UCL Statistics for Data Sets with Non-Detects		
User Selected Options		
Date/Time of Computation	ProUCL 5.13/28/2018 9:02:35 AM	
From File	NitrateUCLInput.xls	
Full Precision	OFF	
Confidence Coefficient	95%	
Number of Bootstrap Operations	2000	
C-14-006 0-10 ft		
General Statistics		
Total Number of Observations	10	Number of Distinct Observations 8
Number of Detects	7	Number of Non-Detects 3
Number of Distinct Detects	5	Number of Distinct Non-Detects 3
Minimum Detect	1.3	Minimum Non-Detect 1.18
Maximum Detect	1.82	Maximum Non-Detect 1.33
Variance Detects	0.0259	Percent Non-Detects 30%
Mean Detects	1.519	SD Detects 0.161
Median Detects	1.49	CV Detects 0.106
Skewness Detects	0.882	Kurtosis Detects 2.024
Mean of Logged Detects	0.413	SD of Logged Detects 0.104
Normal GOF Test on Detects Only		
Shapiro Wilk Test Statistic	0.926	**Shapiro Wilk GOF Test**
5% Shapiro Wilk Critical Value	0.803	Detected Data appear Normal at 5% Significance Level
Lilliefors Test Statistic	0.256	**Lilliefors GOF Test**
5% Lilliefors Critical Value	0.304	Detected Data appear Normal at 5% Significance Level
Detected Data appear Normal at 5% Significance Level		
Kaplan-Meier (KM) Statistics using Normal Critical Values and other Nonparametric UCLs		
KM Mean	1.421	KM Standard Error of Mean 0.0671
KM SD	0.195	95% KM (BCA) UCL 1.537
95% KM (t) UCL	1.544	95% KM (Percentile Bootstrap) UCL 1.537
95% KM (z) UCL	1.531	95% KM Bootstrap t UCL 1.538
90% KM Chebyshev UCL	1.622	95% KM Chebyshev UCL 1.714
97.5% KM Chebyshev UCL	1.84	99% KM Chebyshev UCL 2.089
Gamma GOF Tests on Detected Observations Only		
A-D Test Statistic	0.332	**Anderson-Darling GOF Test**
5% A-D Critical Value	0.708	Detected data appear Gamma Distributed at 5% Significance Level
K-S Test Statistic	0.235	**Kolmogorov-Smirnov GOF**
5% K-S Critical Value	0.311	Detected data appear Gamma Distributed at 5% Significance Level
Detected data appear Gamma Distributed at 5% Significance Level		
Gamma Statistics on Detected Data Only		
k hat (MLE)	107.3	k star (bias corrected MLE) 61.4
Theta hat (MLE)	0.0142	Theta star (bias corrected MLE) 0.0247
nu hat (MLE)	1502	nu star (bias corrected) 859.6
Mean (detects)	1.519	
Gamma ROS Statistics using Imputed Non-Detects		

53	GROS may not be used when data set has > 50% NDs with many tied observations at multiple DLs											
54	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)											
55	For such situations, GROS method may yield incorrect values of UCLs and BTVs											
56	This is especially true when the sample size is small.											
57	For gamma distributed detected data, BTVs and UCLs may be computed using gamma distribution on KM estimates											
58					Minimum	1.143				Mean	1.412	
59					Maximum	1.82				Median	1.45	
60					SD	0.217				CV	0.153	
61					k hat (MLE)	47.73				k star (bias corrected MLE)	33.48	
62					Theta hat (MLE)	0.0296				Theta star (bias corrected MLE)	0.0422	
63					nu hat (MLE)	954.7				nu star (bias corrected)	669.6	
64					Adjusted Level of Significance (β)	0.0267						
65					Approximate Chi Square Value (669.61, α)	610.6				Adjusted Chi Square Value (669.61, β)	600.8	
66					95% Gamma Approximate UCL (use when n>=50)	1.549				95% Gamma Adjusted UCL (use when n<50)	1.574	
67												
68	**Estimates of Gamma Parameters using KM Estimates**											
69					Mean (KM)	1.421				SD (KM)	0.195	
70					Variance (KM)	0.0382				SE of Mean (KM)	0.0671	
71					k hat (KM)	52.87				k star (KM)	37.08	
72					nu hat (KM)	1057				nu star (KM)	741.6	
73					theta hat (KM)	0.0269				theta star (KM)	0.0383	
74					80% gamma percentile (KM)	1.613				90% gamma percentile (KM)	1.727	
75					95% gamma percentile (KM)	1.825				99% gamma percentile (KM)	2.019	
76												
77	**Gamma Kaplan-Meier (KM) Statistics**											
78					Approximate Chi Square Value (741.58, α)	679.4				Adjusted Chi Square Value (741.58, β)	669	
79					95% Gamma Approximate KM-UCL (use when n>=50)	1.551				95% Gamma Adjusted KM-UCL (use when n<50)	1.575	
80												
81	**Lognormal GOF Test on Detected Observations Only**											
82					Shapiro Wilk Test Statistic	0.945				**Shapiro Wilk GOF Test**		
83					5% Shapiro Wilk Critical Value	0.803				Detected Data appear Lognormal at 5% Significance Level		
84					Lilliefors Test Statistic	0.237				**Lilliefors GOF Test**		
85					5% Lilliefors Critical Value	0.304				Detected Data appear Lognormal at 5% Significance Level		
86	**Detected Data appear Lognormal at 5% Significance Level**											
87												
88	**Lognormal ROS Statistics Using Imputed Non-Detects**											
89					Mean in Original Scale	1.42				Mean in Log Scale	0.341	
90					SD in Original Scale	0.207				SD in Log Scale	0.144	
91					95% t UCL (assumes normality of ROS data)	1.54				95% Percentile Bootstrap UCL	1.52	
92					95% BCA Bootstrap UCL	1.525				95% Bootstrap t UCL	1.557	
93					95% H-UCL (Log ROS)	1.552						
94												
95	**Statistics using KM estimates on Logged Data and Assuming Lognormal Distribution**											
96					KM Mean (logged)	0.342				KM Geo Mean	1.408	
97					KM SD (logged)	0.136				95% Critical H Value (KM-Log)	1.828	
98					KM Standard Error of Mean (logged)	0.0468				95% H-UCL (KM -Log)	1.544	
99					KM SD (logged)	0.136				95% Critical H Value (KM-Log)	1.828	
100					KM Standard Error of Mean (logged)	0.0468						
101												
102	**DL/2 Statistics**											
103	**DL/2 Normal**									**DL/2 Log-Transformed**		
104					Mean in Original Scale	1.253				Mean in Log Scale	0.152	

105				SD in Original Scale	0.448					SD in Log Scale	0.43	
106				95% t UCL (Assumes normality)	1.513					95% H-Stat UCL	1.732	
107	**DL/2 is not a recommended method, provided for comparisons and historical reasons**											
108												
109	**Nonparametric Distribution Free UCL Statistics**											
110	**Detected Data appear Normal Distributed at 5% Significance Level**											
111												
112	**Suggested UCL to Use**											
113				95% KM (t) UCL	1.544							
114												
115	Note: Suggestions regarding the selection of a 95% UCL are provided to help the user to select the most appropriate 95% UCL.											
116	Recommendations are based upon data size, data distribution, and skewness.											
117	These recommendations are based upon the results of the simulation studies summarized in Singh, Maichle, and Lee (2006).											
118	However, simulations results will not cover all Real World data sets; for additional insight the user may want to consult a statistician.											
119												
120	**15-009(c) 0-10 ft**											
121												
122	**General Statistics**											
123				Total Number of Observations	31					Number of Distinct Observations	24	
124				Number of Detects	6					Number of Non-Detects	25	
125				Number of Distinct Detects	6					Number of Distinct Non-Detects	19	
126				Minimum Detect	1.1					Minimum Non-Detect	1.04	
127				Maximum Detect	2.24					Maximum Non-Detect	1.38	
128				Variance Detects	0.239					Percent Non-Detects	80.65%	
129				Mean Detects	1.605					SD Detects	0.489	
130				Median Detects	1.47					CV Detects	0.305	
131				Skewness Detects	0.489					Kurtosis Detects	-2.05	
132				Mean of Logged Detects	0.435					SD of Logged Detects	0.301	
133												
134	**Normal GOF Test on Detects Only**											
135				Shapiro Wilk Test Statistic	0.877					**Shapiro Wilk GOF Test**		
136				5% Shapiro Wilk Critical Value	0.788					Detected Data appear Normal at 5% Significance Level		
137				Lilliefors Test Statistic	0.234					**Lilliefors GOF Test**		
138				5% Lilliefors Critical Value	0.325					Detected Data appear Normal at 5% Significance Level		
139	**Detected Data appear Normal at 5% Significance Level**											
140												
141	**Kaplan-Meier (KM) Statistics using Normal Critical Values and other Nonparametric UCLs**											
142				KM Mean	1.162					KM Standard Error of Mean	0.059	
143				KM SD	0.295					95% KM (BCA) UCL	1.283	
144				95% KM (t) UCL	1.262					95% KM (Percentile Bootstrap) UCL	1.261	
145				95% KM (z) UCL	1.259					95% KM Bootstrap t UCL	1.277	
146				90% KM Chebyshev UCL	1.339					95% KM Chebyshev UCL	1.419	
147				97.5% KM Chebyshev UCL	1.53					99% KM Chebyshev UCL	1.749	
148												
149	**Gamma GOF Tests on Detected Observations Only**											
150				A-D Test Statistic	0.403					**Anderson-Darling GOF Test**		
151				5% A-D Critical Value	0.698					Detected data appear Gamma Distributed at 5% Significance Level		
152				K-S Test Statistic	0.242					**Kolmogorov-Smirnov GOF**		
153				5% K-S Critical Value	0.332					Detected data appear Gamma Distributed at 5% Significance Level		
154	**Detected data appear Gamma Distributed at 5% Significance Level**											
155												
156	**Gamma Statistics on Detected Data Only**											

157					k hat (MLE)	13.3					k star (bias corrected MLE)	6.759
158					Theta hat (MLE)	0.121					Theta star (bias corrected MLE)	0.237
159					nu hat (MLE)	159.5					nu star (bias corrected)	81.11
160					Mean (detects)	1.605						
161												
162	**Gamma ROS Statistics using Imputed Non-Detects**											
163	GROS may not be used when data set has > 50% NDs with many tied observations at multiple DLs											
164	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)											
165	For such situations, GROS method may yield incorrect values of UCLs and BTVs											
166	This is especially true when the sample size is small.											
167	For gamma distributed detected data, BTVs and UCLs may be computed using gamma distribution on KM estimates											
168					Minimum	0.01					Mean	0.532
169					Maximum	2.24					Median	0.314
170					SD	0.596					CV	1.119
171					k hat (MLE)	0.791					k star (bias corrected MLE)	0.736
172					Theta hat (MLE)	0.672					Theta star (bias corrected MLE)	0.723
173					nu hat (MLE)	49.07					nu star (bias corrected)	45.65
174					Adjusted Level of Significance (β)	0.0413						
175					Approximate Chi Square Value (45.65, α)	31.15					Adjusted Chi Square Value (45.65, β)	30.48
176					95% Gamma Approximate UCL (use when n>=50)	0.78					95% Gamma Adjusted UCL (use when n<50)	0.797
177												
178	**Estimates of Gamma Parameters using KM Estimates**											
179					Mean (KM)	1.162					SD (KM)	0.295
180					Variance (KM)	0.087					SE of Mean (KM)	0.059
181					k hat (KM)	15.5					k star (KM)	14.02
182					nu hat (KM)	961					nu star (KM)	869.3
183					theta hat (KM)	0.0749					theta star (KM)	0.0828
184					80% gamma percentile (KM)	1.411					90% gamma percentile (KM)	1.573
185					95% gamma percentile (KM)	1.714					99% gamma percentile (KM)	2.002
186												
187	**Gamma Kaplan-Meier (KM) Statistics**											
188					Approximate Chi Square Value (869.30, α)	801.9					Adjusted Chi Square Value (869.30, β)	798.3
189					95% Gamma Approximate KM-UCL (use when n>=50)	1.259					95% Gamma Adjusted KM-UCL (use when n<50)	1.265
190												
191	**Lognormal GOF Test on Detected Observations Only**											
192					Shapiro Wilk Test Statistic	0.898	**Shapiro Wilk GOF Test**					
193					5% Shapiro Wilk Critical Value	0.788	Detected Data appear Lognormal at 5% Significance Level					
194					Lilliefors Test Statistic	0.217	**Lilliefors GOF Test**					
195					5% Lilliefors Critical Value	0.325	Detected Data appear Lognormal at 5% Significance Level					
196	**Detected Data appear Lognormal at 5% Significance Level**											
197												
198	**Lognormal ROS Statistics Using Imputed Non-Detects**											
199					Mean in Original Scale	0.804					Mean in Log Scale	-0.323
200					SD in Original Scale	0.456					SD in Log Scale	0.426
201					95% t UCL (assumes normality of ROS data)	0.943					95% Percentile Bootstrap UCL	0.947
202					95% BCA Bootstrap UCL	0.973					95% Bootstrap t UCL	1.014
203					95% H-UCL (Log ROS)	0.917						
204												
205	**Statistics using KM estimates on Logged Data and Assuming Lognormal Distribution**											
206					KM Mean (logged)	0.127					KM Geo Mean	1.135
207					KM SD (logged)	0.196					95% Critical H Value (KM-Log)	1.74
208					KM Standard Error of Mean (logged)	0.0397					95% H-UCL (KM -Log)	1.232

209					KM SD (logged)	0.196				95% Critical H Value (KM-Log)		1.74
210					KM Standard Error of Mean (logged)	0.0397						
211												
212	**DL/2 Statistics**											
213	**DL/2 Normal**						**DL/2 Log-Transformed**					
214					Mean in Original Scale	0.797				Mean in Log Scale		-0.326
215					SD in Original Scale	0.451				SD in Log Scale		0.405
216					95% t UCL (Assumes normality)	0.934				95% H-Stat UCL		0.899
217	**DL/2 is not a recommended method, provided for comparisons and historical reasons**											
218												
219	**Nonparametric Distribution Free UCL Statistics**											
220	**Detected Data appear Normal Distributed at 5% Significance Level**											
221												
222	**Suggested UCL to Use**											
223					95% KM (t) UCL	1.262						
224												
225	Note: Suggestions regarding the selection of a 95% UCL are provided to help the user to select the most appropriate 95% UCL.											
226	Recommendations are based upon data size, data distribution, and skewness.											
227	These recommendations are based upon the results of the simulation studies summarized in Singh, Maichle, and Lee (2006).											
228	However, simulations results will not cover all Real World data sets; for additional insight the user may want to consult a statistician.											
229												
230	**15-009(h) 0-10 ft**											
231												
232	**General Statistics**											
233					Total Number of Observations	12				Number of Distinct Observations		12
234					Number of Detects	6				Number of Non-Detects		6
235					Number of Distinct Detects	6				Number of Distinct Non-Detects		6
236					Minimum Detect	1.08				Minimum Non-Detect		1.05
237					Maximum Detect	9.71				Maximum Non-Detect		1.25
238					Variance Detects	11.23				Percent Non-Detects		50%
239					Mean Detects	2.905				SD Detects		3.35
240					Median Detects	1.725				CV Detects		1.153
241					Skewness Detects	2.395				Kurtosis Detects		5.793
242					Mean of Logged Detects	0.72				SD of Logged Detects		0.794
243												
244	**Normal GOF Test on Detects Only**											
245					Shapiro Wilk Test Statistic	0.592	**Shapiro Wilk GOF Test**					
246					5% Shapiro Wilk Critical Value	0.788	Detected Data Not Normal at 5% Significance Level					
247					Lilliefors Test Statistic	0.448	**Lilliefors GOF Test**					
248					5% Lilliefors Critical Value	0.325	Detected Data Not Normal at 5% Significance Level					
249	**Detected Data Not Normal at 5% Significance Level**											
250												
251	**Kaplan-Meier (KM) Statistics using Normal Critical Values and other Nonparametric UCLs**											
252					KM Mean	1.984				KM Standard Error of Mean		0.743
253					KM SD	2.351				95% KM (BCA) UCL		3.501
254					95% KM (t) UCL	3.319				95% KM (Percentile Bootstrap) UCL		3.342
255					95% KM (z) UCL	3.207				95% KM Bootstrap t UCL		8.78
256					90% KM Chebyshev UCL	4.214				95% KM Chebyshev UCL		5.224
257					97.5% KM Chebyshev UCL	6.626				99% KM Chebyshev UCL		9.381
258												
259	**Gamma GOF Tests on Detected Observations Only**											
260					A-D Test Statistic	0.994	**Anderson-Darling GOF Test**					

261				5% A-D Critical Value	0.707	Detected Data Not Gamma Distributed at 5% Significance Level						
262				K-S Test Statistic	0.416	**Kolmogorov-Smirnov GOF**						
263				5% K-S Critical Value	0.337	Detected Data Not Gamma Distributed at 5% Significance Level						
264	**Detected Data Not Gamma Distributed at 5% Significance Level**											
265												
266	**Gamma Statistics on Detected Data Only**											
267				k hat (MLE)	1.59	k star (bias corrected MLE)	0.906					
268				Theta hat (MLE)	1.827	Theta star (bias corrected MLE)	3.206					
269				nu hat (MLE)	19.08	nu star (bias corrected)	10.87					
270				Mean (detects)	2.905							
271												
272	**Gamma ROS Statistics using Imputed Non-Detects**											
273	GROS may not be used when data set has > 50% NDs with many tied observations at multiple DLs											
274	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)											
275	For such situations, GROS method may yield incorrect values of UCLs and BTVs											
276	This is especially true when the sample size is small.											
277	For gamma distributed detected data, BTVs and UCLs may be computed using gamma distribution on KM estimates											
278				Minimum	0.01	Mean	1.458					
279				Maximum	9.71	Median	0.545					
280				SD	2.718	CV	1.865					
281				k hat (MLE)	0.298	k star (bias corrected MLE)	0.279					
282				Theta hat (MLE)	4.896	Theta star (bias corrected MLE)	5.227					
283				nu hat (MLE)	7.145	nu star (bias corrected)	6.692					
284				Adjusted Level of Significance (β)	0.029							
285				Approximate Chi Square Value (6.69, α)	2.003	Adjusted Chi Square Value (6.69, β)	1.636					
286				95% Gamma Approximate UCL (use when n>=50)	4.869	95% Gamma Adjusted UCL (use when n<50)	5.961					
287												
288	**Estimates of Gamma Parameters using KM Estimates**											
289				Mean (KM)	1.984	SD (KM)	2.351					
290				Variance (KM)	5.526	SE of Mean (KM)	0.743					
291				k hat (KM)	0.712	k star (KM)	0.59					
292				nu hat (KM)	17.09	nu star (KM)	14.15					
293				theta hat (KM)	2.786	theta star (KM)	3.364					
294				80% gamma percentile (KM)	3.27	90% gamma percentile (KM)	5.18					
295				95% gamma percentile (KM)	7.183	99% gamma percentile (KM)	12.04					
296												
297	**Gamma Kaplan-Meier (KM) Statistics**											
298				Approximate Chi Square Value (14.15, α)	6.675	Adjusted Chi Square Value (14.15, β)	5.909					
299				95% Gamma Approximate KM-UCL (use when n>=50)	4.206	95% Gamma Adjusted KM-UCL (use when n<50)	4.751					
300												
301	**Lognormal GOF Test on Detected Observations Only**											
302				Shapiro Wilk Test Statistic	0.761	**Shapiro Wilk GOF Test**						
303				5% Shapiro Wilk Critical Value	0.788	Detected Data Not Lognormal at 5% Significance Level						
304				Lilliefors Test Statistic	0.365	**Lilliefors GOF Test**						
305				5% Lilliefors Critical Value	0.325	Detected Data Not Lognormal at 5% Significance Level						
306	**Detected Data Not Lognormal at 5% Significance Level**											
307												
308	**Lognormal ROS Statistics Using Imputed Non-Detects**											
309				Mean in Original Scale	1.669	Mean in Log Scale	-0.0696					
310				SD in Original Scale	2.602	SD in Log Scale	0.997					
311				95% t UCL (assumes normality of ROS data)	3.018	95% Percentile Bootstrap UCL	3.021					
312				95% BCA Bootstrap UCL	3.731	95% Bootstrap t UCL	6.215					

313				95% H-UCL (Log ROS)		3.676						
314												
315	**Statistics using KM estimates on Logged Data and Assuming Lognormal Distribution**											
316				KM Mean (logged)		0.39				KM Geo Mean		1.478
317				KM SD (logged)		0.609				95% Critical H Value (KM-Log)		2.284
318				KM Standard Error of Mean (logged)		0.193				95% H-UCL (KM -Log)		2.706
319				KM SD (logged)		0.609				95% Critical H Value (KM-Log)		2.284
320				KM Standard Error of Mean (logged)		0.193						
321												
322	**DL/2 Statistics**											
323	**DL/2 Normal**						**DL/2 Log-Transformed**					
324				Mean in Original Scale		1.742				Mean in Log Scale		0.0854
325				SD in Original Scale		2.565				SD in Log Scale		0.853
326				95% t UCL (Assumes normality)		3.071				95% H-Stat UCL		3.105
327	**DL/2 is not a recommended method, provided for comparisons and historical reasons**											
328												
329	**Nonparametric Distribution Free UCL Statistics**											
330	**Data do not follow a Discernible Distribution at 5% Significance Level**											
331												
332	**Suggested UCL to Use**											
333				95% KM (Chebyshev) UCL		5.224						
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	**36-003(a) 0-10 ft**											
341												
342	**General Statistics**											
343				Total Number of Observations		16				Number of Distinct Observations		16
344				Number of Detects		10				Number of Non-Detects		6
345				Number of Distinct Detects		10				Number of Distinct Non-Detects		6
346				Minimum Detect		1.27				Minimum Non-Detect		1.02
347				Maximum Detect		2.38				Maximum Non-Detect		1.15
348				Variance Detects		0.164				Percent Non-Detects		37.5%
349				Mean Detects		1.771				SD Detects		0.404
350				Median Detects		1.65				CV Detects		0.228
351				Skewness Detects		0.451				Kurtosis Detects		-1.479
352				Mean of Logged Detects		0.549				SD of Logged Detects		0.225
353												
354	**Normal GOF Test on Detects Only**											
355				Shapiro Wilk Test Statistic		0.9	**Shapiro Wilk GOF Test**					
356				5% Shapiro Wilk Critical Value		0.842	Detected Data appear Normal at 5% Significance Level					
357				Lilliefors Test Statistic		0.189	**Lilliefors GOF Test**					
358				5% Lilliefors Critical Value		0.262	Detected Data appear Normal at 5% Significance Level					
359	**Detected Data appear Normal at 5% Significance Level**											
360												
361	**Kaplan-Meier (KM) Statistics using Normal Critical Values and other Nonparametric UCLs**											
362				KM Mean		1.489				KM Standard Error of Mean		0.125
363				KM SD		0.474				95% KM (BCA) UCL		1.718
364				95% KM (t) UCL		1.708				95% KM (Percentile Bootstrap) UCL		1.694

365					95% KM (z) UCL	1.695				95% KM Bootstrap t UCL		1.731
366					90% KM Chebyshev UCL	1.864				95% KM Chebyshev UCL		2.033
367					97.5% KM Chebyshev UCL	2.269				99% KM Chebyshev UCL		2.731
368												
369	**Gamma GOF Tests on Detected Observations Only**											
370					A-D Test Statistic	0.435	**Anderson-Darling GOF Test**					
371					5% A-D Critical Value	0.725	Detected data appear Gamma Distributed at 5% Significance Level					
372					K-S Test Statistic	0.188	**Kolmogorov-Smirnov GOF**					
373					5% K-S Critical Value	0.266	Detected data appear Gamma Distributed at 5% Significance Level					
374	**Detected data appear Gamma Distributed at 5% Significance Level**											
375												
376	**Gamma Statistics on Detected Data Only**											
377					k hat (MLE)	21.89				k star (bias corrected MLE)		15.39
378					Theta hat (MLE)	0.0809				Theta star (bias corrected MLE)		0.115
379					nu hat (MLE)	437.8				nu star (bias corrected)		307.8
380					Mean (detects)	1.771						
381												
382	**Gamma ROS Statistics using Imputed Non-Detects**											
383	GROS may not be used when data set has > 50% NDs with many tied observations at multiple DLs											
384	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)											
385	For such situations, GROS method may yield incorrect values of UCLs and BTVs											
386	This is especially true when the sample size is small.											
387	For gamma distributed detected data, BTVs and UCLs may be computed using gamma distribution on KM estimates											
388					Minimum	0.855				Mean		1.427
389					Maximum	2.38				Median		1.425
390					SD	0.555				CV		0.389
391					k hat (MLE)	7.119				k star (bias corrected MLE)		5.826
392					Theta hat (MLE)	0.201				Theta star (bias corrected MLE)		0.245
393					nu hat (MLE)	227.8				nu star (bias corrected)		186.4
394					Adjusted Level of Significance (β)	0.0335						
395					Approximate Chi Square Value (186.43, α)	155.8				Adjusted Chi Square Value (186.43, β)		152.7
396					95% Gamma Approximate UCL (use when n>=50)	1.708				95% Gamma Adjusted UCL (use when n<50)		1.743
397												
398	**Estimates of Gamma Parameters using KM Estimates**											
399					Mean (KM)	1.489				SD (KM)		0.474
400					Variance (KM)	0.224				SE of Mean (KM)		0.125
401					k hat (KM)	9.894				k star (KM)		8.08
402					nu hat (KM)	316.6				nu star (KM)		258.6
403					theta hat (KM)	0.151				theta star (KM)		0.184
404					80% gamma percentile (KM)	1.903				90% gamma percentile (KM)		2.188
405					95% gamma percentile (KM)	2.443				99% gamma percentile (KM)		2.97
406												
407	**Gamma Kaplan-Meier (KM) Statistics**											
408					Approximate Chi Square Value (258.57, α)	222.3				Adjusted Chi Square Value (258.57, β)		218.5
409					95% Gamma Approximate KM-UCL (use when n>=50)	1.732				95% Gamma Adjusted KM-UCL (use when n<50)		1.762
410												
411	**Lognormal GOF Test on Detected Observations Only**											
412					Shapiro Wilk Test Statistic	0.92	**Shapiro Wilk GOF Test**					
413					5% Shapiro Wilk Critical Value	0.842	Detected Data appear Lognormal at 5% Significance Level					
414					Lilliefors Test Statistic	0.174	**Lilliefors GOF Test**					
415					5% Lilliefors Critical Value	0.262	Detected Data appear Lognormal at 5% Significance Level					
416	**Detected Data appear Lognormal at 5% Significance Level**											

417												
418	**Lognormal ROS Statistics Using Imputed Non-Detects**											
419					Mean in Original Scale	1.475				Mean in Log Scale	0.336	
420					SD in Original Scale	0.504				SD in Log Scale	0.333	
421				95% t UCL (assumes normality of ROS data)		1.696				95% Percentile Bootstrap UCL	1.681	
422					95% BCA Bootstrap UCL	1.702				95% Bootstrap t UCL	1.739	
423					95% H-UCL (Log ROS)	1.741						
424												
425	**Statistics using KM estimates on Logged Data and Assuming Lognormal Distribution**											
426					KM Mean (logged)	0.35				KM Geo Mean	1.419	
427					KM SD (logged)	0.307				95% Critical H Value (KM-Log)	1.876	
428					KM Standard Error of Mean (logged)	0.0808				95% H-UCL (KM -Log)	1.726	
429					KM SD (logged)	0.307				95% Critical H Value (KM-Log)	1.876	
430					KM Standard Error of Mean (logged)	0.0808						
431												
432	**DL/2 Statistics**											
433					**DL/2 Normal**					**DL/2 Log-Transformed**		
434					Mean in Original Scale	1.313				Mean in Log Scale	0.118	
435					SD in Original Scale	0.686				SD in Log Scale	0.6	
436					95% t UCL (Assumes normality)	1.614				95% H-Stat UCL	1.884	
437	**DL/2 is not a recommended method, provided for comparisons and historical reasons**											
438												
439	**Nonparametric Distribution Free UCL Statistics**											
440	**Detected Data appear Normal Distributed at 5% Significance Level**											
441												
442	**Suggested UCL to Use**											
443					95% KM (t) UCL	1.708						
444												
445	Note: Suggestions regarding the selection of a 95% UCL are provided to help the user to select the most appropriate 95% UCL.											
446	Recommendations are based upon data size, data distribution, and skewness.											
447	These recommendations are based upon the results of the simulation studies summarized in Singh, Maichle, and Lee (2006).											
448	However, simulations results will not cover all Real World data sets; for additional insight the user may want to consult a statistician.											
449												
450	**36-008 0-1 ft**											
451												
452	**General Statistics**											
453					Total Number of Observations	57				Number of Distinct Observations	54	
454					Number of Detects	41				Number of Non-Detects	16	
455					Number of Distinct Detects	40				Number of Distinct Non-Detects	15	
456					Minimum Detect	1.34				Minimum Non-Detect	1.15	
457					Maximum Detect	540				Maximum Non-Detect	2.04	
458					Variance Detects	7037				Percent Non-Detects	28.07%	
459					Mean Detects	19.52				SD Detects	83.89	
460					Median Detects	2.87				CV Detects	4.298	
461					Skewness Detects	6.272				Kurtosis Detects	39.81	
462					Mean of Logged Detects	1.441				SD of Logged Detects	1.196	
463												
464	**Normal GOF Test on Detects Only**											
465					Shapiro Wilk Test Statistic	0.219				**Shapiro Wilk GOF Test**		
466					5% Shapiro Wilk Critical Value	0.941				Detected Data Not Normal at 5% Significance Level		
467					Lilliefors Test Statistic	0.425				**Lilliefors GOF Test**		
468					5% Lilliefors Critical Value	0.137				Detected Data Not Normal at 5% Significance Level		

469	**Detected Data Not Normal at 5% Significance Level**											
470												
471	**Kaplan-Meier (KM) Statistics using Normal Critical Values and other Nonparametric UCLs**											
472					KM Mean	14.37			KM Standard Error of Mean	9.488		
473					KM SD	70.76			95% KM (BCA) UCL	34.03		
474					95% KM (t) UCL	30.24			95% KM (Percentile Bootstrap) UCL	33.01		
475					95% KM (z) UCL	29.98			95% KM Bootstrap t UCL	163.3		
476					90% KM Chebyshev UCL	42.84			95% KM Chebyshev UCL	55.73		
477					97.5% KM Chebyshev UCL	73.63			99% KM Chebyshev UCL	108.8		
478												
479	**Gamma GOF Tests on Detected Observations Only**											
480					A-D Test Statistic	7.082			**Anderson-Darling GOF Test**			
481					5% A-D Critical Value	0.83			Detected Data Not Gamma Distributed at 5% Significance Level			
482					K-S Test Statistic	0.321			**Kolmogorov-Smirnov GOF**			
483					5% K-S Critical Value	0.147			Detected Data Not Gamma Distributed at 5% Significance Level			
484	**Detected Data Not Gamma Distributed at 5% Significance Level**											
485												
486	**Gamma Statistics on Detected Data Only**											
487					k hat (MLE)	0.426			k star (bias corrected MLE)	0.411		
488					Theta hat (MLE)	45.86			Theta star (bias corrected MLE)	47.53		
489					nu hat (MLE)	34.9			nu star (bias corrected)	33.68		
490					Mean (detects)	19.52						
491												
492	**Gamma ROS Statistics using Imputed Non-Detects**											
493	GROS may not be used when data set has > 50% NDs with many tied observations at multiple DLs											
494	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)											
495	For such situations, GROS method may yield incorrect values of UCLs and BTVs											
496	This is especially true when the sample size is small.											
497	For gamma distributed detected data, BTVs and UCLs may be computed using gamma distribution on KM estimates											
498					Minimum	0.01			Mean	14.04		
499					Maximum	540			Median	1.99		
500					SD	71.45			CV	5.088		
501					k hat (MLE)	0.246			k star (bias corrected MLE)	0.244		
502					Theta hat (MLE)	57.15			Theta star (bias corrected MLE)	57.44		
503					nu hat (MLE)	28.01			nu star (bias corrected)	27.87		
504					Adjusted Level of Significance (β)	0.0458						
505					Approximate Chi Square Value (27.87, α)	16.83			Adjusted Chi Square Value (27.87, β)	16.61		
506					95% Gamma Approximate UCL (use when n>=50)	23.26			95% Gamma Adjusted UCL (use when n<50)	23.57		
507												
508	**Estimates of Gamma Parameters using KM Estimates**											
509					Mean (KM)	14.37			SD (KM)	70.76		
510					Variance (KM)	5006			SE of Mean (KM)	9.488		
511					k hat (KM)	0.0413			k star (KM)	0.0508		
512					nu hat (KM)	4.704			nu star (KM)	5.79		
513					theta hat (KM)	348.3			theta star (KM)	283		
514					80% gamma percentile (KM)	2.06			90% gamma percentile (KM)	22.39		
515					95% gamma percentile (KM)	76.87			99% gamma percentile (KM)	310.7		
516												
517	**Gamma Kaplan-Meier (KM) Statistics**											
518					Approximate Chi Square Value (5.79, α)	1.534			Adjusted Chi Square Value (5.79, β)	1.478		
519					95% Gamma Approximate KM-UCL (use when n>=50)	54.27			95% Gamma Adjusted KM-UCL (use when n<50)	56.31		
520												

521	**Lognormal GOF Test on Detected Observations Only**											
522					Shapiro Wilk Test Statistic	0.791	**Shapiro Wilk GOF Test**					
523					5% Shapiro Wilk Critical Value	0.941	Detected Data Not Lognormal at 5% Significance Level					
524					Lilliefors Test Statistic	0.187	**Lilliefors GOF Test**					
525					5% Lilliefors Critical Value	0.137	Detected Data Not Lognormal at 5% Significance Level					
526	**Detected Data Not Lognormal at 5% Significance Level**											
527												
528	**Lognormal ROS Statistics Using Imputed Non-Detects**											
529					Mean in Original Scale	14.15	Mean in Log Scale	0.756				
530					SD in Original Scale	71.43	SD in Log Scale	1.503				
531					95% t UCL (assumes normality of ROS data)	29.97	95% Percentile Bootstrap UCL	32.66				
532					95% BCA Bootstrap UCL	52.18	95% Bootstrap t UCL	157.8				
533					95% H-UCL (Log ROS)	12.27						
534												
535	**Statistics using KM estimates on Logged Data and Assuming Lognormal Distribution**											
536					KM Mean (logged)	1.083	KM Geo Mean	2.953				
537					KM SD (logged)	1.155	95% Critical H Value (KM-Log)	2.579				
538					KM Standard Error of Mean (logged)	0.155	95% H-UCL (KM -Log)	8.565				
539					KM SD (logged)	1.155	95% Critical H Value (KM-Log)	2.579				
540					KM Standard Error of Mean (logged)	0.155						
541												
542	**DL/2 Statistics**											
543	**DL/2 Normal**						**DL/2 Log-Transformed**					
544					Mean in Original Scale	14.24	Mean in Log Scale	0.93				
545					SD in Original Scale	71.41	SD in Log Scale	1.307				
546					95% t UCL (Assumes normality)	30.05	95% H-Stat UCL	9.786				
547	**DL/2 is not a recommended method, provided for comparisons and historical reasons**											
548												
549	**Nonparametric Distribution Free UCL Statistics**											
550	**Data do not follow a Discernible Distribution at 5% Significance Level**											
551												
552	**Suggested UCL to Use**											
553					95% KM (Chebyshev) UCL	55.73						
554												
555	Note: Suggestions regarding the selection of a 95% UCL are provided to help the user to select the most appropriate 95% UCL.											
556	Recommendations are based upon data size, data distribution, and skewness.											
557	These recommendations are based upon the results of the simulation studies summarized in Singh, Maichle, and Lee (2006).											
558	However, simulations results will not cover all Real World data sets; for additional insight the user may want to consult a statistician.											
559												
560	**36-008 0-10 ft**											
561												
562	**General Statistics**											
563					Total Number of Observations	107	Number of Distinct Observations	89				
564					Number of Detects	76	Number of Non-Detects	31				
565					Number of Distinct Detects	70	Number of Distinct Non-Detects	24				
566					Minimum Detect	1.01	Minimum Non-Detect	1.04				
567					Maximum Detect	540	Maximum Non-Detect	2.04				
568					Variance Detects	4013	Percent Non-Detects	28.97%				
569					Mean Detects	13.71	SD Detects	63.34				
570					Median Detects	2.41	CV Detects	4.621				
571					Skewness Detects	7.939	Kurtosis Detects	65.88				
572					Mean of Logged Detects	1.211	SD of Logged Detects	1.122				

	A	B	C	D	E	F	G	H	I	J	K	L
573												
574	**Normal GOF Test on Detects Only**											
575					Shapiro Wilk Test Statistic	0.205	**Normal GOF Test on Detected Observations Only**					
576					5% Shapiro Wilk P Value	0	Detected Data Not Normal at 5% Significance Level					
577					Lilliefors Test Statistic	0.421	**Lilliefors GOF Test**					
578					5% Lilliefors Critical Value	0.102	Detected Data Not Normal at 5% Significance Level					
579	**Detected Data Not Normal at 5% Significance Level**											
580												
581	**Kaplan-Meier (KM) Statistics using Normal Critical Values and other Nonparametric UCLs**											
582					KM Mean	10.04	KM Standard Error of Mean	5.191				
583					KM SD	53.34	95% KM (BCA) UCL	19.83				
584					95% KM (t) UCL	18.66	95% KM (Percentile Bootstrap) UCL	19.73				
585					95% KM (z) UCL	18.58	95% KM Bootstrap t UCL	65.68				
586					90% KM Chebyshev UCL	25.62	95% KM Chebyshev UCL	32.67				
587					97.5% KM Chebyshev UCL	42.46	99% KM Chebyshev UCL	61.69				
588												
589	**Gamma GOF Tests on Detected Observations Only**											
590					A-D Test Statistic	13.14	**Anderson-Darling GOF Test**					
591					5% A-D Critical Value	0.828	Detected Data Not Gamma Distributed at 5% Significance Level					
592					K-S Test Statistic	0.343	**Kolmogorov-Smirnov GOF**					
593					5% K-S Critical Value	0.109	Detected Data Not Gamma Distributed at 5% Significance Level					
594	**Detected Data Not Gamma Distributed at 5% Significance Level**											
595												
596	**Gamma Statistics on Detected Data Only**											
597					k hat (MLE)	0.458	k star (bias corrected MLE)	0.449				
598					Theta hat (MLE)	29.94	Theta star (bias corrected MLE)	30.56				
599					nu hat (MLE)	69.6	nu star (bias corrected)	68.18				
600					Mean (detects)	13.71						
601												
602	**Gamma ROS Statistics using Imputed Non-Detects**											
603	GROS may not be used when data set has > 50% NDs with many tied observations at multiple DLs											
604	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)											
605	For such situations, GROS method may yield incorrect values of UCLs and BTVs											
606	This is especially true when the sample size is small.											
607	For gamma distributed detected data, BTVs and UCLs may be computed using gamma distribution on KM estimates											
608					Minimum	0.01	Mean	9.739				
609					Maximum	540	Median	1.73				
610					SD	53.65	CV	5.509				
611					k hat (MLE)	0.257	k star (bias corrected MLE)	0.256				
612					Theta hat (MLE)	37.87	Theta star (bias corrected MLE)	38.02				
613					nu hat (MLE)	55.03	nu star (bias corrected)	54.82				
614					Adjusted Level of Significance (β)	0.0478						
615					Approximate Chi Square Value (54.82, α)	38.8	Adjusted Chi Square Value (54.82, β)	38.62				
616					95% Gamma Approximate UCL (use when n>=50)	13.76	95% Gamma Adjusted UCL (use when n<50)	13.82				
617												
618	**Estimates of Gamma Parameters using KM Estimates**											
619					Mean (KM)	10.04	SD (KM)	53.34				
620					Variance (KM)	2845	SE of Mean (KM)	5.191				
621					k hat (KM)	0.0355	k star (KM)	0.0407				
622					nu hat (KM)	7.587	nu star (KM)	8.708				
623					theta hat (KM)	283.3	theta star (KM)	246.8				
624					80% gamma percentile (KM)	0.596	90% gamma percentile (KM)	11.23				

625	95% gamma percentile (KM)					48.65	99% gamma percentile (KM)					236
626												
627	**Gamma Kaplan-Meier (KM) Statistics**											
628	Approximate Chi Square Value (8.71, α)					3.151	Adjusted Chi Square Value (8.71, β)					3.106
629	95% Gamma Approximate KM-UCL (use when n>=50)					27.75	95% Gamma Adjusted KM-UCL (use when n<50)					28.16
630												
631	**Lognormal GOF Test on Detected Observations Only**											
632	Shapiro Wilk Approximate Test Statistic					0.788	**Shapiro Wilk GOF Test**					
633	5% Shapiro Wilk P Value					2.554E-15	Detected Data Not Lognormal at 5% Significance Level					
634	Lilliefors Test Statistic					0.188	**Lilliefors GOF Test**					
635	5% Lilliefors Critical Value					0.102	Detected Data Not Lognormal at 5% Significance Level					
636	**Detected Data Not Lognormal at 5% Significance Level**											
637												
638	**Lognormal ROS Statistics Using Imputed Non-Detects**											
639	Mean in Original Scale					9.866	Mean in Log Scale					0.617
640	SD in Original Scale					53.62	SD in Log Scale					1.338
641	95% t UCL (assumes normality of ROS data)					18.47	95% Percentile Bootstrap UCL					19.54
642	95% BCA Bootstrap UCL					29.39	95% Bootstrap t UCL					63.82
643	95% H-UCL (Log ROS)					6.314						
644												
645	**Statistics using KM estimates on Logged Data and Assuming Lognormal Distribution**											
646	KM Mean (logged)					0.877	KM Geo Mean					2.404
647	KM SD (logged)					1.077	95% Critical H Value (KM-Log)					2.282
648	KM Standard Error of Mean (logged)					0.105	95% H-UCL (KM -Log)					5.448
649	KM SD (logged)					1.077	95% Critical H Value (KM-Log)					2.282
650	KM Standard Error of Mean (logged)					0.105						
651												
652	**DL/2 Statistics**											
653	**DL/2 Normal**						**DL/2 Log-Transformed**					
654	Mean in Original Scale					9.922	Mean in Log Scale					0.73
655	SD in Original Scale					53.61	SD in Log Scale					1.212
656	95% t UCL (Assumes normality)					18.52	95% H-Stat UCL					5.751
657	**DL/2 is not a recommended method, provided for comparisons and historical reasons**											
658												
659	**Nonparametric Distribution Free UCL Statistics**											
660	**Data do not follow a Discernible Distribution at 5% Significance Level**											
661												
662	**Suggested UCL to Use**											
663	95% KM (Chebyshev) UCL					32.67						
664												
665	Note: Suggestions regarding the selection of a 95% UCL are provided to help the user to select the most appropriate 95% UCL.											
666	Recommendations are based upon data size, data distribution, and skewness.											
667	These recommendations are based upon the results of the simulation studies summarized in Singh, Maichle, and Lee (2006).											
668	However, simulations results will not cover all Real World data sets; for additional insight the user may want to consult a statistician.											
669												