	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 7:19:05 PM								
5	From File			EPC_013Surf_EU02.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					12	Number of Distinct Observations					12
15							Number of Missing Observations					0
16	Minimum					17903	Mean					22708
17	Maximum					30751	Median					21530
18	SD					3931	Std. Error of Mean					1135
19	Coefficient of Variation					0.173	Skewness					1.559
20												
21	Normal GOF Test											
22	Shapiro Wilk Test Statistic					0.75	Shapiro Wilk GOF Test					
23	5% Shapiro Wilk Critical Value					0.859	Data Not Normal at 5% Significance Level					
24	Lilliefors Test Statistic					0.307	Lilliefors GOF Test					
25	5% Lilliefors Critical Value					0.256	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					24745	95% Adjusted-CLT UCL (Chen-1995)					25120
31							95% Modified-t UCL (Johnson-1978)					24831
32												
33	Gamma GOF Test											
34	A-D Test Statistic					1.314	Anderson-Darling Gamma GOF Test					
35	5% A-D Critical Value					0.73	Data Not Gamma Distributed at 5% Significance Level					
36	K-S Test Statistic					0.293	Kolmogrov-Smirnoff Gamma GOF Test					
37	5% K-S Critical Value					0.245	Data Not Gamma Distributed at 5% Significance Level					
38	Data Not Gamma Distributed at 5% Significance Level											
39												
40	Gamma Statistics											
41	k hat (MLE)					41.05	k star (bias corrected MLE)					30.85
42	Theta hat (MLE)					553.1	Theta star (bias corrected MLE)					736.2
43	nu hat (MLE)					985.3	nu star (bias corrected)					740.3
44	MLE Mean (bias corrected)					22708	MLE Sd (bias corrected)					4089
45							Approximate Chi Square Value (0.05)					678.2
46	Adjusted Level of Significance					0.029	Adjusted Chi Square Value					669.1
47												
48	Assuming Gamma Distribution											
49	95% Approximate Gamma UCL (use when n>=50))					24788	95% Adjusted Gamma UCL (use when n<50)					25125
50												
51	Lognormal GOF Test											
52	Shapiro Wilk Test Statistic					0.8	Shapiro Wilk Lognormal GOF Test					

	A	B	C	D	E	F	G	H	I	J	K	L
53					5% Shapiro Wilk Critical Value	0.859		Data Not Lognormal at 5% Significance Level				
54					Lilliefors Test Statistic	0.283		**Lilliefors Lognormal GOF Test**				
55					5% Lilliefors Critical Value	0.256		Data Not Lognormal at 5% Significance Level				
56					**Data Not Lognormal at 5% Significance Level**							
57												
58					**Lognormal Statistics**							
59					Minimum of Logged Data	9.793				Mean of logged Data		10.02
60					Maximum of Logged Data	10.33				SD of logged Data		0.159
61												
62					**Assuming Lognormal Distribution**							
63					95% H-UCL	24777				90% Chebyshev (MVUE) UCL		25822
64					95% Chebyshev (MVUE) UCL	27239				97.5% Chebyshev (MVUE) UCL		29207
65					99% Chebyshev (MVUE) UCL	33071						
66												
67					**Nonparametric Distribution Free UCL Statistics**							
68					**Data do not follow a Discernible Distribution (0.05)**							
69												
70					**Nonparametric Distribution Free UCLs**							
71					95% CLT UCL	24574				95% Jackknife UCL		24745
72					95% Standard Bootstrap UCL	24487				95% Bootstrap-t UCL		27850
73					95% Hall's Bootstrap UCL	39197				95% Percentile Bootstrap UCL		24585
74					95% BCA Bootstrap UCL	25078						
75					90% Chebyshev(Mean, Sd) UCL	26112				95% Chebyshev(Mean, Sd) UCL		27654
76					97.5% Chebyshev(Mean, Sd) UCL	29794				99% Chebyshev(Mean, Sd) UCL		33997
77												
78					**Suggested UCL to Use**							
79					95% Student's-t UCL	24745				or 95% Modified-t UCL		24831
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	**Manganese**											
88												
89					**General Statistics**							
90					Total Number of Observations	12				Number of Distinct Observations		12
91										Number of Missing Observations		0
92					Minimum	456				Mean		928.7
93					Maximum	2156				Median		709
94					SD	569.1				Std. Error of Mean		164.3
95					Coefficient of Variation	0.613				Skewness		1.824
96												
97					**Normal GOF Test**							
98					Shapiro Wilk Test Statistic	0.678		**Shapiro Wilk GOF Test**				
99					5% Shapiro Wilk Critical Value	0.859		Data Not Normal at 5% Significance Level				
100					Lilliefors Test Statistic	0.332		**Lilliefors GOF Test**				
101					5% Lilliefors Critical Value	0.256		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	1224				95% Adjusted-CLT UCL (Chen-1995)		1291
107										95% Modified-t UCL (Johnson-1978)		1238
108												
109	Gamma GOF Test											
110					A-D Test Statistic	1.297	Anderson-Darling Gamma GOF Test					
111					5% A-D Critical Value	0.735	Data Not Gamma Distributed at 5% Significance Level					
112					K-S Test Statistic	0.266	Kolmogrov-Smirnoff Gamma GOF Test					
113					5% K-S Critical Value	0.246	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)	4.154				k star (bias corrected MLE)		3.171
118					Theta hat (MLE)	223.5				Theta star (bias corrected MLE)		292.8
119					nu hat (MLE)	99.71				nu star (bias corrected)		76.11
120					MLE Mean (bias corrected)	928.7				MLE Sd (bias corrected)		521.5
121										Approximate Chi Square Value (0.05)		57.02
122					Adjusted Level of Significance	0.029				Adjusted Chi Square Value		54.5
123												
124	Assuming Gamma Distribution											
125					95% Approximate Gamma UCL (use when n>=50))	1240				95% Adjusted Gamma UCL (use when n<50)		1297
126												
127	Lognormal GOF Test											
128					Shapiro Wilk Test Statistic	0.815	Shapiro Wilk Lognormal GOF Test					
129					5% Shapiro Wilk Critical Value	0.859	Data Not Lognormal at 5% Significance Level					
130					Lilliefors Test Statistic	0.229	Lilliefors Lognormal GOF Test					
131					5% Lilliefors Critical Value	0.256	Data appear Lognormal at 5% Significance Level					
132	Data appear Approximate Lognormal at 5% Significance Level											
133												
134	Lognormal Statistics											
135					Minimum of Logged Data	6.122				Mean of logged Data		6.709
136					Maximum of Logged Data	7.676				SD of logged Data		0.482
137												
138	Assuming Lognormal Distribution											
139					95% H-UCL	1253				90% Chebyshev (MVUE) UCL		1300
140					95% Chebyshev (MVUE) UCL	1476				97.5% Chebyshev (MVUE) UCL		1721
141					99% Chebyshev (MVUE) UCL	2201						
142												
143	Nonparametric Distribution Free UCL Statistics											
144	Data appear to follow a Discernible Distribution at 5% Significance Level											
145												
146	Nonparametric Distribution Free UCLs											
147					95% CLT UCL	1199				95% Jackknife UCL		1224
148					95% Standard Bootstrap UCL	1183				95% Bootstrap-t UCL		1936
149					95% Hall's Bootstrap UCL	2940				95% Percentile Bootstrap UCL		1191
150					95% BCA Bootstrap UCL	1298						
151					90% Chebyshev(Mean, Sd) UCL	1422				95% Chebyshev(Mean, Sd) UCL		1645
152					97.5% Chebyshev(Mean, Sd) UCL	1955				99% Chebyshev(Mean, Sd) UCL		2563
153												
154	Suggested UCL to Use											
155					95% Student's-t UCL	1224				or 95% Modified-t UCL		1238
156												

	A	B	C	D	E	F	G	H	I	J	K	L
157	Note: Suggestions regarding the selection of a 95% UCL are provided to help the user to select the most appropriate 95% UCL.											
158	These recommendations are based upon the results of the simulation studies summarized in Singh, Singh, and Iaci (2002)											
159	and Singh and Singh (2003). However, simulations results will not cover all Real World data sets.											
160	For additional insight the user may want to consult a statistician.											
161												
162												
163	**Uranium-238**											
164												
165	**General Statistics**											
166					Total Number of Observations	12			Number of Distinct Observations			1
167									Number of Missing Observations			0
168					Minimum	1.4			Mean			1.4
169					Maximum	1.4			Median			1.4
170												
171	**Warning: There is only one distinct observation value in this data set - resulting in '0' variance!**											
172	**ProUCL (or any other software) should not be used on such a data set!**											
173	**The data set for variable Uranium-238 was not processed!**											
174												
175	**If possible, compute and collect Data Quality Objectives (DQOs) based sample size and analytical results.**											
176	**The Project Team may decide to use alternative site specific values to estimate environmental parameters (e.g., EPC, BTV).**											
177												
178												
179												
180	**Vanadium**											
181												
182	**General Statistics**											
183					Total Number of Observations	12			Number of Distinct Observations			10
184									Number of Missing Observations			0
185					Minimum	71			Mean			87.83
186					Maximum	108			Median			88
187					SD	11.58			Std. Error of Mean			3.344
188					Coefficient of Variation	0.132			Skewness			0.169
189												
190	**Normal GOF Test**											
191					Shapiro Wilk Test Statistic	0.938			**Shapiro Wilk GOF Test**			
192					5% Shapiro Wilk Critical Value	0.859			Data appear Normal at 5% Significance Level			
193					Lilliefors Test Statistic	0.172			**Lilliefors GOF Test**			
194					5% Lilliefors Critical Value	0.256			Data appear Normal at 5% Significance Level			
195	**Data appear Normal at 5% Significance Level**											
196												
197	**Assuming Normal Distribution**											
198					**95% Normal UCL**				**95% UCLs (Adjusted for Skewness)**			
199					95% Student's-t UCL	93.84			95% Adjusted-CLT UCL (Chen-1995)			93.51
200									95% Modified-t UCL (Johnson-1978)			93.87
201												
202	**Gamma GOF Test**											
203					A-D Test Statistic	0.434			**Anderson-Darling Gamma GOF Test**			
204					5% A-D Critical Value	0.73			Detected data appear Gamma Distributed at 5% Significance Level			
205					K-S Test Statistic	0.191			**Kolmogrov-Smirnoff Gamma GOF Test**			
206					5% K-S Critical Value	0.245			Detected data appear Gamma Distributed at 5% Significance Level			
207	**Detected data appear Gamma Distributed at 5% Significance Level**											
208												

	A	B	C	D	E	F	G	H	I	J	K	L
209						Gamma Statistics						
210					k hat (MLE)	62.8				k star (bias corrected MLE)		47.16
211					Theta hat (MLE)	1.399				Theta star (bias corrected MLE)		1.863
212					nu hat (MLE)	1507				nu star (bias corrected)		1132
213					MLE Mean (bias corrected)	87.83				MLE Sd (bias corrected)		12.79
214										Approximate Chi Square Value (0.05)		1055
215					Adjusted Level of Significance	0.029				Adjusted Chi Square Value		1043
216												
217						Assuming Gamma Distribution						
218				95% Approximate Gamma UCL (use when n>=50))		94.25				95% Adjusted Gamma UCL (use when n<50)		95.28
219												
220						Lognormal GOF Test						
221					Shapiro Wilk Test Statistic	0.939				Shapiro Wilk Lognormal GOF Test		
222					5% Shapiro Wilk Critical Value	0.859				Data appear Lognormal at 5% Significance Level		
223					Lilliefors Test Statistic	0.189				Lilliefors Lognormal GOF Test		
224					5% Lilliefors Critical Value	0.256				Data appear Lognormal at 5% Significance Level		
225						Data appear Lognormal at 5% Significance Level						
226												
227						Lognormal Statistics						
228					Minimum of Logged Data	4.263				Mean of logged Data		4.467
229					Maximum of Logged Data	4.682				SD of logged Data		0.132
230												
231						Assuming Lognormal Distribution						
232					95% H-UCL	94.41				90% Chebyshev (MVUE) UCL		97.9
233					95% Chebyshev (MVUE) UCL	102.5				97.5% Chebyshev (MVUE) UCL		108.8
234					99% Chebyshev (MVUE) UCL	121.2						
235												
236						Nonparametric Distribution Free UCL Statistics						
237						Data appear to follow a Discernible Distribution at 5% Significance Level						
238												
239						Nonparametric Distribution Free UCLs						
240					95% CLT UCL	93.33				95% Jackknife UCL		93.84
241					95% Standard Bootstrap UCL	92.97				95% Bootstrap-t UCL		94.16
242					95% Hall's Bootstrap UCL	93.14				95% Percentile Bootstrap UCL		93.08
243					95% BCA Bootstrap UCL	93						
244					90% Chebyshev(Mean, Sd) UCL	97.86				95% Chebyshev(Mean, Sd) UCL		102.4
245					97.5% Chebyshev(Mean, Sd) UCL	108.7				99% Chebyshev(Mean, Sd) UCL		121.1
246												
247						Suggested UCL to Use						
248					95% Student's-t UCL	93.84						
249												
250						Note: Suggestions regarding the selection of a 95% UCL are provided to help the user to select the most appropriate 95% UCL.						
251						These recommendations are based upon the results of the simulation studies summarized in Singh, Singh, and Iaci (2002)						
252						and Singh and Singh (2003). However, simulations results will not cover all Real World data sets.						
253						For additional insight the user may want to consult a statistician.						
254												