	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 7:14:34 PM								
5	From File			EPC_013Surf_8.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					15	Number of Distinct Observations					15
15							Number of Missing Observations					0
16	Minimum					17679	Mean					22458
17	Maximum					31310	Median					21226
18	SD					3636	Std. Error of Mean					938.8
19	Coefficient of Variation					0.162	Skewness					1.043
20												
21	**Normal GOF Test**											
22	Shapiro Wilk Test Statistic					0.929	**Shapiro Wilk GOF Test**					
23	5% Shapiro Wilk Critical Value					0.881	Data appear Normal at 5% Significance Level					
24	Lilliefors Test Statistic					0.166	**Lilliefors GOF Test**					
25	5% Lilliefors Critical Value					0.229	Data appear Normal at 5% Significance Level					
26	**Data appear 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					24112	95% Adjusted-CLT UCL (Chen-1995)					24273
31							95% Modified-t UCL (Johnson-1978)					24154
32												
33	**Gamma GOF Test**											
34	A-D Test Statistic					0.298	**Anderson-Darling Gamma GOF Test**					
35	5% A-D Critical Value					0.734	Detected data appear Gamma Distributed at 5% Significance Level					
36	K-S Test Statistic					0.159	**Kolmogrov-Smirnoff Gamma GOF Test**					
37	5% K-S Critical Value					0.221	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)					43.8	k star (bias corrected MLE)					35.08
42	Theta hat (MLE)					512.7	Theta star (bias corrected MLE)					640.1
43	nu hat (MLE)					1314	nu star (bias corrected)					1053
44	MLE Mean (bias corrected)					22458	MLE Sd (bias corrected)					3792
45							Approximate Chi Square Value (0.05)					978.2
46	Adjusted Level of Significance					0.0324	Adjusted Chi Square Value					969.4
47												
48	**Assuming Gamma Distribution**											
49	95% Approximate Gamma UCL (use when n>=50))					24164	95% Adjusted Gamma UCL (use when n<50)					24384
50												
51	**Lognormal GOF Test**											
52	Shapiro Wilk Test Statistic					0.963	**Shapiro Wilk Lognormal GOF Test**					

	A	B	C	D	E	F	G	H	I	J	K	L
53					5% Shapiro Wilk Critical Value	0.881	Data appear Lognormal at 5% Significance Level					
54					Lilliefors Test Statistic	0.148	**Lilliefors Lognormal GOF Test**					
55					5% Lilliefors Critical Value	0.229	Data appear Lognormal at 5% Significance Level					
56	**Data appear Lognormal at 5% Significance Level**											
57												
58	**Lognormal Statistics**											
59					Minimum of Logged Data	9.78				Mean of logged Data		10.01
60					Maximum of Logged Data	10.35				SD of logged Data		0.154
61												
62	**Assuming Lognormal Distribution**											
63					95% H-UCL	24181				90% Chebyshev (MVUE) UCL		25144
64					95% Chebyshev (MVUE) UCL	26365				97.5% Chebyshev (MVUE) UCL		28058
65					99% Chebyshev (MVUE) UCL	31385						
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	24002				95% Jackknife UCL		24112
72					95% Standard Bootstrap UCL	23953				95% Bootstrap-t UCL		24618
73					95% Hall's Bootstrap UCL	24684				95% Percentile Bootstrap UCL		23930
74					95% BCA Bootstrap UCL	24230						
75					90% Chebyshev(Mean, Sd) UCL	25275				95% Chebyshev(Mean, Sd) UCL		26550
76					97.5% Chebyshev(Mean, Sd) UCL	28321				99% Chebyshev(Mean, Sd) UCL		31799
77												
78	**Suggested UCL to Use**											
79					95% Student's-t UCL	24112						
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	15				Number of Distinct Observations		15
91										Number of Missing Observations		0
92					Minimum	205				Mean		910.1
93					Maximum	1927				Median		850
94					SD	463.1				Std. Error of Mean		119.6
95					Coefficient of Variation	0.509				Skewness		0.955
96												
97	**Normal GOF Test**											
98					Shapiro Wilk Test Statistic	0.917	**Shapiro Wilk GOF Test**					
99					5% Shapiro Wilk Critical Value	0.881	Data appear Normal at 5% Significance Level					
100					Lilliefors Test Statistic	0.166	**Lilliefors GOF Test**					
101					5% Lilliefors Critical Value	0.229	Data appear Normal at 5% Significance Level					
102	**Data appear 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	1121				95% Adjusted-CLT UCL (Chen-1995)		1138
107										95% Modified-t UCL (Johnson-1978)		1126
108												
109	**Gamma GOF Test**											
110					A-D Test Statistic	0.302	**Anderson-Darling Gamma GOF Test**					
111					5% A-D Critical Value	0.74	Detected data appear Gamma Distributed at 5% Significance Level					
112					K-S Test Statistic	0.135	**Kolmogrov-Smirnoff Gamma GOF Test**					
113					5% K-S Critical Value	0.223	Detected data appear Gamma Distributed at 5% Significance Level					
114	**Detected data appear Gamma Distributed at 5% Significance Level**											
115												
116	**Gamma Statistics**											
117					k hat (MLE)	4.067				k star (bias corrected MLE)		3.298
118					Theta hat (MLE)	223.8				Theta star (bias corrected MLE)		275.9
119					nu hat (MLE)	122				nu star (bias corrected)		98.94
120					MLE Mean (bias corrected)	910.1				MLE Sd (bias corrected)		501.1
121										Approximate Chi Square Value (0.05)		76.99
122					Adjusted Level of Significance	0.0324				Adjusted Chi Square Value		74.61
123												
124	**Assuming Gamma Distribution**											
125					95% Approximate Gamma UCL (use when n>=50))	1169				95% Adjusted Gamma UCL (use when n<50)		1207
126												
127	**Lognormal GOF Test**											
128					Shapiro Wilk Test Statistic	0.941	**Shapiro Wilk Lognormal GOF Test**					
129					5% Shapiro Wilk Critical Value	0.881	Data appear Lognormal at 5% Significance Level					
130					Lilliefors Test Statistic	0.166	**Lilliefors Lognormal GOF Test**					
131					5% Lilliefors Critical Value	0.229	Data appear Lognormal at 5% Significance Level					
132	**Data appear Lognormal at 5% Significance Level**											
133												
134	**Lognormal Statistics**											
135					Minimum of Logged Data	5.323				Mean of logged Data		6.686
136					Maximum of Logged Data	7.564				SD of logged Data		0.551
137												
138	**Assuming Lognormal Distribution**											
139					95% H-UCL	1273				90% Chebyshev (MVUE) UCL		1328
140					95% Chebyshev (MVUE) UCL	1512				97.5% Chebyshev (MVUE) UCL		1768
141					99% Chebyshev (MVUE) UCL	2271						
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	1107				95% Jackknife UCL		1121
148					95% Standard Bootstrap UCL	1096				95% Bootstrap-t UCL		1197
149					95% Hall's Bootstrap UCL	1265				95% Percentile Bootstrap UCL		1107
150					95% BCA Bootstrap UCL	1143						
151					90% Chebyshev(Mean, Sd) UCL	1269				95% Chebyshev(Mean, Sd) UCL		1431
152					97.5% Chebyshev(Mean, Sd) UCL	1657				99% Chebyshev(Mean, Sd) UCL		2100
153												
154	**Suggested UCL to Use**											
155					95% Student's-t UCL	1121						
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					15	Number of Distinct Observations					1
167							Number of Missing Observations					0
168	Minimum					0.0122	Mean					0.0122
169	Maximum					0.0122	Median					0.0122
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	**Vanadium**											
181												
182	**General Statistics**											
183	Total Number of Observations					15	Number of Distinct Observations					13
184							Number of Missing Observations					0
185	Minimum					78	Mean					94.47
186	Maximum					118	Median					96
187	SD					11.51	Std. Error of Mean					2.973
188	Coefficient of Variation					0.122	Skewness					0.516
189												
190	**Normal GOF Test**											
191	Shapiro Wilk Test Statistic					0.956	**Shapiro Wilk GOF Test**					
192	5% Shapiro Wilk Critical Value					0.881	Data appear Normal at 5% Significance Level					
193	Lilliefors Test Statistic					0.123	**Lilliefors GOF Test**					
194	5% Lilliefors Critical Value					0.229	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					99.7	95% Adjusted-CLT UCL (Chen-1995)					99.78
200							95% Modified-t UCL (Johnson-1978)					99.77
201												
202	**Gamma GOF Test**											
203	A-D Test Statistic					0.232	**Anderson-Darling Gamma GOF Test**					
204	5% A-D Critical Value					0.734	Detected data appear Gamma Distributed at 5% Significance Level					
205	K-S Test Statistic					0.107	**Kolmogrov-Smirnoff Gamma GOF Test**					
206	5% K-S Critical Value					0.221	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)	73.78	k star (bias corrected MLE)					59.07
211					Theta hat (MLE)	1.28	Theta star (bias corrected MLE)					1.599
212					nu hat (MLE)	2214	nu star (bias corrected)					1772
213					MLE Mean (bias corrected)	94.47	MLE Sd (bias corrected)					12.29
214							Approximate Chi Square Value (0.05)					1675
215					Adjusted Level of Significance	0.0324	Adjusted Chi Square Value					1664
216												
217	Assuming Gamma Distribution											
218				95% Approximate Gamma UCL (use when n>=50))		99.92	95% Adjusted Gamma UCL (use when n<50)					100.6
219												
220	Lognormal GOF Test											
221					Shapiro Wilk Test Statistic	0.967	Shapiro Wilk Lognormal GOF Test					
222					5% Shapiro Wilk Critical Value	0.881	Data appear Lognormal at 5% Significance Level					
223					Lilliefors Test Statistic	0.11	Lilliefors Lognormal GOF Test					
224					5% Lilliefors Critical Value	0.229	Data appear Lognormal at 5% Significance Level					
225	Data appear Lognormal at 5% Significance Level											
226												
227	Lognormal Statistics											
228					Minimum of Logged Data	4.357	Mean of logged Data					4.541
229					Maximum of Logged Data	4.771	SD of logged Data					0.12
230												
231	Assuming Lognormal Distribution											
232					95% H-UCL	100	90% Chebyshev (MVUE) UCL					103.3
233					95% Chebyshev (MVUE) UCL	107.3	97.5% Chebyshev (MVUE) UCL					112.8
234					99% Chebyshev (MVUE) UCL	123.7						
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	99.36	95% Jackknife UCL					99.7
241					95% Standard Bootstrap UCL	99.12	95% Bootstrap-t UCL					100.3
242					95% Hall's Bootstrap UCL	100	95% Percentile Bootstrap UCL					99.33
243					95% BCA Bootstrap UCL	99.2						
244					90% Chebyshev(Mean, Sd) UCL	103.4	95% Chebyshev(Mean, Sd) UCL					107.4
245					97.5% Chebyshev(Mean, Sd) UCL	113	99% Chebyshev(Mean, Sd) UCL					124
246												
247	Suggested UCL to Use											
248					95% Student's-t UCL	99.7						
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												