Final Remedial Investigation/Feasibility Study Report Former Camp Maxey, Paris, Texas Appendix G

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

> FORMER CAMP MAXEY Paris, Texas

	A B C	D E Attachment 1. UCL	F Statistics fr	G	H H		J	К	L					
1														
2	User Selected Options													
3	Date/Time of Computation	11/12/2013 9:11:16 AM												
4	From File	WorkSheet.xls												
5	Full Precision	OFF												
6	Confidence Coefficient	95%												
7	Number of Bootstrap Operations	10000												
8														
9														
10	Cu													
11 12														
12			General	Statistics										
13	Total	Number of Observations	38			Number	of Distinct C	bservations	24					
14						Number	of Missing C	bservations	0					
16		Minimum	1.2					Mean	3.568					
17		Maximum	15					Median	2.333					
17		SD	3.115				Std. E	rror of Mear	0.505					
18		Coefficient of Variation	0.873					Skewness						
20														
20			Normal GOF Test											
21	S	hapiro Wilk Test Statistic	0.692			Shapiro Will	GOF Test							
22	5% SI	napiro Wilk Critical Value	0.938		Data Not	Normal at 5	% Significar	ice Level						
23		Lilliefors Test Statistic	0.27	Lilliefors GOF Test										
24	5	% Lilliefors Critical Value	0.144	Data Not Normal at 5% Significance Level										
26		Data Not	Normal at 5	% Significan	ce Level									
27														
28		Ass	uming Norn	nal Distributi	on									
29	95% No	rmal UCL			95%	UCLs (Adjus	ted for Skew	ness)						
30		95% Student's-t UCL	4.421		ç	5% Adjuste	d-CLT UCL (Chen-1995	4.596					
31						95% Modifie	d-t UCL (Jol	nnson-1978)	4.452					
32														
33			Gamma (GOF Test										
34		A-D Test Statistic	2.534		Anders	on-Darling (Gamma GOF	Test						
35		5% A-D Critical Value	0.758	D	ata Not Gamr	na Distribute	ed at 5% Sig	nificance Le	vel					
36		K-S Test Statistic	0.218		Kolmog	rov-Smirnoff	Gamma GC	F Test						
37		5% K-S Critical Value	0.145	D	ata Not Gamı	na Distribute	ed at 5% Sig	nificance Le	vel					
38		Data Not Gamm	a Distribute	d at 5% Sigr	nificance Leve	əl								
39														
40			Gamma	Statistics										
41		k hat (MLE)	2.223				tar (bias cor	,						
42		Theta hat (MLE)	1.605			Theta s	tar (bias cor	,						
43		nu hat (MLE)	168.9					s corrected)						
44	MI	E Mean (bias corrected)	3.568				MLE Sd (bia	,						
45					A	Approximate	•	, ,						
46	Adjus	ted Level of Significance	0.0434			Ad	justed Chi S	quare Value	127.9					
47														
48				ma Distribut										
49	95% Approximate Gamma	UCL (use when n>=50))	4.342		95% Adj	usted Gamm	na UCL (use	when n<50	4.378					
50														
51			Lognormal	GOF Test										
52	S	hapiro Wilk Test Statistic	0.877		Shapi	ro Wilk Logr	ormal GOF	Test						
-														

	Α	В	<u> </u>		E	F	G	Н		J	K	L		
53			5% S	hapiro Wilk C		0.938			-	it 5% Signific				
54					Fest Statistic	0.178				ormal GOF T				
55			5	% Lilliefors C		0.144			Lognormal a	it 5% Signific	ance Level			
56					Data Not L	ognormal at	5% Significa	ince Level						
57														
58				N 4::		Lognorma	I Statistics					1.001		
59				Minimum of I		0.182					logged Data			
60			ľ	Maximum of I	Logged Data	2.708				SD of	logged Data	0.641		
61							ma al Diatriku	M =						
62					Assu 95% H-UCL		rmal Distribu	ltion	0.00%	Chabyahay		4 565		
63			050/			4.262				•		4.565		
64				Chebyshev (5.085			97.5%	Chebyshev	(MVUE) UCL	5.805		
65			99%	Chebyshev (WIVUE) UCL	7.221								
66					Nonnorana	trie Dietrikut	ion Free LICI	Statiatica						
67					Data do not fo		ion Free UCI							
68								50001 (0.05)						
69					Nonnar	ametric Dist	ribution Erec							
70	Nonparametric Distribution Free UCLs 95% CLT UCL 4.399 95% Jackknife UC													
71			95%	Standard Bo		4.388					otstrap-t UCL	4.421 4.798		
72				5% Hall's Bo		4.703			95%		potstrap UCL	4.41		
73				95% BCA Bc	-	4.609			5570	r ercentile Do		7.71		
74				ebyshev(Me	•	5.084			95% Cł	ehvshev(Me	ean, Sd) UCL	5.771		
75					,			8.596						
76	97.5% Chebyshev(Mean, Sd) UCL 6.724 99% Chebyshev(Mean, Sd) UCL													
77						Suggested	UCL to Use							
78			95% Ch	ebyshev (Me	an Sd) UCI	5.771								
79						0.771								
80		Note: Suaae	estions regard	ling the seled	tion of a 95%	6 UCL are pr	ovided to he	lp the user to	o select the i	nost appropr	riate 95% UC			
81		00	commendatio	0		•		•						
82					2003). Howev				-		,			
83					, ditional insigl									
84 85														
86														
	Pb													
88														
89						General	Statistics							
90			Total	Number of C	Observations	38			Numbe	r of Distinct (Observations	29		
91									Numbe	r of Missing (Observations	0		
92					Minimum	4.3					Mean	11.16		
93					Maximum	42					Median	9.85		
94					SD	6.525				Std. E	Error of Mean	1.058		
95				Coefficient	t of Variation	0.585					Skewness	3.088		
96							1							
97						Normal C	GOF Test							
98			S	hapiro Wilk	Fest Statistic	0.726			Shapiro Wi	lk GOF Test				
99			5% S	hapiro Wilk C	Critical Value	0.938	Data Not Normal at 5% Significance Level							
100				Lilliefors	Fest Statistic	0.205	Lilliefors GOF Test							
101			5	% Lilliefors C	Critical Value	0.144		Data No	ot Normal at	5% Significa	nce Level			
102					Data Not	Normal at 5	% Significan	ce Level						
102														
104					As	suming Norn	nal Distributi	on						
												I		

105	A B C D E 95% Normal UCL	F	G	H 95%	I J K UCLs (Adjusted for Skewness)	L
	95% Student's-t UCL	12.95			95% Adjusted-CLT UCL (Chen-1995)	13.47
106 107					95% Modified-t UCL (Johnson-1978)	13.04
108		Gamma (
109	A-D Test Statistic	0.738		Anders	son-Darling Gamma GOF Test	
110	5% A-D Critical Value	0.751	Detected		r Gamma Distributed at 5% Significan	ce Level
111	K-S Test Statistic	0.128		Kolmog	rov-Smirnoff Gamma GOF Test	
112	5% K-S Critical Value	0.144	Detected	-	r Gamma Distributed at 5% Significan	ce Level
113	Detected data appear					
114				0		
115		Gamma	Statistics			
116	k hat (MLE)	4.661			k star (bias corrected MLE)	4.311
117	Theta hat (MLE)	2.394			Theta star (bias corrected MLE)	2.589
118	nu hat (MLE)	354.3			nu star (bias corrected)	327.6
119	MLE Mean (bias corrected)	11.16			MLE Sd (bias corrected)	5.376
120					Approximate Chi Square Value (0.05)	286.7
121	Adjusted Level of Significance	0.0434			Adjusted Chi Square Value	285.1
122		0.0404			Aujusted Oni Oquare Value	200.1
123	Δος	sumina Gam	ma Distributi	on		
124	95% Approximate Gamma UCL (use when n>=50)	12.76			usted Gamma UCL (use when n<50)	12.83
125		12.70				12.00
126		Lognormal	GOF Test			
127	Shapiro Wilk Test Statistic	0.966		Shan	iro Wilk Lognormal GOF Test	
128	5% Shapiro Wilk Critical Value	0.938		•	Lognormal at 5% Significance Level	
129	Lilliefors Test Statistic	0.0947			efors Lognormal GOF Test	
130	5% Lilliefors Critical Value	0.144			Lognormal at 5% Significance Level	
131	Data appear				Lognormal at 3 % Significance Lever	
132		Lognomiar				
133		Lognorma	I Statistics			
134	Minimum of Logged Data	1.459		Mean of logged Data	2.301	
135	Maximum of Logged Data	3.738			SD of logged Data	0.45
136		0.700				0.40
137		imina Loano	rmal Distribut	tion		
138	95% H-UCL	12.7			90% Chebyshev (MVUE) UCL	13.52
139	95% Chebyshev (MVUE) UCL	14.66			97.5% Chebyshev (MVUE) UCL	16.23
140	99% Chebyshev (MVUE) UCL	19.32				10.20
141		10.02				
142	Nonnarama	tric Distribut	ion Free UCL	Statistics		
143	Data appear to follow a D				nce Level	
144			albuion di			
145	Nonper	ametric Diet	ribution Free			
146	95% CLT UCL	12.9		5010	95% Jackknife UCL	12.95
147	95% Standard Bootstrap UCL	12.9			95% Bootstrap-t UCL	12.95
148	95% Hall's Bootstrap UCL	21.12			95% Percentile Bootstrap UCL	12.99
149	95% BCA Bootstrap UCL	13.6				12.00
150	90% Chebyshev(Mean, Sd) UCL	14.34			95% Chebyshev(Mean, Sd) UCL	15.78
151	90% Chebyshev(Mean, Sd) UCL 97.5% Chebyshev(Mean, Sd) UCL	14.34			95% Chebyshev(Mean, Sd) UCL 99% Chebyshev(Mean, Sd) UCL	21.69
152	97.3% Chebysnev(Mean, Sd) UCL	17.77				21.09
153		Suggested				
154	95% Adjusted Gamma UCL	12.83				
155	95% Adjusted Gamma UCL	12.03	 			
156						

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

	А	В	С	D		E	F	G	Н	<u> </u>	J		K	L
209														
210							Lognorma	Statistics						
211				linimum of			0.405				Mean o			1.36
212			Ma	aximum of	f Logged	d Data	2.565				SD o	flogged	J Data	0.542
213														
214								rmal Distributi	on					
215					95% H		5.37				Chebyshev			5.745
216				Chebyshev		,	6.312			97.5%	Chebyshev	(MVUE	.) UCL	7.099
217			99% C	Chebyshev	/ (MVUE	E) UCL	8.645							
218														
219								ion Free UCL						
220					Data d	o not fo	llow a Disce	ernible Distribu	ition (0.05)					
221														
222						-		ribution Free l	JCLs					
223					95% CL ⁻		5.392					ackknife		5.413
224				Standard E			5.377				95% Bo			5.652
225				5% Hall's E		•	5.515			95%	Percentile B	ootstra	p UCL	5.416
226				5% BCA E		-	5.522							
227				ebyshev(M		·	6.061				nebyshev(M			6.733
228		97	7.5% Che	ebyshev(M	lean, So	d) UCL	7.664			99% Cl	nebyshev(Me	ean, Sd	i) UCL	9.494
229							-							
230							Suggested	JCL to Use						
231			95% Chel	byshev (M	lean, Sd	I) UCL	6.733							
232														
233	N	lote: Suggestion	-	-				-						
234		These recomm									-		2002)	
235		an	d Singh a	-				ons results will			ld data sets.			
236				For a	additiona	al insigh	it the user m	nay want to co	nsult a statis	stician.				
237														
238														
₂₃₉ Zn														
240							0	O t - 4 ¹ - 4 ¹						
241							General	Statistics			()			
242			I otal N	Number of	Observ	ations	38				r of Distinct			29
243										Numbe	r of Missing			0
244						nimum	5.1						Mean	12.22
245					Max	ximum	34						ledian	9.35
246						SD	7.688				Std. I	Error of		1.247
247				Coefficie	ent of Va	riation	0.629	L				Skev	wness	1.718
248														
249					- -		Normal G	iOF Test		<u></u>				
250				apiro Wilk			0.75			•	ilk GOF Test			
251			5% Sha	apiro Wilk			0.938		Data Not		5% Significa	ince Lev	vel	
252				Lilliefors			0.298				GOF Test			
253			5%	6 Lilliefors			0.144			Normal at	5% Significa	Ince Lev	vel	
254					Da	ata Not	Normal at 5	% Significance) Level					
255														
256						Ass	suming Norn	nal Distributior						
257			95% Nor			,					sted for Ske	•		
258				95% St	tudent's-	-t UCL	14.33				ed-CLT UCL	•	· · ·	14.64
259										95% Modifi	ed-t UCL (Jo	ohnson-	-1978)	14.38
260														

	А		В		С		D		E		F Gamma (G GE Tost		Н		I		J			К	L	
261							Λ Γ		st Statis	stic	2.293	JUF TEST		٨٥٩	oreor	-Darlii			60	F Too	**		-
262									st Statis		0.753		Jata	Not Ga								vol	
263									st Statis		0.755	L	Jala			-Smiri						ivei	
264									tical Val		0.239	Г	Jota		-							wol	
265											0.144 Data Not Gamma Distributed at 5% Significance Level a Distributed at 5% Significance Level												
266								Data	I NOL Ga	annia	Distribute	u at 5% Siy	Inne		ever								
267											Commo	Statistics											
268								k	hat (ML		3.608	Statistics k star (bias corrected MLE)											1
269									-		3.388					Tho		•			d MLE		
270	Theta hat (MLE) nu hat (MLE)										274.2					me		· ·			rrected		
271		MLE Mean (bias corrected)									12.22										rrected		
272					IV		ivicali (i	Dias	conecil	eu)	12.22				An	vrovim			•		e (0.05		,,
273					Δdiu	ister		of Si	ignificar		0.0434				Λh	JUXIII					e Value		
274					Auju	13101	Leven	01 01	igninear		0.0404						Auju	isteu v		quar		210.0	
275										Δεειι	ming Gam	ma Distribut	tion										
276		05%	Appro	vimate	Gamm			wb	en n>=5		14.23		uon	05%	\diue	tod Ga	mma		(1160	who	n n<50) 14.3	2
277		3070	Appio	Annale	Gamm				51112-3	,0))	14.25			3370 F	hujus			IUCL	(use		11150	14.5	2
278											ognormal	GOF Test											
279		Charling MARIE Tools Of State												She	aniro	Wilk L	oano	rmal	COF	Test			
280		Shapiro Wilk Test Statistic									0.889		г	Data No	•		-						
281		5% Shapiro Wilk Critical Value									0.227										Lever		
282		Lilliefors Test Statistic										Lilliefors Lognormal GOF Test											
283	5% Lilliefors Critical Value 0.144 Data Not Lognormal at 5% Significance Level																						
284	Data Not Lognormal at 5% Significance Level																						
285	Lognormal Statistics																						
286						Mir	imum c	of Lo	gged Da		1.629											2.35	58
287									gged Da		3.526		SD of logged Data										
288									33														
289									A	ssum	nina Loano	rmal Distrib	utior	n									
290								9!	5% H-U		14.18	90% Chebyshev (MVUE) UCL 15.1										6	
291					95%	h Ch	ebyshev	v (M	VUE) U	CL	16.58	97.5% Chebyshev (MVUE) UCL											
292							•	•	VUE) U		22.44												
293 294							-		,														
294								١	Vonpara	metri	c Distribut	ion Free UC	CL SI	tatistics									
295								Da	ata do no	ot foll	ow a Disce	ernible Distri	ibuti	on (0.05	5)								
290 297																							
298									Non	parar	netric Dist	ribution Free	e UC	CLs									
299								95%	CLT U	CL	14.27							95	% Ja	ackkn	ife UCL	. 14.3	3
300					95%	6 Sta	andard	Boo	tstrap U	CL	14.23	95% Bootstrap-t UCL							. 15				
301						95%	Hall's I	Boot	tstrap U	CL	14.55					95	% Pe	rcenti	le Bo	ootstr	ap UCL	. 14.3	5
302						959	6 BCA I	Boot	tstrap U	CL	14.68												\neg
303					90% C	heb	yshev(N	Near	n, Sd) U	CL	15.96	95% Chebyshev(Mean, Sd) UCL 17.66								6			
304				ç	7.5% C	heb	yshev(N	Near	n, Sd) U	CL	20.01	99% Chebyshev(Mean, Sd) UCL 24.63								3			
305												1										1	\neg
306										S	uggested	UCL to Use)										
307					95% Cł	neby	shev (N	Лear	n, Sd) U	CL	17.66												\neg
308																							\neg
309		Not	e: Sug	gestio	ns regar	ding	the sel	lection	on of a §	95% l	JCL are pr	ovided to he	elp t	he user	to se	elect th	e mo	st app	oropr	iate 9	95% UC	L.	\neg
310		Т	hese re	ecomr	nendatio	ons	are bas	ed u	pon the	resul	lts of the si	mulation stu	udie	s summ	narize	d in Si	ingh,	Singh	n, and	d laci	(2002)		\neg
311				a	nd Singl	h an	d Singh	n (20	03). Hov	wevei	r, simulatio	ons results v	vill n	ot cove	r all F	Real W	orld (data s	ets.				
312							For a	addi	tional in	sight	the user m	nay want to	cons	sult a sta	atistio	cian.							\neg
212																							