	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 7:23:30 PM								
5	From File			EPC_013Sub_EU09.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					12	Number of Distinct Observations					3
15							Number of Missing Observations					0
16	Minimum					0.875	Mean					9.156
17	Maximum					10	Median					10
18	SD					2.624	Std. Error of Mean					0.757
19	Coefficient of Variation					0.287	Skewness					-3.394
20												
21	Normal GOF Test											
22	Shapiro Wilk Test Statistic					0.375	Shapiro Wilk GOF Test					
23	5% Shapiro Wilk Critical Value					0.859	Data Not Normal at 5% Significance Level					
24	Lilliefors Test Statistic					0.459	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					10.52	95% Adjusted-CLT UCL (Chen-1995)					9.609
31							95% Modified-t UCL (Johnson-1978)					10.39
32												
33	Gamma GOF Test											
34	A-D Test Statistic					3.887	Anderson-Darling Gamma GOF Test					
35	5% A-D Critical Value					0.735	Data Not Gamma Distributed at 5% Significance Level					
36	K-S Test Statistic					0.469	Kolmogrov-Smirnoff Gamma GOF Test					
37	5% K-S Critical Value					0.246	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)					4.203	k star (bias corrected MLE)					3.208
42	Theta hat (MLE)					2.178	Theta star (bias corrected MLE)					2.854
43	nu hat (MLE)					100.9	nu star (bias corrected)					76.99
44	MLE Mean (bias corrected)					9.156	MLE Sd (bias corrected)					5.112
45							Approximate Chi Square Value (0.05)					57.78
46	Adjusted Level of Significance					0.029	Adjusted Chi Square Value					55.25
47												
48	Assuming Gamma Distribution											
49	95% Approximate Gamma UCL (use when n>=50))					12.2	95% Adjusted Gamma UCL (use when n<50)					12.76
50												
51	Lognormal GOF Test											
52	Shapiro Wilk Test Statistic					0.346	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	0.477	**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	-0.134				Mean of logged Data		2.091
60					Maximum of Logged Data	2.303				SD of logged Data		0.701
61												
62	**Assuming Lognormal Distribution**											
63					95% H-UCL	17.24				90% Chebyshev (MVUE) UCL		16.49
64					95% Chebyshev (MVUE) UCL	19.38				97.5% Chebyshev (MVUE) UCL		23.4
65					99% Chebyshev (MVUE) UCL	31.29						
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	10.4				95% Jackknife UCL		10.52
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	11.43				95% Chebyshev(Mean, Sd) UCL		12.46
76					97.5% Chebyshev(Mean, Sd) UCL	13.89				99% Chebyshev(Mean, Sd) UCL		16.69
77												
78	**Suggested UCL to Use**											
79					95% Chebyshev (Mean, Sd) UCL	12.46						
80												
81	**Recommended UCL exceeds the maximum observation**											
82												
83	Note: Suggestions regarding the selection of a 95% UCL are provided to help the user to select the most appropriate 95% UCL.											
84	These recommendations are based upon the results of the simulation studies summarized in Singh, Singh, and Iaci (2002)											
85	and Singh and Singh (2003). However, simulations results will not cover all Real World data sets.											
86	For additional insight the user may want to consult a statistician.											
87												
88	**Note: For highly negatively-skewed data, confidence limits (e.g., Chen, Johnson, Lognormal, and Gamma) may not be**											
89	**reliable. Chen's and Johnson's methods provide adjustments for positvely skewed data sets.**											
90												
91												
92	**Cesium-137**											
93												
94	**General Statistics**											
95					Total Number of Observations	12				Number of Distinct Observations		5
96										Number of Missing Observations		0
97					Minimum	-0.00278				Mean		0.142
98					Maximum	0.393				Median		0.142
99					SD	0.0966				Std. Error of Mean		0.0279
100					Coefficient of Variation	0.679				Skewness		1.256
101												
102	**Normal GOF Test**											
103					Shapiro Wilk Test Statistic	0.713	**Shapiro Wilk GOF Test**					
104					5% Shapiro Wilk Critical Value	0.859	Data Not Normal at 5% Significance Level					

	A	B	C	D	E	F	G	H	I	J	K	L
105					Lilliefors Test Statistic	0.333	**Lilliefors GOF Test**					
106					5% Lilliefors Critical Value	0.256	Data Not Normal at 5% Significance Level					
107	**Data Not Normal at 5% Significance Level**											
108												
109	**Assuming Normal Distribution**											
110	**95% Normal UCL**						**95% UCLs (Adjusted for Skewness)**					
111					95% Student's-t UCL	0.192	95% Adjusted-CLT UCL (Chen-1995)					0.199
112							95% Modified-t UCL (Johnson-1978)					0.194
113	**Gamma Statistics Not Available**											
114	**Lognormal Statistics Not Available**											
115												
116	**Nonparametric Distribution Free UCL Statistics**											
117	**Data do not follow a Discernible Distribution (0.05)**											
118												
119	**Nonparametric Distribution Free UCLs**											
120					95% CLT UCL	0.188	95% Jackknife UCL					0.192
121					95% Standard Bootstrap UCL	0.187	95% Bootstrap-t UCL					0.202
122					95% Hall's Bootstrap UCL	0.288	95% Percentile Bootstrap UCL					0.191
123					95% BCA Bootstrap UCL	0.197						
124					90% Chebyshev(Mean, Sd) UCL	0.226	95% Chebyshev(Mean, Sd) UCL					0.264
125					97.5% Chebyshev(Mean, Sd) UCL	0.316	99% Chebyshev(Mean, Sd) UCL					0.42
126												
127	**Suggested UCL to Use**											
128					95% Chebyshev (Mean, Sd) UCL	0.264						
129												
130	Note: Suggestions regarding the selection of a 95% UCL are provided to help the user to select the most appropriate 95% UCL.											
131	These recommendations are based upon the results of the simulation studies summarized in Singh, Singh, and Iaci (2002)											
132	and Singh and Singh (2003). However, simulations results will not cover all Real World data sets.											
133	For additional insight the user may want to consult a statistician.											
134												
135												
136	**Neptunium-237**											
137												
138	**General Statistics**											
139					Total Number of Observations	12	Number of Distinct Observations					5
140							Number of Missing Observations					0
141					Minimum	-0.0157	Mean					0.223
142					Maximum	0.89	Median					0.223
143					SD	0.232	Std. Error of Mean					0.0671
144					Coefficient of Variation	1.043	Skewness					2.291
145												
146	**Normal GOF Test**											
147					Shapiro Wilk Test Statistic	0.644	**Shapiro Wilk GOF Test**					
148					5% Shapiro Wilk Critical Value	0.859	Data Not Normal at 5% Significance Level					
149					Lilliefors Test Statistic	0.417	**Lilliefors GOF Test**					
150					5% Lilliefors Critical Value	0.256	Data Not Normal at 5% Significance Level					
151	**Data Not Normal at 5% Significance Level**											
152												
153	**Assuming Normal Distribution**											
154	**95% Normal UCL**						**95% UCLs (Adjusted for Skewness)**					
155					95% Student's-t UCL	0.343	95% Adjusted-CLT UCL (Chen-1995)					0.381
156							95% Modified-t UCL (Johnson-1978)					0.351

	A	B	C	D	E	F	G	H	I	J	K	L
157	Gamma Statistics Not Available											
158	Lognormal Statistics Not Available											
159												
160	Nonparametric Distribution Free UCL Statistics											
161	Data do not follow a Discernible Distribution (0.05)											
162												
163	Nonparametric Distribution Free UCLs											
164					95% CLT UCL	0.333				95% Jackknife UCL		0.343
165					95% Standard Bootstrap UCL	0.331				95% Bootstrap-t UCL		0.41
166					95% Hall's Bootstrap UCL	0.845				95% Percentile Bootstrap UCL		0.335
167					95% BCA Bootstrap UCL	0.372						
168					90% Chebyshev(Mean, Sd) UCL	0.424				95% Chebyshev(Mean, Sd) UCL		0.515
169					97.5% Chebyshev(Mean, Sd) UCL	0.642				99% Chebyshev(Mean, Sd) UCL		0.89
170												
171	Suggested UCL to Use											
172					95% Chebyshev (Mean, Sd) UCL	0.515						
173												
174	Note: Suggestions regarding the selection of a 95% UCL are provided to help the user to select the most appropriate 95% UCL.											
175	These recommendations are based upon the results of the simulation studies summarized in Singh, Singh, and Iaci (2002)											
176	and Singh and Singh (2003). However, simulations results will not cover all Real World data sets.											
177	For additional insight the user may want to consult a statistician.											
178												
179												
180	PAH, Total											
181												
182	General Statistics											
183					Total Number of Observations	12				Number of Distinct Observations		3
184										Number of Missing Observations		0
185					Minimum	0.0265				Mean		0.322
186					Maximum	0.47				Median		0.322
187					SD	0.109				Std. Error of Mean		0.0315
188					Coefficient of Variation	0.339				Skewness		-1.625
189												
190	Normal GOF Test											
191					Shapiro Wilk Test Statistic	0.65				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	0.379				95% Adjusted-CLT UCL (Chen-1995)		0.358
200										95% Modified-t UCL (Johnson-1978)		0.376
201												
202	Gamma GOF Test											
203					A-D Test Statistic	2.755				Anderson-Darling Gamma GOF Test		
204					5% A-D Critical Value	0.737				Data Not Gamma Distributed at 5% Significance Level		
205					K-S Test Statistic	0.487				Kolmogrov-Smirnoff Gamma GOF Test		
206					5% K-S Critical Value	0.247				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)	3.601				k star (bias corrected MLE)		2.757
211					Theta hat (MLE)	0.0895				Theta star (bias corrected MLE)		0.117
212					nu hat (MLE)	86.43				nu star (bias corrected)		66.16
213					MLE Mean (bias corrected)	0.322				MLE Sd (bias corrected)		0.194
214										Approximate Chi Square Value (0.05)		48.44
215					Adjusted Level of Significance	0.029				Adjusted Chi Square Value		46.13
216												
217					Assuming Gamma Distribution							
218					95% Approximate Gamma UCL (use when n>=50))	0.44				95% Adjusted Gamma UCL (use when n<50)		0.462
219												
220					Lognormal GOF Test							
221					Shapiro Wilk Test Statistic	0.461				Shapiro Wilk Lognormal GOF Test		
222					5% Shapiro Wilk Critical Value	0.859				Data Not Lognormal at 5% Significance Level		
223					Lilliefors Test Statistic	0.493				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	-3.631				Mean of logged Data		-1.278
229					Maximum of Logged Data	-0.755				SD of logged Data		0.755
230												
231					Assuming Lognormal Distribution							
232					95% H-UCL	0.654				90% Chebyshev (MVUE) UCL		0.607
233					95% Chebyshev (MVUE) UCL	0.718				97.5% Chebyshev (MVUE) UCL		0.873
234					99% Chebyshev (MVUE) UCL	1.178						
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	0.374				95% Jackknife UCL		0.379
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	0.417				95% Chebyshev(Mean, Sd) UCL		0.46
245					97.5% Chebyshev(Mean, Sd) UCL	0.519				99% Chebyshev(Mean, Sd) UCL		0.636
246												
247					Suggested UCL to Use							
248					95% Chebyshev (Mean, Sd) UCL	0.46						
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					Note: For highly negatively-skewed data, confidence limits (e.g., Chen, Johnson, Lognormal, and Gamma) may not be							
256					reliable. Chen's and Johnson's methods provide adjustments for positvely skewed data sets.							
257												
258												
259	Uranium-238											
260												

	A	B	C	D	E	F	G	H	I	J	K	L
261	General Statistics											
262	Total Number of Observations					12	Number of Distinct Observations					5
263							Number of Missing Observations					0
264	Minimum					0.355	Mean					1.967
265	Maximum					6.08	Median					1.967
266	SD					1.438	Std. Error of Mean					0.415
267	Coefficient of Variation					0.731	Skewness					2.247
268												
269	Normal GOF Test											
270	Shapiro Wilk Test Statistic					0.657	Shapiro Wilk GOF Test					
271	5% Shapiro Wilk Critical Value					0.859	Data Not Normal at 5% Significance Level					
272	Lilliefors Test Statistic					0.417	Lilliefors GOF Test					
273	5% Lilliefors Critical Value					0.256	Data Not Normal at 5% Significance Level					
274	Data Not Normal at 5% Significance Level											
275												
276	Assuming Normal Distribution											
277	95% Normal UCL						95% UCLs (Adjusted for Skewness)					
278	95% Student's-t UCL					2.712	95% Adjusted-CLT UCL (Chen-1995)					2.937
279							95% Modified-t UCL (Johnson-1978)					2.757
280												
281	Gamma GOF Test											
282	A-D Test Statistic					1.434	Anderson-Darling Gamma GOF Test					
283	5% A-D Critical Value					0.741	Data Not Gamma Distributed at 5% Significance Level					
284	K-S Test Statistic					0.336	Kolmogrov-Smirnoff Gamma GOF Test					
285	5% K-S Critical Value					0.248	Data Not Gamma Distributed at 5% Significance Level					
286	Data Not Gamma Distributed at 5% Significance Level											
287												
288	Gamma Statistics											
289	k hat (MLE)					2.384	k star (bias corrected MLE)					1.843
290	Theta hat (MLE)					0.825	Theta star (bias corrected MLE)					1.067
291	nu hat (MLE)					57.2	nu star (bias corrected)					44.24
292	MLE Mean (bias corrected)					1.967	MLE Sd (bias corrected)					1.448
293							Approximate Chi Square Value (0.05)					29.98
294	Adjusted Level of Significance					0.029	Adjusted Chi Square Value					28.2
295												
296	Assuming Gamma Distribution											
297	95% Approximate Gamma UCL (use when n>=50))					2.901	95% Adjusted Gamma UCL (use when n<50)					3.085
298												
299	Lognormal GOF Test											
300	Shapiro Wilk Test Statistic					0.794	Shapiro Wilk Lognormal GOF Test					
301	5% Shapiro Wilk Critical Value					0.859	Data Not Lognormal at 5% Significance Level					
302	Lilliefors Test Statistic					0.369	Lilliefors Lognormal GOF Test					
303	5% Lilliefors Critical Value					0.256	Data Not Lognormal at 5% Significance Level					
304	Data Not Lognormal at 5% Significance Level											
305												
306	Lognormal Statistics											
307	Minimum of Logged Data					-1.036	Mean of logged Data					0.452
308	Maximum of Logged Data					1.805	SD of logged Data					0.738
309												
310	Assuming Lognormal Distribution											
311	95% H-UCL					3.578	90% Chebyshev (MVUE) UCL					3.351
312	95% Chebyshev (MVUE) UCL					3.959	97.5% Chebyshev (MVUE) UCL					4.803

	A	B	C	D	E	F	G	H	I	J	K	L
313					99% Chebyshev (MVUE) UCL	6.46						
314												
315					Nonparametric Distribution Free UCL Statistics							
316					Data do not follow a Discernible Distribution (0.05)							
317												
318					Nonparametric Distribution Free UCLs							
319					95% CLT UCL	2.649				95% Jackknife UCL		2.712
320					95% Standard Bootstrap UCL	2.619				95% Bootstrap-t UCL		3.1
321					95% Hall's Bootstrap UCL	5.881				95% Percentile Bootstrap UCL		2.699
322					95% BCA Bootstrap UCL	2.995						
323					90% Chebyshev(Mean, Sd) UCL	3.211				95% Chebyshev(Mean, Sd) UCL		3.775
324					97.5% Chebyshev(Mean, Sd) UCL	4.558				99% Chebyshev(Mean, Sd) UCL		6.095
325												
326					Suggested UCL to Use							
327					95% Chebyshev (Mean, Sd) UCL	3.775						
328												
329					Note: Suggestions regarding the selection of a 95% UCL are provided to help the user to select the most appropriate 95% UCL.							
330					These recommendations are based upon the results of the simulation studies summarized in Singh, Singh, and Iaci (2002)							
331					and Singh and Singh (2003). However, simulations results will not cover all Real World data sets.							
332					For additional insight the user may want to consult a statistician.							
333												
334												
335	Vanadium											
336												
337					General Statistics							
338					Total Number of Observations	12				Number of Distinct Observations		10
339										Number of Missing Observations		0
340					Minimum	80				Mean		103.9
341					Maximum	149				Median		89.5
342					SD	24.43				Std. Error of Mean		7.053
343					Coefficient of Variation	0.235				Skewness		0.942
344												
345					Normal GOF Test							
346					Shapiro Wilk Test Statistic	0.832				Shapiro Wilk GOF Test		
347					5% Shapiro Wilk Critical Value	0.859				Data Not Normal at 5% Significance Level		
348					Lilliefors Test Statistic	0.285				Lilliefors GOF Test		
349					5% Lilliefors Critical Value	0.256				Data Not Normal at 5% Significance Level		
350					Data Not Normal at 5% Significance Level							
351												
352					Assuming Normal Distribution							
353					95% Normal UCL					95% UCLs (Adjusted for Skewness)		
354					95% Student's-t UCL	116.6				95% Adjusted-CLT UCL (Chen-1995)		117.6
355										95% Modified-t UCL (Johnson-1978)		116.9
356												
357					Gamma GOF Test							
358					A-D Test Statistic	0.857				Anderson-Darling Gamma GOF Test		
359					5% A-D Critical Value	0.732				Data Not Gamma Distributed at 5% Significance Level		
360					K-S Test Statistic	0.285				Kolmogrov-Smirnoff Gamma GOF Test		
361					5% K-S Critical Value	0.245				Data Not Gamma Distributed at 5% Significance Level		
362					Data Not Gamma Distributed at 5% Significance Level							
363												
364					Gamma Statistics							

	A	B	C	D	E	F	G	H	I	J	K	L
365					k hat (MLE)	21.56				k star (bias corrected MLE)		16.23
366					Theta hat (MLE)	4.819				Theta star (bias corrected MLE)		6.403
367					nu hat (MLE)	517.5				nu star (bias corrected)		389.5
368					MLE Mean (bias corrected)	103.9				MLE Sd (bias corrected)		25.8
369										Approximate Chi Square Value (0.05)		344.7
370					Adjusted Level of Significance	0.029				Adjusted Chi Square Value		338.3
371												
372					**Assuming Gamma Distribution**							
373					95% Approximate Gamma UCL (use when n>=50))	117.4				95% Adjusted Gamma UCL (use when n<50)		119.6
374												
375					**Lognormal GOF Test**							
376					Shapiro Wilk Test Statistic	0.855				**Shapiro Wilk Lognormal GOF Test**		
377					5% Shapiro Wilk Critical Value	0.859				Data Not Lognormal at 5% Significance Level		
378					Lilliefors Test Statistic	0.273				**Lilliefors Lognormal GOF Test**		
379					5% Lilliefors Critical Value	0.256				Data Not Lognormal at 5% Significance Level		
380					**Data Not Lognormal at 5% Significance Level**							
381												
382					**Lognormal Statistics**							
383					Minimum of Logged Data	4.382				Mean of logged Data		4.62
384					Maximum of Logged Data	5.004				SD of logged Data		0.221
385												
386					**Assuming Lognormal Distribution**							
387					95% H-UCL	117.8				90% Chebyshev (MVUE) UCL		123.8
388					95% Chebyshev (MVUE) UCL	132.9				97.5% Chebyshev (MVUE) UCL		145.4
389					99% Chebyshev (MVUE) UCL	170.1						
390												
391					**Nonparametric Distribution Free UCL Statistics**							
392					**Data do not follow a Discernible Distribution (0.05)**							
393												
394					**Nonparametric Distribution Free UCLs**							
395					95% CLT UCL	115.5				95% Jackknife UCL		116.6
396					95% Standard Bootstrap UCL	115				95% Bootstrap-t UCL		120.2
397					95% Hall's Bootstrap UCL	117.5				95% Percentile Bootstrap UCL		115
398					95% BCA Bootstrap UCL	117.3						
399					90% Chebyshev(Mean, Sd) UCL	125.1				95% Chebyshev(Mean, Sd) UCL		134.7
400					97.5% Chebyshev(Mean, Sd) UCL	148				99% Chebyshev(Mean, Sd) UCL		174.1
401												
402					**Suggested UCL to Use**							
403					95% Student's-t UCL	116.6				or 95% Modified-t UCL		116.9
404												
405					Note: Suggestions regarding the selection of a 95% UCL are provided to help the user to select the most appropriate 95% UCL.							
406					These recommendations are based upon the results of the simulation studies summarized in Singh, Singh, and Iaci (2002)							
407					and Singh and Singh (2003). However, simulations results will not cover all Real World data sets.							
408					For additional insight the user may want to consult a statistician.							
409												