

**APPENDIX G: PROUCL OUTPUT  
MILITARY MUNITIONS RESPONSE PROGRAM  
REMEDIAL INVESTIGATION/FEASIBILITY STUDY**

**FORMER CAMP MAXEY  
Paris, Texas**

A	B	C	D	E	F	G	H	I	J	K	L
1	<b>Attachment 1. UCL Statistics for Uncensored Full Data Sets</b>										
2											
3	User Selected Options										
4	Date/Time of Computation		11/12/2013 9:11:16 AM								
5	From File		WorkSheet.xls								
6	Full Precision		OFF								
7	Confidence Coefficient		95%								
8	Number of Bootstrap Operations		10000								
9											
10											
11	<b>Cu</b>										
12											
13	<b>General Statistics</b>										
14	Total Number of Observations			38		Number of Distinct Observations			24		
15						Number of Missing Observations			0		
16	Minimum			1.2		Mean			3.568		
17	Maximum			15		Median			2.333		
18	SD			3.115		Std. Error of Mean			0.505		
19	Coefficient of Variation			0.873		Skewness			2.247		
20											
21	<b>Normal GOF Test</b>										
22	Shapiro Wilk Test Statistic			0.692		<b>Shapiro Wilk GOF Test</b>					
23	5% Shapiro Wilk Critical Value			0.938		Data Not Normal at 5% Significance Level					
24	Lilliefors Test Statistic			0.27		<b>Lilliefors GOF Test</b>					
25	5% Lilliefors Critical Value			0.144		Data Not Normal at 5% Significance Level					
26	<b>Data Not Normal at 5% Significance Level</b>										
27											
28	<b>Assuming Normal Distribution</b>										
29	<b>95% Normal UCL</b>					<b>95% UCLs (Adjusted for Skewness)</b>					
30	95% Student's-t UCL			4.421		95% Adjusted-CLT UCL (Chen-1995)			4.596		
31						95% Modified-t UCL (Johnson-1978)			4.452		
32											
33	<b>Gamma GOF Test</b>										
34	A-D Test Statistic			2.534		<b>Anderson-Darling Gamma GOF Test</b>					
35	5% A-D Critical Value			0.758		Data Not Gamma Distributed at 5% Significance Level					
36	K-S Test Statistic			0.218		<b>Kolmogrov-Smirnoff Gamma GOF Test</b>					
37	5% K-S Critical Value			0.145		Data Not Gamma Distributed at 5% Significance Level					
38	<b>Data Not Gamma Distributed at 5% Significance Level</b>										
39											
40	<b>Gamma Statistics</b>										
41	k hat (MLE)			2.223		k star (bias corrected MLE)			2.065		
42	Theta hat (MLE)			1.605		Theta star (bias corrected MLE)			1.728		
43	nu hat (MLE)			168.9		nu star (bias corrected)			156.9		
44	MLE Mean (bias corrected)			3.568		MLE Sd (bias corrected)			2.483		
45						Approximate Chi Square Value (0.05)			129		
46	Adjusted Level of Significance			0.0434		Adjusted Chi Square Value			127.9		
47											
48	<b>Assuming Gamma Distribution</b>										
49	95% Approximate Gamma UCL (use when n>=50))			4.342		95% Adjusted Gamma UCL (use when n<50)			4.378		
50											
51	<b>Lognormal GOF Test</b>										
52	Shapiro Wilk Test Statistic			0.877		<b>Shapiro Wilk Lognormal GOF Test</b>					

	A	B	C	D	E	F	G	H	I	J	K	L
53	5% Shapiro Wilk Critical Value				0.938	Data Not Lognormal at 5% Significance Level						
54	Lilliefors Test Statistic				0.178	<b>Lilliefors Lognormal GOF Test</b>						
55	5% Lilliefors Critical Value				0.144	Data Not Lognormal at 5% Significance Level						
56	<b>Data Not Lognormal at 5% Significance Level</b>											
57												
58	<b>Lognormal Statistics</b>											
59	Minimum of Logged Data				0.182	Mean of logged Data				1.031		
60	Maximum of Logged Data				2.708	SD of logged Data				0.641		
61												
62	<b>Assuming Lognormal Distribution</b>											
63	95% H-UCL				4.262	90% Chebyshev (MVUE) UCL				4.565		
64	95% Chebyshev (MVUE) UCL				5.085	97.5% Chebyshev (MVUE) UCL				5.805		
65	99% Chebyshev (MVUE) UCL				7.221							
66												
67	<b>Nonparametric Distribution Free UCL Statistics</b>											
68	<b>Data do not follow a Discernible Distribution (0.05)</b>											
69												
70	<b>Nonparametric Distribution Free UCLs</b>											
71	95% CLT UCL				4.399	95% Jackknife UCL				4.421		
72	95% Standard Bootstrap UCL				4.388	95% Bootstrap-t UCL				4.798		
73	95% Hall's Bootstrap UCL				4.703	95% Percentile Bootstrap UCL				4.41		
74	95% BCA Bootstrap UCL				4.609							
75	90% Chebyshev(Mean, Sd) UCL				5.084	95% Chebyshev(Mean, Sd) UCL				5.771		
76	97.5% Chebyshev(Mean, Sd) UCL				6.724	99% Chebyshev(Mean, Sd) UCL				8.596		
77												
78	<b>Suggested UCL to Use</b>											
79	95% Chebyshev (Mean, Sd) UCL				5.771							
80												
81	Note: Suggestions regarding the selection of a 95% UCL are provided to help the user to select the most appropriate 95% UCL.											
82	These recommendations are based upon the results of the simulation studies summarized in Singh, Singh, and Iaci (2002)											
83	and Singh and Singh (2003). However, simulations results will not cover all Real World data sets.											
84	For additional insight the user may want to consult a statistician.											
85												
86												
87	<b>Pb</b>											
88												
89	<b>General Statistics</b>											
90	Total Number of Observations				38	Number of Distinct Observations				29		
91						Number of Missing Observations				0		
92	Minimum				4.3	Mean				11.16		
93	Maximum				42	Median				9.85		
94	SD				6.525	Std. Error of Mean				1.058		
95	Coefficient of Variation				0.585	Skewness				3.088		
96												
97	<b>Normal GOF Test</b>											
98	Shapiro Wilk Test Statistic				0.726	<b>Shapiro Wilk GOF Test</b>						
99	5% Shapiro Wilk Critical Value				0.938	Data Not Normal at 5% Significance Level						
100	Lilliefors Test Statistic				0.205	<b>Lilliefors GOF Test</b>						
101	5% Lilliefors Critical Value				0.144	Data Not Normal at 5% Significance Level						
102	<b>Data Not Normal at 5% Significance Level</b>											
103												
104	<b>Assuming Normal Distribution</b>											

A	B	C	D	E	F	G	H	I	J	K	L
105	<b>95% Normal UCL</b>					<b>95% UCLs (Adjusted for Skewness)</b>					
106	95% Student's-t UCL			12.95		95% Adjusted-CLT UCL (Chen-1995)				13.47	
107						95% Modified-t UCL (Johnson-1978)				13.04	
108											
109	<b>Gamma GOF Test</b>										
110	A-D Test Statistic			0.738		<b>Anderson-Darling Gamma GOF Test</b>					
111	5% A-D Critical Value			0.751		Detected data appear Gamma Distributed at 5% Significance Level					
112	K-S Test Statistic			0.128		<b>Kolmogrov-Smirnoff Gamma GOF Test</b>					
113	5% K-S Critical Value			0.144		Detected data appear Gamma Distributed at 5% Significance Level					
114	<b>Detected data appear Gamma Distributed at 5% Significance Level</b>										
115											
116	<b>Gamma Statistics</b>										
117	k hat (MLE)			4.661		k star (bias corrected MLE)				4.311	
118	Theta hat (MLE)			2.394		Theta star (bias corrected MLE)				2.589	
119	nu hat (MLE)			354.3		nu star (bias corrected)				327.6	
120	MLE Mean (bias corrected)			11.16		MLE Sd (bias corrected)				5.376	
121						Approximate Chi Square Value (0.05)				286.7	
122	Adjusted Level of Significance			0.0434		Adjusted Chi Square Value				285.1	
123											
124	<b>Assuming Gamma Distribution</b>										
125	95% Approximate Gamma UCL (use when n>=50)			12.76		95% Adjusted Gamma UCL (use when n<50)				12.83	
126											
127	<b>Lognormal GOF Test</b>										
128	Shapiro Wilk Test Statistic			0.966		<b>Shapiro Wilk Lognormal GOF Test</b>					
129	5% Shapiro Wilk Critical Value			0.938		Data appear Lognormal at 5% Significance Level					
130	Lilliefors Test Statistic			0.0947		<b>Lilliefors Lognormal GOF Test</b>					
131	5% Lilliefors Critical Value			0.144		Data appear Lognormal at 5% Significance Level					
132	<b>Data appear Lognormal at 5% Significance Level</b>										
133											
134	<b>Lognormal Statistics</b>										
135	Minimum of Logged Data			1.459		Mean of logged Data				2.301	
136	Maximum of Logged Data			3.738		SD of logged Data				0.45	
137											
138	<b>Assuming Lognormal Distribution</b>										
139	95% H-UCL			12.7		90% Chebyshev (MVUE) UCL				13.52	
140	95% Chebyshev (MVUE) UCL			14.66		97.5% Chebyshev (MVUE) UCL				16.23	
141	99% Chebyshev (MVUE) UCL			19.32							
142											
143	<b>Nonparametric Distribution Free UCL Statistics</b>										
144	<b>Data appear to follow a Discernible Distribution at 5% Significance Level</b>										
145											
146	<b>Nonparametric Distribution Free UCLs</b>										
147	95% CLT UCL			12.9		95% Jackknife UCL				12.95	
148	95% Standard Bootstrap UCL			12.86		95% Bootstrap-t UCL				13.99	
149	95% Hall's Bootstrap UCL			21.12		95% Percentile Bootstrap UCL				12.99	
150	95% BCA Bootstrap UCL			13.6							
151	90% Chebyshev(Mean, Sd) UCL			14.34		95% Chebyshev(Mean, Sd) UCL				15.78	
152	97.5% Chebyshev(Mean, Sd) UCL			17.77		99% Chebyshev(Mean, Sd) UCL				21.69	
153											
154	<b>Suggested UCL to Use</b>										
155	95% Adjusted Gamma UCL			12.83							
156											

A	B	C	D	E	F	G	H	I	J	K	L
157	Note: Suggestions regarding the selection of a 95% UCL are provided to help the user to select the most appropriate 95% UCL.										
158	These recommendations are based upon the results of the simulation studies summarized in Singh, Singh, and Iaci (2002)										
159	and Singh and Singh (2003). However, simulation results will not cover all Real World data sets.										
160	For additional insight the user may want to consult a statistician.										
161											
162											
163	Ni										
164											
165	<b>General Statistics</b>										
166	Total Number of Observations			38		Number of Distinct Observations			25		
167						Number of Missing Observations			0		
168	Minimum			1.5		Mean			4.58		
169	Maximum			13		Median			3.5		
170	SD			3.044		Std. Error of Mean			0.494		
171	Coefficient of Variation			0.665		Skewness			1.715		
172											
173	<b>Normal GOF Test</b>										
174	Shapiro Wilk Test Statistic			0.748		<b>Shapiro Wilk GOF Test</b>					
175	5% Shapiro Wilk Critical Value			0.938		Data Not Normal at 5% Significance Level					
176	Lilliefors Test Statistic			0.3		<b>Lilliefors GOF Test</b>					
177	5% Lilliefors Critical Value			0.144		Data Not Normal at 5% Significance Level					
178	<b>Data Not Normal at 5% Significance Level</b>										
179											
180	<b>Assuming Normal Distribution</b>										
181	<b>95% Normal UCL</b>					<b>95% UCLs (Adjusted for Skewness)</b>					
182	95% Student's-t UCL			5.413		95% Adjusted-CLT UCL (Chen-1995)			5.539		
183						95% Modified-t UCL (Johnson-1978)			5.436		
184											
185	<b>Gamma GOF Test</b>										
186	A-D Test Statistic			2.155		<b>Anderson-Darling Gamma GOF Test</b>					
187	5% A-D Critical Value			0.754		Data Not Gamma Distributed at 5% Significance Level					
188	K-S Test Statistic			0.233		<b>Kolmogrov-Smirnov Gamma GOF Test</b>					
189	5% K-S Critical Value			0.144		Data Not Gamma Distributed at 5% Significance Level					
190	<b>Data Not Gamma Distributed at 5% Significance Level</b>										
191											
192	<b>Gamma Statistics</b>										
193	k hat (MLE)			3.25		k star (bias corrected MLE)			3.011		
194	Theta hat (MLE)			1.409		Theta star (bias corrected MLE)			1.521		
195	nu hat (MLE)			247		nu star (bias corrected)			228.8		
196	MLE Mean (bias corrected)			4.58		MLE Sd (bias corrected)			2.639		
197						Approximate Chi Square Value (0.05)			194.8		
198	Adjusted Level of Significance			0.0434		Adjusted Chi Square Value			193.5		
199											
200	<b>Assuming Gamma Distribution</b>										
201	95% Approximate Gamma UCL (use when n>=50))			5.379		95% Adjusted Gamma UCL (use when n<50)			5.416		
202											
203	<b>Lognormal GOF Test</b>										
204	Shapiro Wilk Test Statistic			0.908		<b>Shapiro Wilk Lognormal GOF Test</b>					
205	5% Shapiro Wilk Critical Value			0.938		Data Not Lognormal at 5% Significance Level					
206	Lilliefors Test Statistic			0.191		<b>Lilliefors Lognormal GOF Test</b>					
207	5% Lilliefors Critical Value			0.144		Data Not Lognormal at 5% Significance Level					
208	<b>Data Not Lognormal at 5% Significance Level</b>										

A	B	C	D	E	F	G	H	I	J	K	L
209											
210	<b>Lognormal Statistics</b>										
211	Minimum of Logged Data				0.405		Mean of logged Data				1.36
212	Maximum of Logged Data				2.565		SD of logged Data				0.542
213											
214	<b>Assuming Lognormal Distribution</b>										
215	95% H-UCL				5.37		90% Chebyshev (MVUE) UCL				5.745
216	95% Chebyshev (MVUE) UCL				6.312		97.5% Chebyshev (MVUE) UCL				7.099
217	99% Chebyshev (MVUE) UCL				8.645						
218											
219	<b>Nonparametric Distribution Free UCL Statistics</b>										
220	<b>Data do not follow a Discernible Distribution (0.05)</b>										
221											
222	<b>Nonparametric Distribution Free UCLs</b>										
223	95% CLT UCL				5.392		95% Jackknife UCL				5.413
224	95% Standard Bootstrap UCL				5.377		95% Bootstrap-t UCL				5.652
225	95% Hall's Bootstrap UCL				5.515		95% Percentile Bootstrap UCL				5.416
226	95% BCA Bootstrap UCL				5.522						
227	90% Chebyshev(Mean, Sd) UCL				6.061		95% Chebyshev(Mean, Sd) UCL				6.733
228	97.5% Chebyshev(Mean, Sd) UCL				7.664		99% Chebyshev(Mean, Sd) UCL				9.494
229											
230	<b>Suggested UCL to Use</b>										
231	95% Chebyshev (Mean, Sd) UCL				6.733						
232											
233	Note: Suggestions regarding the selection of a 95% UCL are provided to help the user to select the most appropriate 95% UCL.										
234	These recommendations are based upon the results of the simulation studies summarized in Singh, Singh, and Iaci (2002)										
235	and Singh and Singh (2003). However, simulations results will not cover all Real World data sets.										
236	For additional insight the user may want to consult a statistician.										
237											
238											
239	Zn										
240											
241	<b>General Statistics</b>										
242	Total Number of Observations				38		Number of Distinct Observations				29
243							Number of Missing Observations				0
244	Minimum				5.1		Mean				12.22
245	Maximum				34		Median				9.35
246	SD				7.688		Std. Error of Mean				1.247
247	Coefficient of Variation				0.629		Skewness				1.718
248											
249	<b>Normal GOF Test</b>										
250	Shapiro Wilk Test Statistic				0.75		<b>Shapiro Wilk GOF Test</b>				
251	5% Shapiro Wilk Critical Value				0.938		Data Not Normal at 5% Significance Level				
252	Lilliefors Test Statistic				0.298		<b>Lilliefors GOF Test</b>				
253	5% Lilliefors Critical Value				0.144		Data Not Normal at 5% Significance Level				
254	<b>Data Not Normal at 5% Significance Level</b>										
255											
256	<b>Assuming Normal Distribution</b>										
257	<b>95% Normal UCL</b>					<b>95% UCLs (Adjusted for Skewness)</b>					
258	95% Student's-t UCL				14.33		95% Adjusted-CLT UCL (Chen-1995)				14.64
259							95% Modified-t UCL (Johnson-1978)				14.38
260											

A	B	C	D	E	F	G	H	I	J	K	L
261	<b>Gamma GOF Test</b>										
262	A-D Test Statistic			2.293		<b>Anderson-Darling Gamma GOF Test</b>					
263	5% A-D Critical Value			0.753		Data Not Gamma Distributed at 5% Significance Level					
264	K-S Test Statistic			0.259		<b>Kolmogrov-Smirnoff Gamma GOF Test</b>					
265	5% K-S Critical Value			0.144		Data Not Gamma Distributed at 5% Significance Level					
266	<b>Data Not Gamma Distributed at 5% Significance Level</b>										
267											
268	<b>Gamma Statistics</b>										
269	k hat (MLE)			3.608		k star (bias corrected MLE)			3.34		
270	Theta hat (MLE)			3.388		Theta star (bias corrected MLE)			3.659		
271	nu hat (MLE)			274.2		nu star (bias corrected)			253.9		
272	MLE Mean (bias corrected)			12.22		MLE Sd (bias corrected)			6.687		
273						Approximate Chi Square Value (0.05)			218		
274	Adjusted Level of Significance			0.0434		Adjusted Chi Square Value			216.6		
275											
276	<b>Assuming Gamma Distribution</b>										
277	95% Approximate Gamma UCL (use when n>=50))			14.23		95% Adjusted Gamma UCL (use when n<50)			14.32		
278											
279	<b>Lognormal GOF Test</b>										
280	Shapiro Wilk Test Statistic			0.889		<b>Shapiro Wilk Lognormal GOF Test</b>					
281	5% Shapiro Wilk Critical Value			0.938		Data Not Lognormal at 5% Significance Level					
282	Lilliefors Test Statistic			0.227		<b>Lilliefors Lognormal GOF Test</b>					
283	5% Lilliefors Critical Value			0.144		Data Not Lognormal at 5% Significance Level					
284	<b>Data Not Lognormal at 5% Significance Level</b>										
285											
286	<b>Lognormal Statistics</b>										
287	Minimum of Logged Data			1.629		Mean of logged Data			2.358		
288	Maximum of Logged Data			3.526		SD of logged Data			0.513		
289											
290	<b>Assuming Lognormal Distribution</b>										
291	95% H-UCL			14.18		90% Chebyshev (MVUE) UCL			15.16		
292	95% Chebyshev (MVUE) UCL			16.58		97.5% Chebyshev (MVUE) UCL			18.56		
293	99% Chebyshev (MVUE) UCL			22.44							
294											
295	<b>Nonparametric Distribution Free UCL Statistics</b>										
296	<b>Data do not follow a Discernible Distribution (0.05)</b>										
297											
298	<b>Nonparametric Distribution Free UCLs</b>										
299	95% CLT UCL			14.27		95% Jackknife UCL			14.33		
300	95% Standard Bootstrap UCL			14.23		95% Bootstrap-t UCL			15		
301	95% Hall's Bootstrap UCL			14.55		95% Percentile Bootstrap UCL			14.35		
302	95% BCA Bootstrap UCL			14.68							
303	90% Chebyshev(Mean, Sd) UCL			15.96		95% Chebyshev(Mean, Sd) UCL			17.66		
304	97.5% Chebyshev(Mean, Sd) UCL			20.01		99% Chebyshev(Mean, Sd) UCL			24.63		
305											
306	<b>Suggested UCL to Use</b>										
307	95% Chebyshev (Mean, Sd) UCL			17.66							
308											
309	Note: Suggestions regarding the selection of a 95% UCL are provided to help the user to select the most appropriate 95% UCL.										
310	These recommendations are based upon the results of the simulation studies summarized in Singh, Singh, and Iaci (2002)										
311	and Singh and Singh (2003). However, simulations results will not cover all Real World data sets.										
312	For additional insight the user may want to consult a statistician.										