

	A	B	C	D	E	F	G	H	I	J	K	L
1	UCL Statistics for Data Sets with Non-Detects											
2												
3	User Selected Options											
4	Date/Time of Computation			8/16/2016 3:46:24 PM								
5	From File			Mercury 006(n) eco.xls								
6	Full Precision			OFF								
7	Confidence Coefficient			95%								
8	Number of Bootstrap Operations			2000								
9												
10	Mercury											
11												
12	General Statistics											
13	Total Number of Observations				7		Number of Distinct Observations				7	
14	Number of Detects				5		Number of Non-Detects				2	
15	Number of Distinct Detects				5		Number of Distinct Non-Detects				2	
16	Minimum Detect				0.0479		Minimum Non-Detect				0.042	
17	Maximum Detect				0.555		Maximum Non-Detect				0.0573	
18	Variance Detects				0.0411		Percent Non-Detects				28.57%	
19	Mean Detects				0.198		SD Detects				0.203	
20	Median Detects				0.124		CV Detects				1.023	
21	Skewness Detects				2.05		Kurtosis Detects				4.427	
22	Mean of Logged Detects				-1.954		SD of Logged Detects				0.878	
23												
24	Note: Sample size is small (e.g., <10), if data are collected using ISM approach, you should use											
25	guidance provided in ITRC Tech Reg Guide on ISM (ITRC, 2012) to compute statistics of interest.											
26	For example, you may want to use Chebyshev UCL to estimate EPC (ITRC, 2012).											
27	Chebyshev UCL can be computed using the Nonparametric and All UCL Options of ProUCL 5.0											
28												
29	Normal GOF Test on Detects Only											
30	Shapiro Wilk Test Statistic				0.713		Shapiro Wilk GOF Test					
31	5% Shapiro Wilk Critical Value				0.762		Detected Data Not Normal at 5% Significance Level					
32	Lilliefors Test Statistic				0.407		Lilliefors GOF Test					
33	5% Lilliefors Critical Value				0.396		Detected Data Not Normal at 5% Significance Level					
34	Detected Data Not Normal at 5% Significance Level											
35												
36	Kaplan-Meier (KM) Statistics using Normal Critical Values and other Nonparametric UCLs											
37	Mean				0.154		Standard Error of Mean				0.0712	
38	SD				0.168		95% KM (BCA) UCL				0.29	
39	95% KM (t) UCL				0.292		95% KM (Percentile Bootstrap) UCL				0.286	
40	95% KM (z) UCL				0.271		95% KM Bootstrap t UCL				0.492	
41	90% KM Chebyshev UCL				0.368		95% KM Chebyshev UCL				0.464	
42	97.5% KM Chebyshev UCL				0.599		99% KM Chebyshev UCL				0.862	
43												
44	Gamma GOF Tests on Detected Observations Only											
45	A-D Test Statistic				0.556		Anderson-Darling GOF Test					
46	5% A-D Critical Value				0.686		Detected data appear Gamma Distributed at 5% Significance Level					
47	K-S Test Statistic				0.35		Kolmogrov-Smirnoff GOF					
48	5% K-S Critical Value				0.361		Detected data appear Gamma Distributed at 5% Significance Level					
49	Detected data appear Gamma Distributed at 5% Significance Level											
50												
51	Gamma Statistics on Detected Data Only											
52	k hat (MLE)				1.636		k star (bias corrected MLE)				0.788	

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53	Theta hat (MLE)					0.121	Theta star (bias corrected MLE)					0.252
54	nu hat (MLE)					16.36	nu star (bias corrected)					7.877
55	MLE Mean (bias corrected)					0.198	MLE Sd (bias corrected)					0.223
56												
57	Gamma Kaplan-Meier (KM) Statistics											
58	k hat (KM)					0.836	nu hat (KM)					11.7
59	Approximate Chi Square Value (11.70, α)					5.029	Adjusted Chi Square Value (11.70, β)					3.794
60	95% Gamma Approximate KM-UCL (use when $n \geq 50$)					0.358	95% Gamma Adjusted KM-UCL (use when $n < 50$)					0.475
61												
62	Gamma ROS Statistics using Imputed Non-Detects											
63	GROS may not be used when data set has > 50% NDs with many tied observations at multiple DLs											
64	GROS may not be used when kstar of detected data is small such as < 0.1											
65	For such situations, GROS method tends to yield inflated values of UCLs and BTVs											
66	For gamma distributed detected data, BTVs and UCLs may be computed using gamma distribution on KM estimates											
67	Minimum					0.01	Mean					0.144
68	Maximum					0.555	Median					0.121
69	SD					0.189	CV					1.311
70	k hat (MLE)					0.768	k star (bias corrected MLE)					0.534
71	Theta hat (MLE)					0.188	Theta star (bias corrected MLE)					0.27
72	nu hat (MLE)					10.76	nu star (bias corrected)					7.48
73	MLE Mean (bias corrected)					0.144	MLE Sd (bias corrected)					0.198
74							Adjusted Level of Significance (β)					0.0158
75	Approximate Chi Square Value (7.48, α)					2.437	Adjusted Chi Square Value (7.48, β)					1.66
76	95% Gamma Approximate UCL (use when $n \geq 50$)					0.443	95% Gamma Adjusted UCL (use when $n < 50$)					0.651
77												
78	Lognormal GOF Test on Detected Observations Only											
79	Shapiro Wilk Test Statistic					0.903	Shapiro Wilk GOF Test					
80	5% Shapiro Wilk Critical Value					0.762	Detected Data appear Lognormal at 5% Significance Level					
81	Lilliefors Test Statistic					0.296	Lilliefors GOF Test					
82	5% Lilliefors Critical Value					0.396	Detected Data appear Lognormal at 5% Significance Level					
83	Detected Data appear Lognormal at 5% Significance Level											
84												
85	Lognormal ROS Statistics Using Imputed Non-Detects											
86	Mean in Original Scale					0.148	Mean in Log Scale					-2.482
87	SD in Original Scale					0.186	SD in Log Scale					1.164
88	95% t UCL (assumes normality of ROS data)					0.285	95% Percentile Bootstrap UCL					0.267
89	95% BCA Bootstrap UCL					0.303	95% Bootstrap t UCL					0.478
90	95% H-UCL (Log ROS)					1.196						
91												
92	UCLs using Lognormal Distribution and KM Estimates when Detected data are Lognormally Distributed											
93	KM Mean (logged)					-2.292	95% H-UCL (KM -Log)					0.457
94	KM SD (logged)					0.853	95% Critical H Value (KM-Log)					3.293
95	KM Standard Error of Mean (logged)					0.361						
96												
97	DL/2 Statistics											
98	DL/2 Normal						DL/2 Log-Transformed					
99	Mean in Original Scale					0.149	Mean in Log Scale					-2.455
100	SD in Original Scale					0.186	SD in Log Scale					1.12
101	95% t UCL (Assumes normality)					0.285	95% H-Stat UCL					1.019
102	DL/2 is not a recommended method, provided for comparisons and historical reasons											
103												
104	Nonparametric Distribution Free UCL Statistics											

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105	Detected Data appear Gamma Distributed at 5% Significance Level											
106												
107	Suggested UCL to Use											
108	95% KM (Chebyshev) UCL					0.464	95% GROS Adjusted Gamma UCL					0.651
109	95% Adjusted Gamma KM-UCL					0.475						
110	Warning: Recommended UCL exceeds the maximum observation											
111												
112	Note: Suggestions regarding the selection of a 95% UCL are provided to help the user to select the most appropriate 95% UCL.											
113	Recommendations are based upon data size, data distribution, and skewness.											
114	These recommendations are based upon the results of the simulation studies summarized in Singh, Maichle, and Lee (2006).											
115	However, simulations results will not cover all Real World data sets; for additional insight the user may want to consult a statistician.											
116												