	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 7:13:39 PM								
5	From File			EPC_013Surf_9.xls								
6	Full Precision			OFF								
7	Confidence Coefficient			95%								
8	Number of Bootstrap Operations			2000								
9												
10												
11	**Chromium**											
12												
13	**General Statistics**											
14	Total Number of Observations					12	Number of Distinct Observations					2
15							Number of Missing Observations					0
16	Minimum					12	Mean					12.83
17	Maximum					22	Median					12
18	SD					2.887	Std. Error of Mean					0.833
19	Coefficient of Variation					0.225	Skewness					3.464
20												
21	**Normal GOF Test**											
22	Shapiro Wilk Test Statistic					0.327	**Shapiro Wilk GOF Test**					
23	5% Shapiro Wilk Critical Value					0.859	Data Not Normal at 5% Significance Level					
24	Lilliefors Test Statistic					0.53	**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					14.33	95% Adjusted-CLT UCL (Chen-1995)					15.09
31							95% Modified-t UCL (Johnson-1978)					14.47
32												
33	**Gamma GOF Test**											
34	A-D Test Statistic					4.09	**Anderson-Darling Gamma GOF Test**					
35	5% A-D Critical Value					0.731	Data Not Gamma Distributed at 5% Significance Level					
36	K-S Test Statistic					0.536	**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)					30.24	k star (bias corrected MLE)					22.73
42	Theta hat (MLE)					0.424	Theta star (bias corrected MLE)					0.565
43	nu hat (MLE)					725.7	nu star (bias corrected)					545.6
44	MLE Mean (bias corrected)					12.83	MLE Sd (bias corrected)					2.692
45							Approximate Chi Square Value (0.05)					492.4
46	Adjusted Level of Significance					0.029	Adjusted Chi Square Value					484.7
47												
48	**Assuming Gamma Distribution**											
49	95% Approximate Gamma UCL (use when n>=50))					14.22	95% Adjusted Gamma UCL (use when n<50)					14.45
50												
51	**Lognormal GOF Test**											
52	Shapiro Wilk Test Statistic					0.327	**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	0.53		**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	2.485				Mean of logged Data		2.535
60					Maximum of Logged Data	3.091				SD of logged Data		0.175
61												
62					**Assuming Lognormal Distribution**							
63					95% H-UCL	14.11				90% Chebyshev (MVUE) UCL		14.75
64					95% Chebyshev (MVUE) UCL	15.63				97.5% Chebyshev (MVUE) UCL		16.85
65					99% Chebyshev (MVUE) UCL	19.25						
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	14.2				95% Jackknife UCL		N/A
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	15.33				95% Chebyshev(Mean, Sd) UCL		16.47
76					97.5% Chebyshev(Mean, Sd) UCL	18.04				99% Chebyshev(Mean, Sd) UCL		21.12
77												
78					**Suggested UCL to Use**							
79					95% Student's-t UCL	14.33				or 95% Modified-t UCL		14.47
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	**Neptunium-237**											
88												
89					**General Statistics**							
90					Total Number of Observations	12				Number of Distinct Observations		3
91										Number of Missing Observations		0
92					Minimum	0.0174				Mean		0.454
93					Maximum	0.89				Median		0.454
94					SD	0.186				Std. Error of Mean		0.0537
95					Coefficient of Variation	0.41				Skewness		0
96												
97					**Normal GOF Test**							
98					Shapiro Wilk Test Statistic	0.6		**Shapiro Wilk GOF Test**				
99					5% Shapiro Wilk Critical Value	0.859		Data Not Normal at 5% Significance Level				
100					Lilliefors Test Statistic	0.417		**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	0.55				95% Adjusted-CLT UCL (Chen-1995)		0.542
107										95% Modified-t UCL (Johnson-1978)		0.55
108												
109	Gamma GOF Test											
110					A-D Test Statistic	3.116	Anderson-Darling Gamma GOF Test					
111					5% A-D Critical Value	0.74	Data Not Gamma Distributed at 5% Significance Level					
112					K-S Test Statistic	0.501	Kolmogrov-Smirnoff Gamma GOF Test					
113					5% K-S Critical Value	0.248	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)	2.473				k star (bias corrected MLE)		1.91
118					Theta hat (MLE)	0.183				Theta star (bias corrected MLE)		0.237
119					nu hat (MLE)	59.35				nu star (bias corrected)		45.85
120					MLE Mean (bias corrected)	0.454				MLE Sd (bias corrected)		0.328
121										Approximate Chi Square Value (0.05)		31.31
122					Adjusted Level of Significance	0.029				Adjusted Chi Square Value		29.49
123												
124	Assuming Gamma Distribution											
125					95% Approximate Gamma UCL (use when n>=50))	0.664				95% Adjusted Gamma UCL (use when n<50)		0.705
126												
127	Lognormal GOF Test											
128					Shapiro Wilk Test Statistic	0.441	Shapiro Wilk Lognormal GOF Test					
129					5% Shapiro Wilk Critical Value	0.859	Data Not Lognormal at 5% Significance Level					
130					Lilliefors Test Statistic	0.504	Lilliefors Lognormal GOF Test					
131					5% Lilliefors Critical Value	0.256	Data Not Lognormal at 5% Significance Level					
132	Data Not Lognormal at 5% Significance Level											
133												
134	Lognormal Statistics											
135					Minimum of Logged Data	-4.051				Mean of logged Data		-1.006
136					Maximum of Logged Data	-0.117				SD of logged Data		0.978
137												
138	Assuming Lognormal Distribution											
139					95% H-UCL	1.379				90% Chebyshev (MVUE) UCL		1.065
140					95% Chebyshev (MVUE) UCL	1.295				97.5% Chebyshev (MVUE) UCL		1.613
141					99% Chebyshev (MVUE) UCL	2.238						
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	0.542				95% Jackknife UCL		0.55
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	0.615				95% Chebyshev(Mean, Sd) UCL		0.688
152					97.5% Chebyshev(Mean, Sd) UCL	0.789				99% Chebyshev(Mean, Sd) UCL		0.988
153												
154	Suggested UCL to Use											
155					95% Chebyshev (Mean, Sd) UCL	0.688						
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					12	Number of Distinct Observations				1	
167							Number of Missing Observations				0	
168	Minimum					0.0265	Mean				0.0265	
169	Maximum					0.0265	Median				0.0265	
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					12	Number of Distinct Observations				3	
184							Number of Missing Observations				0	
185	Minimum					0.92	Mean				3.5	
186	Maximum					6.08	Median				3.5	
187	SD					1.1	Std. Error of Mean				0.318	
188	Coefficient of Variation					0.314	Skewness				0	
189												
190	**Normal GOF Test**											
191	Shapiro Wilk Test Statistic					0.6	**Shapiro Wilk GOF Test**					
192	5% Shapiro Wilk Critical Value					0.859	Data Not Normal at 5% Significance Level					
193	Lilliefors Test Statistic					0.417	**Lilliefors GOF Test**					
194	5% Lilliefors Critical Value					0.256	Data Not Normal at 5% Significance Level					
195	**Data Not 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					4.07	95% Adjusted-CLT UCL (Chen-1995)				4.022	
200							95% Modified-t UCL (Johnson-1978)				4.07	
201												
202	**Gamma GOF Test**											
203	A-D Test Statistic					2.837	**Anderson-Darling Gamma GOF Test**					
204	5% A-D Critical Value					0.731	Data Not Gamma Distributed at 5% Significance Level					
205	K-S Test Statistic					0.464	**Kolmogrov-Smirnoff Gamma GOF Test**					
206	5% K-S Critical Value					0.246	Data Not Gamma Distributed at 5% Significance Level					
207	**Data Not 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)	7.817				k star (bias corrected MLE)		5.918
211					Theta hat (MLE)	0.448				Theta star (bias corrected MLE)		0.591
212					nu hat (MLE)	187.6				nu star (bias corrected)		142
213					MLE Mean (bias corrected)	3.5				MLE Sd (bias corrected)		1.439
214										Approximate Chi Square Value (0.05)		115.5
215					Adjusted Level of Significance	0.029				Adjusted Chi Square Value		111.8
216												
217						Assuming Gamma Distribution						
218				95% Approximate Gamma UCL (use when n>=50))		4.304				95% Adjusted Gamma UCL (use when n<50)		4.445
219												
220						Lognormal GOF Test						
221					Shapiro Wilk Test Statistic	0.524				Shapiro Wilk Lognormal GOF Test		
222					5% Shapiro Wilk Critical Value	0.859				Data Not Lognormal at 5% Significance Level		
223					Lilliefors Test Statistic	0.477				Lilliefors Lognormal GOF Test		
224					5% Lilliefors Critical Value	0.256				Data Not Lognormal at 5% Significance Level		
225						Data Not Lognormal at 5% Significance Level						
226												
227						Lognormal Statistics						
228					Minimum of Logged Data	-0.0834				Mean of logged Data		1.187
229					Maximum of Logged Data	1.805				SD of logged Data		0.431
230												
231						Assuming Lognormal Distribution						
232					95% H-UCL	4.7				90% Chebyshev (MVUE) UCL		4.922
233					95% Chebyshev (MVUE) UCL	5.535				97.5% Chebyshev (MVUE) UCL		6.386
234					99% Chebyshev (MVUE) UCL	8.059						
235												
236						Nonparametric Distribution Free UCL Statistics						
237						Data do not follow a Discernible Distribution (0.05)						
238												
239						Nonparametric Distribution Free UCLs						
240					95% CLT UCL	4.022				95% Jackknife UCL		4.07
241					95% Standard Bootstrap UCL	N/A				95% Bootstrap-t UCL		N/A
242					95% Hall's Bootstrap UCL	N/A				95% Percentile Bootstrap UCL		N/A
243					95% BCA Bootstrap UCL	N/A						
244					90% Chebyshev(Mean, Sd) UCL	4.453				95% Chebyshev(Mean, Sd) UCL		4.884
245					97.5% Chebyshev(Mean, Sd) UCL	5.483				99% Chebyshev(Mean, Sd) UCL		6.66
246												
247						Suggested UCL to Use						
248					95% Student's-t UCL	4.07				or 95% Modified-t UCL		4.07
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												
255												
256	Vanadium											
257												
258						General Statistics						
259					Total Number of Observations	12				Number of Distinct Observations		10
260										Number of Missing Observations		0

	A	B	C	D	E	F	G	H	I	J	K	L
261					Minimum	80					Mean	103.9
262					Maximum	149					Median	89.5
263					SD	24.43					Std. Error of Mean	7.053
264					Coefficient of Variation	0.235					Skewness	0.942
265												
266					Normal GOF Test							
267					Shapiro Wilk Test Statistic	0.832	Shapiro Wilk GOF Test					
268					5% Shapiro Wilk Critical Value	0.859	Data Not Normal at 5% Significance Level					
269					Lilliefors Test Statistic	0.285	Lilliefors GOF Test					
270					5% Lilliefors Critical Value	0.256	Data Not Normal at 5% Significance Level					
271					Data Not Normal at 5% Significance Level							
272												
273					Assuming Normal Distribution							
274			95% Normal UCL				95% UCLs (Adjusted for Skewness)					
275					95% Student's-t UCL	116.6					95% Adjusted-CLT UCL (Chen-1995)	117.6
276											95% Modified-t UCL (Johnson-1978)	116.9
277												
278					Gamma GOF Test							
279					A-D Test Statistic	0.857	Anderson-Darling Gamma GOF Test					
280					5% A-D Critical Value	0.732	Data Not Gamma Distributed at 5% Significance Level					
281					K-S Test Statistic	0.285	Kolmogrov-Smirnoff Gamma GOF Test					
282					5% K-S Critical Value	0.245	Data Not Gamma Distributed at 5% Significance Level					
283					Data Not Gamma Distributed at 5% Significance Level							
284												
285					Gamma Statistics							
286					k hat (MLE)	21.56					k star (bias corrected MLE)	16.23
287					Theta hat (MLE)	4.819					Theta star (bias corrected MLE)	6.403
288					nu hat (MLE)	517.5					nu star (bias corrected)	389.5
289					MLE Mean (bias corrected)	103.9					MLE Sd (bias corrected)	25.8
290											Approximate Chi Square Value (0.05)	344.7
291					Adjusted Level of Significance	0.029					Adjusted Chi Square Value	338.3
292												
293					Assuming Gamma Distribution							
294					95% Approximate Gamma UCL (use when n>=50))	117.4					95% Adjusted Gamma UCL (use when n<50)	119.6
295												
296					Lognormal GOF Test							
297					Shapiro Wilk Test Statistic	0.855	Shapiro Wilk Lognormal GOF Test					
298					5% Shapiro Wilk Critical Value	0.859	Data Not Lognormal at 5% Significance Level					
299					Lilliefors Test Statistic	0.273	Lilliefors Lognormal GOF Test					
300					5% Lilliefors Critical Value	0.256	Data Not Lognormal at 5% Significance Level					
301					Data Not Lognormal at 5% Significance Level							
302												
303					Lognormal Statistics							
304					Minimum of Logged Data	4.382					Mean of logged Data	4.62
305					Maximum of Logged Data	5.004					SD of logged Data	0.221
306												
307					Assuming Lognormal Distribution							
308					95% H-UCL	117.8					90% Chebyshev (MVUE) UCL	123.8
309					95% Chebyshev (MVUE) UCL	132.9					97.5% Chebyshev (MVUE) UCL	145.4
310					99% Chebyshev (MVUE) UCL	170.1						
311												
312					Nonparametric Distribution Free UCL Statistics							

	A	B	C	D	E	F	G	H	I	J	K	L
313	Data do not follow a Discernible Distribution (0.05)											
314												
315	Nonparametric Distribution Free UCLs											
316					95% CLT UCL	115.5				95% Jackknife UCL		116.6
317					95% Standard Bootstrap UCL	115.3				95% Bootstrap-t UCL		118.9
318					95% Hall's Bootstrap UCL	117.9				95% Percentile Bootstrap UCL		115.9
319					95% BCA Bootstrap UCL	116.3						
320					90% Chebyshev(Mean, Sd) UCL	125.1				95% Chebyshev(Mean, Sd) UCL		134.7
321					97.5% Chebyshev(Mean, Sd) UCL	148				99% Chebyshev(Mean, Sd) UCL		174.1
322												
323	Suggested UCL to Use											
324					95% Student's-t UCL	116.6				or 95% Modified-t UCL		116.9
325												
326	Note: Suggestions regarding the selection of a 95% UCL are provided to help the user to select the most appropriate 95% UCL.											
327	These recommendations are based upon the results of the simulation studies summarized in Singh, Singh, and Iaci (2002)											
328	and Singh and Singh (2003). However, simulations results will not cover all Real World data sets.											
329	For additional insight the user may want to consult a statistician.											
330												