	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			2/18/2015 11:33:06 AM								
5	From File			EPC_015Surf_EU08.xls								
6	Full Precision			OFF								
7	Confidence Coefficient			95%								
8	Number of Bootstrap Operations			2000								
9												
10												

	A	B	C	D	E	F	G	H	I	J	K	L
11	Antimony											
12												
13						General Statistics						
14					Total Number of Observations	12				Number of Distinct Observations		8
15										Number of Missing Observations		0
16					Minimum	30				Mean		57.08
17					Maximum	123.8				Median		45.03
18					SD	33.02				Std. Error of Mean		9.532
19					Coefficient of Variation	0.578				Skewness		1.014
20												
21						Normal GOF Test						
22					Shapiro Wilk Test Statistic	0.823				Shapiro Wilk GOF Test		
23					5% Shapiro Wilk Critical Value	0.859				Data Not Normal at 5% Significance Level		
24					Lilliefors Test Statistic	0.211				Lilliefors GOF Test		
25					5% Lilliefors Critical Value	0.256				Data appear Normal at 5% Significance Level		
26						Data appear Approximate 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	74.19				95% Adjusted-CLT UCL (Chen-1995)		75.74
31										95% Modified-t UCL (Johnson-1978)		74.66
32												
33						Gamma GOF Test						
34					A-D Test Statistic	0.803				Anderson-Darling Gamma GOF Test		
35					5% A-D Critical Value	0.737				Data Not Gamma Distributed at 5% Significance Level		
36					K-S Test Statistic	0.243				Kolmogrov-Smirnoff Gamma GOF Test		
37					5% K-S Critical Value	0.247				Detected data appear Gamma Distributed at 5% Significance Level		
38						Detected data follow Appr. Gamma Distribution at 5% Significance Level						
39												
40						Gamma Statistics						
41					k hat (MLE)	3.726				k star (bias corrected MLE)		2.85
42					Theta hat (MLE)	15.32				Theta star (bias corrected MLE)		20.02
43					nu hat (MLE)	89.44				nu star (bias corrected)		68.41
44					MLE Mean (bias corrected)	57.08				MLE Sd (bias corrected)		33.81
45										Approximate Chi Square Value (0.05)		50.37
46					Adjusted Level of Significance	0.029				Adjusted Chi Square Value		48.02
47												
48						Assuming Gamma Distribution						
49					95% Approximate Gamma UCL (use when n>=50))	77.51				95% Adjusted Gamma UCL (use when n<50)		81.32
50												
51						Lognormal GOF Test						
52					Shapiro Wilk Test Statistic	0.848				Shapiro Wilk Lognormal GOF Test		
53					5% Shapiro Wilk Critical Value	0.859				Data Not Lognormal at 5% Significance Level		
54					Lilliefors Test Statistic	0.241				Lilliefors Lognormal GOF Test		
55					5% Lilliefors Critical Value	0.256				Data appear Lognormal at 5% Significance Level		
56						Data appear Approximate Lognormal at 5% Significance Level						
57												
58						Lognormal Statistics						
59					Minimum of Logged Data	3.401				Mean of logged Data		3.904
60					Maximum of Logged Data	4.819				SD of logged Data		0.54
61												

	A	B	C	D	E	F	G	H	I	J	K	L
62	**Assuming Lognormal Distribution**											
63					95% H-UCL	82.04				90% Chebyshev (MVUE) UCL		83.86
64					95% Chebyshev (MVUE) UCL	96.19				97.5% Chebyshev (MVUE) UCL		113.3
65					99% Chebyshev (MVUE) UCL	146.9						
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	72.75				95% Jackknife UCL		74.19
72					95% Standard Bootstrap UCL	72.12				95% Bootstrap-t UCL		80.06
73					95% Hall's Bootstrap UCL	75.5				95% Percentile Bootstrap UCL		72.92
74					95% BCA Bootstrap UCL	74.39						
75					90% Chebyshev(Mean, Sd) UCL	85.67				95% Chebyshev(Mean, Sd) UCL		98.62
76					97.5% Chebyshev(Mean, Sd) UCL	116.6				99% Chebyshev(Mean, Sd) UCL		151.9
77												
78	**Suggested UCL to Use**											
79					95% Student's-t UCL	74.19						
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												

	A	B	C	D	E	F	G	H	I	J	K	L
87	Arsenic											
88												
89						General Statistics						
90					Total Number of Observations	12				Number of Distinct Observations		9
91										Number of Missing Observations		0
92					Minimum	7.37				Mean		10.71
93					Maximum	13.83				Median		11
94					SD	1.815				Std. Error of Mean		0.524
95					Coefficient of Variation	0.169				Skewness		-0.518
96												
97						Normal GOF Test						
98					Shapiro Wilk Test Statistic	0.924				Shapiro Wilk GOF Test		
99					5% Shapiro Wilk Critical Value	0.859				Data appear Normal at 5% Significance Level		
100					Lilliefors Test Statistic	0.231				Lilliefors GOF Test		
101					5% Lilliefors Critical Value	0.256				Data appear Normal at 5% Significance Level		
102						Data appear Normal at 5% Significance Level						
103												
104						Assuming Normal Distribution						
105					95% Normal UCL					95% UCLs (Adjusted for Skewness)		
106					95% Student's-t UCL	11.65				95% Adjusted-CLT UCL (Chen-1995)		11.48
107										95% Modified-t UCL (Johnson-1978)		11.63
108												
109						Gamma GOF Test						
110					A-D Test Statistic	0.628				Anderson-Darling Gamma GOF Test		
111					5% A-D Critical Value	0.731				Detected data appear Gamma Distributed at 5% Significance Level		
112					K-S Test Statistic	0.252				Kolmogrov-Smirnoff Gamma GOF Test		
113					5% K-S Critical Value	0.245				Data Not Gamma Distributed at 5% Significance Level		
114						Detected data follow Appr. Gamma Distribution at 5% Significance Level						
115												
116						Gamma Statistics						
117					k hat (MLE)	34.97				k star (bias corrected MLE)		26.28
118					Theta hat (MLE)	0.306				Theta star (bias corrected MLE)		0.407
119					nu hat (MLE)	839.3				nu star (bias corrected)		630.8
120					MLE Mean (bias corrected)	10.71				MLE Sd (bias corrected)		2.088
121										Approximate Chi Square Value (0.05)		573.5
122					Adjusted Level of Significance	0.029				Adjusted Chi Square Value		565.2
123												
124						Assuming Gamma Distribution						
125					95% Approximate Gamma UCL (use when n>=50))	11.78				95% Adjusted Gamma UCL (use when n<50)		11.95
126												
127						Lognormal GOF Test						
128					Shapiro Wilk Test Statistic	0.889				Shapiro Wilk Lognormal GOF Test		
129					5% Shapiro Wilk Critical Value	0.859				Data appear Lognormal at 5% Significance Level		
130					Lilliefors Test Statistic	0.257				Lilliefors Lognormal GOF Test		
131					5% Lilliefors Critical Value	0.256				Data Not Lognormal at 5% Significance Level		
132						Data appear Approximate Lognormal at 5% Significance Level						
133												
134						Lognormal Statistics						
135					Minimum of Logged Data	1.997				Mean of logged Data		2.357
136					Maximum of Logged Data	2.627				SD of logged Data		0.181
137												

	A	B	C	D	E	F	G	H	I	J	K	L
138	**Assuming Lognormal Distribution**											
139					95% H-UCL	11.86				90% Chebyshev (MVUE) UCL		12.4
140					95% Chebyshev (MVUE) UCL	13.17				97.5% Chebyshev (MVUE) UCL		14.23
141					99% Chebyshev (MVUE) UCL	16.31						
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	11.57				95% Jackknife UCL		11.65
148					95% Standard Bootstrap UCL	11.53				95% Bootstrap-t UCL		11.55
149					95% Hall's Bootstrap UCL	11.54				95% Percentile Bootstrap UCL		11.5
150					95% BCA Bootstrap UCL	11.46						
151					90% Chebyshev(Mean, Sd) UCL	12.28				95% Chebyshev(Mean, Sd) UCL		12.99
152					97.5% Chebyshev(Mean, Sd) UCL	13.98				99% Chebyshev(Mean, Sd) UCL		15.92
153												
154	**Suggested UCL to Use**											
155					95% Student's-t UCL	11.65						
156												
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	**Note: For highly negatively-skewed data, confidence limits (e.g., Chen, Johnson, Lognormal, and Gamma) may not be**											
163	**reliable. Chen's and Johnson's methods provide adjustments for positvely skewed data sets.**											
164												
165												

	A	B	C	D	E	F	G	H	I	J	K	L
166	Cadmium											
167												
168						General Statistics						
169					Total Number of Observations	12				Number of Distinct Observations		4
170										Number of Missing Observations		0
171					Minimum	0.74				Mean		11.85
172					Maximum	16.9				Median		12
173					SD	3.95				Std. Error of Mean		1.14
174					Coefficient of Variation	0.333				Skewness		-2.014
175												
176						Normal GOF Test						
177					Shapiro Wilk Test Statistic	0.627				Shapiro Wilk GOF Test		
178					5% Shapiro Wilk Critical Value	0.859				Data Not Normal at 5% Significance Level		
179					Lilliefors Test Statistic	0.432				Lilliefors GOF Test		
180					5% Lilliefors Critical Value	0.256				Data Not Normal at 5% Significance Level		
181						Data Not Normal at 5% Significance Level						
182												
183						Assuming Normal Distribution						
184					95% Normal UCL					95% UCLs (Adjusted for Skewness)		
185					95% Student's-t UCL	13.9				95% Adjusted-CLT UCL (Chen-1995)		13.02
186										95% Modified-t UCL (Johnson-1978)		13.79
187												
188						Gamma GOF Test						
189					A-D Test Statistic	2.946				Anderson-Darling Gamma GOF Test		
190					5% A-D Critical Value	0.738				Data Not Gamma Distributed at 5% Significance Level		
191					K-S Test Statistic	0.5				Kolmogrov-Smirnoff Gamma GOF Test		
192					5% K-S Critical Value	0.247				Data Not Gamma Distributed at 5% Significance Level		
193						Data Not Gamma Distributed at 5% Significance Level						
194												
195						Gamma Statistics						
196					k hat (MLE)	3.201				k star (bias corrected MLE)		2.456
197					Theta hat (MLE)	3.703				Theta star (bias corrected MLE)		4.826
198					nu hat (MLE)	76.82				nu star (bias corrected)		58.95
199					MLE Mean (bias corrected)	11.85				MLE Sd (bias corrected)		7.563
200										Approximate Chi Square Value (0.05)		42.29
201					Adjusted Level of Significance	0.029				Adjusted Chi Square Value		40.15
202												
203						Assuming Gamma Distribution						
204					95% Approximate Gamma UCL (use when n>=50))	16.52				95% Adjusted Gamma UCL (use when n<50)		17.4
205												
206						Lognormal GOF Test						
207					Shapiro Wilk Test Statistic	0.436				Shapiro Wilk Lognormal GOF Test		
208					5% Shapiro Wilk Critical Value	0.859				Data Not Lognormal at 5% Significance Level		
209					Lilliefors Test Statistic	0.501				Lilliefors Lognormal GOF Test		
210					5% Lilliefors Critical Value	0.256				Data Not Lognormal at 5% Significance Level		
211						Data Not Lognormal at 5% Significance Level						
212												
213						Lognormal Statistics						
214					Minimum of Logged Data	-0.301				Mean of logged Data		2.308
215					Maximum of Logged Data	2.827				SD of logged Data		0.832
216												

	A	B	C	D	E	F	G	H	I	J	K	L
217	**Assuming Lognormal Distribution**											
218					95% H-UCL	27.43				90% Chebyshev (MVUE) UCL		24.12
219					95% Chebyshev (MVUE) UCL	28.84				97.5% Chebyshev (MVUE) UCL		35.38
220					99% Chebyshev (MVUE) UCL	48.24						
221												
222	**Nonparametric Distribution Free UCL Statistics**											
223	**Data do not follow a Discernible Distribution (0.05)**											
224												
225	**Nonparametric Distribution Free UCLs**											
226					95% CLT UCL	13.73				95% Jackknife UCL		13.9
227					95% Standard Bootstrap UCL	N/A				95% Bootstrap-t UCL		N/A
228					95% Hall's Bootstrap UCL	N/A				95% Percentile Bootstrap UCL		N/A
229					95% BCA Bootstrap UCL	N/A						
230					90% Chebyshev(Mean, Sd) UCL	15.27				95% Chebyshev(Mean, Sd) UCL		16.82
231					97.5% Chebyshev(Mean, Sd) UCL	18.97				99% Chebyshev(Mean, Sd) UCL		23.2
232												
233	**Suggested UCL to Use**											
234					95% Chebyshev (Mean, Sd) UCL	16.82						
235												
236	Note: Suggestions regarding the selection of a 95% UCL are provided to help the user to select the most appropriate 95% UCL.											
237	These recommendations are based upon the results of the simulation studies summarized in Singh, Singh, and Iaci (2002)											
238	and Singh and Singh (2003). However, simulations results will not cover all Real World data sets.											
239	For additional insight the user may want to consult a statistician.											
240												
241	**Note: For highly negatively-skewed data, confidence limits (e.g., Chen, Johnson, Lognormal, and Gamma) may not be**											
242	**reliable. Chen's and Johnson's methods provide adjustments for positvely skewed data sets.**											
243												
244												

	A	B	C	D	E	F	G	H	I	J	K	L
245	Chromium											
246												
247						General Statistics						
248					Total Number of Observations	12				Number of Distinct Observations		8
249										Number of Missing Observations		0
250					Minimum	33.8				Mean		65.16
251					Maximum	97.61				Median		67.39
252					SD	23.59				Std. Error of Mean		6.81
253					Coefficient of Variation	0.362				Skewness		-0.0379
254												
255						Normal GOF Test						
256					Shapiro Wilk Test Statistic	0.828				Shapiro Wilk GOF Test		
257					5% Shapiro Wilk Critical Value	0.859				Data Not Normal at 5% Significance Level		
258					Lilliefors Test Statistic	0.3				Lilliefors GOF Test		
259					5% Lilliefors Critical Value	0.256				Data Not Normal at 5% Significance Level		
260						Data Not Normal at 5% Significance Level						
261												
262						Assuming Normal Distribution						
263					95% Normal UCL					95% UCLs (Adjusted for Skewness)		
264					95% Student's-t UCL	77.39				95% Adjusted-CLT UCL (Chen-1995)		76.28
265										95% Modified-t UCL (Johnson-1978)		77.38
266												
267						Gamma GOF Test						
268					A-D Test Statistic	1.045				Anderson-Darling Gamma GOF Test		
269					5% A-D Critical Value	0.731				Data Not Gamma Distributed at 5% Significance Level		
270					K-S Test Statistic	0.314				Kolmogrov-Smirnoff Gamma GOF Test		
271					5% K-S Critical Value	0.246				Data Not Gamma Distributed at 5% Significance Level		
272						Data Not Gamma Distributed at 5% Significance Level						
273												
274						Gamma Statistics						
275					k hat (MLE)	7.761				k star (bias corrected MLE)		5.876
276					Theta hat (MLE)	8.396				Theta star (bias corrected MLE)		11.09
277					nu hat (MLE)	186.3				nu star (bias corrected)		141
278					MLE Mean (bias corrected)	65.16				MLE Sd (bias corrected)		26.88
279										Approximate Chi Square Value (0.05)		114.6
280					Adjusted Level of Significance	0.029				Adjusted Chi Square Value		110.9
281												
282						Assuming Gamma Distribution						
283					95% Approximate Gamma UCL (use when n>=50))	80.2				95% Adjusted Gamma UCL (use when n<50)		82.83
284												
285						Lognormal GOF Test						
286					Shapiro Wilk Test Statistic	0.841				Shapiro Wilk Lognormal GOF Test		
287					5% Shapiro Wilk Critical Value	0.859				Data Not Lognormal at 5% Significance Level		
288					Lilliefors Test Statistic	0.304				Lilliefors Lognormal GOF Test		
289					5% Lilliefors Critical Value	0.256				Data Not Lognormal at 5% Significance Level		
290						Data Not Lognormal at 5% Significance Level						
291												
292						Lognormal Statistics						
293					Minimum of Logged Data	3.52				Mean of logged Data		4.111
294					Maximum of Logged Data	4.581				SD of logged Data		0.387
295												

	A	B	C	D	E	F	G	H	I	J	K	L
296					Assuming Lognormal Distribution							
297					95% H-UCL	83.15				90% Chebyshev (MVUE) UCL		87.54
298					95% Chebyshev (MVUE) UCL	97.6				97.5% Chebyshev (MVUE) UCL		111.6
299					99% Chebyshev (MVUE) UCL	139						
300												
301					Nonparametric Distribution Free UCL Statistics							
302					Data do not follow a Discernible Distribution (0.05)							
303												
304					Nonparametric Distribution Free UCLs							
305					95% CLT UCL	76.36				95% Jackknife UCL		77.39
306					95% Standard Bootstrap UCL	75.79				95% Bootstrap-t UCL		76.51
307					95% Hall's Bootstrap UCL	74.64				95% Percentile Bootstrap UCL		75.68
308					95% BCA Bootstrap UCL	76.41						
309					90% Chebyshev(Mean, Sd) UCL	85.59				95% Chebyshev(Mean, Sd) UCL		94.85
310					97.5% Chebyshev(Mean, Sd) UCL	107.7				99% Chebyshev(Mean, Sd) UCL		132.9
311												
312					Suggested UCL to Use							
313					95% Student's-t UCL	77.39				or 95% Modified-t UCL		77.38
314												
315					Note: Suggestions regarding the selection of a 95% UCL are provided to help the user to select the most appropriate 95% UCL.							
316					These recommendations are based upon the results of the simulation studies summarized in Singh, Singh, and Iaci (2002)							
317					and Singh and Singh (2003). However, simulations results will not cover all Real World data sets.							
318					For additional insight the user may want to consult a statistician.							
319												
320					Note: For highly negatively-skewed data, confidence limits (e.g., Chen, Johnson, Lognormal, and Gamma) may not be							
321					reliable. Chen's and Johnson's methods provide adjustments for positvely skewed data sets.							
322												
323												

	A	B	C	D	E	F	G	H	I	J	K	L
324	Iron											
325												
326					General Statistics							
327					Total Number of Observations	12				Number of Distinct Observations		12
328										Number of Missing Observations		0
329					Minimum	12854				Mean		24363
330					Maximum	39125				Median		23028
331					SD	7514				Std. Error of Mean		2169
332					Coefficient of Variation	0.308				Skewness		0.459
333												
334					Normal GOF Test							
335					Shapiro Wilk Test Statistic	0.965				Shapiro Wilk GOF Test		
336					5% Shapiro Wilk Critical Value	0.859				Data appear Normal at 5% Significance Level		
337					Lilliefors Test Statistic	0.171				Lilliefors GOF Test		
338					5% Lilliefors Critical Value	0.256				Data appear Normal at 5% Significance Level		
339					Data appear Normal at 5% Significance Level							
340												
341					Assuming Normal Distribution							
342					95% Normal UCL					95% UCLs (Adjusted for Skewness)		
343					95% Student's-t UCL	28258				95% Adjusted-CLT UCL (Chen-1995)		28238
344										95% Modified-t UCL (Johnson-1978)		28306
345												
346					Gamma GOF Test							
347					A-D Test Statistic	0.229				Anderson-Darling Gamma GOF Test		
348					5% A-D Critical Value	0.731				Detected data appear Gamma Distributed at 5% Significance Level		
349					K-S Test Statistic	0.166				Kolmogrov-Smirnoff Gamma GOF Test		
350					5% K-S Critical Value	0.245				Detected data appear Gamma Distributed at 5% Significance Level		
351					Detected data appear Gamma Distributed at 5% Significance Level							
352												
353					Gamma Statistics							
354					k hat (MLE)	11.32				k star (bias corrected MLE)		8.543
355					Theta hat (MLE)	2153				Theta star (bias corrected MLE)		2852
356					nu hat (MLE)	271.6				nu star (bias corrected)		205
357					MLE Mean (bias corrected)	24363				MLE Sd (bias corrected)		8335
358										Approximate Chi Square Value (0.05)		172.9
359					Adjusted Level of Significance	0.029				Adjusted Chi Square Value		168.4
360												
361					Assuming Gamma Distribution							
362					95% Approximate Gamma UCL (use when n>=50))	28890				95% Adjusted Gamma UCL (use when n<50)		29663
363												
364					Lognormal GOF Test							
365					Shapiro Wilk Test Statistic	0.972				Shapiro Wilk Lognormal GOF Test		
366					5% Shapiro Wilk Critical Value	0.859				Data appear Lognormal at 5% Significance Level		
367					Lilliefors Test Statistic	0.188				Lilliefors Lognormal GOF Test		
368					5% Lilliefors Critical Value	0.256				Data appear Lognormal at 5% Significance Level		
369					Data appear Lognormal at 5% Significance Level							
370												
371					Lognormal Statistics							
372					Minimum of Logged Data	9.461				Mean of logged Data		10.06
373					Maximum of Logged Data	10.57				SD of logged Data		0.317
374												

	A	B	C	D	E	F	G	H	I	J	K	L
375	**Assuming Lognormal Distribution**											
376					95% H-UCL	29498				90% Chebyshev (MVUE) UCL		31158
377					95% Chebyshev (MVUE) UCL	34223				97.5% Chebyshev (MVUE) UCL		38478
378					99% Chebyshev (MVUE) UCL	46836						
379												
380	**Nonparametric Distribution Free UCL Statistics**											
381	**Data appear to follow a Discernible Distribution at 5% Significance Level**											
382												
383	**Nonparametric Distribution Free UCLs**											
384					95% CLT UCL	27931				95% Jackknife UCL		28258
385					95% Standard Bootstrap UCL	27753				95% Bootstrap-t UCL		28677
386					95% Hall's Bootstrap UCL	29268				95% Percentile Bootstrap UCL		27751
387					95% BCA Bootstrap UCL	27993						
388					90% Chebyshev(Mean, Sd) UCL	30870				95% Chebyshev(Mean, Sd) UCL		33818
389					97.5% Chebyshev(Mean, Sd) UCL	37909				99% Chebyshev(Mean, Sd) UCL		45945
390												
391	**Suggested UCL to Use**											
392					95% Student's-t UCL	28258						
393												
394	Note: Suggestions regarding the selection of a 95% UCL are provided to help the user to select the most appropriate 95% UCL.											
395	These recommendations are based upon the results of the simulation studies summarized in Singh, Singh, and Iaci (2002)											
396	and Singh and Singh (2003). However, simulations results will not cover all Real World data sets.											
397	For additional insight the user may want to consult a statistician.											
398												
399												

	A	B	C	D	E	F	G	H	I	J	K	L
400	Mercury											
401												
402						General Statistics						
403					Total Number of Observations	12				Number of Distinct Observations		3
404										Number of Missing Observations		0
405					Minimum	9.03				Mean		9.923
406					Maximum	10.04				Median		10
407					SD	0.281				Std. Error of Mean		0.0812
408					Coefficient of Variation	0.0283				Skewness		-3.453
409												
410						Normal GOF Test						
411					Shapiro Wilk Test Statistic	0.351				Shapiro Wilk GOF Test		
412					5% Shapiro Wilk Critical Value	0.859				Data Not Normal at 5% Significance Level		
413					Lilliefors Test Statistic	0.525				Lilliefors GOF Test		
414					5% Lilliefors Critical Value	0.256				Data Not Normal at 5% Significance Level		
415						Data Not Normal at 5% Significance Level						
416												
417						Assuming Normal Distribution						
418					95% Normal UCL					95% UCLs (Adjusted for Skewness)		
419					95% Student's-t UCL	10.07				95% Adjusted-CLT UCL (Chen-1995)		9.97
420										95% Modified-t UCL (Johnson-1978)		10.05
421												
422						Gamma GOF Test						
423					A-D Test Statistic	3.9				Anderson-Darling Gamma GOF Test		
424					5% A-D Critical Value	0.731				Data Not Gamma Distributed at 5% Significance Level		
425					K-S Test Statistic	0.53				Kolmogrov-Smirnoff Gamma GOF Test		
426					5% K-S Critical Value	0.245				Data Not Gamma Distributed at 5% Significance Level		
427						Data Not Gamma Distributed at 5% Significance Level						
428												
429						Gamma Statistics						
430					k hat (MLE)	1283				k star (bias corrected MLE)		962
431					Theta hat (MLE)	0.00774				Theta star (bias corrected MLE)		0.0103
432					nu hat (MLE)	30783				nu star (bias corrected)		23089
433					MLE Mean (bias corrected)	9.923				MLE Sd (bias corrected)		0.32
434										Approximate Chi Square Value (0.05)		22737
435					Adjusted Level of Significance	0.029				Adjusted Chi Square Value		22683
436												
437						Assuming Gamma Distribution						
438					95% Approximate Gamma UCL (use when n>=50))	10.08				95% Adjusted Gamma UCL (use when n<50)		10.1
439												
440						Lognormal GOF Test						
441					Shapiro Wilk Test Statistic	0.35				Shapiro Wilk Lognormal GOF Test		
442					5% Shapiro Wilk Critical Value	0.859				Data Not Lognormal at 5% Significance Level		
443					Lilliefors Test Statistic	0.525				Lilliefors Lognormal GOF Test		
444					5% Lilliefors Critical Value	0.256				Data Not Lognormal at 5% Significance Level		
445						Data Not Lognormal at 5% Significance Level						
446												
447						Lognormal Statistics						
448					Minimum of Logged Data	2.201				Mean of logged Data		2.294
449					Maximum of Logged Data	2.307				SD of logged Data		0.0296
450												

	A	B	C	D	E	F	G	H	I	J	K	L
451					Assuming Lognormal Distribution							
452					95% H-UCL	N/A				90% Chebyshev (MVUE) UCL		10.18
453				95% Chebyshev (MVUE) UCL		10.29				97.5% Chebyshev (MVUE) UCL		10.45
454				99% Chebyshev (MVUE) UCL		10.77						
455												
456					Nonparametric Distribution Free UCL Statistics							
457					Data do not follow a Discernible Distribution (0.05)							
458												
459					Nonparametric Distribution Free UCLs							
460					95% CLT UCL	10.06				95% Jackknife UCL		10.07
461				95% Standard Bootstrap UCL		N/A				95% Bootstrap-t UCL		N/A
462				95% Hall's Bootstrap UCL		N/A				95% Percentile Bootstrap UCL		N/A
463				95% BCA Bootstrap UCL		N/A						
464				90% Chebyshev(Mean, Sd) UCL		10.17				95% Chebyshev(Mean, Sd) UCL		10.28
465				97.5% Chebyshev(Mean, Sd) UCL		10.43				99% Chebyshev(Mean, Sd) UCL		10.73
466												
467					Suggested UCL to Use							
468					95% Student's-t UCL	10.07				or 95% Modified-t UCL		10.05
469												
470					Recommended UCL exceeds the maximum observation							
471												
472					Note: Suggestions regarding the selection of a 95% UCL are provided to help the user to select the most appropriate 95% UCL.							
473					These recommendations are based upon the results of the simulation studies summarized in Singh, Singh, and Iaci (2002)							
474					and Singh and Singh (2003). However, simulations results will not cover all Real World data sets.							
475					For additional insight the user may want to consult a statistician.							
476												
477					Note: For highly negatively-skewed data, confidence limits (e.g., Chen, Johnson, Lognormal, and Gamma) may not be							
478					reliable. Chen's and Johnson's methods provide adjustments for positvely skewed data sets.							
479												
480												

	A	B	C	D	E	F	G	H	I	J	K	L
481	Neptunium-237											
482												
483						General Statistics						
484					Total Number of Observations	12				Number of Distinct Observations		1
485										Number of Missing Observations		0
486					Minimum	0.365				Mean		0.365
487					Maximum	0.365				Median		0.365
488												
489						Warning: There is only one distinct observation value in this data set - resulting in '0' variance!						
490						ProUCL (or any other software) should not be used on such a data set!						
491						The data set for variable Neptunium-237 was not processed!						
492												
493						If possible, compute and collect Data Quality Objectives (DQOs) based sample size and analytical results.						
494						The Project Team may decide to use alternative site specific values to estimate environmental parameters (e.g., EPC, BTV).						
495												
496												
497												

	A	B	C	D	E	F	G	H	I	J	K	L
498	Nickel											
499												
500						General Statistics						
501					Total Number of Observations	12				Number of Distinct Observations		11
502										Number of Missing Observations		0
503					Minimum	65				Mean		141.7
504					Maximum	318.1				Median		127.8
505					SD	77.11				Std. Error of Mean		22.26
506					Coefficient of Variation	0.544				Skewness		1.214
507												
508						Normal GOF Test						
509					Shapiro Wilk Test Statistic	0.882				Shapiro Wilk GOF Test		
510					5% Shapiro Wilk Critical Value	0.859				Data appear Normal at 5% Significance Level		
511					Lilliefors Test Statistic	0.179				Lilliefors GOF Test		
512					5% Lilliefors Critical Value	0.256				Data appear Normal at 5% Significance Level		
513						Data appear Normal at 5% Significance Level						
514												
515						Assuming Normal Distribution						
516					95% Normal UCL					95% UCLs (Adjusted for Skewness)		
517					95% Student's-t UCL	181.7				95% Adjusted-CLT UCL (Chen-1995)		186.7
518										95% Modified-t UCL (Johnson-1978)		183
519												
520						Gamma GOF Test						
521					A-D Test Statistic	0.316				Anderson-Darling Gamma GOF Test		
522					5% A-D Critical Value	0.735				Detected data appear Gamma Distributed at 5% Significance Level		
523					K-S Test Statistic	0.189				Kolmogrov-Smirnoff Gamma GOF Test		
524					5% K-S Critical Value	0.246				Detected data appear Gamma Distributed at 5% Significance Level		
525						Detected data appear Gamma Distributed at 5% Significance Level						
526												
527						Gamma Statistics						
528					k hat (MLE)	4.22				k star (bias corrected MLE)		3.22
529					Theta hat (MLE)	33.59				Theta star (bias corrected MLE)		44.02
530					nu hat (MLE)	101.3				nu star (bias corrected)		77.29
531					MLE Mean (bias corrected)	141.7				MLE Sd (bias corrected)		78.99
532										Approximate Chi Square Value (0.05)		58.04
533					Adjusted Level of Significance	0.029				Adjusted Chi Square Value		55.5
534												
535						Assuming Gamma Distribution						
536					95% Approximate Gamma UCL (use when n>=50))	188.8				95% Adjusted Gamma UCL (use when n<50)		197.4
537												
538						Lognormal GOF Test						
539					Shapiro Wilk Test Statistic	0.95				Shapiro Wilk Lognormal GOF Test		
540					5% Shapiro Wilk Critical Value	0.859				Data appear Lognormal at 5% Significance Level		
541					Lilliefors Test Statistic	0.176				Lilliefors Lognormal GOF Test		
542					5% Lilliefors Critical Value	0.256				Data appear Lognormal at 5% Significance Level		
543						Data appear Lognormal at 5% Significance Level						
544												
545						Lognormal Statistics						
546					Minimum of Logged Data	4.174				Mean of logged Data		4.831
547					Maximum of Logged Data	5.762				SD of logged Data		0.51
548												

	A	B	C	D	E	F	G	H	I	J	K	L
549	**Assuming Lognormal Distribution**											
550					95% H-UCL	198.9				90% Chebyshev (MVUE) UCL		205
551					95% Chebyshev (MVUE) UCL	233.9				97.5% Chebyshev (MVUE) UCL		274.1
552					99% Chebyshev (MVUE) UCL	353						
553												
554	**Nonparametric Distribution Free UCL Statistics**											
555	**Data appear to follow a Discernible Distribution at 5% Significance Level**											
556												
557	**Nonparametric Distribution Free UCLs**											
558					95% CLT UCL	178.4				95% Jackknife UCL		181.7
559					95% Standard Bootstrap UCL	177				95% Bootstrap-t UCL		202.2
560					95% Hall's Bootstrap UCL	210.7				95% Percentile Bootstrap UCL		179
561					95% BCA Bootstrap UCL	186.9						
562					90% Chebyshev(Mean, Sd) UCL	208.5				95% Chebyshev(Mean, Sd) UCL		238.8
563					97.5% Chebyshev(Mean, Sd) UCL	280.8				99% Chebyshev(Mean, Sd) UCL		363.2
564												
565	**Suggested UCL to Use**											
566					95% Student's-t UCL	181.7						
567												
568	Note: Suggestions regarding the selection of a 95% UCL are provided to help the user to select the most appropriate 95% UCL.											
569	These recommendations are based upon the results of the simulation studies summarized in Singh, Singh, and Iaci (2002)											
570	and Singh and Singh (2003). However, simulations results will not cover all Real World data sets.											
571	For additional insight the user may want to consult a statistician.											
572												
573												

	A	B	C	D	E	F	G	H	I	J	K	L
574	PAH, Total											
575												
576					General Statistics							
577					Total Number of Observations	12				Number of Distinct Observations		1
578										Number of Missing Observations		0
579					Minimum	0.308				Mean		0.308
580					Maximum	0.308				Median		0.308
581												
582					Warning: There is only one distinct observation value in this data set - resulting in '0' variance!							
583					ProUCL (or any other software) should not be used on such a data set!							
584					The data set for variable PAH, Total was not processed!							
585												
586					If possible, compute and collect Data Quality Objectives (DQOs) based sample size and analytical results.							
587					The Project Team may decide to use alternative site specific values to estimate environmental parameters (e.g., EPC, BTV).							
588												
589												
590												

	A	B	C	D	E	F	G	H	I	J	K	L
591	PCB, Total											
592												
593						General Statistics						
594					Total Number of Observations	12				Number of Distinct Observations		2
595										Number of Missing Observations		0
596					Minimum	4.9				Mean		4.992
597					Maximum	5				Median		5
598					SD	0.0289				Std. Error of Mean		0.00833
599					Coefficient of Variation	0.00578				Skewness		-3.464
600												
601						Normal GOF Test						
602					Shapiro Wilk Test Statistic	0.327				Shapiro Wilk GOF Test		
603					5% Shapiro Wilk Critical Value	0.859				Data Not Normal at 5% Significance Level		
604					Lilliefors Test Statistic	0.53				Lilliefors GOF Test		
605					5% Lilliefors Critical Value	0.256				Data Not Normal at 5% Significance Level		
606						Data Not Normal at 5% Significance Level						
607												
608						Assuming Normal Distribution						
609					95% Normal UCL					95% UCLs (Adjusted for Skewness)		
610					95% Student's-t UCL	5.007				95% Adjusted-CLT UCL (Chen-1995)		4.996
611										95% Modified-t UCL (Johnson-1978)		5.005
612												
613						Gamma GOF Test						
614					A-D Test Statistic	4.094				Anderson-Darling Gamma GOF Test		
615					5% A-D Critical Value	0.731				Data Not Gamma Distributed at 5% Significance Level		
616					K-S Test Statistic	0.535				Kolmogrov-Smirnoff Gamma GOF Test		
617					5% K-S Critical Value	0.245				Data Not Gamma Distributed at 5% Significance Level		
618						Data Not Gamma Distributed at 5% Significance Level						
619												
620						Gamma Statistics						
621					k hat (MLE)	32254				k star (bias corrected MLE)		24191
622					Theta hat (MLE)	1.5476E-4				Theta star (bias corrected MLE)		2.0635E-4
623					nu hat (MLE)	774106				nu star (bias corrected)		580580
624					MLE Mean (bias corrected)	4.992				MLE Sd (bias corrected)		0.0321
625										Approximate Chi Square Value (0.05)		578809
626					Adjusted Level of Significance	0.029				Adjusted Chi Square Value		578539
627												
628						Assuming Gamma Distribution						
629					95% Approximate Gamma UCL (use when n>=50))	5.007				95% Adjusted Gamma UCL (use when n<50)		5.009
630												
631						Lognormal GOF Test						
632					Shapiro Wilk Test Statistic	0.327				Shapiro Wilk Lognormal GOF Test		
633					5% Shapiro Wilk Critical Value	0.859				Data Not Lognormal at 5% Significance Level		
634					Lilliefors Test Statistic	0.53				Lilliefors Lognormal GOF Test		
635					5% Lilliefors Critical Value	0.256				Data Not Lognormal at 5% Significance Level		
636						Data Not Lognormal at 5% Significance Level						
637												
638						Lognormal Statistics						
639					Minimum of Logged Data	1.589				Mean of logged Data		1.608
640					Maximum of Logged Data	1.609				SD of logged Data		0.00583
641												

	A	B	C	D	E	F	G	H	I	J	K	L
642					Assuming Lognormal Distribution							
643					95% H-UCL	N/A			90% Chebyshev (MVUE) UCL			5.017
644				95% Chebyshev (MVUE) UCL		5.028			97.5% Chebyshev (MVUE) UCL			5.044
645				99% Chebyshev (MVUE) UCL		5.075						
646												
647					Nonparametric Distribution Free UCL Statistics							
648					Data do not follow a Discernible Distribution (0.05)							
649												
650					Nonparametric Distribution Free UCLs							
651					95% CLT UCL	5.005			95% Jackknife UCL			N/A
652				95% Standard Bootstrap UCL		N/A			95% Bootstrap-t UCL			N/A
653				95% Hall's Bootstrap UCL		N/A			95% Percentile Bootstrap UCL			N/A
654				95% BCA Bootstrap UCL		N/A						
655				90% Chebyshev(Mean, Sd) UCL		5.017			95% Chebyshev(Mean, Sd) UCL			5.028
656				97.5% Chebyshev(Mean, Sd) UCL		5.044			99% Chebyshev(Mean, Sd) UCL			5.075
657												
658					Suggested UCL to Use							
659					95% Student's-t UCL	5.007			or 95% Modified-t UCL			5.005
660												
661					Recommended UCL exceeds the maximum observation							
662												
663					Note: Suggestions regarding the selection of a 95% UCL are provided to help the user to select the most appropriate 95% UCL.							
664					These recommendations are based upon the results of the simulation studies summarized in Singh, Singh, and Iaci (2002)							
665					and Singh and Singh (2003). However, simulations results will not cover all Real World data sets.							
666					For additional insight the user may want to consult a statistician.							
667												
668					Note: For highly negatively-skewed data, confidence limits (e.g., Chen, Johnson, Lognormal, and Gamma) may not be							
669					reliable. Chen's and Johnson's methods provide adjustments for positvely skewed data sets.							
670												
671												

	A	B	C	D	E	F	G	H	I	J	K	L
672	Uranium											
673												
674					General Statistics							
675					Total Number of Observations	12				Number of Distinct Observations		12
676										Number of Missing Observations		0
677					Minimum	7.69				Mean		33.27
678					Maximum	81.68				Median		28.85
679					SD	21.75				Std. Error of Mean		6.279
680					Coefficient of Variation	0.654				Skewness		0.994
681												
682					Normal GOF Test							
683					Shapiro Wilk Test Statistic	0.921				Shapiro Wilk GOF Test		
684					5% Shapiro Wilk Critical Value	0.859				Data appear Normal at 5% Significance Level		
685					Lilliefors Test Statistic	0.162				Lilliefors GOF Test		
686					5% Lilliefors Critical Value	0.256				Data appear Normal at 5% Significance Level		
687					Data appear Normal at 5% Significance Level							
688												
689					Assuming Normal Distribution							
690					95% Normal UCL					95% UCLs (Adjusted for Skewness)		
691					95% Student's-t UCL	44.55				95% Adjusted-CLT UCL (Chen-1995)		45.52
692										95% Modified-t UCL (Johnson-1978)		44.85
693												
694					Gamma GOF Test							
695					A-D Test Statistic	0.176				Anderson-Darling Gamma GOF Test		
696					5% A-D Critical Value	0.74				Detected data appear Gamma Distributed at 5% Significance Level		
697					K-S Test Statistic	0.114				Kolmogrov-Smirnoff Gamma GOF Test		
698					5% K-S Critical Value	0.248				Detected data appear Gamma Distributed at 5% Significance Level		
699					Detected data appear Gamma Distributed at 5% Significance Level							
700												
701					Gamma Statistics							
702					k hat (MLE)	2.517				k star (bias corrected MLE)		1.944
703					Theta hat (MLE)	13.22				Theta star (bias corrected MLE)		17.12
704					nu hat (MLE)	60.42				nu star (bias corrected)		46.65
705					MLE Mean (bias corrected)	33.27				MLE Sd (bias corrected)		23.86
706										Approximate Chi Square Value (0.05)		31.98
707					Adjusted Level of Significance	0.029				Adjusted Chi Square Value		30.13
708												
709					Assuming Gamma Distribution							
710					95% Approximate Gamma UCL (use when n>=50))	48.53				95% Adjusted Gamma UCL (use when n<50)		51.51
711												
712					Lognormal GOF Test							
713					Shapiro Wilk Test Statistic	0.972				Shapiro Wilk Lognormal GOF Test		
714					5% Shapiro Wilk Critical Value	0.859				Data appear Lognormal at 5% Significance Level		
715					Lilliefors Test Statistic	0.13				Lilliefors Lognormal GOF Test		
716					5% Lilliefors Critical Value	0.256				Data appear Lognormal at 5% Significance Level		
717					Data appear Lognormal at 5% Significance Level							
718												
719					Lognormal Statistics							
720					Minimum of Logged Data	2.04				Mean of logged Data		3.293
721					Maximum of Logged Data	4.403				SD of logged Data		0.709
722												

	A	B	C	D	E	F	G	H	I	J	K	L
723					Assuming Lognormal Distribution							
724					95% H-UCL	58.18				90% Chebyshev (MVUE) UCL		55.4
725				95% Chebyshev (MVUE) UCL		65.19				97.5% Chebyshev (MVUE) UCL		78.79
726				99% Chebyshev (MVUE) UCL		105.5						
727												
728					Nonparametric Distribution Free UCL Statistics							
729					Data appear to follow a Discernible Distribution at 5% Significance Level							
730												
731					Nonparametric Distribution Free UCLs							
732					95% CLT UCL	43.6				95% Jackknife UCL		44.55
733				95% Standard Bootstrap UCL		43.11				95% Bootstrap-t UCL		47.79
734				95% Hall's Bootstrap UCL		50.9				95% Percentile Bootstrap UCL		44.13
735				95% BCA Bootstrap UCL		45.63						
736				90% Chebyshev(Mean, Sd) UCL		52.11				95% Chebyshev(Mean, Sd) UCL		60.64
737				97.5% Chebyshev(Mean, Sd) UCL		72.48				99% Chebyshev(Mean, Sd) UCL		95.75
738												
739					Suggested UCL to Use							
740					95% Student's-t UCL	44.55						
741												
742					Note: Suggestions regarding the selection of a 95% UCL are provided to help the user to select the most appropriate 95% UCL.							
743					These recommendations are based upon the results of the simulation studies summarized in Singh, Singh, and Iaci (2002)							
744					and Singh and Singh (2003). However, simulations results will not cover all Real World data sets.							
745					For additional insight the user may want to consult a statistician.							
746												
747												
748	Uranium-238											
749												
750					General Statistics							
751					Total Number of Observations	12				Number of Distinct Observations		1
752										Number of Missing Observations		0
753					Minimum	6.64				Mean		6.64
754					Maximum	6.64				Median		6.64
755												
756					Warning: There is only one distinct observation value in this data set - resulting in '0' variance!							
757					ProUCL (or any other software) should not be used on such a data set!							
758					The data set for variable Uranium-238 was not processed!							
759												
760					If possible, compute and collect Data Quality Objectives (DQOs) based sample size and analytical results.							
761					The Project Team may decide to use alternative site specific values to estimate environmental parameters (e.g., EPC, BTV).							
762												
763												