UCL Statistics for Data Sets with Non-Detects

User Selected Options	
Date/Time of Computation	ProUCL 5.110/13/2016 9:32:24 AM
From File	ProUCL input 01-003(b1) 0-5, 0-10_a.xls
Full Precision	OFF
Confidence Coefficient	95%
Number of Bootstrap Operations	2000

Copper

General Statistics

Total Number of Observations	8	Number of Distinct Observations	8
		Number of Missing Observations	0
Minimum	3.12	Mean	8.133
Maximum	18.2	Median	7.715
SD	4.435	Std. Error of Mean	1.568
Coefficient of Variation	0.545	Skewness	1.885

Note: Sample size is small (e.g., <10), if data are collected using ISM approach, you should use guidance provided in ITRC Tech Reg Guide on ISM (ITRC, 2012) to compute statistics of interest. For example, you may want to use Chebyshev UCL to estimate EPC (ITRC, 2012). Chebyshev UCL can be computed using the Nonparametric and All UCL Options of ProUCL 5.1

Normal GOF Test

Shapiro Wilk Test Statistic	0.77	**Shapiro Wilk GOF Test**
5% Shapiro Wilk Critical Value	0.818	Data Not Normal at 5% Significance Level
Lilliefors Test Statistic	0.378	**Lilliefors GOF Test**
5% Lilliefors Critical Value	0.283	Data Not Normal at 5% Significance Level

Data Not Normal at 5% Significance Level

Assuming Normal Distribution

95% Normal UCL		**95% UCLs (Adjusted for Skewness)**	
95% Student's-t UCL	11.1	95% Adjusted-CLT UCL (Chen-1995)	11.83
		95% Modified-t UCL (Johnson-1978)	11.28

Gamma GOF Test

A-D Test Statistic	0.63	**Anderson-Darling Gamma GOF Test**
5% A-D Critical Value	0.719	Detected data appear Gamma Distributed at 5% Significance Level
K-S Test Statistic	0.317	**Kolmogorov-Smirnov Gamma GOF Test**
5% K-S Critical Value	0.295	Data Not Gamma Distributed at 5% Significance Level

Detected data follow Appr. Gamma Distribution at 5% Significance Level

Gamma Statistics

k hat (MLE)	4.676	k star (bias corrected MLE)	3.006
Theta hat (MLE)	1.739	Theta star (bias corrected MLE)	2.706
nu hat (MLE)	74.81	nu star (bias corrected)	48.09
MLE Mean (bias corrected)	8.133	MLE Sd (bias corrected)	4.691
		Approximate Chi Square Value (0.05)	33.17
Adjusted Level of Significance	0.0195	Adjusted Chi Square Value	30.07

53	**Assuming Gamma Distribution**											
54	95% Approximate Gamma UCL (use when n>=50)				11.79	95% Adjusted Gamma UCL (use when n<50)					13.01	
55												
56	**Lognormal GOF Test**											
57	Shapiro Wilk Test Statistic				0.897	**Shapiro Wilk Lognormal GOF Test**						
58	5% Shapiro Wilk Critical Value				0.818	Data appear Lognormal at 5% Significance Level						
59	Lilliefors Test Statistic				0.29	**Lilliefors Lognormal GOF Test**						
60	5% Lilliefors Critical Value				0.283	Data Not Lognormal at 5% Significance Level						
61	**Data appear Approximate Lognormal at 5% Significance Level**											
62												
63	**Lognormal Statistics**											
64	Minimum of Logged Data				1.138	Mean of logged Data					1.985	
65	Maximum of Logged Data				2.901	SD of logged Data					0.497	
66												
67	**Assuming Lognormal Distribution**											
68	95% H-UCL				12.8	90% Chebyshev (MVUE) UCL					12.41	
69	95% Chebyshev (MVUE) UCL				14.36	97.5% Chebyshev (MVUE) UCL					17.07	
70	99% Chebyshev (MVUE) UCL				22.39							
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				10.71	95% Jackknife UCL					11.1	
77	95% Standard Bootstrap UCL				10.5	95% Bootstrap-t UCL					12.86	
78	95% Hall's Bootstrap UCL				23.31	95% Percentile Bootstrap UCL					10.89	
79	95% BCA Bootstrap UCL				11.56							
80	90% Chebyshev(Mean, Sd) UCL				12.84	95% Chebyshev(Mean, Sd) UCL					14.97	
81	97.5% Chebyshev(Mean, Sd) UCL				17.92	99% Chebyshev(Mean, Sd) UCL					23.73	
82												
83	**Suggested UCL to Use**											
84	95% Adjusted Gamma UCL				13.01							
85												
86	When a data set follows an approximate (e.g., normal) distribution passing one of the GOF test											
87	When applicable, it is suggested to use a UCL based upon a distribution (e.g., gamma) passing both GOF tests in ProUCL											
88												
89	Note: Suggestions regarding the selection of a 95% UCL are provided to help the user to select the most appropriate 95% UCL.											
90	Recommendations are based upon data size, data distribution, and skewness.											
91	These recommendations are based upon the results of the simulation studies summarized in Singh, Maichle, and Lee (2006).											
92	However, simulations results will not cover all Real World data sets; for additional insight the user may want to consult a statistician.											
93												
94												
95	**Lead**											
96												
97	**General Statistics**											
98	Total Number of Observations				8	Number of Distinct Observations					8	
99						Number of Missing Observations					0	
100	Minimum				13.8	Mean					34.84	
101	Maximum				147	Median					18.85	
102	SD				45.54	Std. Error of Mean					16.1	
103	Coefficient of Variation				1.307	Skewness					2.774	
104												

105	Note: Sample size is small (e.g., <10), if data are collected using ISM approach, you should use											
106	guidance provided in ITRC Tech Reg Guide on ISM (ITRC, 2012) to compute statistics of interest.											
107	For example, you may want to use Chebyshev UCL to estimate EPC (ITRC, 2012).											
108	Chebyshev UCL can be computed using the Nonparametric and All UCL Options of ProUCL 5.1											
109												
110	Normal GOF Test											
111					Shapiro Wilk Test Statistic	0.508	Shapiro Wilk GOF Test					
112					5% Shapiro Wilk Critical Value	0.818	Data Not Normal at 5% Significance Level					
113					Lilliefors Test Statistic	0.447	Lilliefors GOF Test					
114					5% Lilliefors Critical Value	0.283	Data Not Normal at 5% Significance Level					
115	Data Not Normal at 5% Significance Level											
116												
117	Assuming Normal Distribution											
118					95% Normal UCL				95% UCLs (Adjusted for Skewness)			
119					95% Student's-t UCL	65.34			95% Adjusted-CLT UCL (Chen-1995)	78.2		
120									95% Modified-t UCL (Johnson-1978)	67.98		
121												
122	Gamma GOF Test											
123					A-D Test Statistic	1.469	Anderson-Darling Gamma GOF Test					
124					5% A-D Critical Value	0.729	Data Not Gamma Distributed at 5% Significance Level					
125					K-S Test Statistic	0.385	Kolmogorov-Smirnov Gamma GOF Test					
126					5% K-S Critical Value	0.299	Data Not Gamma Distributed at 5% Significance Level					
127	Data Not Gamma Distributed at 5% Significance Level											
128												
129	Gamma Statistics											
130					k hat (MLE)	1.449			k star (bias corrected MLE)	0.989		
131					Theta hat (MLE)	24.03			Theta star (bias corrected MLE)	35.22		
132					nu hat (MLE)	23.19			nu star (bias corrected)	15.83		
133					MLE Mean (bias corrected)	34.84			MLE Sd (bias corrected)	35.03		
134									Approximate Chi Square Value (0.05)	7.841		
135					Adjusted Level of Significance	0.0195			Adjusted Chi Square Value	6.472		
136												
137	Assuming Gamma Distribution											
138					95% Approximate Gamma UCL (use when n>=50))	70.32			95% Adjusted Gamma UCL (use when n<50)	85.2		
139												
140	Lognormal GOF Test											
141					Shapiro Wilk Test Statistic	0.692	Shapiro Wilk Lognormal GOF Test					
142					5% Shapiro Wilk Critical Value	0.818	Data Not Lognormal at 5% Significance Level					
143					Lilliefors Test Statistic	0.317	Lilliefors Lognormal GOF Test					
144					5% Lilliefors Critical Value	0.283	Data Not Lognormal at 5% Significance Level					
145	Data Not Lognormal at 5% Significance Level											
146												
147	Lognormal Statistics											
148					Minimum of Logged Data	2.625			Mean of logged Data	3.168		
149					Maximum of Logged Data	4.99			SD of logged Data	0.772		
150												
151	Assuming Lognormal Distribution											
152					95% H-UCL	74.36			90% Chebyshev (MVUE) UCL	56.13		
153					95% Chebyshev (MVUE) UCL	67.69			97.5% Chebyshev (MVUE) UCL	83.73		
154					99% Chebyshev (MVUE) UCL	115.2						
155												
156	Nonparametric Distribution Free UCL Statistics											

157	**Data do not follow a Discernible Distribution (0.05)**											
158												
159	**Nonparametric Distribution Free UCLs**											
160					95% CLT UCL	61.32			95% Jackknife UCL	65.34		
161					95% Standard Bootstrap UCL	59.76			95% Bootstrap-t UCL	262.7		
162					95% Hall's Bootstrap UCL	193.2			95% Percentile Bootstrap UCL	66		
163					95% BCA Bootstrap UCL	82.41						
164					90% Chebyshev(Mean, Sd) UCL	83.14			95% Chebyshev(Mean, Sd) UCL	105		
165					97.5% Chebyshev(Mean, Sd) UCL	135.4			99% Chebyshev(Mean, Sd) UCL	195		
166												
167	**Suggested UCL to Use**											
168					95% Chebyshev (Mean, Sd) UCL	105						
169												
170	Note: Suggestions regarding the selection of a 95% UCL are provided to help the user to select the most appropriate 95% UCL.											
171	Recommendations are based upon data size, data distribution, and skewness.											
172	These recommendations are based upon the results of the simulation studies summarized in Singh, Maichle, and Lee (2006).											
173	However, simulations results will not cover all Real World data sets; for additional insight the user may want to consult a statistician.											
174												
175												
176	**Mercury**											
177												
178	**General Statistics**											
179					Total Number of Observations	8			Number of Distinct Observations	8		
180									Number of Missing Observations	0		
181					Minimum	0.0136			Mean	0.0791		
182					Maximum	0.378			Median	0.0417		
183					SD	0.121			Std. Error of Mean	0.0429		
184					Coefficient of Variation	1.534			Skewness	2.781		
185												
186	**Note: Sample size is small (e.g., <10), if data are collected using ISM approach, you should use**											
187	**guidance provided in ITRC Tech Reg Guide on ISM (ITRC, 2012) to compute statistics of interest.**											
188	**For example, you may want to use Chebyshev UCL to estimate EPC (ITRC, 2012).**											
189	**Chebyshev UCL can be computed using the Nonparametric and All UCL Options of ProUCL 5.1**											
190												
191	**Normal GOF Test**											
192					Shapiro Wilk Test Statistic	0.507			**Shapiro Wilk GOF Test**			
193					5% Shapiro Wilk Critical Value	0.818			Data Not Normal at 5% Significance Level			
194					Lilliefors Test Statistic	0.475			**Lilliefors GOF Test**			
195					5% Lilliefors Critical Value	0.283			Data Not Normal at 5% Significance Level			
196	**Data Not Normal at 5% Significance Level**											
197												
198	**Assuming Normal Distribution**											
199	**95% Normal UCL**								**95% UCLs (Adjusted for Skewness)**			
200					95% Student's-t UCL	0.16			95% Adjusted-CLT UCL (Chen-1995)	0.195		
201									95% Modified-t UCL (Johnson-1978)	0.167		
202												
203	**Gamma GOF Test**											
204					A-D Test Statistic	1.34			**Anderson-Darling Gamma GOF Test**			
205					5% A-D Critical Value	0.735			Data Not Gamma Distributed at 5% Significance Level			
206					K-S Test Statistic	0.425			**Kolmogorov-Smirnov Gamma GOF Test**			
207					5% K-S Critical Value	0.301			Data Not Gamma Distributed at 5% Significance Level			
208	**Data Not Gamma Distributed at 5% Significance Level**											

209												
210	**Gamma Statistics**											
211						k hat (MLE)	1.057			k star (bias corrected MLE)		0.744
212						Theta hat (MLE)	0.0748			Theta star (bias corrected MLE)		0.106
213						nu hat (MLE)	16.92			nu star (bias corrected)		11.91
214						MLE Mean (bias corrected)	0.0791			MLE Sd (bias corrected)		0.0917
215										Approximate Chi Square Value (0.05)		5.165
216						Adjusted Level of Significance	0.0195			Adjusted Chi Square Value		4.1
217												
218	**Assuming Gamma Distribution**											
219						95% Approximate Gamma UCL (use when n>=50))	0.182			95% Adjusted Gamma UCL (use when n<50)		0.23
220												
221	**Lognormal GOF Test**											
222						Shapiro Wilk Test Statistic	0.79			**Shapiro Wilk Lognormal GOF Test**		
223						5% Shapiro Wilk Critical Value	0.818			Data Not Lognormal at 5% Significance Level		
224						Lilliefors Test Statistic	0.352			**Lilliefors Lognormal GOF Test**		
225						5% Lilliefors Critical Value	0.283			Data Not Lognormal at 5% Significance Level		
226	**Data Not Lognormal at 5% Significance Level**											
227												
228	**Lognormal Statistics**											
229						Minimum of Logged Data	-4.298			Mean of logged Data		-3.08
230						Maximum of Logged Data	-0.973			SD of logged Data		0.943
231												
232	**Assuming Lognormal Distribution**											
233						95% H-UCL	0.231			90% Chebyshev (MVUE) UCL		0.135
234						95% Chebyshev (MVUE) UCL	0.166			97.5% Chebyshev (MVUE) UCL		0.209
235						99% Chebyshev (MVUE) UCL	0.293					
236												
237	**Nonparametric Distribution Free UCL Statistics**											
238	**Data do not follow a Discernible Distribution (0.05)**											
239												
240	**Nonparametric Distribution Free UCLs**											
241						95% CLT UCL	0.15			95% Jackknife UCL		0.16
242						95% Standard Bootstrap UCL	0.145			95% Bootstrap-t UCL		0.851
243						95% Hall's Bootstrap UCL	0.733			95% Percentile Bootstrap UCL		0.163
244						95% BCA Bootstrap UCL	0.202					
245						90% Chebyshev(Mean, Sd) UCL	0.208			95% Chebyshev(Mean, Sd) UCL		0.266
246						97.5% Chebyshev(Mean, Sd) UCL	0.347			99% Chebyshev(Mean, Sd) UCL		0.506
247												
248	**Suggested UCL to Use**											
249						95% Chebyshev (Mean, Sd) UCL	0.266					
250												
251	Note: Suggestions regarding the selection of a 95% UCL are provided to help the user to select the most appropriate 95% UCL.											
252	Recommendations are based upon data size, data distribution, and skewness.											
253	These recommendations are based upon the results of the simulation studies summarized in Singh, Maichle, and Lee (2006).											
254	However, simulations results will not cover all Real World data sets; for additional insight the user may want to consult a statistician.											
255												
256												
257	**Zinc**											
258												
259	**General Statistics**											
260						Total Number of Observations	8			Number of Distinct Observations		8

261											Number of Missing Observations	0
262					Minimum	16.7					Mean	47.86
263					Maximum	108					Median	43.9
264					SD	27.15					Std. Error of Mean	9.6
265					Coefficient of Variation	0.567					Skewness	1.705
266												
267	**Note: Sample size is small (e.g., <10), if data are collected using ISM approach, you should use**											
268	**guidance provided in ITRC Tech Reg Guide on ISM (ITRC, 2012) to compute statistics of interest.**											
269	**For example, you may want to use Chebyshev UCL to estimate EPC (ITRC, 2012).**											
270	**Chebyshev UCL can be computed using the Nonparametric and All UCL Options of ProUCL 5.1**											
271												
272	**Normal GOF Test**											
273					Shapiro Wilk Test Statistic	0.84	**Shapiro Wilk GOF Test**					
274					5% Shapiro Wilk Critical Value	0.818	Data appear Normal at 5% Significance Level					
275					Lilliefors Test Statistic	0.297	**Lilliefors GOF Test**					
276					5% Lilliefors Critical Value	0.283	Data Not Normal at 5% Significance Level					
277	**Data appear Approximate Normal at 5% Significance Level**											
278												
279	**Assuming Normal Distribution**											
280	**95% Normal UCL**						**95% UCLs (Adjusted for Skewness)**					
281					95% Student's-t UCL	66.05					95% Adjusted-CLT UCL (Chen-1995)	69.84
282											95% Modified-t UCL (Johnson-1978)	67.02
283												
284	**Gamma GOF Test**											
285					A-D Test Statistic	0.322	**Anderson-Darling Gamma GOF Test**					
286					5% A-D Critical Value	0.719	Detected data appear Gamma Distributed at 5% Significance Level					
287					K-S Test Statistic	0.226	**Kolmogorov-Smirnov Gamma GOF Test**					
288					5% K-S Critical Value	0.295	Detected data appear Gamma Distributed at 5% Significance Level					
289	**Detected data appear Gamma Distributed at 5% Significance Level**											
290												
291	**Gamma Statistics**											
292					k hat (MLE)	4.147					k star (bias corrected MLE)	2.675
293					Theta hat (MLE)	11.54					Theta star (bias corrected MLE)	17.89
294					nu hat (MLE)	66.35					nu star (bias corrected)	42.8
295					MLE Mean (bias corrected)	47.86					MLE Sd (bias corrected)	29.26
296											Approximate Chi Square Value (0.05)	28.8
297					Adjusted Level of Significance	0.0195					Adjusted Chi Square Value	25.93
298												
299	**Assuming Gamma Distribution**											
300					95% Approximate Gamma UCL (use when n>=50))	71.13					95% Adjusted Gamma UCL (use when n<50)	79
301												
302	**Lognormal GOF Test**											
303					Shapiro Wilk Test Statistic	0.96	**Shapiro Wilk Lognormal GOF Test**					
304					5% Shapiro Wilk Critical Value	0.818	Data appear Lognormal at 5% Significance Level					
305					Lilliefors Test Statistic	0.208	**Lilliefors Lognormal GOF Test**					
306					5% Lilliefors Critical Value	0.283	Data appear Lognormal at 5% Significance Level					
307	**Data appear Lognormal at 5% Significance Level**											
308												
309	**Lognormal Statistics**											
310					Minimum of Logged Data	2.815					Mean of logged Data	3.743
311					Maximum of Logged Data	4.682					SD of logged Data	0.535
312												

313	**Assuming Lognormal Distribution**											
314					95% H-UCL	79.39			90% Chebyshev (MVUE) UCL	75.19		
315					95% Chebyshev (MVUE) UCL	87.61			97.5% Chebyshev (MVUE) UCL	104.8		
316					99% Chebyshev (MVUE) UCL	138.7						
317												
318	**Nonparametric Distribution Free UCL Statistics**											
319	**Data appear to follow a Discernible Distribution at 5% Significance Level**											
320												
321	**Nonparametric Distribution Free UCLs**											
322					95% CLT UCL	63.65			95% Jackknife UCL	66.05		
323					95% Standard Bootstrap UCL	62.79			95% Bootstrap-t UCL	75.98		
324					95% Hall's Bootstrap UCL	142			95% Percentile Bootstrap UCL	62.96		
325					95% BCA Bootstrap UCL	66.95						
326					90% Chebyshev(Mean, Sd) UCL	76.66			95% Chebyshev(Mean, Sd) UCL	89.71		
327					97.5% Chebyshev(Mean, Sd) UCL	107.8			99% Chebyshev(Mean, Sd) UCL	143.4		
328												
329	**Suggested UCL to Use**											
330					95% Student's-t UCL	66.05						
331												
332	When a data set follows an approximate (e.g., normal) distribution passing one of the GOF test											
333	When applicable, it is suggested to use a UCL based upon a distribution (e.g., gamma) passing both GOF tests in ProUCL											
334												
335	Note: Suggestions regarding the selection of a 95% UCL are provided to help the user to select the most appropriate 95% UCL.											
336	Recommendations are based upon data size, data distribution, and skewness.											
337	These recommendations are based upon the results of the simulation studies summarized in Singh, Maichle, and Lee (2006).											
338	However, simulations results will not cover all Real World data sets; for additional insight the user may want to consult a statistician.											
339												
340												
341	**Aroclor-1260**											
342												
343	**General Statistics**											
344					Total Number of Observations	8			Number of Distinct Observations	8		
345									Number of Missing Observations	0		
346					Minimum	0.00257			Mean	0.00917		
347					Maximum	0.0236			Median	0.00688		
348					SD	0.00796			Std. Error of Mean	0.00281		
349					Coefficient of Variation	0.867			Skewness	1.289		
350												
351	**Note: Sample size is small (e.g., <10), if data are collected using ISM approach, you should use**											
352	**guidance provided in ITRC Tech Reg Guide on ISM (ITRC, 2012) to compute statistics of interest.**											
353	**For example, you may want to use Chebyshev UCL to estimate EPC (ITRC, 2012).**											
354	**Chebyshev UCL can be computed using the Nonparametric and All UCL Options of ProUCL 5.1**											
355												
356	**Normal GOF Test**											
357					Shapiro Wilk Test Statistic	0.782			**Shapiro Wilk GOF Test**			
358					5% Shapiro Wilk Critical Value	0.818			Data Not Normal at 5% Significance Level			
359					Lilliefors Test Statistic	0.354			**Lilliefors GOF Test**			
360					5% Lilliefors Critical Value	0.283			Data Not Normal at 5% Significance Level			
361	**Data Not Normal at 5% Significance Level**											
362												
363	**Assuming Normal Distribution**											
364	**95% Normal UCL**								**95% UCLs (Adjusted for Skewness)**			

365				95% Student's-t UCL	0.0145			95% Adjusted-CLT UCL (Chen-1995)			0.0152
366								95% Modified-t UCL (Johnson-1978)			0.0147
367												
368	**Gamma GOF Test**											
369				A-D Test Statistic	0.534	**Anderson-Darling Gamma GOF Test**						
370				5% A-D Critical Value	0.726	Detected data appear Gamma Distributed at 5% Significance Level						
371				K-S Test Statistic	0.281	**Kolmogorov-Smirnov Gamma GOF Test**						
372				5% K-S Critical Value	0.298	Detected data appear Gamma Distributed at 5% Significance Level						
373	**Detected data appear Gamma Distributed at 5% Significance Level**											
374												
375	**Gamma Statistics**											
376				k hat (MLE)	1.788	k star (bias corrected MLE)						1.201
377				Theta hat (MLE)	0.00513	Theta star (bias corrected MLE)						0.00764
378				nu hat (MLE)	28.61	nu star (bias corrected)						19.22
379				MLE Mean (bias corrected)	0.00917	MLE Sd (bias corrected)						0.00837
380						Approximate Chi Square Value (0.05)						10.28
381				Adjusted Level of Significance	0.0195	Adjusted Chi Square Value						8.671
382												
383	**Assuming Gamma Distribution**											
384			95% Approximate Gamma UCL (use when n>=50)		0.0172	95% Adjusted Gamma UCL (use when n<50)						0.0203
385												
386	**Lognormal GOF Test**											
387				Shapiro Wilk Test Statistic	0.903	**Shapiro Wilk Lognormal GOF Test**						
388				5% Shapiro Wilk Critical Value	0.818	Data appear Lognormal at 5% Significance Level						
389				Lilliefors Test Statistic	0.228	**Lilliefors Lognormal GOF Test**						
390				5% Lilliefors Critical Value	0.283	Data appear Lognormal at 5% Significance Level						
391	**Data appear Lognormal at 5% Significance Level**											
392												
393	**Lognormal Statistics**											
394				Minimum of Logged Data	-5.964	Mean of logged Data						-4.996
395				Maximum of Logged Data	-3.747	SD of logged Data						0.823
396												
397	**Assuming Lognormal Distribution**											
398				95% H-UCL	0.0242	90% Chebyshev (MVUE) UCL						0.017
399				95% Chebyshev (MVUE) UCL	0.0207	97.5% Chebyshev (MVUE) UCL						0.0257
400				99% Chebyshev (MVUE) UCL	0.0356							
401												
402	**Nonparametric Distribution Free UCL Statistics**											
403	**Data appear to follow a Discernible Distribution at 5% Significance Level**											
404												
405	**Nonparametric Distribution Free UCLs**											
406				95% CLT UCL	0.0138	95% Jackknife UCL						0.0145
407				95% Standard Bootstrap UCL	0.0135	95% Bootstrap-t UCL						0.025
408				95% Hall's Bootstrap UCL	0.0505	95% Percentile Bootstrap UCL						0.0137
409				95% BCA Bootstrap UCL	0.0158							
410				90% Chebyshev(Mean, Sd) UCL	0.0176	95% Chebyshev(Mean, Sd) UCL						0.0214
411				97.5% Chebyshev(Mean, Sd) UCL	0.0267	99% Chebyshev(Mean, Sd) UCL						0.0372
412												
413	**Suggested UCL to Use**											
414				95% Adjusted Gamma UCL	0.0203							
415												
416	Note: Suggestions regarding the selection of a 95% UCL are provided to help the user to select the most appropriate 95% UCL.											

	A	B	C	D	E	F	G	H	I	J	K	L
417	Recommendations are based upon data size, data distribution, and skewness.											
418	These recommendations are based upon the results of the simulation studies summarized in Singh, Maichle, and Lee (2006).											
419	However, simulations results will not cover all Real World data sets; for additional insight the user may want to consult a statistician.											
420												
421	**Benzo(a)anthracene**											
422												
423	**General Statistics**											
424						Total Number of Observations	8				Number of Distinct Observations	8
425						Number of Detects	6				Number of Non-Detects	2
426						Number of Distinct Detects	6				Number of Distinct Non-Detects	2
427						Minimum Detect	0.0136				Minimum Non-Detect	0.0382
428						Maximum Detect	0.0395				Maximum Non-Detect	0.146
429						Variance Detects	9.5990E-5				Percent Non-Detects	25%
430						Mean Detects	0.0209				SD Detects	0.0098
431						Median Detects	0.0174				CV Detects	0.469
432						Skewness Detects	1.793				Kurtosis Detects	3.302
433						Mean of Logged Detects	-3.943				SD of Logged Detects	0.402
434												
435	**Note: Sample size is small (e.g., <10), if data are collected using ISM approach, you should use**											
436	**guidance provided in ITRC Tech Reg Guide on ISM (ITRC, 2012) to compute statistics of interest.**											
437	**For example, you may want to use Chebyshev UCL to estimate EPC (ITRC, 2012).**											
438	**Chebyshev UCL can be computed using the Nonparametric and All UCL Options of ProUCL 5.1**											
439												
440	**Normal GOF Test on Detects Only**											
441						Shapiro Wilk Test Statistic	0.787				**Shapiro Wilk GOF Test**	
442						5% Shapiro Wilk Critical Value	0.788				Detected Data Not Normal at 5% Significance Level	
443						Lilliefors Test Statistic	0.248				**Lilliefors GOF Test**	
444						5% Lilliefors Critical Value	0.325				Detected Data appear Normal at 5% Significance Level	
445	**Detected Data appear Approximate Normal at 5% Significance Level**											
446												
447	**Kaplan-Meier (KM) Statistics using Normal Critical Values and other Nonparametric UCLs**											
448						KM Mean	0.0204				KM Standard Error of Mean	0.00357
449						KM SD	0.00849				95% KM (BCA) UCL	0.0264
450						95% KM (t) UCL	0.0271				95% KM (Percentile Bootstrap) UCL	0.0259
451						95% KM (z) UCL	0.0262				95% KM Bootstrap t UCL	0.0366
452						90% KM Chebyshev UCL	0.0311				95% KM Chebyshev UCL	0.0359
453						97.5% KM Chebyshev UCL	0.0426				99% KM Chebyshev UCL	0.0559
454												
455	**Gamma GOF Tests on Detected Observations Only**											
456						A-D Test Statistic	0.508				**Anderson-Darling GOF Test**	
457						5% A-D Critical Value	0.698				Detected data appear Gamma Distributed at 5% Significance Level	
458						K-S Test Statistic	0.25				**Kolmogorov-Smirnov GOF**	
459						5% K-S Critical Value	0.333				Detected data appear Gamma Distributed at 5% Significance Level	
460	**Detected data appear Gamma Distributed at 5% Significance Level**											
461												
462	**Gamma Statistics on Detected Data Only**											
463						k hat (MLE)	6.867				k star (bias corrected MLE)	3.544
464						Theta hat (MLE)	0.00304				Theta star (bias corrected MLE)	0.00589
465						nu hat (MLE)	82.4				nu star (bias corrected)	42.53
466						Mean (detects)	0.0209					
467												
468	**Gamma ROS Statistics using Imputed Non-Detects**											

	A	B	C	D	E	F	G	H	I	J	K	L
469	GROS may not be used when data set has > 50% NDs with many tied observations at multiple DLs											
470	GROS may not be used when kstar of detects is small such as <1.0, especially when the sample size is small (e.g., <15-20)											
471	For such situations, GROS method may yield incorrect values of UCLs and BTVs											
472	This is especially true when the sample size is small.											
473	For gamma distributed detected data, BTVs and UCLs may be computed using gamma distribution on KM estimates											
474					Minimum	0.0136			Mean	0.0203		
475					Maximum	0.0395			Median	0.0185		
476					SD	0.00837			CV	0.413		
477					k hat (MLE)	8.845			k star (bias corrected MLE)	5.612		
478					Theta hat (MLE)	0.00229			Theta star (bias corrected MLE)	0.00361		
479					nu hat (MLE)	141.5			nu star (bias corrected)	89.78		
480					Adjusted Level of Significance (β)	0.0195						
481					Approximate Chi Square Value (89.78, α)	68.94			Adjusted Chi Square Value (89.78, β)	64.33		
482					95% Gamma Approximate UCL (use when n>=50)	0.0264			95% Gamma Adjusted UCL (use when n<50)	0.0283		
483												
484	**Estimates of Gamma Parameters using KM Estimates**											
485					Mean (KM)	0.0204			SD (KM)	0.00849		
486					Variance (KM)	7.2092E-5			SE of Mean (KM)	0.00357		
487					k hat (KM)	5.745			k star (KM)	3.674		
488					nu hat (KM)	91.92			nu star (KM)	58.79		
489					theta hat (KM)	0.00354			theta star (KM)	0.00554		
490					80% gamma percentile (KM)	0.0283			90% gamma percentile (KM)	0.0346		
491					95% gamma percentile (KM)	0.0404			99% gamma percentile (KM)	0.0527		
492												
493	**Gamma Kaplan-Meier (KM) Statistics**											
494					Approximate Chi Square Value (58.79, α)	42.16			Adjusted Chi Square Value (58.79, β)	38.62		
495					95% Gamma Approximate KM-UCL (use when n>=50)	0.0284			95% Gamma Adjusted KM-UCL (use when n<50)	0.031		
496												
497	**Lognormal GOF Test on Detected Observations Only**											
498					Shapiro Wilk Test Statistic	0.869			**Shapiro Wilk GOF Test**			
499					5% Shapiro Wilk Critical Value	0.788			Detected Data appear Lognormal at 5% Significance Level			
500					Lilliefors Test Statistic	0.233			**Lilliefors GOF Test**			
501					5% Lilliefors Critical Value	0.325			Detected Data appear Lognormal at 5% Significance Level			
502	**Detected Data appear Lognormal at 5% Significance Level**											
503												
504	**Lognormal ROS Statistics Using Imputed Non-Detects**											
505					Mean in Original Scale	0.0202			Mean in Log Scale	-3.96		
506					SD in Original Scale	0.00839			SD in Log Scale	0.342		
507					95% t UCL (assumes normality of ROS data)	0.0258			95% Percentile Bootstrap UCL	0.0253		
508					95% BCA Bootstrap UCL	0.0265			95% Bootstrap t UCL	0.0331		
509					95% H-UCL (Log ROS)	0.0265						
510												
511	**Statistics using KM estimates on Logged Data and Assuming Lognormal Distribution**											
512					KM Mean (logged)	-3.964			KM Geo Mean	0.019		
513					KM SD (logged)	0.352			95% Critical H Value (KM-Log)	2.126		
514					KM Standard Error of Mean (logged)	0.15			95% H-UCL (KM -Log)	0.0268		
515					KM SD (logged)	0.352			95% Critical H Value (KM-Log)	2.126		
516					KM Standard Error of Mean (logged)	0.15						
517												
518	**DL/2 Statistics**											
519	**DL/2 Normal**								**DL/2 Log-Transformed**			
520					Mean in Original Scale	0.0272			Mean in Log Scale	-3.779		

521				SD in Original Scale	0.0203					SD in Log Scale	0.58	
522				95% t UCL (Assumes normality)	0.0408					95% H-Stat UCL	0.0467	
523	**DL/2 is not a recommended method, provided for comparisons and historical reasons**											
524												
525	**Nonparametric Distribution Free UCL Statistics**											
526	**Detected Data appear Approximate Normal Distributed at 5% Significance Level**											
527												
528	**Suggested UCL to Use**											
529				95% KM (t) UCL	0.0271							
530												
531	When a data set follows an approximate (e.g., normal) distribution passing one of the GOF test											
532	When applicable, it is suggested to use a UCL based upon a distribution (e.g., gamma) passing both GOF tests in ProUCL											
533												
534	Note: Suggestions regarding the selection of a 95% UCL are provided to help the user to select the most appropriate 95% UCL.											
535	Recommendations are based upon data size, data distribution, and skewness.											
536	These recommendations are based upon the results of the simulation studies summarized in Singh, Maichle, and Lee (2006).											
537	However, simulations results will not cover all Real World data sets; for additional insight the user may want to consult a statistician.											
538												
539	**Benzo(a)pyrene**											
540												
541	**General Statistics**											
542				Total Number of Observations	8					Number of Distinct Observations	8	
543				Number of Detects	6					Number of Non-Detects	2	
544				Number of Distinct Detects	6					Number of Distinct Non-Detects	2	
545				Minimum Detect	0.0136					Minimum Non-Detect	0.0382	
546				Maximum Detect	0.0399					Maximum Non-Detect	0.146	
547				Variance Detects	9.3350E-5					Percent Non-Detects	25%	
548				Mean Detects	0.0208					SD Detects	0.00966	
549				Median Detects	0.0178					CV Detects	0.465	
550				Skewness Detects	2.124					Kurtosis Detects	4.784	
551				Mean of Logged Detects	-3.943					SD of Logged Detects	0.381	
552												
553	**Note: Sample size is small (e.g., <10), if data are collected using ISM approach, you should use**											
554	**guidance provided in ITRC Tech Reg Guide on ISM (ITRC, 2012) to compute statistics of interest.**											
555	**For example, you may want to use Chebyshev UCL to estimate EPC (ITRC, 2012).**											
556	**Chebyshev UCL can be computed using the Nonparametric and All UCL Options of ProUCL 5.1**											
557												
558	**Normal GOF Test on Detects Only**											
559				Shapiro Wilk Test Statistic	0.727					**Shapiro Wilk GOF Test**		
560				5% Shapiro Wilk Critical Value	0.788					Detected Data Not Normal at 5% Significance Level		
561				Lilliefors Test Statistic	0.345					**Lilliefors GOF Test**		
562				5% Lilliefors Critical Value	0.325					Detected Data Not Normal at 5% Significance Level		
563	**Detected Data Not Normal at 5% Significance Level**											
564												
565	**Kaplan-Meier (KM) Statistics using Normal Critical Values and other Nonparametric UCLs**											
566				KM Mean	0.0202					KM Standard Error of Mean	0.00347	
567				KM SD	0.00832					95% KM (BCA) UCL	0.0269	
568				95% KM (t) UCL	0.0268					95% KM (Percentile Bootstrap) UCL	0.026	
569				95% KM (z) UCL	0.0259					95% KM Bootstrap t UCL	0.0388	
570				90% KM Chebyshev UCL	0.0306					95% KM Chebyshev UCL	0.0354	
571				97.5% KM Chebyshev UCL	0.0419					99% KM Chebyshev UCL	0.0548	
572												

	A	B	C	D	E	F	G	H	I	J	K	L
573	**Gamma GOF Tests on Detected Observations Only**											
574					A-D Test Statistic	0.663	**Anderson-Darling GOF Test**					
575					5% A-D Critical Value	0.698	Detected data appear Gamma Distributed at 5% Significance Level					
576					K-S Test Statistic	0.299	**Kolmogorov-Smirnov GOF**					
577					5% K-S Critical Value	0.333	Detected data appear Gamma Distributed at 5% Significance Level					
578	**Detected data appear Gamma Distributed at 5% Significance Level**											
579												
580	**Gamma Statistics on Detected Data Only**											
581					k hat (MLE)	7.408			k star (bias corrected MLE)			3.815
582					Theta hat (MLE)	0.00281			Theta star (bias corrected MLE)			0.00545
583					nu hat (MLE)	88.9			nu star (bias corrected)			45.78
584					Mean (detects)	0.0208						
585												
586	**Gamma ROS Statistics using Imputed Non-Detects**											
587	GROS may not be used when data set has > 50% NDs with many tied observations at multiple DLs											
588	GROS may not be used when kstar of detects is small such as <1.0, especially when the sample size is small (e.g., <15-20)											
589	For such situations, GROS method may yield incorrect values of UCLs and BTVs											
590	This is especially true when the sample size is small.											
591	For gamma distributed detected data, BTVs and UCLs may be computed using gamma distribution on KM estimates											
592					Minimum	0.0136			Mean			0.0202
593					Maximum	0.0399			Median			0.0178
594					SD	0.00825			CV			0.408
595					k hat (MLE)	9.552			k star (bias corrected MLE)			6.054
596					Theta hat (MLE)	0.00212			Theta star (bias corrected MLE)			0.00334
597					nu hat (MLE)	152.8			nu star (bias corrected)			96.86
598					Adjusted Level of Significance (β)	0.0195						
599					Approximate Chi Square Value (96.86, α)	75.16			Adjusted Chi Square Value (96.86, β)			70.33
600					95% Gamma Approximate UCL (use when n>=50)	0.026			95% Gamma Adjusted UCL (use when n<50)			0.0278
601												
602	**Estimates of Gamma Parameters using KM Estimates**											
603					Mean (KM)	0.0202			SD (KM)			0.00832
604					Variance (KM)	6.9274E-5			SE of Mean (KM)			0.00347
605					k hat (KM)	5.912			k star (KM)			3.778
606					nu hat (KM)	94.59			nu star (KM)			60.45
607					theta hat (KM)	0.00342			theta star (KM)			0.00536
608					80% gamma percentile (KM)	0.0281			90% gamma percentile (KM)			0.0342
609					95% gamma percentile (KM)	0.0398			99% gamma percentile (KM)			0.0519
610												
611	**Gamma Kaplan-Meier (KM) Statistics**											
612					Approximate Chi Square Value (60.45, α)	43.57			Adjusted Chi Square Value (60.45, β)			39.97
613					95% Gamma Approximate KM-UCL (use when n>=50)	0.0281			95% Gamma Adjusted KM-UCL (use when n<50)			0.0306
614												
615	**Lognormal GOF Test on Detected Observations Only**											
616					Shapiro Wilk Test Statistic	0.834	**Shapiro Wilk GOF Test**					
617					5% Shapiro Wilk Critical Value	0.788	Detected Data appear Lognormal at 5% Significance Level					
618					Lilliefors Test Statistic	0.276	**Lilliefors GOF Test**					
619					5% Lilliefors Critical Value	0.325	Detected Data appear Lognormal at 5% Significance Level					
620	**Detected Data appear Lognormal at 5% Significance Level**											
621												
622	**Lognormal ROS Statistics Using Imputed Non-Detects**											
623					Mean in Original Scale	0.0201			Mean in Log Scale			-3.958
624					SD in Original Scale	0.00826			SD in Log Scale			0.324

625				95% t UCL (assumes normality of ROS data)		0.0257				95% Percentile Bootstrap UCL		0.0254
626				95% BCA Bootstrap UCL		0.0269				95% Bootstrap t UCL		0.0356
627				95% H-UCL (Log ROS)		0.026						
628												
629	**Statistics using KM estimates on Logged Data and Assuming Lognormal Distribution**											
630				KM Mean (logged)		-3.963				KM Geo Mean		0.019
631				KM SD (logged)		0.33				95% Critical H Value (KM-Log)		2.097
632				KM Standard Error of Mean (logged)		0.139				95% H-UCL (KM -Log)		0.0261
633				KM SD (logged)		0.33				95% Critical H Value (KM-Log)		2.097
634				KM Standard Error of Mean (logged)		0.139						
635												
636	**DL/2 Statistics**											
637	**DL/2 Normal**						**DL/2 Log-Transformed**					
638				Mean in Original Scale		0.0271				Mean in Log Scale		-3.779
639				SD in Original Scale		0.0203				SD in Log Scale		0.569
640				95% t UCL (Assumes normality)		0.0407				95% H-Stat UCL		0.0458
641	**DL/2 is not a recommended method, provided for comparisons and historical reasons**											
642												
643	**Nonparametric Distribution Free UCL Statistics**											
644	**Detected Data appear Gamma Distributed at 5% Significance Level**											
645												
646	**Suggested UCL to Use**											
647				95% KM Adjusted Gamma UCL		0.0306				95% GROS Adjusted Gamma UCL		0.0278
648												
649	Note: Suggestions regarding the selection of a 95% UCL are provided to help the user to select the most appropriate 95% UCL.											
650	Recommendations are based upon data size, data distribution, and skewness.											
651	These recommendations are based upon the results of the simulation studies summarized in Singh, Maichle, and Lee (2006).											
652	However, simulations results will not cover all Real World data sets; for additional insight the user may want to consult a statistician.											
653												
654	**Benzo(b)fluoranthene**											
655												
656	**General Statistics**											
657				Total Number of Observations		8				Number of Distinct Observations		8
658				Number of Detects		7				Number of Non-Detects		1
659				Number of Distinct Detects		7				Number of Distinct Non-Detects		1
660				Minimum Detect		0.0158				Minimum Non-Detect		0.0382
661				Maximum Detect		0.049				Maximum Non-Detect		0.0382
662				Variance Detects		1.8441E-4				Percent Non-Detects		12.5%
663				Mean Detects		0.0286				SD Detects		0.0136
664				Median Detects		0.0249				CV Detects		0.475
665				Skewness Detects		0.757				Kurtosis Detects		-1.206
666				Mean of Logged Detects		-3.648				SD of Logged Detects		0.463
667												
668	**Note: Sample size is small (e.g., <10), if data are collected using ISM approach, you should use**											
669	**guidance provided in ITRC Tech Reg Guide on ISM (ITRC, 2012) to compute statistics of interest.**											
670	**For example, you may want to use Chebyshev UCL to estimate EPC (ITRC, 2012).**											
671	**Chebyshev UCL can be computed using the Nonparametric and All UCL Options of ProUCL 5.1**											
672												
673	**Normal GOF Test on Detects Only**											
674				Shapiro Wilk Test Statistic		0.864	**Shapiro Wilk GOF Test**					
675				5% Shapiro Wilk Critical Value		0.803	Detected Data appear Normal at 5% Significance Level					
676				Lilliefors Test Statistic		0.179	**Lilliefors GOF Test**					

	A	B	C	D	E	F	G	H	I	J	K	L
677				5% Lilliefors Critical Value		0.304	Detected Data appear Normal at 5% Significance Level					
678	**Detected Data appear Normal at 5% Significance Level**											
679												
680	**Kaplan-Meier (KM) Statistics using Normal Critical Values and other Nonparametric UCLs**											
681				KM Mean		0.0277	KM Standard Error of Mean					0.00471
682				KM SD		0.0122	95% KM (BCA) UCL					0.0355
683				95% KM (t) UCL		0.0366	95% KM (Percentile Bootstrap) UCL					0.0352
684				95% KM (z) UCL		0.0354	95% KM Bootstrap t UCL					0.0426
685				90% KM Chebyshev UCL		0.0418	95% KM Chebyshev UCL					0.0482
686				97.5% KM Chebyshev UCL		0.0571	99% KM Chebyshev UCL					0.0746
687												
688	**Gamma GOF Tests on Detected Observations Only**											
689				A-D Test Statistic		0.393	**Anderson-Darling GOF Test**					
690				5% A-D Critical Value		0.71	Detected data appear Gamma Distributed at 5% Significance Level					
691				K-S Test Statistic		0.188	**Kolmogorov-Smirnov GOF**					
692				5% K-S Critical Value		0.313	Detected data appear Gamma Distributed at 5% Significance Level					
693	**Detected data appear Gamma Distributed at 5% Significance Level**											
694												
695	**Gamma Statistics on Detected Data Only**											
696				k hat (MLE)		5.509	k star (bias corrected MLE)					3.243
697				Theta hat (MLE)		0.00519	Theta star (bias corrected MLE)					0.00882
698				nu hat (MLE)		77.12	nu star (bias corrected)					45.4
699				Mean (detects)		0.0286						
700												
701	**Gamma ROS Statistics using Imputed Non-Detects**											
702	GROS may not be used when data set has > 50% NDs with many tied observations at multiple DLs											
703	GROS may not be used when kstar of detects is small such as <1.0, especially when the sample size is small (e.g., <15-20)											
704	For such situations, GROS method may yield incorrect values of UCLs and BTVs											
705	This is especially true when the sample size is small.											
706	For gamma distributed detected data, BTVs and UCLs may be computed using gamma distribution on KM estimates											
707				Minimum		0.0158	Mean					0.0277
708				Maximum		0.049	Median					0.0233
709				SD		0.0128	CV					0.461
710				k hat (MLE)		6.001	k star (bias corrected MLE)					3.834
711				Theta hat (MLE)		0.00462	Theta star (bias corrected MLE)					0.00724
712				nu hat (MLE)		96.02	nu star (bias corrected)					61.35
713				Adjusted Level of Significance (β)		0.0195						
714				Approximate Chi Square Value (61.35, α)		44.33	Adjusted Chi Square Value (61.35, β)					40.7
715				95% Gamma Approximate UCL (use when n>=50)		0.0384	95% Gamma Adjusted UCL (use when n<50)					0.0418
716												
717	**Estimates of Gamma Parameters using KM Estimates**											
718				Mean (KM)		0.0277	SD (KM)					0.0122
719				Variance (KM)		1.4790E-4	SE of Mean (KM)					0.00471
720				k hat (KM)		5.179	k star (KM)					3.32
721				nu hat (KM)		82.87	nu star (KM)					53.13
722				theta hat (KM)		0.00534	theta star (KM)					0.00834
723				80% gamma percentile (KM)		0.039	90% gamma percentile (KM)					0.048
724				95% gamma percentile (KM)		0.0564	99% gamma percentile (KM)					0.0745
725												
726	**Gamma Kaplan-Meier (KM) Statistics**											
727				Approximate Chi Square Value (53.13, α)		37.38	Adjusted Chi Square Value (53.13, β)					34.07
728				95% Gamma Approximate KM-UCL (use when n>=50)		0.0393	95% Gamma Adjusted KM-UCL (use when n<50)					0.0432

	A	B	C	D	E	F	G	H	I	J	K	L
729												
730	**Lognormal GOF Test on Detected Observations Only**											
731					Shapiro Wilk Test Statistic	0.902	**Shapiro Wilk GOF Test**					
732					5% Shapiro Wilk Critical Value	0.803	Detected Data appear Lognormal at 5% Significance Level					
733					Lilliefors Test Statistic	0.168	**Lilliefors GOF Test**					
734					5% Lilliefors Critical Value	0.304	Detected Data appear Lognormal at 5% Significance Level					
735	**Detected Data appear Lognormal at 5% Significance Level**											
736												
737	**Lognormal ROS Statistics Using Imputed Non-Detects**											
738					Mean in Original Scale	0.0277	Mean in Log Scale	-3.673				
739					SD in Original Scale	0.0128	SD in Log Scale	0.434				
740					95% t UCL (assumes normality of ROS data)	0.0363	95% Percentile Bootstrap UCL	0.0347				
741					95% BCA Bootstrap UCL	0.0361	95% Bootstrap t UCL	0.0425				
742					95% H-UCL (Log ROS)	0.0404						
743												
744	**Statistics using KM estimates on Logged Data and Assuming Lognormal Distribution**											
745					KM Mean (logged)	-3.677	KM Geo Mean	0.0253				
746					KM SD (logged)	0.418	95% Critical H Value (KM-Log)	2.222				
747					KM Standard Error of Mean (logged)	0.164	95% H-UCL (KM -Log)	0.0392				
748					KM SD (logged)	0.418	95% Critical H Value (KM-Log)	2.222				
749					KM Standard Error of Mean (logged)	0.164						
750												
751	**DL/2 Statistics**											
752				**DL/2 Normal**			**DL/2 Log-Transformed**					
753					Mean in Original Scale	0.0274	Mean in Log Scale	-3.687				
754					SD in Original Scale	0.013	SD in Log Scale	0.442				
755					95% t UCL (Assumes normality)	0.0361	95% H-Stat UCL	0.0403				
756	**DL/2 is not a recommended method, provided for comparisons and historical reasons**											
757												
758	**Nonparametric Distribution Free UCL Statistics**											
759	**Detected Data appear Normal Distributed at 5% Significance Level**											
760												
761	**Suggested UCL to Use**											
762					95% KM (t) UCL	0.0366						
763												
764	Note: Suggestions regarding the selection of a 95% UCL are provided to help the user to select the most appropriate 95% UCL.											
765	Recommendations are based upon data size, data distribution, and skewness.											
766	These recommendations are based upon the results of the simulation studies summarized in Singh, Maichle, and Lee (2006).											
767	However, simulations results will not cover all Real World data sets; for additional insight the user may want to consult a statistician.											
768												
769	**Chrysene**											
770												
771	**General Statistics**											
772					Total Number of Observations	8	Number of Distinct Observations	8				
773					Number of Detects	5	Number of Non-Detects	3				
774					Number of Distinct Detects	5	Number of Distinct Non-Detects	3				
775					Minimum Detect	0.012	Minimum Non-Detect	0.0358				
776					Maximum Detect	0.0417	Maximum Non-Detect	0.146				
777					Variance Detects	1.4973E-4	Percent Non-Detects	37.5%				
778					Mean Detects	0.0203	SD Detects	0.0122				
779					Median Detects	0.0165	CV Detects	0.602				
780					Skewness Detects	1.977	Kurtosis Detects	4.059				

781				Mean of Logged Detects		-4.008				SD of Logged Detects		0.497
782												
783						**Note: Sample size is small (e.g., <10), if data are collected using ISM approach, you should use**							
784						**guidance provided in ITRC Tech Reg Guide on ISM (ITRC, 2012) to compute statistics of interest.**						
785						**For example, you may want to use Chebyshev UCL to estimate EPC (ITRC, 2012).**						
786						**Chebyshev UCL can be computed using the Nonparametric and All UCL Options of ProUCL 5.1**						
787												
788						**Normal GOF Test on Detects Only**						
789				Shapiro Wilk Test Statistic		0.744		**Shapiro Wilk GOF Test**				
790				5% Shapiro Wilk Critical Value		0.762		Detected Data Not Normal at 5% Significance Level				
791				Lilliefors Test Statistic		0.357		**Lilliefors GOF Test**				
792				5% Lilliefors Critical Value		0.343		Detected Data Not Normal at 5% Significance Level				
793						**Detected Data Not Normal at 5% Significance Level**						
794												
795						**Kaplan-Meier (KM) Statistics using Normal Critical Values and other Nonparametric UCLs**						
796				KM Mean		0.0188		KM Standard Error of Mean				0.00415
797				KM SD		0.00967		95% KM (BCA) UCL				0.0256
798				95% KM (t) UCL		0.0267		95% KM (Percentile Bootstrap) UCL				0.0259
799				95% KM (z) UCL		0.0256		95% KM Bootstrap t UCL				0.0387
800				90% KM Chebyshev UCL		0.0313		95% KM Chebyshev UCL				0.0369
801				97.5% KM Chebyshev UCL		0.0447		99% KM Chebyshev UCL				0.0601
802												
803						**Gamma GOF Tests on Detected Observations Only**						
804				A-D Test Statistic		0.562		**Anderson-Darling GOF Test**				
805				5% A-D Critical Value		0.681		Detected data appear Gamma Distributed at 5% Significance Level				
806				K-S Test Statistic		0.313		**Kolmogorov-Smirnov GOF**				
807				5% K-S Critical Value		0.358		Detected data appear Gamma Distributed at 5% Significance Level				
808						**Detected data appear Gamma Distributed at 5% Significance Level**						
809												
810						**Gamma Statistics on Detected Data Only**						
811				k hat (MLE)		4.594		k star (bias corrected MLE)				1.971
812				Theta hat (MLE)		0.00443		Theta star (bias corrected MLE)				0.0103
813				nu hat (MLE)		45.94		nu star (bias corrected)				19.71
814				Mean (detects)		0.0203						
815												
816						**Gamma ROS Statistics using Imputed Non-Detects**						
817						GROS may not be used when data set has > 50% NDs with many tied observations at multiple DLs						
818						GROS may not be used when kstar of detects is small such as <1.0, especially when the sample size is small (e.g., <15-20)						
819						For such situations, GROS method may yield incorrect values of UCLs and BTVs						
820						This is especially true when the sample size is small.						
821						For gamma distributed detected data, BTVs and UCLs may be computed using gamma distribution on KM estimates						
822				Minimum		0.012		Mean				0.0188
823				Maximum		0.0417		Median				0.016
824				SD		0.00951		CV				0.506
825				k hat (MLE)		6.661		k star (bias corrected MLE)				4.246
826				Theta hat (MLE)		0.00282		Theta star (bias corrected MLE)				0.00443
827				nu hat (MLE)		106.6		nu star (bias corrected)				67.94
828				Adjusted Level of Significance (β)		0.0195						
829				Approximate Chi Square Value (67.94, α)		49.97		Adjusted Chi Square Value (67.94, β)				46.09
830				95% Gamma Approximate UCL (use when n>=50)		0.0256		95% Gamma Adjusted UCL (use when n<50)				0.0277
831												
832						**Estimates of Gamma Parameters using KM Estimates**						

833					Mean (KM)	0.0188					SD (KM)	0.00967
834					Variance (KM)	9.3426E-5					SE of Mean (KM)	0.00415
835					k hat (KM)	3.789					k star (KM)	2.451
836					nu hat (KM)	60.62					nu star (KM)	39.22
837					theta hat (KM)	0.00497					theta star (KM)	0.00767
838					80% gamma percentile (KM)	0.0275					90% gamma percentile (KM)	0.0349
839					95% gamma percentile (KM)	0.0419					99% gamma percentile (KM)	0.0572
840												
841	**Gamma Kaplan-Meier (KM) Statistics**											
842					Approximate Chi Square Value (39.22, α)	25.88					Adjusted Chi Square Value (39.22, β)	23.17
843					95% Gamma Approximate KM-UCL (use when n>=50)	0.0285					95% Gamma Adjusted KM-UCL (use when n<50)	0.0318
844												
845	**Lognormal GOF Test on Detected Observations Only**											
846					Shapiro Wilk Test Statistic	0.848	**Shapiro Wilk GOF Test**					
847					5% Shapiro Wilk Critical Value	0.762	Detected Data appear Lognormal at 5% Significance Level					
848					Lilliefors Test Statistic	0.281	**Lilliefors GOF Test**					
849					5% Lilliefors Critical Value	0.343	Detected Data appear Lognormal at 5% Significance Level					
850	**Detected Data appear Lognormal at 5% Significance Level**											
851												
852	**Lognormal ROS Statistics Using Imputed Non-Detects**											
853					Mean in Original Scale	0.0187					Mean in Log Scale	-4.056
854					SD in Original Scale	0.00953					SD in Log Scale	0.383
855					95% t UCL (assumes normality of ROS data)	0.0251					95% Percentile Bootstrap UCL	0.025
856					95% BCA Bootstrap UCL	0.026					95% Bootstrap t UCL	0.0388
857					95% H-UCL (Log ROS)	0.0255						
858												
859	**Statistics using KM estimates on Logged Data and Assuming Lognormal Distribution**											
860					KM Mean (logged)	-4.067					KM Geo Mean	0.0171
861					KM SD (logged)	0.399					95% Critical H Value (KM-Log)	2.194
862					KM Standard Error of Mean (logged)	0.176					95% H-UCL (KM -Log)	0.0258
863					KM SD (logged)	0.399					95% Critical H Value (KM-Log)	2.194
864					KM Standard Error of Mean (logged)	0.176						
865												
866	**DL/2 Statistics**											
867	**DL/2 Normal**						**DL/2 Log-Transformed**					
868					Mean in Original Scale	0.0265					Mean in Log Scale	-3.83
869					SD in Original Scale	0.021					SD in Log Scale	0.618
870					95% t UCL (Assumes normality)	0.0405					95% H-Stat UCL	0.0479
871	**DL/2 is not a recommended method, provided for comparisons and historical reasons**											
872												
873	**Nonparametric Distribution Free UCL Statistics**											
874	**Detected Data appear Gamma Distributed at 5% Significance Level**											
875												
876	**Suggested UCL to Use**											
877					95% KM Adjusted Gamma UCL	0.0318					95% GROS Adjusted Gamma UCL	0.0277
878												
879	Note: Suggestions regarding the selection of a 95% UCL are provided to help the user to select the most appropriate 95% UCL.											
880	Recommendations are based upon data size, data distribution, and skewness.											
881	These recommendations are based upon the results of the simulation studies summarized in Singh, Maichle, and Lee (2006).											
882	However, simulations results will not cover all Real World data sets; for additional insight the user may want to consult a statistician.											
883												
884	**Fluoranthene**											

885												
886	**General Statistics**											
887					Total Number of Observations	8			Number of Distinct Observations	8		
888					Number of Detects	7			Number of Non-Detects	1		
889					Number of Distinct Detects	7			Number of Distinct Non-Detects	1		
890					Minimum Detect	0.0168			Minimum Non-Detect	0.0382		
891					Maximum Detect	0.0657			Maximum Non-Detect	0.0382		
892					Variance Detects	3.2875E-4			Percent Non-Detects	12.5%		
893					Mean Detects	0.0331			SD Detects	0.0181		
894					Median Detects	0.0238			CV Detects	0.548		
895					Skewness Detects	1.117			Kurtosis Detects	0.265		
896					Mean of Logged Detects	-3.525			SD of Logged Detects	0.512		
897												
898	**Note: Sample size is small (e.g., <10), if data are collected using ISM approach, you should use**											
899	**guidance provided in ITRC Tech Reg Guide on ISM (ITRC, 2012) to compute statistics of interest.**											
900	**For example, you may want to use Chebyshev UCL to estimate EPC (ITRC, 2012).**											
901	**Chebyshev UCL can be computed using the Nonparametric and All UCL Options of ProUCL 5.1**											
902												
903	**Normal GOF Test on Detects Only**											
904					Shapiro Wilk Test Statistic	0.867			**Shapiro Wilk GOF Test**			
905					5% Shapiro Wilk Critical Value	0.803			Detected Data appear Normal at 5% Significance Level			
906					Lilliefors Test Statistic	0.268			**Lilliefors GOF Test**			
907					5% Lilliefors Critical Value	0.304			Detected Data appear Normal at 5% Significance Level			
908	**Detected Data appear Normal at 5% Significance Level**											
909												
910	**Kaplan-Meier (KM) Statistics using Normal Critical Values and other Nonparametric UCLs**											
911					KM Mean	0.0319			KM Standard Error of Mean	0.00627		
912					KM SD	0.0162			95% KM (BCA) UCL	0.0422		
913					95% KM (t) UCL	0.0438			95% KM (Percentile Bootstrap) UCL	0.0417		
914					95% KM (z) UCL	0.0422			95% KM Bootstrap t UCL	0.051		
915					90% KM Chebyshev UCL	0.0507			95% KM Chebyshev UCL	0.0593		
916					97.5% KM Chebyshev UCL	0.0711			99% KM Chebyshev UCL	0.0943		
917												
918	**Gamma GOF Tests on Detected Observations Only**											
919					A-D Test Statistic	0.384			**Anderson-Darling GOF Test**			
920					5% A-D Critical Value	0.71			Detected data appear Gamma Distributed at 5% Significance Level			
921					K-S Test Statistic	0.261			**Kolmogorov-Smirnov GOF**			
922					5% K-S Critical Value	0.313			Detected data appear Gamma Distributed at 5% Significance Level			
923	**Detected data appear Gamma Distributed at 5% Significance Level**											
924												
925	**Gamma Statistics on Detected Data Only**											
926					k hat (MLE)	4.418			k star (bias corrected MLE)	2.62		
927					Theta hat (MLE)	0.0075			Theta star (bias corrected MLE)	0.0126		
928					nu hat (MLE)	61.85			nu star (bias corrected)	36.68		
929					Mean (detects)	0.0331						
930												
931	**Gamma ROS Statistics using Imputed Non-Detects**											
932	GROS may not be used when data set has > 50% NDs with many tied observations at multiple DLs											
933	GROS may not be used when kstar of detects is small such as <1.0, especially when the sample size is small (e.g., <15-20)											
934	For such situations, GROS method may yield incorrect values of UCLs and BTVs											
935	This is especially true when the sample size is small.											
936	For gamma distributed detected data, BTVs and UCLs may be computed using gamma distribution on KM estimates											

937					Minimum	0.0168				Mean		0.032
938					Maximum	0.0657				Median		0.0239
939					SD	0.0171				CV		0.535
940					k hat (MLE)	4.787				k star (bias corrected MLE)		3.075
941					Theta hat (MLE)	0.00668				Theta star (bias corrected MLE)		0.0104
942					nu hat (MLE)	76.59				nu star (bias corrected)		49.2
943					Adjusted Level of Significance (β)	0.0195						
944					Approximate Chi Square Value (49.20, α)	34.1				Adjusted Chi Square Value (49.20, β)		30.95
945					95% Gamma Approximate UCL (use when n>=50)	0.0461				95% Gamma Adjusted UCL (use when n<50)		0.0508
946												
947					**Estimates of Gamma Parameters using KM Estimates**							
948					Mean (KM)	0.0319				SD (KM)		0.0162
949					Variance (KM)	2.6238E-4				SE of Mean (KM)		0.00627
950					k hat (KM)	3.885				k star (KM)		2.511
951					nu hat (KM)	62.16				nu star (KM)		40.18
952					theta hat (KM)	0.00822				theta star (KM)		0.0127
953					80% gamma percentile (KM)	0.0465				90% gamma percentile (KM)		0.0589
954					95% gamma percentile (KM)	0.0706				99% gamma percentile (KM)		0.0962
955												
956					**Gamma Kaplan-Meier (KM) Statistics**							
957					Approximate Chi Square Value (40.18, α)	26.66				Adjusted Chi Square Value (40.18, β)		23.91
958					95% Gamma Approximate KM-UCL (use when n>=50)	0.0481				95% Gamma Adjusted KM-UCL (use when n<50)		0.0537
959												
960					**Lognormal GOF Test on Detected Observations Only**							
961					Shapiro Wilk Test Statistic	0.923				**Shapiro Wilk GOF Test**		
962					5% Shapiro Wilk Critical Value	0.803				Detected Data appear Lognormal at 5% Significance Level		
963					Lilliefors Test Statistic	0.233				**Lilliefors GOF Test**		
964					5% Lilliefors Critical Value	0.304				Detected Data appear Lognormal at 5% Significance Level		
965					**Detected Data appear Lognormal at 5% Significance Level**							
966												
967					**Lognormal ROS Statistics Using Imputed Non-Detects**							
968					Mean in Original Scale	0.0319				Mean in Log Scale		-3.553
969					SD in Original Scale	0.0171				SD in Log Scale		0.48
970					95% t UCL (assumes normality of ROS data)	0.0434				95% Percentile Bootstrap UCL		0.0425
971					95% BCA Bootstrap UCL	0.0441				95% Bootstrap t UCL		0.0562
972					95% H-UCL (Log ROS)	0.049						
973												
974					**Statistics using KM estimates on Logged Data and Assuming Lognormal Distribution**							
975					KM Mean (logged)	-3.557				KM Geo Mean		0.0285
976					KM SD (logged)	0.461				95% Critical H Value (KM-Log)		2.29
977					KM Standard Error of Mean (logged)	0.181				95% H-UCL (KM -Log)		0.0473
978					KM SD (logged)	0.461				95% Critical H Value (KM-Log)		2.29
979					KM Standard Error of Mean (logged)	0.181						
980												
981					**DL/2 Statistics**							
982					**DL/2 Normal**					**DL/2 Log-Transformed**		
983					Mean in Original Scale	0.0314				Mean in Log Scale		-3.579
984					SD in Original Scale	0.0175				SD in Log Scale		0.498
985					95% t UCL (Assumes normality)	0.0431				95% H-Stat UCL		0.0492
986					**DL/2 is not a recommended method, provided for comparisons and historical reasons**							
987												
988					**Nonparametric Distribution Free UCL Statistics**							

	A	B	C	D	E	F	G	H	I	J	K	L
989	**Detected Data appear Normal Distributed at 5% Significance Level**											
990												
991	**Suggested UCL to Use**											
992					95% KM (t) UCL	0.0438						
993												
994	Note: Suggestions regarding the selection of a 95% UCL are provided to help the user to select the most appropriate 95% UCL.											
995	Recommendations are based upon data size, data distribution, and skewness.											
996	These recommendations are based upon the results of the simulation studies summarized in Singh, Maichle, and Lee (2006).											
997	However, simulations results will not cover all Real World data sets; for additional insight the user may want to consult a statistician.											
998												
999	**Pyrene**											
1000												
1001	**General Statistics**											
1002					Total Number of Observations	8			Number of Distinct Observations	8		
1003					Number of Detects	6			Number of Non-Detects	2		
1004					Number of Distinct Detects	6			Number of Distinct Non-Detects	2		
1005					Minimum Detect	0.0145			Minimum Non-Detect	0.0382		
1006					Maximum Detect	0.0686			Maximum Non-Detect	0.146		
1007					Variance Detects	4.4122E-4			Percent Non-Detects	25%		
1008					Mean Detects	0.0276			SD Detects	0.021		
1009					Median Detects	0.0183			CV Detects	0.762		
1010					Skewness Detects	2.044			Kurtosis Detects	4.202		
1011					Mean of Logged Detects	-3.768			SD of Logged Detects	0.601		
1012												
1013	**Note: Sample size is small (e.g., <10), if data are collected using ISM approach, you should use**											
1014	**guidance provided in ITRC Tech Reg Guide on ISM (ITRC, 2012) to compute statistics of interest.**											
1015	**For example, you may want to use Chebyshev UCL to estimate EPC (ITRC, 2012).**											
1016	**Chebyshev UCL can be computed using the Nonparametric and All UCL Options of ProUCL 5.1**											
1017												
1018	**Normal GOF Test on Detects Only**											
1019					Shapiro Wilk Test Statistic	0.704			**Shapiro Wilk GOF Test**			
1020					5% Shapiro Wilk Critical Value	0.788			Detected Data Not Normal at 5% Significance Level			
1021					Lilliefors Test Statistic	0.337			**Lilliefors GOF Test**			
1022					5% Lilliefors Critical Value	0.325			Detected Data Not Normal at 5% Significance Level			
1023	**Detected Data Not Normal at 5% Significance Level**											
1024												
1025	**Kaplan-Meier (KM) Statistics using Normal Critical Values and other Nonparametric UCLs**											
1026					KM Mean	0.0264			KM Standard Error of Mean	0.00758		
1027					KM SD	0.0181			95% KM (BCA) UCL	0.0398		
1028					95% KM (t) UCL	0.0408			95% KM (Percentile Bootstrap) UCL	0.0393		
1029					95% KM (z) UCL	0.0389			95% KM Bootstrap t UCL	0.121		
1030					90% KM Chebyshev UCL	0.0491			95% KM Chebyshev UCL	0.0594		
1031					97.5% KM Chebyshev UCL	0.0737			99% KM Chebyshev UCL	0.102		
1032												
1033	**Gamma GOF Tests on Detected Observations Only**											
1034					A-D Test Statistic	0.719			**Anderson-Darling GOF Test**			
1035					5% A-D Critical Value	0.701			Detected Data Not Gamma Distributed at 5% Significance Level			
1036					K-S Test Statistic	0.344			**Kolmogorov-Smirnov GOF**			
1037					5% K-S Critical Value	0.335			Detected Data Not Gamma Distributed at 5% Significance Level			
1038	**Detected Data Not Gamma Distributed at 5% Significance Level**											
1039												
1040	**Gamma Statistics on Detected Data Only**											

1041					k hat (MLE)	2.976				k star (bias corrected MLE)		1.599
1042					Theta hat (MLE)	0.00926				Theta star (bias corrected MLE)		0.0172
1043					nu hat (MLE)	35.71				nu star (bias corrected)		19.19
1044					Mean (detects)	0.0276						
1045												
1046	**Gamma ROS Statistics using Imputed Non-Detects**											
1047	GROS may not be used when data set has > 50% NDs with many tied observations at multiple DLs											
1048	GROS may not be used when kstar of detects is small such as <1.0, especially when the sample size is small (e.g., <15-20)											
1049	For such situations, GROS method may yield incorrect values of UCLs and BTVs											
1050	This is especially true when the sample size is small.											
1051	For gamma distributed detected data, BTVs and UCLs may be computed using gamma distribution on KM estimates											
1052					Minimum	0.0145				Mean		0.0261
1053					Maximum	0.0686				Median		0.0191
1054					SD	0.018				CV		0.689
1055					k hat (MLE)	3.757				k star (bias corrected MLE)		2.432
1056					Theta hat (MLE)	0.00695				Theta star (bias corrected MLE)		0.0107
1057					nu hat (MLE)	60.12				nu star (bias corrected)		38.91
1058					Adjusted Level of Significance (β)	0.0195						
1059					Approximate Chi Square Value (38.91, α)	25.62				Adjusted Chi Square Value (38.91, β)		22.93
1060					95% Gamma Approximate UCL (use when n>=50)	0.0396				95% Gamma Adjusted UCL (use when n<50)		0.0443
1061												
1062	**Estimates of Gamma Parameters using KM Estimates**											
1063					Mean (KM)	0.0264				SD (KM)		0.0181
1064					Variance (KM)	3.2871E-4				SE of Mean (KM)		0.00758
1065					k hat (KM)	2.119				k star (KM)		1.408
1066					nu hat (KM)	33.91				nu star (KM)		22.53
1067					theta hat (KM)	0.0125				theta star (KM)		0.0187
1068					80% gamma percentile (KM)	0.0411				90% gamma percentile (KM)		0.0559
1069					95% gamma percentile (KM)	0.0702				99% gamma percentile (KM)		0.103
1070												
1071	**Gamma Kaplan-Meier (KM) Statistics**											
1072					Approximate Chi Square Value (22.53, α)	12.73				Adjusted Chi Square Value (22.53, β)		10.92
1073					95% Gamma Approximate KM-UCL (use when n>=50)	0.0467				95% Gamma Adjusted KM-UCL (use when n<50)		0.0545
1074												
1075	**Lognormal GOF Test on Detected Observations Only**											
1076					Shapiro Wilk Test Statistic	0.811	**Shapiro Wilk GOF Test**					
1077					5% Shapiro Wilk Critical Value	0.788	Detected Data appear Lognormal at 5% Significance Level					
1078					Lilliefors Test Statistic	0.317	**Lilliefors GOF Test**					
1079					5% Lilliefors Critical Value	0.325	Detected Data appear Lognormal at 5% Significance Level					
1080	**Detected Data appear Lognormal at 5% Significance Level**											
1081												
1082	**Lognormal ROS Statistics Using Imputed Non-Detects**											
1083					Mean in Original Scale	0.0259				Mean in Log Scale		-3.793
1084					SD in Original Scale	0.018				SD in Log Scale		0.511
1085					95% t UCL (assumes normality of ROS data)	0.038				95% Percentile Bootstrap UCL		0.0375
1086					95% BCA Bootstrap UCL	0.0408				95% Bootstrap t UCL		0.0801
1087					95% H-UCL (Log ROS)	0.0406						
1088												
1089	**Statistics using KM estimates on Logged Data and Assuming Lognormal Distribution**											
1090					KM Mean (logged)	-3.8				KM Geo Mean		0.0224
1091					KM SD (logged)	0.524				95% Critical H Value (KM-Log)		2.395
1092					KM Standard Error of Mean (logged)	0.222				95% H-UCL (KM -Log)		0.0413

1093					KM SD (logged)	0.524				95% Critical H Value (KM-Log)		2.395
1094					KM Standard Error of Mean (logged)	0.222						
1095												
1096					**DL/2 Statistics**							
1097					**DL/2 Normal**					**DL/2 Log-Transformed**		
1098					Mean in Original Scale	0.0322				Mean in Log Scale		-3.648
1099					SD in Original Scale	0.0244				SD in Log Scale		0.66
1100					95% t UCL (Assumes normality)	0.0485				95% H-Stat UCL		0.0628
1101					**DL/2 is not a recommended method, provided for comparisons and historical reasons**							
1102												
1103					**Nonparametric Distribution Free UCL Statistics**							
1104					**Detected Data appear Lognormal Distributed at 5% Significance Level**							
1105												
1106					**Suggested UCL to Use**							
1107					KM H-UCL	0.0413						
1108												
1109					Note: Suggestions regarding the selection of a 95% UCL are provided to help the user to select the most appropriate 95% UCL.							
1110					Recommendations are based upon data size, data distribution, and skewness.							
1111					These recommendations are based upon the results of the simulation studies summarized in Singh, Maichle, and Lee (2006).							
1112					However, simulations results will not cover all Real World data sets; for additional insight the user may want to consult a statistician.							
1113												
1114	**Americium-241**											
1115												
1116					**General Statistics**							
1117					Total Number of Observations	8				Number of Distinct Observations		8
1118					Number of Detects	5				Number of Non-Detects		3
1119					Number of Distinct Detects	5				Number of Distinct Non-Detects		3
1120					Minimum Detect	0.0189				Minimum Non-Detect		0.00889
1121					Maximum Detect	0.384				Maximum Non-Detect		0.0323
1122					Variance Detects	0.0238				Percent Non-Detects		37.5%
1123					Mean Detects	0.11				SD Detects		0.154
1124					Median Detects	0.0565				CV Detects		1.398
1125					Skewness Detects	2.158				Kurtosis Detects		4.722
1126					Mean of Logged Detects	-2.821				SD of Logged Detects		1.152
1127												
1128					**Note: Sample size is small (e.g., <10), if data are collected using ISM approach, you should use**							
1129					**guidance provided in ITRC Tech Reg Guide on ISM (ITRC, 2012) to compute statistics of interest.**							
1130					**For example, you may want to use Chebyshev UCL to estimate EPC (ITRC, 2012).**							
1131					**Chebyshev UCL can be computed using the Nonparametric and All UCL Options of ProUCL 5.1**							
1132												
1133					**Normal GOF Test on Detects Only**							
1134					Shapiro Wilk Test Statistic	0.662				**Shapiro Wilk GOF Test**		
1135					5% Shapiro Wilk Critical Value	0.762				Detected Data Not Normal at 5% Significance Level		
1136					Lilliefors Test Statistic	0.421				**Lilliefors GOF Test**		
1137					5% Lilliefors Critical Value	0.343				Detected Data Not Normal at 5% Significance Level		
1138					**Detected Data Not Normal at 5% Significance Level**							
1139												
1140					**Kaplan-Meier (KM) Statistics using Normal Critical Values and other Nonparametric UCLs**							
1141					KM Mean	0.074				KM Standard Error of Mean		0.0469
1142					KM SD	0.119				95% KM (BCA) UCL		0.163
1143					95% KM (t) UCL	0.163				95% KM (Percentile Bootstrap) UCL		0.159
1144					95% KM (z) UCL	0.151				95% KM Bootstrap t UCL		0.439

1145				90% KM Chebyshev UCL		0.215				95% KM Chebyshev UCL		0.279
1146				97.5% KM Chebyshev UCL		0.367				99% KM Chebyshev UCL		0.541
1147												
1148						**Gamma GOF Tests on Detected Observations Only**							
1149					A-D Test Statistic	0.576				**Anderson-Darling GOF Test**		
1150					5% A-D Critical Value	0.693				Detected data appear Gamma Distributed at 5% Significance Level		
1151					K-S Test Statistic	0.356				**Kolmogorov-Smirnov GOF**		
1152					5% K-S Critical Value	0.365				Detected data appear Gamma Distributed at 5% Significance Level		
1153					**Detected data appear Gamma Distributed at 5% Significance Level**							
1154												
1155						**Gamma Statistics on Detected Data Only**							
1156					k hat (MLE)	0.944				k star (bias corrected MLE)		0.511
1157					Theta hat (MLE)	0.117				Theta star (bias corrected MLE)		0.216
1158					nu hat (MLE)	9.435				nu star (bias corrected)		5.107
1159					Mean (detects)	0.11						
1160												
1161						**Gamma ROS Statistics using Imputed Non-Detects**							
1162						GROS may not be used when data set has > 50% NDs with many tied observations at multiple DLs						
1163						GROS may not be used when kstar of detects is small such as <1.0, especially when the sample size is small (e.g., <15-20)						
1164						For such situations, GROS method may yield incorrect values of UCLs and BTVs						
1165						This is especially true when the sample size is small.						
1166						For gamma distributed detected data, BTVs and UCLs may be computed using gamma distribution on KM estimates						
1167					Minimum	0.01				Mean		0.0727
1168					Maximum	0.384				Median		0.024
1169					SD	0.128				CV		1.755
1170					k hat (MLE)	0.697				k star (bias corrected MLE)		0.519
1171					Theta hat (MLE)	0.104				Theta star (bias corrected MLE)		0.14
1172					nu hat (MLE)	11.15				nu star (bias corrected)		8.3
1173					Adjusted Level of Significance (β)	0.0195						
1174					Approximate Chi Square Value (8.30, α)	2.91				Adjusted Chi Square Value (8.30, β)		2.166
1175					95% Gamma Approximate UCL (use when n>=50)	0.207				95% Gamma Adjusted UCL (use when n<50)		0.278
1176												
1177						**Estimates of Gamma Parameters using KM Estimates**							
1178					Mean (KM)	0.074				SD (KM)		0.119
1179					Variance (KM)	0.0141				SE of Mean (KM)		0.0469
1180					k hat (KM)	0.388				k star (KM)		0.326
1181					nu hat (KM)	6.213				nu star (KM)		5.216
1182					theta hat (KM)	0.19				theta star (KM)		0.227
1183					80% gamma percentile (KM)	0.116				90% gamma percentile (KM)		0.216
1184					95% gamma percentile (KM)	0.329				99% gamma percentile (KM)		0.621
1185												
1186						**Gamma Kaplan-Meier (KM) Statistics**							
1187					Approximate Chi Square Value (5.22, α)	1.253				Adjusted Chi Square Value (5.22, β)		0.831
1188					95% Gamma Approximate KM-UCL (use when n>=50)	0.308				95% Gamma Adjusted KM-UCL (use when n<50)		0.464
1189												
1190						**Lognormal GOF Test on Detected Observations Only**							
1191					Shapiro Wilk Test Statistic	0.901				**Shapiro Wilk GOF Test**		
1192					5% Shapiro Wilk Critical Value	0.762				Detected Data appear Lognormal at 5% Significance Level		
1193					Lilliefors Test Statistic	0.282				**Lilliefors GOF Test**		
1194					5% Lilliefors Critical Value	0.343				Detected Data appear Lognormal at 5% Significance Level		
1195						**Detected Data appear Lognormal at 5% Significance Level**						
1196												

1197	**Lognormal ROS Statistics Using Imputed Non-Detects**											
1198					Mean in Original Scale	0.0719				Mean in Log Scale	-3.612	
1199					SD in Original Scale	0.128				SD in Log Scale	1.43	
1200					95% t UCL (assumes normality of ROS data)	0.158				95% Percentile Bootstrap UCL	0.158	
1201					95% BCA Bootstrap UCL	0.173				95% Bootstrap t UCL	0.457	
1202					95% H-UCL (Log ROS)	0.878						
1203												
1204	**Statistics using KM estimates on Logged Data and Assuming Lognormal Distribution**											
1205					KM Mean (logged)	-3.415				KM Geo Mean	0.0329	
1206					KM SD (logged)	1.148				95% Critical H Value (KM-Log)	3.801	
1207					KM Standard Error of Mean (logged)	0.467				95% H-UCL (KM -Log)	0.331	
1208					KM SD (logged)	1.148				95% Critical H Value (KM-Log)	3.801	
1209					KM Standard Error of Mean (logged)	0.467						
1210												
1211	**DL/2 Statistics**											
1212	**DL/2 Normal**									**DL/2 Log-Transformed**		
1213					Mean in Original Scale	0.0732				Mean in Log Scale	-3.489	
1214					SD in Original Scale	0.127				SD in Log Scale	1.323	
1215					95% t UCL (Assumes normality)	0.158				95% H-Stat UCL	0.618	
1216	**DL/2 is not a recommended method, provided for comparisons and historical reasons**											
1217												
1218	**Nonparametric Distribution Free UCL Statistics**											
1219	**Detected Data appear Gamma Distributed at 5% Significance Level**											
1220												
1221	**Suggested UCL to Use**											
1222					95% KM Bootstrap t UCL	0.439				Adjusted KM-UCL (use when k<=1 and 15 < n < 50 but k<=1)	0.464	
1223												
1224	Note: Suggestions regarding the selection of a 95% UCL are provided to help the user to select the most appropriate 95% UCL.											
1225	Recommendations are based upon data size, data distribution, and skewness.											
1226	These recommendations are based upon the results of the simulation studies summarized in Singh, Maichle, and Lee (2006).											
1227	However, simulations results will not cover all Real World data sets; for additional insight the user may want to consult a statistician.											
1228												
1229												
1230	**Plutonium-239/240**											
1231												
1232	**General Statistics**											
1233					Total Number of Observations	11				Number of Distinct Observations	10	
1234										Number of Missing Observations	0	
1235					Minimum	0.159				Mean	4.106	
1236					Maximum	21.5				Median	1.15	
1237					SD	6.643				Std. Error of Mean	2.003	
1238					Coefficient of Variation	1.618				Skewness	2.298	
1239												
1240	**Normal GOF Test**											
1241					Shapiro Wilk Test Statistic	0.605				**Shapiro Wilk GOF Test**		
1242					5% Shapiro Wilk Critical Value	0.85				Data Not Normal at 5% Significance Level		
1243					Lilliefors Test Statistic	0.394				**Lilliefors GOF Test**		
1244					5% Lilliefors Critical Value	0.251				Data Not Normal at 5% Significance Level		
1245	**Data Not Normal at 5% Significance Level**											
1246												
1247	**Assuming Normal Distribution**											
1248	**95% Normal UCL**									**95% UCLs (Adjusted for Skewness)**		

	A	B	C	D	E	F	G	H	I	J	K	L
1249				95% Student's-t UCL		7.737			95% Adjusted-CLT UCL (Chen-1995)			8.884
1250									95% Modified-t UCL (Johnson-1978)			7.968
1251												
1252					**Gamma GOF Test**							
1253				A-D Test Statistic		0.961			**Anderson-Darling Gamma GOF Test**			
1254				5% A-D Critical Value		0.768			Data Not Gamma Distributed at 5% Significance Level			
1255				K-S Test Statistic		0.267			**Kolmogorov-Smirnov Gamma GOF Test**			
1256				5% K-S Critical Value		0.266			Data Not Gamma Distributed at 5% Significance Level			
1257					**Data Not Gamma Distributed at 5% Significance Level**							
1258												
1259					**Gamma Statistics**							
1260				k hat (MLE)		0.678			k star (bias corrected MLE)			0.554
1261				Theta hat (MLE)		6.057			Theta star (bias corrected MLE)			7.416
1262				nu hat (MLE)		14.92			nu star (bias corrected)			12.18
1263				MLE Mean (bias corrected)		4.106			MLE Sd (bias corrected)			5.518
1264									Approximate Chi Square Value (0.05)			5.347
1265				Adjusted Level of Significance		0.0278			Adjusted Chi Square Value			4.63
1266												
1267					**Assuming Gamma Distribution**							
1268				95% Approximate Gamma UCL (use when n>=50))		9.355			95% Adjusted Gamma UCL (use when n<50)			10.8
1269												
1270					**Lognormal GOF Test**							
1271				Shapiro Wilk Test Statistic		0.927			**Shapiro Wilk Lognormal GOF Test**			
1272				5% Shapiro Wilk Critical Value		0.85			Data appear Lognormal at 5% Significance Level			
1273				Lilliefors Test Statistic		0.196			**Lilliefors Lognormal GOF Test**			
1274				5% Lilliefors Critical Value		0.251			Data appear Lognormal at 5% Significance Level			
1275					**Data appear Lognormal at 5% Significance Level**							
1276												
1277					**Lognormal Statistics**							
1278				Minimum of Logged Data		-1.839			Mean of logged Data			0.517
1279				Maximum of Logged Data		3.068			SD of logged Data			1.358
1280												
1281					**Assuming Lognormal Distribution**							
1282				95% H-UCL		20.9			90% Chebyshev (MVUE) UCL			8.558
1283				95% Chebyshev (MVUE) UCL		10.76			97.5% Chebyshev (MVUE) UCL			13.83
1284				99% Chebyshev (MVUE) UCL		19.84						
1285												
1286					**Nonparametric Distribution Free UCL Statistics**							
1287					**Data appear to follow a Discernible Distribution at 5% Significance Level**							
1288												
1289					**Nonparametric Distribution Free UCLs**							
1290				95% CLT UCL		7.401			95% Jackknife UCL			7.737
1291				95% Standard Bootstrap UCL		7.29			95% Bootstrap-t UCL			28.86
1292				95% Hall's Bootstrap UCL		25.74			95% Percentile Bootstrap UCL			7.59
1293				95% BCA Bootstrap UCL		8.809						
1294				90% Chebyshev(Mean, Sd) UCL		10.12			95% Chebyshev(Mean, Sd) UCL			12.84
1295				97.5% Chebyshev(Mean, Sd) UCL		16.61			99% Chebyshev(Mean, Sd) UCL			24.04
1296												
1297					**Suggested UCL to Use**							
1298				95% Chebyshev (Mean, Sd) UCL		12.84						
1299												
1300	Note: Suggestions regarding the selection of a 95% UCL are provided to help the user to select the most appropriate 95% UCL.											

	A	B	C	D	E	F	G	H	I	J	K	L
1301	Recommendations are based upon data size, data distribution, and skewness.											
1302	These recommendations are based upon the results of the simulation studies summarized in Singh, Maichle, and Lee (2006).											
1303	However, simulations results will not cover all Real World data sets; for additional insight the user may want to consult a statistician.											
1304												