2262	Mean in Original Scale					5.17	Mean in Log Scale					-0.60
2263	SD in Original Scale					12.94	SD in Log Scale					2.32
2264	95% t UCL (assumes normality of ROS data)					7.53	95% Percentile Bootstrap UCL					7.67
2265	95% BCA Bootstrap UCL					8.17	95% Bootstrap t UCL					8.77
2266	95% H-UCL (Log ROS)					21.51						
2267												
2268	DL/2 Statistics											
2269	DL/2 Normal						DL/2 Log-Transformed					
2270	Mean in Original Scale					5.17	Mean in Log Scale					-0.56
2271	SD in Original Scale					12.94	SD in Log Scale					2.28
2272	95% t UCL (Assumes normality)					7.53	95% H-Stat UCL					19.74
2273	DL/2 is not a recommended method, provided for comparisons and historical reasons											
2274												
2275	Nonparametric Distribution Free UCL Statistics											
2276	Data do not follow a Discernible Distribution at 5% Significance Level											
2277												
2278	Suggested UCL to Use											
2279	97.5% KM (Chebyshev) UCL					14.04						
2280												
2281	Recommendations regarding the selection of a 95% UCL are provided to help the user to select the most appropriate											
2282	Recommendations are based upon data size, data distribution, and skewness.											
2283	Recommendations are based upon the results of the simulation studies summarized in Singh, Maichle, and											
2284	Recommendations results will not cover all Real World data sets; for additional insight the user may want to consult											
2285												
2286												
2287	Uranium											
2288												
2289	General Statistics											
2290	Total Number of Observations					87	Number of Distinct Observations					85
2291							Number of Missing Observations					0
2292	Minimum					0.63	Mean					79.34
2293	Maximum					659	Median					31.81
2294	SD					118.84	Std. Error of Mean					12.74
2295	Coefficient of Variation					1.49	Skewness					2.44
2296												

	A	B	C	D	E	F	G	H	I	J	K	L
2297	Normal GOF Test											
2298	Shapiro Wilk Test Statistic					0.66	Shapiro Wilk GOF Test					
2299	5% Shapiro Wilk P Value					0	Data Not Normal at 5% Significance Level					
2300	Lilliefors Test Statistic					0.26	Lilliefors GOF Test					
2301	5% Lilliefors Critical Value					0.094	Data Not Normal at 5% Significance Level					
2302	Data Not Normal at 5% Significance Level											
2303												
2304	Assuming Normal Distribution											
2305	95% Normal UCL						95% UCLs (Adjusted for Skewness)					
2306	95% Student's-t UCL					100.5	95% Adjusted-CLT UCL (Chen-1995)					103.9
2307							95% Modified-t UCL (Johnson-1978)					101.1
2308												
2309	Gamma GOF Test											
2310	A-D Test Statistic					1.35	Anderson-Darling Gamma GOF Test					
2311	5% A-D Critical Value					0.80	Data Not Gamma Distributed at 5% Significance Level					
2312	K-S Test Statistic					0.11	Kolmogrov-Smirnoff Gamma GOF Test					
2313	5% K-S Critical Value					0.10	Data Not Gamma Distributed at 5% Significance Level					
2314	Data Not Gamma Distributed at 5% Significance Level											
2315												
2316	Gamma Statistics											
2317	k hat (MLE)					0.59	k star (bias corrected MLE)					0.58
2318	Theta hat (MLE)					133	Theta star (bias corrected MLE)					135.9
2319	nu hat (MLE)					103.8	nu star (bias corrected)					101.6
2320	MLE Mean (bias corrected)					79.3	MLE Sd (bias corrected)					103.8
2321							Approximate Chi Square Value (0.05)					79.3
2322	Adjusted Level of Significance					0.04	Adjusted Chi Square Value					78.9
2323												
2324	Assuming Gamma Distribution											
2325	Approximate Gamma UCL (use when n>=50))					101.6	Adjusted Gamma UCL (use when n<50)					102
2326												
2327	Lognormal GOF Test											
2328	Shapiro Wilk Test Statistic					0.96	Shapiro Wilk Lognormal GOF Test					
2329	5% Shapiro Wilk P Value					0.10	Data appear Lognormal at 5% Significance Level					
2330	Lilliefors Test Statistic					0.08	Lilliefors Lognormal GOF Test					
2331	5% Lilliefors Critical Value					0.094	Data appear Lognormal at 5% Significance Level					
2332	Data appear Lognormal at 5% Significance Level											
2333												
2334	Lognormal Statistics											
2335	Minimum of Logged Data					-0.44	Mean of logged Data					3.33
2336	Maximum of Logged Data					6.49	SD of logged Data					1.60
2337												
2338	Assuming Lognormal Distribution											
2339	95% H-UCL					166.9	90% Chebyshev (MVUE) UCL					169.6
2340	95% Chebyshev (MVUE) UCL					202	97.5% Chebyshev (MVUE) UCL					246.9
2341	99% Chebyshev (MVUE) UCL					335.2						
2342												
2343	Nonparametric Distribution Free UCL Statistics											
2344	Data appear to follow a Discernible Distribution at 5% Significance Level											
2345												
2346	Nonparametric Distribution Free UCLs											
2347	95% CLT UCL					100.3	95% Jackknife UCL					100.5
2348	95% Standard Bootstrap UCL					100.1	95% Bootstrap-t UCL					106.5
2349	95% Hall's Bootstrap UCL					105	95% Percentile Bootstrap UCL					101.7
2350	95% BCA Bootstrap UCL					105.4						
2351	90% Chebyshev(Mean, Sd) UCL					117.5	95% Chebyshev(Mean, Sd) UCL					134.9
2352	97.5% Chebyshev(Mean, Sd) UCL					158.9	99% Chebyshev(Mean, Sd) UCL					206.1
2353												
2354	Suggested UCL to Use											
2355	95% H-UCL					166.9						
2356												
2357	Recommendations regarding the selection of a 95% UCL are provided to help the user to select the most appropriate UCL. Recommendations are based upon the results of the simulation studies summarized in Singh, Singh, and Singh and Singh (2003). However, simulations results will not cover all Real World data sets. For additional insight the user may want to consult a statistician.											
2358												
2359												
2360												
2361												
2362	ProUCL computes and outputs H-statistic based UCLs for historical reasons only.											
2363	ProUCL often results in unstable (both high and low) values of UCL95 as shown in examples in the Technical Manual. It is therefore recommended to avoid the use of H-statistic based 95% UCLs.											
2364	Nonparametric methods are preferred to compute UCL95 for skewed data sets which do not follow a gamma distribution.											
2365												
2366												
2367												
2368	Uranium-234											
2369												
2370	General Statistics											
2371	Total Number of Observations					83	Number of Distinct Observations					82
2372							Number of Missing Observations					0
2373	Minimum					0.59	Mean					6.54
2374	Maximum					43.4	Median					3.58
2375	SD					8.31	Std. Error of Mean					0.91
2376	Coefficient of Variation					1.27	Skewness					2.52
2377												
2378	Normal GOF Test											

	A	B	C	D	E	F	G	H	I	J	K	L	
2379	Shapiro Wilk Test Statistic					0.67	Shapiro Wilk GOF Test						
2380	5% Shapiro Wilk P Value					0	Data Not Normal at 5% Significance Level						
2381	Lilliefors Test Statistic					0.24	Lilliefors GOF Test						
2382	5% Lilliefors Critical Value					0.09	Data Not Normal at 5% Significance Level						
2383	Data Not Normal at 5% Significance Level												
2384													
2385	Assuming Normal Distribution												
2386	95% Normal UCL					95% UCLs (Adjusted for Skewness)							
2387	95% Student's-t UCL					8.06	95% Adjusted-CLT UCL (Chen-1995)					8.31	
2388							95% Modified-t UCL (Johnson-1978)					8.10	
2389													
2390	Gamma GOF Test												
2391	A-D Test Statistic					2.38	Anderson-Darling Gamma GOF Test						
2392	5% A-D Critical Value					0.78	Data Not Gamma Distributed at 5% Significance Level						
2393	K-S Test Statistic					0.13	Kolmogrov-Smirnoff Gamma GOF Test						
2394	5% K-S Critical Value					0.10	Data Not Gamma Distributed at 5% Significance Level						
2395	Data Not Gamma Distributed at 5% Significance Level												
2396													
2397	Gamma Statistics												
2398	k hat (MLE)					1.02	k star (bias corrected MLE)					0.99	
2399	Theta hat (MLE)					6.41	Theta star (bias corrected MLE)					6.59	
2400	nu hat (MLE)					169.6	nu star (bias corrected)					164.8	
2401	MLE Mean (bias corrected)					6.54	MLE Sd (bias corrected)					6.57	
2402							Approximate Chi Square Value (0.05)					136.1	
2403	Adjusted Level of Significance					0.04	Adjusted Chi Square Value					135.6	
2404													
2405	Assuming Gamma Distribution												
2406	Approximate Gamma UCL (use when n>=50))					7.92	Adjusted Gamma UCL (use when n<50)					7.95	
2407													
2408	Lognormal GOF Test												
2409	Shapiro Wilk Test Statistic					0.95	Shapiro Wilk Lognormal GOF Test						
2410	5% Shapiro Wilk P Value					0.03	Data Not Lognormal at 5% Significance Level						
2411	Lilliefors Test Statistic					0.06	Lilliefors Lognormal GOF Test						
2412	5% Lilliefors Critical Value					0.09	Data appear Lognormal at 5% Significance Level						
2413	Data appear Approximate Lognormal at 5% Significance Level												
2414													
2415	Lognormal Statistics												
2416	Minimum of Logged Data					-0.51	Mean of logged Data					1.31	
2417	Maximum of Logged Data					3.77	SD of logged Data					1.03	
2418													
2419	Assuming Lognormal Distribution												
2420	95% H-UCL					8.27	90% Chebyshev (MVUE) UCL					8.92	
2421	95% Chebyshev (MVUE) UCL					10.1	97.5% Chebyshev (MVUE) UCL					11.74	
2422	99% Chebyshev (MVUE) UCL					14.95							
2423													
2424	Nonparametric Distribution Free UCL Statistics												
2425	Data appear to follow a Discernible Distribution at 5% Significance Level												
2426													
2427	Nonparametric Distribution Free UCLs												
2428	95% CLT UCL					8.04	95% Jackknife UCL					8.06	
2429	95% Standard Bootstrap UCL					8.04	95% Bootstrap-t UCL					8.55	
2430	95% Hall's Bootstrap UCL					8.39	95% Percentile Bootstrap UCL					8.11	
2431	95% BCA Bootstrap UCL					8.39							
2432	90% Chebyshev(Mean, Sd) UCL					9.28	95% Chebyshev(Mean, Sd) UCL					10.5	
2433	97.5% Chebyshev(Mean, Sd) UCL					12.25	99% Chebyshev(Mean, Sd) UCL					15.6	
2434													
2435	Suggested UCL to Use												
2436	95% Chebyshev (Mean, Sd) UCL					10.5							
2437													
2438	Recommendations regarding the selection of a 95% UCL are provided to help the user to select the most appropriate												
2439	Recommendations are based upon the results of the simulation studies summarized in Singh, Singh, and												
2440	Singh and Singh (2003). However, simulations results will not cover all Real World data sets												
2441	For additional insight the user may want to consult a statistician.												
2442													
2443	Uranium-235/236												
2444													
2445	General Statistics												
2446	Total Number of Observations					83	Number of Distinct Observations					77	
2447	Number of Detects					79	Number of Non-Detects					4	
2448	Number of Distinct Detects					73	Number of Distinct Non-Detects					4	
2449	Minimum Detect					0.05	Minimum Non-Detect					0.04	
2450	Maximum Detect					6.57	Maximum Non-Detect					0.08	
2451	Variance Detects					1.37	Percent Non-Detects					4.81	
2452	Mean Detects					0.79	SD Detects					1.17	
2453	Median Detects					0.35	CV Detects					1.47	
2454	Skewness Detects					2.97	Kurtosis Detects					10.0	
2455	Mean of Logged Detects					-0.96	SD of Logged Detects					1.20	
2456													
2457	Normal GOF Test on Detects Only												
2458	Shapiro Wilk Test Statistic					0.63	Normal GOF Test on Detected Observations Only						
2459	5% Shapiro Wilk P Value					0	Detected Data Not Normal at 5% Significance Level						
2460	Lilliefors Test Statistic					0.26	Lilliefors GOF Test						

	A	B	C	D	E	F	G	H	I	J	K	L
2543												
2544	General Statistics											
2545	Total Number of Observations					83	Number of Distinct Observations					81
2546							Number of Missing Observations					0
2547	Minimum					0.65	Mean					35.7
2548	Maximum					291	Median					14.7
2549	SD					57.6	Std. Error of Mean					6.32
2550	Coefficient of Variation					1.61	Skewness					2.85
2551												
2552	Normal GOF Test											
2553	Shapiro Wilk Test Statistic					0.61	Shapiro Wilk GOF Test					
2554	5% Shapiro Wilk P Value					0	Data Not Normal at 5% Significance Level					
2555	Lilliefors Test Statistic					0.27	Lilliefors GOF Test					
2556	5% Lilliefors Critical Value					0.09	Data Not Normal at 5% Significance Level					
2557	Data Not Normal at 5% Significance Level											
2558												
2559	Assuming Normal Distribution											
2560	95% Normal UCL						95% UCLs (Adjusted for Skewness)					
2561	95% Student's-t UCL					46.2	95% Adjusted-CLT UCL (Chen-1995)					48.2
2562							95% Modified-t UCL (Johnson-1978)					46.5
2563												
2564	Gamma GOF Test											
2565	A-D Test Statistic					1.88	Anderson-Darling Gamma GOF Test					
2566	5% A-D Critical Value					0.80	Data Not Gamma Distributed at 5% Significance Level					
2567	K-S Test Statistic					0.11	Kolmogrov-Smirnoff Gamma GOF Test					
2568	5% K-S Critical Value					0.10	Data Not Gamma Distributed at 5% Significance Level					
2569	Data Not Gamma Distributed at 5% Significance Level											
2570												
2571	Gamma Statistics											
2572	k hat (MLE)					0.61	k star (bias corrected MLE)					0.60
2573	Theta hat (MLE)					58.0	Theta star (bias corrected MLE)					59.3
2574	nu hat (MLE)					102.2	nu star (bias corrected)					99.8
2575	MLE Mean (bias corrected)					35.7	MLE Sd (bias corrected)					46.0
2576							Approximate Chi Square Value (0.05)					77.7
2577	Adjusted Level of Significance					0.04	Adjusted Chi Square Value					77.4
2578												
2579	Assuming Gamma Distribution											
2580	Approximate Gamma UCL (use when n>=50))					45.8	Adjusted Gamma UCL (use when n<50)					46.0
2581												
2582	Lognormal GOF Test											
2583	Shapiro Wilk Test Statistic					0.96	Shapiro Wilk Lognormal GOF Test					
2584	5% Shapiro Wilk P Value					0.10	Data appear Lognormal at 5% Significance Level					
2585	Lilliefors Test Statistic					0.06	Lilliefors Lognormal GOF Test					
2586	5% Lilliefors Critical Value					0.09	Data appear Lognormal at 5% Significance Level					
2587	Data appear Lognormal at 5% Significance Level											
2588												
2589	Lognormal Statistics											
2590	Minimum of Logged Data					-0.42	Mean of logged Data					2.57
2591	Maximum of Logged Data					5.67	SD of logged Data					1.48
2592												
2593	Assuming Lognormal Distribution											
2594	95% H-UCL					61.6	90% Chebyshev (MVUE) UCL					63.9
2595	95% Chebyshev (MVUE) UCL					75.4	97.5% Chebyshev (MVUE) UCL					91.5
2596	99% Chebyshev (MVUE) UCL					123.1						
2597												
2598	Nonparametric Distribution Free UCL Statistics											
2599	Data appear to follow a Discernible Distribution at 5% Significance Level											
2600												
2601	Nonparametric Distribution Free UCLs											
2602	95% CLT UCL					46.1	95% Jackknife UCL					46.2
2603	95% Standard Bootstrap UCL					46.1	95% Bootstrap-t UCL					50.0
2604	95% Hall's Bootstrap UCL					49.7	95% Percentile Bootstrap UCL					46.8
2605	95% BCA Bootstrap UCL					49.2						
2606	90% Chebyshev(Mean, Sd) UCL					54.6	95% Chebyshev(Mean, Sd) UCL					63.2
2607	97.5% Chebyshev(Mean, Sd) UCL					75.2	99% Chebyshev(Mean, Sd) UCL					98.6
2608												
2609	Suggested UCL to Use											
2610	95% H-UCL					61.6						
2611												
2612	Recommendations regarding the selection of a 95% UCL are provided to help the user to select the most appropriate											
2613	Recommendations are based upon the results of the simulation studies summarized in Singh, Singh, and Singh											
2614	and Singh and Singh (2003). However, simulations results will not cover all Real World data sets											
2615	For additional insight the user may want to consult a statistician.											
2616												
2617	ProUCL computes and outputs H-statistic based UCLs for historical reasons only.											
2618	ProUCL often results in unstable (both high and low) values of UCL95 as shown in examples in the Technical Manual.											
2619	It is therefore recommended to avoid the use of H-statistic based 95% UCLs.											
2620	Nonparametric methods are preferred to compute UCL95 for skewed data sets which do not follow a gamma distribution.											
2621												
2622	Vanadium											
2623												
2624	General Statistics											

	A	B	C	D	E	F	G	H	I	J	K	L	
2625	Total Number of Observations					87	Number of Distinct Observations					73	
2626	Number of Detects					84	Number of Non-Detects					3	
2627	Number of Distinct Detects					70	Number of Distinct Non-Detects					3	
2628	Minimum Detect					2.59	Minimum Non-Detect					7.1	
2629	Maximum Detect					34.9	Maximum Non-Detect					8.9	
2630	Variance Detects					38.7	Percent Non-Detects					3.44	
2631	Mean Detects					15.5	SD Detects					6.22	
2632	Median Detects					15.0	CV Detects					0.4	
2633	Skewness Detects					0.7	Kurtosis Detects					0.95	
2634	Mean of Logged Detects					2.66	SD of Logged Detects					0.44	
2635													
2636	Normal GOF Test on Detects Only												
2637	Shapiro Wilk Test Statistic					0.96	Normal GOF Test on Detected Observations Only						
2638	5% Shapiro Wilk P Value					0.07	Detected Data appear Normal at 5% Significance Level						
2639	Lilliefors Test Statistic					0.08	Lilliefors GOF Test						
2640	5% Lilliefors Critical Value					0.09	Detected Data appear Normal at 5% Significance Level						
2641	Detected Data appear Normal at 5% Significance Level												
2642													
2643	Kaplan-Meier (KM) Statistics using Normal Critical Values and other Nonparametric UCLs												
2644	Mean					15.2	Standard Error of Mean					0.68	
2645	SD					6.34	95% KM (BCA) UCL					16.4	
2646	95% KM (t) UCL					16.3	95% KM (Percentile Bootstrap) UCL					16.3	
2647	95% KM (z) UCL					16.3	95% KM Bootstrap t UCL					16.4	
2648	90% KM Chebyshev UCL					17.3	95% KM Chebyshev UCL					18.2	
2649	97.5% KM Chebyshev UCL					19.5	99% KM Chebyshev UCL					22.0	
2650													
2651	Gamma GOF Tests on Detected Observations Only												
2652	A-D Test Statistic					0.25	Anderson-Darling GOF Test						
2653	5% A-D Critical Value					0.75	data appear Gamma Distributed at 5% Significance Level						
2654	K-S Test Statistic					0.05	Kolmogrov-Smirnoff GOF						
2655	5% K-S Critical Value					0.09	data appear Gamma Distributed at 5% Significance Level						
2656	Detected data appear Gamma Distributed at 5% Significance Level												
2657													
2658	Gamma Statistics on Detected Data Only												
2659	k hat (MLE)					5.93	k star (bias corrected MLE)					5.73	
2660	Theta hat (MLE)					2.62	Theta star (bias corrected MLE)					2.71	
2661	nu hat (MLE)					997.5	nu star (bias corrected)					963.2	
2662	MLE Mean (bias corrected)					15.5	MLE Sd (bias corrected)					6.50	
2663													
2664	Gamma Kaplan-Meier (KM) Statistics												
2665	k hat (KM)					5.77	nu hat (KM)					1005	
2666	Approximate Chi Square Value (N/A, α)					932	Adjusted Chi Square Value (N/A, β)					930.8	
2667	Approximate KM-UCL (use when $n \geq 50$)					16.4	Gamma Adjusted KM-UCL (use when $n < 50$)					16.4	
2668													
2669	Gamma ROS Statistics using Imputed Non-Detects												
2670	GROS may not be used when data set has > 50% NDs with many tied observations at multiple DLs												
2671	GROS may not be used when kstar of detected data is small such as < 0.1												
2672	For such situations, GROS method tends to yield inflated values of UCLs and BTVs												
2673	Gamma distributed detected data, BTVs and UCLs may be computed using gamma distribution on KM estimates												
2674	Minimum					2.59	Mean					15.2	
2675	Maximum					34.9	Median					14.7	
2676	SD					6.34	CV					0.41	
2677	k hat (MLE)					5.50	k star (bias corrected MLE)					5.32	
2678	Theta hat (MLE)					2.77	Theta star (bias corrected MLE)					2.86	
2679	nu hat (MLE)					958.7	nu star (bias corrected)					926.9	
2680	MLE Mean (bias corrected)					15.2	MLE Sd (bias corrected)					6.61	
2681							Adjusted Level of Significance (β)					0.04	
2682	Approximate Chi Square Value (926.93, α)					857.3	Adjusted Chi Square Value (926.93, β)					856.1	
2683	Gamma Approximate UCL (use when $n \geq 50$)					16.5	Gamma Adjusted UCL (use when $n < 50$)					16.5	
2684													
2685	Lognormal GOF Test on Detected Observations Only												
2686	Lilliefors Test Statistic					0.08	Lilliefors GOF Test						
2687	5% Lilliefors Critical Value					0.09	Detected Data appear Lognormal at 5% Significance Level						
2688	Detected Data appear Approximate Lognormal at 5% Significance Level												
2689													
2690	Lognormal ROS Statistics Using Imputed Non-Detects												
2691	Mean in Original Scale					15.2	Mean in Log Scale					2.63	
2692	SD in Original Scale					6.32	SD in Log Scale					0.45	
2693	95% t UCL (assumes normality of ROS data)					16.4	95% Percentile Bootstrap UCL					16.3	
2694	95% BCA Bootstrap UCL					16.4	95% Bootstrap t UCL					16.4	
2695	95% H-UCL (Log ROS)					16.9							
2696													
2697	UCLs using Lognormal Distribution and KM Estimates when Detected data are Lognormally Distributed												
2698	KM Mean (logged)					2.62	95% H-UCL (KM -Log)					16.9	
2699	KM SD (logged)					0.47	95% Critical H Value (KM-Log)					1.82	
2700	KM Standard Error of Mean (logged)					0.05							
2701													
2702	DL/2 Statistics												
2703	DL/2 Normal						DL/2 Log-Transformed						
2704	Mean in Original Scale					15.1	Mean in Log Scale					2.61	
2705	SD in Original Scale					6.47	SD in Log Scale					0.49	
2706	95% t UCL (Assumes normality)					16.3	95% H-Stat UCL					17.0	

A	B	C	D	E	F	G	H	I	J	K	L
2707	DL/2 is not a recommended method, provided for comparisons and historical reasons										
2708											
2709	Nonparametric Distribution Free UCL Statistics										
2710	Detected Data appear Normal Distributed at 5% Significance Level										
2711											
2712	Suggested UCL to Use										
2713	95% KM (t) UCL			16.34	95% KM (Percentile Bootstrap) UCL			16.34			
2714											
2715	Instructions regarding the selection of a 95% UCL are provided to help the user to select the most appropriate										
2716	Recommendations are based upon data size, data distribution, and skewness.										
2717	Recommendations are based upon the results of the simulation studies summarized in Singh, Maichle, and										
2718	Simulation results will not cover all Real World data sets; for additional insight the user may want to consult										
2719											
2720											
2721	Zinc										
2722											
2723	General Statistics										
2724	Total Number of Observations			87	Number of Distinct Observations			82			
2725					Number of Missing Observations			0			
2726	Minimum			13.1	Mean			197.5			
2727	Maximum			13300	Median			42			
2728	SD			1421	Std. Error of Mean			152.4			
2729	Coefficient of Variation			7.19	Skewness			9.32			
2730											
2731	Normal GOF Test										
2732	Shapiro Wilk Test Statistic			0.11	Shapiro Wilk GOF Test						
2733	5% Shapiro Wilk P Value			0	Data Not Normal at 5% Significance Level						
2734	Lilliefors Test Statistic			0.50	Lilliefors GOF Test						
2735	5% Lilliefors Critical Value			0.094	Data Not Normal at 5% Significance Level						
2736	Data Not Normal at 5% Significance Level										
2737											
2738	Assuming Normal Distribution										
2739	95% Normal UCL				95% UCLs (Adjusted for Skewness)						
2740	95% Student's-t UCL			450.9	95% Adjusted-CLT UCL (Chen-1995)			610.9			
2741					95% Modified-t UCL (Johnson-1978)			476.3			
2742											
2743	Gamma GOF Test										
2744	A-D Test Statistic			25.24	Anderson-Darling Gamma GOF Test						
2745	5% A-D Critical Value			0.83	Data Not Gamma Distributed at 5% Significance Level						
2746	K-S Test Statistic			0.45	Kolmogorov-Smirnov Gamma GOF Test						
2747	5% K-S Critical Value			0.10	Data Not Gamma Distributed at 5% Significance Level						
2748	Data Not Gamma Distributed at 5% Significance Level										
2749											
2750	Gamma Statistics										
2751	k hat (MLE)			0.43	k star (bias corrected MLE)			0.42			
2752	Theta hat (MLE)			452.3	Theta star (bias corrected MLE)			460.1			
2753	nu hat (MLE)			75.94	nu star (bias corrected)			74.7			
2754	MLE Mean (bias corrected)			197.5	MLE Sd (bias corrected)			301.5			
2755					Approximate Chi Square Value (0.05)			55.7			
2756	Adjusted Level of Significance			0.04	Adjusted Chi Square Value			55.5			
2757											
2758	Assuming Gamma Distribution										
2759	Approximate Gamma UCL (use when n>=50)			264.4	Adjusted Gamma UCL (use when n<50)			265.7			
2760											
2761	Lognormal GOF Test										
2762	Shapiro Wilk Test Statistic			0.60	Shapiro Wilk Lognormal GOF Test						
2763	5% Shapiro Wilk P Value			0	Data Not Lognormal at 5% Significance Level						
2764	Lilliefors Test Statistic			0.17	Lilliefors Lognormal GOF Test						
2765	5% Lilliefors Critical Value			0.094	Data Not Lognormal at 5% Significance Level						
2766	Data Not Lognormal at 5% Significance Level										
2767											
2768	Lognormal Statistics										
2769	Minimum of Logged Data			2.57	Mean of logged Data			3.8			
2770	Maximum of Logged Data			9.49	SD of logged Data			0.73			
2771											
2772	Assuming Lognormal Distribution										
2773	95% H-UCL			68.5	90% Chebyshev (MVUE) UCL			73.3			
2774	95% Chebyshev (MVUE) UCL			80.2	97.5% Chebyshev (MVUE) UCL			89.7			
2775	99% Chebyshev (MVUE) UCL			108.5							
2776											
2777	Nonparametric Distribution Free UCL Statistics										
2778	Data do not follow a Discernible Distribution (0.05)										
2779											
2780	Nonparametric Distribution Free UCLs										
2781	95% CLT UCL			448.1	95% Jackknife UCL			450.9			
2782	95% Standard Bootstrap UCL			451.6	95% Bootstrap-t UCL			14117			
2783	95% Hall's Bootstrap UCL			3646	95% Percentile Bootstrap UCL			501.5			
2784	95% BCA Bootstrap UCL			804.5							
2785	90% Chebyshev(Mean, Sd) UCL			654.6	95% Chebyshev(Mean, Sd) UCL			861.7			
2786	97.5% Chebyshev(Mean, Sd) UCL			1149	99% Chebyshev(Mean, Sd) UCL			1714			
2787											
2788	Suggested UCL to Use										

	A	B	C	D	E	F	G	H	I	J	K	L	
2789	95% Chebyshev (Mean, Sd) UCL						861.7						
2790													
2791	tions regarding the selection of a 95% UCL are provided to help the user to select the most appropriate												
2792	mmendations are based upon the results of the simulation studies summarized in Singh, Singh, and												
2793	and Singh and Singh (2003). However, simulations results will not cover all Real World data sets												
2794	For additional insight the user may want to consult a statistician.												
2795													

	A	B	C	D	E	F	G	H	I	J	K	L
1	UCL Statistics for Data Sets with Non-Detects											
2												
3	User Selected Options											
4	Time of Computation		8/13/2015 2:04:30 PM									
5	From File		ProUCLinput_15-008(b)_0-5.xls									
6	Full Precision		OFF									
7	Confidence Coefficient		95%									
8	Number of Bootstrap Operations		2000									
9												
10												
11	Aluminum											
12												
13	General Statistics											
14	Total Number of Observations				171		Number of Distinct Observations				148	
15							Number of Missing Observations				0	
16	Minimum				935		Mean				5017	
17	Maximum				13300		Median				4780	
18	SD				2637		Std. Error of Mean				201.6	
19	Coefficient of Variation				0.52		Skewness				0.81	
20												
21	Normal GOF Test											
22	Shapiro Wilk Test Statistic				0.93		Shapiro Wilk GOF Test					
23	5% Shapiro Wilk P Value				4.1607E-05		Data Not Normal at 5% Significance Level					
24	Lilliefors Test Statistic				0.084		Lilliefors GOF Test					
25	5% Lilliefors Critical Value				0.061		Data Not Normal at 5% Significance Level					
26	Data Not Normal at 5% Significance Level											
27												
28	Assuming Normal Distribution											
29	95% Normal UCL				95% UCLs (Adjusted for Skewness)							
30	95% Student's-t UCL				5351		95% Adjusted-CLT UCL (Chen-1995)				5362	
31							95% Modified-t UCL (Johnson-1978)				5353	
32												
33	Gamma GOF Test											
34	A-D Test Statistic				0.68		Anderson-Darling Gamma GOF Test					
35	5% A-D Critical Value				0.751		data appear Gamma Distributed at 5% Significance Level					
36	K-S Test Statistic				0.051		Kolmogorov-Smirnov Gamma GOF Test					
37	5% K-S Critical Value				0.071		data appear Gamma Distributed at 5% Significance Level					
38	Detected data appear Gamma Distributed at 5% Significance Level											
39												
40	Gamma Statistics											
41	k hat (MLE)				3.46		k star (bias corrected MLE)				3.40	
42	Theta hat (MLE)				1448		Theta star (bias corrected MLE)				1472	
43	nu hat (MLE)				1185		nu star (bias corrected)				1166	
44	MLE Mean (bias corrected)				5017		MLE Sd (bias corrected)				2718	
45							Approximate Chi Square Value (0.05)				1087	
46	Adjusted Level of Significance				0.04		Adjusted Chi Square Value				1087	
47												
48	Assuming Gamma Distribution											
49	Approximate Gamma UCL (use when n>=50)				5379		Adjusted Gamma UCL (use when n<50)				5382	
50												
51	Lognormal GOF Test											
52	Shapiro Wilk Test Statistic				0.95		Shapiro Wilk Lognormal GOF Test					
53	5% Shapiro Wilk P Value				2.0940E-05		Data Not Lognormal at 5% Significance Level					
54	Lilliefors Test Statistic				0.091		Lilliefors Lognormal GOF Test					
55	5% Lilliefors Critical Value				0.061		Data Not Lognormal at 5% Significance Level					
56	Data Not Lognormal at 5% Significance Level											
57												
58	Lognormal Statistics											
59	Minimum of Logged Data				6.84		Mean of logged Data				8.37	
60	Maximum of Logged Data				9.49		SD of logged Data				0.58	
61												
62	Assuming Lognormal Distribution											
63	95% H-UCL				5548		90% Chebyshev (MVUE) UCL				5834	

	A	B	C	D	E	F	G	H	I	J	K	L
64		95% Chebyshev (MVUE) UCL				6166	97.5% Chebyshev (MVUE) UCL				6626	
65		99% Chebyshev (MVUE) UCL				7531						
66												
67	Nonparametric Distribution Free UCL Statistics											
68	Data appear to follow a Discernible Distribution at 5% Significance Level											
69												
70	Nonparametric Distribution Free UCLs											
71		95% CLT UCL				5349	95% Jackknife UCL				5351	
72		95% Standard Bootstrap UCL				5347	95% Bootstrap-t UCL				5366	
73		95% Hall's Bootstrap UCL				5343	95% Percentile Bootstrap UCL				5356	
74		95% BCA Bootstrap UCL				5334						
75		90% Chebyshev(Mean, Sd) UCL				5622	95% Chebyshev(Mean, Sd) UCL				5896	
76		97.5% Chebyshev(Mean, Sd) UCL				6277	99% Chebyshev(Mean, Sd) UCL				7024	
77												
78	Suggested UCL to Use											
79		95% Approximate Gamma UCL				5379						
80												
81	ations regarding the selection of a 95% UCL are provided to help the user to select the most appropriate											
82	ommendations are based upon the results of the simulation studies summarized in Singh, Singh, and											
83	and Singh and Singh (2003). However, simulations results will not cover all Real World data sets											
84	For additional insight the user may want to consult a statistician.											
85												
86	Americium-241											
87												
88	General Statistics											
89		Total Number of Observations				163	Number of Distinct Observations				146	
90		Number of Detects				7	Number of Non-Detects				156	
91		Number of Distinct Detects				7	Number of Distinct Non-Detects				139	
92		Minimum Detect				0.02	Minimum Non-Detect				-0.017	
93		Maximum Detect				0.07	Maximum Non-Detect				0.03	
94		Variance Detects				5.8522E	Percent Non-Detects				95.7	
95		Mean Detects				0.04	SD Detects				0.02	
96		Median Detects				0.03	CV Detects				0.53	
97		Skewness Detects				0.45	Kurtosis Detects				-2.26	
98												
99	Normal GOF Test on Detects Only											
100		Shapiro Wilk Test Statistic				0.82	Shapiro Wilk GOF Test					
101		5% Shapiro Wilk Critical Value				0.80	ected Data appear Normal at 5% Significance Le					
102		Lilliefors Test Statistic				0.28	Lilliefors GOF Test					
103		5% Lilliefors Critical Value				0.33	ected Data appear Normal at 5% Significance Le					
104	Detected Data appear Normal at 5% Significance Level											
105												
106	Kaplan-Meier (KM) Statistics using Normal Critical Values and other Nonparametric UCLs											
107		Mean				-0.014	Standard Error of Mean				0.001	
108		SD				0.01	95% KM (BCA) UCL				-0.004	
109		95% KM (t) UCL				-0.012	95% KM (Percentile Bootstrap) UCL				-0.005	
110		95% KM (z) UCL				-0.012	95% KM Bootstrap t UCL				-0.013	
111		90% KM Chebyshev UCL				-0.011	95% KM Chebyshev UCL				-0.009	
112		97.5% KM Chebyshev UCL				-0.007	99% KM Chebyshev UCL				-0.003	
113												
114	Gamma GOF Tests on Detected Observations Only											
115		A-D Test Statistic				0.60	Anderson-Darling GOF Test					
116		5% A-D Critical Value				0.71	data appear Gamma Distributed at 5% Significar					
117		K-S Test Statistic				0.27	Kolmogrov-Smirnoff GOF					
118		5% K-S Critical Value				0.31	data appear Gamma Distributed at 5% Significar					
119	Detected data appear Gamma Distributed at 5% Significance Level											
120												
121	Gamma Statistics on Detected Data Only											
122		k hat (MLE)				4.10	k star (bias corrected MLE)				2.44	
123		Theta hat (MLE)				0.01	Theta star (bias corrected MLE)				0.01	
124		nu hat (MLE)				57.4	nu star (bias corrected)				34.1	
125		MLE Mean (bias corrected)				0.04	MLE Sd (bias corrected)				0.02	
126												

	A	B	C	D	E	F	G	H	I	J	K	L
127	Gamma Kaplan-Meier (KM) Statistics											
128	k hat (KM)					1.16	nu hat (KM)					381.2
129							Adjusted Level of Significance (β)					0.044
130	Approximate Chi Square Value (381.19, α)					336.9	Adjusted Chi Square Value (381.19, β)					336.6
131	Approximate KM-UCL (use when $n \geq 50$)					-0.016	Gamma Adjusted KM-UCL (use when $n < 50$)					-0.016
132												
133	DL/2 Statistics											
134	Mean in Original Scale					0.004	SD in Original Scale					0.014
135	95% t UCL (Assumes normality)					0.005						
136	DL/2 is not a recommended method, provided for comparisons and historical reasons											
137												
138	Nonparametric Distribution Free UCL Statistics											
139	Detected Data appear Normal Distributed at 5% Significance Level											
140												
141	Suggested UCL to Use											
142	95% KM (t) UCL					-0.012	95% KM (Percentile Bootstrap) UCL					-0.005
143												
144	Recommendations regarding the selection of a 95% UCL are provided to help the user to select the most appropriate											
145	Recommendations are based upon data size, data distribution, and skewness.											
146	Recommendations are based upon the results of the simulation studies summarized in Singh, Maichle, and											
147	Recommendations results will not cover all Real World data sets; for additional insight the user may want to consult											
148												
149	Antimony											
150												
151	General Statistics											
152	Total Number of Observations					171	Number of Distinct Observations					113
153	Number of Detects					42	Number of Non-Detects					129
154	Number of Distinct Detects					41	Number of Distinct Non-Detects					77
155	Minimum Detect					0.43	Minimum Non-Detect					0.41
156	Maximum Detect					256	Maximum Non-Detect					8.6
157	Variance Detects					1534	Percent Non-Detects					75.4
158	Mean Detects					8.63	SD Detects					39.1
159	Median Detects					1.64	CV Detects					4.53
160	Skewness Detects					6.44	Kurtosis Detects					41.7
161	Mean of Logged Detects					0.73	SD of Logged Detects					1.12
162												
163	Normal GOF Test on Detects Only											
164	Shapiro Wilk Test Statistic					0.19	Shapiro Wilk GOF Test					
165	5% Shapiro Wilk Critical Value					0.94	Detected Data Not Normal at 5% Significance Level					
166	Lilliefors Test Statistic					0.46	Lilliefors GOF Test					
167	5% Lilliefors Critical Value					0.13	Detected Data Not Normal at 5% Significance Level					
168	Detected Data Not Normal at 5% Significance Level											
169												
170	Kaplan-Meier (KM) Statistics using Normal Critical Values and other Nonparametric UCLs											
171	Mean					2.57	Standard Error of Mean					1.50
172	SD					19.49	95% KM (BCA) UCL					5.62
173	95% KM (t) UCL					5.06	95% KM (Percentile Bootstrap) UCL					5.56
174	95% KM (z) UCL					5.05	95% KM Bootstrap t UCL					27.7
175	90% KM Chebyshev UCL					7.09	95% KM Chebyshev UCL					9.14
176	97.5% KM Chebyshev UCL					11.99	99% KM Chebyshev UCL					17.5
177												
178	Gamma GOF Tests on Detected Observations Only											
179	A-D Test Statistic					6.65	Anderson-Darling GOF Test					
180	5% A-D Critical Value					0.82	Detected Data Not Gamma Distributed at 5% Significance Level					
181	K-S Test Statistic					0.31	Kolmogrov-Smirnoff GOF					
182	5% K-S Critical Value					0.14	Detected Data Not Gamma Distributed at 5% Significance Level					
183	Detected Data Not Gamma Distributed at 5% Significance Level											
184												
185	Gamma Statistics on Detected Data Only											
186	k hat (MLE)					0.45	k star (bias corrected MLE)					0.43
187	Theta hat (MLE)					19.06	Theta star (bias corrected MLE)					19.7
188	nu hat (MLE)					38.04	nu star (bias corrected)					36.6
189	MLE Mean (bias corrected)					8.63	MLE Sd (bias corrected)					13.0

	A	B	C	D	E	F	G	H	I	J	K	L
190												
191	Gamma Kaplan-Meier (KM) Statistics											
192	k hat (KM)				0.01		nu hat (KM)				5.95	
193	Approximate Chi Square Value (5.95, α)				1.61		Adjusted Chi Square Value (5.95, β)				1.59	
194	Approximate KM-UCL (use when $n \geq 50$)				9.47		Gamma Adjusted KM-UCL (use when $n < 50$)				9.58	
195	Gamma (KM) may not be used when k hat (KM) is < 0.1											
196												
197	Gamma ROS Statistics using Imputed Non-Detects											
198	GROS may not be used when data set has $> 50\%$ NDs with many tied observations at multiple DLs											
199	GROS may not be used when kstar of detected data is small such as < 0.1											
200	For such situations, GROS method tends to yield inflated values of UCLs and BTVs											
201	Gamma distributed detected data, BTVs and UCLs may be computed using gamma distribution on KM e											
202	Minimum				0.01		Mean				0.12	
203	Maximum				256		Median				2.01	
204	SD				19.5		CV				9.20	
205	k hat (MLE)				0.18		k star (bias corrected MLE)				0.18	
206	Theta hat (MLE)				11.5		Theta star (bias corrected MLE)				11.5	
207	nu hat (MLE)				62.9		nu star (bias corrected)				63.1	
208	MLE Mean (bias corrected)				2.12		MLE Sd (bias corrected)				4.94	
209							Adjusted Level of Significance (β)				0.04	
210	Approximate Chi Square Value (63.18, α)				45.9		Adjusted Chi Square Value (63.18, β)				45.7	
211	Gamma Approximate UCL (use when $n \geq 50$)				2.92		Gamma Adjusted UCL (use when $n < 50$)				2.93	
212												
213	Lognormal GOF Test on Detected Observations Only											
214	Shapiro Wilk Test Statistic				0.82		Shapiro Wilk GOF Test					
215	5% Shapiro Wilk Critical Value				0.94		Detected Data Not Lognormal at 5% Significance Level					
216	Lilliefors Test Statistic				0.10		Lilliefors GOF Test					
217	5% Lilliefors Critical Value				0.13		Detected Data appear Lognormal at 5% Significance Level					
218	Detected Data appear Approximate Lognormal at 5% Significance Level											
219												
220	Lognormal ROS Statistics Using Imputed Non-Detects											
221	Mean in Original Scale				2.36		Mean in Log Scale				-0.77	
222	SD in Original Scale				19.5		SD in Log Scale				1.14	
223	95% t UCL (assumes normality of ROS data)				4.84		95% Percentile Bootstrap UCL				5.35	
224	95% BCA Bootstrap UCL				7.02		95% Bootstrap t UCL				27.9	
225	95% H-UCL (Log ROS)				1.07							
226												
227	UCLs using Lognormal Distribution and KM Estimates when Detected data are Lognormally Distributed											
228	KM Mean (logged)				-0.25		95% H-UCL (KM -Log)				1.25	
229	KM SD (logged)				0.83		95% Critical H Value (KM-Log)				2.03	
230	KM Standard Error of Mean (logged)				0.08							
231												
232	DL/2 Statistics											
233	DL/2 Normal						DL/2 Log-Transformed					
234	Mean in Original Scale				2.62		Mean in Log Scale				-0.22	
235	SD in Original Scale				19.5		SD in Log Scale				0.86	
236	95% t UCL (Assumes normality)				5.09		95% H-Stat UCL				1.34	
237	DL/2 is not a recommended method, provided for comparisons and historical reasons											
238												
239	Nonparametric Distribution Free UCL Statistics											
240	Detected Data appear Approximate Lognormal Distributed at 5% Significance Level											
241												
242	Suggested UCL to Use											
243	95% KM (BCA) UCL				5.62							
244												
245	Recommendations regarding the selection of a 95% UCL are provided to help the user to select the most appropriate											
246	Recommendations are based upon data size, data distribution, and skewness.											
247	Recommendations are based upon the results of the simulation studies summarized in Singh, Maichle, and											
248	Simulation results will not cover all Real World data sets; for additional insight the user may want to cons											
249												
250	Aroclor-1254											
251												
252	General Statistics											

	A	B	C	D	E	F	G	H	I	J	K	L
253	Total Number of Observations					40	Number of Distinct Observations					37
254	Number of Detects					20	Number of Non-Detects					20
255	Number of Distinct Detects					19	Number of Distinct Non-Detects					18
256	Minimum Detect					0.002	Minimum Non-Detect					0.003
257	Maximum Detect					0.14	Maximum Non-Detect					0.005
258	Variance Detects					9.7768E	Percent Non-Detects					50%
259	Mean Detects					0.016	SD Detects					0.03
260	Median Detects					0.007	CV Detects					1.84
261	Skewness Detects					3.80	Kurtosis Detects					15.6
262	Mean of Logged Detects					-4.80	SD of Logged Detects					1.08
263												
264	Normal GOF Test on Detects Only											
265	Shapiro Wilk Test Statistic					0.47	Shapiro Wilk GOF Test					
266	5% Shapiro Wilk Critical Value					0.90	Detected Data Not Normal at 5% Significance Level					
267	Lilliefors Test Statistic					0.35	Lilliefors GOF Test					
268	5% Lilliefors Critical Value					0.19	Detected Data Not Normal at 5% Significance Level					
269	Detected Data Not Normal at 5% Significance Level											
270												
271	Kaplan-Meier (KM) Statistics using Normal Critical Values and other Nonparametric UCLs											
272	Mean					0.009	Standard Error of Mean					0.003
273	SD					0.02	95% KM (BCA) UCL					0.01
274	95% KM (t) UCL					0.016	95% KM (Percentile Bootstrap) UCL					0.01
275	95% KM (z) UCL					0.013	95% KM Bootstrap t UCL					0.02
276	90% KM Chebyshev UCL					0.026	95% KM Chebyshev UCL					0.02
277	97.5% KM Chebyshev UCL					0.032	99% KM Chebyshev UCL					0.04
278												
279	Gamma GOF Tests on Detected Observations Only											
280	A-D Test Statistic					1.35	Anderson-Darling GOF Test					
281	5% A-D Critical Value					0.77	Detected Data Not Gamma Distributed at 5% Significance Level					
282	K-S Test Statistic					0.24	Kolmogrov-Smirnoff GOF					
283	5% K-S Critical Value					0.20	Detected Data Not Gamma Distributed at 5% Significance Level					
284	Detected Data Not Gamma Distributed at 5% Significance Level											
285												
286	Gamma Statistics on Detected Data Only											
287	k hat (MLE)					0.81	k star (bias corrected MLE)					0.72
288	Theta hat (MLE)					0.026	Theta star (bias corrected MLE)					0.02
289	nu hat (MLE)					32.7	nu star (bias corrected)					29.1
290	MLE Mean (bias corrected)					0.016	MLE Sd (bias corrected)					0.013
291												
292	Gamma Kaplan-Meier (KM) Statistics											
293	k hat (KM)					0.18	nu hat (KM)					15.1
294	Approximate Chi Square Value (15.16, α)					7.37	Adjusted Chi Square Value (15.16, β)					7.16
295	Approximate KM-UCL (use when $n \geq 50$)					0.02	Gamma Adjusted KM-UCL (use when $n < 50$)					0.02
296												
297	Gamma ROS Statistics using Imputed Non-Detects											
298	GROS may not be used when data set has > 50% NDs with many tied observations at multiple DLs											
299	GROS may not be used when kstar of detected data is small such as < 0.1											
300	For such situations, GROS method tends to yield inflated values of UCLs and BTVs											
301	Gamma distributed detected data, BTVs and UCLs may be computed using gamma distribution on KM estimate											
302	Minimum					0.002	Mean					0.013
303	Maximum					0.14	Median					0.01
304	SD					0.022	CV					1.64
305	k hat (MLE)					1.40	k star (bias corrected MLE)					1.31
306	Theta hat (MLE)					0.009	Theta star (bias corrected MLE)					0.01
307	nu hat (MLE)					112.5	nu star (bias corrected)					105.4
308	MLE Mean (bias corrected)					0.013	MLE Sd (bias corrected)					0.01
309							Adjusted Level of Significance (β)					0.04
310	Approximate Chi Square Value (105.37, α)					82.68	Adjusted Chi Square Value (105.37, β)					81.93
311	Gamma Approximate UCL (use when $n \geq 50$)					0.013	Gamma Adjusted UCL (use when $n < 50$)					0.01
312												
313	Lognormal GOF Test on Detected Observations Only											
314	Shapiro Wilk Test Statistic					0.92	Shapiro Wilk GOF Test					
315	5% Shapiro Wilk Critical Value					0.90	Detected Data appear Lognormal at 5% Significance Level					

	A	B	C	D	E	F	G	H	I	J	K	L	
316	Lilliefors Test Statistic					0.13	Lilliefors GOF Test						
317	5% Lilliefors Critical Value					0.19	Detected Data appear Lognormal at 5% Significance Level						
318	Detected Data appear Lognormal at 5% Significance Level												
319													
320	Lognormal ROS Statistics Using Imputed Non-Detects												
321	Mean in Original Scale					0.009	Mean in Log Scale					-5.39	
322	SD in Original Scale					0.02	SD in Log Scale					0.97	
323	95% t UCL (assumes normality of ROS data)					0.01	95% Percentile Bootstrap UCL					0.01	
324	95% BCA Bootstrap UCL					0.02	95% Bootstrap t UCL					0.02	
325	95% H-UCL (Log ROS)					0.01							
326													
327	Tests using Lognormal Distribution and KM Estimates when Detected data are Lognormally Distributed												
328	KM Mean (logged)					-5.34	95% H-UCL (KM -Log)					0.01	
329	KM SD (logged)					0.93	95% Critical H Value (KM-Log)					2.33	
330	KM Standard Error of Mean (logged)					0.15							
331													
332	DL/2 Statistics												
333	DL/2 Normal						DL/2 Log-Transformed						
334	Mean in Original Scale					0.009	Mean in Log Scale					-5.52	
335	SD in Original Scale					0.02	SD in Log Scale					1.05	
336	95% t UCL (Assumes normality)					0.01	95% H-Stat UCL					0.01	
337	DL/2 is not a recommended method, provided for comparisons and historical reasons												
338													
339	Nonparametric Distribution Free UCL Statistics												
340	Detected Data appear Lognormal Distributed at 5% Significance Level												
341													
342	Suggested UCL to Use												
343	95% KM (BCA) UCL					0.01							
344													
345	Recommendations regarding the selection of a 95% UCL are provided to help the user to select the most appropriate UCL.												
346	Recommendations are based upon data size, data distribution, and skewness.												
347	Recommendations are based upon the results of the simulation studies summarized in Singh, Maichle, and Singh (2004).												
348	Simulation results will not cover all Real World data sets; for additional insight the user may want to consult the literature.												
349													
350	Aroclor-1260												
351													
352	General Statistics												
353	Total Number of Observations					40	Number of Distinct Observations					37	
354	Number of Detects					16	Number of Non-Detects					24	
355	Number of Distinct Detects					16	Number of Distinct Non-Detects					22	
356	Minimum Detect					0.002	Minimum Non-Detect					0.003	
357	Maximum Detect					0.06	Maximum Non-Detect					0.005	
358	Variance Detects					3.0524E-05	Percent Non-Detects					60%	
359	Mean Detects					0.01	SD Detects					0.01	
360	Median Detects					0.007	CV Detects					1.26	
361	Skewness Detects					2.15	Kurtosis Detects					3.77	
362	Mean of Logged Detects					-4.80	SD of Logged Detects					0.97	
363													
364	Normal GOF Test on Detects Only												
365	Shapiro Wilk Test Statistic					0.64	Shapiro Wilk GOF Test						
366	5% Shapiro Wilk Critical Value					0.88	Detected Data Not Normal at 5% Significance Level						
367	Lilliefors Test Statistic					0.33	Lilliefors GOF Test						
368	5% Lilliefors Critical Value					0.22	Detected Data Not Normal at 5% Significance Level						
369	Detected Data Not Normal at 5% Significance Level												
370													
371	Kaplan-Meier (KM) Statistics using Normal Critical Values and other Nonparametric UCLs												
372	Mean					0.007	Standard Error of Mean					0.001	
373	SD					0.01	95% KM (BCA) UCL					0.01	
374	95% KM (t) UCL					0.01	95% KM (Percentile Bootstrap) UCL					0.01	
375	95% KM (z) UCL					0.01	95% KM Bootstrap t UCL					0.01	
376	90% KM Chebyshev UCL					0.01	95% KM Chebyshev UCL					0.01	
377	97.5% KM Chebyshev UCL					0.01	99% KM Chebyshev UCL					0.02	
378													

	A	B	C	D	E	F	G	H	I	J	K	L
379	Gamma GOF Tests on Detected Observations Only											
380	A-D Test Statistic					1.11	Anderson-Darling GOF Test					
381	5% A-D Critical Value					0.76	Detected Data Not Gamma Distributed at 5% Significance Level					
382	K-S Test Statistic					0.25	Kolmogrov-Smirnoff GOF					
383	5% K-S Critical Value					0.22	Detected Data Not Gamma Distributed at 5% Significance Level					
384	Detected Data Not Gamma Distributed at 5% Significance Level											
385												
386	Gamma Statistics on Detected Data Only											
387	k hat (MLE)					1.10	k star (bias corrected MLE)					0.93
388	Theta hat (MLE)					0.01	Theta star (bias corrected MLE)					0.01
389	nu hat (MLE)					35.3	nu star (bias corrected)					30.0
390	MLE Mean (bias corrected)					0.01	MLE Sd (bias corrected)					0.01
391												
392	Gamma Kaplan-Meier (KM) Statistics											
393	k hat (KM)					0.36	nu hat (KM)					28.9
394	Approximate Chi Square Value (28.99, α)					17.7	Adjusted Chi Square Value (28.99, β)					17.3
395	Approximate KM-UCL (use when n>=50)					0.01	Gamma Adjusted KM-UCL (use when n<50)					0.01
396												
397	Gamma ROS Statistics using Imputed Non-Detects											
398	GROS may not be used when data set has > 50% NDs with many tied observations at multiple DLs											
399	GROS may not be used when kstar of detected data is small such as < 0.1											
400	For such situations, GROS method tends to yield inflated values of UCLs and BTVs											
401	Gamma distributed detected data, BTVs and UCLs may be computed using gamma distribution on KM estimates											
402	Minimum					0.002	Mean					0.01
403	Maximum					0.06	Median					0.01
404	SD					0.01	CV					0.95
405	k hat (MLE)					2.43	k star (bias corrected MLE)					2.26
406	Theta hat (MLE)					0.004	Theta star (bias corrected MLE)					0.005
407	nu hat (MLE)					194.7	nu star (bias corrected)					181.4
408	MLE Mean (bias corrected)					0.01	MLE Sd (bias corrected)					0.007
409							Adjusted Level of Significance (β)					0.04
410	Approximate Chi Square Value (181.43, α)					151.3	Adjusted Chi Square Value (181.43, β)					150.2
411	Gamma Approximate UCL (use when n>=50)					0.01	Gamma Adjusted UCL (use when n<50)					0.01
412												
413	Lognormal GOF Test on Detected Observations Only											
414	Shapiro Wilk Test Statistic					0.91	Shapiro Wilk GOF Test					
415	5% Shapiro Wilk Critical Value					0.88	Detected Data appear Lognormal at 5% Significance Level					
416	Lilliefors Test Statistic					0.18	Lilliefors GOF Test					
417	5% Lilliefors Critical Value					0.22	Detected Data appear Lognormal at 5% Significance Level					
418	Detected Data appear Lognormal at 5% Significance Level											
419												
420	Lognormal ROS Statistics Using Imputed Non-Detects											
421	Mean in Original Scale					0.007	Mean in Log Scale					-5.52
422	SD in Original Scale					0.01	SD in Log Scale					0.85
423	95% t UCL (assumes normality of ROS data)					0.01	95% Percentile Bootstrap UCL					0.01
424	95% BCA Bootstrap UCL					0.01	95% Bootstrap t UCL					0.01
425	95% H-UCL (Log ROS)					0.007						
426												
427	UCLs using Lognormal Distribution and KM Estimates when Detected data are Lognormally Distributed											
428	KM Mean (logged)					-5.44	95% H-UCL (KM -Log)					0.007
429	KM SD (logged)					0.79	95% Critical H Value (KM-Log)					2.19
430	KM Standard Error of Mean (logged)					0.13						
431												
432	DL/2 Statistics											
433	DL/2 Normal						DL/2 Log-Transformed					
434	Mean in Original Scale					0.006	Mean in Log Scale					-5.65
435	SD in Original Scale					0.01	SD in Log Scale					0.93
436	95% t UCL (Assumes normality)					0.01	95% H-Stat UCL					0.007
437	DL/2 is not a recommended method, provided for comparisons and historical reasons											
438												
439	Nonparametric Distribution Free UCL Statistics											
440	Detected Data appear Lognormal Distributed at 5% Significance Level											
441												

	A	B	C	D	E	F	G	H	I	J	K	L	
442	Suggested UCL to Use												
443	95% KM (t) UCL					0.01	95% KM (% Bootstrap) UCL					0.01	
444													
445	ations regarding the selection of a 95% UCL are provided to help the user to select the most appropriate												
446	Recommendations are based upon data size, data distribution, and skewness.												
447	Recommendations are based upon the results of the simulation studies summarized in Singh, Maichle, and												
448	ations results will not cover all Real World data sets; for additional insight the user may want to cons												
449													
450	Arsenic												
451													
452	General Statistics												
453	Total Number of Observations					171	Number of Distinct Observations					128	
454	Number of Detects					167	Number of Non-Detects					4	
455	Number of Distinct Detects					128	Number of Distinct Non-Detects					4	
456	Minimum Detect					0.46	Minimum Non-Detect					1.1	
457	Maximum Detect					6.6	Maximum Non-Detect					1.8	
458	Variance Detects					0.96	Percent Non-Detects					2.33	
459	Mean Detects					1.89	SD Detects					0.98	
460	Median Detects					1.66	CV Detects					0.52	
461	Skewness Detects					2.08	Kurtosis Detects					6.20	
462	Mean of Logged Detects					0.52	SD of Logged Detects					0.45	
463													
464	Normal GOF Test on Detects Only												
465	Shapiro Wilk Test Statistic					0.82	Normal GOF Test on Detected Observations Only						
466	5% Shapiro Wilk P Value					0	Detected Data Not Normal at 5% Significance Level						
467	Lilliefors Test Statistic					0.15	Lilliefors GOF Test						
468	5% Lilliefors Critical Value					0.06	Detected Data Not Normal at 5% Significance Level						
469	Detected Data Not Normal at 5% Significance Level												
470													
471	Kaplan-Meier (KM) Statistics using Normal Critical Values and other Nonparametric UCLs												
472	Mean					1.87	Standard Error of Mean					0.073	
473	SD					0.97	95% KM (BCA) UCL					2.00	
474	95% KM (t) UCL					1.99	95% KM (Percentile Bootstrap) UCL					1.99	
475	95% KM (z) UCL					1.99	95% KM Bootstrap t UCL					2.02	
476	90% KM Chebyshev UCL					2.09	95% KM Chebyshev UCL					2.20	
477	97.5% KM Chebyshev UCL					2.34	99% KM Chebyshev UCL					2.62	
478													
479	Gamma GOF Tests on Detected Observations Only												
480	A-D Test Statistic					1.68	Anderson-Darling GOF Test						
481	5% A-D Critical Value					0.75	ed Data Not Gamma Distributed at 5% Significance Level						
482	K-S Test Statistic					0.09	Kolmogrov-Smirnoff GOF						
483	5% K-S Critical Value					0.07	ed Data Not Gamma Distributed at 5% Significance Level						
484	Detected Data Not Gamma Distributed at 5% Significance Level												
485													
486	Gamma Statistics on Detected Data Only												
487	k hat (MLE)					4.77	k star (bias corrected MLE)					4.69	
488	Theta hat (MLE)					0.39	Theta star (bias corrected MLE)					0.40	
489	nu hat (MLE)					1595	nu star (bias corrected)					1568	
490	MLE Mean (bias corrected)					1.89	MLE Sd (bias corrected)					0.87	
491													
492	Gamma Kaplan-Meier (KM) Statistics												
493	k hat (KM)					3.66	nu hat (KM)					1255	
494	Approximate Chi Square Value (N/A, α)					1174	Adjusted Chi Square Value (N/A, β)					1173	
495	Approximate KM-UCL (use when $n \geq 50$)					2.00	Gamma Adjusted KM-UCL (use when $n < 50$)					2.00	
496													
497	Gamma ROS Statistics using Imputed Non-Detects												
498	GROS may not be used when data set has > 50% NDs with many tied observations at multiple DLs												
499	GROS may not be used when kstar of detected data is small such as < 0.1												
500	For such situations, GROS method tends to yield inflated values of UCLs and BTVs												
501	Gamma distributed detected data, BTVs and UCLs may be computed using gamma distribution on KM e												
502	Minimum					0.46	Mean					1.87	
503	Maximum					6.6	Median					1.65	
504	SD					0.98	CV					0.52	

	A	B	C	D	E	F	G	H	I	J	K	L
505	k hat (MLE)					4.71	k star (bias corrected MLE)					4.64
506	Theta hat (MLE)					0.39	Theta star (bias corrected MLE)					0.40
507	nu hat (MLE)					1614	nu star (bias corrected)					1587
508	MLE Mean (bias corrected)					1.87	MLE Sd (bias corrected)					0.86
509							Adjusted Level of Significance (β)					0.04
510	Approximate Chi Square Value (N/A, α)					1495	Adjusted Chi Square Value (N/A, β)					1495
511	Gamma Approximate UCL (use when $n \geq 50$)					1.98	Gamma Adjusted UCL (use when $n < 50$)					1.98
512												
513	Lognormal GOF Test on Detected Observations Only											
514	Lilliefors Test Statistic					0.05	Lilliefors GOF Test					
515	5% Lilliefors Critical Value					0.06	Detected Data appear Lognormal at 5% Significance Level					
516	Detected Data appear Lognormal at 5% Significance Level											
517												
518	Lognormal ROS Statistics Using Imputed Non-Detects											
519	Mean in Original Scale					1.87	Mean in Log Scale					0.51
520	SD in Original Scale					0.98	SD in Log Scale					0.45
521	95% t UCL (assumes normality of ROS data)					1.99	95% Percentile Bootstrap UCL					1.99
522	95% BCA Bootstrap UCL					2.00	95% Bootstrap t UCL					2.01
523	95% H-UCL (Log ROS)					1.98						
524												
525	UCLs using Lognormal Distribution and KM Estimates when Detected data are Lognormally Distributed											
526	KM Mean (logged)					0.51	95% H-UCL (KM -Log)					1.98
527	KM SD (logged)					0.45	95% Critical H Value (KM-Log)					1.79
528	KM Standard Error of Mean (logged)					0.03						
529												
530	DL/2 Statistics											
531	DL/2 Normal						DL/2 Log-Transformed					
532	Mean in Original Scale					1.86	Mean in Log Scale					0.51
533	SD in Original Scale					0.98	SD in Log Scale					0.47
534	95% t UCL (Assumes normality)					1.99	95% H-Stat UCL					1.98
535	DL/2 is not a recommended method, provided for comparisons and historical reasons											
536												
537	Nonparametric Distribution Free UCL Statistics											
538	Detected Data appear Lognormal Distributed at 5% Significance Level											
539												
540	Suggested UCL to Use											
541	95% KM (BCA) UCL					2.00						
542												
543	Recommendations regarding the selection of a 95% UCL are provided to help the user to select the most appropriate											
544	Recommendations are based upon data size, data distribution, and skewness.											
545	Recommendations are based upon the results of the simulation studies summarized in Singh, Maichle, and											
546	Recommendations results will not cover all Real World data sets; for additional insight the user may want to consult											
547												
548	Barium											
549												
550	General Statistics											
551	Total Number of Observations					171	Number of Distinct Observations					154
552	Number of Detects					169	Number of Non-Detects					2
553	Number of Distinct Detects					152	Number of Distinct Non-Detects					2
554	Minimum Detect					8.66	Minimum Non-Detect					19.9
555	Maximum Detect					344	Maximum Non-Detect					28.7
556	Variance Detects					1687	Percent Non-Detects					1.17
557	Mean Detects					68.6	SD Detects					41.0
558	Median Detects					59.1	CV Detects					0.59
559	Skewness Detects					2.36	Kurtosis Detects					11.6
560	Mean of Logged Detects					4.07	SD of Logged Detects					0.56
561												
562	Normal GOF Test on Detects Only											
563	Shapiro Wilk Test Statistic					0.85	Normal GOF Test on Detected Observations Only					
564	5% Shapiro Wilk P Value					0	Detected Data Not Normal at 5% Significance Level					
565	Lilliefors Test Statistic					0.09	Lilliefors GOF Test					
566	5% Lilliefors Critical Value					0.06	Detected Data Not Normal at 5% Significance Level					
567	Detected Data Not Normal at 5% Significance Level											

	A	B	C	D	E	F	G	H	I	J	K	L
568												
569	Kaplan-Meier (KM) Statistics using Normal Critical Values and other Nonparametric UCLs											
570	Mean				68.1	Standard Error of Mean				3.15		
571	SD				41.0	95% KM (BCA) UCL				73.1		
572	95% KM (t) UCL				73.3	95% KM (Percentile Bootstrap) UCL				73.2		
573	95% KM (z) UCL				73.2	95% KM Bootstrap t UCL				74.1		
574	90% KM Chebyshev UCL				77.5	95% KM Chebyshev UCL				81.8		
575	97.5% KM Chebyshev UCL				87.7	99% KM Chebyshev UCL				99.4		
576												
577	Gamma GOF Tests on Detected Observations Only											
578	A-D Test Statistic				0.36	Anderson-Darling GOF Test						
579	5% A-D Critical Value				0.75	data appear Gamma Distributed at 5% Significance Level						
580	K-S Test Statistic				0.04	Kolmogrov-Smirnoff GOF						
581	5% K-S Critical Value				0.07	data appear Gamma Distributed at 5% Significance Level						
582	Detected data appear Gamma Distributed at 5% Significance Level											
583												
584	Gamma Statistics on Detected Data Only											
585	k hat (MLE)				3.39	k star (bias corrected MLE)				3.34		
586	Theta hat (MLE)				20.2	Theta star (bias corrected MLE)				20.5		
587	nu hat (MLE)				1148	nu star (bias corrected)				1129		
588	MLE Mean (bias corrected)				68.6	MLE Sd (bias corrected)				37.5		
589												
590	Gamma Kaplan-Meier (KM) Statistics											
591	k hat (KM)				2.75	nu hat (KM)				940.7		
592	Approximate Chi Square Value (940.66, α)				870.5	Adjusted Chi Square Value (940.66, β)				869.9		
593	Approximate KM-UCL (use when $n \geq 50$)				73.5	Gamma Adjusted KM-UCL (use when $n < 50$)				73.6		
594												
595	Gamma ROS Statistics using Imputed Non-Detects											
596	GROS may not be used when data set has > 50% NDs with many tied observations at multiple DLs											
597	GROS may not be used when kstar of detected data is small such as < 0.1											
598	For such situations, GROS method tends to yield inflated values of UCLs and BTVs											
599	Gamma distributed detected data, BTVs and UCLs may be computed using gamma distribution on KM estimates											
600	Minimum				8.66	Mean				68.0		
601	Maximum				344	Median				58.2		
602	SD				41.2	CV				0.60		
603	k hat (MLE)				3.22	k star (bias corrected MLE)				3.17		
604	Theta hat (MLE)				21.0	Theta star (bias corrected MLE)				21.4		
605	nu hat (MLE)				1103	nu star (bias corrected)				1085		
606	MLE Mean (bias corrected)				68.0	MLE Sd (bias corrected)				38.1		
607						Adjusted Level of Significance (β)				0.04		
608	Approximate Chi Square Value (N/A, α)				1010	Adjusted Chi Square Value (N/A, β)				1009		
609	Gamma Approximate UCL (use when $n \geq 50$)				73.1	Gamma Adjusted UCL (use when $n < 50$)				73.1		
610												
611	Lognormal GOF Test on Detected Observations Only											
612	Lilliefors Test Statistic				0.04	Lilliefors GOF Test						
613	5% Lilliefors Critical Value				0.06	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				68.1	Mean in Log Scale				4.06		
618	SD in Original Scale				41.1	SD in Log Scale				0.57		
619	95% t UCL (assumes normality of ROS data)				73.3	95% Percentile Bootstrap UCL				73.6		
620	95% BCA Bootstrap UCL				73.9	95% Bootstrap t UCL				73.9		
621	95% H-UCL (Log ROS)				74.4							
622												
623	UCLs using Lognormal Distribution and KM Estimates when Detected data are Lognormally Distributed											
624	KM Mean (logged)				4.06	95% H-UCL (KM -Log)				74.4		
625	KM SD (logged)				0.57	95% Critical H Value (KM-Log)				1.85		
626	KM Standard Error of Mean (logged)				0.04							
627												
628	DL/2 Statistics											
629	DL/2 Normal					DL/2 Log-Transformed						
630	Mean in Original Scale				68.0	Mean in Log Scale				4.05		

	A	B	C	D	E	F	G	H	I	J	K	L
631	SD in Original Scale					41.24	SD in Log Scale					0.58
632	95% t UCL (Assumes normality)					73.24	95% H-Stat UCL					74.74
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 Gamma Distributed at 5% Significance Level											
637												
638	Suggested UCL to Use											
639	95% KM (BCA) UCL					73.16	95% GROS Approximate Gamma UCL					73.16
640	95% Approximate Gamma KM-UCL					73.54						
641												
642	utions regarding the selection of a 95% UCL are provided to help the user to select the most appropriate											
643	Recommendations are based upon data size, data distribution, and skewness.											
644	hmmendations are based upon the results of the simulation studies summarized in Singh, Maichle, and											
645	ations results will not cover all Real World data sets; for additional insight the user may want to cons											
646												
647	Beryllium											
648												
649	General Statistics											
650	Total Number of Observations					171	Number of Distinct Observations					159
651	Number of Detects					168	Number of Non-Detects					3
652	Number of Distinct Detects					157	Number of Distinct Non-Detects					3
653	Minimum Detect					0.18	Minimum Non-Detect					0.36
654	Maximum Detect					47.5	Maximum Non-Detect					0.93
655	Variance Detects					30.74	Percent Non-Detects					1.75
656	Mean Detects					2.66	SD Detects					5.54
657	Median Detects					0.92	CV Detects					2.08
658	Skewness Detects					5.40	Kurtosis Detects					34.9
659	Mean of Logged Detects					0.21	SD of Logged Detects					1.07
660												
661	Normal GOF Test on Detects Only											
662	Shapiro Wilk Test Statistic					0.43	Normal GOF Test on Detected Observations Only					
663	5% Shapiro Wilk P Value					0	Detected Data Not Normal at 5% Significance Level					
664	Lilliefors Test Statistic					0.32	Lilliefors GOF Test					
665	5% Lilliefors Critical Value					0.06	Detected Data Not Normal at 5% Significance Level					
666	Detected Data Not Normal at 5% Significance Level											
667												
668	Kaplan-Meier (KM) Statistics using Normal Critical Values and other Nonparametric UCLs											
669	Mean					2.62	Standard Error of Mean					0.42
670	SD					5.49	95% KM (BCA) UCL					3.37
671	95% KM (t) UCL					3.32	95% KM (Percentile Bootstrap) UCL					3.36
672	95% KM (z) UCL					3.31	95% KM Bootstrap t UCL					3.72
673	90% KM Chebyshev UCL					3.89	95% KM Chebyshev UCL					4.46
674	97.5% KM Chebyshev UCL					5.25	99% KM Chebyshev UCL					6.81
675												
676	Gamma GOF Tests on Detected Observations Only											
677	A-D Test Statistic					10.51	Anderson-Darling GOF Test					
678	5% A-D Critical Value					0.79	ed Data Not Gamma Distributed at 5% Significanc					
679	K-S Test Statistic					0.19	Kolmogrov-Smirnoff GOF					
680	5% K-S Critical Value					0.07	ed Data Not Gamma Distributed at 5% Significanc					
681	Detected Data Not Gamma Distributed at 5% Significance Level											
682												
683	Gamma Statistics on Detected Data Only											
684	k hat (MLE)					0.77	k star (bias corrected MLE)					0.76
685	Theta hat (MLE)					3.42	Theta star (bias corrected MLE)					3.46
686	nu hat (MLE)					261.9	nu star (bias corrected)					258.6
687	MLE Mean (bias corrected)					2.66	MLE Sd (bias corrected)					3.03
688												
689	Gamma Kaplan-Meier (KM) Statistics											
690	k hat (KM)					0.22	nu hat (KM)					78.2
691	Approximate Chi Square Value (78.22, α)					58.84	Adjusted Chi Square Value (78.22, β)					58.7
692	Approximate KM-UCL (use when n>=50)					3.49	mma Adjusted KM-UCL (use when n<50)					3.49
693												

A	B	C	D	E	F	G	H	I	J	K	L
694	Gamma ROS Statistics using Imputed Non-Detects										
695	GROS may not be used when data set has > 50% NDs with many tied observations at multiple DLs										
696	GROS may not be used when kstar of detected data is small such as < 0.1										
697	For such situations, GROS method tends to yield inflated values of UCLs and BTVs										
698	Gamma distributed detected data, BTVs and UCLs may be computed using gamma distribution on KM estimate										
699	Minimum				0.01	Mean				2.62	
700	Maximum				47.5	Median				0.91	
701	SD				5.51	CV				2.10	
702	k hat (MLE)				0.72	k star (bias corrected MLE)				0.71	
703	Theta hat (MLE)				3.61	Theta star (bias corrected MLE)				3.66	
704	nu hat (MLE)				247.6	nu star (bias corrected)				244.6	
705	MLE Mean (bias corrected)				2.62	MLE Sd (bias corrected)				3.09	
706						Adjusted Level of Significance (β)				0.04	
707	Approximate Chi Square Value (244.55, α)				209.3	Adjusted Chi Square Value (244.55, β)				209.1	
708	Gamma Approximate UCL (use when n>=50)				3.06	Gamma Adjusted UCL (use when n<50)				3.06	
709											
710	Lognormal GOF Test on Detected Observations Only										
711	Lilliefors Test Statistic				0.11	Lilliefors GOF Test					
712	5% Lilliefors Critical Value				0.06	Detected Data Not Lognormal at 5% Significance Level					
713	Detected Data Not Lognormal at 5% Significance Level										
714											
715	Lognormal ROS Statistics Using Imputed Non-Detects										
716	Mean in Original Scale				2.62	Mean in Log Scale				0.19	
717	SD in Original Scale				5.50	SD in Log Scale				1.08	
718	95% t UCL (assumes normality of ROS data)				3.32	95% Percentile Bootstrap UCL				3.37	
719	95% BCA Bootstrap UCL				3.52	95% Bootstrap t UCL				3.70	
720	95% H-UCL (Log ROS)				2.62						
721											
722	DL/2 Statistics										
723	DL/2 Normal					DL/2 Log-Transformed					
724	Mean in Original Scale				2.62	Mean in Log Scale				0.18	
725	SD in Original Scale				5.50	SD in Log Scale				1.08	
726	95% t UCL (Assumes normality)				3.32	95% H-Stat UCL				2.62	
727	DL/2 is not a recommended method, provided for comparisons and historical reasons										
728											
729	Nonparametric Distribution Free UCL Statistics										
730	Data do not follow a Discernible Distribution at 5% Significance Level										
731											
732	Suggested UCL to Use										
733	95% KM (Chebyshev) UCL				4.46						
734											
735	Recommendations regarding the selection of a 95% UCL are provided to help the user to select the most appropriate										
736	Recommendations are based upon data size, data distribution, and skewness.										
737	Recommendations are based upon the results of the simulation studies summarized in Singh, Maichle, and										
738	Recommendations results will not cover all Real World data sets; for additional insight the user may want to consult										
739											
740	Cadmium										
741											
742	General Statistics										
743	Total Number of Observations				171	Number of Distinct Observations				142	
744	Number of Detects				50	Number of Non-Detects				121	
745	Number of Distinct Detects				48	Number of Distinct Non-Detects				94	
746	Minimum Detect				0.10	Minimum Non-Detect				0.21	
747	Maximum Detect				7.98	Maximum Non-Detect				0.88	
748	Variance Detects				1.25	Percent Non-Detects				70.7	
749	Mean Detects				0.50	SD Detects				1.12	
750	Median Detects				0.25	CV Detects				2.22	
751	Skewness Detects				6.31	Kurtosis Detects				42.4	
752	Mean of Logged Detects				-1.22	SD of Logged Detects				0.81	
753											
754	Normal GOF Test on Detects Only										
755	Shapiro Wilk Test Statistic				0.32	Shapiro Wilk GOF Test					
756	5% Shapiro Wilk Critical Value				0.94	Detected Data Not Normal at 5% Significance Level					

	A	B	C	D	E	F	G	H	I	J	K	L							
757	Lilliefors Test Statistic					0.36	Lilliefors GOF Test												
758	5% Lilliefors Critical Value					0.12	Detected Data Not Normal at 5% Significance Level												
759																			
760																			
761	Kaplan-Meier (KM) Statistics using Normal Critical Values and other Nonparametric UCLs																		
762	Mean					0.31	Standard Error of Mean					0.04							
763	SD					0.61	95% KM (BCA) UCL					0.42							
764	95% KM (t) UCL					0.39	95% KM (Percentile Bootstrap) UCL					0.4							
765	95% KM (z) UCL					0.39	95% KM Bootstrap t UCL					0.50							
766	90% KM Chebyshev UCL					0.46	95% KM Chebyshev UCL					0.52							
767	97.5% KM Chebyshev UCL					0.62	99% KM Chebyshev UCL					0.80							
768																			
769	Gamma GOF Tests on Detected Observations Only																		
770	A-D Test Statistic					4.39	Anderson-Darling GOF Test												
771	5% A-D Critical Value					0.77	Detected Data Not Gamma Distributed at 5% Significance Level												
772	K-S Test Statistic					0.23							Kolmogrov-Smirnoff GOF						
773	5% K-S Critical Value					0.12													
774	Detected Data Not Gamma Distributed at 5% Significance Level																		
775																			
776	Gamma Statistics on Detected Data Only																		
777	k hat (MLE)					1.05	k star (bias corrected MLE)					1.00							
778	Theta hat (MLE)					0.47	Theta star (bias corrected MLE)					0.5							
779	nu hat (MLE)					105.9	nu star (bias corrected)					100.9							
780	MLE Mean (bias corrected)					0.50	MLE Sd (bias corrected)					0.50							
781																			
782	Gamma Kaplan-Meier (KM) Statistics																		
783	k hat (KM)					0.25	nu hat (KM)					87.1							
784	Approximate Chi Square Value (87.10, α)					66.5	Adjusted Chi Square Value (87.10, β)					66.4							
785	Approximate KM-UCL (use when $n \geq 50$)					0.40	Gamma Adjusted KM-UCL (use when $n < 50$)					0.40							
786																			
787	Gamma ROS Statistics using Imputed Non-Detects																		
788	GROS may not be used when data set has > 50% NDs with many tied observations at multiple DLs																		
789	GROS may not be used when kstar of detected data is small such as < 0.1																		
790	For such situations, GROS method tends to yield inflated values of UCLs and BTVs																		
791	Gamma distributed detected data, BTVs and UCLs may be computed using gamma distribution on KM estimate																		
792	Minimum					0.01	Mean					0.24							
793	Maximum					7.98	Median					0.11							
794	SD					0.63	CV					2.63							
795	k hat (MLE)					0.87	k star (bias corrected MLE)					0.86							
796	Theta hat (MLE)					0.27	Theta star (bias corrected MLE)					0.27							
797	nu hat (MLE)					300.6	nu star (bias corrected)					296.6							
798	MLE Mean (bias corrected)					0.24	MLE Sd (bias corrected)					0.25							
799							Adjusted Level of Significance (β)					0.04							
800	Approximate Chi Square Value (296.62, α)					257.7	Adjusted Chi Square Value (296.62, β)					257.4							
801	Gamma Approximate UCL (use when $n \geq 50$)					0.27	Gamma Adjusted UCL (use when $n < 50$)					0.27							
802																			
803	Lognormal GOF Test on Detected Observations Only																		
804	Shapiro Wilk Test Statistic					0.88	Shapiro Wilk GOF Test												
805	5% Shapiro Wilk Critical Value					0.94	Detected Data Not Lognormal at 5% Significance Level												
806	Lilliefors Test Statistic					0.13							Lilliefors GOF Test						
807	5% Lilliefors Critical Value					0.12													
808	Detected Data Not Lognormal at 5% Significance Level																		
809																			
810	Lognormal ROS Statistics Using Imputed Non-Detects																		
811	Mean in Original Scale					0.31	Mean in Log Scale					-1.41							
812	SD in Original Scale					0.61	SD in Log Scale					0.48							
813	95% t UCL (assumes normality of ROS data)					0.38	95% Percentile Bootstrap UCL					0.39							
814	95% BCA Bootstrap UCL					0.45	95% Bootstrap t UCL					0.58							
815	95% H-UCL (Log ROS)					0.29													
816																			
817	DL/2 Statistics																		
818	DL/2 Normal						DL/2 Log-Transformed												
819	Mean in Original Scale					0.33	Mean in Log Scale					-1.29							

	A	B	C	D	E	F	G	H	I	J	K	L	
820	SD in Original Scale					0.61	SD in Log Scale					0.46	
821	95% t UCL (Assumes normality)					0.41	95% H-Stat UCL					0.32	
822	DL/2 is not a recommended method, provided for comparisons and historical reasons												
823													
824	Nonparametric Distribution Free UCL Statistics												
825	Data do not follow a Discernible Distribution at 5% Significance Level												
826													
827	Suggested UCL to Use												
828	95% KM (t) UCL					0.39	95% KM (% Bootstrap) UCL					0.4	
829													
830	Directions regarding the selection of a 95% UCL are provided to help the user to select the most appropriate												
831	Recommendations are based upon data size, data distribution, and skewness.												
832	Recommendations are based upon the results of the simulation studies summarized in Singh, Maichle, and												
833	Simulation results will not cover all Real World data sets; for additional insight the user may want to consult												
834													
835	Calcium												
836													
837	General Statistics												
838	Total Number of Observations					171	Number of Distinct Observations					144	
839	Number of Detects					169	Number of Non-Detects					2	
840	Number of Distinct Detects					142	Number of Distinct Non-Detects					2	
841	Minimum Detect					273	Minimum Non-Detect					460	
842	Maximum Detect					27600	Maximum Non-Detect					736	
843	Variance Detects					552345	Percent Non-Detects					1.17	
844	Mean Detects					1836	SD Detects					2350	
845	Median Detects					1480	CV Detects					1.28	
846	Skewness Detects					8.36	Kurtosis Detects					87.4	
847	Mean of Logged Detects					7.23	SD of Logged Detects					0.69	
848													
849	Normal GOF Test on Detects Only												
850	Shapiro Wilk Test Statistic					0.43	Normal GOF Test on Detected Observations Only						
851	5% Shapiro Wilk P Value					0	Detected Data Not Normal at 5% Significance Level						
852	Lilliefors Test Statistic					0.25	Lilliefors GOF Test						
853	5% Lilliefors Critical Value					0.06	Detected Data Not Normal at 5% Significance Level						
854	Detected Data Not Normal at 5% Significance Level												
855													
856	Kaplan-Meier (KM) Statistics using Normal Critical Values and other Nonparametric UCLs												
857	Mean					1819	Standard Error of Mean					179.1	
858	SD					2335	95% KM (BCA) UCL					2163	
859	95% KM (t) UCL					2115	95% KM (Percentile Bootstrap) UCL					2130	
860	95% KM (z) UCL					2113	95% KM Bootstrap t UCL					2443	
861	90% KM Chebyshev UCL					2356	95% KM Chebyshev UCL					2599	
862	97.5% KM Chebyshev UCL					2937	99% KM Chebyshev UCL					3601	
863													
864	Gamma GOF Tests on Detected Observations Only												
865	A-D Test Statistic					3.35	Anderson-Darling GOF Test						
866	5% A-D Critical Value					0.76	Detected Data Not Gamma Distributed at 5% Significance Level						
867	K-S Test Statistic					0.11	Kolmogorov-Smirnov GOF						
868	5% K-S Critical Value					0.07	Detected Data Not Gamma Distributed at 5% Significance Level						
869	Detected Data Not Gamma Distributed at 5% Significance Level												
870													
871	Gamma Statistics on Detected Data Only												
872	k hat (MLE)					1.95	k star (bias corrected MLE)					1.92	
873	Theta hat (MLE)					939.6	Theta star (bias corrected MLE)					954.6	
874	nu hat (MLE)					660.3	nu star (bias corrected)					649.9	
875	MLE Mean (bias corrected)					1836	MLE Sd (bias corrected)					1324	
876													
877	Gamma Kaplan-Meier (KM) Statistics												
878	k hat (KM)					0.60	nu hat (KM)					207.6	
879	Approximate Chi Square Value (207.60, α)					175.3	Adjusted Chi Square Value (207.60, β)					175	
880	Approximate KM-UCL (use when n>=50)					2155	Gamma Adjusted KM-UCL (use when n<50)					2158	
881													
882	Gamma ROS Statistics using Imputed Non-Detects												

	A	B	C	D	E	F	G	H	I	J	K	L
883	GROS may not be used when data set has > 50% NDs with many tied observations at multiple DLs											
884	GROS may not be used when kstar of detected data is small such as < 0.1											
885	For such situations, GROS method tends to yield inflated values of UCLs and BTVs											
886	Gamma distributed detected data, BTVs and UCLs may be computed using gamma distribution on KM estimate											
887			Minimum	0.01			Mean	1814				
888			Maximum	27600			Median	1480				
889			SD	2345			CV	1.29				
890			k hat (MLE)	1.38			k star (bias corrected MLE)	1.36				
891			Theta hat (MLE)	1314			Theta star (bias corrected MLE)	1334				
892			nu hat (MLE)	472.1			nu star (bias corrected)	465.2				
893			MLE Mean (bias corrected)	1814			MLE Sd (bias corrected)	1555				
894							Adjusted Level of Significance (β)	0.044				
895			Approximate Chi Square Value (465.19, α)	416.2			Adjusted Chi Square Value (465.19, β)	415.8				
896			Gamma Approximate UCL (use when n>=50)	2028			Gamma Adjusted UCL (use when n<50)	2030				
897												
898	Lognormal GOF Test on Detected Observations Only											
899			Lilliefors Test Statistic	0.084			Lilliefors GOF Test					
900			5% Lilliefors Critical Value	0.064			Detected Data Not Lognormal at 5% Significance Level					
901	Detected Data Not Lognormal at 5% Significance Level											
902												
903	Lognormal ROS Statistics Using Imputed Non-Detects											
904			Mean in Original Scale	1820			Mean in Log Scale	7.22				
905			SD in Original Scale	2341			SD in Log Scale	0.70				
906			95% t UCL (assumes normality of ROS data)	2116			95% Percentile Bootstrap UCL	2125				
907			95% BCA Bootstrap UCL	2316			95% Bootstrap t UCL	2395				
908			95% H-UCL (Log ROS)	1948								
909												
910	DL/2 Statistics											
911			DL/2 Normal				DL/2 Log-Transformed					
912			Mean in Original Scale	1818			Mean in Log Scale	7.22				
913			SD in Original Scale	2342			SD in Log Scale	0.71				
914			95% t UCL (Assumes normality)	2114			95% H-Stat UCL	1956				
915	DL/2 is not a recommended method, provided for comparisons and historical reasons											
916												
917	Nonparametric Distribution Free UCL Statistics											
918	Data do not follow a Discernible Distribution at 5% Significance Level											
919												
920	Suggested UCL to Use											
921			95% KM (BCA) UCL	2163								
922												
923	Recommendations regarding the selection of a 95% UCL are provided to help the user to select the most appropriate UCL.											
924	Recommendations are based upon data size, data distribution, and skewness.											
925	Recommendations are based upon the results of the simulation studies summarized in Singh, Maichle, and Singh (2007).											
926	Simulation results will not cover all Real World data sets; for additional insight the user may want to consult the literature.											
927												
928	Cesium-137											
929												
930	General Statistics											
931			Total Number of Observations	156			Number of Distinct Observations	152				
932			Number of Detects	59			Number of Non-Detects	97				
933			Number of Distinct Detects	58			Number of Distinct Non-Detects	95				
934			Minimum Detect	0.076			Minimum Non-Detect	-0.047				
935			Maximum Detect	1.96			Maximum Non-Detect	0.11				
936			Variance Detects	0.12			Percent Non-Detects	62.1				
937			Mean Detects	0.39			SD Detects	0.35				
938			Median Detects	0.29			CV Detects	0.88				
939			Skewness Detects	2.48			Kurtosis Detects	8.30				
940												
941	Normal GOF Test on Detects Only											
942			Shapiro Wilk Test Statistic	0.75			Normal GOF Test on Detected Observations Only					
943			5% Shapiro Wilk P Value	1.155E-05			Detected Data Not Normal at 5% Significance Level					
944			Lilliefors Test Statistic	0.18			Lilliefors GOF Test					
945			5% Lilliefors Critical Value	0.11			Detected Data Not Normal at 5% Significance Level					

	A	B	C	D	E	F	G	H	I	J	K	L
946	Detected Data Not Normal at 5% Significance Level											
947												
948	Kaplan-Meier (KM) Statistics using Normal Critical Values and other Nonparametric UCLs											
949	Mean		0.12	Standard Error of Mean		0.024						
950	SD		0.30	95% KM (BCA) UCL		0.16						
951	95% KM (t) UCL		0.16	95% KM (Percentile Bootstrap) UCL		0.16						
952	95% KM (z) UCL		0.16	95% KM Bootstrap t UCL		0.16						
953	90% KM Chebyshev UCL		0.19	95% KM Chebyshev UCL		0.22						
954	97.5% KM Chebyshev UCL		0.27	99% KM Chebyshev UCL		0.36						
955												
956	Gamma GOF Tests on Detected Observations Only											
957	A-D Test Statistic		0.80	Anderson-Darling GOF Test								
958	5% A-D Critical Value		0.76	Detected Data Not Gamma Distributed at 5% Significance Level								
959	K-S Test Statistic		0.11	Kolmogrov-Smirnoff GOF								
960	5% K-S Critical Value		0.11	Data appear Gamma Distributed at 5% Significance Level								
961	Detected data follow Appr. Gamma Distribution at 5% Significance Level											
962												
963	Gamma Statistics on Detected Data Only											
964	k hat (MLE)		1.82	k star (bias corrected MLE)		1.74						
965	Theta hat (MLE)		0.21	Theta star (bias corrected MLE)		0.22						
966	nu hat (MLE)		215.7	nu star (bias corrected)		206.1						
967	MLE Mean (bias corrected)		0.39	MLE Sd (bias corrected)		0.3						
968												
969	Gamma Kaplan-Meier (KM) Statistics											
970	k hat (KM)		0.15	nu hat (KM)		49.4						
971				Adjusted Level of Significance (β)		0.044						
972	Approximate Chi Square Value (49.46, α)		34.3	Adjusted Chi Square Value (49.46, β)		34.2						
973	Approximate KM-UCL (use when $n \geq 50$)		0.17	Gamma Adjusted KM-UCL (use when $n < 50$)		0.17						
974												
975	DL/2 Statistics											
976	Mean in Original Scale		0.15	SD in Original Scale		0.28						
977	95% t UCL (Assumes normality)		0.19									
978	DL/2 is not a recommended method, provided for comparisons and historical reasons											
979												
980	Nonparametric Distribution Free UCL Statistics											
981	Detected Data appear Approximate Gamma Distributed at 5% Significance Level											
982												
983	Suggested UCL to Use											
984	95% KM (t) UCL		0.16	95% GROS Approximate Gamma UCL		N/A						
985	95% Approximate Gamma KM-UCL		0.17									
986	Warning: One or more Recommended UCL(s) not available!											
987												
988	Recommendations regarding the selection of a 95% UCL are provided to help the user to select the most appropriate											
989	Recommendations are based upon data size, data distribution, and skewness.											
990	Recommendations are based upon the results of the simulation studies summarized in Singh, Maichle, and											
991	Simulation results will not cover all Real World data sets; for additional insight the user may want to consult											
992												
993	Chromium											
994												
995	General Statistics											
996	Total Number of Observations		171	Number of Distinct Observations		142						
997	Number of Detects		169	Number of Non-Detects		2						
998	Number of Distinct Detects		140	Number of Distinct Non-Detects		2						
999	Minimum Detect		2.65	Minimum Non-Detect		1.8						
1000	Maximum Detect		55.8	Maximum Non-Detect		1.95						
1001	Variance Detects		65.1	Percent Non-Detects		1.17						
1002	Mean Detects		12.6	SD Detects		8.07						
1003	Median Detects		10.5	CV Detects		0.63						
1004	Skewness Detects		1.96	Kurtosis Detects		5.47						
1005	Mean of Logged Detects		2.37	SD of Logged Detects		0.56						
1006												
1007	Normal GOF Test on Detects Only											
1008	Shapiro Wilk Test Statistic		0.83	Normal GOF Test on Detected Observations Only								

	A	B	C	D	E	F	G	H	I	J	K	L	
1009	5% Shapiro Wilk P Value					0	Detected Data Not Normal at 5% Significance Level						
1010	Lilliefors Test Statistic					0.15	Lilliefors GOF Test						
1011	5% Lilliefors Critical Value					0.06	Detected Data Not Normal at 5% Significance Level						
1012	Detected Data Not Normal at 5% Significance Level												
1013													
1014	Kaplan-Meier (KM) Statistics using Normal Critical Values and other Nonparametric UCLs												
1015	Mean					12.5	Standard Error of Mean					0.62	
1016	SD					8.08	95% KM (BCA) UCL					13.6	
1017	95% KM (t) UCL					13.5	95% KM (Percentile Bootstrap) UCL					13.6	
1018	95% KM (z) UCL					13.5	95% KM Bootstrap t UCL					13.6	
1019	90% KM Chebyshev UCL					14.4	95% KM Chebyshev UCL					15.2	
1020	97.5% KM Chebyshev UCL					16.4	99% KM Chebyshev UCL					18.7	
1021													
1022	Gamma GOF Tests on Detected Observations Only												
1023	A-D Test Statistic					1.69	Anderson-Darling GOF Test						
1024	5% A-D Critical Value					0.75	Detected Data Not Gamma Distributed at 5% Significance Level						
1025	K-S Test Statistic					0.08	Kolmogrov-Smirnoff GOF						
1026	5% K-S Critical Value					0.07	Detected Data Not Gamma Distributed at 5% Significance Level						
1027	Detected Data Not Gamma Distributed at 5% Significance Level												
1028													
1029	Gamma Statistics on Detected Data Only												
1030	k hat (MLE)					3.22	k star (bias corrected MLE)					3.16	
1031	Theta hat (MLE)					3.93	Theta star (bias corrected MLE)					4.00	
1032	nu hat (MLE)					1089	nu star (bias corrected)					1071	
1033	MLE Mean (bias corrected)					12.6	MLE Sd (bias corrected)					7.12	
1034													
1035	Gamma Kaplan-Meier (KM) Statistics												
1036	k hat (KM)					2.41	nu hat (KM)					825.3	
1037	Approximate Chi Square Value (825.32, α)					759.6	Adjusted Chi Square Value (825.32, β)					759.1	
1038	Approximate KM-UCL (use when n>=50)					13.6	Gamma Adjusted KM-UCL (use when n<50)					13.6	
1039													
1040	Gamma ROS Statistics using Imputed Non-Detects												
1041	GROS may not be used when data set has > 50% NDs with many tied observations at multiple DLs												
1042	GROS may not be used when kstar of detected data is small such as < 0.1												
1043	For such situations, GROS method tends to yield inflated values of UCLs and BTVs												
1044	Gamma distributed detected data, BTVs and UCLs may be computed using gamma distribution on KM estimates												
1045	Minimum					0.01	Mean					12.5	
1046	Maximum					55.8	Median					10.5	
1047	SD					8.14	CV					0.64	
1048	k hat (MLE)					2.29	k star (bias corrected MLE)					2.26	
1049	Theta hat (MLE)					5.45	Theta star (bias corrected MLE)					5.54	
1050	nu hat (MLE)					786	nu star (bias corrected)					773.5	
1051	MLE Mean (bias corrected)					12.5	MLE Sd (bias corrected)					8.33	
1052							Adjusted Level of Significance (β)					0.04	
1053	Approximate Chi Square Value (773.52, α)					710	Adjusted Chi Square Value (773.52, β)					709.5	
1054	Gamma Approximate UCL (use when n>=50)					13.6	Gamma Adjusted UCL (use when n<50)					13.6	
1055													
1056	Lognormal GOF Test on Detected Observations Only												
1057	Lilliefors Test Statistic					0.04	Lilliefors GOF Test						
1058	5% Lilliefors Critical Value					0.06	Detected Data appear Lognormal at 5% Significance Level						
1059	Detected Data appear Lognormal at 5% Significance Level												
1060													
1061	Lognormal ROS Statistics Using Imputed Non-Detects												
1062	Mean in Original Scale					12.5	Mean in Log Scale					2.36	
1063	SD in Original Scale					8.10	SD in Log Scale					0.58	
1064	95% t UCL (assumes normality of ROS data)					13.5	95% Percentile Bootstrap UCL					13.6	
1065	95% BCA Bootstrap UCL					13.7	95% Bootstrap t UCL					13.7	
1066	95% H-UCL (Log ROS)					13.6							
1067													
1068	Estimates using Lognormal Distribution and KM Estimates when Detected data are Lognormally Distributed												
1069	KM Mean (logged)					2.35	95% H-UCL (KM -Log)					13.6	
1070	KM SD (logged)					0.59	95% Critical H Value (KM-Log)					1.86	
1071	KM Standard Error of Mean (logged)					0.04							

	A	B	C	D	E	F	G	H	I	J	K	L	
1072													
1073	DL/2 Statistics												
1074	DL/2 Normal						DL/2 Log-Transformed						
1075	Mean in Original Scale					12.54	Mean in Log Scale					2.34	
1076	SD in Original Scale					8.12	SD in Log Scale					0.61	
1077	95% t UCL (Assumes normality)					13.54	95% H-Stat UCL					13.84	
1078	DL/2 is not a recommended method, provided for comparisons and historical reasons												
1079													
1080	Nonparametric Distribution Free UCL Statistics												
1081	Detected Data appear Lognormal Distributed at 5% Significance Level												
1082													
1083	Suggested UCL to Use												
1084	95% KM (BCA) UCL					13.64							
1085													
1086	Directions regarding the selection of a 95% UCL are provided to help the user to select the most appropriate												
1087	Recommendations are based upon data size, data distribution, and skewness.												
1088	Recommendations are based upon the results of the simulation studies summarized in Singh, Maichle, and												
1089	Recommendations results will not cover all Real World data sets; for additional insight the user may want to consult												
1090													
1091	Cobalt												
1092													
1093	General Statistics												
1094	Total Number of Observations					171	Number of Distinct Observations					141	
1095	Number of Detects					163	Number of Non-Detects					8	
1096	Number of Distinct Detects					139	Number of Distinct Non-Detects					6	
1097	Minimum Detect					0.63	Minimum Non-Detect					1.3	
1098	Maximum Detect					17.1	Maximum Non-Detect					5.2	
1099	Variance Detects					7.96	Percent Non-Detects					4.67	
1100	Mean Detects					4.21	SD Detects					2.82	
1101	Median Detects					3.59	CV Detects					0.67	
1102	Skewness Detects					1.97	Kurtosis Detects					5.26	
1103	Mean of Logged Detects					1.24	SD of Logged Detects					0.61	
1104													
1105	Normal GOF Test on Detects Only												
1106	Shapiro Wilk Test Statistic					0.82	Normal GOF Test on Detected Observations Only						
1107	5% Shapiro Wilk P Value					0	Detected Data Not Normal at 5% Significance Level						
1108	Lilliefors Test Statistic					0.15	Lilliefors GOF Test						
1109	5% Lilliefors Critical Value					0.069	Detected Data Not Normal at 5% Significance Level						
1110	Detected Data Not Normal at 5% Significance Level												
1111													
1112	Kaplan-Meier (KM) Statistics using Normal Critical Values and other Nonparametric UCLs												
1113	Mean					4.07	Standard Error of Mean					0.21	
1114	SD					2.81	95% KM (BCA) UCL					4.45	
1115	95% KM (t) UCL					4.43	95% KM (Percentile Bootstrap) UCL					4.42	
1116	95% KM (z) UCL					4.43	95% KM Bootstrap t UCL					4.49	
1117	90% KM Chebyshev UCL					4.72	95% KM Chebyshev UCL					5.02	
1118	97.5% KM Chebyshev UCL					5.42	99% KM Chebyshev UCL					6.22	
1119													
1120	Gamma GOF Tests on Detected Observations Only												
1121	A-D Test Statistic					1.04	Anderson-Darling GOF Test						
1122	5% A-D Critical Value					0.76	Detected Data Not Gamma Distributed at 5% Significance Level						
1123	K-S Test Statistic					0.07	Kolmogrov-Smirnoff GOF						
1124	5% K-S Critical Value					0.074	Detected Data appear Gamma Distributed at 5% Significance Level						
1125	Detected data follow Appr. Gamma Distribution at 5% Significance Level												
1126													
1127	Gamma Statistics on Detected Data Only												
1128	k hat (MLE)					2.80	k star (bias corrected MLE)					2.76	
1129	Theta hat (MLE)					1.5	Theta star (bias corrected MLE)					1.52	
1130	nu hat (MLE)					915.1	nu star (bias corrected)					899.6	
1131	MLE Mean (bias corrected)					4.21	MLE Sd (bias corrected)					2.53	
1132													
1133	Gamma Kaplan-Meier (KM) Statistics												
1134	k hat (KM)					2.1	nu hat (KM)					718.2	

	A	B	C	D	E	F	G	H	I	J	K	L
1135	Approximate Chi Square Value (718.21, α)					657	Adjusted Chi Square Value (718.21, β)					656.5
1136	Approximate KM-UCL (use when $n \geq 50$)					4.45	Gamma Adjusted KM-UCL (use when $n < 50$)					4.46
1137												
1138	Gamma ROS Statistics using Imputed Non-Detects											
1139	GROS may not be used when data set has > 50% NDs with many tied observations at multiple DLs											
1140	GROS may not be used when kstar of detected data is small such as < 0.1											
1141	For such situations, GROS method tends to yield inflated values of UCLs and BTVs											
1142	Gamma distributed detected data, BTVs and UCLs may be computed using gamma distribution on KM estimates											
1143	Minimum					0.21	Mean					4.05
1144	Maximum					17.1	Median					3.52
1145	SD					2.84	CV					0.7
1146	k hat (MLE)					2.40	k star (bias corrected MLE)					2.36
1147	Theta hat (MLE)					1.69	Theta star (bias corrected MLE)					1.71
1148	nu hat (MLE)					821.4	nu star (bias corrected)					808.3
1149	MLE Mean (bias corrected)					4.05	MLE Sd (bias corrected)					2.64
1150							Adjusted Level of Significance (β)					0.044
1151	Approximate Chi Square Value (808.32, α)					743.3	Adjusted Chi Square Value (808.32, β)					742.8
1152	Gamma Approximate UCL (use when $n \geq 50$)					4.41	Gamma Adjusted UCL (use when $n < 50$)					4.41
1153												
1154	Lognormal GOF Test on Detected Observations Only											
1155	Lilliefors Test Statistic					0.07	Lilliefors GOF Test					
1156	5% Lilliefors Critical Value					0.065	Detected Data Not Lognormal at 5% Significance Level					
1157	Detected Data appear Approximate Lognormal at 5% Significance Level											
1158												
1159	Lognormal ROS Statistics Using Imputed Non-Detects											
1160	Mean in Original Scale					4.08	Mean in Log Scale					1.20
1161	SD in Original Scale					2.81	SD in Log Scale					0.63
1162	95% t UCL (assumes normality of ROS data)					4.43	95% Percentile Bootstrap UCL					4.46
1163	95% BCA Bootstrap UCL					4.47	95% Bootstrap t UCL					4.46
1164	95% H-UCL (Log ROS)					4.49						
1165												
1166	Estimates using Lognormal Distribution and KM Estimates when Detected data are Lognormally Distributed											
1167	KM Mean (logged)					1.20	95% H-UCL (KM -Log)					4.49
1168	KM SD (logged)					0.64	95% Critical H Value (KM-Log)					1.89
1169	KM Standard Error of Mean (logged)					0.045						
1170												
1171	DL/2 Statistics											
1172	DL/2 Normal						DL/2 Log-Transformed					
1173	Mean in Original Scale					4.06	Mean in Log Scale					1.18
1174	SD in Original Scale					2.83	SD in Log Scale					0.67
1175	95% t UCL (Assumes normality)					4.42	95% H-Stat UCL					4.53
1176	DL/2 is not a recommended method, provided for comparisons and historical reasons											
1177												
1178	Nonparametric Distribution Free UCL Statistics											
1179	Detected Data appear Approximate Gamma Distributed at 5% Significance Level											
1180												
1181	Suggested UCL to Use											
1182	95% KM (BCA) UCL					4.45	95% GROS Approximate Gamma UCL					4.41
1183	95% Approximate Gamma KM-UCL					4.45						
1184												
1185	Recommendations regarding the selection of a 95% UCL are provided to help the user to select the most appropriate											
1186	Recommendations are based upon data size, data distribution, and skewness.											
1187	Recommendations are based upon the results of the simulation studies summarized in Singh, Maichle, and											
1188	Simulation results will not cover all Real World data sets; for additional insight the user may want to consult											
1189												
1190	Copper											
1191												
1192	General Statistics											
1193	Total Number of Observations					156	Number of Distinct Observations					148
1194	Number of Detects					153	Number of Non-Detects					3
1195	Number of Distinct Detects					145	Number of Distinct Non-Detects					3
1196	Minimum Detect					1.73	Minimum Non-Detect					3.26
1197	Maximum Detect					36400	Maximum Non-Detect					3.61

	A	B	C	D	E	F	G	H	I	J	K	L	
1198	Variance Detects					878104	Percent Non-Detects					1.92	
1199	Mean Detects					390.8	SD Detects					2963	
1200	Median Detects					12.4	CV Detects					7.58	
1201	Skewness Detects					11.9	Kurtosis Detects					146.2	
1202	Mean of Logged Detects					3.19	SD of Logged Detects					1.85	
1203													
1204	Normal GOF Test on Detects Only												
1205	Shapiro Wilk Test Statistic					0.13	Normal GOF Test on Detected Observations Only						
1206	5% Shapiro Wilk P Value					0	Detected Data Not Normal at 5% Significance Level						
1207	Lilliefors Test Statistic					0.44	Lilliefors GOF Test						
1208	5% Lilliefors Critical Value					0.07	Detected Data Not Normal at 5% Significance Level						
1209	Detected Data Not Normal at 5% Significance Level												
1210													
1211	Kaplan-Meier (KM) Statistics using Normal Critical Values and other Nonparametric UCLs												
1212	Mean					383.3	Standard Error of Mean					235	
1213	SD					2926	95% KM (BCA) UCL					872.9	
1214	95% KM (t) UCL					772.2	95% KM (Percentile Bootstrap) UCL					849.1	
1215	95% KM (z) UCL					769.8	95% KM Bootstrap t UCL					3252	
1216	90% KM Chebyshev UCL					1088	95% KM Chebyshev UCL					1408	
1217	97.5% KM Chebyshev UCL					1851	99% KM Chebyshev UCL					2722	
1218													
1219	Gamma GOF Tests on Detected Observations Only												
1220	A-D Test Statistic					21.7	Anderson-Darling GOF Test						
1221	5% A-D Critical Value					0.89	Detected Data Not Gamma Distributed at 5% Significance Level						
1222	K-S Test Statistic					0.27	Kolmogrov-Smirnoff GOF						
1223	5% K-S Critical Value					0.08	Detected Data Not Gamma Distributed at 5% Significance Level						
1224	Detected Data Not Gamma Distributed at 5% Significance Level												
1225													
1226	Gamma Statistics on Detected Data Only												
1227	k hat (MLE)					0.25	k star (bias corrected MLE)					0.25	
1228	Theta hat (MLE)					1532	Theta star (bias corrected MLE)					1536	
1229	nu hat (MLE)					78.0	nu star (bias corrected)					77.8	
1230	MLE Mean (bias corrected)					390.8	MLE Sd (bias corrected)					774.7	
1231													
1232	Gamma Kaplan-Meier (KM) Statistics												
1233	k hat (KM)					0.01	nu hat (KM)					5.35	
1234	Approximate Chi Square Value (5.36, α)					1.32	Adjusted Chi Square Value (5.36, β)					1.30	
1235	Approximate KM-UCL (use when $n \geq 50$)					1555	Gamma Adjusted KM-UCL (use when $n < 50$)					1577	
1236	Gamma (KM) may not be used when k hat (KM) is < 0.1												
1237													
1238	Gamma ROS Statistics using Imputed Non-Detects												
1239	GROS may not be used when data set has > 50% NDs with many tied observations at multiple DLs												
1240	GROS may not be used when kstar of detected data is small such as < 0.1												
1241	For such situations, GROS method tends to yield inflated values of UCLs and BTVs												
1242	Gamma distributed detected data, BTVs and UCLs may be computed using gamma distribution on KM estimate												
1243	Minimum					0.01	Mean					383.3	
1244	Maximum					36400	Median					11.9	
1245	SD					2935	CV					7.65	
1246	k hat (MLE)					0.24	k star (bias corrected MLE)					0.24	
1247	Theta hat (MLE)					1563	Theta star (bias corrected MLE)					1566	
1248	nu hat (MLE)					76.5	nu star (bias corrected)					76.3	
1249	MLE Mean (bias corrected)					383.3	MLE Sd (bias corrected)					774.7	
1250							Adjusted Level of Significance (β)					0.04	
1251	Approximate Chi Square Value (76.37, α)					57.2	Adjusted Chi Square Value (76.37, β)					57.0	
1252	Gamma Approximate UCL (use when $n \geq 50$)					511.3	Gamma Adjusted UCL (use when $n < 50$)					512.7	
1253													
1254	Lognormal GOF Test on Detected Observations Only												
1255	Lilliefors Test Statistic					0.16	Lilliefors GOF Test						
1256	5% Lilliefors Critical Value					0.07	Detected Data Not Lognormal at 5% Significance Level						
1257	Detected Data Not Lognormal at 5% Significance Level												
1258													
1259	Lognormal ROS Statistics Using Imputed Non-Detects												
1260	Mean in Original Scale					383.3	Mean in Log Scale					3.12	

	A	B	C	D	E	F	G	H	I	J	K	L	
1261	SD in Original Scale					2935	SD in Log Scale					1.90	
1262	95% t UCL (assumes normality of ROS data)					772.1	95% Percentile Bootstrap UCL					840.2	
1263	95% BCA Bootstrap UCL					1290	95% Bootstrap t UCL					3181	
1264	95% H-UCL (Log ROS)					225.5							
1265													
1266	DL/2 Statistics												
1267	DL/2 Normal					DL/2 Log-Transformed							
1268	Mean in Original Scale					383.3	Mean in Log Scale					3.14	
1269	SD in Original Scale					2935	SD in Log Scale					1.87	
1270	95% t UCL (Assumes normality)					772.1	95% H-Stat UCL					214.1	
1271	DL/2 is not a recommended method, provided for comparisons and historical reasons												
1272													
1273	Nonparametric Distribution Free UCL Statistics												
1274	Data do not follow a Discernible Distribution at 5% Significance Level												
1275													
1276	Suggested UCL to Use												
1277	97.5% KM (Chebyshev) UCL					1851							
1278													
1279	Recommendations regarding the selection of a 95% UCL are provided to help the user to select the most appropriate												
1280	Recommendations are based upon data size, data distribution, and skewness.												
1281	Recommendations are based upon the results of the simulation studies summarized in Singh, Maichle, and												
1282	Recommendations results will not cover all Real World data sets; for additional insight the user may want to consult												
1283													
1284	Cyanide (Total)												
1285													
1286	General Statistics												
1287	Total Number of Observations					163	Number of Distinct Observations					103	
1288	Number of Detects					22	Number of Non-Detects					141	
1289	Number of Distinct Detects					22	Number of Distinct Non-Detects					85	
1290	Minimum Detect					0.07	Minimum Non-Detect					0.07	
1291	Maximum Detect					0.55	Maximum Non-Detect					0.42	
1292	Variance Detects					0.01	Percent Non-Detects					86.5	
1293	Mean Detects					0.18	SD Detects					0.11	
1294	Median Detects					0.14	CV Detects					0.60	
1295	Skewness Detects					2.09	Kurtosis Detects					5.59	
1296	Mean of Logged Detects					-1.84	SD of Logged Detects					0.50	
1297													
1298	Normal GOF Test on Detects Only												
1299	Shapiro Wilk Test Statistic					0.79	Shapiro Wilk GOF Test						
1300	5% Shapiro Wilk Critical Value					0.91	Detected Data Not Normal at 5% Significance Level						
1301	Lilliefors Test Statistic					0.18	Lilliefors GOF Test						
1302	5% Lilliefors Critical Value					0.18	Detected Data Not Normal at 5% Significance Level						
1303	Detected Data Not Normal at 5% Significance Level												
1304													
1305	Kaplan-Meier (KM) Statistics using Normal Critical Values and other Nonparametric UCLs												
1306	Mean					0.12	Standard Error of Mean					0.009	
1307	SD					0.06	95% KM (BCA) UCL					0.14	
1308	95% KM (t) UCL					0.14	95% KM (Percentile Bootstrap) UCL					0.14	
1309	95% KM (z) UCL					0.14	95% KM Bootstrap t UCL					0.14	
1310	90% KM Chebyshev UCL					0.15	95% KM Chebyshev UCL					0.17	
1311	97.5% KM Chebyshev UCL					0.18	99% KM Chebyshev UCL					0.22	
1312													
1313	Gamma GOF Tests on Detected Observations Only												
1314	A-D Test Statistic					0.52	Anderson-Darling GOF Test						
1315	5% A-D Critical Value					0.74	data appear Gamma Distributed at 5% Significance Level						
1316	K-S Test Statistic					0.14	Kolmogorov-Smirnoff GOF						
1317	5% K-S Critical Value					0.18	data appear Gamma Distributed at 5% Significance Level						
1318	Detected data appear Gamma Distributed at 5% Significance Level												
1319													
1320	Gamma Statistics on Detected Data Only												
1321	k hat (MLE)					3.93	k star (bias corrected MLE)					3.43	
1322	Theta hat (MLE)					0.04	Theta star (bias corrected MLE)					0.05	
1323	nu hat (MLE)					173.2	nu star (bias corrected)					150.9	

A	B	C	D	E	F	G	H	I	J	K	L
1324	MLE Mean (bias corrected)				0.18	MLE Sd (bias corrected)				0.09	
1325											
1326	Gamma Kaplan-Meier (KM) Statistics										
1327	k hat (KM)				4.10	nu hat (KM)				1338	
1328	Approximate Chi Square Value (N/A, α)				1254	Adjusted Chi Square Value (N/A, β)				1254	
1329	Approximate KM-UCL (use when $n \geq 50$)				0.13	Gamma Adjusted KM-UCL (use when $n < 50$)				0.13	
1330											
1331	Gamma ROS Statistics using Imputed Non-Detects										
1332	GROS may not be used when data set has > 50% NDs with many tied observations at multiple DLs										
1333	GROS may not be used when kstar of detected data is small such as < 0.1										
1334	For such situations, GROS method tends to yield inflated values of UCLs and BTVs										
1335	Gamma distributed detected data, BTVs and UCLs may be computed using gamma distribution on KM estimates										
1336	Minimum				0.01	Mean				0.11	
1337	Maximum				0.55	Median				0.10	
1338	SD				0.05	CV				0.52	
1339	k hat (MLE)				5.02	k star (bias corrected MLE)				4.93	
1340	Theta hat (MLE)				0.02	Theta star (bias corrected MLE)				0.02	
1341	nu hat (MLE)				1636	nu star (bias corrected)				1608	
1342	MLE Mean (bias corrected)				0.11	MLE Sd (bias corrected)				0.04	
1343						Adjusted Level of Significance (β)				0.04	
1344	Approximate Chi Square Value (N/A, α)				1516	Adjusted Chi Square Value (N/A, β)				1515	
1345	Gamma Approximate UCL (use when $n \geq 50$)				0.11	Gamma Adjusted UCL (use when $n < 50$)				0.11	
1346											
1347	Lognormal GOF Test on Detected Observations Only										
1348	Shapiro Wilk Test Statistic				0.95	Shapiro Wilk GOF Test					
1349	5% Shapiro Wilk Critical Value				0.91	Detected Data appear Lognormal at 5% Significance Level					
1350	Lilliefors Test Statistic				0.11	Lilliefors GOF Test					
1351	5% Lilliefors Critical Value				0.18	Detected Data appear Lognormal at 5% Significance Level					
1352	Detected Data appear Lognormal at 5% Significance Level										
1353											
1354	Lognormal ROS Statistics Using Imputed Non-Detects										
1355	Mean in Original Scale				0.11	Mean in Log Scale				-2.19	
1356	SD in Original Scale				0.05	SD in Log Scale				0.31	
1357	95% t UCL (assumes normality of ROS data)				0.12	95% Percentile Bootstrap UCL				0.12	
1358	95% BCA Bootstrap UCL				0.12	95% Bootstrap t UCL				0.12	
1359	95% H-UCL (Log ROS)				0.12						
1360											
1361	DLs using Lognormal Distribution and KM Estimates when Detected data are Lognormally Distributed										
1362	KM Mean (logged)				-2.14	95% H-UCL (KM -Log)				0.13	
1363	KM SD (logged)				0.39	95% Critical H Value (KM-Log)				1.76	
1364	KM Standard Error of Mean (logged)				0.07						
1365											
1366	DL/2 Statistics										
1367	DL/2 Normal					DL/2 Log-Transformed					
1368	Mean in Original Scale				0.14	Mean in Log Scale				-2.01	
1369	SD in Original Scale				0.04	SD in Log Scale				0.32	
1370	95% t UCL (Assumes normality)				0.14	95% H-Stat UCL				0.14	
1371	DL/2 is not a recommended method, provided for comparisons and historical reasons										
1372											
1373	Nonparametric Distribution Free UCL Statistics										
1374	Detected Data appear Gamma Distributed at 5% Significance Level										
1375											
1376	Suggested UCL to Use										
1377	95% KM (t) UCL				0.14	95% GROS Approximate Gamma UCL				0.11	
1378	95% Approximate Gamma KM-UCL				0.13						
1379											
1380	Recommendations regarding the selection of a 95% UCL are provided to help the user to select the most appropriate										
1381	Recommendations are based upon data size, data distribution, and skewness.										
1382	Recommendations are based upon the results of the simulation studies summarized in Singh, Maichle, and										
1383	Recommendations results will not cover all Real World data sets; for additional insight the user may want to consult										
1384											
1385	HMX										
1386											

	A	B	C	D	E	F	G	H	I	J	K	L
1387	General Statistics											
1388	Total Number of Observations					163	Number of Distinct Observations					18
1389	Number of Detects					17	Number of Non-Detects					146
1390	Number of Distinct Detects					17	Number of Distinct Non-Detects					1
1391	Minimum Detect					0.15	Minimum Non-Detect					0.5
1392	Maximum Detect					35.3	Maximum Non-Detect					0.5
1393	Variance Detects					89.74	Percent Non-Detects					89.5
1394	Mean Detects					5.56	SD Detects					9.47
1395	Median Detects					0.57	CV Detects					1.70
1396	Skewness Detects					2.25	Kurtosis Detects					5.53
1397	Mean of Logged Detects					0.14	SD of Logged Detects					1.91
1398												
1399	Normal GOF Test on Detects Only											
1400	Shapiro Wilk Test Statistic					0.64	Shapiro Wilk GOF Test					
1401	5% Shapiro Wilk Critical Value					0.89	Detected Data Not Normal at 5% Significance Level					
1402	Lilliefors Test Statistic					0.34	Lilliefors GOF Test					
1403	5% Lilliefors Critical Value					0.21	Detected Data Not Normal at 5% Significance Level					
1404	Detected Data Not Normal at 5% Significance Level											
1405												
1406	Kaplan-Meier (KM) Statistics using Normal Critical Values and other Nonparametric UCLs											
1407	Mean					0.78	Standard Error of Mean					0.27
1408	SD					3.38	95% KM (BCA) UCL					1.26
1409	95% KM (t) UCL					1.23	95% KM (Percentile Bootstrap) UCL					1.26
1410	95% KM (z) UCL					1.23	95% KM Bootstrap t UCL					1.74
1411	90% KM Chebyshev UCL					1.60	95% KM Chebyshev UCL					1.97
1412	97.5% KM Chebyshev UCL					2.49	99% KM Chebyshev UCL					3.50
1413												
1414	Gamma GOF Tests on Detected Observations Only											
1415	A-D Test Statistic					1.35	Anderson-Darling GOF Test					
1416	5% A-D Critical Value					0.81	ed Data Not Gamma Distributed at 5% Significance Level					
1417	K-S Test Statistic					0.23	Kolmogorov-Smirnov GOF					
1418	5% K-S Critical Value					0.22	ed Data Not Gamma Distributed at 5% Significance Level					
1419	Detected Data Not Gamma Distributed at 5% Significance Level											
1420												
1421	Gamma Statistics on Detected Data Only											
1422	k hat (MLE)					0.41	k star (bias corrected MLE)					0.38
1423	Theta hat (MLE)					13.3	Theta star (bias corrected MLE)					12.9
1424	nu hat (MLE)					14.1	nu star (bias corrected)					14.5
1425	MLE Mean (bias corrected)					5.56	MLE Sd (bias corrected)					9.00
1426												
1427	Gamma Kaplan-Meier (KM) Statistics											
1428	k hat (KM)					0.05	nu hat (KM)					17.3
1429	Approximate Chi Square Value (17.32, α)					8.90	Adjusted Chi Square Value (17.32, β)					8.85
1430	Approximate KM-UCL (use when $n \geq 50$)					1.51	Gamma Adjusted KM-UCL (use when $n < 50$)					1.52
1431	Gamma (KM) may not be used when k hat (KM) is < 0.1											
1432												
1433	Gamma ROS Statistics using Imputed Non-Detects											
1434	GROS may not be used when data set has $> 50\%$ NDs with many tied observations at multiple DLs											
1435	GROS may not be used when kstar of detected data is small such as < 0.1											
1436	For such situations, GROS method tends to yield inflated values of UCLs and BTVs											
1437	Gamma distributed detected data, BTVs and UCLs may be computed using gamma distribution on KM estimate											
1438	Minimum					0.01	Mean					1.07
1439	Maximum					35.3	Median					0.01
1440	SD					3.58	CV					3.32
1441	k hat (MLE)					0.22	k star (bias corrected MLE)					0.22
1442	Theta hat (MLE)					4.76	Theta star (bias corrected MLE)					4.76
1443	nu hat (MLE)					73.8	nu star (bias corrected)					73.7
1444	MLE Mean (bias corrected)					1.07	MLE Sd (bias corrected)					2.26
1445							Adjusted Level of Significance (β)					0.04
1446	Approximate Chi Square Value (73.79, α)					55.0	Adjusted Chi Square Value (73.79, β)					54.8
1447	Gamma Approximate UCL (use when $n \geq 50$)					1.44	Gamma Adjusted UCL (use when $n < 50$)					1.45
1448												
1449	Lognormal GOF Test on Detected Observations Only											

	A	B	C	D	E	F	G	H	I	J	K	L	
1450	Shapiro Wilk Test Statistic					0.85	Shapiro Wilk GOF Test						
1451	5% Shapiro Wilk Critical Value					0.89	Detected Data Not Lognormal at 5% Significance Level						
1452	Lilliefors Test Statistic					0.22	Lilliefors GOF Test						
1453	5% Lilliefors Critical Value					0.21	Detected Data Not Lognormal at 5% Significance Level						
1454	Detected Data Not Lognormal at 5% Significance Level												
1455													
1456	Lognormal ROS Statistics Using Imputed Non-Detects												
1457	Mean in Original Scale					0.98	Mean in Log Scale					-1.26	
1458	SD in Original Scale					3.39	SD in Log Scale					1.38	
1459	95% t UCL (assumes normality of ROS data)					1.42	95% Percentile Bootstrap UCL					1.47	
1460	95% BCA Bootstrap UCL					1.71	95% Bootstrap t UCL					1.9	
1461	95% H-UCL (Log ROS)					0.98							
1462													
1463	DL/2 Statistics												
1464	DL/2 Normal					DL/2 Log-Transformed							
1465	Mean in Original Scale					0.80	Mean in Log Scale					-1.22	
1466	SD in Original Scale					3.39	SD in Log Scale					0.76	
1467	95% t UCL (Assumes normality)					1.24	95% H-Stat UCL					0.44	
1468	DL/2 is not a recommended method, provided for comparisons and historical reasons												
1469													
1470	Nonparametric Distribution Free UCL Statistics												
1471	Data do not follow a Discernible Distribution at 5% Significance Level												
1472													
1473	Suggested UCL to Use												
1474	95% KM (Chebyshev) UCL					1.97							
1475													
1476	Recommendations regarding the selection of a 95% UCL are provided to help the user to select the most appropriate UCL.												
1477	Recommendations are based upon data size, data distribution, and skewness.												
1478	Recommendations are based upon the results of the simulation studies summarized in Singh, Maichle, and Singh (2007).												
1479	Simulation results will not cover all Real World data sets; for additional insight the user may want to consult the literature.												
1480													
1481													
1482	Iron												
1483													
1484	General Statistics												
1485	Total Number of Observations					171	Number of Distinct Observations					126	
1486							Number of Missing Observations					0	
1487	Minimum					4250	Mean					10122	
1488	Maximum					22300	Median					9740	
1489	SD					2859	Std. Error of Mean					218.7	
1490	Coefficient of Variation					0.28	Skewness					1.20	
1491													
1492	Normal GOF Test												
1493	Shapiro Wilk Test Statistic					0.93	Shapiro Wilk GOF Test						
1494	5% Shapiro Wilk P Value					7.574E-06	Data Not Normal at 5% Significance Level						
1495	Lilliefors Test Statistic					0.096	Lilliefors GOF Test						
1496	5% Lilliefors Critical Value					0.061	Data Not Normal at 5% Significance Level						
1497	Data Not Normal at 5% Significance Level												
1498													
1499	Assuming Normal Distribution												
1500	95% Normal UCL					95% UCLs (Adjusted for Skewness)							
1501	95% Student's-t UCL					10483	95% Adjusted-CLT UCL (Chen-1995)					10503	
1502							95% Modified-t UCL (Johnson-1978)					10487	
1503													
1504	Gamma GOF Test												
1505	A-D Test Statistic					0.70	Anderson-Darling Gamma GOF Test						
1506	5% A-D Critical Value					0.75	Data appear Gamma Distributed at 5% Significance Level						
1507	K-S Test Statistic					0.059	Kolmogorov-Smirnoff Gamma GOF Test						
1508	5% K-S Critical Value					0.071	Data appear Gamma Distributed at 5% Significance Level						
1509	Detected data appear Gamma Distributed at 5% Significance Level												
1510													
1511	Gamma Statistics												
1512	k hat (MLE)					13.7	k star (bias corrected MLE)					13.4	

	A	B	C	D	E	F	G	H	I	J	K	L
1513	Theta hat (MLE)					738.4	Theta star (bias corrected MLE)					751.4
1514	nu hat (MLE)					4688	nu star (bias corrected)					4607
1515	MLE Mean (bias corrected)					10122	MLE Sd (bias corrected)					2758
1516							Approximate Chi Square Value (0.05)					4450
1517	Adjusted Level of Significance					0.04	Adjusted Chi Square Value					4449
1518												
1519	Assuming Gamma Distribution											
1520	Approximate Gamma UCL (use when n>=50)					10478	Adjusted Gamma UCL (use when n<50)					10481
1521												
1522	Lognormal GOF Test											
1523	Shapiro Wilk Test Statistic					0.98	Shapiro Wilk Lognormal GOF Test					
1524	5% Shapiro Wilk P Value					0.81	Data appear Lognormal at 5% Significance Level					
1525	Lilliefors Test Statistic					0.05	Lilliefors Lognormal GOF Test					
1526	5% Lilliefors Critical Value					0.06	Data appear Lognormal at 5% Significance Level					
1527	Data appear Lognormal at 5% Significance Level											
1528												
1529	Lognormal Statistics											
1530	Minimum of Logged Data					8.35	Mean of logged Data					9.18
1531	Maximum of Logged Data					10.0	SD of logged Data					0.27
1532												
1533	Assuming Lognormal Distribution											
1534	95% H-UCL					10487	90% Chebyshev (MVUE) UCL					10759
1535	95% Chebyshev (MVUE) UCL					11049	97.5% Chebyshev (MVUE) UCL					11452
1536	99% Chebyshev (MVUE) UCL					12243						
1537												
1538	Nonparametric Distribution Free UCL Statistics											
1539	Data appear to follow a Discernible Distribution at 5% Significance Level											
1540												
1541	Nonparametric Distribution Free UCLs											
1542	95% CLT UCL					10481	95% Jackknife UCL					10483
1543	95% Standard Bootstrap UCL					10475	95% Bootstrap-t UCL					10514
1544	95% Hall's Bootstrap UCL					10516	95% Percentile Bootstrap UCL					10479
1545	95% BCA Bootstrap UCL					10525						
1546	90% Chebyshev(Mean, Sd) UCL					10778	95% Chebyshev(Mean, Sd) UCL					11075
1547	97.5% Chebyshev(Mean, Sd) UCL					11487	99% Chebyshev(Mean, Sd) UCL					12297
1548												
1549	Suggested UCL to Use											
1550	95% Approximate Gamma UCL					10478						
1551												
1552	Conditions regarding the selection of a 95% UCL are provided to help the user to select the most appropriate											
1553	Recommendations are based upon the results of the simulation studies summarized in Singh, Singh, and											
1554	and Singh and Singh (2003). However, simulations results will not cover all Real World data sets											
1555	For additional insight the user may want to consult a statistician.											
1556												
1557	Lead											
1558												
1559	General Statistics											
1560	Total Number of Observations					171	Number of Distinct Observations					158
1561	Number of Detects					170	Number of Non-Detects					1
1562	Number of Distinct Detects					157	Number of Distinct Non-Detects					1
1563	Minimum Detect					2.48	Minimum Non-Detect					7.46
1564	Maximum Detect					138000	Maximum Non-Detect					7.46
1565	Variance Detects					1.119E-1	Percent Non-Detects					0.58
1566	Mean Detects					885.2	SD Detects					10580
1567	Median Detects					15.7	CV Detects					11.9
1568	Skewness Detects					13.0	Kurtosis Detects					169.9
1569	Mean of Logged Detects					3.19	SD of Logged Detects					1.53
1570												
1571	Normal GOF Test on Detects Only											
1572	Shapiro Wilk Test Statistic					0.08	Normal GOF Test on Detected Observations Only					
1573	5% Shapiro Wilk P Value					0	Detected Data Not Normal at 5% Significance Level					
1574	Lilliefors Test Statistic					0.48	Lilliefors GOF Test					
1575	5% Lilliefors Critical Value					0.06	Detected Data Not Normal at 5% Significance Level					

	A	B	C	D	E	F	G	H	I	J	K	L
1576	Detected Data Not Normal at 5% Significance Level											
1577												
1578	Kaplan-Meier (KM) Statistics using Normal Critical Values and other Nonparametric UCLs											
1579	Mean				880.1	Standard Error of Mean				806.7		
1580	SD				10518	95% KM (BCA) UCL				2510		
1581	95% KM (t) UCL				2214	95% KM (Percentile Bootstrap) UCL				2491		
1582	95% KM (z) UCL				2207	95% KM Bootstrap t UCL				69555		
1583	90% KM Chebyshev UCL				3300	95% KM Chebyshev UCL				4396		
1584	97.5% KM Chebyshev UCL				5918	99% KM Chebyshev UCL				8907		
1585												
1586	Gamma GOF Tests on Detected Observations Only											
1587	A-D Test Statistic				38.1	Anderson-Darling GOF Test						
1588	5% A-D Critical Value				0.91	Detected Data Not Gamma Distributed at 5% Significance Level						
1589	K-S Test Statistic				0.34	Kolmogrov-Smirnoff GOF						
1590	5% K-S Critical Value				0.07	Detected Data Not Gamma Distributed at 5% Significance Level						
1591	Detected Data Not Gamma Distributed at 5% Significance Level											
1592												
1593	Gamma Statistics on Detected Data Only											
1594	k hat (MLE)				0.20	k star (bias corrected MLE)				0.20		
1595	Theta hat (MLE)				4329	Theta star (bias corrected MLE)				4322		
1596	nu hat (MLE)				69.5	nu star (bias corrected)				69.6		
1597	MLE Mean (bias corrected)				885.2	MLE Sd (bias corrected)				1956		
1598												
1599	Gamma Kaplan-Meier (KM) Statistics											
1600	k hat (KM)				0.007	nu hat (KM)				2.39		
1601	Approximate Chi Square Value (2.39, α)				0.21	Adjusted Chi Square Value (2.39, β)				0.21		
1602	Approximate KM-UCL (use when $n \geq 50$)				9656	Gamma Adjusted KM-UCL (use when $n < 50$)				9832		
1603	Gamma (KM) may not be used when k hat (KM) is < 0.1											
1604												
1605	Gamma ROS Statistics using Imputed Non-Detects											
1606	GROS may not be used when data set has $> 50\%$ NDs with many tied observations at multiple DLs											
1607	GROS may not be used when kstar of detected data is small such as < 0.1											
1608	For such situations, GROS method tends to yield inflated values of UCLs and BTVs											
1609	Gamma distributed detected data, BTVs and UCLs may be computed using gamma distribution on KM estimate											
1610	Minimum				0.01	Mean				880		
1611	Maximum				138000	Median				15.6		
1612	SD				10549	CV				11.9		
1613	k hat (MLE)				0.20	k star (bias corrected MLE)				0.20		
1614	Theta hat (MLE)				4345	Theta star (bias corrected MLE)				4337		
1615	nu hat (MLE)				69.2	nu star (bias corrected)				69.3		
1616	MLE Mean (bias corrected)				880	MLE Sd (bias corrected)				1954		
1617						Adjusted Level of Significance (β)				0.04		
1618	Approximate Chi Square Value (69.39, α)				51.2	Adjusted Chi Square Value (69.39, β)				51.0		
1619	Gamma Approximate UCL (use when $n \geq 50$)				1192	Gamma Adjusted UCL (use when $n < 50$)				1195		
1620												
1621	Lognormal GOF Test on Detected Observations Only											
1622	Lilliefors Test Statistic				0.13	Lilliefors GOF Test						
1623	5% Lilliefors Critical Value				0.06	Detected Data Not Lognormal at 5% Significance Level						
1624	Detected Data Not Lognormal at 5% Significance Level											
1625												
1626	Lognormal ROS Statistics Using Imputed Non-Detects											
1627	Mean in Original Scale				880	Mean in Log Scale				3.18		
1628	SD in Original Scale				10549	SD in Log Scale				1.53		
1629	95% t UCL (assumes normality of ROS data)				2214	95% Percentile Bootstrap UCL				2490		
1630	95% BCA Bootstrap UCL				3311	95% Bootstrap t UCL				69303		
1631	95% H-UCL (Log ROS)				107.5							
1632												
1633	DL/2 Statistics											
1634	DL/2 Normal					DL/2 Log-Transformed						
1635	Mean in Original Scale				880	Mean in Log Scale				3.18		
1636	SD in Original Scale				10549	SD in Log Scale				1.53		
1637	95% t UCL (Assumes normality)				2214	95% H-Stat UCL				107.6		
1638	DL/2 is not a recommended method, provided for comparisons and historical reasons											

	A	B	C	D	E	F	G	H	I	J	K	L
1639												
1640	Nonparametric Distribution Free UCL Statistics											
1641	Data do not follow a Discernible Distribution at 5% Significance Level											
1642												
1643	Suggested UCL to Use											
1644	97.5% KM (Chebyshev) UCL 5918											
1645												
1646	ations regarding the selection of a 95% UCL are provided to help the user to select the most appropriate											
1647	Recommendations are based upon data size, data distribution, and skewness.											
1648	Recommendations are based upon the results of the simulation studies summarized in Singh, Maichle, and											
1649	ations results will not cover all Real World data sets; for additional insight the user may want to cons											
1650												
1651	Magnesium											
1652												
1653	General Statistics											
1654	Total Number of Observations				171	Number of Distinct Observations				145		
1655	Number of Detects				163	Number of Non-Detects				8		
1656	Number of Distinct Detects				138	Number of Distinct Non-Detects				8		
1657	Minimum Detect				136	Minimum Non-Detect				217		
1658	Maximum Detect				2870	Maximum Non-Detect				955		
1659	Variance Detects				296062	Percent Non-Detects				4.67		
1660	Mean Detects				997	SD Detects				544.1		
1661	Median Detects				924	CV Detects				0.54		
1662	Skewness Detects				0.93	Kurtosis Detects				1.18		
1663	Mean of Logged Detects				6.73	SD of Logged Detects				0.62		
1664												
1665	Normal GOF Test on Detects Only											
1666	Shapiro Wilk Test Statistic				0.93	Normal GOF Test on Detected Observations Only						
1667	5% Shapiro Wilk P Value				5.1757E	Detected Data Not Normal at 5% Significance Level						
1668	Lilliefors Test Statistic				0.084	Lilliefors GOF Test						
1669	5% Lilliefors Critical Value				0.069	Detected Data Not Normal at 5% Significance Level						
1670	Detected Data Not Normal at 5% Significance Level											
1671												
1672	Kaplan-Meier (KM) Statistics using Normal Critical Values and other Nonparametric UCLs											
1673	Mean				971.3	Standard Error of Mean				41.9		
1674	SD				545	95% KM (BCA) UCL				1037		
1675	95% KM (t) UCL				1041	95% KM (Percentile Bootstrap) UCL				1037		
1676	95% KM (z) UCL				1040	95% KM Bootstrap t UCL				1048		
1677	90% KM Chebyshev UCL				1097	95% KM Chebyshev UCL				1154		
1678	97.5% KM Chebyshev UCL				1233	99% KM Chebyshev UCL				1389		
1679												
1680	Gamma GOF Tests on Detected Observations Only											
1681	A-D Test Statistic				0.97	Anderson-Darling GOF Test						
1682	5% A-D Critical Value				0.75	ed Data Not Gamma Distributed at 5% Significance Level						
1683	K-S Test Statistic				0.084	Kolmogrov-Smirnoff GOF						
1684	5% K-S Critical Value				0.07	ed Data Not Gamma Distributed at 5% Significance Level						
1685	Detected Data Not Gamma Distributed at 5% Significance Level											
1686												
1687	Gamma Statistics on Detected Data Only											
1688	k hat (MLE)				3.13	k star (bias corrected MLE)				3.08		
1689	Theta hat (MLE)				317.8	Theta star (bias corrected MLE)				323.4		
1690	nu hat (MLE)				1023	nu star (bias corrected)				1005		
1691	MLE Mean (bias corrected)				997	MLE Sd (bias corrected)				567.8		
1692												
1693	Gamma Kaplan-Meier (KM) Statistics											
1694	k hat (KM)				3.17	nu hat (KM)				1086		
1695	Approximate Chi Square Value (N/A, α)				1011	Adjusted Chi Square Value (N/A, β)				1010		
1696	Approximate KM-UCL (use when $n \geq 50$)				1044	Gamma Adjusted KM-UCL (use when $n < 50$)				1044		
1697												
1698	Gamma ROS Statistics using Imputed Non-Detects											
1699	GROS may not be used when data set has > 50% NDs with many tied observations at multiple DLs											
1700	GROS may not be used when kstar of detected data is small such as < 0.1											
1701	For such situations, GROS method tends to yield inflated values of UCLs and BTVs											

	A	B	C	D	E	F	G	H	I	J	K	L
1702	Gamma distributed detected data, BTVs and UCLs may be computed using gamma distribution on KM e											
1703	Minimum				136	Mean				972.2		
1704	Maximum				2870	Median				896		
1705	SD				543.8	CV				0.55		
1706	k hat (MLE)				3.04	k star (bias corrected MLE)				2.99		
1707	Theta hat (MLE)				319.2	Theta star (bias corrected MLE)				324.5		
1708	nu hat (MLE)				1042	nu star (bias corrected)				1025		
1709	MLE Mean (bias corrected)				972.2	MLE Sd (bias corrected)				561.7		
1710						Adjusted Level of Significance (β)				0.04		
1711	Approximate Chi Square Value (N/A, α)				951.3	Adjusted Chi Square Value (N/A, β)				950.7		
1712	Gamma Approximate UCL (use when n>=50)				1047	Gamma Adjusted UCL (use when n<50)				1048		
1713												
1714	Lognormal GOF Test on Detected Observations Only											
1715	Lilliefors Test Statistic				0.11	Lilliefors GOF Test						
1716	5% Lilliefors Critical Value				0.06	Detected Data Not Lognormal at 5% Significance Level						
1717	Detected Data Not Lognormal at 5% Significance Level											
1718												
1719	Lognormal ROS Statistics Using Imputed Non-Detects											
1720	Mean in Original Scale				971.5	Mean in Log Scale				6.70		
1721	SD in Original Scale				544.2	SD in Log Scale				0.63		
1722	95% t UCL (assumes normality of ROS data)				1040	95% Percentile Bootstrap UCL				1043		
1723	95% BCA Bootstrap UCL				1046	95% Bootstrap t UCL				1044		
1724	95% H-UCL (Log ROS)				1091							
1725												
1726	DL/2 Statistics											
1727	DL/2 Normal					DL/2 Log-Transformed						
1728	Mean in Original Scale				967.1	Mean in Log Scale				6.69		
1729	SD in Original Scale				549.1	SD in Log Scale				0.65		
1730	95% t UCL (Assumes normality)				1037	95% H-Stat UCL				1098		
1731	DL/2 is not a recommended method, provided for comparisons and historical reasons											
1732												
1733	Nonparametric Distribution Free UCL Statistics											
1734	Data do not follow a Discernible Distribution at 5% Significance Level											
1735												
1736	Suggested UCL to Use											
1737	95% KM (BCA) UCL				1037							
1738												
1739	Recommendations regarding the selection of a 95% UCL are provided to help the user to select the most appropriate											
1740	Recommendations are based upon data size, data distribution, and skewness.											
1741	Recommendations are based upon the results of the simulation studies summarized in Singh, Maichle, and											
1742	Recommendations results will not cover all Real World data sets; for additional insight the user may want to consult											
1743												
1744												
1745	Manganese											
1746												
1747	General Statistics											
1748	Total Number of Observations				171	Number of Distinct Observations				119		
1749						Number of Missing Observations				0		
1750	Minimum				102	Mean				254.9		
1751	Maximum				765	Median				238		
1752	SD				89.7	Std. Error of Mean				6.86		
1753	Coefficient of Variation				0.35	Skewness				2.47		
1754												
1755	Normal GOF Test											
1756	Shapiro Wilk Test Statistic				0.82	Shapiro Wilk GOF Test						
1757	5% Shapiro Wilk P Value				0	Data Not Normal at 5% Significance Level						
1758	Lilliefors Test Statistic				0.14	Lilliefors GOF Test						
1759	5% Lilliefors Critical Value				0.06	Data Not Normal at 5% Significance Level						
1760	Data Not Normal at 5% Significance Level											
1761												
1762	Assuming Normal Distribution											
1763	95% Normal UCL					95% UCLs (Adjusted for Skewness)						
1764	95% Student's-t UCL				266.2	95% Adjusted-CLT UCL (Chen-1995)				267.6		

	A	B	C	D	E	F	G	H	I	J	K	L
1765						95% Modified-t UCL (Johnson-1978)						266.5
1766												
1767	Gamma GOF Test											
1768	A-D Test Statistic					2.07	Anderson-Darling Gamma GOF Test					
1769	5% A-D Critical Value					0.75	Data Not Gamma Distributed at 5% Significance Level					
1770	K-S Test Statistic					0.09	Kolmogrov-Smirnov Gamma GOF Test					
1771	5% K-S Critical Value					0.07	Data Not Gamma Distributed at 5% Significance Level					
1772	Data Not Gamma Distributed at 5% Significance Level											
1773												
1774	Gamma Statistics											
1775	k hat (MLE)					10.4	k star (bias corrected MLE)					10.2
1776	Theta hat (MLE)					24.5	Theta star (bias corrected MLE)					24.9
1777	nu hat (MLE)					3558	nu star (bias corrected)					3497
1778	MLE Mean (bias corrected)					254.9	MLE Sd (bias corrected)					79.7
1779							Approximate Chi Square Value (0.05)					3360
1780	Adjusted Level of Significance					0.04	Adjusted Chi Square Value					3359
1781												
1782	Assuming Gamma Distribution											
1783	Approximate Gamma UCL (use when n>=50)					265.2	Adjusted Gamma UCL (use when n<50)					265.3
1784												
1785	Lognormal GOF Test											
1786	Shapiro Wilk Test Statistic					0.97	Shapiro Wilk Lognormal GOF Test					
1787	5% Shapiro Wilk P Value					0.05	Data appear Lognormal at 5% Significance Level					
1788	Lilliefors Test Statistic					0.07	Lilliefors Lognormal GOF Test					
1789	5% Lilliefors Critical Value					0.06	Data Not Lognormal at 5% Significance Level					
1790	Data appear Approximate Lognormal at 5% Significance Level											
1791												
1792	Lognormal Statistics											
1793	Minimum of Logged Data					4.62	Mean of logged Data					5.49
1794	Maximum of Logged Data					6.64	SD of logged Data					0.30
1795												
1796	Assuming Lognormal Distribution											
1797	95% H-UCL					264.5	90% Chebyshev (MVUE) UCL					272.1
1798	95% Chebyshev (MVUE) UCL					280.3	97.5% Chebyshev (MVUE) UCL					291.7
1799	99% Chebyshev (MVUE) UCL					314						
1800												
1801	Nonparametric Distribution Free UCL Statistics											
1802	Data appear to follow a Discernible Distribution at 5% Significance Level											
1803												
1804	Nonparametric Distribution Free UCLs											
1805	95% CLT UCL					266.2	95% Jackknife UCL					266.2
1806	95% Standard Bootstrap UCL					266.2	95% Bootstrap-t UCL					268.3
1807	95% Hall's Bootstrap UCL					269	95% Percentile Bootstrap UCL					267
1808	95% BCA Bootstrap UCL					267.9						
1809	90% Chebyshev(Mean, Sd) UCL					275.5	95% Chebyshev(Mean, Sd) UCL					284.8
1810	97.5% Chebyshev(Mean, Sd) UCL					297.8	99% Chebyshev(Mean, Sd) UCL					323.2
1811												
1812	Suggested UCL to Use											
1813	95% Student's-t UCL					266.2	or 95% Modified-t UCL					266.5
1814												
1815	Recommendations regarding the selection of a 95% UCL are provided to help the user to select the most appropriate											
1816	Recommendations are based upon the results of the simulation studies summarized in Singh, Singh, and Singh											
1817	and Singh and Singh (2003). However, simulations results will not cover all Real World data sets											
1818	For additional insight the user may want to consult a statistician.											
1819												
1820	Mercury											
1821												
1822	General Statistics											
1823	Total Number of Observations					171	Number of Distinct Observations					137
1824	Number of Detects					135	Number of Non-Detects					36
1825	Number of Distinct Detects					120	Number of Distinct Non-Detects					25
1826	Minimum Detect					0.004	Minimum Non-Detect					0.01
1827	Maximum Detect					1.1	Maximum Non-Detect					0.11

	A	B	C	D	E	F	G	H	I	J	K	L
1828				Variance Detects	0.008			Percent Non-Detects				21.04
1829				Mean Detects	0.02			SD Detects				0.09
1830				Median Detects	0.01			CV Detects				3.86
1831				Skewness Detects	11.29			Kurtosis Detects				129.8
1832				Mean of Logged Detects	-4.27			SD of Logged Detects				0.69
1833												
1834				Normal GOF Test on Detects Only								
1835				Shapiro Wilk Test Statistic	0.15			Normal GOF Test on Detected Observations Only				
1836				5% Shapiro Wilk P Value	0			Detected Data Not Normal at 5% Significance Level				
1837				Lilliefors Test Statistic	0.41			Lilliefors GOF Test				
1838				5% Lilliefors Critical Value	0.07			Detected Data Not Normal at 5% Significance Level				
1839				Detected Data Not Normal at 5% Significance Level								
1840												
1841				Kaplan-Meier (KM) Statistics using Normal Critical Values and other Nonparametric UCLs								
1842				Mean	0.02			Standard Error of Mean				0.006
1843				SD	0.08			95% KM (BCA) UCL				0.03
1844				95% KM (t) UCL	0.03			95% KM (Percentile Bootstrap) UCL				0.03
1845				95% KM (z) UCL	0.03			95% KM Bootstrap t UCL				0.09
1846				90% KM Chebyshev UCL	0.04			95% KM Chebyshev UCL				0.04
1847				97.5% KM Chebyshev UCL	0.06			99% KM Chebyshev UCL				0.08
1848												
1849				Gamma GOF Tests on Detected Observations Only								
1850				A-D Test Statistic	7.407E-4			Anderson-Darling GOF Test				
1851				5% A-D Critical Value	0.78			Detected Data Not Gamma Distributed at 5% Significance Level				
1852				K-S Test Statistic	0.22			Kolmogrov-Smirnoff GOF				
1853				5% K-S Critical Value	0.08			Detected Data Not Gamma Distributed at 5% Significance Level				
1854				Detected Data Not Gamma Distributed at 5% Significance Level								
1855												
1856				Gamma Statistics on Detected Data Only								
1857				k hat (MLE)	1.03			k star (bias corrected MLE)				1.01
1858				Theta hat (MLE)	0.02			Theta star (bias corrected MLE)				0.02
1859				nu hat (MLE)	279.1			nu star (bias corrected)				274.2
1860				MLE Mean (bias corrected)	0.02			MLE Sd (bias corrected)				0.02
1861												
1862				Gamma Kaplan-Meier (KM) Statistics								
1863				k hat (KM)	0.06			nu hat (KM)				22.19
1864				Approximate Chi Square Value (22.19, α)	12.4			Adjusted Chi Square Value (22.19, β)				12.4
1865				Approximate KM-UCL (use when $n \geq 50$)	0.03			Gamma Adjusted KM-UCL (use when $n < 50$)				0.03
1866				Gamma (KM) may not be used when k hat (KM) is < 0.1								
1867												
1868				Gamma ROS Statistics using Imputed Non-Detects								
1869				GROS may not be used when data set has > 50% NDs with many tied observations at multiple DLs								
1870				GROS may not be used when kstar of detected data is small such as < 0.1								
1871				For such situations, GROS method tends to yield inflated values of UCLs and BTVs								
1872				Gamma distributed detected data, BTVs and UCLs may be computed using gamma distribution on KM estimates								
1873				Minimum	0.004			Mean				0.02
1874				Maximum	1.1			Median				0.01
1875				SD	0.08			CV				3.87
1876				k hat (MLE)	1.14			k star (bias corrected MLE)				1.13
1877				Theta hat (MLE)	0.01			Theta star (bias corrected MLE)				0.01
1878				nu hat (MLE)	393			nu star (bias corrected)				387.5
1879				MLE Mean (bias corrected)	0.02			MLE Sd (bias corrected)				0.02
1880								Adjusted Level of Significance (β)				0.04
1881				Approximate Chi Square Value (387.45, α)	342.8			Adjusted Chi Square Value (387.45, β)				342.5
1882				Gamma Approximate UCL (use when $n \geq 50$)	0.02			Gamma Adjusted UCL (use when $n < 50$)				0.02
1883												
1884				Lognormal GOF Test on Detected Observations Only								
1885				Lilliefors Test Statistic	0.09			Lilliefors GOF Test				
1886				5% Lilliefors Critical Value	0.07			Detected Data Not Lognormal at 5% Significance Level				
1887				Detected Data Not Lognormal at 5% Significance Level								
1888												
1889				Lognormal ROS Statistics Using Imputed Non-Detects								
1890				Mean in Original Scale	0.02			Mean in Log Scale				-4.35

	A	B	C	D	E	F	G	H	I	J	K	L
1891	SD in Original Scale					0.083	SD in Log Scale					0.64
1892	95% t UCL (assumes normality of ROS data)					0.033	95% Percentile Bootstrap UCL					0.033
1893	95% BCA Bootstrap UCL					0.043	95% Bootstrap t UCL					0.083
1894	95% H-UCL (Log ROS)					0.013						
1895												
1896	DL/2 Statistics											
1897	DL/2 Normal						DL/2 Log-Transformed					
1898	Mean in Original Scale					0.023	Mean in Log Scale					-4.34
1899	SD in Original Scale					0.083	SD in Log Scale					0.72
1900	95% t UCL (Assumes normality)					0.033	95% H-Stat UCL					0.013
1901	DL/2 is not a recommended method, provided for comparisons and historical reasons											
1902												
1903	Nonparametric Distribution Free UCL Statistics											
1904	Data do not follow a Discernible Distribution at 5% Significance Level											
1905												
1906	Suggested UCL to Use											
1907	95% KM (BCA) UCL					0.033						
1908												
1909	Recommendations regarding the selection of a 95% UCL are provided to help the user to select the most appropriate											
1910	Recommendations are based upon data size, data distribution, and skewness.											
1911	Recommendations are based upon the results of the simulation studies summarized in Singh, Maichle, and											
1912	Recommendations results will not cover all Real World data sets; for additional insight the user may want to consult											
1913												
1914	Nickel											
1915												
1916	General Statistics											
1917	Total Number of Observations					171	Number of Distinct Observations					154
1918	Number of Detects					166	Number of Non-Detects					5
1919	Number of Distinct Detects					150	Number of Distinct Non-Detects					4
1920	Minimum Detect					2.22	Minimum Non-Detect					2.8
1921	Maximum Detect					21	Maximum Non-Detect					8.4
1922	Variance Detects					9.29	Percent Non-Detects					2.92
1923	Mean Detects					6.26	SD Detects					3.04
1924	Median Detects					5.51	CV Detects					0.48
1925	Skewness Detects					1.86	Kurtosis Detects					4.85
1926	Mean of Logged Detects					1.73	SD of Logged Detects					0.42
1927												
1928	Normal GOF Test on Detects Only											
1929	Shapiro Wilk Test Statistic					0.84	Normal GOF Test on Detected Observations Only					
1930	5% Shapiro Wilk P Value					0	Detected Data Not Normal at 5% Significance Level					
1931	Lilliefors Test Statistic					0.12	Lilliefors GOF Test					
1932	5% Lilliefors Critical Value					0.063	Detected Data Not Normal at 5% Significance Level					
1933	Detected Data Not Normal at 5% Significance Level											
1934												
1935	Kaplan-Meier (KM) Statistics using Normal Critical Values and other Nonparametric UCLs											
1936	Mean					6.20	Standard Error of Mean					0.23
1937	SD					3.02	95% KM (BCA) UCL					6.57
1938	95% KM (t) UCL					6.58	95% KM (Percentile Bootstrap) UCL					6.60
1939	95% KM (z) UCL					6.58	95% KM Bootstrap t UCL					6.62
1940	90% KM Chebyshev UCL					6.9	95% KM Chebyshev UCL					7.21
1941	97.5% KM Chebyshev UCL					7.65	99% KM Chebyshev UCL					8.51
1942												
1943	Gamma GOF Tests on Detected Observations Only											
1944	A-D Test Statistic					1.54	Anderson-Darling GOF Test					
1945	5% A-D Critical Value					0.75	Detected Data Not Gamma Distributed at 5% Significance Level					
1946	K-S Test Statistic					0.063	Kolmogorov-Smirnoff GOF					
1947	5% K-S Critical Value					0.073	Detected data appear Gamma Distributed at 5% Significance Level					
1948	Detected data follow Appr. Gamma Distribution at 5% Significance Level											
1949												
1950	Gamma Statistics on Detected Data Only											
1951	k hat (MLE)					5.35	k star (bias corrected MLE)					5.26
1952	Theta hat (MLE)					1.16	Theta star (bias corrected MLE)					1.18
1953	nu hat (MLE)					1779	nu star (bias corrected)					1748

	A	B	C	D	E	F	G	H	I	J	K	L
1954	MLE Mean (bias corrected)					6.26	MLE Sd (bias corrected)					2.72
1955												
1956	Gamma Kaplan-Meier (KM) Statistics											
1957	k hat (KM)					4.20	nu hat (KM)					1439
1958	Approximate Chi Square Value (N/A, α)					1352	Adjusted Chi Square Value (N/A, β)					1351
1959	Approximate KM-UCL (use when $n \geq 50$)					6.60	Gamma Adjusted KM-UCL (use when $n < 50$)					6.60
1960												
1961	Gamma ROS Statistics using Imputed Non-Detects											
1962	GROS may not be used when data set has > 50% NDs with many tied observations at multiple DLs											
1963	GROS may not be used when kstar of detected data is small such as < 0.1											
1964	For such situations, GROS method tends to yield inflated values of UCLs and BTVs											
1965	Gamma distributed detected data, BTVs and UCLs may be computed using gamma distribution on KM estimates											
1966	Minimum					1.66	Mean					6.19
1967	Maximum					21	Median					5.46
1968	SD					3.03	CV					0.48
1969	k hat (MLE)					5.26	k star (bias corrected MLE)					5.17
1970	Theta hat (MLE)					1.17	Theta star (bias corrected MLE)					1.19
1971	nu hat (MLE)					1801	nu star (bias corrected)					1771
1972	MLE Mean (bias corrected)					6.19	MLE Sd (bias corrected)					2.72
1973							Adjusted Level of Significance (β)					0.044
1974	Approximate Chi Square Value (N/A, α)					1674	Adjusted Chi Square Value (N/A, β)					1674
1975	Gamma Approximate UCL (use when $n \geq 50$)					6.55	Gamma Adjusted UCL (use when $n < 50$)					6.55
1976												
1977	Lognormal GOF Test on Detected Observations Only											
1978	Lilliefors Test Statistic					0.044	Lilliefors GOF Test					
1979	5% Lilliefors Critical Value					0.062	Detected Data appear Lognormal at 5% Significance Level					
1980	Detected Data appear Lognormal at 5% Significance Level											
1981												
1982	Lognormal ROS Statistics Using Imputed Non-Detects											
1983	Mean in Original Scale					6.20	Mean in Log Scale					1.72
1984	SD in Original Scale					3.02	SD in Log Scale					0.42
1985	95% t UCL (assumes normality of ROS data)					6.58	95% Percentile Bootstrap UCL					6.59
1986	95% BCA Bootstrap UCL					6.64	95% Bootstrap t UCL					6.62
1987	95% H-UCL (Log ROS)					6.54						
1988												
1989	UCLs using Lognormal Distribution and KM Estimates when Detected data are Lognormally Distributed											
1990	KM Mean (logged)					1.72	95% H-UCL (KM -Log)					6.54
1991	KM SD (logged)					0.43	95% Critical H Value (KM-Log)					1.77
1992	KM Standard Error of Mean (logged)					0.033						
1993												
1994	DL/2 Statistics											
1995	DL/2 Normal						DL/2 Log-Transformed					
1996	Mean in Original Scale					6.16	Mean in Log Scale					1.71
1997	SD in Original Scale					3.05	SD in Log Scale					0.44
1998	95% t UCL (Assumes normality)					6.55	95% H-Stat UCL					6.53
1999	DL/2 is not a recommended method, provided for comparisons and historical reasons											
2000												
2001	Nonparametric Distribution Free UCL Statistics											
2002	Detected Data appear Approximate Gamma Distributed at 5% Significance Level											
2003												
2004	Suggested UCL to Use											
2005	95% KM (BCA) UCL					6.57	95% GROS Approximate Gamma UCL					6.55
2006	95% Approximate Gamma KM-UCL					6.60						
2007												
2008	Recommendations regarding the selection of a 95% UCL are provided to help the user to select the most appropriate											
2009	Recommendations are based upon data size, data distribution, and skewness.											
2010	Recommendations are based upon the results of the simulation studies summarized in Singh, Maichle, and											
2011	Recommendations results will not cover all Real World data sets; for additional insight the user may want to consult											
2012												
2013	Plutonium-239/240											
2014												
2015	General Statistics											
2016	Total Number of Observations					163	Number of Distinct Observations					150

	A	B	C	D	E	F	G	H	I	J	K	L
2017	Number of Detects					36	Number of Non-Detects					127
2018	Number of Distinct Detects					36	Number of Distinct Non-Detects					115
2019	Minimum Detect					0.01	Minimum Non-Detect					-0.007
2020	Maximum Detect					0.33	Maximum Non-Detect					0.02
2021	Variance Detects					0.005	Percent Non-Detects					77.9
2022	Mean Detects					0.06	SD Detects					0.07
2023	Median Detects					0.04	CV Detects					1.09
2024	Skewness Detects					2.84	Kurtosis Detects					7.33
2025												
2026	Normal GOF Test on Detects Only											
2027	Shapiro Wilk Test Statistic					0.55	Shapiro Wilk GOF Test					
2028	5% Shapiro Wilk Critical Value					0.93	Detected Data Not Normal at 5% Significance Level					
2029	Lilliefors Test Statistic					0.33	Lilliefors GOF Test					
2030	5% Lilliefors Critical Value					0.14	Detected Data Not Normal at 5% Significance Level					
2031	Detected Data Not Normal at 5% Significance Level											
2032												
2033	Kaplan-Meier (KM) Statistics using Normal Critical Values and other Nonparametric UCLs											
2034	Mean					0.009	Standard Error of Mean					0.003
2035	SD					0.04	95% KM (BCA) UCL					0.02
2036	95% KM (t) UCL					0.01	95% KM (Percentile Bootstrap) UCL					0.01
2037	95% KM (z) UCL					0.01	95% KM Bootstrap t UCL					0.01
2038	90% KM Chebyshev UCL					0.02	95% KM Chebyshev UCL					0.02
2039	97.5% KM Chebyshev UCL					0.03	99% KM Chebyshev UCL					0.04
2040												
2041	Gamma GOF Tests on Detected Observations Only											
2042	A-D Test Statistic					3.24	Anderson-Darling GOF Test					
2043	5% A-D Critical Value					0.76	Detected Data Not Gamma Distributed at 5% Significance Level					
2044	K-S Test Statistic					0.26	Kolmogorov-Smirnov GOF					
2045	5% K-S Critical Value					0.14	Detected Data Not Gamma Distributed at 5% Significance Level					
2046	Detected Data Not Gamma Distributed at 5% Significance Level											
2047												
2048	Gamma Statistics on Detected Data Only											
2049	k hat (MLE)					1.82	k star (bias corrected MLE)					1.69
2050	Theta hat (MLE)					0.03	Theta star (bias corrected MLE)					0.04
2051	nu hat (MLE)					131.6	nu star (bias corrected)					122
2052	MLE Mean (bias corrected)					0.06	MLE Sd (bias corrected)					0.05
2053												
2054	Gamma Kaplan-Meier (KM) Statistics											
2055	k hat (KM)					0.03	nu hat (KM)					12.9
2056							Adjusted Level of Significance (β)					0.04
2057	Approximate Chi Square Value (12.99, α)					5.88	Adjusted Chi Square Value (12.99, β)					5.84
2058	Approximate KM-UCL (use when $n \geq 50$)					0.02	Gamma Adjusted KM-UCL (use when $n < 50$)					0.02
2059	Gamma (KM) may not be used when k hat (KM) is < 0.1											
2060												
2061	DL/2 Statistics											
2062	Mean in Original Scale					0.01	SD in Original Scale					0.04
2063	95% t UCL (Assumes normality)					0.02						
2064	DL/2 is not a recommended method, provided for comparisons and historical reasons											
2065												
2066	Nonparametric Distribution Free UCL Statistics											
2067	Data do not follow a Discernible Distribution at 5% Significance Level											
2068												
2069	Suggested UCL to Use											
2070	97.5% KM (Chebyshev) UCL					0.03						
2071												
2072	Recommendations regarding the selection of a 95% UCL are provided to help the user to select the most appropriate											
2073	Recommendations are based upon data size, data distribution, and skewness.											
2074	Recommendations are based upon the results of the simulation studies summarized in Singh, Maichle, and											
2075	Recommendations results will not cover all Real World data sets; for additional insight the user may want to consult											
2076												
2077	RDX											
2078												
2079	General Statistics											

	A	B	C	D	E	F	G	H	I	J	K	L
2080	Total Number of Observations					163	Number of Distinct Observations					7
2081	Number of Detects					6	Number of Non-Detects					157
2082	Number of Distinct Detects					6	Number of Distinct Non-Detects					1
2083	Minimum Detect					0.13	Minimum Non-Detect					0.5
2084	Maximum Detect					7.72	Maximum Non-Detect					0.5
2085	Variance Detects					8.75	Percent Non-Detects					96.3
2086	Mean Detects					1.87	SD Detects					2.95
2087	Median Detects					0.49	CV Detects					1.58
2088	Skewness Detects					2.14	Kurtosis Detects					4.63
2089	Mean of Logged Detects					-0.34	SD of Logged Detects					1.49
2090												
2091	Normal GOF Test on Detects Only											
2092	Shapiro Wilk Test Statistic					0.67	Shapiro Wilk GOF Test					
2093	5% Shapiro Wilk Critical Value					0.78	Detected Data Not Normal at 5% Significance Level					
2094	Lilliefors Test Statistic					0.33	Lilliefors GOF Test					
2095	5% Lilliefors Critical Value					0.36	Detected Data appear Normal at 5% Significance Level					
2096	Detected Data appear Approximate Normal at 5% Significance Level											
2097												
2098	Kaplan-Meier (KM) Statistics using Normal Critical Values and other Nonparametric UCLs											
2099	Mean					0.32	Standard Error of Mean					0.09
2100	SD					0.61	95% KM (BCA) UCL					0.54
2101	95% KM (t) UCL					0.47	95% KM (Percentile Bootstrap) UCL					0.53
2102	95% KM (z) UCL					0.47	95% KM Bootstrap t UCL					0.64
2103	90% KM Chebyshev UCL					0.59	95% KM Chebyshev UCL					0.71
2104	97.5% KM Chebyshev UCL					0.88	99% KM Chebyshev UCL					1.22
2105												
2106	Gamma GOF Tests on Detected Observations Only											
2107	A-D Test Statistic					0.48	Anderson-Darling GOF Test					
2108	5% A-D Critical Value					0.72	data appear Gamma Distributed at 5% Significance Level					
2109	K-S Test Statistic					0.30	Kolmogrov-Smirnoff GOF					
2110	5% K-S Critical Value					0.34	data appear Gamma Distributed at 5% Significance Level					
2111	Detected data appear Gamma Distributed at 5% Significance Level											
2112												
2113	Gamma Statistics on Detected Data Only											
2114	k hat (MLE)					0.63	k star (bias corrected MLE)					0.42
2115	Theta hat (MLE)					2.96	Theta star (bias corrected MLE)					4.38
2116	nu hat (MLE)					7.59	nu star (bias corrected)					5.12
2117	MLE Mean (bias corrected)					1.87	MLE Sd (bias corrected)					2.86
2118												
2119	Gamma Kaplan-Meier (KM) Statistics											
2120	k hat (KM)					0.28	nu hat (KM)					92.6
2121	Approximate Chi Square Value (92.60, α)					71.4	Adjusted Chi Square Value (92.60, β)					71.2
2122	Approximate KM-UCL (use when $n \geq 50$)					0.42	Gamma Adjusted KM-UCL (use when $n < 50$)					0.42
2123												
2124	Gamma ROS Statistics using Imputed Non-Detects											
2125	GROS may not be used when data set has > 50% NDs with many tied observations at multiple DLs											
2126	GROS may not be used when kstar of detected data is small such as < 0.1											
2127	For such situations, GROS method tends to yield inflated values of UCLs and BTVs											
2128	Gamma distributed detected data, BTVs and UCLs may be computed using gamma distribution on KM estimate											
2129	Minimum					0.01	Mean					0.37
2130	Maximum					7.72	Median					0.01
2131	SD					0.81	CV					2.15
2132	k hat (MLE)					0.34	k star (bias corrected MLE)					0.34
2133	Theta hat (MLE)					1.08	Theta star (bias corrected MLE)					1.09
2134	nu hat (MLE)					113.5	nu star (bias corrected)					112.7
2135	MLE Mean (bias corrected)					0.37	MLE Sd (bias corrected)					0.64
2136							Adjusted Level of Significance (β)					0.04
2137	Approximate Chi Square Value (112.72, α)					89.2	Adjusted Chi Square Value (112.72, β)					89.0
2138	Gamma Approximate UCL (use when $n \geq 50$)					0.47	Gamma Adjusted UCL (use when $n < 50$)					0.47
2139												
2140	Lognormal GOF Test on Detected Observations Only											
2141	Shapiro Wilk Test Statistic					0.94	Shapiro Wilk GOF Test					
2142	5% Shapiro Wilk Critical Value					0.78	Detected Data appear Lognormal at 5% Significance Level					

	A	B	C	D	E	F	G	H	I	J	K	L	
2143	Lilliefors Test Statistic					0.23	Lilliefors GOF Test						
2144	5% Lilliefors Critical Value					0.36	Detected Data appear Lognormal at 5% Significance Level						
2145	Detected Data appear Lognormal at 5% Significance Level												
2146													
2147	Lognormal ROS Statistics Using Imputed Non-Detects												
2148	Mean in Original Scale					0.37	Mean in Log Scale					-1.45	
2149	SD in Original Scale					0.65	SD in Log Scale					0.92	
2150	95% t UCL (assumes normality of ROS data)					0.46	95% Percentile Bootstrap UCL					0.46	
2151	95% BCA Bootstrap UCL					0.51	95% Bootstrap t UCL					0.55	
2152	95% H-UCL (Log ROS)					0.41							
2153													
2154	UCLs using Lognormal Distribution and KM Estimates when Detected data are Lognormally Distributed												
2155	KM Mean (logged)					-1.38	95% H-UCL (KM -Log)					0.31	
2156	KM SD (logged)					0.56	95% Critical H Value (KM-Log)					1.84	
2157	KM Standard Error of Mean (logged)					0.29							
2158													
2159	DL/2 Statistics												
2160	DL/2 Normal						DL/2 Log-Transformed						
2161	Mean in Original Scale					0.31	Mean in Log Scale					-1.34	
2162	SD in Original Scale					0.60	SD in Log Scale					0.32	
2163	95% t UCL (Assumes normality)					0.38	95% H-Stat UCL					0.28	
2164	DL/2 is not a recommended method, provided for comparisons and historical reasons												
2165													
2166	Nonparametric Distribution Free UCL Statistics												
2167	Detected Data appear Approximate Normal Distributed at 5% Significance Level												
2168													
2169	Suggested UCL to Use												
2170	95% KM (t) UCL					0.47	95% KM (Percentile Bootstrap) UCL					0.53	
2171													
2172	Recommendations regarding the selection of a 95% UCL are provided to help the user to select the most appropriate												
2173	Recommendations are based upon data size, data distribution, and skewness.												
2174	Recommendations are based upon the results of the simulation studies summarized in Singh, Maichle, and												
2175	Simulation results will not cover all Real World data sets; for additional insight the user may want to consult												
2176													
2177	Silver												
2178													
2179	General Statistics												
2180	Total Number of Observations					171	Number of Distinct Observations					150	
2181	Number of Detects					77	Number of Non-Detects					94	
2182	Number of Distinct Detects					72	Number of Distinct Non-Detects					82	
2183	Minimum Detect					0.11	Minimum Non-Detect					0.14	
2184	Maximum Detect					6.95	Maximum Non-Detect					1.1	
2185	Variance Detects					0.84	Percent Non-Detects					54.9	
2186	Mean Detects					0.65	SD Detects					0.91	
2187	Median Detects					0.43	CV Detects					1.40	
2188	Skewness Detects					4.82	Kurtosis Detects					29.7	
2189	Mean of Logged Detects					-0.89	SD of Logged Detects					0.90	
2190													
2191	Normal GOF Test on Detects Only												
2192	Shapiro Wilk Test Statistic					0.54	Normal GOF Test on Detected Observations Only						
2193	5% Shapiro Wilk P Value					0	Detected Data Not Normal at 5% Significance Level						
2194	Lilliefors Test Statistic					0.27	Lilliefors GOF Test						
2195	5% Lilliefors Critical Value					0.10	Detected Data Not Normal at 5% Significance Level						
2196	Detected Data Not Normal at 5% Significance Level												
2197													
2198	Kaplan-Meier (KM) Statistics using Normal Critical Values and other Nonparametric UCLs												
2199	Mean					0.42	Standard Error of Mean					0.05	
2200	SD					0.65	95% KM (BCA) UCL					0.51	
2201	95% KM (t) UCL					0.51	95% KM (Percentile Bootstrap) UCL					0.51	
2202	95% KM (z) UCL					0.51	95% KM Bootstrap t UCL					0.56	
2203	90% KM Chebyshev UCL					0.58	95% KM Chebyshev UCL					0.64	
2204	97.5% KM Chebyshev UCL					0.74	99% KM Chebyshev UCL					0.93	
2205													

	A	B	C	D	E	F	G	H	I	J	K	L	
2206	Gamma GOF Tests on Detected Observations Only												
2207	A-D Test Statistic					2.27	Anderson-Darling GOF Test						
2208	5% A-D Critical Value					0.77	Detected Data Not Gamma Distributed at 5% Significance Level						
2209	K-S Test Statistic					0.11	Kolmogorov-Smirnoff GOF						
2210	5% K-S Critical Value					0.10	Detected Data Not Gamma Distributed at 5% Significance Level						
2211	Detected Data Not Gamma Distributed at 5% Significance Level												
2212													
2213	Gamma Statistics on Detected Data Only												
2214	k hat (MLE)					1.21	k star (bias corrected MLE)					1.17	
2215	Theta hat (MLE)					0.53	Theta star (bias corrected MLE)					0.55	
2216	nu hat (MLE)					187	nu star (bias corrected)					181	
2217	MLE Mean (bias corrected)					0.65	MLE Sd (bias corrected)					0.60	
2218													
2219	Gamma Kaplan-Meier (KM) Statistics												
2220	k hat (KM)					0.42	nu hat (KM)					145.2	
2221	Approximate Chi Square Value (145.20, α)					118.4	Adjusted Chi Square Value (145.20, β)					118.1	
2222	Approximate KM-UCL (use when n>=50)					0.52	Gamma Adjusted KM-UCL (use when n<50)					0.52	
2223													
2224	Gamma ROS Statistics using Imputed Non-Detects												
2225	GROS may not be used when data set has > 50% NDs with many tied observations at multiple DLs												
2226	GROS may not be used when kstar of detected data is small such as < 0.1												
2227	For such situations, GROS method tends to yield inflated values of UCLs and BTVs												
2228	Gamma distributed detected data, BTVs and UCLs may be computed using gamma distribution on KM estimates												
2229	Minimum					0.01	Mean					0.34	
2230	Maximum					6.95	Median					0.12	
2231	SD					0.67	CV					1.98	
2232	k hat (MLE)					0.71	k star (bias corrected MLE)					0.70	
2233	Theta hat (MLE)					0.47	Theta star (bias corrected MLE)					0.48	
2234	nu hat (MLE)					245.3	nu star (bias corrected)					242.4	
2235	MLE Mean (bias corrected)					0.34	MLE Sd (bias corrected)					0.40	
2236							Adjusted Level of Significance (β)					0.04	
2237	Approximate Chi Square Value (242.37, α)					207.3	Adjusted Chi Square Value (242.37, β)					207.1	
2238	Gamma Approximate UCL (use when n>=50)					0.39	Gamma Adjusted UCL (use when n<50)					0.39	
2239													
2240	Lognormal GOF Test on Detected Observations Only												
2241	Lilliefors Test Statistic					0.10	Lilliefors GOF Test						
2242	5% Lilliefors Critical Value					0.10	Detected Data Not Lognormal at 5% Significance Level						
2243	Detected Data Not Lognormal at 5% Significance Level												
2244													
2245	Lognormal ROS Statistics Using Imputed Non-Detects												
2246	Mean in Original Scale					0.42	Mean in Log Scale					-1.20	
2247	SD in Original Scale					0.64	SD in Log Scale					0.67	
2248	95% t UCL (assumes normality of ROS data)					0.50	95% Percentile Bootstrap UCL					0.51	
2249	95% BCA Bootstrap UCL					0.54	95% Bootstrap t UCL					0.56	
2250	95% H-UCL (Log ROS)					0.41							
2251													
2252	DL/2 Statistics												
2253	DL/2 Normal						DL/2 Log-Transformed						
2254	Mean in Original Scale					0.45	Mean in Log Scale					-1.09	
2255	SD in Original Scale					0.64	SD in Log Scale					0.65	
2256	95% t UCL (Assumes normality)					0.53	95% H-Stat UCL					0.45	
2257	DL/2 is not a recommended method, provided for comparisons and historical reasons												
2258													
2259	Nonparametric Distribution Free UCL Statistics												
2260	Data do not follow a Discernible Distribution at 5% Significance Level												
2261													
2262	Suggested UCL to Use												
2263	95% KM (t) UCL					0.51	95% KM (% Bootstrap) UCL					0.51	
2264													
2265	Recommendations regarding the selection of a 95% UCL are provided to help the user to select the most appropriate												
2266	Recommendations are based upon data size, data distribution, and skewness.												
2267	Recommendations are based upon the results of the simulation studies summarized in Singh, Maichle, and												
2268	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	
2269													
2270	TATB												
2271													
2272	General Statistics												
2273	Total Number of Observations					163	Number of Distinct Observations					14	
2274	Number of Detects					13	Number of Non-Detects					150	
2275	Number of Distinct Detects					13	Number of Distinct Non-Detects					1	
2276	Minimum Detect					0.33	Minimum Non-Detect					1	
2277	Maximum Detect					28.6	Maximum Non-Detect					1	
2278	Variance Detects					59.8	Percent Non-Detects					92.0	
2279	Mean Detects					6.18	SD Detects					7.73	
2280	Median Detects					4.78	CV Detects					1.25	
2281	Skewness Detects					2.27	Kurtosis Detects					6.05	
2282	Mean of Logged Detects					1.05	SD of Logged Detects					1.42	
2283													
2284	Normal GOF Test on Detects Only												
2285	Shapiro Wilk Test Statistic					0.73	Shapiro Wilk GOF Test						
2286	5% Shapiro Wilk Critical Value					0.86	Detected Data Not Normal at 5% Significance Level						
2287	Lilliefors Test Statistic					0.22	Lilliefors GOF Test						
2288	5% Lilliefors Critical Value					0.24	Detected Data appear Normal at 5% Significance Level						
2289	Detected Data appear Approximate Normal at 5% Significance Level												
2290													
2291	Kaplan-Meier (KM) Statistics using Normal Critical Values and other Nonparametric UCLs												
2292	Mean					1.05	Standard Error of Mean					0.22	
2293	SD					2.59	95% KM (BCA) UCL					1.48	
2294	95% KM (t) UCL					1.42	95% KM (Percentile Bootstrap) UCL					1.45	
2295	95% KM (z) UCL					1.42	95% KM Bootstrap t UCL					1.68	
2296	90% KM Chebyshev UCL					1.73	95% KM Chebyshev UCL					2.03	
2297	97.5% KM Chebyshev UCL					2.46	99% KM Chebyshev UCL					3.29	
2298													
2299	Gamma GOF Tests on Detected Observations Only												
2300	A-D Test Statistic					0.43	Anderson-Darling GOF Test						
2301	5% A-D Critical Value					0.76	data appear Gamma Distributed at 5% Significance Level						
2302	K-S Test Statistic					0.20	Kolmogrov-Smirnoff GOF						
2303	5% K-S Critical Value					0.24	data appear Gamma Distributed at 5% Significance Level						
2304	Detected data appear Gamma Distributed at 5% Significance Level												
2305													
2306	Gamma Statistics on Detected Data Only												
2307	k hat (MLE)					0.77	k star (bias corrected MLE)					0.64	
2308	Theta hat (MLE)					7.96	Theta star (bias corrected MLE)					9.54	
2309	nu hat (MLE)					20.16	nu star (bias corrected)					16.8	
2310	MLE Mean (bias corrected)					6.18	MLE Sd (bias corrected)					7.67	
2311													
2312	Gamma Kaplan-Meier (KM) Statistics												
2313	k hat (KM)					0.16	nu hat (KM)					53.9	
2314	Approximate Chi Square Value (53.96, α)					38.0	Adjusted Chi Square Value (53.96, β)					37.9	
2315	Approximate KM-UCL (use when $n \geq 50$)					1.49	Gamma Adjusted KM-UCL (use when $n < 50$)					1.49	
2316													
2317	Gamma ROS Statistics using Imputed Non-Detects												
2318	GROS may not be used when data set has > 50% NDs with many tied observations at multiple DLs												
2319	GROS may not be used when kstar of detected data is small such as < 0.1												
2320	For such situations, GROS method tends to yield inflated values of UCLs and BTVs												
2321	Gamma distributed detected data, BTVs and UCLs may be computed using gamma distribution on KM estimate												
2322	Minimum					0.01	Mean					1.22	
2323	Maximum					28.6	Median					0.01	
2324	SD					2.96	CV					2.42	
2325	k hat (MLE)					0.25	k star (bias corrected MLE)					0.24	
2326	Theta hat (MLE)					4.88	Theta star (bias corrected MLE)					4.89	
2327	nu hat (MLE)					81.4	nu star (bias corrected)					81.3	
2328	MLE Mean (bias corrected)					1.22	MLE Sd (bias corrected)					2.44	
2329													
2330	Approximate Chi Square Value (81.32, α)					61.5	Adjusted Chi Square Value (81.32, β)					61.3	
2331	Gamma Approximate UCL (use when $n \geq 50$)					1.61	Gamma Adjusted UCL (use when $n < 50$)					1.61	

	A	B	C	D	E	F	G	H	I	J	K	L
2332												
2333	Lognormal GOF Test on Detected Observations Only											
2334	Shapiro Wilk Test Statistic				0.92	Shapiro Wilk GOF Test						
2335	5% Shapiro Wilk Critical Value				0.86	Detected Data appear Lognormal at 5% Significance Level						
2336	Lilliefors Test Statistic				0.19	Lilliefors GOF Test						
2337	5% Lilliefors Critical Value				0.24	Detected Data appear Lognormal at 5% Significance Level						
2338	Detected Data appear Lognormal at 5% Significance Level											
2339												
2340	Lognormal ROS Statistics Using Imputed Non-Detects											
2341	Mean in Original Scale				1.38	Mean in Log Scale				-0.38		
2342	SD in Original Scale				2.69	SD in Log Scale				1.15		
2343	95% t UCL (assumes normality of ROS data)				1.73	95% Percentile Bootstrap UCL				1.76		
2344	95% BCA Bootstrap UCL				1.87	95% Bootstrap t UCL				2.00		
2345	95% H-UCL (Log ROS)				1.63							
2346												
2347	PLs using Lognormal Distribution and KM Estimates when Detected data are Lognormally Distributed											
2348	KM Mean (logged)				-0.41	95% H-UCL (KM -Log)				0.90		
2349	KM SD (logged)				0.66	95% Critical H Value (KM-Log)				1.90		
2350	KM Standard Error of Mean (logged)				0.15							
2351												
2352	DL/2 Statistics											
2353	DL/2 Normal				DL/2 Log-Transformed							
2354	Mean in Original Scale				0.95	Mean in Log Scale				-0.55		
2355	SD in Original Scale				2.61	SD in Log Scale				0.61		
2356	95% t UCL (Assumes normality)				1.29	95% H-Stat UCL				0.75		
2357	DL/2 is not a recommended method, provided for comparisons and historical reasons											
2358												
2359	Nonparametric Distribution Free UCL Statistics											
2360	Detected Data appear Approximate Normal Distributed at 5% Significance Level											
2361												
2362	Suggested UCL to Use											
2363	95% KM (t) UCL				1.42	95% KM (Percentile Bootstrap) UCL				1.45		
2364												
2365	Recommendations regarding the selection of a 95% UCL are provided to help the user to select the most appropriate											
2366	Recommendations are based upon data size, data distribution, and skewness.											
2367	Recommendations are based upon the results of the simulation studies summarized in Singh, Maichle, and											
2368	Recommendations results will not cover all Real World data sets; for additional insight the user may want to consult											
2369												
2370	Tritium											
2371												
2372	General Statistics											
2373	Total Number of Observations				163	Number of Distinct Observations				163		
2374	Number of Detects				143	Number of Non-Detects				20		
2375	Number of Distinct Detects				143	Number of Distinct Non-Detects				20		
2376	Minimum Detect				0.01	Minimum Non-Detect				-0.006		
2377	Maximum Detect				199.2	Maximum Non-Detect				0.09		
2378	Variance Detects				371.8	Percent Non-Detects				12.2		
2379	Mean Detects				5.05	SD Detects				19.2		
2380	Median Detects				0.33	CV Detects				3.81		
2381	Skewness Detects				7.96	Kurtosis Detects				74.6		
2382												
2383	Normal GOF Test on Detects Only											
2384	Shapiro Wilk Test Statistic				0.29	Normal GOF Test on Detected Observations Only						
2385	5% Shapiro Wilk P Value				0	Detected Data Not Normal at 5% Significance Level						
2386	Lilliefors Test Statistic				0.39	Lilliefors GOF Test						
2387	5% Lilliefors Critical Value				0.07	Detected Data Not Normal at 5% Significance Level						
2388	Detected Data Not Normal at 5% Significance Level											
2389												
2390	Kaplan-Meier (KM) Statistics using Normal Critical Values and other Nonparametric UCLs											
2391	Mean				4.43	Standard Error of Mean				1.42		
2392	SD				18.0	95% KM (BCA) UCL				7.49		
2393	95% KM (t) UCL				6.78	95% KM (Percentile Bootstrap) UCL				6.89		
2394	95% KM (z) UCL				6.77	95% KM Bootstrap t UCL				9.43		

	A	B	C	D	E	F	G	H	I	J	K	L
2395	90% KM Chebyshev UCL					8.69	95% KM Chebyshev UCL					10.61
2396	97.5% KM Chebyshev UCL					13.31	99% KM Chebyshev UCL					18.51
2397												
2398	Gamma GOF Tests on Detected Observations Only											
2399	A-D Test Statistic					10.01	Anderson-Darling GOF Test					
2400	5% A-D Critical Value					0.87	Detected Data Not Gamma Distributed at 5% Significance Level					
2401	K-S Test Statistic					0.18	Kolmogorov-Smirnoff GOF					
2402	5% K-S Critical Value					0.08	Detected Data Not Gamma Distributed at 5% Significance Level					
2403	Detected Data Not Gamma Distributed at 5% Significance Level											
2404												
2405	Gamma Statistics on Detected Data Only											
2406	k hat (MLE)					0.29	k star (bias corrected MLE)					0.28
2407	Theta hat (MLE)					17.41	Theta star (bias corrected MLE)					17.51
2408	nu hat (MLE)					82.91	nu star (bias corrected)					82.51
2409	MLE Mean (bias corrected)					5.05	MLE Sd (bias corrected)					9.41
2410												
2411	Gamma Kaplan-Meier (KM) Statistics											
2412	k hat (KM)					0.06	nu hat (KM)					19.61
2413							Adjusted Level of Significance (β)					0.04
2414	Approximate Chi Square Value (19.64, α)					10.51	Adjusted Chi Square Value (19.64, β)					10.51
2415	Approximate KM-UCL (use when $n \geq 50$)					8.23	Gamma Adjusted KM-UCL (use when $n < 50$)					8.27
2416	Gamma (KM) may not be used when k hat (KM) is < 0.1											
2417												
2418	DL/2 Statistics											
2419	Mean in Original Scale					4.43	SD in Original Scale					18.11
2420	95% t UCL (Assumes normality)					6.78						
2421	DL/2 is not a recommended method, provided for comparisons and historical reasons											
2422												
2423	Nonparametric Distribution Free UCL Statistics											
2424	Data do not follow a Discernible Distribution at 5% Significance Level											
2425												
2426	Suggested UCL to Use											
2427	97.5% KM (Chebyshev) UCL					13.31						
2428												
2429	Instructions regarding the selection of a 95% UCL are provided to help the user to select the most appropriate											
2430	Recommendations are based upon data size, data distribution, and skewness.											
2431	Recommendations are based upon the results of the simulation studies summarized in Singh, Maichle, and											
2432	Recommendations results will not cover all Real World data sets; for additional insight the user may want to consult											
2433												
2434	Uranium											
2435												
2436	General Statistics											
2437	Total Number of Observations					171	Number of Distinct Observations					165
2438	Number of Detects					169	Number of Non-Detects					2
2439	Number of Distinct Detects					163	Number of Distinct Non-Detects					2
2440	Minimum Detect					0.43	Minimum Non-Detect					0.60
2441	Maximum Detect					659	Maximum Non-Detect					0.62
2442	Variance Detects					11157	Percent Non-Detects					1.17
2443	Mean Detects					55.91	SD Detects					105.61
2444	Median Detects					13.3	CV Detects					1.88
2445	Skewness Detects					2.96	Kurtosis Detects					9.68
2446	Mean of Logged Detects					2.45	SD of Logged Detects					1.95
2447												
2448	Normal GOF Test on Detects Only											
2449	Shapiro Wilk Test Statistic					0.57	Normal GOF Test on Detected Observations Only					
2450	5% Shapiro Wilk P Value					0	Detected Data Not Normal at 5% Significance Level					
2451	Lilliefors Test Statistic					0.29	Lilliefors GOF Test					
2452	5% Lilliefors Critical Value					0.06	Detected Data Not Normal at 5% Significance Level					
2453	Detected Data Not Normal at 5% Significance Level											
2454												
2455	Kaplan-Meier (KM) Statistics using Normal Critical Values and other Nonparametric UCLs											
2456	Mean					55.31	Standard Error of Mean					8.04
2457	SD					104.9	95% KM (BCA) UCL					68.11

	A	B	C	D	E	F	G	H	I	J	K	L
2458						95% KM (t) UCL	68.64				95% KM (Percentile Bootstrap) UCL	69.94
2459						95% KM (z) UCL	68.5				95% KM Bootstrap t UCL	71.14
2460						90% KM Chebyshev UCL	79.4				95% KM Chebyshev UCL	90.4
2461						97.5% KM Chebyshev UCL	105.6				99% KM Chebyshev UCL	135.4
2462												
2463						Gamma GOF Tests on Detected Observations Only						
2464						A-D Test Statistic	4.55				Anderson-Darling GOF Test	
2465						5% A-D Critical Value	0.84				ed Data Not Gamma Distributed at 5% Significance Level	
2466						K-S Test Statistic	0.11				Kolmogrov-Smirnoff GOF	
2467						5% K-S Critical Value	0.07				ed Data Not Gamma Distributed at 5% Significance Level	
2468						Detected Data Not Gamma Distributed at 5% Significance Level						
2469												
2470						Gamma Statistics on Detected Data Only						
2471						k hat (MLE)	0.41				k star (bias corrected MLE)	0.41
2472						Theta hat (MLE)	134.6				Theta star (bias corrected MLE)	135.7
2473						nu hat (MLE)	140.6				nu star (bias corrected)	139.4
2474						MLE Mean (bias corrected)	55.9				MLE Sd (bias corrected)	87.14
2475												
2476						Gamma Kaplan-Meier (KM) Statistics						
2477						k hat (KM)	0.27				nu hat (KM)	95.24
2478						Approximate Chi Square Value (95.25, α)	73.74				Adjusted Chi Square Value (95.25, β)	73.5
2479						Approximate KM-UCL (use when n>=50)	71.4				Gamma Adjusted KM-UCL (use when n<50)	71.64
2480												
2481						Gamma ROS Statistics using Imputed Non-Detects						
2482						GROS may not be used when data set has > 50% NDs with many tied observations at multiple DLs						
2483						GROS may not be used when kstar of detected data is small such as < 0.1						
2484						For such situations, GROS method tends to yield inflated values of UCLs and BTVs						
2485						Gamma distributed detected data, BTVs and UCLs may be computed using gamma distribution on KM e						
2486						Minimum	0.01				Mean	55.34
2487						Maximum	659				Median	11.8
2488						SD	105.2				CV	1.90
2489						k hat (MLE)	0.4				k star (bias corrected MLE)	0.39
2490						Theta hat (MLE)	138.2				Theta star (bias corrected MLE)	139.3
2491						nu hat (MLE)	136.9				nu star (bias corrected)	135.9
2492						MLE Mean (bias corrected)	55.34				MLE Sd (bias corrected)	87.74
2493											Adjusted Level of Significance (β)	0.04
2494						Approximate Chi Square Value (135.87, α)	109.9				Adjusted Chi Square Value (135.87, β)	109.7
2495						Gamma Approximate UCL (use when n>=50)	68.3				Gamma Adjusted UCL (use when n<50)	68.5
2496												
2497						Lognormal GOF Test on Detected Observations Only						
2498						Lilliefors Test Statistic	0.07				Lilliefors GOF Test	
2499						5% Lilliefors Critical Value	0.06				ed Data Not Lognormal at 5% Significance Level	
2500						Detected Data Not Lognormal at 5% Significance Level						
2501												
2502						Lognormal ROS Statistics Using Imputed Non-Detects						
2503						Mean in Original Scale	55.34				Mean in Log Scale	2.40
2504						SD in Original Scale	105.2				SD in Log Scale	1.98
2505						95% t UCL (assumes normality of ROS data)	68.64				95% Percentile Bootstrap UCL	68.8
2506						95% BCA Bootstrap UCL	71.3				95% Bootstrap t UCL	71.4
2507						95% H-UCL (Log ROS)	129.4					
2508												
2509						DL/2 Statistics						
2510						DL/2 Normal					DL/2 Log-Transformed	
2511						Mean in Original Scale	55.34				Mean in Log Scale	2.41
2512						SD in Original Scale	105.2				SD in Log Scale	1.98
2513						95% t UCL (Assumes normality)	68.64				95% H-Stat UCL	128.4
2514						DL/2 is not a recommended method, provided for comparisons and historical reasons						
2515												
2516						Nonparametric Distribution Free UCL Statistics						
2517						Data do not follow a Discernible Distribution at 5% Significance Level						
2518												
2519						Suggested UCL to Use						
2520						97.5% KM (Chebyshev) UCL	105.6					

	A	B	C	D	E	F	G	H	I	J	K	L	
2521													
2522	ations regarding the selection of a 95% UCL are provided to help the user to select the most appropriate												
2523	Recommendations are based upon data size, data distribution, and skewness.												
2524	mndations are based upon the results of the simulation studies summarized in Singh, Maichle, and												
2525	ations results will not cover all Real World data sets; for additional insight the user may want to cons												
2526													
2527													
2528	Uranium-234												
2529													
2530	General Statistics												
2531	Total Number of Observations					163	Number of Distinct Observations					148	
2532							Number of Missing Observations					0	
2533	Minimum					0.24	Mean					4.25	
2534	Maximum					43.4	Median					1.64	
2535	SD					6.66	Std. Error of Mean					0.52	
2536	Coefficient of Variation					1.56	Skewness					3.31	
2537													
2538	Normal GOF Test												
2539	Shapiro Wilk Test Statistic					0.58	Shapiro Wilk GOF Test						
2540	5% Shapiro Wilk P Value					0	Data Not Normal at 5% Significance Level						
2541	Lilliefors Test Statistic					0.27	Lilliefors GOF Test						
2542	5% Lilliefors Critical Value					0.06	Data Not Normal at 5% Significance Level						
2543	Data Not Normal at 5% Significance Level												
2544													
2545	Assuming Normal Distribution												
2546	95% Normal UCL					95% UCLs (Adjusted for Skewness)							
2547	95% Student's-t UCL					5.11	95% Adjusted-CLT UCL (Chen-1995)					5.25	
2548							95% Modified-t UCL (Johnson-1978)					5.14	
2549													
2550	Gamma GOF Test												
2551	A-D Test Statistic					7.53	Anderson-Darling Gamma GOF Test						
2552	5% A-D Critical Value					0.79	Data Not Gamma Distributed at 5% Significance Level						
2553	K-S Test Statistic					0.15	Kolmogrov-Smirnoff Gamma GOF Test						
2554	5% K-S Critical Value					0.07	Data Not Gamma Distributed at 5% Significance Level						
2555	Data Not Gamma Distributed at 5% Significance Level												
2556													
2557	Gamma Statistics												
2558	k hat (MLE)					0.82	k star (bias corrected MLE)					0.81	
2559	Theta hat (MLE)					5.14	Theta star (bias corrected MLE)					5.21	
2560	nu hat (MLE)					269.8	nu star (bias corrected)					266.1	
2561	MLE Mean (bias corrected)					4.25	MLE Sd (bias corrected)					4.70	
2562							Approximate Chi Square Value (0.05)					229.4	
2563	Adjusted Level of Significance					0.04	Adjusted Chi Square Value					229.1	
2564													
2565	Assuming Gamma Distribution												
2566	roximate Gamma UCL (use when n>=50))					4.93	Adjusted Gamma UCL (use when n<50)					4.94	
2567													
2568	Lognormal GOF Test												
2569	Shapiro Wilk Test Statistic					0.93	Shapiro Wilk Lognormal GOF Test						
2570	5% Shapiro Wilk P Value					1.8710E	Data Not Lognormal at 5% Significance Level						
2571	Lilliefors Test Statistic					0.12	Lilliefors Lognormal GOF Test						
2572	5% Lilliefors Critical Value					0.06	Data Not Lognormal at 5% Significance Level						
2573	Data Not Lognormal at 5% Significance Level												
2574													
2575	Lognormal Statistics												
2576	Minimum of Logged Data					-1.39	Mean of logged Data					0.73	
2577	Maximum of Logged Data					3.77	SD of logged Data					1.12	
2578													
2579	Assuming Lognormal Distribution												
2580	95% H-UCL					4.77	90% Chebyshev (MVUE) UCL					5.16	
2581	95% Chebyshev (MVUE) UCL					5.74	97.5% Chebyshev (MVUE) UCL					6.55	
2582	99% Chebyshev (MVUE) UCL					8.14							
2583													

	A	B	C	D	E	F	G	H	I	J	K	L
2584	Nonparametric Distribution Free UCL Statistics											
2585	Data do not follow a Discernible Distribution (0.05)											
2586												
2587	Nonparametric Distribution Free UCLs											
2588	95% CLT UCL				5.11	95% Jackknife UCL				5.11		
2589	95% Standard Bootstrap UCL				5.11	95% Bootstrap-t UCL				5.29		
2590	95% Hall's Bootstrap UCL				5.28	95% Percentile Bootstrap UCL				5.16		
2591	95% BCA Bootstrap UCL				5.28							
2592	90% Chebyshev(Mean, Sd) UCL				5.82	95% Chebyshev(Mean, Sd) UCL				6.53		
2593	97.5% Chebyshev(Mean, Sd) UCL				7.51	99% Chebyshev(Mean, Sd) UCL				9.45		
2594												
2595	Suggested UCL to Use											
2596	95% Chebyshev (Mean, Sd) UCL				6.53							
2597												
2598	Directions regarding the selection of a 95% UCL are provided to help the user to select the most appropriate											
2599	Recommendations are based upon the results of the simulation studies summarized in Singh, Singh, and											
2600	and Singh and Singh (2003). However, simulations results will not cover all Real World data sets											
2601	For additional insight the user may want to consult a statistician.											
2602												
2603	Uranium-235/236											
2604												
2605	General Statistics											
2606	Total Number of Observations				163	Number of Distinct Observations				154		
2607	Number of Detects				130	Number of Non-Detects				33		
2608	Number of Distinct Detects				122	Number of Distinct Non-Detects				33		
2609	Minimum Detect				0.03	Minimum Non-Detect				0.01		
2610	Maximum Detect				6.57	Maximum Non-Detect				0.08		
2611	Variance Detects				1.00	Percent Non-Detects				20.2		
2612	Mean Detects				0.59	SD Detects				1.00		
2613	Median Detects				0.19	CV Detects				1.67		
2614	Skewness Detects				3.47	Kurtosis Detects				14.3		
2615	Mean of Logged Detects				-1.36	SD of Logged Detects				1.25		
2616												
2617	Normal GOF Test on Detects Only											
2618	Shapiro Wilk Test Statistic				0.57	Normal GOF Test on Detected Observations Only						
2619	5% Shapiro Wilk P Value				0	Detected Data Not Normal at 5% Significance Level						
2620	Lilliefors Test Statistic				0.28	Lilliefors GOF Test						
2621	5% Lilliefors Critical Value				0.07	Detected Data Not Normal at 5% Significance Level						
2622	Detected Data Not Normal at 5% Significance Level											
2623												
2624	Kaplan-Meier (KM) Statistics using Normal Critical Values and other Nonparametric UCLs											
2625	Mean				0.48	Standard Error of Mean				0.07		
2626	SD				0.92	95% KM (BCA) UCL				0.61		
2627	95% KM (t) UCL				0.59	95% KM (Percentile Bootstrap) UCL				0.59		
2628	95% KM (z) UCL				0.59	95% KM Bootstrap t UCL				0.62		
2629	90% KM Chebyshev UCL				0.69	95% KM Chebyshev UCL				0.79		
2630	97.5% KM Chebyshev UCL				0.93	99% KM Chebyshev UCL				1.2		
2631												
2632	Gamma GOF Tests on Detected Observations Only											
2633	A-D Test Statistic				5.39	Anderson-Darling GOF Test						
2634	5% A-D Critical Value				0.79	Detected Data Not Gamma Distributed at 5% Significance Level						
2635	K-S Test Statistic				0.15	Kolmogorov-Smirnov GOF						
2636	5% K-S Critical Value				0.08	Detected Data Not Gamma Distributed at 5% Significance Level						
2637	Detected Data Not Gamma Distributed at 5% Significance Level											
2638												
2639	Gamma Statistics on Detected Data Only											
2640	k hat (MLE)				0.70	k star (bias corrected MLE)				0.69		
2641	Theta hat (MLE)				0.84	Theta star (bias corrected MLE)				0.85		
2642	nu hat (MLE)				184.2	nu star (bias corrected)				181.2		
2643	MLE Mean (bias corrected)				0.59	MLE Sd (bias corrected)				0.71		
2644												
2645	Gamma Kaplan-Meier (KM) Statistics											
2646	k hat (KM)				0.27	nu hat (KM)				88.5		

	A	B	C	D	E	F	G	H	I	J	K	L
2647	Approximate Chi Square Value (88.52, α)					67.82	Adjusted Chi Square Value (88.52, β)					67.62
2648	Approximate KM-UCL (use when $n \geq 50$)					0.62	Gamma Adjusted KM-UCL (use when $n < 50$)					0.62
2649												
2650	Gamma ROS Statistics using Imputed Non-Detects											
2651	GROS may not be used when data set has > 50% NDs with many tied observations at multiple DLs											
2652	GROS may not be used when kstar of detected data is small such as < 0.1											
2653	For such situations, GROS method tends to yield inflated values of UCLs and BTVs											
2654	Gamma distributed detected data, BTVs and UCLs may be computed using gamma distribution on KM estimates											
2655	Minimum					0.01	Mean					0.47
2656	Maximum					6.57	Median					0.13
2657	SD					0.92	CV					1.93
2658	k hat (MLE)					0.49	k star (bias corrected MLE)					0.49
2659	Theta hat (MLE)					0.96	Theta star (bias corrected MLE)					0.97
2660	nu hat (MLE)					161.4	nu star (bias corrected)					159.7
2661	MLE Mean (bias corrected)					0.47	MLE Sd (bias corrected)					0.68
2662							Adjusted Level of Significance (β)					0.04
2663	Approximate Chi Square Value (159.74, α)					131.5	Adjusted Chi Square Value (159.74, β)					131.3
2664	Gamma Approximate UCL (use when $n \geq 50$)					0.58	Gamma Adjusted UCL (use when $n < 50$)					0.58
2665												
2666	Lognormal GOF Test on Detected Observations Only											
2667	Lilliefors Test Statistic					0.10	Lilliefors GOF Test					
2668	5% Lilliefors Critical Value					0.07	Detected Data Not Lognormal at 5% Significance Level					
2669	Detected Data Not Lognormal at 5% Significance Level											
2670												
2671	Lognormal ROS Statistics Using Imputed Non-Detects											
2672	Mean in Original Scale					0.47	Mean in Log Scale					-1.90
2673	SD in Original Scale					0.92	SD in Log Scale					1.54
2674	95% t UCL (assumes normality of ROS data)					0.59	95% Percentile Bootstrap UCL					0.60
2675	95% BCA Bootstrap UCL					0.62	95% Bootstrap t UCL					0.62
2676	95% H-UCL (Log ROS)					0.68						
2677												
2678	DL/2 Statistics											
2679	DL/2 Normal						DL/2 Log-Transformed					
2680	Mean in Original Scale					0.48	Mean in Log Scale					-1.89
2681	SD in Original Scale					0.92	SD in Log Scale					1.53
2682	95% t UCL (Assumes normality)					0.6	95% H-Stat UCL					0.68
2683	DL/2 is not a recommended method, provided for comparisons and historical reasons											
2684												
2685	Nonparametric Distribution Free UCL Statistics											
2686	Data do not follow a Discernible Distribution at 5% Significance Level											
2687												
2688	Suggested UCL to Use											
2689	95% KM (Chebyshev) UCL					0.79						
2690												
2691	Recommendations regarding the selection of a 95% UCL are provided to help the user to select the most appropriate											
2692	Recommendations are based upon data size, data distribution, and skewness.											
2693	Recommendations are based upon the results of the simulation studies summarized in Singh, Maichle, and											
2694	Recommendations results will not cover all Real World data sets; for additional insight the user may want to consult											
2695												
2696												
2697	Uranium-238											
2698												
2699	General Statistics											
2700	Total Number of Observations					163	Number of Distinct Observations					157
2701							Number of Missing Observations					0
2702	Minimum					0.25	Mean					22.5
2703	Maximum					291	Median					4.16
2704	SD					46.5	Std. Error of Mean					3.64
2705	Coefficient of Variation					2.06	Skewness					3.65
2706												
2707	Normal GOF Test											
2708	Shapiro Wilk Test Statistic					0.52	Shapiro Wilk GOF Test					
2709	5% Shapiro Wilk P Value					0	Data Not Normal at 5% Significance Level					

	A	B	C	D	E	F	G	H	I	J	K	L	
2773													
2774		General Statistics											
2775		Total Number of Observations				171		Number of Distinct Observations				140	
2776		Number of Detects				164		Number of Non-Detects				7	
2777		Number of Distinct Detects				133		Number of Distinct Non-Detects				7	
2778		Minimum Detect				1.99		Minimum Non-Detect				3.2	
2779		Maximum Detect				34.9		Maximum Non-Detect				8.9	
2780		Variance Detects				44.0		Percent Non-Detects				4.09	
2781		Mean Detects				12.8		SD Detects				6.63	
2782		Median Detects				11.8		CV Detects				0.51	
2783		Skewness Detects				0.63		Kurtosis Detects				0.28	
2784		Mean of Logged Detects				2.39		SD of Logged Detects				0.60	
2785													
2786		Normal GOF Test on Detects Only											
2787		Shapiro Wilk Test Statistic				0.95	Normal GOF Test on Detected Observations Only						
2788		5% Shapiro Wilk P Value				6.9704E	Detected Data Not Normal at 5% Significance Level						
2789		Lilliefors Test Statistic				0.06	Lilliefors GOF Test						
2790		5% Lilliefors Critical Value				0.06	Detected Data appear Normal at 5% Significance Level						
2791		Detected Data appear Approximate Normal at 5% Significance Level											
2792													
2793		Kaplan-Meier (KM) Statistics using Normal Critical Values and other Nonparametric UCLs											
2794		Mean				12.44		Standard Error of Mean				0.51	
2795		SD				6.70		95% KM (BCA) UCL				13.3	
2796		95% KM (t) UCL				13.3		95% KM (Percentile Bootstrap) UCL				13.2	
2797		95% KM (z) UCL				13.3		95% KM Bootstrap t UCL				13.3	
2798		90% KM Chebyshev UCL				14.0		95% KM Chebyshev UCL				14.7	
2799		97.5% KM Chebyshev UCL				15.6		99% KM Chebyshev UCL				17.5	
2800													
2801		Gamma GOF Tests on Detected Observations Only											
2802		A-D Test Statistic				0.56		Anderson-Darling GOF Test					
2803		5% A-D Critical Value				0.75		data appear Gamma Distributed at 5% Significance Level					
2804		K-S Test Statistic				0.05		Kolmogrov-Smirnoff GOF					
2805		5% K-S Critical Value				0.07		data appear Gamma Distributed at 5% Significance Level					
2806		Detected data appear Gamma Distributed at 5% Significance Level											
2807													
2808		Gamma Statistics on Detected Data Only											
2809		k hat (MLE)				3.35		k star (bias corrected MLE)				3.30	
2810		Theta hat (MLE)				3.81		Theta star (bias corrected MLE)				3.88	
2811		nu hat (MLE)				1102		nu star (bias corrected)				1083	
2812		MLE Mean (bias corrected)				12.8		MLE Sd (bias corrected)				7.05	
2813													
2814		Gamma Kaplan-Meier (KM) Statistics											
2815		k hat (KM)				3.45		nu hat (KM)				1180	
2816		Approximate Chi Square Value (N/A, α)				1101		Adjusted Chi Square Value (N/A, β)				1101	
2817		Approximate KM-UCL (use when n>=50)				13.3		Gamma Adjusted KM-UCL (use when n<50)				13.3	
2818													
2819		Gamma ROS Statistics using Imputed Non-Detects											
2820		GROS may not be used when data set has > 50% NDs with many tied observations at multiple DLs											
2821		GROS may not be used when kstar of detected data is small such as < 0.1											
2822		For such situations, GROS method tends to yield inflated values of UCLs and BTVs											
2823		Gamma distributed detected data, BTVs and UCLs may be computed using gamma distribution on KM estimate											
2824		Minimum				1.99		Mean				12.4	
2825		Maximum				34.9		Median				11.6	
2826		SD				6.68		CV				0.53	
2827		k hat (MLE)				3.20		k star (bias corrected MLE)				3.14	
2828		Theta hat (MLE)				3.90		Theta star (bias corrected MLE)				3.96	
2829		nu hat (MLE)				1095		nu star (bias corrected)				1077	
2830		MLE Mean (bias corrected)				12.4		MLE Sd (bias corrected)				7.03	
2831								Adjusted Level of Significance (β)				0.04	
2832		Approximate Chi Square Value (N/A, α)				1002		Adjusted Chi Square Value (N/A, β)				1001	
2833		Gamma Approximate UCL (use when n>=50)				13.4		Gamma Adjusted UCL (use when n<50)				13.4	
2834													
2835		Lognormal GOF Test on Detected Observations Only											

	A	B	C	D	E	F	G	H	I	J	K	L							
2836	Lilliefors Test Statistic					0.08	Lilliefors GOF Test												
2837	5% Lilliefors Critical Value					0.06	Detected Data Not Lognormal at 5% Significance Level												
2838																			
2839																			
2840	Lognormal ROS Statistics Using Imputed Non-Detects																		
2841	Mean in Original Scale					12.4	Mean in Log Scale					2.36							
2842	SD in Original Scale					6.69	SD in Log Scale					0.61							
2843	95% t UCL (assumes normality of ROS data)					13.3	95% Percentile Bootstrap UCL					13.2							
2844	95% BCA Bootstrap UCL					13.4	95% Bootstrap t UCL					13.4							
2845	95% H-UCL (Log ROS)					13.9													
2846																			
2847	DL/2 Statistics																		
2848	DL/2 Normal					DL/2 Log-Transformed													
2849	Mean in Original Scale					12.4	Mean in Log Scale					2.34							
2850	SD in Original Scale					6.77	SD in Log Scale					0.64							
2851	95% t UCL (Assumes normality)					13.2	95% H-Stat UCL					14.0							
2852	DL/2 is not a recommended method, provided for comparisons and historical reasons																		
2853																			
2854	Nonparametric Distribution Free UCL Statistics																		
2855	Detected Data appear Approximate Normal Distributed at 5% Significance Level																		
2856																			
2857	Suggested UCL to Use																		
2858	95% KM (t) UCL					13.3	95% KM (Percentile Bootstrap) UCL					13.2							
2859																			
2860	Options regarding the selection of a 95% UCL are provided to help the user to select the most appropriate																		
2861	Recommendations are based upon data size, data distribution, and skewness.																		
2862	Recommendations are based upon the results of the simulation studies summarized in Singh, Maichle, and																		
2863	Options results will not cover all Real World data sets; for additional insight the user may want to consult																		
2864																			
2865																			
2866	Zinc																		
2867																			
2868	General Statistics																		
2869	Total Number of Observations					171	Number of Distinct Observations					143							
2870							Number of Missing Observations					0							
2871	Minimum					13.1	Mean					118.9							
2872	Maximum					13300	Median					37.6							
2873	SD					1014	Std. Error of Mean					77.5							
2874	Coefficient of Variation					8.52	Skewness					13.0							
2875																			
2876	Normal GOF Test																		
2877	Shapiro Wilk Test Statistic					0.08	Shapiro Wilk GOF Test												
2878	5% Shapiro Wilk P Value					0	Data Not Normal at 5% Significance Level												
2879	Lilliefors Test Statistic					0.49	Lilliefors GOF Test												
2880	5% Lilliefors Critical Value					0.06	Data Not Normal at 5% Significance Level												
2881	Data Not Normal at 5% Significance Level																		
2882																			
2883	Assuming Normal Distribution																		
2884	95% Normal UCL					95% UCLs (Adjusted for Skewness)													
2885	95% Student's-t UCL					247.2	95% Adjusted-CLT UCL (Chen-1995)					329.3							
2886							95% Modified-t UCL (Johnson-1978)					260.1							
2887																			
2888	Gamma GOF Test																		
2889	A-D Test Statistic					5.848E-4	Anderson-Darling Gamma GOF Test												
2890	5% A-D Critical Value					0.81	Data Not Gamma Distributed at 5% Significance Level												
2891	K-S Test Statistic					0.41	Kolmogrov-Smirnoff Gamma GOF Test												
2892	5% K-S Critical Value					0.07	Data Not Gamma Distributed at 5% Significance Level												
2893	Data Not Gamma Distributed at 5% Significance Level																		
2894																			
2895	Gamma Statistics																		
2896	k hat (MLE)					0.57	k star (bias corrected MLE)					0.56							
2897	Theta hat (MLE)					207.3	Theta star (bias corrected MLE)					209.5							
2898	nu hat (MLE)					196.2	nu star (bias corrected)					194.1							

	A	B	C	D	E	F	G	H	I	J	K	L
2899	MLE Mean (bias corrected)					118.9	MLE Sd (bias corrected)					157.9
2900	Adjusted Level of Significance					0.04	Approximate Chi Square Value (0.05)					162.9
2901							Adjusted Chi Square Value					162.6
2902												
2903	Assuming Gamma Distribution											
2904	Approximate Gamma UCL (use when n>=50))					141.7	Adjusted Gamma UCL (use when n<50)					141.9
2905												
2906	Lognormal GOF Test											
2907	Shapiro Wilk Test Statistic					0.65	Shapiro Wilk Lognormal GOF Test					
2908	5% Shapiro Wilk P Value					0	Data Not Lognormal at 5% Significance Level					
2909	Lilliefors Test Statistic					0.16	Lilliefors Lognormal GOF Test					
2910	5% Lilliefors Critical Value					0.06	Data Not Lognormal at 5% Significance Level					
2911	Data Not Lognormal at 5% Significance Level											
2912												
2913	Lognormal Statistics											
2914	Minimum of Logged Data					2.57	Mean of logged Data					3.69
2915	Maximum of Logged Data					9.49	SD of logged Data					0.56
2916												
2917	Assuming Lognormal Distribution											
2918	95% H-UCL					51.2	90% Chebyshev (MVUE) UCL					53.8
2919	95% Chebyshev (MVUE) UCL					56.7	97.5% Chebyshev (MVUE) UCL					60.9
2920	99% Chebyshev (MVUE) UCL					69.0						
2921												
2922	Nonparametric Distribution Free UCL Statistics											
2923	Data do not follow a Discernible Distribution (0.05)											
2924												
2925	Nonparametric Distribution Free UCLs											
2926	95% CLT UCL					246.5	95% Jackknife UCL					247.2
2927	95% Standard Bootstrap UCL					247.9	95% Bootstrap-t UCL					5901
2928	95% Hall's Bootstrap UCL					1362	95% Percentile Bootstrap UCL					273.4
2929	95% BCA Bootstrap UCL					352.6						
2930	90% Chebyshev(Mean, Sd) UCL					351.6	95% Chebyshev(Mean, Sd) UCL					456.9
2931	97.5% Chebyshev(Mean, Sd) UCL					603.2	99% Chebyshev(Mean, Sd) UCL					890.5
2932												
2933	Suggested UCL to Use											
2934	95% Chebyshev (Mean, Sd) UCL					456.9						
2935												
2936	Recommendations regarding the selection of a 95% UCL are provided to help the user to select the most appropriate											
2937	Recommendations are based upon the results of the simulation studies summarized in Singh, Singh, and Singh											
2938	and Singh and Singh (2003). However, simulations results will not cover all Real World data sets											
2939	For additional insight the user may want to consult a statistician.											
2940												