	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 7:24:37 PM								
5	From File			EPC_013Sub_EU07.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	26258				95% Bootstrap-t UCL		30826
73					95% Hall's Bootstrap UCL	45110				95% Percentile Bootstrap UCL		26340
74					95% BCA Bootstrap UCL	28064						
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	**PCB, Total**											
88												
89	**General Statistics**											
90					Total Number of Observations	10				Number of Distinct Observations		4
91										Number of Missing Observations		0
92					Minimum	0.05				Mean		3.57
93					Maximum	5				Median		5
94					SD	2.306				Std. Error of Mean		0.729
95					Coefficient of Variation	0.646				Skewness		-1.047
96												
97	**Normal GOF Test**											
98					Shapiro Wilk Test Statistic	0.611	**Shapiro Wilk GOF Test**					
99					5% Shapiro Wilk Critical Value	0.842	Data Not Normal at 5% Significance Level					
100					Lilliefors Test Statistic	0.432	**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	4.907				95% Adjusted-CLT UCL (Chen-1995)		4.512
107										95% Modified-t UCL (Johnson-1978)		4.867
108												
109	Gamma GOF Test											
110					A-D Test Statistic	1.985	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	0.454	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)	0.806				k star (bias corrected MLE)		0.631
118					Theta hat (MLE)	4.429				Theta star (bias corrected MLE)		5.659
119					nu hat (MLE)	16.12				nu star (bias corrected)		12.62
120					MLE Mean (bias corrected)	3.57				MLE Sd (bias corrected)		4.495
121										Approximate Chi Square Value (0.05)		5.637
122					Adjusted Level of Significance	0.0267				Adjusted Chi Square Value		4.85
123												
124	Assuming Gamma Distribution											
125					95% Approximate Gamma UCL (use when n>=50))	7.991				95% Adjusted Gamma UCL (use when n<50)		9.287
126												
127	Lognormal GOF Test											
128					Shapiro Wilk Test Statistic	0.649	Shapiro Wilk Lognormal GOF Test					
129					5% Shapiro Wilk Critical Value	0.842	Data Not Lognormal at 5% Significance Level					
130					Lilliefors Test Statistic	0.422	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	-2.996				Mean of logged Data		0.537
136					Maximum of Logged Data	1.609				SD of logged Data		1.822
137												
138	Assuming Lognormal Distribution											
139					95% H-UCL	183.8				90% Chebyshev (MVUE) UCL		18.23
140					95% Chebyshev (MVUE) UCL	23.54				97.5% Chebyshev (MVUE) UCL		30.91
141					99% Chebyshev (MVUE) UCL	45.39						
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	4.77				95% Jackknife UCL		4.907
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	5.758				95% Chebyshev(Mean, Sd) UCL		6.749
152					97.5% Chebyshev(Mean, Sd) UCL	8.124				99% Chebyshev(Mean, Sd) UCL		10.83
153												
154	Suggested UCL to Use											
155					99% Chebyshev (Mean, Sd) UCL	10.83						
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	**Note: For highly negatively-skewed data, confidence limits (e.g., Chen, Johnson, Lognormal, and Gamma) may not be**											
165	**reliable. Chen's and Johnson's methods provide adjustments for positvely skewed data sets.**											
166												
167												
168	**Silver**											
169												
170	**General Statistics**											
171	Total Number of Observations					10	Number of Distinct Observations					6
172							Number of Missing Observations					0
173	Minimum					0.033	Mean					50.85
174	Maximum					146	Median					50
175	SD					46.71	Std. Error of Mean					14.77
176	Coefficient of Variation					0.919	Skewness					0.936
177												
178	**Normal GOF Test**											
179	Shapiro Wilk Test Statistic					0.845	**Shapiro Wilk GOF Test**					
180	5% Shapiro Wilk Critical Value					0.842	Data appear Normal at 5% Significance Level					
181	Lilliefors Test Statistic					0.307	**Lilliefors GOF Test**					
182	5% Lilliefors Critical Value					0.28	Data Not Normal at 5% Significance Level					
183	**Data appear Approximate Normal at 5% Significance Level**											
184												
185	**Assuming Normal Distribution**											
186	**95% Normal UCL**						**95% UCLs (Adjusted for Skewness)**					
187	95% Student's-t UCL					77.92	95% Adjusted-CLT UCL (Chen-1995)					79.82
188							95% Modified-t UCL (Johnson-1978)					78.65
189												
190	**Gamma GOF Test**											
191	A-D Test Statistic					0.951	**Anderson-Darling Gamma GOF Test**					
192	5% A-D Critical Value					0.775	Data Not Gamma Distributed at 5% Significance Level					
193	K-S Test Statistic					0.374	**Kolmogrov-Smirnoff Gamma GOF Test**					
194	5% K-S Critical Value					0.28	Data Not Gamma Distributed at 5% Significance Level					
195	**Data Not Gamma Distributed at 5% Significance Level**											
196												
197	**Gamma Statistics**											
198	k hat (MLE)					0.53	k star (bias corrected MLE)					0.438
199	Theta hat (MLE)					95.95	Theta star (bias corrected MLE)					116.2
200	nu hat (MLE)					10.6	nu star (bias corrected)					8.752
201	MLE Mean (bias corrected)					50.85	MLE Sd (bias corrected)					76.86
202							Approximate Chi Square Value (0.05)					3.178
203	Adjusted Level of Significance					0.0267	Adjusted Chi Square Value					2.623
204												
205	**Assuming Gamma Distribution**											
206	95% Approximate Gamma UCL (use when n>=50))					140	95% Adjusted Gamma UCL (use when n<50)					169.7
207												
208	**Lognormal GOF Test**											

	A	B	C	D	E	F	G	H	I	J	K	L
209					Shapiro Wilk Test Statistic	0.75	**Shapiro Wilk Lognormal GOF Test**					
210					5% Shapiro Wilk Critical Value	0.842	Data Not Lognormal at 5% Significance Level					
211					Lilliefors Test Statistic	0.374	**Lilliefors Lognormal GOF Test**					
212					5% Lilliefors Critical Value	0.28	Data Not Lognormal at 5% Significance Level					
213	**Data Not Lognormal at 5% Significance Level**											
214												
215	**Lognormal Statistics**											
216					Minimum of Logged Data	-3.411				Mean of logged Data		2.741
217					Maximum of Logged Data	4.984				SD of logged Data		2.605
218												
219	**Assuming Lognormal Distribution**											
220					95% H-UCL	181057				90% Chebyshev (MVUE) UCL		641.4
221					95% Chebyshev (MVUE) UCL	845.5				97.5% Chebyshev (MVUE) UCL		1129
222					99% Chebyshev (MVUE) UCL	1686						
223												
224	**Nonparametric Distribution Free UCL Statistics**											
225	**Data appear to follow a Discernible Distribution at 5% Significance Level**											
226												
227	**Nonparametric Distribution Free UCLs**											
228					95% CLT UCL	75.14				95% Jackknife UCL		77.92
229					95% Standard Bootstrap UCL	73.5				95% Bootstrap-t UCL		88.58
230					95% Hall's Bootstrap UCL	127.1				95% Percentile Bootstrap UCL		74.83
231					95% BCA Bootstrap UCL	78.03						
232					90% Chebyshev(Mean, Sd) UCL	95.16				95% Chebyshev(Mean, Sd) UCL		115.2
233					97.5% Chebyshev(Mean, Sd) UCL	143.1				99% Chebyshev(Mean, Sd) UCL		197.8
234												
235	**Suggested UCL to Use**											
236					95% Student's-t UCL	77.92						
237												
238	Note: Suggestions regarding the selection of a 95% UCL are provided to help the user to select the most appropriate 95% UCL.											
239	These recommendations are based upon the results of the simulation studies summarized in Singh, Singh, and Iaci (2002)											
240	and Singh and Singh (2003). However, simulations results will not cover all Real World data sets.											
241	For additional insight the user may want to consult a statistician.											
242												
243												
244	**Uranium-238**											
245												
246	**General Statistics**											
247					Total Number of Observations	10				Number of Distinct Observations		4
248										Number of Missing Observations		0
249					Minimum	0.411				Mean		2.177
250					Maximum	4.82				Median		2.177
251					SD	1.099				Std. Error of Mean		0.348
252					Coefficient of Variation	0.505				Skewness		1.284
253												
254	**Normal GOF Test**											
255					Shapiro Wilk Test Statistic	0.731	**Shapiro Wilk GOF Test**					
256					5% Shapiro Wilk Critical Value	0.842	Data Not Normal at 5% Significance Level					
257					Lilliefors Test Statistic	0.4	**Lilliefors GOF Test**					
258					5% Lilliefors Critical Value	0.28	Data Not Normal at 5% Significance Level					
259	**Data Not Normal at 5% Significance Level**											
260												

	A	B	C	D	E	F	G	H	I	J	K	L
261	Assuming Normal Distribution											
262	95% Normal UCL						95% UCLs (Adjusted for Skewness)					
263					95% Student's-t UCL	2.814				95% Adjusted-CLT UCL (Chen-1995)		2.9
264										95% Modified-t UCL (Johnson-1978)		2.838
265												
266	Gamma GOF Test											
267					A-D Test Statistic	1.427	Anderson-Darling Gamma GOF Test					
268					5% A-D Critical Value	0.73	Data Not Gamma Distributed at 5% Significance Level					
269					K-S Test Statistic	0.369	Kolmogrov-Smirnoff Gamma GOF Test					
270					5% K-S Critical Value	0.268	Data Not Gamma Distributed at 5% Significance Level					
271	Data Not Gamma Distributed at 5% Significance Level											
272												
273	Gamma Statistics											
274					k hat (MLE)	3.761				k star (bias corrected MLE)		2.7
275					Theta hat (MLE)	0.579				Theta star (bias corrected MLE)		0.806
276					nu hat (MLE)	75.22				nu star (bias corrected)		53.99
277					MLE Mean (bias corrected)	2.177				MLE Sd (bias corrected)		1.325
278										Approximate Chi Square Value (0.05)		38.11
279					Adjusted Level of Significance	0.0267				Adjusted Chi Square Value		35.8
280												
281	Assuming Gamma Distribution											
282				95% Approximate Gamma UCL (use when n>=50))		3.084				95% Adjusted Gamma UCL (use when n<50)		3.283
283												
284	Lognormal GOF Test											
285					Shapiro Wilk Test Statistic	0.719	Shapiro Wilk Lognormal GOF Test					
286					5% Shapiro Wilk Critical Value	0.842	Data Not Lognormal at 5% Significance Level					
287					Lilliefors Test Statistic	0.388	Lilliefors Lognormal GOF Test					
288					5% Lilliefors Critical Value	0.28	Data Not Lognormal at 5% Significance Level					
289	Data Not Lognormal at 5% Significance Level											
290												
291	Lognormal Statistics											
292					Minimum of Logged Data	-0.889				Mean of logged Data		0.639
293					Maximum of Logged Data	1.573				SD of logged Data		0.622
294												
295	Assuming Lognormal Distribution											
296					95% H-UCL	3.785				90% Chebyshev (MVUE) UCL		3.612
297					95% Chebyshev (MVUE) UCL	4.229				97.5% Chebyshev (MVUE) UCL		5.085
298					99% Chebyshev (MVUE) UCL	6.767						
299												
300	Nonparametric Distribution Free UCL Statistics											
301	Data do not follow a Discernible Distribution (0.05)											
302												
303	Nonparametric Distribution Free UCLs											
304					95% CLT UCL	2.749				95% Jackknife UCL		2.814
305					95% Standard Bootstrap UCL	N/A				95% Bootstrap-t UCL		N/A
306					95% Hall's Bootstrap UCL	N/A				95% Percentile Bootstrap UCL		N/A
307					95% BCA Bootstrap UCL	N/A						
308					90% Chebyshev(Mean, Sd) UCL	3.22				95% Chebyshev(Mean, Sd) UCL		3.692
309					97.5% Chebyshev(Mean, Sd) UCL	4.348				99% Chebyshev(Mean, Sd) UCL		5.635
310												
311	Suggested UCL to Use											
312					95% Chebyshev (Mean, Sd) UCL	3.692						

	A	B	C	D	E	F	G	H	I	J	K	L
313												
314	Note: Suggestions regarding the selection of a 95% UCL are provided to help the user to select the most appropriate 95% UCL.											
315	These recommendations are based upon the results of the simulation studies summarized in Singh, Singh, and Iaci (2002)											
316	and Singh and Singh (2003). However, simulations results will not cover all Real World data sets.											
317	For additional insight the user may want to consult a statistician.											
318												
319												
320	**Vanadium**											
321												
322	**General Statistics**											
323	Total Number of Observations					10	Number of Distinct Observations					9
324							Number of Missing Observations					0
325	Minimum					86	Mean					109
326	Maximum					145	Median					102
327	SD					21.67	Std. Error of Mean					6.852
328	Coefficient of Variation					0.199	Skewness					0.653
329												
330	**Normal GOF Test**											
331	Shapiro Wilk Test Statistic					0.871	**Shapiro Wilk GOF Test**					
332	5% Shapiro Wilk Critical Value					0.842	Data appear Normal at 5% Significance Level					
333	Lilliefors Test Statistic					0.256	**Lilliefors GOF Test**					
334	5% Lilliefors Critical Value					0.28	Data appear Normal at 5% Significance Level					
335	**Data appear Normal at 5% Significance Level**											
336												
337	**Assuming Normal Distribution**											
338	**95% Normal UCL**						**95% UCLs (Adjusted for Skewness)**					
339	95% Student's-t UCL					121.6	95% Adjusted-CLT UCL (Chen-1995)					121.8
340							95% Modified-t UCL (Johnson-1978)					121.8
341												
342	**Gamma GOF Test**											
343	A-D Test Statistic					0.593	**Anderson-Darling Gamma GOF Test**					
344	5% A-D Critical Value					0.724	Detected data appear Gamma Distributed at 5% Significance Level					
345	K-S Test Statistic					0.265	**Kolmogrov-Smirnoff Gamma GOF Test**					
346	5% K-S Critical Value					0.266	Detected data appear Gamma Distributed at 5% Significance Level					
347	**Detected data appear Gamma Distributed at 5% Significance Level**											
348												
349	**Gamma Statistics**											
350	k hat (MLE)					29.47	k star (bias corrected MLE)					20.7
351	Theta hat (MLE)					3.698	Theta star (bias corrected MLE)					5.266
352	nu hat (MLE)					589.5	nu star (bias corrected)					414
353	MLE Mean (bias corrected)					109	MLE Sd (bias corrected)					23.96
354							Approximate Chi Square Value (0.05)					367.8
355	Adjusted Level of Significance					0.0267	Adjusted Chi Square Value					360.2
356												
357	**Assuming Gamma Distribution**											
358	95% Approximate Gamma UCL (use when n>=50))					122.7	95% Adjusted Gamma UCL (use when n<50)					125.3
359												
360	**Lognormal GOF Test**											
361	Shapiro Wilk Test Statistic					0.882	**Shapiro Wilk Lognormal GOF Test**					
362	5% Shapiro Wilk Critical Value					0.842	Data appear Lognormal at 5% Significance Level					
363	Lilliefors Test Statistic					0.252	**Lilliefors Lognormal GOF Test**					
364	5% Lilliefors Critical Value					0.28	Data appear Lognormal at 5% Significance Level					

	A	B	C	D	E	F	G	H	I	J	K	L
365	Data appear Lognormal at 5% Significance Level											
366												
367	Lognormal Statistics											
368					Minimum of Logged Data	4.454				Mean of logged Data		4.674
369					Maximum of Logged Data	4.977				SD of logged Data		0.193
370												
371	Assuming Lognormal Distribution											
372					95% H-UCL	123.1				90% Chebyshev (MVUE) UCL		128.9
373					95% Chebyshev (MVUE) UCL	138				97.5% Chebyshev (MVUE) UCL		150.5
374					99% Chebyshev (MVUE) UCL	175.2						
375												
376	Nonparametric Distribution Free UCL Statistics											
377	Data appear to follow a Discernible Distribution at 5% Significance Level											
378												
379	Nonparametric Distribution Free UCLs											
380					95% CLT UCL	120.3				95% Jackknife UCL		121.6
381					95% Standard Bootstrap UCL	119.7				95% Bootstrap-t UCL		124.3
382					95% Hall's Bootstrap UCL	121.5				95% Percentile Bootstrap UCL		121
383					95% BCA Bootstrap UCL	120.6						
384					90% Chebyshev(Mean, Sd) UCL	129.6				95% Chebyshev(Mean, Sd) UCL		138.9
385					97.5% Chebyshev(Mean, Sd) UCL	151.8				99% Chebyshev(Mean, Sd) UCL		177.2
386												
387	Suggested UCL to Use											
388					95% Student's-t UCL	121.6						
389												
390	Note: Suggestions regarding the selection of a 95% UCL are provided to help the user to select the most appropriate 95% UCL.											
391	These recommendations are based upon the results of the simulation studies summarized in Singh, Singh, and Iaci (2002)											
392	and Singh and Singh (2003). However, simulations results will not cover all Real World data sets.											
393	For additional insight the user may want to consult a statistician.											
394												