	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 11:33:57 AM								
5	From File			EPC_015Surf_EU09.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		12
15										Number of Missing Observations		0
16					Minimum	0.28				Mean		87.25
17					Maximum	161.4				Median		86.77
18					SD	47.33				Std. Error of Mean		13.66
19					Coefficient of Variation	0.543				Skewness		-0.215
20												
21						Normal GOF Test						
22					Shapiro Wilk Test Statistic	0.978				Shapiro Wilk GOF Test		
23					5% Shapiro Wilk Critical Value	0.859				Data appear Normal at 5% Significance Level		
24					Lilliefors Test Statistic	0.128				Lilliefors GOF Test		
25					5% Lilliefors Critical Value	0.256				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	111.8				95% Adjusted-CLT UCL (Chen-1995)		108.8
31										95% Modified-t UCL (Johnson-1978)		111.6
32												
33						Gamma GOF Test						
34					A-D Test Statistic	1.224				Anderson-Darling Gamma GOF Test		
35					5% A-D Critical Value	0.753				Data Not Gamma Distributed at 5% Significance Level		
36					K-S Test Statistic	0.265				Kolmogrov-Smirnoff Gamma GOF Test		
37					5% K-S Critical Value	0.251				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)	1.158				k star (bias corrected MLE)		0.924
42					Theta hat (MLE)	75.34				Theta star (bias corrected MLE)		94.41
43					nu hat (MLE)	27.79				nu star (bias corrected)		22.18
44					MLE Mean (bias corrected)	87.25				MLE Sd (bias corrected)		90.76
45										Approximate Chi Square Value (0.05)		12.47
46					Adjusted Level of Significance	0.029				Adjusted Chi Square Value		11.37
47												
48						Assuming Gamma Distribution						
49					95% Approximate Gamma UCL (use when n>=50))	155.1				95% Adjusted Gamma UCL (use when n<50)		170.1
50												
51						Lognormal GOF Test						
52					Shapiro Wilk Test Statistic	0.58				Shapiro Wilk Lognormal GOF Test		
53					5% Shapiro Wilk Critical Value	0.859				Data Not Lognormal at 5% Significance Level		
54					Lilliefors Test Statistic	0.307				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	-1.273				Mean of logged Data		3.978
60					Maximum of Logged Data	5.084				SD of logged Data		1.721
61												

	A	B	C	D	E	F	G	H	I	J	K	L
62	**Assuming Lognormal Distribution**											
63					95% H-UCL	2255			90% Chebyshev (MVUE) UCL			486.7
64					95% Chebyshev (MVUE) UCL	623.4			97.5% Chebyshev (MVUE) UCL			813.1
65					99% Chebyshev (MVUE) UCL	1186						
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	109.7			95% Jackknife UCL			111.8
72					95% Standard Bootstrap UCL	108.4			95% Bootstrap-t UCL			110.6
73					95% Hall's Bootstrap UCL	110.2			95% Percentile Bootstrap UCL			109.3
74					95% BCA Bootstrap UCL	107.6						
75					90% Chebyshev(Mean, Sd) UCL	128.2			95% Chebyshev(Mean, Sd) UCL			146.8
76					97.5% Chebyshev(Mean, Sd) UCL	172.6			99% Chebyshev(Mean, Sd) UCL			223.2
77												
78	**Suggested UCL to Use**											
79					95% Student's-t UCL	111.8						
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	**Note: For highly negatively-skewed data, confidence limits (e.g., Chen, Johnson, Lognormal, and Gamma) may not be**											
87	**reliable. Chen's and Johnson's methods provide adjustments for positvely skewed data sets.**											
88												
89												

	A	B	C	D	E	F	G	H	I	J	K	L
90	Arsenic											
91												
92						General Statistics						
93					Total Number of Observations	12				Number of Distinct Observations		7
94										Number of Missing Observations		0
95					Minimum	7.72				Mean		10.27
96					Maximum	12.41				Median		11
97					SD	1.497				Std. Error of Mean		0.432
98					Coefficient of Variation	0.146				Skewness		-0.873
99												
100						Normal GOF Test						
101					Shapiro Wilk Test Statistic	0.79				Shapiro Wilk GOF Test		
102					5% Shapiro Wilk Critical Value	0.859				Data Not Normal at 5% Significance Level		
103					Lilliefors Test Statistic	0.299				Lilliefors GOF Test		
104					5% Lilliefors Critical Value	0.256				Data Not Normal at 5% Significance Level		
105						Data Not Normal at 5% Significance Level						
106												
107						Assuming Normal Distribution						
108					95% Normal UCL					95% UCLs (Adjusted for Skewness)		
109					95% Student's-t UCL	11.04				95% Adjusted-CLT UCL (Chen-1995)		10.86
110										95% Modified-t UCL (Johnson-1978)		11.02
111												
112						Gamma GOF Test						
113					A-D Test Statistic	1.493				Anderson-Darling Gamma GOF Test		
114					5% A-D Critical Value	0.73				Data Not Gamma Distributed at 5% Significance Level		
115					K-S Test Statistic	0.315				Kolmogrov-Smirnoff Gamma GOF Test		
116					5% K-S Critical Value	0.245				Data Not Gamma Distributed at 5% Significance Level		
117						Data Not Gamma Distributed at 5% Significance Level						
118												
119						Gamma Statistics						
120					k hat (MLE)	46.95				k star (bias corrected MLE)		35.26
121					Theta hat (MLE)	0.219				Theta star (bias corrected MLE)		0.291
122					nu hat (MLE)	1127				nu star (bias corrected)		846.3
123					MLE Mean (bias corrected)	10.27				MLE Sd (bias corrected)		1.729
124										Approximate Chi Square Value (0.05)		779.8
125					Adjusted Level of Significance	0.029				Adjusted Chi Square Value		770.1
126												
127						Assuming Gamma Distribution						
128					95% Approximate Gamma UCL (use when n>=50))	11.14				95% Adjusted Gamma UCL (use when n<50)		11.28
129												
130						Lognormal GOF Test						
131					Shapiro Wilk Test Statistic	0.767				Shapiro Wilk Lognormal GOF Test		
132					5% Shapiro Wilk Critical Value	0.859				Data Not Lognormal at 5% Significance Level		
133					Lilliefors Test Statistic	0.313				Lilliefors Lognormal GOF Test		
134					5% Lilliefors Critical Value	0.256				Data Not Lognormal at 5% Significance Level		
135						Data Not Lognormal at 5% Significance Level						
136												
137						Lognormal Statistics						
138					Minimum of Logged Data	2.044				Mean of logged Data		2.318
139					Maximum of Logged Data	2.519				SD of logged Data		0.156
140												

	A	B	C	D	E	F	G	H	I	J	K	L
141	**Assuming Lognormal Distribution**											
142					95% H-UCL	11.2				90% Chebyshev (MVUE) UCL		11.66
143					95% Chebyshev (MVUE) UCL	12.3				97.5% Chebyshev (MVUE) UCL		13.17
144					99% Chebyshev (MVUE) UCL	14.89						
145												
146	**Nonparametric Distribution Free UCL Statistics**											
147	**Data do not follow a Discernible Distribution (0.05)**											
148												
149	**Nonparametric Distribution Free UCLs**											
150					95% CLT UCL	10.98				95% Jackknife UCL		11.04
151					95% Standard Bootstrap UCL	10.94				95% Bootstrap-t UCL		10.9
152					95% Hall's Bootstrap UCL	10.84				95% Percentile Bootstrap UCL		10.94
153					95% BCA Bootstrap UCL	10.85						
154					90% Chebyshev(Mean, Sd) UCL	11.56				95% Chebyshev(Mean, Sd) UCL		12.15
155					97.5% Chebyshev(Mean, Sd) UCL	12.96				99% Chebyshev(Mean, Sd) UCL		14.56
156												
157	**Suggested UCL to Use**											
158					95% Student's-t UCL	11.04				or 95% Modified-t UCL		11.02
159												
160	Note: Suggestions regarding the selection of a 95% UCL are provided to help the user to select the most appropriate 95% UCL.											
161	These recommendations are based upon the results of the simulation studies summarized in Singh, Singh, and Iaci (2002)											
162	and Singh and Singh (2003). However, simulations results will not cover all Real World data sets.											
163	For additional insight the user may want to consult a statistician.											
164												
165	**Note: For highly negatively-skewed data, confidence limits (e.g., Chen, Johnson, Lognormal, and Gamma) may not be**											
166	**reliable. Chen's and Johnson's methods provide adjustments for positvely skewed data sets.**											
167												
168												

	A	B	C	D	E	F	G	H	I	J	K	L
169	Cadmium											
170												
171					General Statistics							
172					Total Number of Observations	12				Number of Distinct Observations		4
173										Number of Missing Observations		0
174					Minimum	0.075				Mean		12.12
175					Maximum	21.56				Median		12
176					SD	4.751				Std. Error of Mean		1.372
177					Coefficient of Variation	0.392				Skewness		-0.872
178												
179					Normal GOF Test							
180					Shapiro Wilk Test Statistic	0.685				Shapiro Wilk GOF Test		
181					5% Shapiro Wilk Critical Value	0.859				Data Not Normal at 5% Significance Level		
182					Lilliefors Test Statistic	0.406				Lilliefors GOF Test		
183					5% Lilliefors Critical Value	0.256				Data Not Normal at 5% Significance Level		
184					Data Not Normal at 5% Significance Level							
185												
186					Assuming Normal Distribution							
187					95% Normal UCL					95% UCLs (Adjusted for Skewness)		
188					95% Student's-t UCL	14.59				95% Adjusted-CLT UCL (Chen-1995)		14.01
189										95% Modified-t UCL (Johnson-1978)		14.53
190												
191					Gamma GOF Test							
192					A-D Test Statistic	3.139				Anderson-Darling Gamma GOF Test		
193					5% A-D Critical Value	0.745				Data Not Gamma Distributed at 5% Significance Level		
194					K-S Test Statistic	0.519				Kolmogrov-Smirnoff Gamma GOF Test		
195					5% K-S Critical Value	0.249				Data Not Gamma Distributed at 5% Significance Level		
196					Data Not Gamma Distributed at 5% Significance Level							
197												
198					Gamma Statistics							
199					k hat (MLE)	1.53				k star (bias corrected MLE)		1.203
200					Theta hat (MLE)	7.926				Theta star (bias corrected MLE)		10.08
201					nu hat (MLE)	36.71				nu star (bias corrected)		28.87
202					MLE Mean (bias corrected)	12.12				MLE Sd (bias corrected)		11.06
203										Approximate Chi Square Value (0.05)		17.6
204					Adjusted Level of Significance	0.029				Adjusted Chi Square Value		16.27
205												
206					Assuming Gamma Distribution							
207					95% Approximate Gamma UCL (use when n>=50))	19.88				95% Adjusted Gamma UCL (use when n<50)		21.51
208												
209					Lognormal GOF Test							
210					Shapiro Wilk Test Statistic	0.413				Shapiro Wilk Lognormal GOF Test		
211					5% Shapiro Wilk Critical Value	0.859				Data Not Lognormal at 5% Significance Level		
212					Lilliefors Test Statistic	0.509				Lilliefors Lognormal GOF Test		
213					5% Lilliefors Critical Value	0.256				Data Not Lognormal at 5% Significance Level		
214					Data Not Lognormal at 5% Significance Level							
215												
216					Lognormal Statistics							
217					Minimum of Logged Data	-2.59				Mean of logged Data		2.134
218					Maximum of Logged Data	3.071				SD of logged Data		1.499
219												

	A	B	C	D	E	F	G	H	I	J	K	L
220	**Assuming Lognormal Distribution**											
221					95% H-UCL	150.8				90% Chebyshev (MVUE) UCL		53.42
222				95% Chebyshev (MVUE) UCL		67.63				97.5% Chebyshev (MVUE) UCL		87.34
223				99% Chebyshev (MVUE) UCL		126.1						
224												
225	**Nonparametric Distribution Free UCL Statistics**											
226	**Data do not follow a Discernible Distribution (0.05)**											
227												
228	**Nonparametric Distribution Free UCLs**											
229					95% CLT UCL	14.38				95% Jackknife UCL		14.59
230				95% Standard Bootstrap UCL		N/A				95% Bootstrap-t UCL		N/A
231				95% Hall's Bootstrap UCL		N/A				95% Percentile Bootstrap UCL		N/A
232				95% BCA Bootstrap UCL		N/A						
233				90% Chebyshev(Mean, Sd) UCL		16.24				95% Chebyshev(Mean, Sd) UCL		18.1
234				97.5% Chebyshev(Mean, Sd) UCL		20.69				99% Chebyshev(Mean, Sd) UCL		25.77
235												
236	**Suggested UCL to Use**											
237				95% Chebyshev (Mean, Sd) UCL		18.1						
238												
239	Note: Suggestions regarding the selection of a 95% UCL are provided to help the user to select the most appropriate 95% UCL.											
240	These recommendations are based upon the results of the simulation studies summarized in Singh, Singh, and Iaci (2002)											
241	and Singh and Singh (2003). However, simulations results will not cover all Real World data sets.											
242	For additional insight the user may want to consult a statistician.											
243												
244	**Note: For highly negatively-skewed data, confidence limits (e.g., Chen, Johnson, Lognormal, and Gamma) may not be**											
245	**reliable. Chen's and Johnson's methods provide adjustments for positvely skewed data sets.**											
246												
247												

	A	B	C	D	E	F	G	H	I	J	K	L
248	Chromium											
249												
250						General Statistics						
251					Total Number of Observations	12				Number of Distinct Observations		4
252										Number of Missing Observations		0
253					Minimum	51.88				Mean		84.74
254					Maximum	140.6				Median		85
255					SD	20.97				Std. Error of Mean		6.055
256					Coefficient of Variation	0.248				Skewness		1.446
257												
258						Normal GOF Test						
259					Shapiro Wilk Test Statistic	0.673				Shapiro Wilk GOF Test		
260					5% Shapiro Wilk Critical Value	0.859				Data Not Normal at 5% Significance Level		
261					Lilliefors Test Statistic	0.412				Lilliefors GOF Test		
262					5% Lilliefors Critical Value	0.256				Data Not Normal at 5% Significance Level		
263						Data Not Normal at 5% Significance Level						
264												
265						Assuming Normal Distribution						
266					95% Normal UCL					95% UCLs (Adjusted for Skewness)		
267					95% Student's-t UCL	95.61				95% Adjusted-CLT UCL (Chen-1995)		97.4
268										95% Modified-t UCL (Johnson-1978)		96.03
269												
270						Gamma GOF Test						
271					A-D Test Statistic	1.981				Anderson-Darling Gamma GOF Test		
272					5% A-D Critical Value	0.732				Data Not Gamma Distributed at 5% Significance Level		
273					K-S Test Statistic	0.381				Kolmogrov-Smirnoff Gamma GOF Test		
274					5% K-S Critical Value	0.245				Data Not Gamma Distributed at 5% Significance Level		
275						Data Not Gamma Distributed at 5% Significance Level						
276												
277						Gamma Statistics						
278					k hat (MLE)	19.4				k star (bias corrected MLE)		14.61
279					Theta hat (MLE)	4.367				Theta star (bias corrected MLE)		5.8
280					nu hat (MLE)	465.7				nu star (bias corrected)		350.6
281					MLE Mean (bias corrected)	84.74				MLE Sd (bias corrected)		22.17
282										Approximate Chi Square Value (0.05)		308.2
283					Adjusted Level of Significance	0.029				Adjusted Chi Square Value		302.2
284												
285						Assuming Gamma Distribution						
286					95% Approximate Gamma UCL (use when n>=50))	96.39				95% Adjusted Gamma UCL (use when n<50)		98.33
287												
288						Lognormal GOF Test						
289					Shapiro Wilk Test Statistic	0.719				Shapiro Wilk Lognormal GOF Test		
290					5% Shapiro Wilk Critical Value	0.859				Data Not Lognormal at 5% Significance Level		
291					Lilliefors Test Statistic	0.382				Lilliefors Lognormal GOF Test		
292					5% Lilliefors Critical Value	0.256				Data Not Lognormal at 5% Significance Level		
293						Data Not Lognormal at 5% Significance Level						
294												
295						Lognormal Statistics						
296					Minimum of Logged Data	3.949				Mean of logged Data		4.414
297					Maximum of Logged Data	4.946				SD of logged Data		0.236
298												

	A	B	C	D	E	F	G	H	I	J	K	L
299					Assuming Lognormal Distribution							
300					95% H-UCL	97.03				90% Chebyshev (MVUE) UCL		102.1
301				95% Chebyshev (MVUE) UCL		110				97.5% Chebyshev (MVUE) UCL		121
302				99% Chebyshev (MVUE) UCL		142.6						
303												
304					Nonparametric Distribution Free UCL Statistics							
305					Data do not follow a Discernible Distribution (0.05)							
306												
307					Nonparametric Distribution Free UCLs							
308					95% CLT UCL	94.7				95% Jackknife UCL		95.61
309				95% Standard Bootstrap UCL		N/A				95% Bootstrap-t UCL		N/A
310				95% Hall's Bootstrap UCL		N/A				95% Percentile Bootstrap UCL		N/A
311				95% BCA Bootstrap UCL		N/A						
312				90% Chebyshev(Mean, Sd) UCL		102.9				95% Chebyshev(Mean, Sd) UCL		111.1
313				97.5% Chebyshev(Mean, Sd) UCL		122.5				99% Chebyshev(Mean, Sd) UCL		145
314												
315					Suggested UCL to Use							
316					95% Student's-t UCL	95.61				or 95% Modified-t UCL		96.03
317												
318	Note: Suggestions regarding the selection of a 95% UCL are provided to help the user to select the most appropriate 95% UCL.											
319	These recommendations are based upon the results of the simulation studies summarized in Singh, Singh, and Iaci (2002)											
320	and Singh and Singh (2003). However, simulations results will not cover all Real World data sets.											
321	For additional insight the user may want to consult a statistician.											
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	9781				Mean		23609
330					Maximum	34775				Median		22115
331					SD	7683				Std. Error of Mean		2218
332					Coefficient of Variation	0.325				Skewness		-0.0789
333												
334					Normal GOF Test							
335					Shapiro Wilk Test Statistic	0.938				Shapiro Wilk GOF Test		
336					5% Shapiro Wilk Critical Value	0.859				Data appear Normal at 5% Significance Level		
337					Lilliefors Test Statistic	0.181				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	27592				95% Adjusted-CLT UCL (Chen-1995)		27203
344										95% Modified-t UCL (Johnson-1978)		27584
345												
346					Gamma GOF Test							
347					A-D Test Statistic	0.396				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	0.18				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)	9.086				k star (bias corrected MLE)		6.87
355					Theta hat (MLE)	2598				Theta star (bias corrected MLE)		3437
356					nu hat (MLE)	218.1				nu star (bias corrected)		164.9
357					MLE Mean (bias corrected)	23609				MLE Sd (bias corrected)		9007
358										Approximate Chi Square Value (0.05)		136.2
359					Adjusted Level of Significance	0.029				Adjusted Chi Square Value		132.2
360												
361					Assuming Gamma Distribution							
362					95% Approximate Gamma UCL (use when n>=50))	28583				95% Adjusted Gamma UCL (use when n<50)		29442
363												
364					Lognormal GOF Test							
365					Shapiro Wilk Test Statistic	0.912				Shapiro Wilk Lognormal GOF Test		
366					5% Shapiro Wilk Critical Value	0.859				Data appear Lognormal at 5% Significance Level		
367					Lilliefors Test Statistic	0.179				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	9.188				Mean of logged Data		10.01
373					Maximum of Logged Data	10.46				SD of logged Data		0.366
374												

	A	B	C	D	E	F	G	H	I	J	K	L
375	**Assuming Lognormal Distribution**											
376					95% H-UCL	29735			90% Chebyshev (MVUE) UCL			31353
377					95% Chebyshev (MVUE) UCL	34806			97.5% Chebyshev (MVUE) UCL			39599
378					99% Chebyshev (MVUE) UCL	49013						
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	27257			95% Jackknife UCL			27592
385					95% Standard Bootstrap UCL	27133			95% Bootstrap-t UCL			27563
386					95% Hall's Bootstrap UCL	27112			95% Percentile Bootstrap UCL			27173
387					95% BCA Bootstrap UCL	27326						
388					90% Chebyshev(Mean, Sd) UCL	30263			95% Chebyshev(Mean, Sd) UCL			33276
389					97.5% Chebyshev(Mean, Sd) UCL	37459			99% Chebyshev(Mean, Sd) UCL			45676
390												
391	**Suggested UCL to Use**											
392					95% Student's-t UCL	27592						
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	**Note: For highly negatively-skewed data, confidence limits (e.g., Chen, Johnson, Lognormal, and Gamma) may not be**											
400	**reliable. Chen's and Johnson's methods provide adjustments for positvely skewed data sets.**											
401												
402												

	A	B	C	D	E	F	G	H	I	J	K	L
403	Nickel											
404												
405					General Statistics							
406					Total Number of Observations	12			Number of Distinct Observations			10
407									Number of Missing Observations			0
408					Minimum	65			Mean			120.9
409					Maximum	208.3			Median			111.7
410					SD	53.94			Std. Error of Mean			15.57
411					Coefficient of Variation	0.446			Skewness			0.502
412												
413					Normal GOF Test							
414					Shapiro Wilk Test Statistic	0.883			Shapiro Wilk GOF Test			
415					5% Shapiro Wilk Critical Value	0.859			Data appear Normal at 5% Significance Level			
416					Lilliefors Test Statistic	0.175			Lilliefors GOF Test			
417					5% Lilliefors Critical Value	0.256			Data appear Normal at 5% Significance Level			
418					Data appear Normal at 5% Significance Level							
419												
420					Assuming Normal Distribution							
421					95% Normal UCL				95% UCLs (Adjusted for Skewness)			
422					95% Student's-t UCL	148.9			95% Adjusted-CLT UCL (Chen-1995)			149
423									95% Modified-t UCL (Johnson-1978)			149.3
424												
425					Gamma GOF Test							
426					A-D Test Statistic	0.502			Anderson-Darling Gamma GOF Test			
427					5% A-D Critical Value	0.732			Detected data appear Gamma Distributed at 5% Significance Level			
428					K-S Test Statistic	0.202			Kolmogrov-Smirnoff Gamma GOF Test			
429					5% K-S Critical Value	0.246			Detected data appear Gamma Distributed at 5% Significance Level			
430					Detected data appear Gamma Distributed at 5% Significance Level							
431												
432					Gamma Statistics							
433					k hat (MLE)	5.534			k star (bias corrected MLE)			4.206
434					Theta hat (MLE)	21.85			Theta star (bias corrected MLE)			28.75
435					nu hat (MLE)	132.8			nu star (bias corrected)			101
436					MLE Mean (bias corrected)	120.9			MLE Sd (bias corrected)			58.97
437									Approximate Chi Square Value (0.05)			78.77
438					Adjusted Level of Significance	0.029			Adjusted Chi Square Value			75.78
439												
440					Assuming Gamma Distribution							
441					95% Approximate Gamma UCL (use when n>=50))	155			95% Adjusted Gamma UCL (use when n<50)			161.1
442												
443					Lognormal GOF Test							
444					Shapiro Wilk Test Statistic	0.887			Shapiro Wilk Lognormal GOF Test			
445					5% Shapiro Wilk Critical Value	0.859			Data appear Lognormal at 5% Significance Level			
446					Lilliefors Test Statistic	0.198			Lilliefors Lognormal GOF Test			
447					5% Lilliefors Critical Value	0.256			Data appear Lognormal at 5% Significance Level			
448					Data appear Lognormal at 5% Significance Level							
449												
450					Lognormal Statistics							
451					Minimum of Logged Data	4.174			Mean of logged Data			4.702
452					Maximum of Logged Data	5.339			SD of logged Data			0.453
453												

	A	B	C	D	E	F	G	H	I	J	K	L
454					Assuming Lognormal Distribution							
455					95% H-UCL	162.4				90% Chebyshev (MVUE) UCL		169.5
456					95% Chebyshev (MVUE) UCL	191.4				97.5% Chebyshev (MVUE) UCL		221.9
457					99% Chebyshev (MVUE) UCL	281.7						
458												
459					Nonparametric Distribution Free UCL Statistics							
460					Data appear to follow a Discernible Distribution at 5% Significance Level							
461												
462					Nonparametric Distribution Free UCLs							
463					95% CLT UCL	146.6				95% Jackknife UCL		148.9
464					95% Standard Bootstrap UCL	145.4				95% Bootstrap-t UCL		152.8
465					95% Hall's Bootstrap UCL	147.5				95% Percentile Bootstrap UCL		146.1
466					95% BCA Bootstrap UCL	148.1						
467					90% Chebyshev(Mean, Sd) UCL	167.7				95% Chebyshev(Mean, Sd) UCL		188.8
468					97.5% Chebyshev(Mean, Sd) UCL	218.2				99% Chebyshev(Mean, Sd) UCL		275.9
469												
470					Suggested UCL to Use							
471					95% Student's-t UCL	148.9						
472												
473					Note: Suggestions regarding the selection of a 95% UCL are provided to help the user to select the most appropriate 95% UCL.							
474					These recommendations are based upon the results of the simulation studies summarized in Singh, Singh, and Iaci (2002)							
475					and Singh and Singh (2003). However, simulations results will not cover all Real World data sets.							
476					For additional insight the user may want to consult a statistician.							
477												
478												
479	PAH, Total											
480												
481					General Statistics							
482					Total Number of Observations	12				Number of Distinct Observations		1
483										Number of Missing Observations		0
484					Minimum	0.204				Mean		0.204
485					Maximum	0.204				Median		0.204
486												
487					Warning: There is only one distinct observation value in this data set - resulting in '0' variance!							
488					ProUCL (or any other software) should not be used on such a data set!							
489					The data set for variable PAH, Total was not processed!							
490												
491					If possible, compute and collect Data Quality Objectives (DQOs) based sample size and analytical results.							
492					The Project Team may decide to use alternative site specific values to estimate environmental parameters (e.g., EPC, BTV).							
493												
494												
495												

	A	B	C	D	E	F	G	H	I	J	K	L
496	PCB, Total											
497												
498	General Statistics											
499					Total Number of Observations	12				Number of Distinct Observations		2
500										Number of Missing Observations		0
501					Minimum	0.33				Mean		4.611
502					Maximum	5				Median		5
503					SD	1.348				Std. Error of Mean		0.389
504					Coefficient of Variation	0.292				Skewness		-3.464
505												
506	Normal GOF Test											
507					Shapiro Wilk Test Statistic	0.327				Shapiro Wilk GOF Test		
508					5% Shapiro Wilk Critical Value	0.859				Data Not Normal at 5% Significance Level		
509					Lilliefors Test Statistic	0.53				Lilliefors GOF Test		
510					5% Lilliefors Critical Value	0.256				Data Not Normal at 5% Significance Level		
511	Data Not Normal at 5% Significance Level											
512												
513	Assuming Normal Distribution											
514					95% Normal UCL					95% UCLs (Adjusted for Skewness)		
515					95% Student's-t UCL	5.31				95% Adjusted-CLT UCL (Chen-1995)		4.835
516										95% Modified-t UCL (Johnson-1978)		5.245
517												
518	Gamma GOF Test											
519					A-D Test Statistic	4.17				Anderson-Darling Gamma GOF Test		
520					5% A-D Critical Value	0.737				Data Not Gamma Distributed at 5% Significance Level		
521					K-S Test Statistic	0.546				Kolmogrov-Smirnoff Gamma GOF Test		
522					5% K-S Critical Value	0.247				Data Not Gamma Distributed at 5% Significance Level		
523	Data Not Gamma Distributed at 5% Significance Level											
524												
525	Gamma Statistics											
526					k hat (MLE)	3.595				k star (bias corrected MLE)		2.752
527					Theta hat (MLE)	1.283				Theta star (bias corrected MLE)		1.676
528					nu hat (MLE)	86.28				nu star (bias corrected)		66.04
529					MLE Mean (bias corrected)	4.611				MLE Sd (bias corrected)		2.78
530										Approximate Chi Square Value (0.05)		48.34
531					Adjusted Level of Significance	0.029				Adjusted Chi Square Value		46.04
532												
533	Assuming Gamma Distribution											
534					95% Approximate Gamma UCL (use when n>=50))	6.299				95% Adjusted Gamma UCL (use when n<50)		6.614
535												
536	Lognormal GOF Test											
537					Shapiro Wilk Test Statistic	0.327				Shapiro Wilk Lognormal GOF Test		
538					5% Shapiro Wilk Critical Value	0.859				Data Not Lognormal at 5% Significance Level		
539					Lilliefors Test Statistic	0.53				Lilliefors Lognormal GOF Test		
540					5% Lilliefors Critical Value	0.256				Data Not Lognormal at 5% Significance Level		
541	Data Not Lognormal at 5% Significance Level											
542												
543	Lognormal Statistics											
544					Minimum of Logged Data	-1.109				Mean of logged Data		1.383
545					Maximum of Logged Data	1.609				SD of logged Data		0.785
546												

	A	B	C	D	E	F	G	H	I	J	K	L
547					Assuming Lognormal Distribution							
548					95% H-UCL	9.904				90% Chebyshev (MVUE) UCL		9.005
549				95% Chebyshev (MVUE) UCL		10.7				97.5% Chebyshev (MVUE) UCL		13.06
550				99% Chebyshev (MVUE) UCL		17.69						
551												
552					Nonparametric Distribution Free UCL Statistics							
553					Data do not follow a Discernible Distribution (0.05)							
554												
555					Nonparametric Distribution Free UCLs							
556					95% CLT UCL	5.251				95% Jackknife UCL		N/A
557				95% Standard Bootstrap UCL		N/A				95% Bootstrap-t UCL		N/A
558				95% Hall's Bootstrap UCL		N/A				95% Percentile Bootstrap UCL		N/A
559				95% BCA Bootstrap UCL		N/A						
560				90% Chebyshev(Mean, Sd) UCL		5.778				95% Chebyshev(Mean, Sd) UCL		6.307
561				97.5% Chebyshev(Mean, Sd) UCL		7.041				99% Chebyshev(Mean, Sd) UCL		8.483
562												
563					Suggested UCL to Use							
564				95% Chebyshev (Mean, Sd) UCL		6.307						
565												
566					Recommended UCL exceeds the maximum observation							
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					Note: For highly negatively-skewed data, confidence limits (e.g., Chen, Johnson, Lognormal, and Gamma) may not be							
574					reliable. Chen's and Johnson's methods provide adjustments for positvely skewed data sets.							
575												
576												

	A	B	C	D	E	F	G	H	I	J	K	L
577	Uranium											
578												
579					General Statistics							
580					Total Number of Observations	12				Number of Distinct Observations		12
581										Number of Missing Observations		0
582					Minimum	12.6				Mean		26.03
583					Maximum	43.96				Median		24.03
584					SD	8.931				Std. Error of Mean		2.578
585					Coefficient of Variation	0.343				Skewness		0.738
586												
587					Normal GOF Test							
588					Shapiro Wilk Test Statistic	0.948				Shapiro Wilk GOF Test		
589					5% Shapiro Wilk Critical Value	0.859				Data appear Normal at 5% Significance Level		
590					Lilliefors Test Statistic	0.144				Lilliefors GOF Test		
591					5% Lilliefors Critical Value	0.256				Data appear Normal at 5% Significance Level		
592					Data appear Normal at 5% Significance Level							
593												
594					Assuming Normal Distribution							
595					95% Normal UCL					95% UCLs (Adjusted for Skewness)		
596					95% Student's-t UCL	30.66				95% Adjusted-CLT UCL (Chen-1995)		30.85
597										95% Modified-t UCL (Johnson-1978)		30.75
598												
599					Gamma GOF Test							
600					A-D Test Statistic	0.212				Anderson-Darling Gamma GOF Test		
601					5% A-D Critical Value	0.73				Detected data appear Gamma Distributed at 5% Significance Level		
602					K-S Test Statistic	0.118				Kolmogrov-Smirnoff Gamma GOF Test		
603					5% K-S Critical Value	0.245				Detected data appear Gamma Distributed at 5% Significance Level		
604					Detected data appear Gamma Distributed at 5% Significance Level							
605												
606					Gamma Statistics							
607					k hat (MLE)	9.548				k star (bias corrected MLE)		7.216
608					Theta hat (MLE)	2.726				Theta star (bias corrected MLE)		3.607
609					nu hat (MLE)	229.1				nu star (bias corrected)		173.2
610					MLE Mean (bias corrected)	26.03				MLE Sd (bias corrected)		9.689
611										Approximate Chi Square Value (0.05)		143.8
612					Adjusted Level of Significance	0.029				Adjusted Chi Square Value		139.7
613												
614					Assuming Gamma Distribution							
615					95% Approximate Gamma UCL (use when n>=50))	31.36				95% Adjusted Gamma UCL (use when n<50)		32.27
616												
617					Lognormal GOF Test							
618					Shapiro Wilk Test Statistic	0.978				Shapiro Wilk Lognormal GOF Test		
619					5% Shapiro Wilk Critical Value	0.859				Data appear Lognormal at 5% Significance Level		
620					Lilliefors Test Statistic	0.124				Lilliefors Lognormal GOF Test		
621					5% Lilliefors Critical Value	0.256				Data appear Lognormal at 5% Significance Level		
622					Data appear Lognormal at 5% Significance Level							
623												
624					Lognormal Statistics							
625					Minimum of Logged Data	2.534				Mean of logged Data		3.206
626					Maximum of Logged Data	3.783				SD of logged Data		0.343
627												

	A	B	C	D	E	F	G	H	I	J	K	L
628					Assuming Lognormal Distribution							
629					95% H-UCL	32.08			90% Chebyshev (MVUE) UCL			33.86
630				95% Chebyshev (MVUE) UCL		37.41			97.5% Chebyshev (MVUE) UCL			42.33
631				99% Chebyshev (MVUE) UCL		51.99						
632												
633					Nonparametric Distribution Free UCL Statistics							
634					Data appear to follow a Discernible Distribution at 5% Significance Level							
635												
636					Nonparametric Distribution Free UCLs							
637					95% CLT UCL	30.27			95% Jackknife UCL			30.66
638				95% Standard Bootstrap UCL		30.07			95% Bootstrap-t UCL			31.47
639				95% Hall's Bootstrap UCL		32.16			95% Percentile Bootstrap UCL			30.34
640				95% BCA Bootstrap UCL		30.57						
641				90% Chebyshev(Mean, Sd) UCL		33.76			95% Chebyshev(Mean, Sd) UCL			37.26
642				97.5% Chebyshev(Mean, Sd) UCL		42.13			99% Chebyshev(Mean, Sd) UCL			51.68
643												
644					Suggested UCL to Use							
645				95% Student's-t UCL		30.66						
646												
647					Note: Suggestions regarding the selection of a 95% UCL are provided to help the user to select the most appropriate 95% UCL.							
648					These recommendations are based upon the results of the simulation studies summarized in Singh, Singh, and Iaci (2002)							
649					and Singh and Singh (2003). However, simulations results will not cover all Real World data sets.							
650					For additional insight the user may want to consult a statistician.							
651												
652												
653	Uranium-238											
654												
655					General Statistics							
656				Total Number of Observations		12			Number of Distinct Observations			1
657									Number of Missing Observations			0
658				Minimum		7.12			Mean			7.12
659				Maximum		7.12			Median			7.12
660												
661					Warning: There is only one distinct observation value in this data set - resulting in '0' variance!							
662					ProUCL (or any other software) should not be used on such a data set!							
663					The data set for variable Uranium-238 was not processed!							
664												
665					If possible, compute and collect Data Quality Objectives (DQOs) based sample size and analytical results.							
666					The Project Team may decide to use alternative site specific values to estimate environmental parameters (e.g., EPC, BTV).							
667												
668												
669												

	A	B	C	D	E	F	G	H	I	J	K	L
670	Vanadium											
671												
672						General Statistics						
673					Total Number of Observations	12				Number of Distinct Observations		4
674										Number of Missing Observations		0
675					Minimum	31.9				Mean		67.37
676					Maximum	77.92				Median		70
677					SD	11.41				Std. Error of Mean		3.295
678					Coefficient of Variation	0.169				Skewness		-3.175
679												
680						Normal GOF Test						
681					Shapiro Wilk Test Statistic	0.459				Shapiro Wilk GOF Test		
682					5% Shapiro Wilk Critical Value	0.859				Data Not Normal at 5% Significance Level		
683					Lilliefors Test Statistic	0.46				Lilliefors GOF Test		
684					5% Lilliefors Critical Value	0.256				Data Not Normal at 5% Significance Level		
685						Data Not Normal at 5% Significance Level						
686												
687						Assuming Normal Distribution						
688					95% Normal UCL					95% UCLs (Adjusted for Skewness)		
689					95% Student's-t UCL	73.29				95% Adjusted-CLT UCL (Chen-1995)		69.56
690										95% Modified-t UCL (Johnson-1978)		72.78
691												
692						Gamma GOF Test						
693					A-D Test Statistic	3.35				Anderson-Darling Gamma GOF Test		
694					5% A-D Critical Value	0.731				Data Not Gamma Distributed at 5% Significance Level		
695					K-S Test Statistic	0.48				Kolmogrov-Smirnoff Gamma GOF Test		
696					5% K-S Critical Value	0.245				Data Not Gamma Distributed at 5% Significance Level		
697						Data Not Gamma Distributed at 5% Significance Level						
698												
699						Gamma Statistics						
700					k hat (MLE)	25.26				k star (bias corrected MLE)		19
701					Theta hat (MLE)	2.667				Theta star (bias corrected MLE)		3.545
702					nu hat (MLE)	606.3				nu star (bias corrected)		456.1
703					MLE Mean (bias corrected)	67.37				MLE Sd (bias corrected)		15.45
704										Approximate Chi Square Value (0.05)		407.6
705					Adjusted Level of Significance	0.029				Adjusted Chi Square Value		400.6
706												
707						Assuming Gamma Distribution						
708					95% Approximate Gamma UCL (use when n>=50))	75.39				95% Adjusted Gamma UCL (use when n<50)		76.71
709												
710						Lognormal GOF Test						
711					Shapiro Wilk Test Statistic	0.417				Shapiro Wilk Lognormal GOF Test		
712					5% Shapiro Wilk Critical Value	0.859				Data Not Lognormal at 5% Significance Level		
713					Lilliefors Test Statistic	0.482				Lilliefors Lognormal GOF Test		
714					5% Lilliefors Critical Value	0.256				Data Not Lognormal at 5% Significance Level		
715						Data Not Lognormal at 5% Significance Level						
716												
717						Lognormal Statistics						
718					Minimum of Logged Data	3.463				Mean of logged Data		4.19
719					Maximum of Logged Data	4.356				SD of logged Data		0.231
720												

	A	B	C	D	E	F	G	H	I	J	K	L
721					Assuming Lognormal Distribution							
722					95% H-UCL	77.27				90% Chebyshev (MVUE) UCL		81.31
723					95% Chebyshev (MVUE) UCL	87.49				97.5% Chebyshev (MVUE) UCL		96.06
724					99% Chebyshev (MVUE) UCL	112.9						
725												
726					Nonparametric Distribution Free UCL Statistics							
727					Data do not follow a Discernible Distribution (0.05)							
728												
729					Nonparametric Distribution Free UCLs							
730					95% CLT UCL	72.79				95% Jackknife UCL		73.29
731					95% Standard Bootstrap UCL	N/A				95% Bootstrap-t UCL		N/A
732					95% Hall's Bootstrap UCL	N/A				95% Percentile Bootstrap UCL		N/A
733					95% BCA Bootstrap UCL	N/A						
734					90% Chebyshev(Mean, Sd) UCL	77.26				95% Chebyshev(Mean, Sd) UCL		81.73
735					97.5% Chebyshev(Mean, Sd) UCL	87.95				99% Chebyshev(Mean, Sd) UCL		100.2
736												
737					Suggested UCL to Use							
738					95% Student's-t UCL	73.29				or 95% Modified-t UCL		72.78
739												
740					Note: Suggestions regarding the selection of a 95% UCL are provided to help the user to select the most appropriate 95% UCL.							
741					These recommendations are based upon the results of the simulation studies summarized in Singh, Singh, and Iaci (2002)							
742					and Singh and Singh (2003). However, simulations results will not cover all Real World data sets.							
743					For additional insight the user may want to consult a statistician.							
744												
745					Note: For highly negatively-skewed data, confidence limits (e.g., Chen, Johnson, Lognormal, and Gamma) may not be							
746					reliable. Chen's and Johnson's methods provide adjustments for positvely skewed data sets.							
747												