	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			3/1/2015 12:51:07 PM								
5	From File			EPC_204Surf_EU02.xls								
6	Full Precision			OFF								
7	Confidence Coefficient			95%								
8	Number of Bootstrap Operations			2000								
9												
10												
11	Arsenic											
12												
13	General Statistics											
14	Total Number of Observations					11	Number of Distinct Observations					3
15							Number of Missing Observations					0
16	Minimum					6.7	Mean					16.43
17	Maximum					84	Median					10
18	SD					22.43	Std. Error of Mean					6.764
19	Coefficient of Variation					1.366	Skewness					3.305
20												
21	Normal GOF Test											
22	Shapiro Wilk Test Statistic					0.372	Shapiro Wilk GOF Test					
23	5% Shapiro Wilk Critical Value					0.85	Data Not Normal at 5% Significance Level					
24	Lilliefors Test Statistic					0.522	Lilliefors GOF Test					
25	5% Lilliefors Critical Value					0.267	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					28.69	95% Adjusted-CLT UCL (Chen-1995)					34.75
31							95% Modified-t UCL (Johnson-1978)					29.81
32												
33	Gamma GOF Test											
34	A-D Test Statistic					3.295	Anderson-Darling Gamma GOF Test					
35	5% A-D Critical Value					0.741	Data Not Gamma Distributed at 5% Significance Level					
36	K-S Test Statistic					0.531	Kolmogrov-Smirnoff Gamma GOF Test					
37	5% K-S Critical Value					0.259	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)					1.62	k star (bias corrected MLE)					1.239
42	Theta hat (MLE)					10.14	Theta star (bias corrected MLE)					13.26
43	nu hat (MLE)					35.65	nu star (bias corrected)					27.26
44	MLE Mean (bias corrected)					16.43	MLE Sd (bias corrected)					14.76
45							Approximate Chi Square Value (0.05)					16.35
46	Adjusted Level of Significance					0.0278	Adjusted Chi Square Value					14.99
47												
48	Assuming Gamma Distribution											
49	95% Approximate Gamma UCL (use when n>=50))					27.38	95% Adjusted Gamma UCL (use when n<50)					29.87
50												
51	Lognormal GOF Test											
52	Shapiro Wilk Test Statistic					0.454	Shapiro Wilk Lognormal GOF Test					

	A	B	C	D	E	F	G	H	I	J	K	L
53					5% Shapiro Wilk Critical Value	0.85	Data Not Lognormal at 5% Significance Level					
54					Lilliefors Test Statistic	0.502	**Lilliefors Lognormal GOF Test**					
55					5% Lilliefors Critical Value	0.267	Data Not Lognormal at 5% Significance Level					
56	**Data Not Lognormal at 5% Significance Level**											
57												
58	**Lognormal Statistics**											
59					Minimum of Logged Data	1.902	Mean of logged Data					2.46
60					Maximum of Logged Data	4.431	SD of logged Data					0.665
61												
62	**Assuming Lognormal Distribution**											
63					95% H-UCL	24.22	90% Chebyshev (MVUE) UCL					23.12
64					95% Chebyshev (MVUE) UCL	27.13	97.5% Chebyshev (MVUE) UCL					32.71
65					99% Chebyshev (MVUE) UCL	43.65						
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	27.55	95% Jackknife UCL					28.69
72					95% Standard Bootstrap UCL	N/A	95% Bootstrap-t UCL					N/A
73					95% Hall's Bootstrap UCL	N/A	95% Percentile Bootstrap UCL					N/A
74					95% BCA Bootstrap UCL	N/A						
75					90% Chebyshev(Mean, Sd) UCL	36.72	95% Chebyshev(Mean, Sd) UCL					45.91
76					97.5% Chebyshev(Mean, Sd) UCL	58.67	99% Chebyshev(Mean, Sd) UCL					83.73
77												
78	**Suggested UCL to Use**											
79					95% Chebyshev (Mean, Sd) UCL	45.91						
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	**Chromium**											
88												
89	**General Statistics**											
90					Total Number of Observations	11	Number of Distinct Observations					2
91							Number of Missing Observations					0
92					Minimum	12	Mean					14.27
93					Maximum	37	Median					12
94					SD	7.538	Std. Error of Mean					2.273
95					Coefficient of Variation	0.528	Skewness					3.317
96												
97	**Normal GOF Test**											
98					Shapiro Wilk Test Statistic	0.345	**Shapiro Wilk GOF Test**					
99					5% Shapiro Wilk Critical Value	0.85	Data Not Normal at 5% Significance Level					
100					Lilliefors Test Statistic	0.528	**Lilliefors GOF Test**					
101					5% Lilliefors Critical Value	0.267	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	18.39				95% Adjusted-CLT UCL (Chen-1995)		20.44
107										95% Modified-t UCL (Johnson-1978)		18.77
108												
109	Gamma GOF Test											
110					A-D Test Statistic	3.71	Anderson-Darling Gamma GOF Test					
111					5% A-D Critical Value	0.731	Data Not Gamma Distributed at 5% Significance Level					
112					K-S Test Statistic	0.537	Kolmogrov-Smirnoff Gamma GOF Test					
113					5% K-S Critical Value	0.256	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)	7.197				k star (bias corrected MLE)		5.295
118					Theta hat (MLE)	1.983				Theta star (bias corrected MLE)		2.696
119					nu hat (MLE)	158.3				nu star (bias corrected)		116.5
120					MLE Mean (bias corrected)	14.27				MLE Sd (bias corrected)		6.203
121										Approximate Chi Square Value (0.05)		92.57
122					Adjusted Level of Significance	0.0278				Adjusted Chi Square Value		89.09
123												
124	Assuming Gamma Distribution											
125					95% Approximate Gamma UCL (use when n>=50))	17.96				95% Adjusted Gamma UCL (use when n<50)		18.66
126												
127	Lognormal GOF Test											
128					Shapiro Wilk Test Statistic	0.345	Shapiro Wilk Lognormal GOF Test					
129					5% Shapiro Wilk Critical Value	0.85	Data Not Lognormal at 5% Significance Level					
130					Lilliefors Test Statistic	0.528	Lilliefors Lognormal GOF Test					
131					5% Lilliefors Critical Value	0.267	Data Not Lognormal at 5% Significance Level					
132	Data Not Lognormal at 5% Significance Level											
133												
134	Lognormal Statistics											
135					Minimum of Logged Data	2.485				Mean of logged Data		2.587
136					Maximum of Logged Data	3.611				SD of logged Data		0.34
137												
138	Assuming Lognormal Distribution											
139					95% H-UCL	17.43				90% Chebyshev (MVUE) UCL		18.35
140					95% Chebyshev (MVUE) UCL	20.32				97.5% Chebyshev (MVUE) UCL		23.05
141					99% Chebyshev (MVUE) UCL	28.42						
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	18.01				95% Jackknife UCL		N/A
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	21.09				95% Chebyshev(Mean, Sd) UCL		24.18
152					97.5% Chebyshev(Mean, Sd) UCL	28.47				99% Chebyshev(Mean, Sd) UCL		36.89
153												
154	Suggested UCL to Use											
155					95% Student's-t UCL	18.39				or 95% Modified-t UCL		18.77
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	PAH, Total											
164												
165	General Statistics											
166	Total Number of Observations					11	Number of Distinct Observations					1
167							Number of Missing Observations					0
168	Minimum					0.062	Mean					0.062
169	Maximum					0.062	Median					0.062
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 PAH, Total 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	Uranium-238											
181												
182	General Statistics											
183	Total Number of Observations					11	Number of Distinct Observations					1
184							Number of Missing Observations					0
185	Minimum					3.92	Mean					3.92
186	Maximum					3.92	Median					3.92
187												
188	Warning: There is only one distinct observation value in this data set - resulting in '0' variance!											
189	ProUCL (or any other software) should not be used on such a data set!											
190	The data set for variable Uranium-238 was not processed!											
191												
192	If possible, compute and collect Data Quality Objectives (DQOs) based sample size and analytical results.											
193	The Project Team may decide to use alternative site specific values to estimate environmental parameters (e.g., EPC, BTV).											
194												
195												
196												
197	Vanadium											
198												
199	General Statistics											
200	Total Number of Observations					11	Number of Distinct Observations					10
201							Number of Missing Observations					0
202	Minimum					90	Mean					113.2
203	Maximum					132	Median					116
204	SD					12.87	Std. Error of Mean					3.88
205	Coefficient of Variation					0.114	Skewness					-0.408
206												
207	Normal GOF Test											
208	Shapiro Wilk Test Statistic					0.966	Shapiro Wilk GOF Test					

	A	B	C	D	E	F	G	H	I	J	K	L
209					5% Shapiro Wilk Critical Value	0.85		Data appear Normal at 5% Significance Level				
210					Lilliefors Test Statistic	0.132		**Lilliefors GOF Test**				
211					5% Lilliefors Critical Value	0.267		Data appear Normal at 5% Significance Level				
212					**Data appear Normal at 5% Significance Level**							
213												
214					**Assuming Normal Distribution**							
215				**95% Normal UCL**				**95% UCLs (Adjusted for Skewness)**				
216					95% Student's-t UCL	120.2				95% Adjusted-CLT UCL (Chen-1995)		119.1
217										95% Modified-t UCL (Johnson-1978)		120.1
218												
219					**Gamma GOF Test**							
220					A-D Test Statistic	0.252		**Anderson-Darling Gamma GOF Test**				
221					5% A-D Critical Value	0.727		Detected data appear Gamma Distributed at 5% Significance Level				
222					K-S Test Statistic	0.148		**Kolmogrov-Smirnoff Gamma GOF Test**				
223					5% K-S Critical Value	0.255		Detected data appear Gamma Distributed at 5% Significance Level				
224					**Detected data appear Gamma Distributed at 5% Significance Level**							
225												
226					**Gamma Statistics**							
227					k hat (MLE)	82.02				k star (bias corrected MLE)		59.71
228					Theta hat (MLE)	1.38				Theta star (bias corrected MLE)		1.895
229					nu hat (MLE)	1805				nu star (bias corrected)		1314
230					MLE Mean (bias corrected)	113.2				MLE Sd (bias corrected)		14.65
231										Approximate Chi Square Value (0.05)		1231
232					Adjusted Level of Significance	0.0278				Adjusted Chi Square Value		1217
233												
234					**Assuming Gamma Distribution**							
235					95% Approximate Gamma UCL (use when n>=50))	120.8				95% Adjusted Gamma UCL (use when n<50)		122.1
236												
237					**Lognormal GOF Test**							
238					Shapiro Wilk Test Statistic	0.952		**Shapiro Wilk Lognormal GOF Test**				
239					5% Shapiro Wilk Critical Value	0.85		Data appear Lognormal at 5% Significance Level				
240					Lilliefors Test Statistic	0.149		**Lilliefors Lognormal GOF Test**				
241					5% Lilliefors Critical Value	0.267		Data appear Lognormal at 5% Significance Level				
242					**Data appear Lognormal at 5% Significance Level**							
243												
244					**Lognormal Statistics**							
245					Minimum of Logged Data	4.5				Mean of logged Data		4.723
246					Maximum of Logged Data	4.883				SD of logged Data		0.117
247												
248					**Assuming Lognormal Distribution**							
249					95% H-UCL	121.1				90% Chebyshev (MVUE) UCL		125.2
250					95% Chebyshev (MVUE) UCL	130.6				97.5% Chebyshev (MVUE) UCL		138.2
251					99% Chebyshev (MVUE) UCL	153						
252												
253					**Nonparametric Distribution Free UCL Statistics**							
254					**Data appear to follow a Discernible Distribution at 5% Significance Level**							
255												
256					**Nonparametric Distribution Free UCLs**							
257					95% CLT UCL	119.6				95% Jackknife UCL		120.2
258					95% Standard Bootstrap UCL	119.2				95% Bootstrap-t UCL		119.5
259					95% Hall's Bootstrap UCL	119.4				95% Percentile Bootstrap UCL		118.9
260					95% BCA Bootstrap UCL	118.8						

	A	B	C	D	E	F	G	H	I	J	K	L
261					90% Chebyshev(Mean, Sd) UCL	124.8				95% Chebyshev(Mean, Sd) UCL		130.1
262					97.5% Chebyshev(Mean, Sd) UCL	137.4				99% Chebyshev(Mean, Sd) UCL		151.8
263												
264					**Suggested UCL to Use**							
265					95% Student's-t UCL	120.2						
266												
267	Note: Suggestions regarding the selection of a 95% UCL are provided to help the user to select the most appropriate 95% UCL.											
268	These recommendations are based upon the results of the simulation studies summarized in Singh, Singh, and Iaci (2002)											
269	and Singh and Singh (2003). However, simulations results will not cover all Real World data sets.											
270	For additional insight the user may want to consult a statistician.											
271												
272	**Note: For highly negatively-skewed data, confidence limits (e.g., Chen, Johnson, Lognormal, and Gamma) may not be**											
273	**reliable. Chen's and Johnson's methods provide adjustments for positvely skewed data sets.**											
274												