

	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 2:19:06 PM									
5	From File		ProUCLinput_15-010(b)_0-1.xls									
6	Full Precision		OFF									
7	Confidence Coefficient		95%									
8	f Bootstrap Operations		2000									
9												
10												
11	Barium											
12												
13	General Statistics											
14	Total Number of Observations				9		Number of Distinct Observations				9	
15							Number of Missing Observations				0	
16	Minimum				35.8		Mean				68.3	
17	Maximum				143		Median				52.9	
18	SD				33.4		Std. Error of Mean				11.1	
19	Coefficient of Variation				0.49		Skewness				1.52	
20												
21	Note: Sample size is small (e.g., <10), if data are collected using ISM approach, you should use											
22	guidance provided in ITRC Tech Reg Guide on ISM (ITRC, 2012) to compute statistics of interest.											
23	For example, you may want to use Chebyshev UCL to estimate EPC (ITRC, 2012).											
24	Chebyshev UCL can be computed using the Nonparametric and All UCL Options of ProUCL 5.0											
25												
26	Normal GOF Test											
27	Shapiro Wilk Test Statistic				0.85		Shapiro Wilk GOF Test					
28	5% Shapiro Wilk Critical Value				0.82		Data appear Normal at 5% Significance Level					
29	Lilliefors Test Statistic				0.23		Lilliefors GOF Test					
30	5% Lilliefors Critical Value				0.29		Data appear Normal at 5% Significance Level					
31	Data appear Normal at 5% Significance Level											
32												
33	Assuming Normal Distribution											
34	95% Normal UCL						95% UCLs (Adjusted for Skewness)					
35	95% Student's-t UCL				89.1		95% Adjusted-CLT UCL (Chen-1995)				92.7	
36							95% Modified-t UCL (Johnson-1978)				90.0	
37												
38	Gamma GOF Test											
39	A-D Test Statistic				0.34		Anderson-Darling Gamma GOF Test					
40	5% A-D Critical Value				0.72		data appear Gamma Distributed at 5% Significance Level					
41	K-S Test Statistic				0.22		Kolmogorov-Smirnov Gamma GOF Test					
42	5% K-S Critical Value				0.28		data appear Gamma Distributed at 5% Significance Level					
43	Detected data appear Gamma Distributed at 5% Significance Level											
44												
45	Gamma Statistics											
46	k hat (MLE)				5.67		k star (bias corrected MLE)				3.85	
47	Theta hat (MLE)				12.0		Theta star (bias corrected MLE)				17.7	
48	nu hat (MLE)				102.2		nu star (bias corrected)				69.4	
49	MLE Mean (bias corrected)				68.3		MLE Sd (bias corrected)				34.8	
50							Approximate Chi Square Value (0.05)				51.2	
51	Adjusted Level of Significance				0.02		Adjusted Chi Square Value				47.9	
52												
53	Assuming Gamma Distribution											
54	Approximate Gamma UCL (use when n>=50)				92.6		Adjusted Gamma UCL (use when n<50)				98.9	
55												
56	Lognormal GOF Test											
57	Shapiro Wilk Test Statistic				0.95		Shapiro Wilk Lognormal GOF Test					
58	5% Shapiro Wilk Critical Value				0.82		Data appear Lognormal at 5% Significance Level					
59	Lilliefors Test Statistic				0.20		Lilliefors Lognormal GOF Test					
60	5% Lilliefors Critical Value				0.29		Data appear Lognormal at 5% Significance Level					
61	Data appear Lognormal at 5% Significance Level											
62												
63	Lognormal Statistics											

	A	B	C	D	E	F	G	H	I	J	K	L
64	Minimum of Logged Data					3.57	Mean of logged Data					4.13
65	Maximum of Logged Data					4.96	SD of logged Data					0.43
66												
67	Assuming Lognormal Distribution											
68	95% H-UCL					96.04	90% Chebyshev (MVUE) UCL					97.99
69	95% Chebyshev (MVUE) UCL					111.5	97.5% Chebyshev (MVUE) UCL					130.4
70	99% Chebyshev (MVUE) UCL					167.5						
71												
72	Nonparametric Distribution Free UCL Statistics											
73	Data appear to follow a Discernible Distribution at 5% Significance Level											
74												
75	Nonparametric Distribution Free UCLs											
76	95% CLT UCL					86.7	95% Jackknife UCL					89.1
77	95% Standard Bootstrap UCL					85.5	95% Bootstrap-t UCL					102.5
78	95% Hall's Bootstrap UCL					140.7	95% Percentile Bootstrap UCL					88.2
79	95% BCA Bootstrap UCL					90.1						
80	90% Chebyshev(Mean, Sd) UCL					101.8	95% Chebyshev(Mean, Sd) UCL					117
81	97.5% Chebyshev(Mean, Sd) UCL					138	99% Chebyshev(Mean, Sd) UCL					179.4
82												
83	Suggested UCL to Use											
84	95% Student's-t UCL					89.1						
85												
86	ations regarding the selection of a 95% UCL are provided to help the user to select the most appropriate											
87	ommendations are based upon the results of the simulation studies summarized in Singh, Singh, and											
88	and Singh and Singh (2003). However, simulations results will not cover all Real World data sets											
89	For additional insight the user may want to consult a statistician.											
90												
91												
92	Calcium											
93												
94	General Statistics											
95	Total Number of Observations					9	Number of Distinct Observations					8
96							Number of Missing Observations					0
97	Minimum					1060	Mean					1777
98	Maximum					4480	Median					1420
99	SD					1107	Std. Error of Mean					369
100	Coefficient of Variation					0.62	Skewness					2.19
101												
102	Note: Sample size is small (e.g., <10), if data are collected using ISM approach, you should use											
103	guidance provided in ITRC Tech Reg Guide on ISM (ITRC, 2012) to compute statistics of interest.											
104	For example, you may want to use Chebyshev UCL to estimate EPC (ITRC, 2012).											
105	Chebyshev UCL can be computed using the Nonparametric and All UCL Options of ProUCL 5.0											
106												
107	Normal GOF Test											
108	Shapiro Wilk Test Statistic					0.70	Shapiro Wilk GOF Test					
109	5% Shapiro Wilk Critical Value					0.82	Data Not Normal at 5% Significance Level					
110	Lilliefors Test Statistic					0.28	Lilliefors GOF Test					
111	5% Lilliefors Critical Value					0.29	Data appear Normal at 5% Significance Level					
112	Data appear Approximate Normal at 5% Significance Level											
113												
114	Assuming Normal Distribution											
115	95% Normal UCL						95% UCLs (Adjusted for Skewness)					
116	95% Student's-t UCL					2463	95% Adjusted-CLT UCL (Chen-1995)					2672
117							95% Modified-t UCL (Johnson-1978)					2508
118												
119	Gamma GOF Test											
120	A-D Test Statistic					0.78	Anderson-Darling Gamma GOF Test					
121	5% A-D Critical Value					0.72	Data Not Gamma Distributed at 5% Significance Level					
122	K-S Test Statistic					0.26	Kolmogrov-Smirnoff Gamma GOF Test					
123	5% K-S Critical Value					0.28	Data appear Gamma Distributed at 5% Significance Level					
124	Detected data follow Appr. Gamma Distribution at 5% Significance Level											
125												
126	Gamma Statistics											

	A	B	C	D	E	F	G	H	I	J	K	L
127	k hat (MLE)					4.24	k star (bias corrected MLE)					2.90
128	Theta hat (MLE)					418.9	Theta star (bias corrected MLE)					612.3
129	nu hat (MLE)					76.34	nu star (bias corrected)					52.2
130	MLE Mean (bias corrected)					1777	MLE Sd (bias corrected)					1043
131							Approximate Chi Square Value (0.05)					36.6
132	Adjusted Level of Significance					0.02	Adjusted Chi Square Value					33.9
133												
134	Assuming Gamma Distribution											
135	Approximate Gamma UCL (use when n>=50))					2533	Adjusted Gamma UCL (use when n<50)					2738
136												
137	Lognormal GOF Test											
138	Shapiro Wilk Test Statistic					0.82	Shapiro Wilk Lognormal GOF Test					
139	5% Shapiro Wilk Critical Value					0.82	Data Not Lognormal at 5% Significance Level					
140	Lilliefors Test Statistic					0.23	Lilliefors Lognormal GOF Test					
141	5% Lilliefors Critical Value					0.29	Data appear Lognormal at 5% Significance Level					
142	Data appear Approximate Lognormal at 5% Significance Level											
143												
144	Lognormal Statistics											
145	Minimum of Logged Data					6.96	Mean of logged Data					7.36
146	Maximum of Logged Data					8.40	SD of logged Data					0.48
147												
148	Assuming Lognormal Distribution											
149	95% H-UCL					2581	90% Chebyshev (MVUE) UCL					2597
150	95% Chebyshev (MVUE) UCL					2984	97.5% Chebyshev (MVUE) UCL					3522
151	99% Chebyshev (MVUE) UCL					4578						
152												
153	Nonparametric Distribution Free UCL Statistics											
154	Data appear to follow a Discernible Distribution at 5% Significance Level											
155												
156	Nonparametric Distribution Free UCLs											
157	95% CLT UCL					2384	95% Jackknife UCL					2463
158	95% Standard Bootstrap UCL					2367	95% Bootstrap-t UCL					3430
159	95% Hall's Bootstrap UCL					4618	95% Percentile Bootstrap UCL					2406
160	95% BCA Bootstrap UCL					2626						
161	90% Chebyshev(Mean, Sd) UCL					2884	95% Chebyshev(Mean, Sd) UCL					3385
162	97.5% Chebyshev(Mean, Sd) UCL					4081	99% Chebyshev(Mean, Sd) UCL					5448
163												
164	Suggested UCL to Use											
165	95% Student's-t UCL					2463						
166												
167	Recommendations regarding the selection of a 95% UCL are provided to help the user to select the most appropriate											
168	recommendations are based upon the results of the simulation studies summarized in Singh, Singh, and											
169	and Singh and Singh (2003). However, simulations results will not cover all Real World data sets											
170	For additional insight the user may want to consult a statistician.											
171												
172												
173	Cesium-137											
174												
175	General Statistics											
176	Total Number of Observations					9	Number of Distinct Observations					9
177							Number of Missing Observations					0
178	Minimum					0.07	Mean					0.58
179	Maximum					2.34	Median					0.24
180	SD					0.72	Std. Error of Mean					0.24
181	Coefficient of Variation					1.24	Skewness					2.14
182												
183	Note: Sample size is small (e.g., <10), if data are collected using ISM approach, you should use											
184	guidance provided in ITRC Tech Reg Guide on ISM (ITRC, 2012) to compute statistics of interest.											
185	For example, you may want to use Chebyshev UCL to estimate EPC (ITRC, 2012).											
186	Chebyshev UCL can be computed using the Nonparametric and All UCL Options of ProUCL 5.0											
187												
188	Normal GOF Test											
189	Shapiro Wilk Test Statistic					0.72	Shapiro Wilk GOF Test					

	A	B	C	D	E	F	G	H	I	J	K	L	
190	5% Shapiro Wilk Critical Value					0.82	Data Not Normal at 5% Significance Level						
191	Lilliefors Test Statistic					0.25	Lilliefors GOF Test						
192	5% Lilliefors Critical Value					0.29	Data appear Normal at 5% Significance Level						
193	Data appear Approximate Normal at 5% Significance Level												
194													
195	Assuming Normal Distribution												
196	95% Normal UCL					95% UCLs (Adjusted for Skewness)							
197	95% Student's-t UCL					1.03	95% Adjusted-CLT UCL (Chen-1995)					1.16	
198							95% Modified-t UCL (Johnson-1978)					1.06	
199													
200	Gamma GOF Test												
201	A-D Test Statistic					0.42	Anderson-Darling Gamma GOF Test						
202	5% A-D Critical Value					0.74	data appear Gamma Distributed at 5% Significance Level						
203	K-S Test Statistic					0.21	Kolmogrov-Smirnoff Gamma GOF Test						
204	5% K-S Critical Value					0.28	data appear Gamma Distributed at 5% Significance Level						
205	Detected data appear Gamma Distributed at 5% Significance Level												
206													
207	Gamma Statistics												
208	k hat (MLE)					1.01	k star (bias corrected MLE)					0.75	
209	Theta hat (MLE)					0.57	Theta star (bias corrected MLE)					0.77	
210	nu hat (MLE)					18.24	nu star (bias corrected)					13.53	
211	MLE Mean (bias corrected)					0.58	MLE Sd (bias corrected)					0.67	
212							Approximate Chi Square Value (0.05)					6.24	
213	Adjusted Level of Significance					0.02	Adjusted Chi Square Value					5.24	
214													
215	Assuming Gamma Distribution												
216	Approximate Gamma UCL (use when n>=50))					1.26	Adjusted Gamma UCL (use when n<50)					1.50	
217													
218	Lognormal GOF Test												
219	Shapiro Wilk Test Statistic					0.96	Shapiro Wilk Lognormal GOF Test						
220	5% Shapiro Wilk Critical Value					0.82	Data appear Lognormal at 5% Significance Level						
221	Lilliefors Test Statistic					0.16	Lilliefors Lognormal GOF Test						
222	5% Lilliefors Critical Value					0.29	Data appear Lognormal at 5% Significance Level						
223	Data appear Lognormal at 5% Significance Level												
224													
225	Lognormal Statistics												
226	Minimum of Logged Data					-2.63	Mean of logged Data					-1.10	
227	Maximum of Logged Data					0.85	SD of logged Data					1.10	
228													
229	Assuming Lognormal Distribution												
230	95% H-UCL					2.37	90% Chebyshev (MVUE) UCL					1.19	
231	95% Chebyshev (MVUE) UCL					1.47	97.5% Chebyshev (MVUE) UCL					1.87	
232	99% Chebyshev (MVUE) UCL					2.66							
233													
234	Nonparametric Distribution Free UCL Statistics												
235	Data appear to follow a Discernible Distribution at 5% Significance Level												
236													
237	Nonparametric Distribution Free UCLs												
238	95% CLT UCL					0.98	95% Jackknife UCL					1.03	
239	95% Standard Bootstrap UCL					0.95	95% Bootstrap-t UCL					1.67	
240	95% Hall's Bootstrap UCL					2.41	95% Percentile Bootstrap UCL					0.99	
241	95% BCA Bootstrap UCL					1.12							
242	90% Chebyshev(Mean, Sd) UCL					1.30	95% Chebyshev(Mean, Sd) UCL					1.63	
243	97.5% Chebyshev(Mean, Sd) UCL					2.09	99% Chebyshev(Mean, Sd) UCL					2.98	
244													
245	Suggested UCL to Use												
246	95% Student's-t UCL					1.03							
247													
248	Recommendations regarding the selection of a 95% UCL are provided to help the user to select the most appropriate												
249	Recommendations are based upon the results of the simulation studies summarized in Singh, Singh, and Singh												
250	and Singh and Singh (2003). However, simulations results will not cover all Real World data sets												
251	For additional insight the user may want to consult a statistician.												
252													

	A	B	C	D	E	F	G	H	I	J	K	L	
253													
254	Chromium												
255													
256	General Statistics												
257	Total Number of Observations					9	Number of Distinct Observations					9	
258							Number of Missing Observations					0	
259	Minimum					3.87	Mean					7.50	
260	Maximum					12.8	Median					6.58	
261	SD					2.72	Std. Error of Mean					0.90	
262	Coefficient of Variation					0.36	Skewness					0.98	
263													
264	Note: Sample size is small (e.g., <10), if data are collected using ISM approach, you should use												
265	guidance provided in ITRC Tech Reg Guide on ISM (ITRC, 2012) to compute statistics of interest.												
266	For example, you may want to use Chebyshev UCL to estimate EPC (ITRC, 2012).												
267	Chebyshev UCL can be computed using the Nonparametric and All UCL Options of ProUCL 5.0												
268													
269	Normal GOF Test												
270	Shapiro Wilk Test Statistic					0.90	Shapiro Wilk GOF Test						
271	5% Shapiro Wilk Critical Value					0.82	Data appear Normal at 5% Significance Level						
272	Lilliefors Test Statistic					0.22	Lilliefors GOF Test						
273	5% Lilliefors Critical Value					0.29	Data appear Normal at 5% Significance Level						
274	Data appear Normal at 5% Significance Level												
275													
276	Assuming Normal Distribution												
277	95% Normal UCL						95% UCLs (Adjusted for Skewness)						
278	95% Student's-t UCL					9.19	95% Adjusted-CLT UCL (Chen-1995)					9.31	
279							95% Modified-t UCL (Johnson-1978)					9.24	
280													
281	Gamma GOF Test												
282	A-D Test Statistic					0.35	Anderson-Darling Gamma GOF Test						
283	5% A-D Critical Value					0.72	data appear Gamma Distributed at 5% Significance Level						
284	K-S Test Statistic					0.18	Kolmogrov-Smirnoff Gamma GOF Test						
285	5% K-S Critical Value					0.27	data appear Gamma Distributed at 5% Significance Level						
286	Detected data appear Gamma Distributed at 5% Significance Level												
287													
288	Gamma Statistics												
289	k hat (MLE)					9.17	k star (bias corrected MLE)					6.19	
290	Theta hat (MLE)					0.81	Theta star (bias corrected MLE)					1.21	
291	nu hat (MLE)					165.2	nu star (bias corrected)					111.5	
292	MLE Mean (bias corrected)					7.50	MLE Sd (bias corrected)					3.01	
293							Approximate Chi Square Value (0.05)					88.1	
294	Adjusted Level of Significance					0.02	Adjusted Chi Square Value					83.7	
295													
296	Assuming Gamma Distribution												
297	Approximate Gamma UCL (use when n>=50))					9.49	Adjusted Gamma UCL (use when n<50)					9.99	
298													
299	Lognormal GOF Test												
300	Shapiro Wilk Test Statistic					0.95	Shapiro Wilk Lognormal GOF Test						
301	5% Shapiro Wilk Critical Value					0.82	Data appear Lognormal at 5% Significance Level						
302	Lilliefors Test Statistic					0.19	Lilliefors Lognormal GOF Test						
303	5% Lilliefors Critical Value					0.29	Data appear Lognormal at 5% Significance Level						
304	Data appear Lognormal at 5% Significance Level												
305													
306	Lognormal Statistics												
307	Minimum of Logged Data					1.35	Mean of logged Data					1.96	
308	Maximum of Logged Data					2.54	SD of logged Data					0.35	
309													
310	Assuming Lognormal Distribution												
311	95% H-UCL					9.77	90% Chebyshev (MVUE) UCL					10.1	
312	95% Chebyshev (MVUE) UCL					11.3	97.5% Chebyshev (MVUE) UCL					13.0	
313	99% Chebyshev (MVUE) UCL					16.3							
314													
315	Nonparametric Distribution Free UCL Statistics												

[illegible]

	A	B	C	D	E	F	G	H	I	J	K	L
379												
380	Lognormal GOF Test											
381	Shapiro Wilk Test Statistic				0.89		Shapiro Wilk Lognormal GOF Test					
382	5% Shapiro Wilk Critical Value				0.82		Data appear Lognormal at 5% Significance Level					
383	Lilliefors Test Statistic				0.17		Lilliefors Lognormal GOF Test					
384	5% Lilliefors Critical Value				0.29		Data appear Lognormal at 5% Significance Level					
385	Data appear Lognormal at 5% Significance Level											
386												
387	Lognormal Statistics											
388	Minimum of Logged Data				1.32		Mean of logged Data				1.83	
389	Maximum of Logged Data				2.82		SD of logged Data				0.49	
390												
391	Assuming Lognormal Distribution											
392	95% H-UCL				10.34		90% Chebyshev (MVUE) UCL				10.34	
393	95% Chebyshev (MVUE) UCL				11.94		97.5% Chebyshev (MVUE) UCL				14.11	
394	99% Chebyshev (MVUE) UCL				18.4							
395												
396	Nonparametric Distribution Free UCL Statistics											
397	Data appear to follow a Discernible Distribution at 5% Significance Level											
398												
399	Nonparametric Distribution Free UCLs											
400	95% CLT UCL				9.29		95% Jackknife UCL				9.58	
401	95% Standard Bootstrap UCL				9.16		95% Bootstrap-t UCL				11.7	
402	95% Hall's Bootstrap UCL				18.54		95% Percentile Bootstrap UCL				9.19	
403	95% BCA Bootstrap UCL				10.04							
404	90% Chebyshev(Mean, Sd) UCL				11.14		95% Chebyshev(Mean, Sd) UCL				13.04	
405	97.5% Chebyshev(Mean, Sd) UCL				15.64		99% Chebyshev(Mean, Sd) UCL				20.74	
406												
407	Suggested UCL to Use											
408	95% Student's-t UCL				9.58							
409												
410	ations regarding the selection of a 95% UCL are provided to help the user to select the most appropriate											
411	ommendations are based upon the results of the simulation studies summarized in Singh, Singh, and											
412	and Singh and Singh (2003). However, simulations results will not cover all Real World data sets											
413	For additional insight the user may want to consult a statistician.											
414												
415												
416	Iron											
417												
418	General Statistics											
419	Total Number of Observations				9		Number of Distinct Observations				9	
420							Number of Missing Observations				0	
421	Minimum				8680		Mean				10779	
422	Maximum				14600		Median				10800	
423	SD				1860		Std. Error of Mean				620.1	
424	Coefficient of Variation				0.17		Skewness				0.92	
425												
426	Note: Sample size is small (e.g., <10), if data are collected using ISM approach, you should use											
427	guidance provided in ITRC Tech Reg Guide on ISM (ITRC, 2012) to compute statistics of interest.											
428	For example, you may want to use Chebyshev UCL to estimate EPC (ITRC, 2012).											
429	Chebyshev UCL can be computed using the Nonparametric and All UCL Options of ProUCL 5.0											
430												
431	Normal GOF Test											
432	Shapiro Wilk Test Statistic				0.90		Shapiro Wilk GOF Test					
433	5% Shapiro Wilk Critical Value				0.82		Data appear Normal at 5% Significance Level					
434	Lilliefors Test Statistic				0.16		Lilliefors GOF Test					
435	5% Lilliefors Critical Value				0.29		Data appear Normal at 5% Significance Level					
436	Data appear Normal at 5% Significance Level											
437												
438	Assuming Normal Distribution											
439	95% Normal UCL						95% UCLs (Adjusted for Skewness)					
440	95% Student's-t UCL				11932		95% Adjusted-CLT UCL (Chen-1995)				12003	
441							95% Modified-t UCL (Johnson-1978)				11964	

	A	B	C	D	E	F	G	H	I	J	K	L
442												
443	Gamma GOF Test											
444	A-D Test Statistic					0.37	Anderson-Darling Gamma GOF Test					
445	5% A-D Critical Value					0.72	data appear Gamma Distributed at 5% Significance Level					
446	K-S Test Statistic					0.19	Kolmogorov-Smirnov Gamma GOF Test					
447	5% K-S Critical Value					0.27	data appear Gamma Distributed at 5% Significance Level					
448	Detected data appear Gamma Distributed at 5% Significance Level											
449												
450	Gamma Statistics											
451	k hat (MLE)					39.8	k star (bias corrected MLE)					26.6
452	Theta hat (MLE)					270.3	Theta star (bias corrected MLE)					404.3
453	nu hat (MLE)					717.9	nu star (bias corrected)					479.9
454	MLE Mean (bias corrected)					10779	MLE Sd (bias corrected)					2088
455							Approximate Chi Square Value (0.05)					430.1
456	Adjusted Level of Significance					0.02	Adjusted Chi Square Value					420.1
457												
458	Assuming Gamma Distribution											
459	Approximate Gamma UCL (use when n>=50)					12027	Adjusted Gamma UCL (use when n<50)					12312
460												
461	Lognormal GOF Test											
462	Shapiro Wilk Test Statistic					0.92	Shapiro Wilk Lognormal GOF Test					
463	5% Shapiro Wilk Critical Value					0.82	Data appear Lognormal at 5% Significance Level					
464	Lilliefors Test Statistic					0.18	Lilliefors Lognormal GOF Test					
465	5% Lilliefors Critical Value					0.29	Data appear Lognormal at 5% Significance Level					
466	Data appear Lognormal at 5% Significance Level											
467												
468	Lognormal Statistics											
469	Minimum of Logged Data					9.06	Mean of logged Data					9.27
470	Maximum of Logged Data					9.58	SD of logged Data					0.16
471												
472	Assuming Lognormal Distribution											
473	95% H-UCL					12054	90% Chebyshev (MVUE) UCL					12573
474	95% Chebyshev (MVUE) UCL					13387	97.5% Chebyshev (MVUE) UCL					14517
475	99% Chebyshev (MVUE) UCL					16737						
476												
477	Nonparametric Distribution Free UCL Statistics											
478	Data appear to follow a Discernible Distribution at 5% Significance Level											
479												
480	Nonparametric Distribution Free UCLs											
481	95% CLT UCL					11799	95% Jackknife UCL					11932
482	95% Standard Bootstrap UCL					11740	95% Bootstrap-t UCL					12168
483	95% Hall's Bootstrap UCL					12704	95% Percentile Bootstrap UCL					11726
484	95% BCA Bootstrap UCL					11878						
485	90% Chebyshev(Mean, Sd) UCL					12639	95% Chebyshev(Mean, Sd) UCL					13482
486	97.5% Chebyshev(Mean, Sd) UCL					14651	99% Chebyshev(Mean, Sd) UCL					16949
487												
488	Suggested UCL to Use											
489	95% Student's-t UCL					11932						
490												
491	Recommendations regarding the selection of a 95% UCL are provided to help the user to select the most appropriate											
492	recommendations are based upon the results of the simulation studies summarized in Singh, Singh, and											
493	Singh and Singh (2003). However, simulation results will not cover all Real World data sets											
494	For additional insight the user may want to consult a statistician.											
495												
496												
497	Manganese											
498												
499	General Statistics											
500	Total Number of Observations					9	Number of Distinct Observations					9
501							Number of Missing Observations					0
502	Minimum					218	Mean					292.1
503	Maximum					574	Median					259
504	SD					109.3	Std. Error of Mean					36.4

	A	B	C	D	E	F	G	H	I	J	K	L
505	Coefficient of Variation					0.37	Skewness					2.64
506												
507	Note: Sample size is small (e.g., <10), if data are collected using ISM approach, you should use											
508	guidance provided in ITRC Tech Reg Guide on ISM (ITRC, 2012) to compute statistics of interest.											
509	For example, you may want to use Chebyshev UCL to estimate EPC (ITRC, 2012).											
510	Chebyshev UCL can be computed using the Nonparametric and All UCL Options of ProUCL 5.0											
511												
512	Normal GOF Test											
513	Shapiro Wilk Test Statistic					0.62	Shapiro Wilk GOF Test					
514	5% Shapiro Wilk Critical Value					0.82	Data Not Normal at 5% Significance Level					
515	Lilliefors Test Statistic					0.32	Lilliefors GOF Test					
516	5% Lilliefors Critical Value					0.29	Data Not Normal at 5% Significance Level					
517	Data Not Normal at 5% Significance Level											
518												
519	Assuming Normal Distribution											
520	95% Normal UCL						95% UCLs (Adjusted for Skewness)					
521	95% Student's-t UCL					359.8	95% Adjusted-CLT UCL (Chen-1995)					386.4
522							95% Modified-t UCL (Johnson-1978)					365.2
523												
524	Gamma GOF Test											
525	A-D Test Statistic					1.17	Anderson-Darling Gamma GOF Test					
526	5% A-D Critical Value					0.72	Data Not Gamma Distributed at 5% Significance Level					
527	K-S Test Statistic					0.3	Kolmogrov-Smirnoff Gamma GOF Test					
528	5% K-S Critical Value					0.27	Data Not Gamma Distributed at 5% Significance Level					
529	Data Not Gamma Distributed at 5% Significance Level											
530												
531	Gamma Statistics											
532	k hat (MLE)					11.40	k star (bias corrected MLE)					7.71
533	Theta hat (MLE)					25.49	Theta star (bias corrected MLE)					37.8
534	nu hat (MLE)					206.3	nu star (bias corrected)					138.9
535	MLE Mean (bias corrected)					292.1	MLE Sd (bias corrected)					105.2
536							Approximate Chi Square Value (0.05)					112.6
537	Adjusted Level of Significance					0.025	Adjusted Chi Square Value					107.6
538												
539	Assuming Gamma Distribution											
540	Approximate Gamma UCL (use when n>=50))					360.15	Adjusted Gamma UCL (use when n<50)					376.8
541												
542	Lognormal GOF Test											
543	Shapiro Wilk Test Statistic					0.73	Shapiro Wilk Lognormal GOF Test					
544	5% Shapiro Wilk Critical Value					0.82	Data Not Lognormal at 5% Significance Level					
545	Lilliefors Test Statistic					0.28	Lilliefors Lognormal GOF Test					
546	5% Lilliefors Critical Value					0.29	Data appear Lognormal at 5% Significance Level					
547	Data appear Approximate Lognormal at 5% Significance Level											
548												
549	Lognormal Statistics											
550	Minimum of Logged Data					5.38	Mean of logged Data					5.63
551	Maximum of Logged Data					6.35	SD of logged Data					0.29
552												
553	Assuming Lognormal Distribution											
554	95% H-UCL					357.8	90% Chebyshev (MVUE) UCL					374.7
555	95% Chebyshev (MVUE) UCL					413	97.5% Chebyshev (MVUE) UCL					466.1
556	99% Chebyshev (MVUE) UCL					570.6						
557												
558	Nonparametric Distribution Free UCL Statistics											
559	Data appear to follow a Discernible Distribution at 5% Significance Level											
560												
561	Nonparametric Distribution Free UCLs											
562	95% CLT UCL					352	95% Jackknife UCL					359.8
563	95% Standard Bootstrap UCL					348.5	95% Bootstrap-t UCL					537.6
564	95% Hall's Bootstrap UCL					635.8	95% Percentile Bootstrap UCL					359.1
565	95% BCA Bootstrap UCL					392.9						
566	90% Chebyshev(Mean, Sd) UCL					401.4	95% Chebyshev(Mean, Sd) UCL					450.9
567	97.5% Chebyshev(Mean, Sd) UCL					519.6	99% Chebyshev(Mean, Sd) UCL					654.5

	A	B	C	D	E	F	G	H	I	J	K	L
568												
569	Suggested UCL to Use											
570	95% Student's-t UCL					359.8	or 95% Modified-t UCL					365.2
571												
572	ations regarding the selection of a 95% UCL are provided to help the user to select the most appropriate											
573	ommendations are based upon the results of the simulation studies summarized in Singh, Singh, and											
574	and Singh and Singh (2003). However, simulations results will not cover all Real World data sets											
575	For additional insight the user may want to consult a statistician.											
576												
577												
578	Mercury											
579												
580	General Statistics											
581	Total Number of Observations					9	Number of Distinct Observations					9
582							Number of Missing Observations					0
583	Minimum					0.02	Mean					0.14
584	Maximum					0.68	Median					0.05
585	SD					0.21	Std. Error of Mean					0.07
586	Coefficient of Variation					1.47	Skewness					2.44
587												
588	Note: Sample size is small (e.g., <10), if data are collected using ISM approach, you should use											
589	guidance provided in ITRC Tech Reg Guide on ISM (ITRC, 2012) to compute statistics of interest.											
590	For example, you may want to use Chebyshev UCL to estimate EPC (ITRC, 2012).											
591	Chebyshev UCL can be computed using the Nonparametric and All UCL Options of ProUCL 5.0											
592												
593	Normal GOF Test											
594	Shapiro Wilk Test Statistic					0.64	Shapiro Wilk GOF Test					
595	5% Shapiro Wilk Critical Value					0.82	Data Not Normal at 5% Significance Level					
596	Lilliefors Test Statistic					0.29	Lilliefors GOF Test					
597	5% Lilliefors Critical Value					0.29	Data Not Normal at 5% Significance Level					
598	Data Not Normal at 5% Significance Level											
599												
600	Assuming Normal Distribution											
601	95% Normal UCL						95% UCLs (Adjusted for Skewness)					
602	95% Student's-t UCL					0.27	95% Adjusted-CLT UCL (Chen-1995)					0.32
603							95% Modified-t UCL (Johnson-1978)					0.28
604												
605	Gamma GOF Test											
606	A-D Test Statistic					0.62	Anderson-Darling Gamma GOF Test					
607	5% A-D Critical Value					0.74	data appear Gamma Distributed at 5% Significance Level					
608	K-S Test Statistic					0.23	Kolmogorov-Smirnov Gamma GOF Test					
609	5% K-S Critical Value					0.28	data appear Gamma Distributed at 5% Significance Level					
610	Detected data appear Gamma Distributed at 5% Significance Level											
611												
612	Gamma Statistics											
613	k hat (MLE)					0.83	k star (bias corrected MLE)					0.62
614	Theta hat (MLE)					0.17	Theta star (bias corrected MLE)					0.23
615	nu hat (MLE)					14.9	nu star (bias corrected)					11.2
616	MLE Mean (bias corrected)					0.14	MLE Sd (bias corrected)					0.18
617							Approximate Chi Square Value (0.05)					4.76
618	Adjusted Level of Significance					0.02	Adjusted Chi Square Value					3.91
619												
620	Assuming Gamma Distribution											
621	Approximate Gamma UCL (use when n>=50)					0.34	Adjusted Gamma UCL (use when n<50)					0.42
622												
623	Lognormal GOF Test											
624	Shapiro Wilk Test Statistic					0.91	Shapiro Wilk Lognormal GOF Test					
625	5% Shapiro Wilk Critical Value					0.82	Data appear Lognormal at 5% Significance Level					
626	Lilliefors Test Statistic					0.16	Lilliefors Lognormal GOF Test					
627	5% Lilliefors Critical Value					0.29	Data appear Lognormal at 5% Significance Level					
628	Data appear Lognormal at 5% Significance Level											
629												
630	Lognormal Statistics											

	A	B	C	D	E	F	G	H	I	J	K	L
631	Minimum of Logged Data					-3.89	Mean of logged Data					-2.63
632	Maximum of Logged Data					-0.37	SD of logged Data					1.19
633												
634	Assuming Lognormal Distribution											
635	95% H-UCL					0.69	90% Chebyshev (MVUE) UCL					0.29
636	95% Chebyshev (MVUE) UCL					0.36	97.5% Chebyshev (MVUE) UCL					0.46
637	99% Chebyshev (MVUE) UCL					0.66						
638												
639	Nonparametric Distribution Free UCL Statistics											
640	Data appear to follow a Discernible Distribution at 5% Significance Level											
641												
642	Nonparametric Distribution Free UCLs											
643	95% CLT UCL					0.26	95% Jackknife UCL					0.27
644	95% Standard Bootstrap UCL					0.25	95% Bootstrap-t UCL					0.59
645	95% Hall's Bootstrap UCL					0.66	95% Percentile Bootstrap UCL					0.27
646	95% BCA Bootstrap UCL					0.31						
647	90% Chebyshev(Mean, Sd) UCL					0.36	95% Chebyshev(Mean, Sd) UCL					0.45
648	97.5% Chebyshev(Mean, Sd) UCL					0.59	99% Chebyshev(Mean, Sd) UCL					0.86
649												
650	Suggested UCL to Use											
651	95% Adjusted Gamma UCL					0.42						
652												
653	itions regarding the selection of a 95% UCL are provided to help the user to select the most appropriate											
654	ommendations are based upon the results of the simulation studies summarized in Singh, Singh, and											
655	and Singh and Singh (2003). However, simulations results will not cover all Real World data sets											
656	For additional insight the user may want to consult a statistician.											
657												
658												
659	Uranium											
660												
661	General Statistics											
662	Total Number of Observations					9	Number of Distinct Observations					9
663							Number of Missing Observations					0
664	Minimum					0.66	Mean					3.47
665	Maximum					13.3	Median					1.52
666	SD					3.97	Std. Error of Mean					1.32
667	Coefficient of Variation					1.14	Skewness					2.28
668												
669	Note: Sample size is small (e.g., <10), if data are collected using ISM approach, you should use											
670	guidance provided in ITRC Tech Reg Guide on ISM (ITRC, 2012) to compute statistics of interest.											
671	For example, you may want to use Chebyshev UCL to estimate EPC (ITRC, 2012).											
672	Chebyshev UCL can be computed using the Nonparametric and All UCL Options of ProUCL 5.0											
673												
674	Normal GOF Test											
675	Shapiro Wilk Test Statistic					0.70	Shapiro Wilk GOF Test					
676	5% Shapiro Wilk Critical Value					0.82	Data Not Normal at 5% Significance Level					
677	Lilliefors Test Statistic					0.24	Lilliefors GOF Test					
678	5% Lilliefors Critical Value					0.29	Data appear Normal at 5% Significance Level					
679	Data appear Approximate Normal at 5% Significance Level											
680												
681	Assuming Normal Distribution											
682	95% Normal UCL						95% UCLs (Adjusted for Skewness)					
683	95% Student's-t UCL					5.93	95% Adjusted-CLT UCL (Chen-1995)					6.72
684							95% Modified-t UCL (Johnson-1978)					6.10
685												
686	Gamma GOF Test											
687	A-D Test Statistic					0.49	Anderson-Darling Gamma GOF Test					
688	5% A-D Critical Value					0.73	data appear Gamma Distributed at 5% Significance Level					
689	K-S Test Statistic					0.25	Kolmogorov-Smirnov Gamma GOF Test					
690	5% K-S Critical Value					0.28	data appear Gamma Distributed at 5% Significance Level					
691	Detected data appear Gamma Distributed at 5% Significance Level											
692												
693	Gamma Statistics											

	A	B	C	D	E	F	G	H	I	J	K	L
694	k hat (MLE)					1.29	k star (bias corrected MLE)					0.93
695	Theta hat (MLE)					2.67	Theta star (bias corrected MLE)					3.70
696	nu hat (MLE)					23.34	nu star (bias corrected)					16.9
697	MLE Mean (bias corrected)					3.47	MLE Sd (bias corrected)					3.58
698							Approximate Chi Square Value (0.05)					8.6
699	Adjusted Level of Significance					0.025	Adjusted Chi Square Value					7.38
700												
701	Assuming Gamma Distribution											
702	Approximate Gamma UCL (use when n>=50))					6.82	Adjusted Gamma UCL (use when n<50)					7.95
703												
704	Lognormal GOF Test											
705	Shapiro Wilk Test Statistic					0.94	Shapiro Wilk Lognormal GOF Test					
706	5% Shapiro Wilk Critical Value					0.82	Data appear Lognormal at 5% Significance Level					
707	Lilliefors Test Statistic					0.21	Lilliefors Lognormal GOF Test					
708	5% Lilliefors Critical Value					0.29	Data appear Lognormal at 5% Significance Level					
709	Data appear Lognormal at 5% Significance Level											
710												
711	Lognormal Statistics											
712	Minimum of Logged Data					-0.41	Mean of logged Data					0.81
713	Maximum of Logged Data					2.58	SD of logged Data					0.94
714												
715	Assuming Lognormal Distribution											
716	95% H-UCL					9.84	90% Chebyshev (MVUE) UCL					6.49
717	95% Chebyshev (MVUE) UCL					7.93	97.5% Chebyshev (MVUE) UCL					9.95
718	99% Chebyshev (MVUE) UCL					13.9						
719												
720	Nonparametric Distribution Free UCL Statistics											
721	Data appear to follow a Discernible Distribution at 5% Significance Level											
722												
723	Nonparametric Distribution Free UCLs											
724	95% CLT UCL					5.65	95% Jackknife UCL					5.93
725	95% Standard Bootstrap UCL					5.54	95% Bootstrap-t UCL					9.80
726	95% Hall's Bootstrap UCL					13.86	95% Percentile Bootstrap UCL					5.85
727	95% BCA Bootstrap UCL					6.79						
728	90% Chebyshev(Mean, Sd) UCL					7.44	95% Chebyshev(Mean, Sd) UCL					9.24
729	97.5% Chebyshev(Mean, Sd) UCL					11.74	99% Chebyshev(Mean, Sd) UCL					16.64
730												
731	Suggested UCL to Use											
732	95% Student's-t UCL					5.93						
733												
734	Options regarding the selection of a 95% UCL are provided to help the user to select the most appropriate											
735	Recommendations are based upon the results of the simulation studies summarized in Singh, Singh, and											
736	Singh and Singh and Singh (2003). However, simulations results will not cover all Real World data sets											
737	For additional insight the user may want to consult a statistician.											
738												
739												
740	Uranium-234											
741												
742	General Statistics											
743	Total Number of Observations					9	Number of Distinct Observations					9
744							Number of Missing Observations					0
745	Minimum					0.79	Mean					1.69
746	Maximum					4.93	Median					1.18
747	SD					1.26	Std. Error of Mean					0.42
748	Coefficient of Variation					0.74	Skewness					2.59
749												
750	Note: Sample size is small (e.g., <10), if data are collected using ISM approach, you should use											
751	guidance provided in ITRC Tech Reg Guide on ISM (ITRC, 2012) to compute statistics of interest.											
752	For example, you may want to use Chebyshev UCL to estimate EPC (ITRC, 2012).											
753	Chebyshev UCL can be computed using the Nonparametric and All UCL Options of ProUCL 5.0											
754												
755	Normal GOF Test											
756	Shapiro Wilk Test Statistic					0.64	Shapiro Wilk GOF Test					

	A	B	C	D	E	F	G	H	I	J	K	L	
757	5% Shapiro Wilk Critical Value					0.82	Data Not Normal at 5% Significance Level						
758	Lilliefors Test Statistic					0.33	Lilliefors GOF Test						
759	5% Lilliefors Critical Value					0.29	Data Not Normal at 5% Significance Level						
760	Data Not Normal at 5% Significance Level												
761													
762	Assuming Normal Distribution												
763	95% Normal UCL					95% UCLs (Adjusted for Skewness)							
764	95% Student's-t UCL					2.47	95% Adjusted-CLT UCL (Chen-1995)					2.77	
765							95% Modified-t UCL (Johnson-1978)					2.53	
766													
767	Gamma GOF Test												
768	A-D Test Statistic					0.83	Anderson-Darling Gamma GOF Test						
769	5% A-D Critical Value					0.72	Data Not Gamma Distributed at 5% Significance Level						
770	K-S Test Statistic					0.25	Kolmogrov-Smirnoff Gamma GOF Test						
771	5% K-S Critical Value					0.28	data appear Gamma Distributed at 5% Significance Level						
772	Detected data follow Appr. Gamma Distribution at 5% Significance Level												
773													
774	Gamma Statistics												
775	k hat (MLE)					3.36	k star (bias corrected MLE)					2.31	
776	Theta hat (MLE)					0.50	Theta star (bias corrected MLE)					0.73	
777	nu hat (MLE)					60.5	nu star (bias corrected)					41.7	
778	MLE Mean (bias corrected)					1.69	MLE Sd (bias corrected)					1.11	
779							Approximate Chi Square Value (0.05)					27.8	
780	Adjusted Level of Significance					0.02	Adjusted Chi Square Value					25.5	
781													
782	Assuming Gamma Distribution												
783	Approximate Gamma UCL (use when n>=50)					2.52	Adjusted Gamma UCL (use when n<50)					2.76	
784													
785	Lognormal GOF Test												
786	Shapiro Wilk Test Statistic					0.85	Shapiro Wilk Lognormal GOF Test						
787	5% Shapiro Wilk Critical Value					0.82	Data appear Lognormal at 5% Significance Level						
788	Lilliefors Test Statistic					0.21	Lilliefors Lognormal GOF Test						
789	5% Lilliefors Critical Value					0.29	Data appear Lognormal at 5% Significance Level						
790	Data appear Lognormal at 5% Significance Level												
791													
792	Lognormal Statistics												
793	Minimum of Logged Data					-0.22	Mean of logged Data					0.37	
794	Maximum of Logged Data					1.59	SD of logged Data					0.53	
795													
796	Assuming Lognormal Distribution												
797	95% H-UCL					2.56	90% Chebyshev (MVUE) UCL					2.52	
798	95% Chebyshev (MVUE) UCL					2.92	97.5% Chebyshev (MVUE) UCL					3.48	
799	99% Chebyshev (MVUE) UCL					4.57							
800													
801	Nonparametric Distribution Free UCL Statistics												
802	Data appear to follow a Discernible Distribution at 5% Significance Level												
803													
804	Nonparametric Distribution Free UCLs												
805	95% CLT UCL					2.38	95% Jackknife UCL					2.47	
806	95% Standard Bootstrap UCL					2.33	95% Bootstrap-t UCL					3.95	
807	95% Hall's Bootstrap UCL					4.97	95% Percentile Bootstrap UCL					2.48	
808	95% BCA Bootstrap UCL					2.85							
809	90% Chebyshev(Mean, Sd) UCL					2.95	95% Chebyshev(Mean, Sd) UCL					3.52	
810	97.5% Chebyshev(Mean, Sd) UCL					4.31	99% Chebyshev(Mean, Sd) UCL					5.87	
811													
812	Suggested UCL to Use												
813	95% Adjusted Gamma UCL					2.76							
814													
815	Directions regarding the selection of a 95% UCL are provided to help the user to select the most appropriate												
816	Recommendations are based upon the results of the simulation studies summarized in Singh, Singh, and												
817	Singh and Singh and Singh (2003). However, simulations results will not cover all Real World data sets												
818	For additional insight the user may want to consult a statistician.												
819													

	A	B	C	D	E	F	G	H	I	J	K	L
820	Uranium-235/236											
821												
822	General Statistics											
823	Total Number of Observations					9	Number of Distinct Observations					9
824	Number of Detects					5	Number of Non-Detects					4
825	Number of Distinct Detects					5	Number of Distinct Non-Detects					4
826	Minimum Detect					0.08	Minimum Non-Detect					0.04
827	Maximum Detect					0.38	Maximum Non-Detect					0.06
828	Variance Detects					0.01	Percent Non-Detects					44.4
829	Mean Detects					0.15	SD Detects					0.13
830	Median Detects					0.09	CV Detects					0.87
831	Skewness Detects					2.18	Kurtosis Detects					4.82
832	Mean of Logged Detects					-2.10	SD of Logged Detects					0.65
833												
834	Note: Sample size is small (e.g., <10), if data are collected using ISM approach, you should use											
835	guidance provided in ITRC Tech Reg Guide on ISM (ITRC, 2012) to compute statistics of interest.											
836	For example, you may want to use Chebyshev UCL to estimate EPC (ITRC, 2012).											
837	Chebyshev UCL can be computed using the Nonparametric and All UCL Options of ProUCL 5.0											
838												
839	Normal GOF Test on Detects Only											
840	Shapiro Wilk Test Statistic					0.62	Shapiro Wilk GOF Test					
841	5% Shapiro Wilk Critical Value					0.76	Detected Data Not Normal at 5% Significance Level					
842	Lilliefors Test Statistic					0.41	Lilliefors GOF Test					
843	5% Lilliefors Critical Value					0.39	Detected Data Not Normal at 5% Significance Level					
844	Detected Data Not Normal at 5% Significance Level											
845												
846	Kaplan-Meier (KM) Statistics using Normal Critical Values and other Nonparametric UCLs											
847	Mean					0.10	Standard Error of Mean					0.03
848	SD					0.10	95% KM (BCA) UCL					0.18
849	95% KM (t) UCL					0.17	95% KM (Percentile Bootstrap) UCL					0.17
850	95% KM (z) UCL					0.16	95% KM Bootstrap t UCL					0.29
851	90% KM Chebyshev UCL					0.21	95% KM Chebyshev UCL					0.27
852	97.5% KM Chebyshev UCL					0.34	99% KM Chebyshev UCL					0.48
853												
854	Gamma GOF Tests on Detected Observations Only											
855	A-D Test Statistic					0.93	Anderson-Darling GOF Test					
856	5% A-D Critical Value					0.68	Detected Data Not Gamma Distributed at 5% Significance Level					
857	K-S Test Statistic					0.38	Kolmogorov-Smirnov GOF					
858	5% K-S Critical Value					0.36	Detected Data Not Gamma Distributed at 5% Significance Level					
859	Detected Data Not Gamma Distributed at 5% Significance Level											
860												
861	Gamma Statistics on Detected Data Only											
862	k hat (MLE)					2.51	k star (bias corrected MLE)					1.13
863	Theta hat (MLE)					0.06	Theta star (bias corrected MLE)					0.13
864	nu hat (MLE)					25.1	nu star (bias corrected)					11.3
865	MLE Mean (bias corrected)					0.15	MLE Sd (bias corrected)					0.14
866												
867	Gamma Kaplan-Meier (KM) Statistics											
868	k hat (KM)					1.04	nu hat (KM)					18.7
869	Approximate Chi Square Value (18.74, α)					9.92	Adjusted Chi Square Value (18.74, β)					8.60
870	Approximate KM-UCL (use when $n \geq 50$)					0.19	Gamma Adjusted KM-UCL (use when $n < 50$)					0.22
871												
872	Gamma ROS Statistics using Imputed Non-Detects											
873	GROS may not be used when data set has > 50% NDs with many tied observations at multiple DLs											
874	GROS may not be used when kstar of detected data is small such as < 0.1											
875	For such situations, GROS method tends to yield inflated values of UCLs and BTVs											
876	Gamma distributed detected data, BTVs and UCLs may be computed using gamma distribution on KM estimate											
877	Minimum					0.01	Mean					0.08
878	Maximum					0.38	Median					0.08
879	SD					0.11	CV					1.34
880	k hat (MLE)					0.75	k star (bias corrected MLE)					0.57
881	Theta hat (MLE)					0.11	Theta star (bias corrected MLE)					0.15
882	nu hat (MLE)					13.6	nu star (bias corrected)					10.4

	A	B	C	D	E	F	G	H	I	J	K	L
883	MLE Mean (bias corrected)					0.08	MLE Sd (bias corrected)					0.11
884							Adjusted Level of Significance (β)					0.02
885	Approximate Chi Square Value (10.43, α)					4.21	Adjusted Chi Square Value (10.43, β)					3.41
886	Normal Approximate UCL (use when $n \geq 50$)					0.21	Gamma Adjusted UCL (use when $n < 50$)					0.27
887												
888	Lognormal GOF Test on Detected Observations Only											
889	Shapiro Wilk Test Statistic					0.70	Shapiro Wilk GOF Test					
890	5% Shapiro Wilk Critical Value					0.76	Detected Data Not Lognormal at 5% Significance Level					
891	Lilliefors Test Statistic					0.34	Lilliefors GOF Test					
892	5% Lilliefors Critical Value					0.39	Detected Data appear Lognormal at 5% Significance Level					
893	Detected Data appear Approximate Lognormal at 5% Significance Level											
894												
895	Lognormal ROS Statistics Using Imputed Non-Detects											
896	Mean in Original Scale					0.09	Mean in Log Scale					-2.85
897	SD in Original Scale					0.11	SD in Log Scale					1.00
898	95% t UCL (assumes normality of ROS data)					0.16	95% Percentile Bootstrap UCL					0.16
899	95% BCA Bootstrap UCL					0.18	95% Bootstrap t UCL					0.26
900	95% H-UCL (Log ROS)					0.30						
901												
902	Estimates using Lognormal Distribution and KM Estimates when Detected data are Lognormally Distributed											
903	KM Mean (logged)					-2.53	95% H-UCL (KM -Log)					0.17
904	KM SD (logged)					0.65	95% Critical H Value (KM-Log)					2.54
905	KM Standard Error of Mean (logged)					0.24						
906												
907	DL/2 Statistics											
908	DL/2 Normal						DL/2 Log-Transformed					
909	Mean in Original Scale					0.09	Mean in Log Scale					-2.73
910	SD in Original Scale					0.11	SD in Log Scale					0.89
911	95% t UCL (Assumes normality)					0.16	95% H-Stat UCL					0.24
912	DL/2 is not a recommended method, provided for comparisons and historical reasons											
913												
914	Nonparametric Distribution Free UCL Statistics											
915	Detected Data appear Approximate Lognormal Distributed at 5% Significance Level											
916												
917	Suggested UCL to Use											
918	95% KM (t) UCL					0.17	95% KM (% Bootstrap) UCL					0.17
919												
920	Recommendations regarding the selection of a 95% UCL are provided to help the user to select the most appropriate											
921	Recommendations are based upon data size, data distribution, and skewness.											
922	Recommendations are based upon the results of the simulation studies summarized in Singh, Maichle, and											
923	Simulation results will not cover all Real World data sets; for additional insight the user may want to consult											
924												
925												
926	Uranium-238											
927												
928	General Statistics											
929	Total Number of Observations					9	Number of Distinct Observations					8
930							Number of Missing Observations					0
931	Minimum					1.03	Mean					2.21
932	Maximum					6.93	Median					1.58
933	SD					1.82	Std. Error of Mean					0.60
934	Coefficient of Variation					0.82	Skewness					2.64
935												
936	Note: Sample size is small (e.g., <10), if data are collected using ISM approach, you should use											
937	guidance provided in ITRC Tech Reg Guide on ISM (ITRC, 2012) to compute statistics of interest.											
938	For example, you may want to use Chebyshev UCL to estimate EPC (ITRC, 2012).											
939	Chebyshev UCL can be computed using the Nonparametric and All UCL Options of ProUCL 5.0											
940												
941	Normal GOF Test											
942	Shapiro Wilk Test Statistic					0.62	Shapiro Wilk GOF Test					
943	5% Shapiro Wilk Critical Value					0.82	Data Not Normal at 5% Significance Level					
944	Lilliefors Test Statistic					0.35	Lilliefors GOF Test					
945	5% Lilliefors Critical Value					0.29	Data Not Normal at 5% Significance Level					

	A	B	C	D	E	F	G	H	I	J	K	L		
946	Data Not Normal at 5% Significance Level													
947														
948	Assuming Normal Distribution													
949	95% Normal UCL						95% UCLs (Adjusted for Skewness)							
950	95% Student's-t UCL						3.35	95% Adjusted-CLT UCL (Chen-1995)						3.79
951								95% Modified-t UCL (Johnson-1978)						3.43
952														
953	Gamma GOF Test													
954	A-D Test Statistic						0.91	Anderson-Darling Gamma GOF Test						
955	5% A-D Critical Value						0.72	Data Not Gamma Distributed at 5% Significance Level						
956	K-S Test Statistic						0.26	Kolmogrov-Smirnoff Gamma GOF Test						
957	5% K-S Critical Value						0.28	Data appear Gamma Distributed at 5% Significance Level						
958	Detected data follow Appr. Gamma Distribution at 5% Significance Level													
959														
960	Gamma Statistics													
961	k hat (MLE)						2.88	k star (bias corrected MLE)						1.99
962	Theta hat (MLE)						0.77	Theta star (bias corrected MLE)						1.11
963	nu hat (MLE)						51.8	nu star (bias corrected)						35.8
964	MLE Mean (bias corrected)						2.21	MLE Sd (bias corrected)						1.57
965								Approximate Chi Square Value (0.05)						23.1
966	Adjusted Level of Significance						0.02	Adjusted Chi Square Value						21.0
967														
968	Assuming Gamma Distribution													
969	Approximate Gamma UCL (use when n>=50)						3.43	Adjusted Gamma UCL (use when n<50)						3.77
970														
971	Lognormal GOF Test													
972	Shapiro Wilk Test Statistic						0.83	Shapiro Wilk Lognormal GOF Test						
973	5% Shapiro Wilk Critical Value						0.82	Data appear Lognormal at 5% Significance Level						
974	Lilliefors Test Statistic						0.21	Lilliefors Lognormal GOF Test						
975	5% Lilliefors Critical Value						0.29	Data appear Lognormal at 5% Significance Level						
976	Data appear Lognormal at 5% Significance Level													
977														
978	Lognormal Statistics													
979	Minimum of Logged Data						0.02	Mean of logged Data						0.61
980	Maximum of Logged Data						1.93	SD of logged Data						0.57
981														
982	Assuming Lognormal Distribution													
983	95% H-UCL						3.49	90% Chebyshev (MVUE) UCL						3.36
984	95% Chebyshev (MVUE) UCL						3.92	97.5% Chebyshev (MVUE) UCL						4.69
985	99% Chebyshev (MVUE) UCL						6.22							
986														
987	Nonparametric Distribution Free UCL Statistics													
988	Data appear to follow a Discernible Distribution at 5% Significance Level													
989														
990	Nonparametric Distribution Free UCLs													
991	95% CLT UCL						3.21	95% Jackknife UCL						3.35
992	95% Standard Bootstrap UCL						3.15	95% Bootstrap-t UCL						5.73
993	95% Hall's Bootstrap UCL						6.84	95% Percentile Bootstrap UCL						3.29
994	95% BCA Bootstrap UCL						3.83							
995	90% Chebyshev(Mean, Sd) UCL						4.04	95% Chebyshev(Mean, Sd) UCL						4.87
996	97.5% Chebyshev(Mean, Sd) UCL						6.02	99% Chebyshev(Mean, Sd) UCL						8.28
997														
998	Suggested UCL to Use													
999	95% Adjusted Gamma UCL						3.77							
1000														
1001	Recommendations regarding the selection of a 95% UCL are provided to help the user to select the most appropriate													
1002	Recommendations are based upon the results of the simulation studies summarized in Singh, Singh, and													
1003	Singh and Singh and Singh (2003). However, simulations results will not cover all Real World data sets													
1004	For additional insight the user may want to consult a statistician.													
1005														
1006														
1007	Vanadium													
1008														

	A	B	C	D	E	F	G	H	I	J	K	L
1009	General Statistics											
1010	Total Number of Observations					9	Number of Distinct Observations					9
1011							Number of Missing Observations					0
1012	Minimum					8.21	Mean					13.0
1013	Maximum					16.7	Median					12.7
1014	SD					2.72	Std. Error of Mean					0.91
1015	Coefficient of Variation					0.20	Skewness					-0.32
1016												
1017	Note: Sample size is small (e.g., <10), if data are collected using ISM approach, you should use											
1018	guidance provided in ITRC Tech Reg Guide on ISM (ITRC, 2012) to compute statistics of interest.											
1019	For example, you may want to use Chebyshev UCL to estimate EPC (ITRC, 2012).											
1020	Chebyshev UCL can be computed using the Nonparametric and All UCL Options of ProUCL 5.0											
1021												
1022	Normal GOF Test											
1023	Shapiro Wilk Test Statistic					0.95	Shapiro Wilk GOF Test					
1024	5% Shapiro Wilk Critical Value					0.82	Data appear Normal at 5% Significance Level					
1025	Lilliefors Test Statistic					0.13	Lilliefors GOF Test					
1026	5% Lilliefors Critical Value					0.29	Data appear Normal at 5% Significance Level					
1027	Data appear Normal at 5% Significance Level											
1028												
1029	Assuming Normal Distribution											
1030	95% Normal UCL						95% UCLs (Adjusted for Skewness)					
1031	95% Student's-t UCL					14.71	95% Adjusted-CLT UCL (Chen-1995)					14.41
1032							95% Modified-t UCL (Johnson-1978)					14.71
1033												
1034	Gamma GOF Test											
1035	A-D Test Statistic					0.26	Anderson-Darling Gamma GOF Test					
1036	5% A-D Critical Value					0.72	data appear Gamma Distributed at 5% Significance Level					
1037	K-S Test Statistic					0.15	Kolmogrov-Smirnoff Gamma GOF Test					
1038	5% K-S Critical Value					0.27	data appear Gamma Distributed at 5% Significance Level					
1039	Detected data appear Gamma Distributed at 5% Significance Level											
1040												
1041	Gamma Statistics											
1042	k hat (MLE)					23.8	k star (bias corrected MLE)					15.9
1043	Theta hat (MLE)					0.54	Theta star (bias corrected MLE)					0.81
1044	nu hat (MLE)					429.7	nu star (bias corrected)					287.8
1045	MLE Mean (bias corrected)					13.0	MLE Sd (bias corrected)					3.26
1046							Approximate Chi Square Value (0.05)					249.5
1047	Adjusted Level of Significance					0.02	Adjusted Chi Square Value					241.9
1048												
1049	Assuming Gamma Distribution											
1050	Approximate Gamma UCL (use when n>=50)					15.0	Adjusted Gamma UCL (use when n<50)					15.5
1051												
1052	Lognormal GOF Test											
1053	Shapiro Wilk Test Statistic					0.93	Shapiro Wilk Lognormal GOF Test					
1054	5% Shapiro Wilk Critical Value					0.82	Data appear Lognormal at 5% Significance Level					
1055	Lilliefors Test Statistic					0.15	Lilliefors Lognormal GOF Test					
1056	5% Lilliefors Critical Value					0.29	Data appear Lognormal at 5% Significance Level					
1057	Data appear Lognormal at 5% Significance Level											
1058												
1059	Lognormal Statistics											
1060	Minimum of Logged Data					2.10	Mean of logged Data					2.54
1061	Maximum of Logged Data					2.81	SD of logged Data					0.22
1062												
1063	Assuming Lognormal Distribution											
1064	95% H-UCL					15.2	90% Chebyshev (MVUE) UCL					15.9
1065	95% Chebyshev (MVUE) UCL					17.3	97.5% Chebyshev (MVUE) UCL					19.1
1066	99% Chebyshev (MVUE) UCL					22.7						
1067												
1068	Nonparametric Distribution Free UCL Statistics											
1069	Data appear to follow a Discernible Distribution at 5% Significance Level											
1070												
1071	Nonparametric Distribution Free UCLs											

	A	B	C	D	E	F	G	H	I	J	K	L
1072	95% CLT UCL					14.5	95% Jackknife UCL					14.7
1073	95% Standard Bootstrap UCL					14.4	95% Bootstrap-t UCL					14.7
1074	95% Hall's Bootstrap UCL					14.4	95% Percentile Bootstrap UCL					14.4
1075	95% BCA Bootstrap UCL					14.3						
1076	90% Chebyshev(Mean, Sd) UCL					15.7	95% Chebyshev(Mean, Sd) UCL					17.0
1077	97.5% Chebyshev(Mean, Sd) UCL					18.7	99% Chebyshev(Mean, Sd) UCL					22.1
1078												
1079	Suggested UCL to Use											
1080	95% Student's-t UCL					14.7						
1081												
1082	ations regarding the selection of a 95% UCL are provided to help the user to select the most appropriate											
1083	ommendations are based upon the results of the simulation studies summarized in Singh, Singh, and											
1084	and Singh and Singh (2003). However, simulations results will not cover all Real World data sets											
1085	For additional insight the user may want to consult a statistician.											
1086												
1087	highly negatively-skewed data, confidence limits (e.g., Chen, Johnson, Lognormal, and Gamma) may											
1088	reliable. Chen's and Johnson's methods provide adjustments for positively skewed data sets.											
1089												
1090												
1091	Zinc											
1092												
1093	General Statistics											
1094	Total Number of Observations					9	Number of Distinct Observations					8
1095							Number of Missing Observations					0
1096	Minimum					31.5	Mean					40.2
1097	Maximum					52.8	Median					41.3
1098	SD					6.21	Std. Error of Mean					2.07
1099	Coefficient of Variation					0.15	Skewness					0.55
1100												
1101	Note: Sample size is small (e.g., <10), if data are collected using ISM approach, you should use											
1102	guidance provided in ITRC Tech Reg Guide on ISM (ITRC, 2012) to compute statistics of interest.											
1103	For example, you may want to use Chebyshev UCL to estimate EPC (ITRC, 2012).											
1104	Chebyshev UCL can be computed using the Nonparametric and All UCL Options of ProUCL 5.0											
1105												
1106	Normal GOF Test											
1107	Shapiro Wilk Test Statistic					0.87	Shapiro Wilk GOF Test					
1108	5% Shapiro Wilk Critical Value					0.82	Data appear Normal at 5% Significance Level					
1109	Lilliefors Test Statistic					0.25	Lilliefors GOF Test					
1110	5% Lilliefors Critical Value					0.29	Data appear Normal at 5% Significance Level					
1111	Data appear Normal at 5% Significance Level											
1112												
1113	Assuming Normal Distribution											
1114	95% Normal UCL						95% UCLs (Adjusted for Skewness)					
1115	95% Student's-t UCL					44.0	95% Adjusted-CLT UCL (Chen-1995)					44.0
1116							95% Modified-t UCL (Johnson-1978)					44.1
1117												
1118	Gamma GOF Test											
1119	A-D Test Statistic					0.63	Anderson-Darling Gamma GOF Test					
1120	5% A-D Critical Value					0.72	data appear Gamma Distributed at 5% Significance Level					
1121	K-S Test Statistic					0.23	Kolmogrov-Smirnov Gamma GOF Test					
1122	5% K-S Critical Value					0.27	data appear Gamma Distributed at 5% Significance Level					
1123	Detected data appear Gamma Distributed at 5% Significance Level											
1124												
1125	Gamma Statistics											
1126	k hat (MLE)					47.9	k star (bias corrected MLE)					32.0
1127	Theta hat (MLE)					0.83	Theta star (bias corrected MLE)					1.25
1128	nu hat (MLE)					862.5	nu star (bias corrected)					576.3
1129	MLE Mean (bias corrected)					40.2	MLE Sd (bias corrected)					7.10
1130							Approximate Chi Square Value (0.05)					521.6
1131	Adjusted Level of Significance					0.02	Adjusted Chi Square Value					510.6
1132												
1133	Assuming Gamma Distribution											
1134	Approximate Gamma UCL (use when n>=50))					44.4	Adjusted Gamma UCL (use when n<50)					45.4

	A	B	C	D	E	F	G	H	I	J	K	L
1135												
1136	Lognormal GOF Test											
1137	Shapiro Wilk Test Statistic				0.88	Shapiro Wilk Lognormal GOF Test						
1138	5% Shapiro Wilk Critical Value				0.82	Data appear Lognormal at 5% Significance Level						
1139	Lilliefors Test Statistic				0.23	Lilliefors Lognormal GOF Test						
1140	5% Lilliefors Critical Value				0.29	Data appear Lognormal at 5% Significance Level						
1141	Data appear Lognormal at 5% Significance Level											
1142												
1143	Lognormal Statistics											
1144	Minimum of Logged Data				3.45	Mean of logged Data				3.68		
1145	Maximum of Logged Data				3.96	SD of logged Data				0.15		
1146												
1147	Assuming Lognormal Distribution											
1148	95% H-UCL				44.5	90% Chebyshev (MVUE) UCL				46.4		
1149	95% Chebyshev (MVUE) UCL				49.2	97.5% Chebyshev (MVUE) UCL				53.0		
1150	99% Chebyshev (MVUE) UCL				60.7							
1151												
1152	Nonparametric Distribution Free UCL Statistics											
1153	Data appear to follow a Discernible Distribution at 5% Significance Level											
1154												
1155	Nonparametric Distribution Free UCLs											
1156	95% CLT UCL				43.6	95% Jackknife UCL				44.0		
1157	95% Standard Bootstrap UCL				43.4	95% Bootstrap-t UCL				44.1		
1158	95% Hall's Bootstrap UCL				45.5	95% Percentile Bootstrap UCL				43.5		
1159	95% BCA Bootstrap UCL				43.8							
1160	90% Chebyshev(Mean, Sd) UCL				46.4	95% Chebyshev(Mean, Sd) UCL				49.2		
1161	97.5% Chebyshev(Mean, Sd) UCL				53.1	99% Chebyshev(Mean, Sd) UCL				60.8		
1162												
1163	Suggested UCL to Use											
1164	95% Student's-t UCL				44.0							
1165												
1166	tions regarding the selection of a 95% UCL are provided to help the user to select the most appropriate											
1167	mmendations are based upon the results of the simulation studies summarized in Singh, Singh, and											
1168	and Singh and Singh (2003). However, simulations results will not cover all Real World data sets											
1169	For additional insight the user may want to consult a statistician.											
1170												