

APPENDIX C –CONFIDENCE INTERVALS FOR MEANS

For the computation of MTTR, a 90% confidence interval will be calculated. Confidence intervals depend upon the number of data values (N) used in the calculation. For an MTTR confidence interval calculation, N is the number of outages. Two sets of formulas are provided: One set for N is ≥ 30 , and a second set for $N < 30$.

a. $N \geq 30$

$$\sigma_M = \frac{\text{Standard deviation, or } \sigma}{(N)^{1/2}}$$

The standard deviation, σ , is calculated as follows:

1. First calculate the estimate of the mean, $M = [\sum \text{Data value (i)}]/N$
 - For MTTR, the “data value (i)” for each outage is equal to its outage duration.
2. Next calculate an estimate of the standard deviation:

$$\sigma = [(1/(N-1) \times (\sum (\text{Data value (i)} - M)^2)]^{1/2}$$

The “true” mean, with 90% confidence, is equal to the $M \pm 1.645 \times \sigma_M$

b. $N < 30$

The same calculations for M and σ are made. The true mean 90% confidence interval, M, has a different formula:

$$\text{True mean} = M \pm t \times \sigma/(N-1)^{1/2}$$

A value of “t” is determined by a look-up, which depends upon the value on N-1. A table of “t” values for a 90% confidence interval for N-1 values from 1 through 29 is provided on the next page.

N-1	t
29	1.699
28	1.701
27	1.703
26	1.706
25	1.708
24	1.711
23	1.714
22	1.717
21	1.721
20	1.725
19	1.729
18	1.734
17	1.740
16	1.746
15	1.753
14	1.761
13	1.771
12	1.782
11	1.796
10	1.812
9	1.833
8	1.860
7	1.895
6	1.943
5	2.015
5	2.132
3	2.353
2	2.920
1	6.314