	A	B	C	D	E	F	G	H	I	J	K	L
1	UCL Statistics for Uncensored Full Data Sets											
2												
3	User Selected Options											
4	Date/Time of Computation			3/2/2015 7:15:11 PM								
5	From File			EPC_013Surf_7.xls								
6	Full Precision			OFF								
7	Confidence Coefficient			95%								
8	Number of Bootstrap Operations			2000								
9												
10												
11	Iron											
12												
13	General Statistics											
14	Total Number of Observations					10	Number of Distinct Observations					10
15							Number of Missing Observations					0
16	Minimum					15858	Mean					23010
17	Maximum					39372	Median					21126
18	SD					6667	Std. Error of Mean					2108
19	Coefficient of Variation					0.29	Skewness					1.848
20												
21	Normal GOF Test											
22	Shapiro Wilk Test Statistic					0.818	Shapiro Wilk GOF Test					
23	5% Shapiro Wilk Critical Value					0.842	Data Not Normal at 5% Significance Level					
24	Lilliefors Test Statistic					0.28	Lilliefors GOF Test					
25	5% Lilliefors Critical Value					0.28	Data Not Normal at 5% Significance Level					
26	Data Not Normal at 5% Significance Level											
27												
28	Assuming Normal Distribution											
29	95% Normal UCL						95% UCLs (Adjusted for Skewness)					
30	95% Student's-t UCL					26875	95% Adjusted-CLT UCL (Chen-1995)					27794
31							95% Modified-t UCL (Johnson-1978)					27080
32												
33	Gamma GOF Test											
34	A-D Test Statistic					0.565	Anderson-Darling Gamma GOF Test					
35	5% A-D Critical Value					0.725	Detected data appear Gamma Distributed at 5% Significance Level					
36	K-S Test Statistic					0.262	Kolmogrov-Smirnoff Gamma GOF Test					
37	5% K-S Critical Value					0.266	Detected data appear Gamma Distributed at 5% Significance Level					
38	Detected data appear Gamma Distributed at 5% Significance Level											
39												
40	Gamma Statistics											
41	k hat (MLE)					16.01	k star (bias corrected MLE)					11.28
42	Theta hat (MLE)					1437	Theta star (bias corrected MLE)					2041
43	nu hat (MLE)					320.3	nu star (bias corrected)					225.5
44	MLE Mean (bias corrected)					23010	MLE Sd (bias corrected)					6852
45							Approximate Chi Square Value (0.05)					191.8
46	Adjusted Level of Significance					0.0267	Adjusted Chi Square Value					186.4
47												
48	Assuming Gamma Distribution											
49	95% Approximate Gamma UCL (use when n>=50)					27061	95% Adjusted Gamma UCL (use when n<50)					27847
50												
51	Lognormal GOF Test											
52	Shapiro Wilk Test Statistic					0.908	Shapiro Wilk Lognormal GOF Test					

	A	B	C	D	E	F	G	H	I	J	K	L
53					5% Shapiro Wilk Critical Value	0.842	Data appear Lognormal at 5% Significance Level					
54					Lilliefors Test Statistic	0.245	**Lilliefors Lognormal GOF Test**					
55					5% Lilliefors Critical Value	0.28	Data appear Lognormal at 5% Significance Level					
56	**Data appear Lognormal at 5% Significance Level**											
57												
58	**Lognormal Statistics**											
59					Minimum of Logged Data	9.671				Mean of logged Data		10.01
60					Maximum of Logged Data	10.58				SD of logged Data		0.254
61												
62	**Assuming Lognormal Distribution**											
63					95% H-UCL	27123				90% Chebyshev (MVUE) UCL		28516
64					95% Chebyshev (MVUE) UCL	31037				97.5% Chebyshev (MVUE) UCL		34536
65					99% Chebyshev (MVUE) UCL	41408						
66												
67	**Nonparametric Distribution Free UCL Statistics**											
68	**Data appear to follow a Discernible Distribution at 5% Significance Level**											
69												
70	**Nonparametric Distribution Free UCLs**											
71					95% CLT UCL	26478				95% Jackknife UCL		26875
72					95% Standard Bootstrap UCL	26333				95% Bootstrap-t UCL		30503
73					95% Hall's Bootstrap UCL	45082				95% Percentile Bootstrap UCL		26680
74					95% BCA Bootstrap UCL	27604						
75					90% Chebyshev(Mean, Sd) UCL	29335				95% Chebyshev(Mean, Sd) UCL		32199
76					97.5% Chebyshev(Mean, Sd) UCL	36176				99% Chebyshev(Mean, Sd) UCL		43986
77												
78	**Suggested UCL to Use**											
79					95% Adjusted Gamma UCL	27847						
80												
81	Note: Suggestions regarding the selection of a 95% UCL are provided to help the user to select the most appropriate 95% UCL.											
82	These recommendations are based upon the results of the simulation studies summarized in Singh, Singh, and Iaci (2002)											
83	and Singh and Singh (2003). However, simulations results will not cover all Real World data sets.											
84	For additional insight the user may want to consult a statistician.											
85												
86												
87	**Silver**											
88												
89	**General Statistics**											
90					Total Number of Observations	10				Number of Distinct Observations		4
91										Number of Missing Observations		0
92					Minimum	0.033				Mean		60.4
93					Maximum	146				Median		50
94					SD	39.43				Std. Error of Mean		12.47
95					Coefficient of Variation	0.653				Skewness		1.149
96												
97	**Normal GOF Test**											
98					Shapiro Wilk Test Statistic	0.756	**Shapiro Wilk GOF Test**					
99					5% Shapiro Wilk Critical Value	0.842	Data Not Normal at 5% Significance Level					
100					Lilliefors Test Statistic	0.404	**Lilliefors GOF Test**					
101					5% Lilliefors Critical Value	0.28	Data Not Normal at 5% Significance Level					
102	**Data Not Normal at 5% Significance Level**											
103												
104	**Assuming Normal Distribution**											

	A	B	C	D	E	F	G	H	I	J	K	L
105	95% Normal UCL						95% UCLs (Adjusted for Skewness)					
106					95% Student's-t UCL	83.26				95% Adjusted-CLT UCL (Chen-1995)		85.75
107										95% Modified-t UCL (Johnson-1978)		84.02
108												
109	Gamma GOF Test											
110					A-D Test Statistic	2.055	Anderson-Darling Gamma GOF Test					
111					5% A-D Critical Value	0.755	Data Not Gamma Distributed at 5% Significance Level					
112					K-S Test Statistic	0.486	Kolmogrov-Smirnoff Gamma GOF Test					
113					5% K-S Critical Value	0.275	Data Not Gamma Distributed at 5% Significance Level					
114	Data Not Gamma Distributed at 5% Significance Level											
115												
116	Gamma Statistics											
117					k hat (MLE)	0.804				k star (bias corrected MLE)		0.63
118					Theta hat (MLE)	75.08				Theta star (bias corrected MLE)		95.91
119					nu hat (MLE)	16.09				nu star (bias corrected)		12.6
120					MLE Mean (bias corrected)	60.4				MLE Sd (bias corrected)		76.11
121										Approximate Chi Square Value (0.05)		5.622
122					Adjusted Level of Significance	0.0267				Adjusted Chi Square Value		4.837
123												
124	Assuming Gamma Distribution											
125					95% Approximate Gamma UCL (use when n>=50))	135.3				95% Adjusted Gamma UCL (use when n<50)		157.3
126												
127	Lognormal GOF Test											
128					Shapiro Wilk Test Statistic	0.491	Shapiro Wilk Lognormal GOF Test					
129					5% Shapiro Wilk Critical Value	0.842	Data Not Lognormal at 5% Significance Level					
130					Lilliefors Test Statistic	0.49	Lilliefors Lognormal GOF Test					
131					5% Lilliefors Critical Value	0.28	Data Not Lognormal at 5% Significance Level					
132	Data Not Lognormal at 5% Significance Level											
133												
134	Lognormal Statistics											
135					Minimum of Logged Data	-3.411				Mean of logged Data		3.364
136					Maximum of Logged Data	4.984				SD of logged Data		2.412
137												
138	Assuming Lognormal Distribution											
139					95% H-UCL	91306				90% Chebyshev (MVUE) UCL		846.1
140					95% Chebyshev (MVUE) UCL	1111				97.5% Chebyshev (MVUE) UCL		1480
141					99% Chebyshev (MVUE) UCL	2203						
142												
143	Nonparametric Distribution Free UCL Statistics											
144	Data do not follow a Discernible Distribution (0.05)											
145												
146	Nonparametric Distribution Free UCLs											
147					95% CLT UCL	80.91				95% Jackknife UCL		83.26
148					95% Standard Bootstrap UCL	N/A				95% Bootstrap-t UCL		N/A
149					95% Hall's Bootstrap UCL	N/A				95% Percentile Bootstrap UCL		N/A
150					95% BCA Bootstrap UCL	N/A						
151					90% Chebyshev(Mean, Sd) UCL	97.81				95% Chebyshev(Mean, Sd) UCL		114.8
152					97.5% Chebyshev(Mean, Sd) UCL	138.3				99% Chebyshev(Mean, Sd) UCL		184.5
153												
154	Suggested UCL to Use											
155					99% Chebyshev (Mean, Sd) UCL	184.5						
156												

	A	B	C	D	E	F	G	H	I	J	K	L
157	Recommended UCL exceeds the maximum observation											
158												
159	Note: Suggestions regarding the selection of a 95% UCL are provided to help the user to select the most appropriate 95% UCL.											
160	These recommendations are based upon the results of the simulation studies summarized in Singh, Singh, and Iaci (2002)											
161	and Singh and Singh (2003). However, simulations results will not cover all Real World data sets.											
162	For additional insight the user may want to consult a statistician.											
163												
164												
165	Uranium-238											
166												
167	General Statistics											
168					Total Number of Observations	10	Number of Distinct Observations				1	
169							Number of Missing Observations				0	
170					Minimum	1.3	Mean				1.3	
171					Maximum	1.3	Median				1.3	
172												
173	Warning: There is only one distinct observation value in this data set - resulting in '0' variance!											
174	ProUCL (or any other software) should not be used on such a data set!											
175	The data set for variable Uranium-238 was not processed!											
176												
177	If possible, compute and collect Data Quality Objectives (DQOs) based sample size and analytical results.											
178	The Project Team may decide to use alternative site specific values to estimate environmental parameters (e.g., EPC, BTV).											
179												
180												
181												
182	Vanadium											
183												
184	General Statistics											
185					Total Number of Observations	10	Number of Distinct Observations				9	
186							Number of Missing Observations				0	
187					Minimum	86	Mean				109	
188					Maximum	145	Median				102	
189					SD	21.67	Std. Error of Mean				6.852	
190					Coefficient of Variation	0.199	Skewness				0.653	
191												
192	Normal GOF Test											
193					Shapiro Wilk Test Statistic	0.871	Shapiro Wilk GOF Test					
194					5% Shapiro Wilk Critical Value	0.842	Data appear Normal at 5% Significance Level					
195					Lilliefors Test Statistic	0.256	Lilliefors GOF Test					
196					5% Lilliefors Critical Value	0.28	Data appear Normal at 5% Significance Level					
197	Data appear Normal at 5% Significance Level											
198												
199	Assuming Normal Distribution											
200	95% Normal UCL						95% UCLs (Adjusted for Skewness)					
201					95% Student's-t UCL	121.6	95% Adjusted-CLT UCL (Chen-1995)				121.8	
202							95% Modified-t UCL (Johnson-1978)				121.8	
203												
204	Gamma GOF Test											
205					A-D Test Statistic	0.593	Anderson-Darling Gamma GOF Test					
206					5% A-D Critical Value	0.724	Detected data appear Gamma Distributed at 5% Significance Level					
207					K-S Test Statistic	0.265	Kolmogrov-Smirnoff Gamma GOF Test					
208					5% K-S Critical Value	0.266	Detected data appear Gamma Distributed at 5% Significance Level					

	A	B	C	D	E	F	G	H	I	J	K	L
209	Detected data appear Gamma Distributed at 5% Significance Level											
210												
211	Gamma Statistics											
212					k hat (MLE)	29.47				k star (bias corrected MLE)		20.7
213					Theta hat (MLE)	3.698				Theta star (bias corrected MLE)		5.266
214					nu hat (MLE)	589.5				nu star (bias corrected)		414
215					MLE Mean (bias corrected)	109				MLE Sd (bias corrected)		23.96
216										Approximate Chi Square Value (0.05)		367.8
217					Adjusted Level of Significance	0.0267				Adjusted Chi Square Value		360.2
218												
219	Assuming Gamma Distribution											
220					95% Approximate Gamma UCL (use when n>=50))	122.7				95% Adjusted Gamma UCL (use when n<50)		125.3
221												
222	Lognormal GOF Test											
223					Shapiro Wilk Test Statistic	0.882				Shapiro Wilk Lognormal GOF Test		
224					5% Shapiro Wilk Critical Value	0.842				Data appear Lognormal at 5% Significance Level		
225					Lilliefors Test Statistic	0.252				Lilliefors Lognormal GOF Test		
226					5% Lilliefors Critical Value	0.28				Data appear Lognormal at 5% Significance Level		
227	Data appear Lognormal at 5% Significance Level											
228												
229	Lognormal Statistics											
230					Minimum of Logged Data	4.454				Mean of logged Data		4.674
231					Maximum of Logged Data	4.977				SD of logged Data		0.193
232												
233	Assuming Lognormal Distribution											
234					95% H-UCL	123.1				90% Chebyshev (MVUE) UCL		128.9
235					95% Chebyshev (MVUE) UCL	138				97.5% Chebyshev (MVUE) UCL		150.5
236					99% Chebyshev (MVUE) UCL	175.2						
237												
238	Nonparametric Distribution Free UCL Statistics											
239	Data appear to follow a Discernible Distribution at 5% Significance Level											
240												
241	Nonparametric Distribution Free UCLs											
242					95% CLT UCL	120.3				95% Jackknife UCL		121.6
243					95% Standard Bootstrap UCL	119.8				95% Bootstrap-t UCL		125
244					95% Hall's Bootstrap UCL	120.7				95% Percentile Bootstrap UCL		120.2
245					95% BCA Bootstrap UCL	121.1						
246					90% Chebyshev(Mean, Sd) UCL	129.6				95% Chebyshev(Mean, Sd) UCL		138.9
247					97.5% Chebyshev(Mean, Sd) UCL	151.8				99% Chebyshev(Mean, Sd) UCL		177.2
248												
249	Suggested UCL to Use											
250					95% Student's-t UCL	121.6						
251												
252	Note: Suggestions regarding the selection of a 95% UCL are provided to help the user to select the most appropriate 95% UCL.											
253	These recommendations are based upon the results of the simulation studies summarized in Singh, Singh, and Iaci (2002)											
254	and Singh and Singh (2003). However, simulations results will not cover all Real World data sets.											
255	For additional insight the user may want to consult a statistician.											
256												