2023-27 Transmission Revenue Reset

Appendix 9A: Fitting probability distributions to Service Component data

Updated for 2020 data

Submitted: 1 September 2021
PUBLIC

Contents

1 Service Component Parameters

This Appendix sets out the information used to calculate AusNet's proposed Service Component caps and floors, as presented in section 8.3.1.2 of the Revised Revenue Proposal. This information was obtained using the @risk product, a risk analysis and simulation add-in tool for Microsoft Excel.

For each parameter, proposed caps and floors have been set equal to the 5th and 95th percentiles, respectively, of the probability distribution that provides the best fit to the relevant historical data. This approach aligns with that adopted by the AER in the Draft Decision and in recent determinations for ElectraNet, TransGrid and TasNetworks. The distributions and caps and floors have been revised since AusNet's Revenue Proposal to take account of 2020 actual data, which was unavailable at the time. Consistent with the requirements of the STPIS, the caps and floors set out in this document are based on the five most recent years of performance data (2016-20).

In the Draft Decision, the AER disagreed with AusNet's preference to adopt distributions based on the Anderson-Daring (A-D) fit statistics. Instead, the AER relied solely on the Kolmogorov-Smirnov (K-S) method of fitting probability distributions. For this Revised Revenue Proposal, AusNet has followed the AER's preferred method of using only the K-S method to determine the most appropriate distribution.

For the loss of supply event frequency parameters (>0.05 and >0.30 system minutes) performance data is not conducive to statistical analysis. This is due to the small number of events usually, but not always, recorded in any one year of a five year data series. To align with the Draft Decision and to ensure consistency between the two indicators, the Poisson distribution has been used to set caps and floors for these sub-parameters.

The following table summarises the probability distributions and percentiles underpinning the proposed caps and floors.

Table 1.1: Summary of probability distributions and percentiles

Parameter	Preferred Distribution	5th percentile	95th percentile
Average circuit outage rate			
Line event rate (fault)	Gamma	0.1243	0.2237
Transformer event rate (fault)	Erlang	0.0649	0.1880
Reactive plant event rate (fault)	Dagum	0.1490	0.3043
Line event rate (forced)	FatigueLife	0.0382	0.2074
Transformer event rate (forced)	Burr12	0.0754	0.1588
Reactive plant event rate (forced)	Burr12	0.1965	0.3466
Loss of supply event frequency			
Number of events >0.05 system minutes	Poisson	0	4
Number of events >0.30 system minutes	Poisson	0	2
Average outage duration			
Average outage duration	Rayleigh	10.6	80.8
Proper operation of equipment			
Failure of protection equipment	Poisson	22	40
Material failure of SCADA system	Geometric	0	3
Incorrect operational isolation of primary or secondary equipment	Poisson	3	11

The remainder of this document sets out the rationale for selecting each distribution and the underlying percentile data as calculated by @risk.

1.1 Service parameter 1 – Average circuit outage rate

1.1.1 Lines event rate – fault (continuous)

The @risk software found that the Gamma distribution is the most appropriate fit.

Figure 1-1: Lines event rate (fault) – distribution fit using K-S

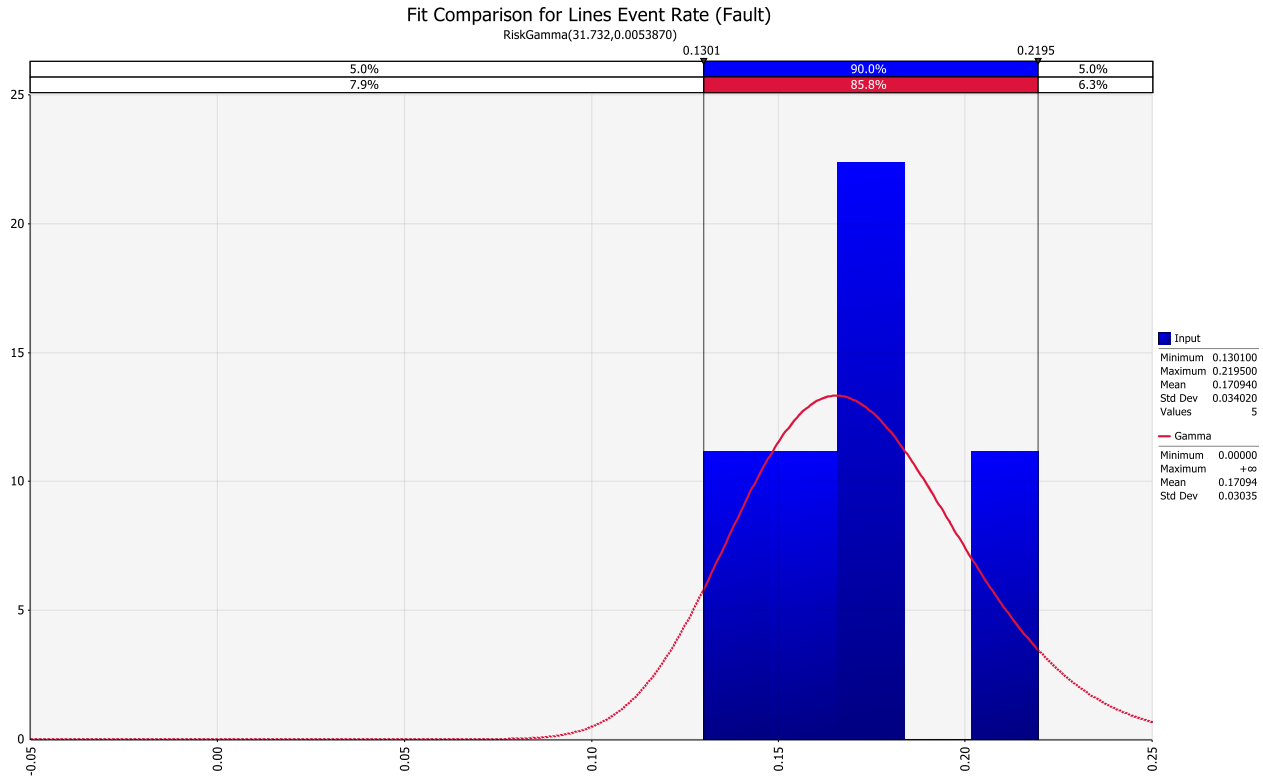
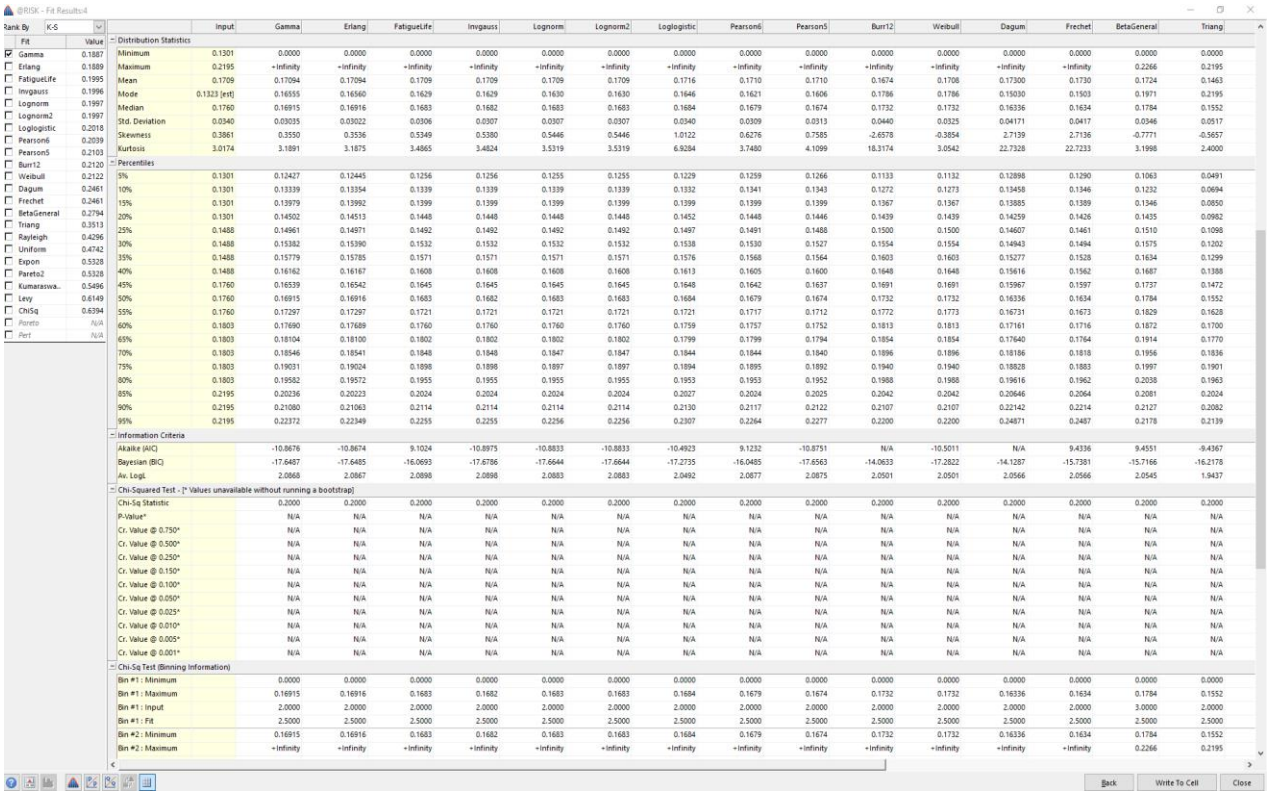


Figure 1.2: Lines event rate (fault) – statistics table using K-S



1.1.2 Transformer event rate – fault (continuous)

The @risk software found that the Erlang distribution is the most appropriate fit.

Figure 1-2: Transformer event rate (fault) – distribution fit using K-S

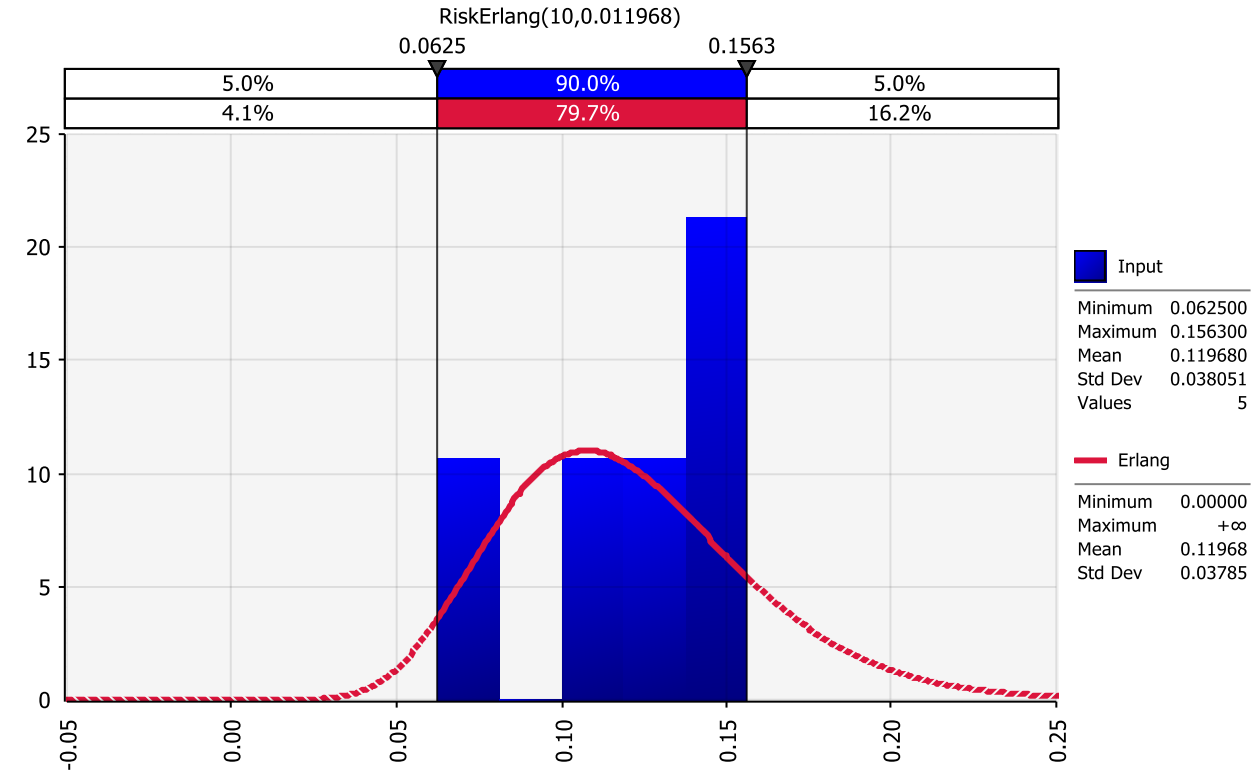
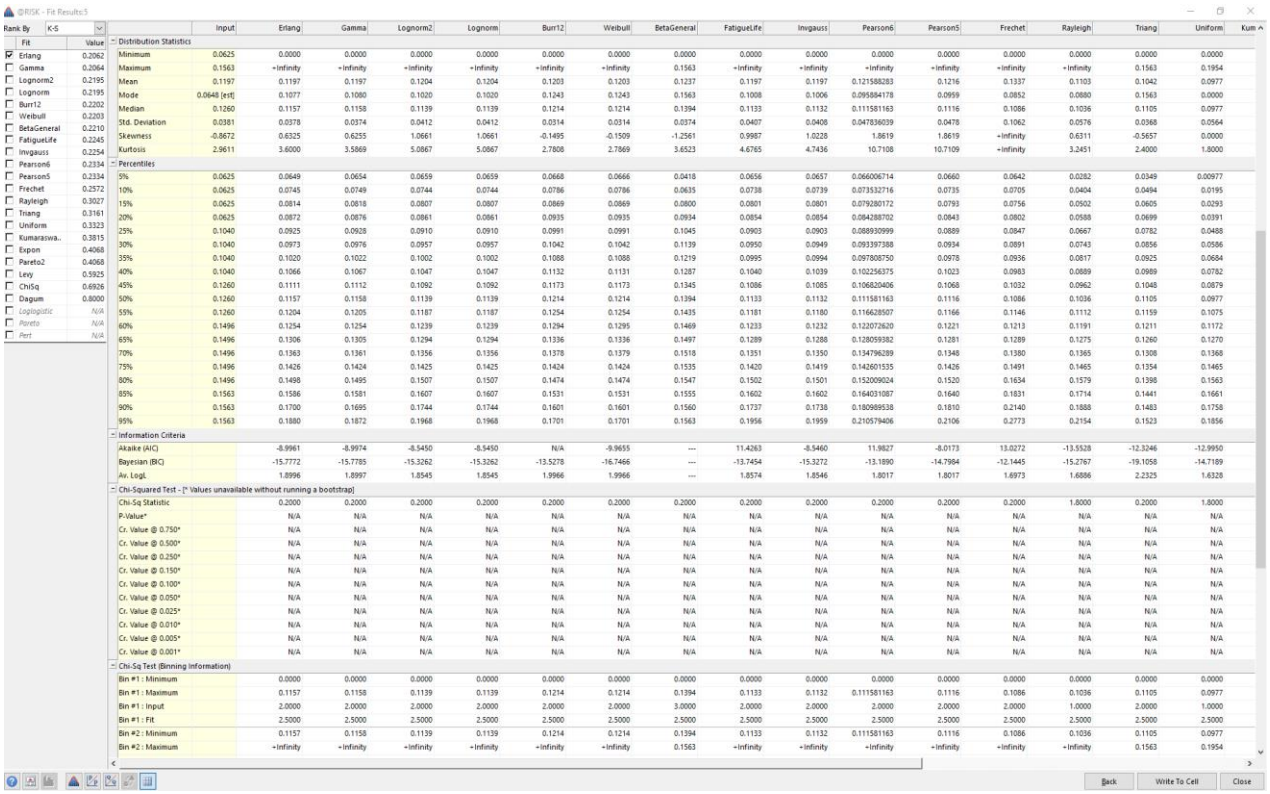


Figure 1.2: Transformer event rate (fault) – statistics table using K-S



1.1.3 Reactive plant event rate – fault (continuous)

The @risk software found that the Dagum distribution is the most appropriate fit.

Figure 1-3: Reactive plant event rate (fault) – distribution fit using K-S

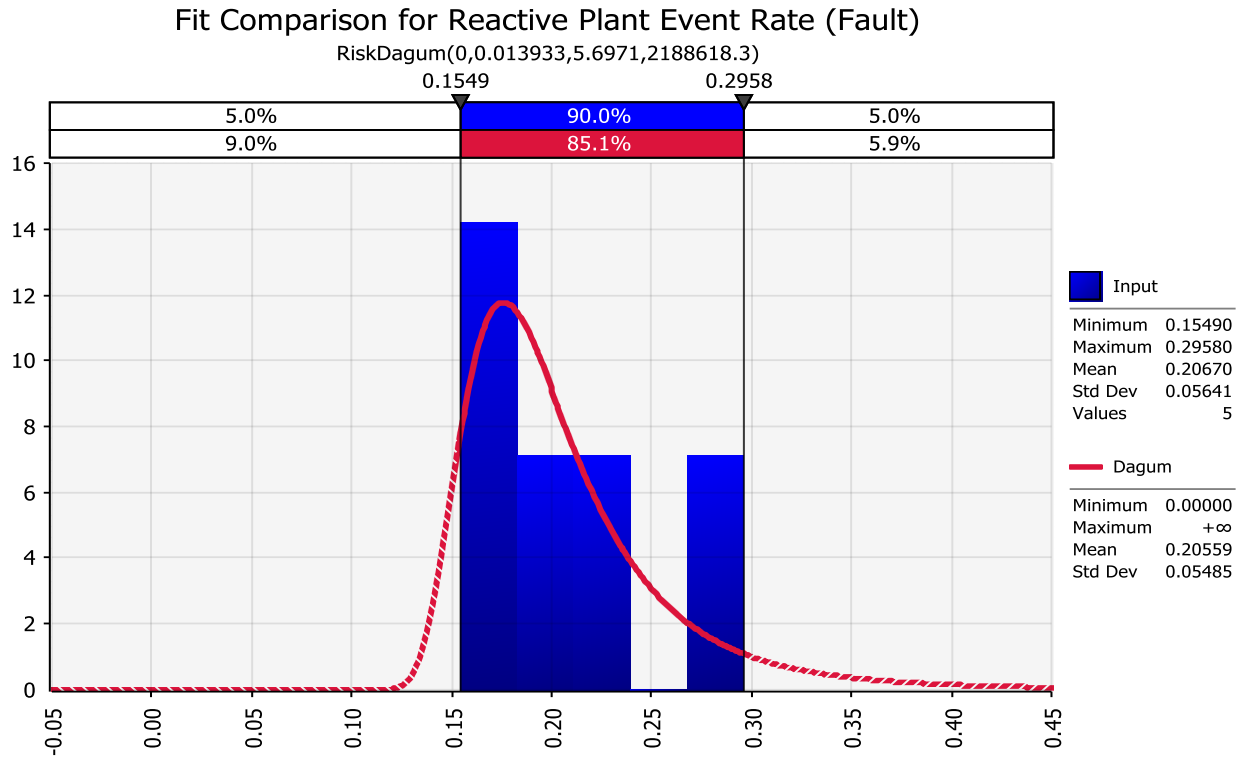
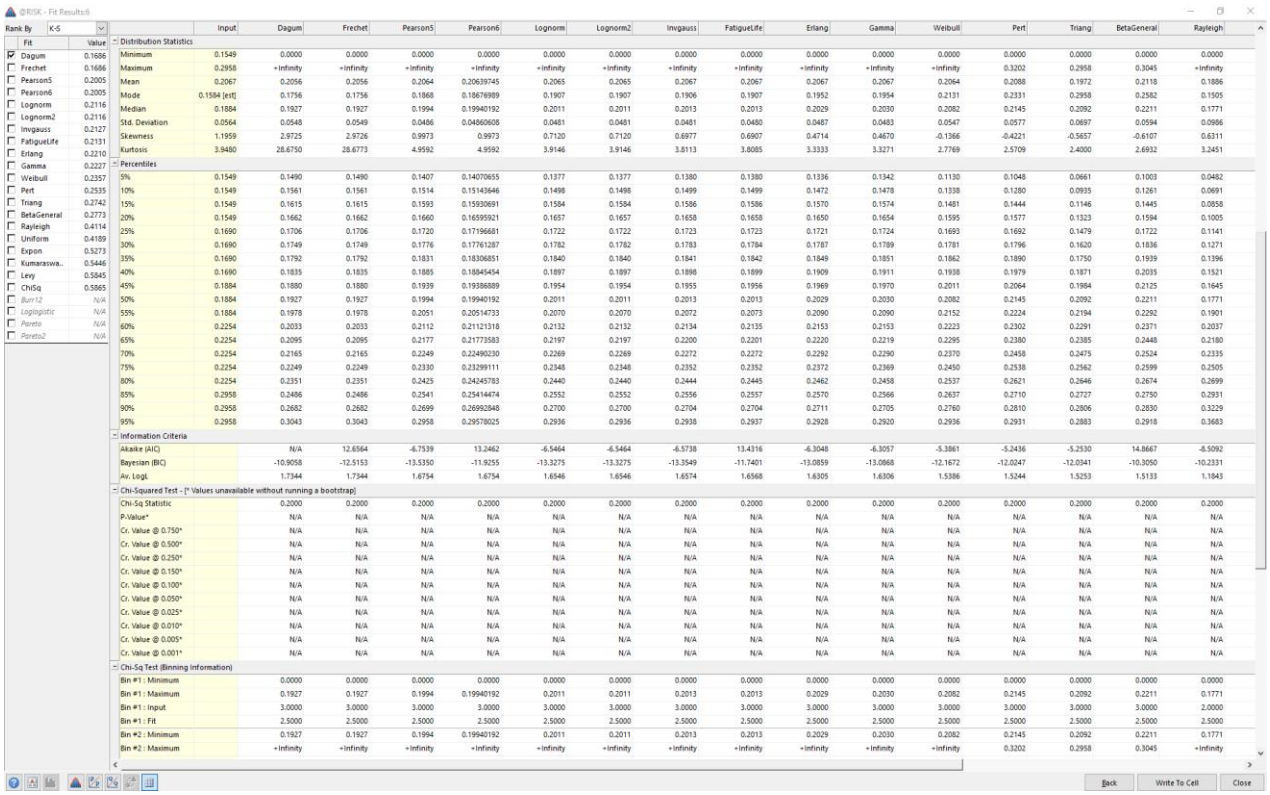


Figure 1-4: Reactive plant event rate (fault) – statistics table using K-S



1.1.4 Lines event rate – forced (continuous)

The @risk software found that the FatigueLife distribution is the most appropriate fit.

Figure 1-5: Lines event rate (forced) – distribution fit using K-S

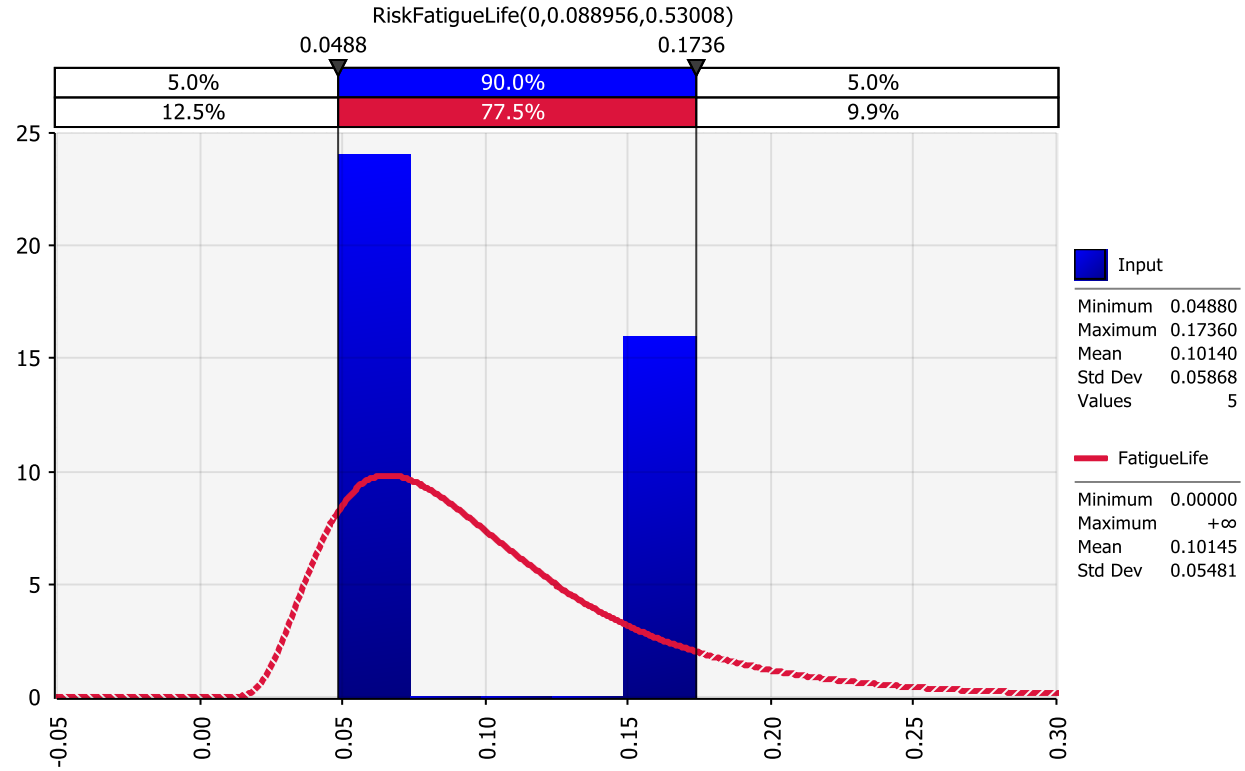
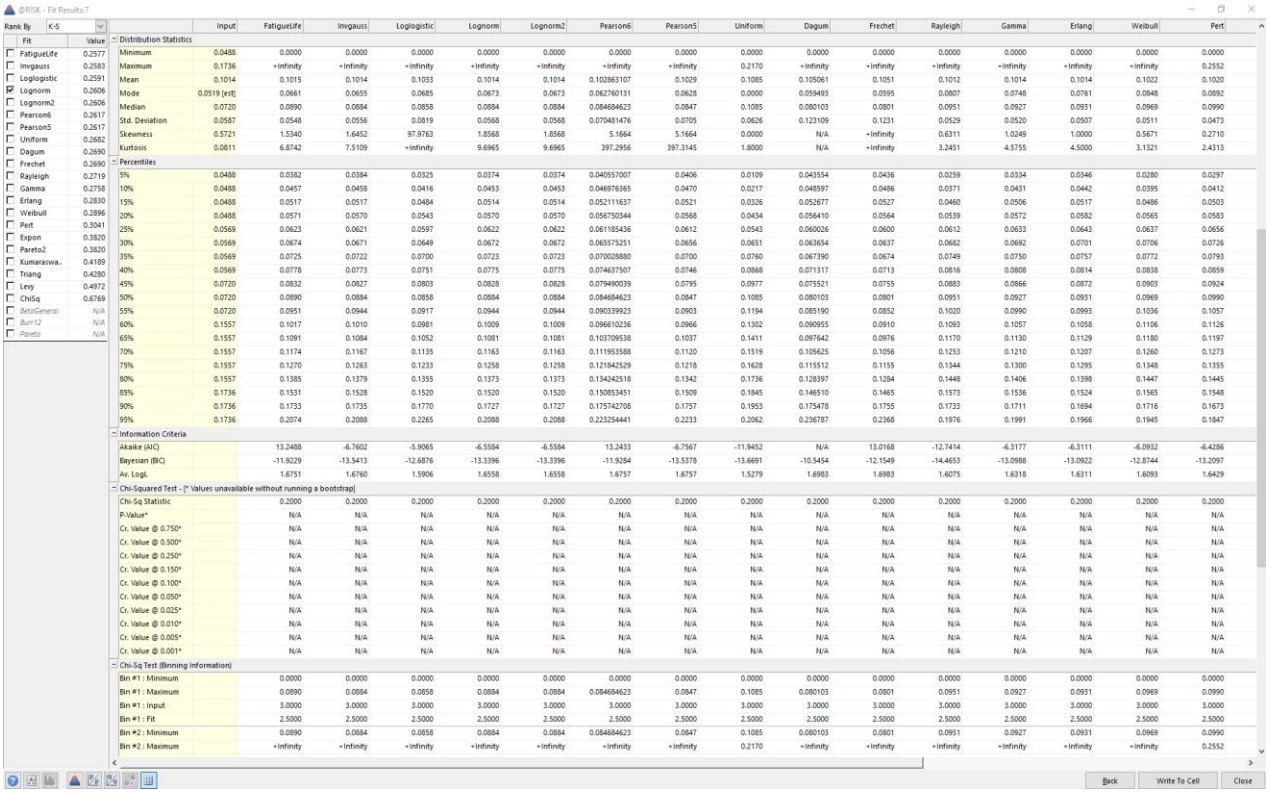


Figure 1-6: Lines event rate (forced) – statistics table using K-S



1.1.5 Transformer event rate – forced (continuous)

The @risk software found that the Burr12 distribution is the most appropriate fit.

Figure 1-7: Transformer event rate (forced) – distribution fit using K-S

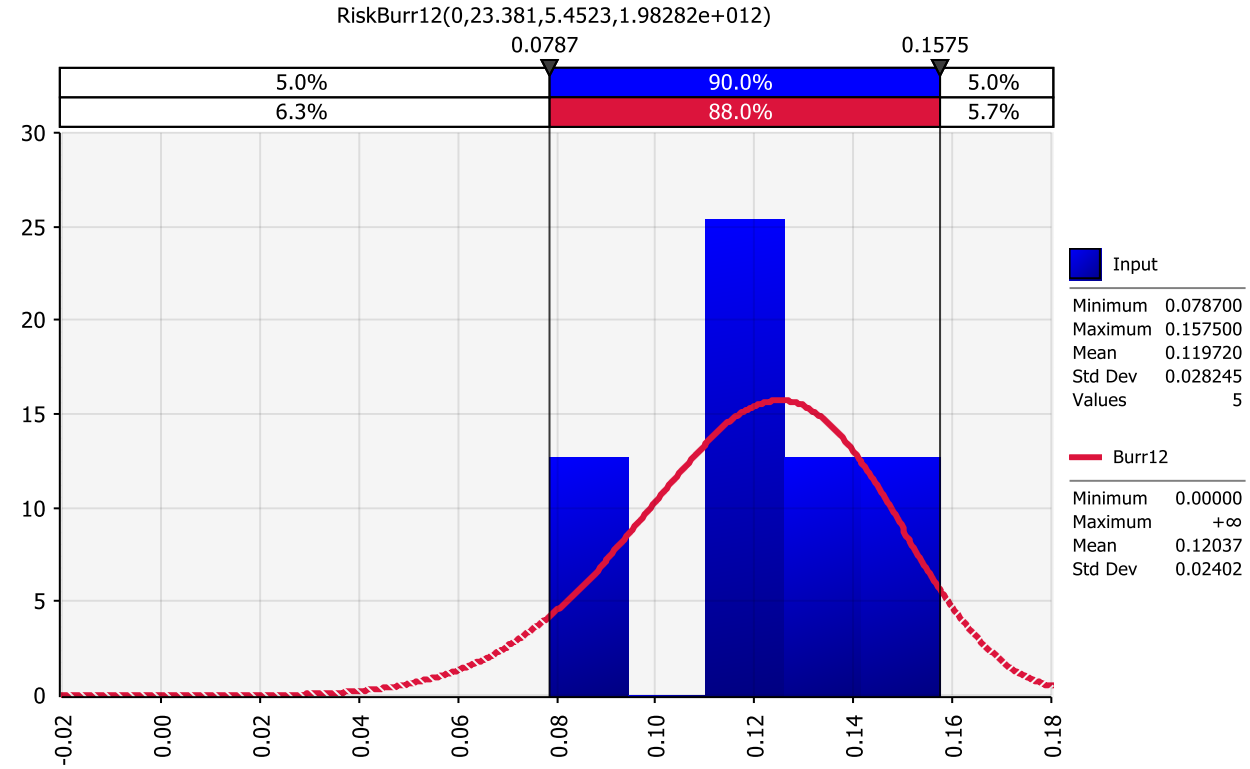
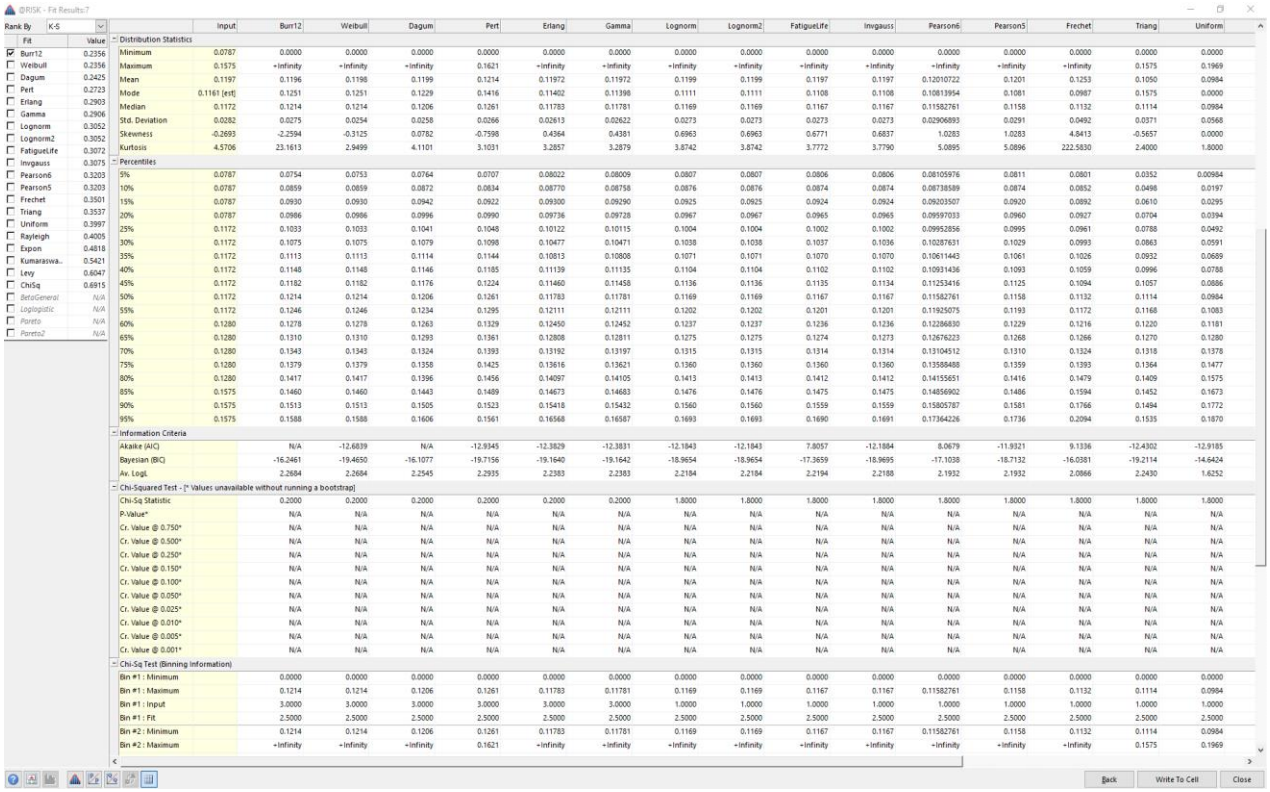


Figure 1-8: Transformer event rate (forced) – statistics table using K-S



1.1.6 Reactive plant event rate – forced (continuous)

The @risk software found that the Burr12 distribution is the most appropriate fit.

Figure 1-9: Reactive plant event rate (forced) – distribution fit using K-S

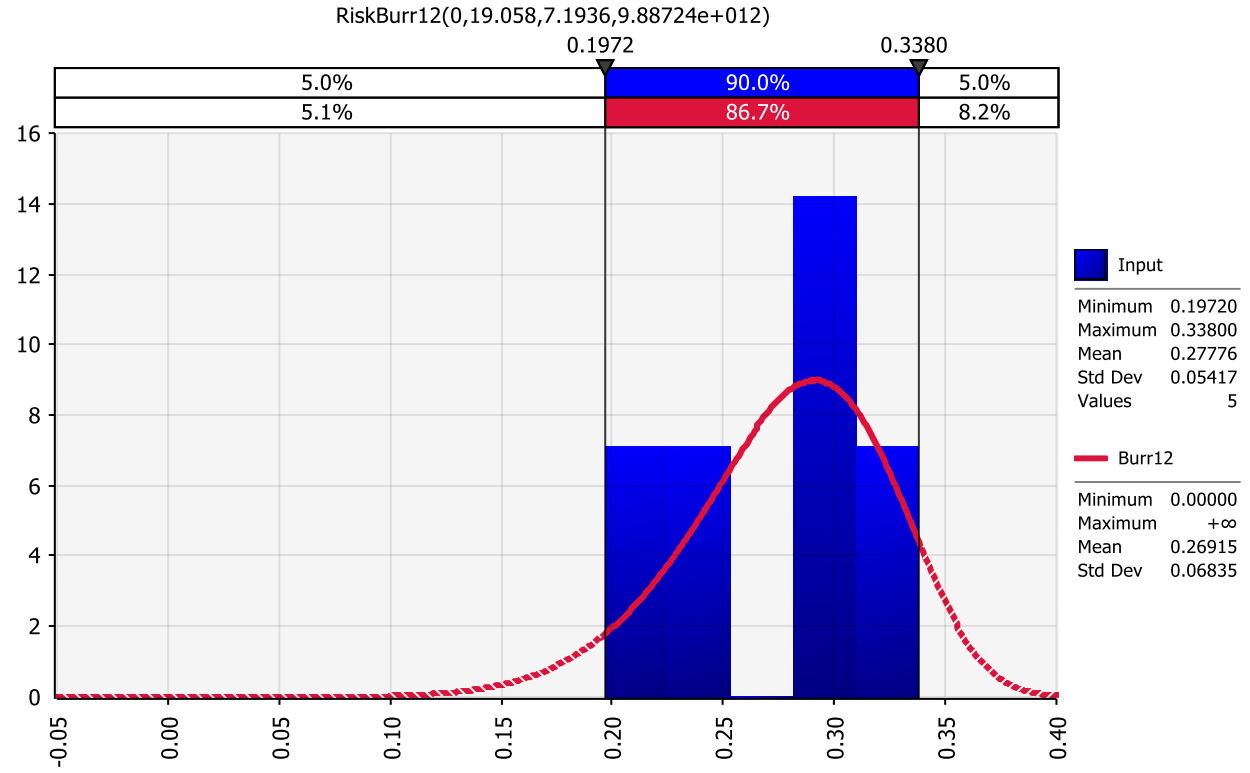
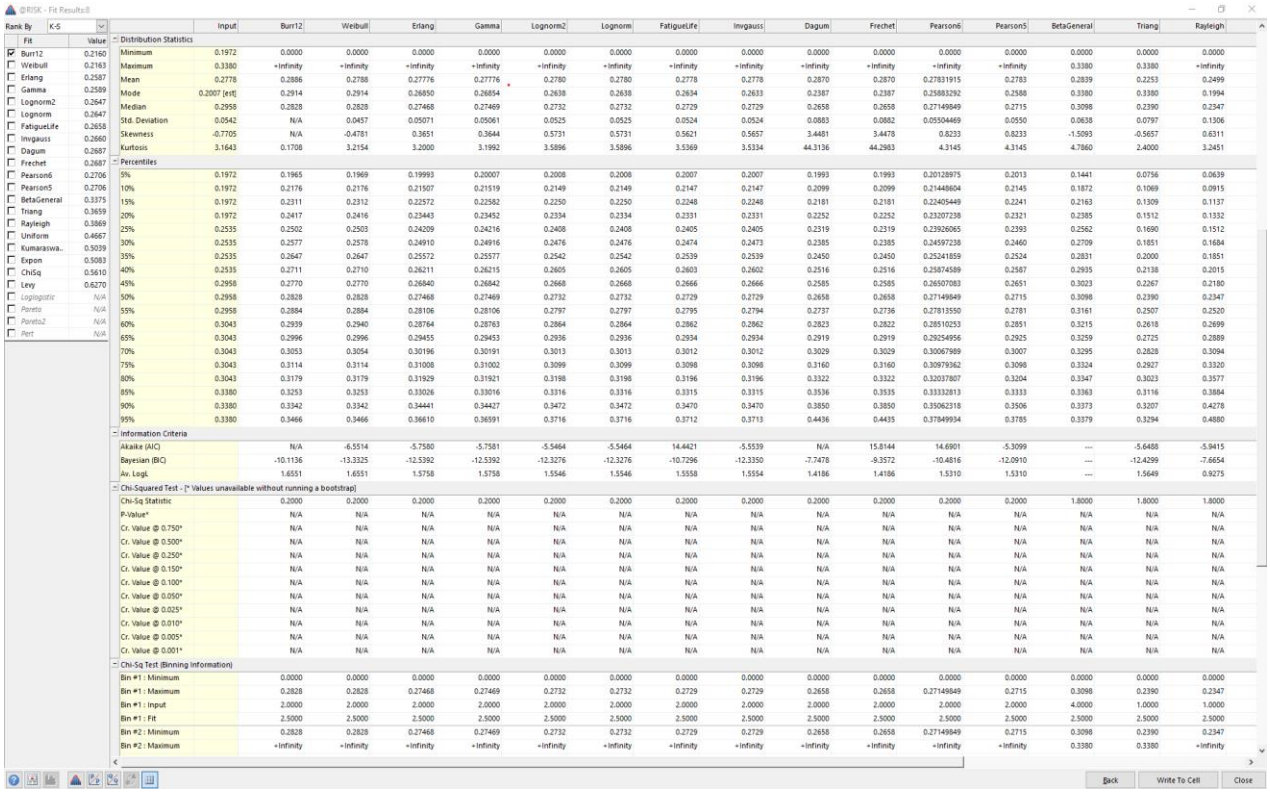


Figure 1-10: Reactive plant event rate (forced) – statistics table using K-S



1.2 Service parameter 2 – loss of supply event frequency

1.2.1 Number of events > 0.05 system minutes (discrete)

Whilst @risk found that the Geometric distribution is the best fit according to AIC and IntUniform according to BIC, the Poisson distribution has been adopted, consistent with both the loss of supply event frequency (>0.30 system minutes) parameter and the Draft Decision.

Figure 1-11: Number of events >0.05 system minutes – Poisson distribution

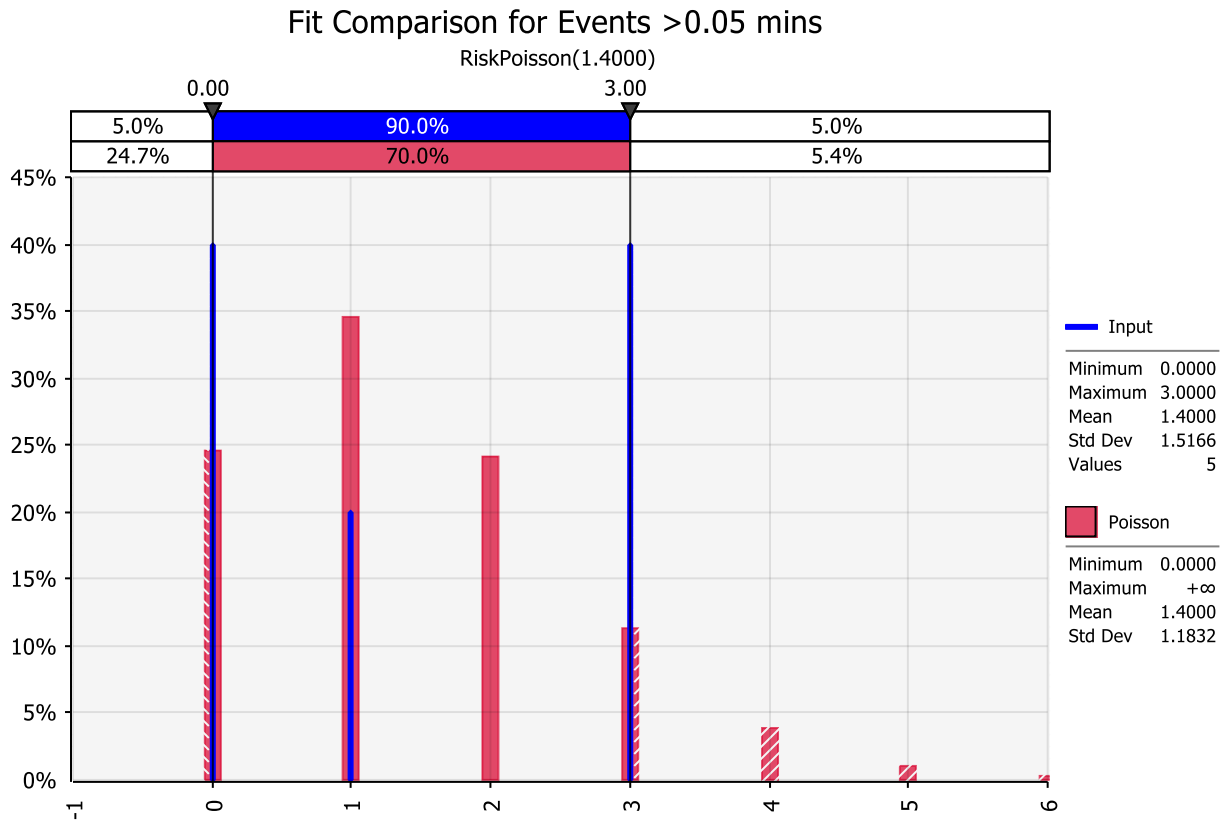
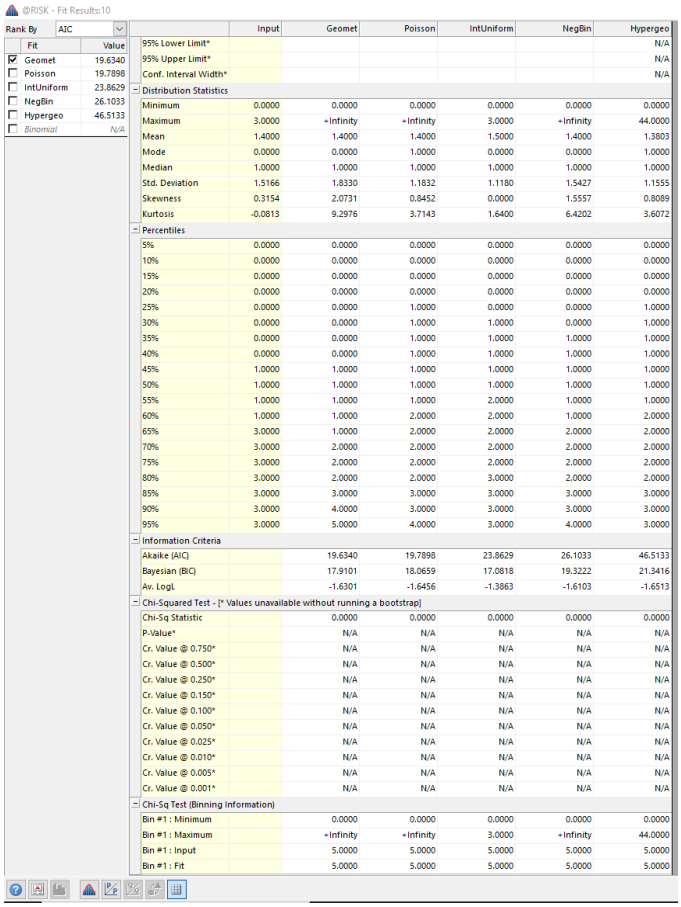


Figure 1-12: Number of events >0.05 system minutes – AIC statistics table



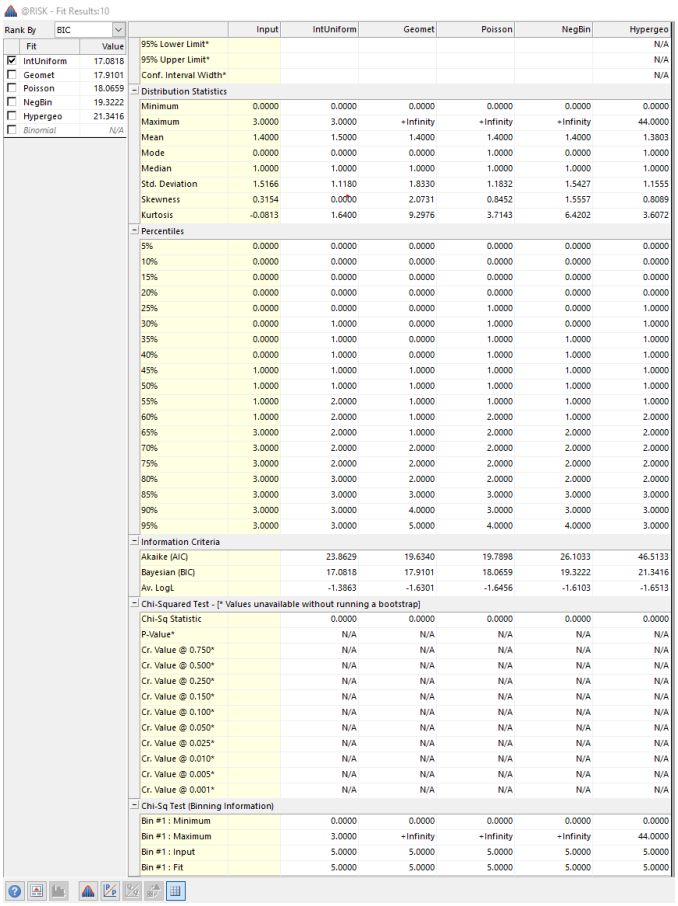
@RISK - Fit Results:10

Rank By: AIC

Fit	Value
☑ Geomet	19.6340
☐ Poisson	19.7898
☐ IntUniform	23.8629
☐ NegBin	26.1033
☐ Hypergeo	46.5133
☐ *Binomial*	*N/A*

	Input	Geomet	Poisson	IntUniform	NegBin	Hypergeo
95% Lower Limit*						N/A
95% Upper Limit*						N/A
Conf. Interval Width*						N/A
Distribution Statistics						
Minimum	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Maximum	3.0000	+Infinity	+Infinity	3.0000	+Infinity	44.0000
Mean	1.4000	1.4000	1.4000	1.5000	1.4000	1.3803
Mode	0.0000	0.0000	1.0000	0.0000	0.0000	1.0000
Median	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000
Std. Deviation	1.5166	1.8330	1.1832	1.1180	1.5427	1.1555
Skewness	0.3154	2.0731	0.8452	0.0000	1.5557	0.8089
Kurtosis	-0.0813	9.2976	3.7143	1.6400	6.4202	3.6072
Percentiles						
5%	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
10%	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
15%	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
20%	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
25%	0.0000	0.0000	1.0000	0.0000	0.0000	1.0000
30%	0.0000	0.0000	1.0000	1.0000	0.0000	1.0000
35%	0.0000	0.0000	1.0000	1.0000	1.0000	1.0000
40%	0.0000	0.0000	1.0000	1.0000	1.0000	1.0000
45%	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000
50%	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000
55%	1.0000	1.0000	1.0000	2.0000	1.0000	1.0000
60%	1.0000	1.0000	2.0000	2.0000	1.0000	2.0000
65%	3.0000	1.0000	2.0000	2.0000	2.0000	2.0000
70%	3.0000	2.0000	2.0000	2.0000	2.0000	2.0000
75%	3.0000	2.0000	2.0000	2.0000	2.0000	2.0000
80%	3.0000	2.0000	2.0000	3.0000	2.0000	2.0000
85%	3.0000	3.0000	3.0000	3.0000	3.0000	3.0000
90%	3.0000	4.0000	3.0000	3.0000	3.0000	3.0000
95%	3.0000	5.0000	4.0000	3.0000	4.0000	3.0000
Information Criteria						
Akaike (AIC)		19.6340	19.7898	23.8629	26.1033	46.5133
Bayesian (BIC)		17.9101	18.0659	17.0818	19.3222	21.3416
Av. LogL		-1.6301	-1.6456	-1.3863	-1.6103	-1.6513
Chi-Squared Test - [* Values unavailable without running a bootstrap]						
Chi-Sq Statistic		0.0000	0.0000	0.0000	0.0000	0.0000
P-Value*		N/A	N/A	N/A	N/A	N/A
Cr. Value @ 0.750*		N/A	N/A	N/A	N/A	N/A
Cr. Value @ 0.500*		N/A	N/A	N/A	N/A	N/A
Cr. Value @ 0.250*		N/A	N/A	N/A	N/A	N/A
Cr. Value @ 0.150*		N/A	N/A	N/A	N/A	N/A
Cr. Value @ 0.100*		N/A	N/A	N/A	N/A	N/A
Cr. Value @ 0.050*		N/A	N/A	N/A	N/A	N/A
Cr. Value @ 0.025*		N/A	N/A	N/A	N/A	N/A
Cr. Value @ 0.010*		N/A	N/A	N/A	N/A	N/A
Cr. Value @ 0.005*		N/A	N/A	N/A	N/A	N/A
Cr. Value @ 0.001*		N/A	N/A	N/A	N/A	N/A
Chi-Sq Test (Binning Information)						
Bin #1 : Minimum		0.0000	0.0000	0.0000	0.0000	0.0000
Bin #1 : Maximum		+Infinity	+Infinity	3.0000	+Infinity	44.0000
Bin #1 : Input		5.0000	5.0000	5.0000	5.0000	5.0000
Bin #1 : Fit		5.0000	5.0000	5.0000	5.0000	5.0000

Figure 1-13: Number of events >0.05 system minutes – BIC statistics table



@RISK - Fit Results:10

Rank By: BIC

Fit	Value
☑ IntUniform	17.0818
☐ Geomet	17.9101
☐ Poisson	18.0659
☐ NegBin	19.3222
☐ Hypergeo	21.3416
☐ *Binomial*	*N/A*

	Input	IntUniform	Geomet	Poisson	NegBin	Hypergeo
95% Lower Limit*						N/A
95% Upper Limit*						N/A
Conf. Interval Width*						N/A
Distribution Statistics						
Minimum	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Maximum	3.0000	3.0000	+Infinity	+Infinity	+Infinity	44.0000
Mean	1.4000	1.5000	1.4000	1.4000	1.4000	1.3803
Mode	0.0000	0.0000	0.0000	1.0000	0.0000	1.0000
Median	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000
Std. Deviation	1.5166	1.1180	1.8330	1.1832	1.5427	1.1555
Skewness	0.3154	0.0000	2.0731	0.8452	1.5557	0.8089
Kurtosis	-0.0813	1.6400	9.2976	3.7143	6.4202	3.6072
Percentiles						
5%	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
10%	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
15%	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
20%	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
25%	0.0000	0.0000	0.0000	1.0000	0.0000	1.0000
30%	0.0000	1.0000	0.0000	1.0000	0.0000	1.0000
35%	0.0000	1.0000	0.0000	1.0000	1.0000	1.0000
40%	0.0000	1.0000	0.0000	1.0000	1.0000	1.0000
45%	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000
50%	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000
55%	1.0000	2.0000	1.0000	1.0000	1.0000	1.0000
60%	1.0000	2.0000	1.0000	2.0000	1.0000	2.0000
65%	3.0000	2.0000	1.0000	2.0000	2.0000	2.0000
70%	3.0000	2.0000	2.0000	2.0000	2.0000	2.0000
75%	3.0000	2.0000	2.0000	2.0000	2.0000	2.0000
80%	3.0000	3.0000	2.0000	2.0000	2.0000	2.0000
85%	3.0000	3.0000	3.0000	3.0000	3.0000	3.0000
90%	3.0000	3.0000	4.0000	3.0000	3.0000	3.0000
95%	3.0000	3.0000	5.0000	4.0000	4.0000	3.0000
Information Criteria						
Akaike (AIC)		23.8629	19.6340	19.7898	26.1033	46.5133
Bayesian (BIC)		17.0818	17.9101	18.0659	19.3222	21.3416
Av. LogL		-1.3863	-1.6301	-1.6456	-1.6103	-1.6513
Chi-Squared Test - [* Values unavailable without running a bootstrap]						
Chi-Sq Statistic		0.0000	0.0000	0.0000	0.0000	0.0000
P-Value*		N/A	N/A	N/A	N/A	N/A
Cr. Value @ 0.750*		N/A	N/A	N/A	N/A	N/A
Cr. Value @ 0.500*		N/A	N/A	N/A	N/A	N/A
Cr. Value @ 0.250*		N/A	N/A	N/A	N/A	N/A
Cr. Value @ 0.150*		N/A	N/A	N/A	N/A	N/A
Cr. Value @ 0.100*		N/A	N/A	N/A	N/A	N/A
Cr. Value @ 0.050*		N/A	N/A	N/A	N/A	N/A
Cr. Value @ 0.025*		N/A	N/A	N/A	N/A	N/A
Cr. Value @ 0.010*		N/A	N/A	N/A	N/A	N/A
Cr. Value @ 0.005*		N/A	N/A	N/A	N/A	N/A
Cr. Value @ 0.001*		N/A	N/A	N/A	N/A	N/A
Chi-Sq Test (Binning Information)						
Bin #1 : Minimum		0.0000	0.0000	0.0000	0.0000	0.0000
Bin #1 : Maximum		3.0000	+Infinity	+Infinity	+Infinity	44.0000
Bin #1 : Input		5.0000	5.0000	5.0000	5.0000	5.0000
Bin #1 : Fit		5.0000	5.0000	5.0000	5.0000	5.0000

1.2.2 Number of events > 0.30 system minutes (discrete)

The data does not lend itself easily to statistical analysis, as it is comprised of either zero or one events. To retain consistency with the 0.05 minutes parameter and the Draft Decision, the Poisson distribution has been adopted and is in accordance with AIC.

Figure 1-14: Number of events >0.30 system minutes – Poisson distribution

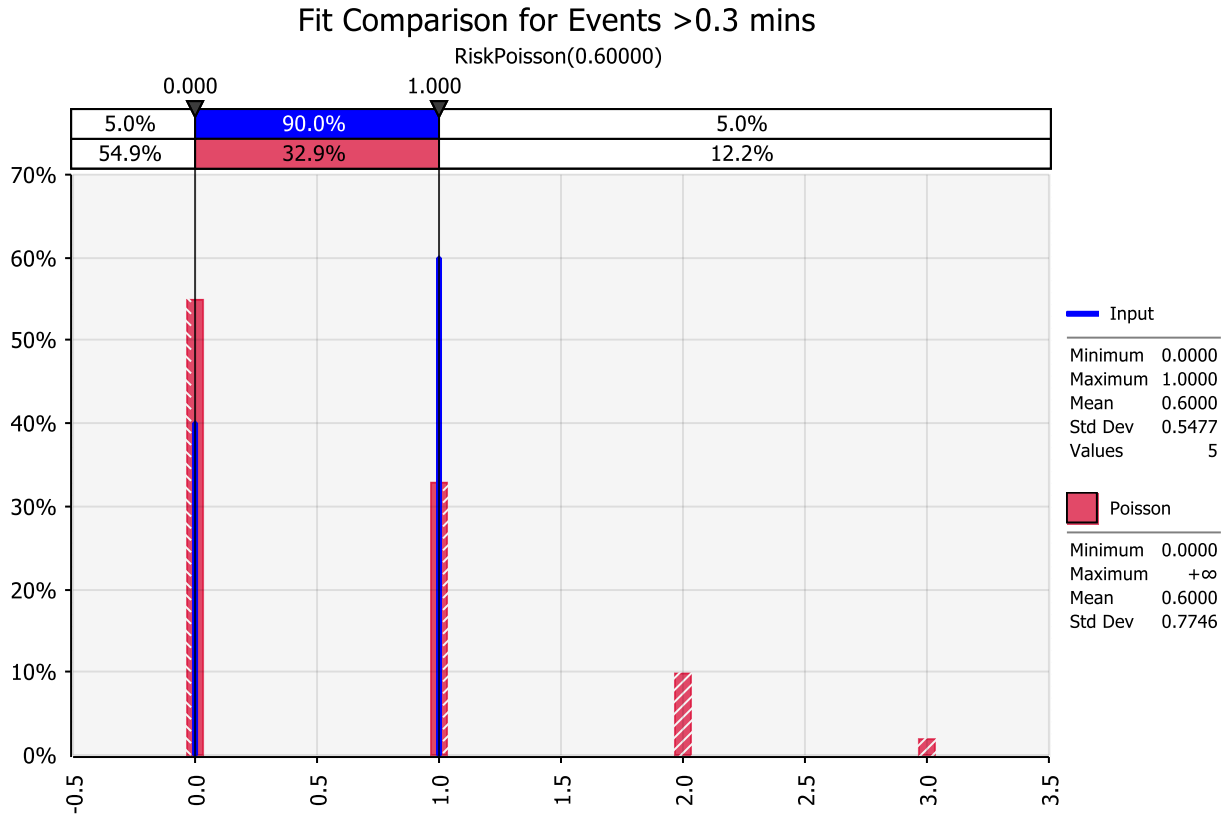


Figure 1-15: Number of events >0.30 system minutes – AIC distribution

@RISK - Fit Results:10

Rank By: AIC

Fit	Value
☑ Poisson	12.3983
☐ Geomet	13.9183
☐ Binomial	16.7301
☐ IntUniform	16.9315
☐ Hypergeo	36.7301
☐ NegBin	N/A

	Input	Poisson	Geomet	Binomial	IntUniform	Hypergeo
95% Lower Limit*						N/A
95% Upper Limit*						N/A
Conf. Interval Width*						N/A
Distribution Statistics						
Minimum	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Maximum	1.0000	+Infinity	+Infinity	1.0000	1.0000	1.0000
Mean	0.6000	0.6000	0.6000	0.6000	0.5000	0.6000
Mode	1.0000	0.0000	0.0000	1.0000	0.0000	1.0000
Median	1.0000	0.0000	0.0000	1.0000	0.0000	1.0000
Std. Deviation	0.5477	0.7746	0.9798	0.4899	0.5000	0.4899
Skewness	-0.6086	1.2910	2.2454	-0.4082	0.0000	-0.4082
Kurtosis	-0.3333	4.6667	10.0417	1.1667	1.0000	1.1667
Percentiles						
5%	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
10%	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
15%	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
20%	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
25%	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
30%	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
35%	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
40%	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
45%	1.0000	0.0000	0.0000	1.0000	0.0000	1.0000
50%	1.0000	0.0000	0.0000	1.0000	0.0000	1.0000
55%	1.0000	1.0000	0.0000	1.0000	1.0000	1.0000
60%	1.0000	1.0000	0.0000	1.0000	1.0000	1.0000
65%	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000
70%	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000
75%	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000
80%	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000
85%	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000
90%	1.0000	2.0000	2.0000	1.0000	1.0000	1.0000
95%	1.0000	2.0000	3.0000	1.0000	1.0000	1.0000
Information Criteria						
Akaike (AIC)		12.3983	13.9183	16.7301	16.9315	36.7301
Bayesian (BIC)		10.6744	12.1944	9.9490	10.1503	11.5584
Av. LogL		-0.9065	-1.0585	-0.6730	-0.6931	-0.6730
Chi-Squared Test - [* Values unavailable without running a bootstrap]						
Chi-Sq Statistic		0.0000	0.0000	0.0000	0.0000	0.0000
P-Value*		N/A	N/A	N/A	N/A	N/A
Cr. Value @ 0.750*		N/A	N/A	N/A	N/A	N/A
Cr. Value @ 0.500*		N/A	N/A	N/A	N/A	N/A
Cr. Value @ 0.250*		N/A	N/A	N/A	N/A	N/A
Cr. Value @ 0.150*		N/A	N/A	N/A	N/A	N/A
Cr. Value @ 0.100*		N/A	N/A	N/A	N/A	N/A
Cr. Value @ 0.050*		N/A	N/A	N/A	N/A	N/A
Cr. Value @ 0.025*		N/A	N/A	N/A	N/A	N/A
Cr. Value @ 0.010*		N/A	N/A	N/A	N/A	N/A
Cr. Value @ 0.005*		N/A	N/A	N/A	N/A	N/A
Cr. Value @ 0.001*		N/A	N/A	N/A	N/A	N/A
Chi-Sq Test (Binning Information)						
Bin #1 : Minimum		0.0000	0.0000	0.0000	0.0000	0.0000
Bin #1 : Maximum		+Infinity	+Infinity	1.0000	1.0000	1.0000
Bin #1 : Input		5.0000	5.0000	5.0000	5.0000	5.0000
Bin #1 : Fit		5.0000	5.0000	5.0000	5.0000	5.0000

Figure 1-16: Number of events >0.30 system minutes – BIC distribution

@RISK - Fit Results:10

Rank By: BIC

Fit	Value
☑ Binomial	9.9490
☐ IntUniform	10.1503
☐ Poisson	10.6744
☐ Hypergeo	11.5584
☐ Geomet	12.1944
☐ NegBin	N/A

	Input	Binomial	IntUniform	Poisson	Hypergeo	Geomet
95% Lower Limit*					N/A	
95% Upper Limit*					N/A	
Conf. Interval Width*					N/A	
Distribution Statistics						
Minimum	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Maximum	1.0000	1.0000	1.0000	+Infinity	1.0000	+Infinity
Mean	0.6000	0.6000	0.5000	0.6000	0.6000	0.6000
Mode	1.0000	1.0000	0.0000	0.0000	1.0000	0.0000
Median	1.0000	1.0000	0.0000	0.0000	1.0000	0.0000
Std. Deviation	0.5477	0.4899	0.5000	0.7746	0.4899	0.9798
Skewness	-0.6086	-0.4082	0.0000	1.2910	-0.4082	2.2454
Kurtosis	-0.3333	1.1667	1.0000	4.6667	1.1667	10.0417
Percentiles						
5%	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
10%	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
15%	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
20%	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
25%	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
30%	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
35%	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
40%	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
45%	1.0000	1.0000	0.0000	0.0000	1.0000	0.0000
50%	1.0000	1.0000	0.0000	0.0000	1.0000	0.0000
55%	1.0000	1.0000	1.0000	1.0000	1.0000	0.0000
60%	1.0000	1.0000	1.0000	1.0000	1.0000	0.0000
65%	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000
70%	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000
75%	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000
80%	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000
85%	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000
90%	1.0000	1.0000	1.0000	2.0000	1.0000	2.0000
95%	1.0000	1.0000	1.0000	2.0000	1.0000	3.0000
Information Criteria						
Akaike (AIC)		16.7301	16.9315	12.3983	36.7301	13.9183
Bayesian (BIC)		9.9490	10.1503	10.6744	11.5584	12.1944
Av. LogL		-0.6730	-0.6931	-0.9065	-0.6730	-1.0585
Chi-Squared Test - [* Values unavailable without running a bootstrap]						
Chi-Sq Statistic		0.0000	0.0000	0.0000	0.0000	0.0000
P-Value*		N/A	N/A	N/A	N/A	N/A
Cr. Value @ 0.750*		N/A	N/A	N/A	N/A	N/A
Cr. Value @ 0.500*		N/A	N/A	N/A	N/A	N/A
Cr. Value @ 0.250*		N/A	N/A	N/A	N/A	N/A
Cr. Value @ 0.150*		N/A	N/A	N/A	N/A	N/A
Cr. Value @ 0.100*		N/A	N/A	N/A	N/A	N/A
Cr. Value @ 0.050*		N/A	N/A	N/A	N/A	N/A
Cr. Value @ 0.025*		N/A	N/A	N/A	N/A	N/A
Cr. Value @ 0.010*		N/A	N/A	N/A	N/A	N/A
Cr. Value @ 0.005*		N/A	N/A	N/A	N/A	N/A
Cr. Value @ 0.001*		N/A	N/A	N/A	N/A	N/A
Chi-Sq Test (Binning Information)						
Bin #1 : Minimum		0.0000	0.0000	0.0000	0.0000	0.0000
Bin #1 : Maximum		1.0000	1.0000	+Infinity	1.0000	+Infinity
Bin #1 : Input		5.0000	5.0000	5.0000	5.0000	5.0000
Bin #1 : Fit		5.0000	5.0000	5.0000	5.0000	5.0000

1.3 Service parameter 3 – average outage duration

1.3.1 Average outage duration (continuous)

The @risk software found the Rayleigh distribution is the most appropriate fit.

Figure 1-17: Average outage duration – distribution fit using K-S

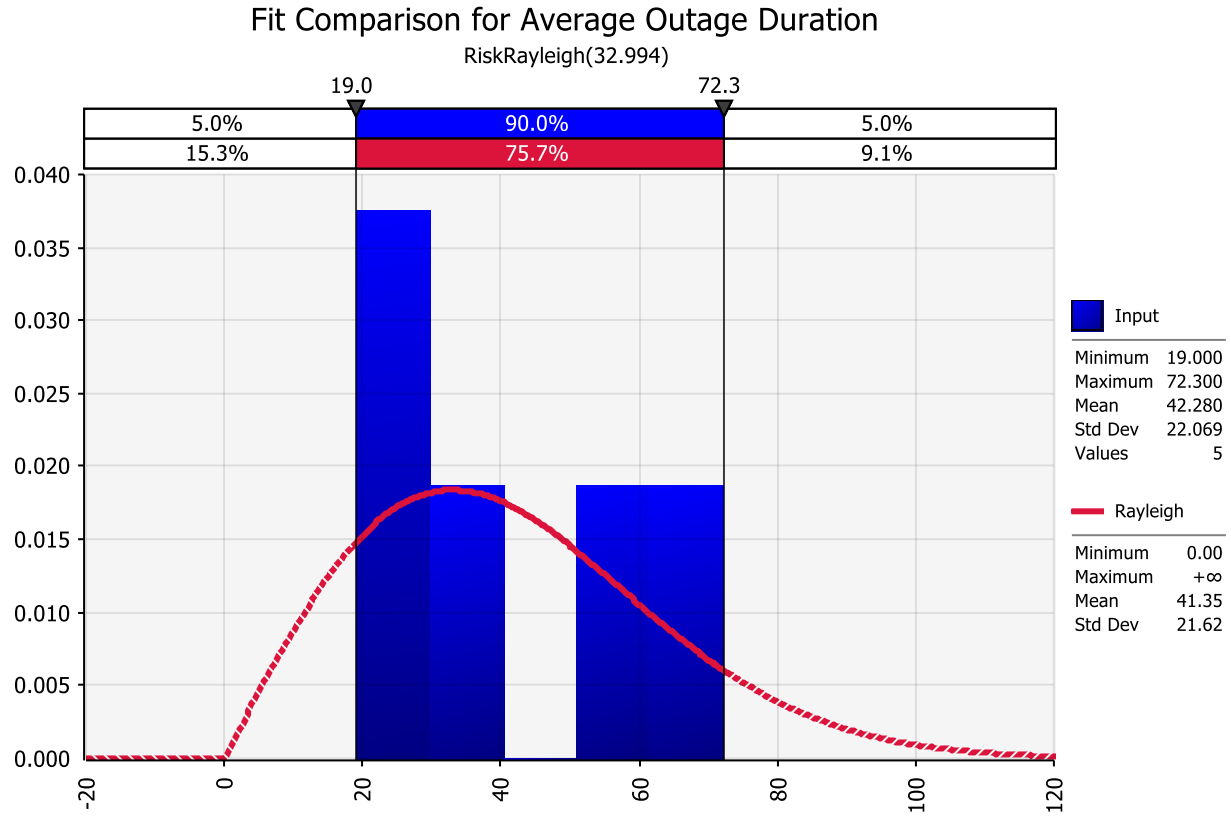
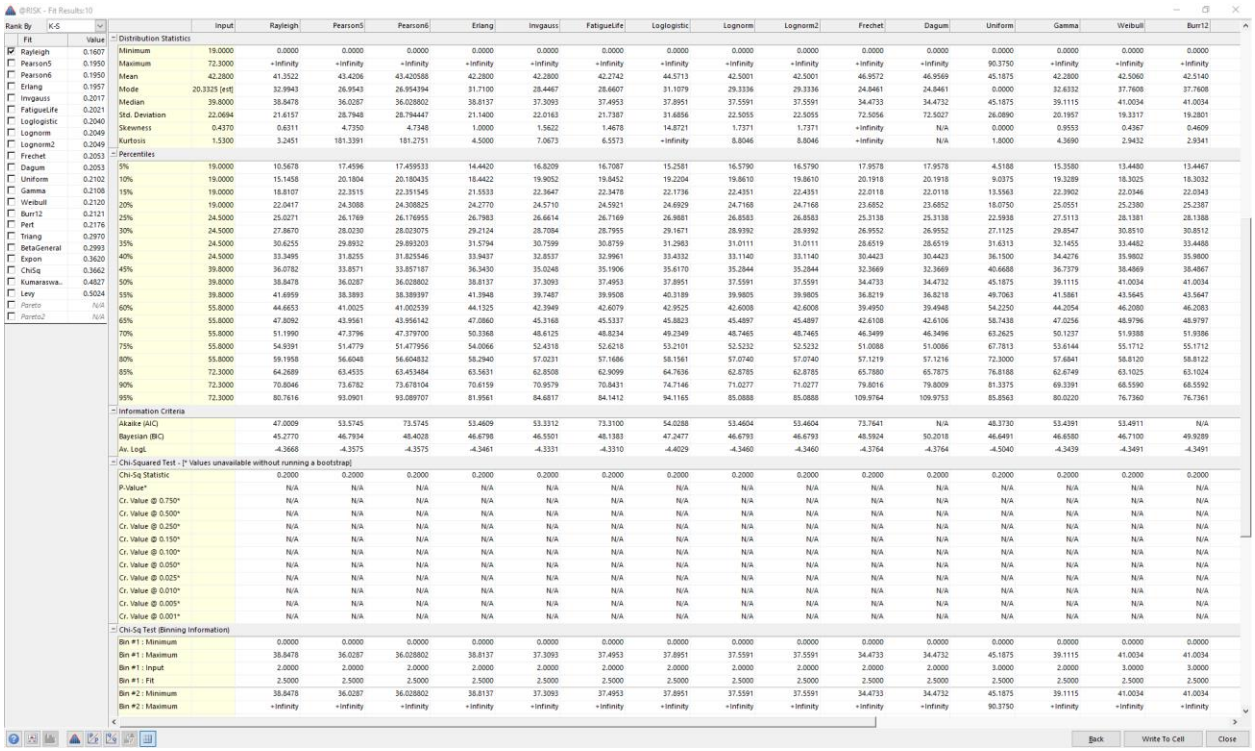


Figure 1-18: Average outage duration – statistics table using K-S



1.4 Service parameter 4 – proper operation of equipment

1.4.1 Failure of protection system (discrete)

Whilst @risk found that the IntUniform distribution is the best fit according to BIC, the Poisson distribution has been adopted, consistent with distribution used for the other sub-parameters with discrete distributions (loss of supply event frequency).

Figure 1-19: Failure of protection system – Poisson distribution

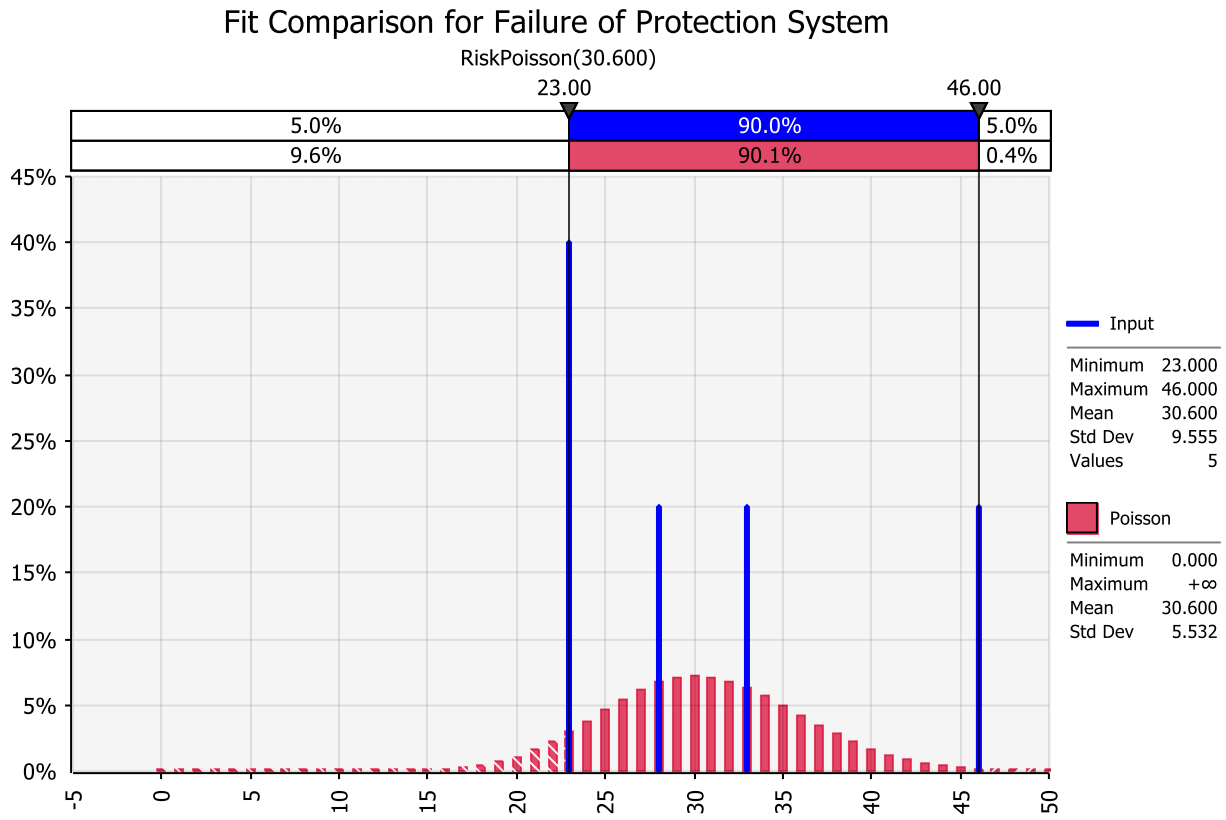


Figure 1-20: Failure of protection system – AIC distribution

@RISK - Fit Results:10

Rank By: AIC

Fit	Value
☑ Poisson	40.7276
☐ IntUniform	41.7805
☐ NegBin	45.0301
☐ Geomet	47.7050
☐ Hypergeo	67.8519
☐ *Binomial*	*N/A*

	Input	Poisson	IntUniform	NegBin	Geomet	Hypergeo
95% Lower Limit*						N/A
95% Upper Limit*						N/A
Conf. Interval Width*						N/A
Distribution Statistics						
Minimum	23.0000	0.0000	23.0000	0.0000	0.0000	0.0000
Maximum	46.0000	+Infinity	46.0000	+Infinity	+Infinity	938.0000
Mean	30.6000	30.6000	34.5000	30.6000	30.6000	30.5729
Mode	23.0000	30.0000	23.0000	29.0000	0.0000	30.0000
Median	28.0000	30.0000	34.0000	30.0000	21.0000	30.0000
Std. Deviation	9.5551	5.5317	6.9222	8.2495	31.0960	5.3599
Skewness	1.3233	0.1808	0.0000	0.4180	2.0003	0.1644
Kurtosis	4.4468	3.0327	1.7958	3.2547	9.0010	3.0233
Percentiles						
5%	23.0000	22.0000	24.0000	18.0000	1.0000	22.0000
10%	23.0000	24.0000	25.0000	20.0000	3.0000	24.0000
15%	23.0000	25.0000	26.0000	22.0000	5.0000	25.0000
20%	23.0000	26.0000	27.0000	24.0000	6.0000	26.0000
25%	23.0000	27.0000	28.0000	25.0000	8.0000	27.0000
30%	23.0000	28.0000	30.0000	26.0000	11.0000	28.0000
35%	23.0000	28.0000	31.0000	27.0000	13.0000	28.0000
40%	23.0000	29.0000	32.0000	28.0000	15.0000	29.0000
45%	28.0000	30.0000	33.0000	29.0000	18.0000	30.0000
50%	28.0000	30.0000	34.0000	30.0000	21.0000	30.0000
55%	28.0000	31.0000	36.0000	31.0000	24.0000	31.0000
60%	28.0000	32.0000	37.0000	32.0000	28.0000	32.0000
65%	33.0000	33.0000	38.0000	33.0000	32.0000	33.0000
70%	33.0000	33.0000	39.0000	34.0000	37.0000	33.0000
75%	33.0000	34.0000	40.0000	36.0000	43.0000	34.0000
80%	33.0000	35.0000	42.0000	37.0000	50.0000	35.0000
85%	46.0000	36.0000	43.0000	39.0000	58.0000	36.0000
90%	46.0000	38.0000	44.0000	41.0000	71.0000	38.0000
95%	46.0000	40.0000	45.0000	45.0000	93.0000	40.0000
Information Criteria						
Akaike (AIC)		40.7276	41.7805	45.0301	47.7050	67.8519
Bayesian (BIC)		39.0037	34.9994	38.2490	45.9811	42.6802
Av. LogL		-3.7394	-3.1781	-3.5030	-4.4372	-3.7852
Chi-Squared Test - [* Values unavailable without running a bootstrap]						
Chi-Sq Statistic		0.0000	0.0000	0.0000	0.0000	0.0000
P-Value*		N/A	N/A	N/A	N/A	N/A
Cr. Value @ 0.750*		N/A	N/A	N/A	N/A	N/A
Cr. Value @ 0.500*		N/A	N/A	N/A	N/A	N/A
Cr. Value @ 0.250*		N/A	N/A	N/A	N/A	N/A
Cr. Value @ 0.150*		N/A	N/A	N/A	N/A	N/A
Cr. Value @ 0.100*		N/A	N/A	N/A	N/A	N/A
Cr. Value @ 0.050*		N/A	N/A	N/A	N/A	N/A
Cr. Value @ 0.025*		N/A	N/A	N/A	N/A	N/A
Cr. Value @ 0.010*		N/A	N/A	N/A	N/A	N/A
Cr. Value @ 0.005*		N/A	N/A	N/A	N/A	N/A
Cr. Value @ 0.001*		N/A	N/A	N/A	N/A	N/A
Chi-Sq Test (Binning Information)						
Bin #1 : Minimum		0.0000	23.0000	0.0000	0.0000	0.0000
Bin #1 : Maximum		+Infinity	46.0000	+Infinity	+Infinity	938.0000
Bin #1 : Input		5.0000	5.0000	5.0000	5.0000	5.0000
Bin #1 : Fit		5.0000	5.0000	5.0000	5.0000	5.0000

Figure 1-21: Failure of protection system – BIC distribution

@RISK - Fit Results:10

Rank By: BIC

Fit	Value
☑ IntUniform	34.9994
☐ NegBin	38.2490
☐ Poisson	39.0037
☐ Hypergeo	42.6802
☐ Geomet	45.9811
☐ *Binomial*	*N/A*

	Input	IntUniform	NegBin	Poisson	Hypergeo	Geomet
95% Lower Limit*					N/A	
95% Upper Limit*					N/A	
Conf. Interval Width*					N/A	
Distribution Statistics						
Minimum	23.0000	23.0000	0.0000	0.0000	0.0000	0.0000
Maximum	46.0000	46.0000	+Infinity	+Infinity	938.0000	+Infinity
Mean	30.6000	34.5000	30.6000	30.6000	30.5729	30.6000
Mode	23.0000	23.0000	29.0000	30.0000	30.0000	0.0000
Median	28.0000	34.0000	30.0000	30.0000	30.0000	21.0000
Std. Deviation	9.5551	6.9222	8.2495	5.5317	5.3599	31.0960
Skewness	1.3233	0.0000	0.4180	0.1808	0.1644	2.0003
Kurtosis	4.4468	1.7958	3.2547	3.0327	3.0233	9.0010
Percentiles						
5%	23.0000	24.0000	18.0000	22.0000	22.0000	1.0000
10%	23.0000	25.0000	20.0000	24.0000	24.0000	3.0000
15%	23.0000	26.0000	22.0000	25.0000	25.0000	5.0000
20%	23.0000	27.0000	24.0000	26.0000	26.0000	6.0000
25%	23.0000	28.0000	25.0000	27.0000	27.0000	8.0000
30%	23.0000	30.0000	26.0000	28.0000	28.0000	11.0000
35%	23.0000	31.0000	27.0000	28.0000	28.0000	13.0000
40%	23.0000	32.0000	28.0000	29.0000	29.0000	15.0000
45%	28.0000	33.0000	29.0000	30.0000	30.0000	18.0000
50%	28.0000	34.0000	30.0000	30.0000	30.0000	21.0000
55%	28.0000	36.0000	31.0000	31.0000	31.0000	24.0000
60%	28.0000	37.0000	32.0000	32.0000	32.0000	28.0000
65%	33.0000	38.0000	33.0000	33.0000	33.0000	32.0000
70%	33.0000	39.0000	34.0000	33.0000	33.0000	37.0000
75%	33.0000	40.0000	36.0000	34.0000	34.0000	43.0000
80%	33.0000	42.0000	37.0000	35.0000	35.0000	50.0000
85%	46.0000	43.0000	39.0000	36.0000	36.0000	58.0000
90%	46.0000	44.0000	41.0000	38.0000	38.0000	71.0000
95%	46.0000	45.0000	45.0000	40.0000	40.0000	93.0000
Information Criteria						
Akaike (AIC)		41.7805	45.0301	40.7276	67.8519	47.7050
Bayesian (BIC)		34.9994	38.2490	39.0037	42.6802	45.9811
Av. LogL		-3.1781	-3.5030	-3.7394	-3.7852	-4.4372
Chi-Squared Test - [* Values unavailable without running a bootstrap]						
Chi-Sq Statistic		0.0000	0.0000	0.0000	0.0000	0.0000
P-Value*		N/A	N/A	N/A	N/A	N/A
Cr. Value @ 0.750*		N/A	N/A	N/A	N/A	N/A
Cr. Value @ 0.500*		N/A	N/A	N/A	N/A	N/A
Cr. Value @ 0.250*		N/A	N/A	N/A	N/A	N/A
Cr. Value @ 0.150*		N/A	N/A	N/A	N/A	N/A
Cr. Value @ 0.100*		N/A	N/A	N/A	N/A	N/A
Cr. Value @ 0.050*		N/A	N/A	N/A	N/A	N/A
Cr. Value @ 0.025*		N/A	N/A	N/A	N/A	N/A
Cr. Value @ 0.010*		N/A	N/A	N/A	N/A	N/A
Cr. Value @ 0.005*		N/A	N/A	N/A	N/A	N/A
Cr. Value @ 0.001*		N/A	N/A	N/A	N/A	N/A
Chi-Sq Test (Binning Information)						
Bin #1 : Minimum		23.0000	0.0000	0.0000	0.0000	0.0000
Bin #1 : Maximum		46.0000	+Infinity	+Infinity	938.0000	+Infinity
Bin #1 : Input		5.0000	5.0000	5.0000	5.0000	5.0000
Bin #1 : Fit		5.0000	5.0000	5.0000	5.0000	5.0000

1.4.2 Material failure of SCADA system (discrete)

The @risk software found the Geometric distribution is the most appropriate fit.

Figure 1-22: Material failure of SCADA system – Geometric distribution

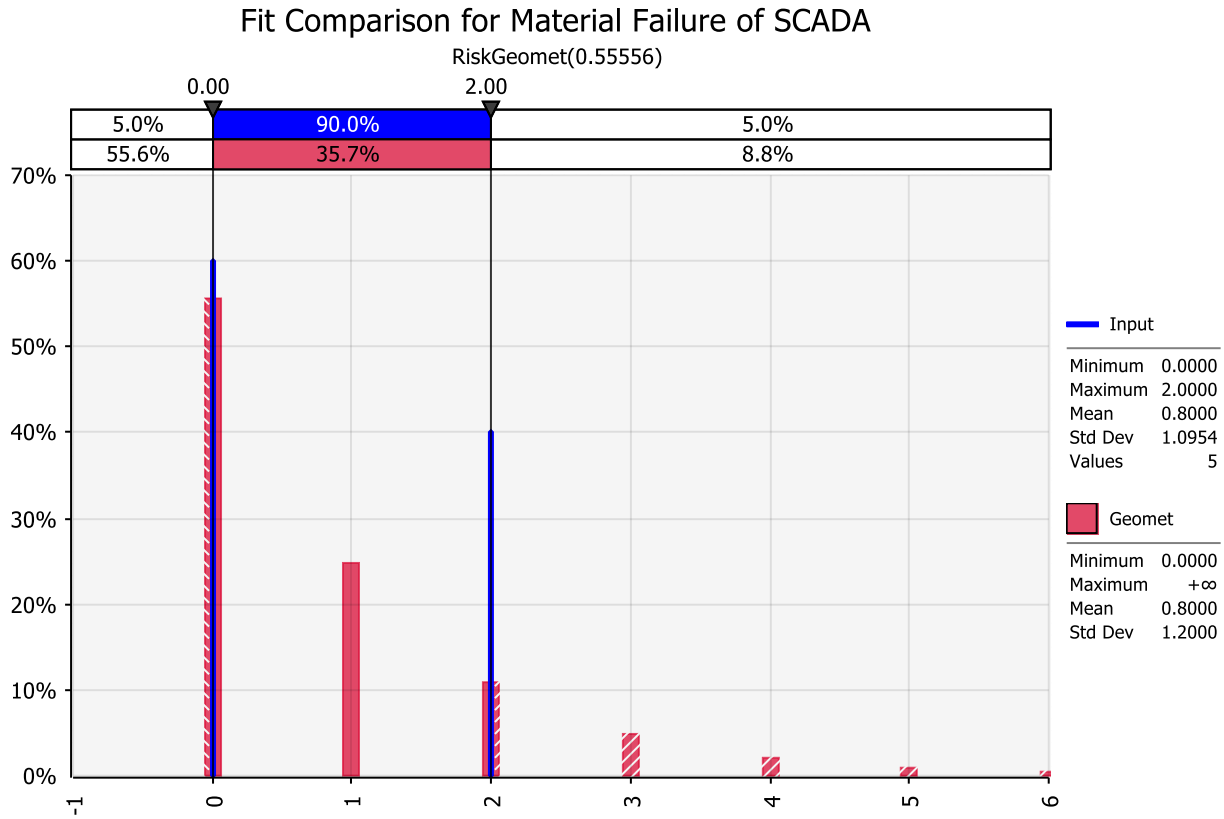
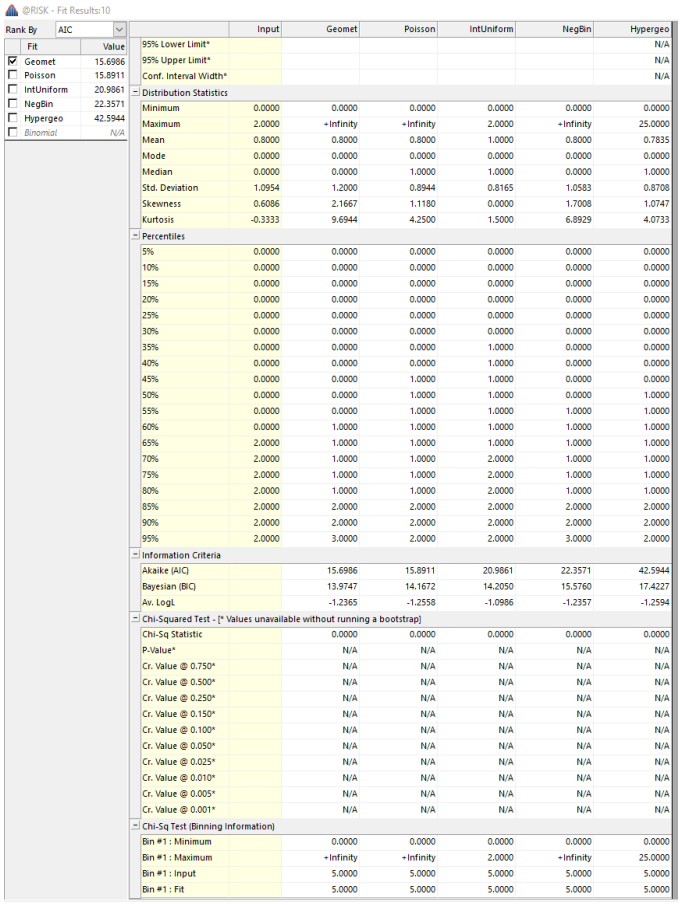


Figure 1-23: Material failure of SCADA system – AIC distribution



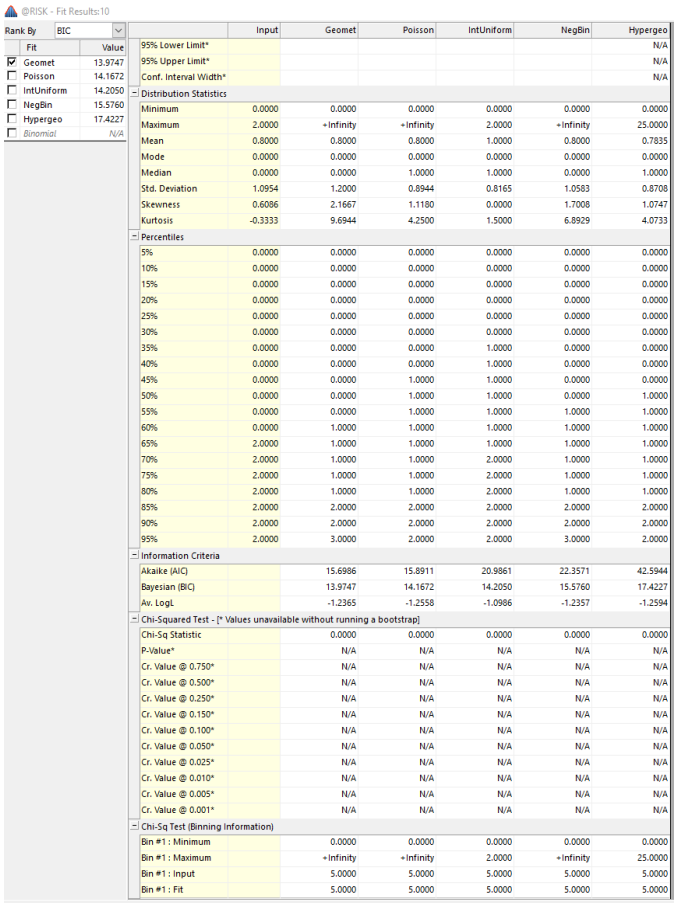
@RISK - Fit Results:10

Rank By: AIC

Fit	Value
☑ Geomet	15.6986
☐ Poisson	15.8911
☐ IntUniform	20.9861
☐ NegBin	22.3571
☐ Hypergeo	42.5944
☐ *Binomial*	*N/A*

	Input	Geomet	Poisson	IntUniform	NegBin	Hypergeo
95% Lower Limit*						N/A
95% Upper Limit*						N/A
Conf. Interval Width*						N/A
Distribution Statistics						
Minimum	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Maximum	2.0000	+Infinity	+Infinity	2.0000	+Infinity	25.0000
Mean	0.8000	0.8000	0.8000	1.0000	0.8000	0.7835
Mode	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Median	0.0000	0.0000	1.0000	1.0000	0.0000	1.0000
Std. Deviation	1.0954	1.2000	0.8944	0.8165	1.0583	0.8708
Skewness	0.6086	2.1667	1.1180	0.0000	1.7008	1.0747
Kurtosis	-0.3333	9.6944	4.2500	1.5000	6.8929	4.0733
Percentiles						
5%	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
10%	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
15%	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
20%	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
25%	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
30%	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
35%	0.0000	0.0000	0.0000	1.0000	0.0000	0.0000
40%	0.0000	0.0000	0.0000	1.0000	0.0000	0.0000
45%	0.0000	0.0000	1.0000	1.0000	0.0000	0.0000
50%	0.0000	0.0000	1.0000	1.0000	0.0000	1.0000
55%	0.0000	0.0000	1.0000	1.0000	1.0000	1.0000
60%	0.0000	1.0000	1.0000	1.0000	1.0000	1.0000
65%	2.0000	1.0000	1.0000	1.0000	1.0000	1.0000
70%	2.0000	1.0000	1.0000	2.0000	1.0000	1.0000
75%	2.0000	1.0000	1.0000	2.0000	1.0000	1.0000
80%	2.0000	1.0000	1.0000	2.0000	1.0000	1.0000
85%	2.0000	2.0000	2.0000	2.0000	2.0000	2.0000
90%	2.0000	2.0000	2.0000	2.0000	2.0000	2.0000
95%	2.0000	3.0000	2.0000	2.0000	3.0000	2.0000
Information Criteria						
Akaike (AIC)		15.6986	15.8911	20.9861	22.3571	42.5944
Bayesian (BIC)		13.9747	14.1672	14.2050	15.5760	17.4227
Av. LogL		-1.2365	-1.2558	-1.0986	-1.2357	-1.2594
Chi-Squared Test - [* Values unavailable without running a bootstrap]						
Chi-Sq Statistic		0.0000	0.0000	0.0000	0.0000	0.0000
P-Value*		N/A	N/A	N/A	N/A	N/A
Cr. Value @ 0.750*		N/A	N/A	N/A	N/A	N/A
Cr. Value @ 0.500*		N/A	N/A	N/A	N/A	N/A
Cr. Value @ 0.250*		N/A	N/A	N/A	N/A	N/A
Cr. Value @ 0.150*		N/A	N/A	N/A	N/A	N/A
Cr. Value @ 0.100*		N/A	N/A	N/A	N/A	N/A
Cr. Value @ 0.050*		N/A	N/A	N/A	N/A	N/A
Cr. Value @ 0.025*		N/A	N/A	N/A	N/A	N/A
Cr. Value @ 0.010*		N/A	N/A	N/A	N/A	N/A
Cr. Value @ 0.005*		N/A	N/A	N/A	N/A	N/A
Cr. Value @ 0.001*		N/A	N/A	N/A	N/A	N/A
Chi-Sq Test (Binning Information)						
Bin #1 : Minimum		0.0000	0.0000	0.0000	0.0000	0.0000
Bin #1 : Maximum		+Infinity	+Infinity	2.0000	+Infinity	25.0000
Bin #1 : Input		5.0000	5.0000	5.0000	5.0000	5.0000
Bin #1 : Fit		5.0000	5.0000	5.0000	5.0000	5.0000

Figure 1-24: Material failure of SCADA system – BIC distribution



@RISK - Fit Results:10

Rank By: BIC

Fit	Value
☑ Geomet	13.9747
☐ Poisson	14.1672
☐ IntUniform	14.2050
☐ NegBin	15.5760
☐ Hypergeo	17.4227
☐ *Binomial*	*N/A*

	Input	Geomet	Poisson	IntUniform	NegBin	Hypergeo
95% Lower Limit*						N/A
95% Upper Limit*						N/A
Conf. Interval Width*						N/A
Distribution Statistics						
Minimum	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Maximum	2.0000	+Infinity	+Infinity	2.0000	+Infinity	25.0000
Mean	0.8000	0.8000	0.8000	1.0000	0.8000	0.7835
Mode	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Median	0.0000	0.0000	1.0000	1.0000	0.0000	1.0000
Std. Deviation	1.0954	1.2000	0.8944	0.8165	1.0583	0.8708
Skewness	0.6086	2.1667	1.1180	0.0000	1.7008	1.0747
Kurtosis	-0.3333	9.6944	4.2500	1.5000	6.8929	4.0733
Percentiles						
5%	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
10%	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
15%	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
20%	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
25%	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
30%	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
35%	0.0000	0.0000	0.0000	1.0000	0.0000	0.0000
40%	0.0000	0.0000	0.0000	1.0000	0.0000	0.0000
45%	0.0000	0.0000	1.0000	1.0000	0.0000	0.0000
50%	0.0000	0.0000	1.0000	1.0000	0.0000	1.0000
55%	0.0000	0.0000	1.0000	1.0000	1.0000	1.0000
60%	0.0000	1.0000	1.0000	1.0000	1.0000	1.0000
65%	2.0000	1.0000	1.0000	1.0000	1.0000	1.0000
70%	2.0000	1.0000	1.0000	2.0000	1.0000	1.0000
75%	2.0000	1.0000	1.0000	2.0000	1.0000	1.0000
80%	2.0000	1.0000	1.0000	2.0000	1.0000	1.0000
85%	2.0000	2.0000	2.0000	2.0000	2.0000	2.0000
90%	2.0000	2.0000	2.0000	2.0000	2.0000	2.0000
95%	2.0000	3.0000	2.0000	2.0000	3.0000	2.0000
Information Criteria						
Akaike (AIC)		15.6986	15.8911	20.9861	22.3571	42.5944
Bayesian (BIC)		13.9747	14.1672	14.2050	15.5760	17.4227
Av. LogL		-1.2365	-1.2558	-1.0986	-1.2357	-1.2594
Chi-Squared Test - [* Values unavailable without running a bootstrap]						
Chi-Sq Statistic		0.0000	0.0000	0.0000	0.0000	0.0000
P-Value*		N/A	N/A	N/A	N/A	N/A
Cr. Value @ 0.750*		N/A	N/A	N/A	N/A	N/A
Cr. Value @ 0.500*		N/A	N/A	N/A	N/A	N/A
Cr. Value @ 0.250*		N/A	N/A	N/A	N/A	N/A
Cr. Value @ 0.150*		N/A	N/A	N/A	N/A	N/A
Cr. Value @ 0.100*		N/A	N/A	N/A	N/A	N/A
Cr. Value @ 0.050*		N/A	N/A	N/A	N/A	N/A
Cr. Value @ 0.025*		N/A	N/A	N/A	N/A	N/A
Cr. Value @ 0.010*		N/A	N/A	N/A	N/A	N/A
Cr. Value @ 0.005*		N/A	N/A	N/A	N/A	N/A
Cr. Value @ 0.001*		N/A	N/A	N/A	N/A	N/A
Chi-Sq Test (Binning Information)						
Bin #1 : Minimum		0.0000	0.0000	0.0000	0.0000	0.0000
Bin #1 : Maximum		+Infinity	+Infinity	2.0000	+Infinity	25.0000
Bin #1 : Input		5.0000	5.0000	5.0000	5.0000	5.0000
Bin #1 : Fit		5.0000	5.0000	5.0000	5.0000	5.0000

1.4.3 Incorrect operational isolation of primary or secondary equipment (discrete)

Whilst @risk found that the IntUniform distribution is the best fit according to BIC, the Poisson distribution has been adopted, consistent with distribution used for the other sub-parameters with discrete distributions (loss of supply event frequency).

Figure 1-25: Incorrect operational isolation of equipment – Poisson distribution

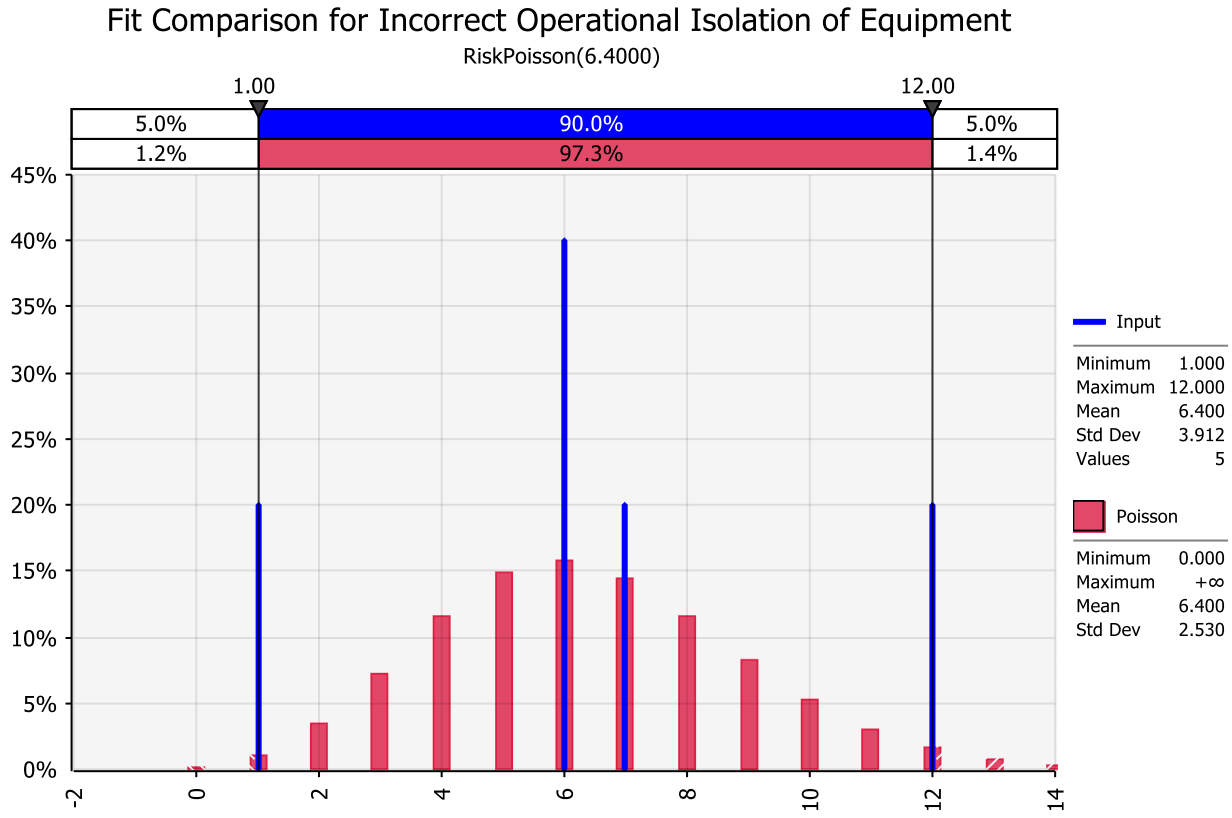


Figure 1-26: Incorrect operational isolation of equipment – AIC distribution

@RISK - Fit Results:12

Rank By: AIC

Fit	Value
☑ Poisson	31.8720
☐ Geomet	32.6398
☐ IntUniform	34.8491
☐ NegBin	36.9383
☐ Hypergeo	58.7208
☐ *Binomial*	*N/A*

	Input	Poisson	Geomet	IntUniform	NegBin	Hypergeo
95% Lower Limit*						N/A
95% Upper Limit*						N/A
Conf. Interval Width*						N/A
Distribution Statistics						
Minimum	1.0000	0.0000	0.0000	1.0000	0.0000	0.0000
Maximum	12.0000	+Infinity	+Infinity	12.0000	+Infinity	202.0000
Mean	6.4000	6.4000	6.4000	6.5000	6.4000	6.3861
Mode	6.0000	6.0000	0.0000	1.0000	5.0000	6.0000
Median	6.0000	6.0000	4.0000	6.0000	6.0000	6.0000
Std. Deviation	3.9115	2.5298	6.8819	3.4521	3.8199	2.4791
Skewness	0.1270	0.3953	2.0053	0.0000	0.9319	0.3732
Kurtosis	4.7929	3.1563	9.0211	1.7832	4.2685	3.1278
Percentiles						
5%	1.0000	3.0000	0.0000	1.0000	1.0000	3.0000
10%	1.0000	3.0000	0.0000	2.0000	2.0000	3.0000
15%	1.0000	4.0000	1.0000	2.0000	3.0000	4.0000
20%	1.0000	4.0000	1.0000	3.0000	3.0000	4.0000
25%	6.0000	5.0000	1.0000	3.0000	4.0000	5.0000
30%	6.0000	5.0000	2.0000	4.0000	4.0000	5.0000
35%	6.0000	5.0000	2.0000	5.0000	4.0000	5.0000
40%	6.0000	6.0000	3.0000	5.0000	5.0000	6.0000
45%	6.0000	6.0000	4.0000	6.0000	5.0000	6.0000
50%	6.0000	6.0000	4.0000	6.0000	6.0000	6.0000
55%	6.0000	7.0000	5.0000	7.0000	6.0000	7.0000
60%	6.0000	7.0000	6.0000	8.0000	7.0000	7.0000
65%	7.0000	7.0000	7.0000	8.0000	7.0000	7.0000
70%	7.0000	8.0000	8.0000	9.0000	8.0000	8.0000
75%	7.0000	8.0000	9.0000	9.0000	9.0000	8.0000
80%	7.0000	8.0000	11.0000	10.0000	9.0000	8.0000
85%	12.0000	9.0000	13.0000	11.0000	10.0000	9.0000
90%	12.0000	10.0000	15.0000	11.0000	12.0000	10.0000
95%	12.0000	11.0000	20.0000	12.0000	14.0000	11.0000
Information Criteria						
Akaike (AIC)		31.8720	32.6398	34.8491	36.9383	58.7208
Bayesian (BIC)		30.1481	30.9159	28.0679	30.1572	33.5491
Av. LogL		-2.8539	-2.9306	-2.4849	-2.6938	-2.8721
Chi-Squared Test - [* Values unavailable without running a bootstrap]						
Chi-Sq Statistic		0.0000	0.0000	0.0000	0.0000	0.0000
P-Value*		N/A	N/A	N/A	N/A	N/A
Cr. Value @ 0.750*		N/A	N/A	N/A	N/A	N/A
Cr. Value @ 0.500*		N/A	N/A	N/A	N/A	N/A
Cr. Value @ 0.250*		N/A	N/A	N/A	N/A	N/A
Cr. Value @ 0.150*		N/A	N/A	N/A	N/A	N/A
Cr. Value @ 0.100*		N/A	N/A	N/A	N/A	N/A
Cr. Value @ 0.050*		N/A	N/A	N/A	N/A	N/A
Cr. Value @ 0.025*		N/A	N/A	N/A	N/A	N/A
Cr. Value @ 0.010*		N/A	N/A	N/A	N/A	N/A
Cr. Value @ 0.005*		N/A	N/A	N/A	N/A	N/A
Cr. Value @ 0.001*		N/A	N/A	N/A	N/A	N/A
Chi-Sq Test (Binning Information)						
Bin #1 : Minimum		0.0000	0.0000	1.0000	0.0000	0.0000
Bin #1 : Maximum		+Infinity	+Infinity	12.0000	+Infinity	202.0000
Bin #1 : Input		5.0000	5.0000	5.0000	5.0000	5.0000
Bin #1 : Fit		5.0000	5.0000	5.0000	5.0000	5.0000

Figure 1-27: Incorrect operational isolation of equipment – BIC distribution

@RISK - Fit Results:12

Rank By: BIC

Fit	Value
☑ IntUniform	28.0679
☐ Poisson	30.1481
☐ NegBin	30.1572
☐ Geomet	30.9159
☐ Hypergeo	33.5491
☐ *Binomial*	*N/A*

	Input	IntUniform	Poisson	NegBin	Geomet	Hypergeo
95% Lower Limit*						N/A
95% Upper Limit*						N/A
Conf. Interval Width*						N/A
Distribution Statistics						
Minimum	1.0000	1.0000	0.0000	0.0000	0.0000	0.0000
Maximum	12.0000	12.0000	+Infinity	+Infinity	+Infinity	202.0000
Mean	6.4000	6.5000	6.4000	6.4000	6.4000	6.3861
Mode	6.0000	1.0000	6.0000	5.0000	0.0000	6.0000
Median	6.0000	6.0000	6.0000	6.0000	4.0000	6.0000
Std. Deviation	3.9115	3.4521	2.5298	3.8199	6.8819	2.4791
Skewness	0.1270	0.0000	0.3953	0.9319	2.0053	0.3732
Kurtosis	4.7929	1.7832	3.1563	4.2685	9.0211	3.1278
Percentiles						
5%	1.0000	1.0000	3.0000	1.0000	0.0000	3.0000
10%	1.0000	2.0000	3.0000	2.0000	0.0000	3.0000
15%	1.0000	2.0000	4.0000	3.0000	1.0000	4.0000
20%	1.0000	3.0000	4.0000	3.0000	1.0000	4.0000
25%	6.0000	3.0000	5.0000	4.0000	1.0000	5.0000
30%	6.0000	4.0000	5.0000	4.0000	2.0000	5.0000
35%	6.0000	5.0000	5.0000	4.0000	2.0000	5.0000
40%	6.0000	5.0000	6.0000	5.0000	3.0000	6.0000
45%	6.0000	6.0000	6.0000	5.0000	4.0000	6.0000
50%	6.0000	6.0000	6.0000	6.0000	4.0000	6.0000
55%	6.0000	7.0000	7.0000	6.0000	5.0000	7.0000
60%	6.0000	8.0000	7.0000	7.0000	6.0000	7.0000
65%	7.0000	8.0000	7.0000	7.0000	7.0000	7.0000
70%	7.0000	9.0000	8.0000	8.0000	8.0000	8.0000
75%	7.0000	9.0000	8.0000	9.0000	9.0000	8.0000
80%	7.0000	10.0000	8.0000	9.0000	11.0000	8.0000
85%	12.0000	11.0000	9.0000	10.0000	13.0000	9.0000
90%	12.0000	11.0000	10.0000	12.0000	15.0000	10.0000
95%	12.0000	12.0000	11.0000	14.0000	20.0000	11.0000
Information Criteria						
Akaike (AIC)		34.8491	31.8720	36.9383	32.6398	58.7208
Bayesian (BIC)		28.0679	30.1481	30.1572	30.9159	33.5491
Av. LogL		-2.4849	-2.8539	-2.6938	-2.9306	-2.8721
Chi-Squared Test - [* Values unavailable without running a bootstrap]						
Chi-Sq Statistic		0.0000	0.0000	0.0000	0.0000	0.0000
P-Value*		N/A	N/A	N/A	N/A	N/A
Cr. Value @ 0.750*		N/A	N/A	N/A	N/A	N/A
Cr. Value @ 0.500*		N/A	N/A	N/A	N/A	N/A
Cr. Value @ 0.250*		N/A	N/A	N/A	N/A	N/A
Cr. Value @ 0.150*		N/A	N/A	N/A	N/A	N/A
Cr. Value @ 0.100*		N/A	N/A	N/A	N/A	N/A
Cr. Value @ 0.050*		N/A	N/A	N/A	N/A	N/A
Cr. Value @ 0.025*		N/A	N/A	N/A	N/A	N/A
Cr. Value @ 0.010*		N/A	N/A	N/A	N/A	N/A
Cr. Value @ 0.005*		N/A	N/A	N/A	N/A	N/A
Cr. Value @ 0.001*		N/A	N/A	N/A	N/A	N/A
Chi-Sq Test (Binning Information)						
Bin #1 : Minimum		1.0000	0.0000	0.0000	0.0000	0.0000
Bin #1 : Maximum		12.0000	+Infinity	+Infinity	+Infinity	202.0000
Bin #1 : Input		5.0000	5.0000	5.0000	5.0000	5.0000
Bin #1 : Fit		5.0000	5.0000	5.0000	5.0000	5.0000