

|    | A  | B | C                          | D | E | F                                    | G   | H | I | J | K     | L |
|----|--|---|----------------------------|---|---|--------------------------------------|---|---|---|---|-------|---|
| 1  | UCL Statistics for Data Sets with Non-Detects  |   |                            |   |   |                                      |   |   |   |   |       |   |
| 2  |  |   |                            |   |   |                                      |   |   |   |   |       |   |
| 3  | User Selected Options  |   |                            |   |   |                                      |   |   |   |   |       |   |
| 4  | Date/Time of Computation   |   | 3/6/2016 10:01:13 PM       |   |   |                                      |   |   |   |   |       |   |
| 5  | From File  |   | ProUCLinput 49-004 0-1.xls |   |   |                                      |   |   |   |   |       |   |
| 6  | Full Precision   |   | OFF                        |   |   |                                      |   |   |   |   |       |   |
| 7  | Confidence Coefficient   |   | 95%                        |   |   |                                      |   |   |   |   |       |   |
| 8  | Number of Bootstrap Operations   |   | 2000                       |   |   |                                      |   |   |   |   |       |   |
| 9  |  |   |                            |   |   |                                      |   |   |   |   |       |   |
| 10 | Aluminum   |   |                            |   |   |                                      |   |   |   |   |       |   |
| 11 |  |   |                            |   |   |                                      |   |   |   |   |       |   |
| 12 |  |   |                            |   |   | General Statistics                   |   |   |   |   |       |   |
| 13 | Total Number of Observations   |   |                            |   |   | 148                                  | Number of Distinct Observations                     |   |   |   | 98    |   |
| 14 |  |   |                            |   |   |                                      | Number of Missing Observations                      |   |   |   | 0     |   |
| 15 | Minimum  |   |                            |   |   | 5740                                 | Mean  |   |   |   | 12363 |   |
| 16 | Maximum  |   |                            |   |   | 35100                                | Median  |   |   |   | 11450 |   |
| 17 | SD   |   |                            |   |   | 4264                                 | Std. Error of Mean                                  |   |   |   | 350.5 |   |
| 18 | Coefficient of Variation   |   |                            |   |   | 0.345                                | Skewness  |   |   |   | 1.778 |   |
| 19 |  |   |                            |   |   |                                      |   |   |   |   |       |   |
| 20 |  |   |                            |   |   | Normal GOF Test                      |   |   |   |   |       |   |
| 21 | Shapiro Wilk Test Statistic  |   |                            |   |   | 0.869                                | Shapiro Wilk GOF Test                               |   |   |   |       |   |
| 22 | 5% Shapiro Wilk P Value  |   |                            |   |   | 0                                    | Data Not Normal at 5% Significance Level            |   |   |   |       |   |
| 23 | Lilliefors Test Statistic  |   |                            |   |   | 0.174                                | Lilliefors GOF Test                                 |   |   |   |       |   |
| 24 | 5% Lilliefors Critical Value   |   |                            |   |   | 0.0728                               | Data Not Normal at 5% Significance Level            |   |   |   |       |   |
| 25 | Data Not Normal at 5% Significance Level   |   |                            |   |   |                                      |   |   |   |   |       |   |
| 26 |  |   |                            |   |   |                                      |   |   |   |   |       |   |
| 27 |  |   |                            |   |   | Assuming Normal Distribution         |   |   |   |   |       |   |
| 28 | 95% Normal UCL   |   |                            |   |   |                                      | 95% UCLs (Adjusted for Skewness)                    |   |   |   |       |   |
| 29 | 95% Student's-t UCL  |   |                            |   |   | 12943                                | 95% Adjusted-CLT UCL (Chen-1995)                    |   |   |   | 12994 |   |
| 30 |  |   |                            |   |   |                                      | 95% Modified-t UCL (Johnson-1978)                   |   |   |   | 12952 |   |
| 31 |  |   |                            |   |   |                                      |   |   |   |   |       |   |
| 32 | Gamma GOF Test   |   |                            |   |   |                                      |   |   |   |   |       |   |
| 33 | A-D Test Statistic   |   |                            |   |   | 2.635                                | Anderson-Darling Gamma GOF Test                     |   |   |   |       |   |
| 34 | 5% A-D Critical Value  |   |                            |   |   | 0.752                                | Data Not Gamma Distributed at 5% Significance Level |   |   |   |       |   |
| 35 | K-S Test Statistic   |   |                            |   |   | 0.13                                 | Kolmogorov-Smirnoff Gamma GOF Test                  |   |   |   |       |   |
| 36 | 5% K-S Critical Value  |   |                            |   |   | 0.077                                | Data Not Gamma Distributed at 5% Significance Level |   |   |   |       |   |
| 37 | Data Not Gamma Distributed at 5% Significance Level  |   |                            |   |   |                                      |   |   |   |   |       |   |
| 38 |  |   |                            |   |   |                                      |   |   |   |   |       |   |
| 39 |  |   |                            |   |   | Gamma Statistics                     |   |   |   |   |       |   |
| 40 | k hat (MLE)  |   |                            |   |   | 10.29                                | k star (bias corrected MLE)                         |   |   |   | 10.08 |   |
| 41 | Theta hat (MLE)  |   |                            |   |   | 1202                                 | Theta star (bias corrected MLE)                     |   |   |   | 1226  |   |
| 42 | nu hat (MLE)   |   |                            |   |   | 3045                                 | nu star (bias corrected)                            |   |   |   | 2984  |   |
| 43 | MLE Mean (bias corrected)  |   |                            |   |   | 12363                                | MLE Sd (bias corrected)                             |   |   |   | 3894  |   |
| 44 |  |   |                            |   |   |                                      | Approximate Chi Square Value (0.05)                 |   |   |   | 2858  |   |
| 45 | Adjusted Level of Significance   |   |                            |   |   | 0.0484                               | Adjusted Chi Square Value                           |   |   |   | 2857  |   |
| 46 |  |   |                            |   |   |                                      |   |   |   |   |       |   |
| 47 |  |   |                            |   |   | Assuming Gamma Distribution          |   |   |   |   |       |   |
| 48 | 95% Approximate Gamma UCL (use when n>=50))  |   |                            |   |   | 12908                                | 95% Adjusted Gamma UCL (use when n<50)              |   |   |   | 12913 |   |
| 49 |  |   |                            |   |   |                                      |   |   |   |   |       |   |
| 50 |  |   |                            |   |   | Lognormal GOF Test                   |   |   |   |   |       |   |
| 51 | Shapiro Wilk Test Statistic  |   |                            |   |   | 0.967                                | Shapiro Wilk Lognormal GOF Test                     |   |   |   |       |   |
| 52 | 5% Shapiro Wilk P Value  |   |                            |   |   | 0.0227                               | Data Not Lognormal at 5% Significance Level         |   |   |   |       |   |
| 53 | Lilliefors Test Statistic  |   |                            |   |   | 0.107                                | Lilliefors Lognormal GOF Test                       |   |   |   |       |   |
| 54 | 5% Lilliefors Critical Value   |   |                            |   |   | 0.0728                               | Data Not Lognormal at 5% Significance Level         |   |   |   |       |   |
| 55 | Data Not Lognormal at 5% Significance Level  |   |                            |   |   |                                      |   |   |   |   |       |   |
| 56 |  |   |                            |   |   |                                      |   |   |   |   |       |   |
| 57 |  |   |                            |   |   | Lognormal Statistics                 |   |   |   |   |       |   |
| 58 | Minimum of Logged Data   |   |                            |   |   | 8.655                                | Mean of logged Data                                 |   |   |   | 9.373 |   |
| 59 | Maximum of Logged Data   |   |                            |   |   | 10.47                                | SD of logged Data                                   |   |   |   | 0.306 |   |
| 60 |  |   |                            |   |   |                                      |   |   |   |   |       |   |
| 61 |  |   |                            |   |   | Assuming Lognormal Distribution      |   |   |   |   |       |   |
| 62 | 95% H-UCL  |   |                            |   |   | 12882                                | 90% Chebyshev (MVUE) UCL                            |   |   |   | 13277 |   |
| 63 | 95% Chebyshev (MVUE) UCL   |   |                            |   |   | 13707                                | 97.5% Chebyshev (MVUE) UCL                          |   |   |   | 14304 |   |
| 64 | 99% Chebyshev (MVUE) UCL   |   |                            |   |   | 15478                                |   |   |   |   |       |   |
| 65 |  |   |                            |   |   |                                      |   |   |   |   |       |   |
| 66 | Nonparametric Distribution Free UCL Statistics   |   |                            |   |   |                                      |   |   |   |   |       |   |
| 67 | Data do not follow a Discernible Distribution (0.05)   |   |                            |   |   |                                      |   |   |   |   |       |   |
| 68 |  |   |                            |   |   |                                      |   |   |   |   |       |   |
| 69 |  |   |                            |   |   | Nonparametric Distribution Free UCLs |   |   |   |   |       |   |
| 70 | 95% CLT UCL  |   |                            |   |   | 12939                                | 95% Jackknife UCL                                   |   |   |   | 12943 |   |
| 71 | 95% Standard Bootstrap UCL   |   |                            |   |   | 12937                                | 95% Bootstrap-t UCL                                 |   |   |   | 12994 |   |
| 72 | 95% Hall's Bootstrap UCL   |   |                            |   |   | 13017                                | 95% Percentile Bootstrap UCL                        |   |   |   | 12962 |   |
| 73 | 95% BCA Bootstrap UCL  |   |                            |   |   | 12962                                |   |   |   |   |       |   |
| 74 | 90% Chebyshev(Mean, Sd) UCL  |   |                            |   |   | 13414                                | 95% Chebyshev(Mean, Sd) UCL                         |   |   |   | 13891 |   |
| 75 | 97.5% Chebyshev(Mean, Sd) UCL  |   |                            |   |   | 14552                                | 99% Chebyshev(Mean, Sd) UCL                         |   |   |   | 15850 |   |
| 76 |  |   |                            |   |   |                                      |   |   |   |   |       |   |
| 77 |  |   |                            |   |   | Suggested UCL to Use                 |   |   |   |   |       |   |
| 78 | 95% Student's-t UCL  |   |                            |   |   | 12943                                | or 95% Modified-t UCL                               |   |   |   | 12952 |   |
| 79 |  |   |                            |   |   |                                      |   |   |   |   |       |   |
| 80 | Note: Suggestions regarding the selection of a 95% UCL are provided to help the user to select the most appropriate 95% UCL. |   |                            |   |   |                                      |   |   |   |   |       |   |
| 81 | These recommendations are based upon the results of the simulation studies summarized in Singh, Singh, and Iaci (2002)       |   |                            |   |   |                                      |   |   |   |   |       |   |
| 82 | and Singh and Singh (2003). However, simulations results will not cover all Real World data sets.                            |   |                            |   |   |                                      |   |   |   |   |       |   |
| 83 | For additional insight the user may want to consult a statistician.  |   |                            |   |   |                                      |   |   |   |   |       |   |
| 84 |  |   |                            |   |   |                                      |   |   |   |   |       |   |
| 85 | Antimony   |   |                            |   |   |                                      |   |   |   |   |       |   |
| 86 |  |   |                            |   |   |                                      |   |   |   |   |       |   |
| 87 |  |   |                            |   |   | General Statistics                   |   |   |   |   |       |   |
| 88 | Total Number of Observations   |   |                            |   |   | 148                                  | Number of Distinct Observations                     |   |   |   | 60    |   |
| 89 | Number of Detects  |   |                            |   |   | 96                                   | Number of Non-Detects                               |   |   |   | 52    |   |

|     |   |   |   |   |   |           |   |                      |   |   |  |         |
|-----|---|---|---|---|---|-----------|---|----------------------|---|---|--|---------|
|     | A | B | C | D | E   | F         | G | H                    | I | J | K  | L       |
| 90  |   |   |   |   | Number of Distinct Detects  | 40        |   |                      |   |   | Number of Distinct Non-Detects                               | 31      |
| 91  |   |   |   |   | Minimum Detect  | 0.074     |   |                      |   |   | Minimum Non-Detect   | 0.17    |
| 92  |   |   |   |   | Maximum Detect  | 0.45      |   |                      |   |   | Maximum Non-Detect   | 6       |
| 93  |   |   |   |   | Variance Detects  | 0.00899   |   |                      |   |   | Percent Non-Detects  | 35.14%  |
| 94  |   |   |   |   | Mean Detects  | 0.204     |   |                      |   |   | SD Detects   | 0.0948  |
| 95  |   |   |   |   | Median Detects  | 0.175     |   |                      |   |   | CV Detects   | 0.466   |
| 96  |   |   |   |   | Skewness Detects  | 0.82      |   |                      |   |   | Kurtosis Detects   | -0.165  |
| 97  |   |   |   |   | Mean of Logged Detects  | -1.696    |   |                      |   |   | SD of Logged Detects   | 0.459   |
| 98  |   |   |   |   |   |           |   |                      |   |   |  |         |
| 99  |   |   |   |   | Normal GOF Test on Detects Only   |           |   |                      |   |   |  |         |
| 100 |   |   |   |   | Shapiro Wilk Test Statistic   | 0.906     |   |                      |   |   | Normal GOF Test on Detected Observations Only                |         |
| 101 |   |   |   |   | 5% Shapiro Wilk P Value   | 8.1275E-8 |   |                      |   |   | Detected Data Not Normal at 5% Significance Level            |         |
| 102 |   |   |   |   | Lilliefors Test Statistic   | 0.138     |   |                      |   |   | Lilliefors GOF Test  |         |
| 103 |   |   |   |   | 5% Lilliefors Critical Value  | 0.0904    |   |                      |   |   | Detected Data Not Normal at 5% Significance Level            |         |
| 104 |   |   |   |   | Detected Data Not Normal at 5% Significance Level   |           |   |                      |   |   |  |         |
| 105 |   |   |   |   |   |           |   |                      |   |   |  |         |
| 106 |   |   |   |   | Kaplan-Meier (KM) Statistics using Normal Critical Values and other Nonparametric UCLs                      |           |   |                      |   |   |  |         |
| 107 |   |   |   |   | Mean  | 0.193     |   |                      |   |   | Standard Error of Mean                                       | 0.00854 |
| 108 |   |   |   |   | SD  | 0.0899    |   |                      |   |   | 95% KM (BCA) UCL   | 0.208   |
| 109 |   |   |   |   | 95% KM (t) UCL  | 0.207     |   |                      |   |   | 95% KM (Percentile Bootstrap) UCL                            | 0.206   |
| 110 |   |   |   |   | 95% KM (z) UCL  | 0.207     |   |                      |   |   | 95% KM Bootstrap t UCL                                       | 0.208   |
| 111 |   |   |   |   | 90% KM Chebyshev UCL  | 0.219     |   |                      |   |   | 95% KM Chebyshev UCL   | 0.23    |
| 112 |   |   |   |   | 97.5% KM Chebyshev UCL  | 0.246     |   |                      |   |   | 99% KM Chebyshev UCL   | 0.278   |
| 113 |   |   |   |   |   |           |   |                      |   |   |  |         |
| 114 |   |   |   |   | Gamma GOF Tests on Detected Observations Only   |           |   |                      |   |   |  |         |
| 115 |   |   |   |   | A-D Test Statistic  | 0.913     |   |                      |   |   | Anderson-Darling GOF Test                                    |         |
| 116 |   |   |   |   | 5% A-D Critical Value   | 0.755     |   |                      |   |   | Detected Data Not Gamma Distributed at 5% Significance Level |         |
| 117 |   |   |   |   | K-S Test Statistic  | 0.0999    |   |                      |   |   | Kolmogorov-Smirnov GOF                                       |         |
| 118 |   |   |   |   | 5% K-S Critical Value   | 0.0915    |   |                      |   |   | Detected Data Not Gamma Distributed at 5% Significance Level |         |
| 119 |   |   |   |   | Detected Data Not Gamma Distributed at 5% Significance Level  |           |   |                      |   |   |  |         |
| 120 |   |   |   |   |   |           |   |                      |   |   |  |         |
| 121 |   |   |   |   | Gamma Statistics on Detected Data Only  |           |   |                      |   |   |  |         |
| 122 |   |   |   |   | k hat (MLE)   | 4.971     |   |                      |   |   | k star (bias corrected MLE)                                  | 4.822   |
| 123 |   |   |   |   | Theta hat (MLE)   | 0.0409    |   |                      |   |   | Theta star (bias corrected MLE)                              | 0.0422  |
| 124 |   |   |   |   | nu hat (MLE)  | 954.4     |   |                      |   |   | nu star (bias corrected)                                     | 925.9   |
| 125 |   |   |   |   | MLE Mean (bias corrected)   | 0.204     |   |                      |   |   | MLE Sd (bias corrected)                                      | 0.0927  |
| 126 |   |   |   |   |   |           |   |                      |   |   |  |         |
| 127 |   |   |   |   | Gamma Kaplan-Meier (KM) Statistics  |           |   |                      |   |   |  |         |
| 128 |   |   |   |   | k hat (KM)  | 4.601     |   |                      |   |   | nu hat (KM)  | 1362    |
| 129 |   |   |   |   | Approximate Chi Square Value (N/A, $\alpha$ )   | 1277      |   |                      |   |   | Adjusted Chi Square Value (N/A, $\beta$ )                    | 1277    |
| 130 |   |   |   |   | 95% Gamma Approximate KM-UCL (use when $n \geq 50$ )  | 0.206     |   |                      |   |   | 95% Gamma Adjusted KM-UCL (use when $n < 50$ )               | 0.206   |
| 131 |   |   |   |   |   |           |   |                      |   |   |  |         |
| 132 |   |   |   |   | Gamma ROS Statistics using Imputed Non-Detects  |           |   |                      |   |   |  |         |
| 133 |   |   |   |   | GROS may not be used when data set has > 50% NDs with many tied observations at multiple DLs                |           |   |                      |   |   |  |         |
| 134 |   |   |   |   | GROS may not be used when kstar of detected data is small such as < 0.1                                     |           |   |                      |   |   |  |         |
| 135 |   |   |   |   | For such situations, GROS method tends to yield inflated values of UCLs and BTVs                            |           |   |                      |   |   |  |         |
| 136 |   |   |   |   | For gamma distributed detected data, BTVs and UCLs may be computed using gamma distribution on KM estimates |           |   |                      |   |   |  |         |
| 137 |   |   |   |   | Minimum   | 0.074     |   |                      |   |   | Mean   | 0.191   |
| 138 |   |   |   |   | Maximum   | 0.45      |   |                      |   |   | Median   | 0.177   |
| 139 |   |   |   |   | SD  | 0.0812    |   |                      |   |   | CV   | 0.424   |
| 140 |   |   |   |   | k hat (MLE)   | 6.401     |   |                      |   |   | k star (bias corrected MLE)                                  | 6.275   |
| 141 |   |   |   |   | Theta hat (MLE)   | 0.0299    |   |                      |   |   | Theta star (bias corrected MLE)                              | 0.0305  |
| 142 |   |   |   |   | nu hat (MLE)  | 1895      |   |                      |   |   | nu star (bias corrected)                                     | 1857    |
| 143 |   |   |   |   | MLE Mean (bias corrected)   | 0.191     |   |                      |   |   | MLE Sd (bias corrected)                                      | 0.0764  |
| 144 |   |   |   |   |   |           |   |                      |   |   | Adjusted Level of Significance ( $\beta$ )                   | 0.0484  |
| 145 |   |   |   |   | Approximate Chi Square Value (N/A, $\alpha$ )   | 1758      |   |                      |   |   | Adjusted Chi Square Value (N/A, $\beta$ )                    | 1757    |
| 146 |   |   |   |   | 95% Gamma Approximate UCL (use when $n \geq 50$ )   | 0.202     |   |                      |   |   | 95% Gamma Adjusted UCL (use when $n < 50$ )                  | 0.202   |
| 147 |   |   |   |   |   |           |   |                      |   |   |  |         |
| 148 |   |   |   |   | Lognormal GOF Test on Detected Observations Only  |           |   |                      |   |   |  |         |
| 149 |   |   |   |   | Lilliefors Test Statistic   | 0.0754    |   |                      |   |   | Lilliefors GOF Test  |         |
| 150 |   |   |   |   | 5% Lilliefors Critical Value  | 0.0904    |   |                      |   |   | Detected Data appear Lognormal at 5% Significance Level      |         |
| 151 |   |   |   |   | Detected Data appear Approximate Lognormal at 5% Significance Level   |           |   |                      |   |   |  |         |
| 152 |   |   |   |   |   |           |   |                      |   |   |  |         |
| 153 |   |   |   |   | Lognormal ROS Statistics Using Imputed Non-Detects  |           |   |                      |   |   |  |         |
| 154 |   |   |   |   | Mean in Original Scale  | 0.19      |   |                      |   |   | Mean in Log Scale  | -1.739  |
| 155 |   |   |   |   | SD in Original Scale  | 0.0809    |   |                      |   |   | SD in Log Scale  | 0.392   |
| 156 |   |   |   |   | 95% t UCL (assumes normality of ROS data)   | 0.201     |   |                      |   |   | 95% Percentile Bootstrap UCL                                 | 0.201   |
| 157 |   |   |   |   | 95% BCA Bootstrap UCL   | 0.202     |   |                      |   |   | 95% Bootstrap t UCL  | 0.202   |
| 158 |   |   |   |   | 95% H-UCL (Log ROS)   | 0.201     |   |                      |   |   |  |         |
| 159 |   |   |   |   |   |           |   |                      |   |   |  |         |
| 160 |   |   |   |   | UCLs using Lognormal Distribution and KM Estimates when Detected data are Lognormally Distributed           |           |   |                      |   |   |  |         |
| 161 |   |   |   |   | KM Mean (logged)  | -1.746    |   |                      |   |   | 95% H-UCL (KM -Log)  | 0.206   |
| 162 |   |   |   |   | KM SD (logged)  | 0.444     |   |                      |   |   | 95% Critical H Value (KM-Log)                                | 1.799   |
| 163 |   |   |   |   | KM Standard Error of Mean (logged)  | 0.0432    |   |                      |   |   |  |         |
| 164 |   |   |   |   |   |           |   |                      |   |   |  |         |
| 165 |   |   |   |   | DL/2 Statistics   |           |   |                      |   |   |  |         |
| 166 |   |   |   |   | DL/2 Normal   |           |   | DL/2 Log-Transformed |   |   |  |         |
| 167 |   |   |   |   | Mean in Original Scale  | 0.242     |   |                      |   |   | Mean in Log Scale  | -1.61   |
| 168 |   |   |   |   | SD in Original Scale  | 0.255     |   |                      |   |   | SD in Log Scale  | 0.555   |
| 169 |   |   |   |   | 95% t UCL (Assumes normality)   | 0.276     |   |                      |   |   | 95% H-Stat UCL   | 0.254   |
| 170 |   |   |   |   | DL/2 is not a recommended method, provided for comparisons and historical reasons                           |           |   |                      |   |   |  |         |
| 171 |   |   |   |   |   |           |   |                      |   |   |  |         |
| 172 |   |   |   |   | Nonparametric Distribution Free UCL Statistics  |           |   |                      |   |   |  |         |
| 173 |   |   |   |   | Detected Data appear Approximate Lognormal Distributed at 5% Significance Level                             |           |   |                      |   |   |  |         |
| 174 |   |   |   |   |   |           |   |                      |   |   |  |         |

|     |  |   |   |   |        |   |   |   |  |   |       |   |     |  |
|-----|--|---|---|---|--------|---|---|---|--|---|-------|---|-----|--|
|     | A  | B | C | D | E      | F | G   | H | I                                      | J | K     | L |     |  |
| 175 | Suggested UCL to Use   |   |   |   |        |   |   |   |  |   |       |   |     |  |
| 176 | 95% KM (BCA) UCL   |   |   |   | 0.208  |   |   |   |  |   |       |   |     |  |
| 177 |  |   |   |   |        |   |   |   |  |   |       |   |     |  |
| 178 | Note: Suggestions regarding the selection of a 95% UCL are provided to help the user to select the most appropriate 95% UCL              |   |   |   |        |   |   |   |  |   |       |   |     |  |
| 179 | Recommendations are based upon data size, data distribution, and skewness.   |   |   |   |        |   |   |   |  |   |       |   |     |  |
| 180 | These recommendations are based upon the results of the simulation studies summarized in Singh, Maichle, and Lee (2006)                  |   |   |   |        |   |   |   |  |   |       |   |     |  |
| 181 | However, simulations results will not cover all Real World data sets; for additional insight the user may want to consult a statistician |   |   |   |        |   |   |   |  |   |       |   |     |  |
| 182 |  |   |   |   |        |   |   |   |  |   |       |   |     |  |
| 183 |  |   |   |   |        |   |   |   |  |   |       |   |     |  |
| 184 | Barium   |   |   |   |        |   |   |   |  |   |       |   |     |  |
| 185 |  |   |   |   |        |   |   |   |  |   |       |   |     |  |
| 186 | General Statistics   |   |   |   |        |   |   |   |  |   |       |   |     |  |
| 187 | Total Number of Observations   |   |   |   | 148    |   | Number of Distinct Observations                                 |   |  |   | 99    |   |     |  |
| 188 |  |   |   |   |        |   | Number of Missing Observations                                  |   |  |   | 0     |   |     |  |
| 189 | Minimum  |   |   |   | 88.7   |   | Mean  |   |  |   | 192.6 |   |     |  |
| 190 | Maximum  |   |   |   | 403    |   | Median  |   |  |   | 189   |   |     |  |
| 191 | SD   |   |   |   | 46.51  |   | Std. Error of Mean  |   |  |   | 3.823 |   |     |  |
| 192 | Coefficient of Variation   |   |   |   | 0.241  |   | Skewness  |   |  |   | 0.837 |   |     |  |
| 193 |  |   |   |   |        |   |   |   |  |   |       |   |     |  |
| 194 | Normal GOF Test  |   |   |   |        |   |   |   |  |   |       |   |     |  |
| 195 | Shapiro Wilk Test Statistic  |   |   |   | 0.967  |   | Shapiro Wilk GOF Test   |   |  |   |       |   |     |  |
| 196 | 5% Shapiro Wilk P Value  |   |   |   | 0.0279 |   | Data Not Normal at 5% Significance Level                        |   |  |   |       |   |     |  |
| 197 | Lilliefors Test Statistic  |   |   |   | 0.0638 |   | Lilliefors GOF Test   |   |  |   |       |   |     |  |
| 198 | 5% Lilliefors Critical Value   |   |   |   | 0.0728 |   | Data appear Normal at 5% Significance Level                     |   |  |   |       |   |     |  |
| 199 | Data appear Approximate Normal at 5% Significance Level  |   |   |   |        |   |   |   |  |   |       |   |     |  |
| 200 |  |   |   |   |        |   |   |   |  |   |       |   |     |  |
| 201 | Assuming Normal Distribution   |   |   |   |        |   |   |   |  |   |       |   |     |  |
| 202 | 95% Normal UCL   |   |   |   |        |   | 95% UCLs (Adjusted for Skewness)                                |   |  |   |       |   |     |  |
| 203 | 95% Student's-t UCL  |   |   |   | 198.9  |   | 95% Adjusted-CLT UCL (Chen-1995)                                |   |  |   | 199.2 |   |     |  |
| 204 |  |   |   |   |        |   | 95% Modified-t UCL (Johnson-1978)                               |   |  |   | 199   |   |     |  |
| 205 |  |   |   |   |        |   |   |   |  |   |       |   |     |  |
| 206 | Gamma GOF Test   |   |   |   |        |   |   |   |  |   |       |   |     |  |
| 207 | A-D Test Statistic   |   |   |   | 0.387  |   | Anderson-Darling Gamma GOF Test                                 |   |  |   |       |   |     |  |
| 208 | 5% A-D Critical Value  |   |   |   | 0.751  |   | Detected data appear Gamma Distributed at 5% Significance Level |   |  |   |       |   |     |  |
| 209 | K-S Test Statistic   |   |   |   | 0.0523 |   | Kolmogrov-Smirnoff Gamma GOF Test                               |   |  |   |       |   |     |  |
| 210 | 5% K-S Critical Value  |   |   |   | 0.0769 |   | Detected data appear Gamma Distributed at 5% Significance Level |   |  |   |       |   |     |  |
| 211 | Detected data appear Gamma Distributed at 5% Significance Level  |   |   |   |        |   |   |   |  |   |       |   |     |  |
| 212 |  |   |   |   |        |   |   |   |  |   |       |   |     |  |
| 213 | Gamma Statistics   |   |   |   |        |   |   |   |  |   |       |   |     |  |
| 214 | k hat (MLE)  |   |   |   | 17.86  |   | k star (bias corrected MLE)                                     |   |  |   | 17.5  |   |     |  |
| 215 | Theta hat (MLE)  |   |   |   | 10.78  |   | Theta star (bias corrected MLE)                                 |   |  |   | 11    |   |     |  |
| 216 | nu hat (MLE)   |   |   |   | 5287   |   | nu star (bias corrected)  |   |  |   | 5181  |   |     |  |
| 217 | MLE Mean (bias corrected)  |   |   |   | 192.6  |   | MLE Sd (bias corrected)   |   |  |   | 46.03 |   |     |  |
| 218 |  |   |   |   |        |   | Approximate Chi Square Value (0.05)                             |   |  |   | 5015  |   |     |  |
| 219 | Adjusted Level of Significance   |   |   |   | 0.0484 |   | Adjusted Chi Square Value                                       |   |  |   | 5013  |   |     |  |
| 220 |  |   |   |   |        |   |   |   |  |   |       |   |     |  |
| 221 | Assuming Gamma Distribution  |   |   |   |        |   |   |   |  |   |       |   |     |  |
| 222 | 95% Approximate Gamma UCL (use when n>=50))  |   |   |   |        |   | 199   |   | 95% Adjusted Gamma UCL (use when n<50) |   |       |   | 199 |  |
| 223 |  |   |   |   |        |   |   |   |  |   |       |   |     |  |
| 224 | Lognormal GOF Test   |   |   |   |        |   |   |   |  |   |       |   |     |  |
| 225 | Shapiro Wilk Test Statistic  |   |   |   | 0.991  |   | Shapiro Wilk Lognormal GOF Test                                 |   |  |   |       |   |     |  |
| 226 | 5% Shapiro Wilk P Value  |   |   |   | 0.965  |   | Data appear Lognormal at 5% Significance Level                  |   |  |   |       |   |     |  |
| 227 | Lilliefors Test Statistic  |   |   |   | 0.0677 |   | Lilliefors Lognormal GOF Test                                   |   |  |   |       |   |     |  |
| 228 | 5% Lilliefors Critical Value   |   |   |   | 0.0728 |   | Data appear Lognormal at 5% Significance Level                  |   |  |   |       |   |     |  |
| 229 | Data appear Lognormal at 5% Significance Level   |   |   |   |        |   |   |   |  |   |       |   |     |  |
| 230 |  |   |   |   |        |   |   |   |  |   |       |   |     |  |
| 231 | Lognormal Statistics   |   |   |   |        |   |   |   |  |   |       |   |     |  |
| 232 | Minimum of Logged Data   |   |   |   | 4.485  |   | Mean of logged Data   |   |  |   | 5.232 |   |     |  |
| 233 | Maximum of Logged Data   |   |   |   | 5.999  |   | SD of logged Data   |   |  |   | 0.239 |   |     |  |
| 234 |  |   |   |   |        |   |   |   |  |   |       |   |     |  |
| 235 | Assuming Lognormal Distribution  |   |   |   |        |   |   |   |  |   |       |   |     |  |
| 236 | 95% H-UCL  |   |   |   | 199.3  |   | 90% Chebyshev (MVUE) UCL  |   |  |   | 204.2 |   |     |  |
| 237 | 95% Chebyshev (MVUE) UCL   |   |   |   | 209.4  |   | 97.5% Chebyshev (MVUE) UCL                                      |   |  |   | 216.6 |   |     |  |
| 238 | 99% Chebyshev (MVUE) UCL   |   |   |   | 230.8  |   |   |   |  |   |       |   |     |  |
| 239 |  |   |   |   |        |   |   |   |  |   |       |   |     |  |
| 240 | Nonparametric Distribution Free UCL Statistics   |   |   |   |        |   |   |   |  |   |       |   |     |  |
| 241 | Data appear to follow a Discernible Distribution at 5% Significance Level  |   |   |   |        |   |   |   |  |   |       |   |     |  |
| 242 |  |   |   |   |        |   |   |   |  |   |       |   |     |  |
| 243 | Nonparametric Distribution Free UCLs   |   |   |   |        |   |   |   |  |   |       |   |     |  |
| 244 | 95% CLT UCL  |   |   |   | 198.9  |   | 95% Jackknife UCL   |   |  |   | 198.9 |   |     |  |
| 245 | 95% Standard Bootstrap UCL   |   |   |   | 198.9  |   | 95% Bootstrap-t UCL   |   |  |   | 199.1 |   |     |  |
| 246 | 95% Hall's Bootstrap UCL   |   |   |   | 199.4  |   | 95% Percentile Bootstrap UCL                                    |   |  |   | 198.9 |   |     |  |
| 247 | 95% BCA Bootstrap UCL  |   |   |   | 198.8  |   |   |   |  |   |       |   |     |  |
| 248 | 90% Chebyshev(Mean, Sd) UCL  |   |   |   | 204.1  |   | 95% Chebyshev(Mean, Sd) UCL                                     |   |  |   | 209.3 |   |     |  |
| 249 | 97.5% Chebyshev(Mean, Sd) UCL  |   |   |   | 216.5  |   | 99% Chebyshev(Mean, Sd) UCL                                     |   |  |   | 230.6 |   |     |  |
| 250 |  |   |   |   |        |   |   |   |  |   |       |   |     |  |
| 251 | Suggested UCL to Use   |   |   |   |        |   |   |   |  |   |       |   |     |  |
| 252 | 95% Student's-t UCL  |   |   |   | 198.9  |   |   |   |  |   |       |   |     |  |
| 253 |  |   |   |   |        |   |   |   |  |   |       |   |     |  |
| 254 | Note: Suggestions regarding the selection of a 95% UCL are provided to help the user to select the most appropriate 95% UCL              |   |   |   |        |   |   |   |  |   |       |   |     |  |
| 255 | These recommendations are based upon the results of the simulation studies summarized in Singh, Singh, and Iaci (2002)                   |   |   |   |        |   |   |   |  |   |       |   |     |  |
| 256 | and Singh and Singh (2003). However, simulations results will not cover all Real World data sets   |   |   |   |        |   |   |   |  |   |       |   |     |  |
| 257 | For additional insight the user may want to consult a statistician.  |   |   |   |        |   |   |   |  |   |       |   |     |  |
| 258 |  |   |   |   |        |   |   |   |  |   |       |   |     |  |
| 259 | Cesium-137   |   |   |   |        |   |   |   |  |   |       |   |     |  |

|     |  |   |   |   |        |  |   |   |   |         |   |   |
|-----|--|---|---|---|--------|--|---|---|---|---------|---|---|
|     | A  | B | C | D | E      | F  | G | H | I | J       | K | L |
| 260 |  |   |   |   |        |  |   |   |   |         |   |   |
| 261 | General Statistics   |   |   |   |        |  |   |   |   |         |   |   |
| 262 | Total Number of Observations   |   |   |   | 161    | Number of Distinct Observations                              |   |   |   | 118     |   |   |
| 263 | Number of Detects  |   |   |   | 38     | Number of Non-Detects  |   |   |   | 123     |   |   |
| 264 | Number of Distinct Detects   |   |   |   | 36     | Number of Distinct Non-Detects                               |   |   |   | 84      |   |   |
| 265 | Minimum Detect   |   |   |   | 0.09   | Minimum Non-Detect   |   |   |   | -0.036  |   |   |
| 266 | Maximum Detect   |   |   |   | 3.28   | Maximum Non-Detect   |   |   |   | 0.168   |   |   |
| 267 | Variance Detects   |   |   |   | 0.512  | Percent Non-Detects  |   |   |   | 76.4%   |   |   |
| 268 | Mean Detects   |   |   |   | 0.528  | SD Detects   |   |   |   | 0.716   |   |   |
| 269 | Median Detects   |   |   |   | 0.231  | CV Detects   |   |   |   | 1.356   |   |   |
| 270 | Skewness Detects   |   |   |   | 2.419  | Kurtosis Detects   |   |   |   | 5.776   |   |   |
| 271 |  |   |   |   |        |  |   |   |   |         |   |   |
| 272 | Normal GOF Test on Detects Only  |   |   |   |        |  |   |   |   |         |   |   |
| 273 | Shapiro Wilk Test Statistic  |   |   |   | 0.619  | Shapiro Wilk GOF Test  |   |   |   |         |   |   |
| 274 | 5% Shapiro Wilk Critical Value   |   |   |   | 0.938  | Detected Data Not Normal at 5% Significance Level            |   |   |   |         |   |   |
| 275 | Lilliefors Test Statistic  |   |   |   | 0.372  | Lilliefors GOF Test  |   |   |   |         |   |   |
| 276 | 5% Lilliefors Critical Value   |   |   |   | 0.144  | Detected Data Not Normal at 5% Significance Level            |   |   |   |         |   |   |
| 277 | Detected Data Not Normal at 5% Significance Level  |   |   |   |        |  |   |   |   |         |   |   |
| 278 |  |   |   |   |        |  |   |   |   |         |   |   |
| 279 | Kaplan-Meier (KM) Statistics using Normal Critical Values and other Nonparametric UCLs   |   |   |   |        |  |   |   |   |         |   |   |
| 280 | Mean   |   |   |   | 0.0972 | Standard Error of Mean                                       |   |   |   | 0.0334  |   |   |
| 281 | SD   |   |   |   | 0.418  | 95% KM (BCA) UCL   |   |   |   | 0.168   |   |   |
| 282 | 95% KM (t) UCL   |   |   |   | 0.153  | 95% KM (Percentile Bootstrap) UCL                            |   |   |   | 0.155   |   |   |
| 283 | 95% KM (z) UCL   |   |   |   | 0.152  | 95% KM Bootstrap t UCL                                       |   |   |   | 0.175   |   |   |
| 284 | 90% KM Chebyshev UCL   |   |   |   | 0.197  | 95% KM Chebyshev UCL   |   |   |   | 0.243   |   |   |
| 285 | 97.5% KM Chebyshev UCL   |   |   |   | 0.306  | 99% KM Chebyshev UCL   |   |   |   | 0.43    |   |   |
| 286 |  |   |   |   |        |  |   |   |   |         |   |   |
| 287 | Gamma GOF Tests on Detected Observations Only  |   |   |   |        |  |   |   |   |         |   |   |
| 288 | A-D Test Statistic   |   |   |   | 3.298  | Anderson-Darling GOF Test                                    |   |   |   |         |   |   |
| 289 | 5% A-D Critical Value  |   |   |   | 0.777  | Detected Data Not Gamma Distributed at 5% Significance Level |   |   |   |         |   |   |
| 290 | K-S Test Statistic   |   |   |   | 0.283  | Kolmogrov-Smirnoff GOF                                       |   |   |   |         |   |   |
| 291 | 5% K-S Critical Value  |   |   |   | 0.147  | Detected Data Not Gamma Distributed at 5% Significance Level |   |   |   |         |   |   |
| 292 | Detected Data Not Gamma Distributed at 5% Significance Level   |   |   |   |        |  |   |   |   |         |   |   |
| 293 |  |   |   |   |        |  |   |   |   |         |   |   |
| 294 | Gamma Statistics on Detected Data Only   |   |   |   |        |  |   |   |   |         |   |   |
| 295 | k hat (MLE)  |   |   |   | 1.036  | k star (bias corrected MLE)                                  |   |   |   | 0.972   |   |   |
| 296 | Theta hat (MLE)  |   |   |   | 0.509  | Theta star (bias corrected MLE)                              |   |   |   | 0.543   |   |   |
| 297 | nu hat (MLE)   |   |   |   | 78.75  | nu star (bias corrected)                                     |   |   |   | 73.86   |   |   |
| 298 | MLE Mean (bias corrected)  |   |   |   | 0.528  | MLE Sd (bias corrected)                                      |   |   |   | 0.535   |   |   |
| 299 |  |   |   |   |        |  |   |   |   |         |   |   |
| 300 | Gamma Kaplan-Meier (KM) Statistics   |   |   |   |        |  |   |   |   |         |   |   |
| 301 | k hat (KM)   |   |   |   | 0.054  | nu hat (KM)  |   |   |   | 17.39   |   |   |
| 302 |  |   |   |   |        | Adjusted Level of Significance (β)                           |   |   |   | 0.0485  |   |   |
| 303 | Approximate Chi Square Value (17.39, α)  |   |   |   | 8.951  | Adjusted Chi Square Value (17.39, β)                         |   |   |   | 8.896   |   |   |
| 304 | 95% Gamma Approximate KM-UCL (use when n>=50)  |   |   |   | 0.189  | 95% Gamma Adjusted KM-UCL (use when n<50)                    |   |   |   | 0.19    |   |   |
| 305 | Gamma (KM) may not be used when k hat (KM) is < 0.1  |   |   |   |        |  |   |   |   |         |   |   |
| 306 |  |   |   |   |        |  |   |   |   |         |   |   |
| 307 | DL/2 Statistics  |   |   |   |        |  |   |   |   |         |   |   |
| 308 | Mean in Original Scale   |   |   |   | 0.135  | SD in Original Scale   |   |   |   | 0.408   |   |   |
| 309 | 95% t UCL (Assumes normality)  |   |   |   | 0.188  |  |   |   |   |         |   |   |
| 310 | DL/2 is not a recommended method, provided for comparisons and historical reasons  |   |   |   |        |  |   |   |   |         |   |   |
| 311 |  |   |   |   |        |  |   |   |   |         |   |   |
| 312 | Nonparametric Distribution Free UCL Statistics   |   |   |   |        |  |   |   |   |         |   |   |
| 313 | Data do not follow a Discernible Distribution at 5% Significance Level   |   |   |   |        |  |   |   |   |         |   |   |
| 314 |  |   |   |   |        |  |   |   |   |         |   |   |
| 315 | Suggested UCL to Use   |   |   |   |        |  |   |   |   |         |   |   |
| 316 | 97.5% KM (Chebyshev) UCL   |   |   |   | 0.306  |  |   |   |   |         |   |   |
| 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 | Recommendations are based upon data size, data distribution, and skewness.   |   |   |   |        |  |   |   |   |         |   |   |
| 320 | These recommendations are based upon the results of the simulation studies summarized in Singh, Maichle, and Lee (2006)                  |   |   |   |        |  |   |   |   |         |   |   |
| 321 | However, simulations results will not cover all Real World data sets; for additional insight the user may want to consult a statistician |   |   |   |        |  |   |   |   |         |   |   |
| 322 |  |   |   |   |        |  |   |   |   |         |   |   |
| 323 |  |   |   |   |        |  |   |   |   |         |   |   |
| 324 | Chromium   |   |   |   |        |  |   |   |   |         |   |   |
| 325 |  |   |   |   |        |  |   |   |   |         |   |   |
| 326 | General Statistics   |   |   |   |        |  |   |   |   |         |   |   |
| 327 | Total Number of Observations   |   |   |   | 148    | Number of Distinct Observations                              |   |   |   | 67      |   |   |
| 328 |  |   |   |   |        | Number of Missing Observations                               |   |   |   | 0       |   |   |
| 329 | Minimum  |   |   |   | 4.9    | Mean   |   |   |   | 9.614   |   |   |
| 330 | Maximum  |   |   |   | 14.4   | Median   |   |   |   | 9.7     |   |   |
| 331 | SD   |   |   |   | 1.764  | Std. Error of Mean   |   |   |   | 0.145   |   |   |
| 332 | Coefficient of Variation   |   |   |   | 0.184  | Skewness   |   |   |   | -0.0641 |   |   |
| 333 |  |   |   |   |        |  |   |   |   |         |   |   |
| 334 | Normal GOF Test  |   |   |   |        |  |   |   |   |         |   |   |
| 335 | Shapiro Wilk Test Statistic  |   |   |   | 0.985  | Shapiro Wilk GOF Test  |   |   |   |         |   |   |
| 336 | 5% Shapiro Wilk P Value  |   |   |   | 0.742  | Data appear Normal at 5% Significance Level                  |   |   |   |         |   |   |
| 337 | Lilliefors Test Statistic  |   |   |   | 0.0491 | Lilliefors GOF Test  |   |   |   |         |   |   |
| 338 | 5% Lilliefors Critical Value   |   |   |   | 0.0728 | 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  |   |   |   | 9.854  | 95% Adjusted-CLT UCL (Chen-1995)                             |   |   |   | 9.852   |   |   |
| 344 |  |   |   |   |        | 95% Modified-t UCL (Johnson-1978)                            |   |   |   | 9.854   |   |   |

|     |   |                              |   |   |           |     |   |                                 |   |   |       |    |  |
|-----|---|------------------------------|---|---|-----------|-----|---|---------------------------------|---|---|-------|----|--|
|     | A   | B                            | C | D | E         | F   | G   | H                               | I | J | K     | L  |  |
| 345 |   |                              |   |   |           |     |   |                                 |   |   |       |    |  |
| 346 | Gamma GOF Test  |                              |   |   |           |     |   |                                 |   |   |       |    |  |
| 347 | A-D Test Statistic  |                              |   |   | 0.737     |     | Anderson-Darling Gamma GOF Test                                 |                                 |   |   |       |    |  |
| 348 | 5% A-D Critical Value   |                              |   |   | 0.75      |     | Detected data appear Gamma Distributed at 5% Significance Level |                                 |   |   |       |    |  |
| 349 | K-S Test Statistic  |                              |   |   | 0.0748    |     | Kolmogrov-Smirnoff Gamma GOF Test                               |                                 |   |   |       |    |  |
| 350 | 5% K-S Critical Value   |                              |   |   | 0.0769    |     | 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)   |                              |   |   | 28.17     |     | k star (bias corrected MLE)                                     |                                 |   |   | 27.6  |    |  |
| 355 | Theta hat (MLE)   |                              |   |   | 0.341     |     | Theta star (bias corrected MLE)                                 |                                 |   |   | 0.348 |    |  |
| 356 | nu hat (MLE)  |                              |   |   | 8338      |     | nu star (bias corrected)  |                                 |   |   | 8170  |    |  |
| 357 | MLE Mean (bias corrected)   |                              |   |   | 9.614     |     | MLE Sd (bias corrected)   |                                 |   |   | 1.83  |    |  |
| 358 |   |                              |   |   |           |     | Approximate Chi Square Value (0.05)                             |                                 |   |   | 7961  |    |  |
| 359 | Adjusted Level of Significance  |                              |   |   | 0.0484    |     | Adjusted Chi Square Value                                       |                                 |   |   | 7959  |    |  |
| 360 |   |                              |   |   |           |     |   |                                 |   |   |       |    |  |
| 361 | Assuming Gamma Distribution   |                              |   |   |           |     |   |                                 |   |   |       |    |  |
| 362 | 95% Approximate Gamma UCL (use when n>=50))   |                              |   |   | 9.867     |     | 95% Adjusted Gamma UCL (use when n<50)                          |                                 |   |   | 9.869 |    |  |
| 363 |   |                              |   |   |           |     |   |                                 |   |   |       |    |  |
| 364 | Lognormal GOF Test  |                              |   |   |           |     |   |                                 |   |   |       |    |  |
| 365 | Shapiro Wilk Test Statistic   |                              |   |   | 0.962     |     | Shapiro Wilk Lognormal GOF Test                                 |                                 |   |   |       |    |  |
| 366 | 5% Shapiro Wilk P Value   |                              |   |   | 0.00553   |     | Data Not Lognormal at 5% Significance Level                     |                                 |   |   |       |    |  |
| 367 | Lilliefors Test Statistic   |                              |   |   | 0.0882    |     | Lilliefors Lognormal GOF Test                                   |                                 |   |   |       |    |  |
| 368 | 5% Lilliefors Critical Value  |                              |   |   | 0.0728    |     | Data Not Lognormal at 5% Significance Level                     |                                 |   |   |       |    |  |
| 369 | Data Not Lognormal at 5% Significance Level   |                              |   |   |           |     |   |                                 |   |   |       |    |  |
| 370 |   |                              |   |   |           |     |   |                                 |   |   |       |    |  |
| 371 | Lognormal Statistics  |                              |   |   |           |     |   |                                 |   |   |       |    |  |
| 372 | Minimum of Logged Data  |                              |   |   | 1.589     |     | Mean of logged Data   |                                 |   |   | 2.245 |    |  |
| 373 | Maximum of Logged Data  |                              |   |   | 2.667     |     | SD of logged Data   |                                 |   |   | 0.194 |    |  |
| 374 |   |                              |   |   |           |     |   |                                 |   |   |       |    |  |
| 375 | Assuming Lognormal Distribution   |                              |   |   |           |     |   |                                 |   |   |       |    |  |
| 376 | 95% H-UCL   |                              |   |   | 9.887     |     | 90% Chebyshev (MVUE) UCL  |                                 |   |   | 10.09 |    |  |
| 377 | 95% Chebyshev (MVUE) UCL  |                              |   |   | 10.3      |     | 97.5% Chebyshev (MVUE) UCL                                      |                                 |   |   | 10.59 |    |  |
| 378 | 99% Chebyshev (MVUE) UCL  |                              |   |   | 11.16     |     |   |                                 |   |   |       |    |  |
| 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   |                              |   |   | 9.853     |     | 95% Jackknife UCL   |                                 |   |   | 9.854 |    |  |
| 385 | 95% Standard Bootstrap UCL  |                              |   |   | 9.857     |     | 95% Bootstrap-t UCL   |                                 |   |   | 9.862 |    |  |
| 386 | 95% Hall's Bootstrap UCL  |                              |   |   | 9.85      |     | 95% Percentile Bootstrap UCL                                    |                                 |   |   | 9.86  |    |  |
| 387 | 95% BCA Bootstrap UCL   |                              |   |   | 9.853     |     |   |                                 |   |   |       |    |  |
| 388 | 90% Chebyshev(Mean, Sd) UCL   |                              |   |   | 10.05     |     | 95% Chebyshev(Mean, Sd) UCL                                     |                                 |   |   | 10.25 |    |  |
| 389 | 97.5% Chebyshev(Mean, Sd) UCL   |                              |   |   | 10.52     |     | 99% Chebyshev(Mean, Sd) UCL                                     |                                 |   |   | 11.06 |    |  |
| 390 |   |                              |   |   |           |     |   |                                 |   |   |       |    |  |
| 391 | Suggested UCL to Use  |                              |   |   |           |     |   |                                 |   |   |       |    |  |
| 392 | 95% Student's-t UCL   |                              |   |   | 9.854     |     |   |                                 |   |   |       |    |  |
| 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 positively skewed data sets.                                 |                              |   |   |           |     |   |                                 |   |   |       |    |  |
| 401 |   |                              |   |   |           |     |   |                                 |   |   |       |    |  |
| 402 |   |                              |   |   |           |     |   |                                 |   |   |       |    |  |
| 403 | Cobalt  |                              |   |   |           |     |   |                                 |   |   |       |    |  |
| 404 |   |                              |   |   |           |     |   |                                 |   |   |       |    |  |
| 405 |   | General Statistics           |   |   |           |     |   |                                 |   |   |       |    |  |
| 406 |   | Total Number of Observations |   |   |           | 148 |   | Number of Distinct Observations |   |   |       | 58 |  |
| 407 |   |                              |   |   |           |     |   | Number of Missing Observations  |   |   |       | 0  |  |
| 408 | Minimum   |                              |   |   | 2.5       |     | Mean  |                                 |   |   | 6.255 |    |  |
| 409 | Maximum   |                              |   |   | 14.9      |     | Median  |                                 |   |   | 6.3   |    |  |
| 410 | SD  |                              |   |   | 1.557     |     | Std. Error of Mean  |                                 |   |   | 0.128 |    |  |
| 411 | Coefficient of Variation  |                              |   |   | 0.249     |     | Skewness  |                                 |   |   | 1.037 |    |  |
| 412 |   |                              |   |   |           |     |   |                                 |   |   |       |    |  |
| 413 | Normal GOF Test   |                              |   |   |           |     |   |                                 |   |   |       |    |  |
| 414 | Shapiro Wilk Test Statistic   |                              |   |   | 0.953     |     | Shapiro Wilk GOF Test   |                                 |   |   |       |    |  |
| 415 | 5% Shapiro Wilk P Value   |                              |   |   | 2.3874E-4 |     | Data Not Normal at 5% Significance Level                        |                                 |   |   |       |    |  |
| 416 | Lilliefors Test Statistic   |                              |   |   | 0.0753    |     | Lilliefors GOF Test   |                                 |   |   |       |    |  |
| 417 | 5% Lilliefors Critical Value  |                              |   |   | 0.0728    |     | Data Not Normal at 5% Significance Level                        |                                 |   |   |       |    |  |
| 418 | Data Not 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   |                              |   |   | 6.466     |     | 95% Adjusted-CLT UCL (Chen-1995)                                |                                 |   |   | 6.477 |    |  |
| 423 |   |                              |   |   |           |     | 95% Modified-t UCL (Johnson-1978)                               |                                 |   |   | 6.468 |    |  |
| 424 |   |                              |   |   |           |     |   |                                 |   |   |       |    |  |
| 425 | Gamma GOF Test  |                              |   |   |           |     |   |                                 |   |   |       |    |  |
| 426 | A-D Test Statistic  |                              |   |   | 1.174     |     | Anderson-Darling Gamma GOF Test                                 |                                 |   |   |       |    |  |
| 427 | 5% A-D Critical Value   |                              |   |   | 0.751     |     | Data Not Gamma Distributed at 5% Significance Level             |                                 |   |   |       |    |  |
| 428 | K-S Test Statistic  |                              |   |   | 0.0797    |     | Kolmogrov-Smirnoff Gamma GOF Test                               |                                 |   |   |       |    |  |
| 429 | 5% K-S Critical Value   |                              |   |   | 0.0769    |     | Data Not Gamma Distributed at 5% Significance Level             |                                 |   |   |       |    |  |

|     |   |   |   |   |           |   |   |   |   |   |   |   |       |
|-----|---|---|---|---|-----------|---|---|---|---|---|---|---|-------|
|     | A   | B | C | D | E         | F | G | H | I   | J | K | L |       |
| 430 | Data Not Gamma Distributed at 5% Significance Level   |   |   |   |           |   |   |   |   |   |   |   |       |
| 431 |   |   |   |   |           |   |   |   |   |   |   |   |       |
| 432 | Gamma Statistics  |   |   |   |           |   |   |   |   |   |   |   |       |
| 433 | k hat (MLE)   |   |   |   | 16.32     |   |   |   | k star (bias corrected MLE)                         |   |   |   | 15.99 |
| 434 | Theta hat (MLE)   |   |   |   | 0.383     |   |   |   | Theta star (bias corrected MLE)                     |   |   |   | 0.391 |
| 435 | nu hat (MLE)  |   |   |   | 4831      |   |   |   | nu star (bias corrected)                            |   |   |   | 4734  |
| 436 | MLE Mean (bias corrected)   |   |   |   | 6.255     |   |   |   | MLE Sd (bias corrected)                             |   |   |   | 1.564 |
| 437 |   |   |   |   |           |   |   |   | Approximate Chi Square Value (0.05)                 |   |   |   | 4575  |
| 438 | Adjusted Level of Significance  |   |   |   | 0.0484    |   |   |   | Adjusted Chi Square Value                           |   |   |   | 4574  |
| 439 |   |   |   |   |           |   |   |   |   |   |   |   |       |
| 440 | Assuming Gamma Distribution   |   |   |   |           |   |   |   |   |   |   |   |       |
| 441 | 95% Approximate Gamma UCL (use when n>=50))   |   |   |   | 6.472     |   |   |   | 95% Adjusted Gamma UCL (use when n<50)              |   |   |   | 6.474 |
| 442 |   |   |   |   |           |   |   |   |   |   |   |   |       |
| 443 | Lognormal GOF Test  |   |   |   |           |   |   |   |   |   |   |   |       |
| 444 | Shapiro Wilk Test Statistic   |   |   |   | 0.965     |   |   |   | Shapiro Wilk Lognormal GOF Test                     |   |   |   |       |
| 445 | 5% Shapiro Wilk P Value   |   |   |   | 0.015     |   |   |   | Data Not Lognormal at 5% Significance Level         |   |   |   |       |
| 446 | Lilliefors Test Statistic   |   |   |   | 0.0956    |   |   |   | Lilliefors Lognormal GOF Test                       |   |   |   |       |
| 447 | 5% Lilliefors Critical Value  |   |   |   | 0.0728    |   |   |   | Data Not Lognormal at 5% Significance Level         |   |   |   |       |
| 448 | Data Not Lognormal at 5% Significance Level   |   |   |   |           |   |   |   |   |   |   |   |       |
| 449 |   |   |   |   |           |   |   |   |   |   |   |   |       |
| 450 | Lognormal Statistics  |   |   |   |           |   |   |   |   |   |   |   |       |
| 451 | Minimum of Logged Data  |   |   |   | 0.916     |   |   |   | Mean of logged Data                                 |   |   |   | 1.802 |
| 452 | Maximum of Logged Data  |   |   |   | 2.701     |   |   |   | SD of logged Data                                   |   |   |   | 0.254 |
| 453 |   |   |   |   |           |   |   |   |   |   |   |   |       |
| 454 | Assuming Lognormal Distribution   |   |   |   |           |   |   |   |   |   |   |   |       |
| 455 | 95% H-UCL   |   |   |   | 6.493     |   |   |   | 90% Chebyshev (MVUE) UCL                            |   |   |   | 6.661 |
| 456 | 95% Chebyshev (MVUE) UCL  |   |   |   | 6.842     |   |   |   | 97.5% Chebyshev (MVUE) UCL                          |   |   |   | 7.092 |
| 457 | 99% Chebyshev (MVUE) UCL  |   |   |   | 7.585     |   |   |   |   |   |   |   |       |
| 458 |   |   |   |   |           |   |   |   |   |   |   |   |       |
| 459 | Nonparametric Distribution Free UCL Statistics  |   |   |   |           |   |   |   |   |   |   |   |       |
| 460 | Data do not follow a Discernible Distribution (0.05)  |   |   |   |           |   |   |   |   |   |   |   |       |
| 461 |   |   |   |   |           |   |   |   |   |   |   |   |       |
| 462 | Nonparametric Distribution Free UCLs  |   |   |   |           |   |   |   |   |   |   |   |       |
| 463 | 95% CLT UCL   |   |   |   | 6.465     |   |   |   | 95% Jackknife UCL                                   |   |   |   | 6.466 |
| 464 | 95% Standard Bootstrap UCL  |   |   |   | 6.47      |   |   |   | 95% Bootstrap-t UCL                                 |   |   |   | 6.466 |
| 465 | 95% Hall's Bootstrap UCL  |   |   |   | 6.495     |   |   |   | 95% Percentile Bootstrap UCL                        |   |   |   | 6.461 |
| 466 | 95% BCA Bootstrap UCL   |   |   |   | 6.478     |   |   |   |   |   |   |   |       |
| 467 | 90% Chebyshev(Mean, Sd) UCL   |   |   |   | 6.639     |   |   |   | 95% Chebyshev(Mean, Sd) UCL                         |   |   |   | 6.813 |
| 468 | 97.5% Chebyshev(Mean, Sd) UCL   |   |   |   | 7.054     |   |   |   | 99% Chebyshev(Mean, Sd) UCL                         |   |   |   | 7.528 |
| 469 |   |   |   |   |           |   |   |   |   |   |   |   |       |
| 470 | Suggested UCL to Use  |   |   |   |           |   |   |   |   |   |   |   |       |
| 471 | 95% Student's-t UCL   |   |   |   | 6.466     |   |   |   | or 95% Modified-t UCL                               |   |   |   | 6.468 |
| 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 | Copper  |   |   |   |           |   |   |   |   |   |   |   |       |
| 480 |   |   |   |   |           |   |   |   |   |   |   |   |       |
| 481 | General Statistics  |   |   |   |           |   |   |   |   |   |   |   |       |
| 482 | Total Number of Observations  |   |   |   | 148       |   |   |   | Number of Distinct Observations                     |   |   |   | 81    |
| 483 |   |   |   |   |           |   |   |   | Number of Missing Observations                      |   |   |   | 0     |
| 484 | Minimum   |   |   |   | 4         |   |   |   | Mean  |   |   |   | 9.685 |
| 485 | Maximum   |   |   |   | 120       |   |   |   | Median  |   |   |   | 7.95  |
| 486 | SD  |   |   |   | 9.857     |   |   |   | Std. Error of Mean                                  |   |   |   | 0.81  |
| 487 | Coefficient of Variation  |   |   |   | 1.018     |   |   |   | Skewness  |   |   |   | 9.75  |
| 488 |   |   |   |   |           |   |   |   |   |   |   |   |       |
| 489 | Normal GOF Test   |   |   |   |           |   |   |   |   |   |   |   |       |
| 490 | Shapiro Wilk Test Statistic   |   |   |   | 0.339     |   |   |   | Shapiro Wilk GOF Test                               |   |   |   |       |
| 491 | 5% Shapiro Wilk P Value   |   |   |   | 0         |   |   |   | Data Not Normal at 5% Significance Level            |   |   |   |       |
| 492 | Lilliefors Test Statistic   |   |   |   | 0.282     |   |   |   | Lilliefors GOF Test                                 |   |   |   |       |
| 493 | 5% Lilliefors Critical Value  |   |   |   | 0.0728    |   |   |   | Data Not Normal at 5% Significance Level            |   |   |   |       |
| 494 | Data Not Normal at 5% Significance Level  |   |   |   |           |   |   |   |   |   |   |   |       |
| 495 |   |   |   |   |           |   |   |   |   |   |   |   |       |
| 496 | Assuming Normal Distribution  |   |   |   |           |   |   |   |   |   |   |   |       |
| 497 | 95% Normal UCL  |   |   |   |           |   |   |   | 95% UCLs (Adjusted for Skewness)                    |   |   |   |       |
| 498 | 95% Student's-t UCL   |   |   |   | 11.03     |   |   |   | 95% Adjusted-CLT UCL (Chen-1995)                    |   |   |   | 11.71 |
| 499 |   |   |   |   |           |   |   |   | 95% Modified-t UCL (Johnson-1978)                   |   |   |   | 11.13 |
| 500 |   |   |   |   |           |   |   |   |   |   |   |   |       |
| 501 | Gamma GOF Test  |   |   |   |           |   |   |   |   |   |   |   |       |
| 502 | A-D Test Statistic  |   |   |   | 6.757E+28 |   |   |   | Anderson-Darling Gamma GOF Test                     |   |   |   |       |
| 503 | 5% A-D Critical Value   |   |   |   | 0.756     |   |   |   | Data Not Gamma Distributed at 5% Significance Level |   |   |   |       |
| 504 | K-S Test Statistic  |   |   |   | 0.207     |   |   |   | Kolmogrov-Smirnoff Gamma GOF Test                   |   |   |   |       |
| 505 | 5% K-S Critical Value   |   |   |   | 0.0774    |   |   |   | Data Not Gamma Distributed at 5% Significance Level |   |   |   |       |
| 506 | Data Not Gamma Distributed at 5% Significance Level   |   |   |   |           |   |   |   |   |   |   |   |       |
| 507 |   |   |   |   |           |   |   |   |   |   |   |   |       |
| 508 | Gamma Statistics  |   |   |   |           |   |   |   |   |   |   |   |       |
| 509 | k hat (MLE)   |   |   |   | 4.01      |   |   |   | k star (bias corrected MLE)                         |   |   |   | 3.933 |
| 510 | Theta hat (MLE)   |   |   |   | 2.415     |   |   |   | Theta star (bias corrected MLE)                     |   |   |   | 2.463 |
| 511 | nu hat (MLE)  |   |   |   | 1187      |   |   |   | nu star (bias corrected)                            |   |   |   | 1164  |
| 512 | MLE Mean (bias corrected)   |   |   |   | 9.685     |   |   |   | MLE Sd (bias corrected)                             |   |   |   | 4.884 |
| 513 |   |   |   |   |           |   |   |   | Approximate Chi Square Value (0.05)                 |   |   |   | 1086  |
| 514 | Adjusted Level of Significance  |   |   |   | 0.0484    |   |   |   | Adjusted Chi Square Value                           |   |   |   | 1085  |

|     | A   | B | C | D | E | F         | G   | H | I | J | K | L     |
|-----|---|---|---|---|---|-----------|---|---|---|---|---|-------|
| 515 |   |   |   |   |   |           |   |   |   |   |   |       |
| 516 | <b>Assuming Gamma Distribution</b>  |   |   |   |   |           |   |   |   |   |   |       |
| 517 | 95% Approximate Gamma UCL (use when n>=50))   |   |   |   |   | 10.38     | 95% Adjusted Gamma UCL (use when n<50)              |   |   |   |   | 10.39 |
| 518 |   |   |   |   |   |           |   |   |   |   |   |       |
| 519 | <b>Lognormal GOF Test</b>   |   |   |   |   |           |   |   |   |   |   |       |
| 520 | Shapiro Wilk Test Statistic   |   |   |   |   | 0.879     | <b>Shapiro Wilk Lognormal GOF Test</b>              |   |   |   |   |       |
| 521 | 5% Shapiro Wilk P Value   |   |   |   |   | 0         | Data Not Lognormal at 5% Significance Level         |   |   |   |   |       |
| 522 | Lilliefors Test Statistic   |   |   |   |   | 0.155     | <b>Lilliefors Lognormal GOF Test</b>                |   |   |   |   |       |
| 523 | 5% Lilliefors Critical Value  |   |   |   |   | 0.0728    | Data Not Lognormal at 5% Significance Level         |   |   |   |   |       |
| 524 | <b>Data Not Lognormal at 5% Significance Level</b>  |   |   |   |   |           |   |   |   |   |   |       |
| 525 |   |   |   |   |   |           |   |   |   |   |   |       |
| 526 | <b>Lognormal Statistics</b>   |   |   |   |   |           |   |   |   |   |   |       |
| 527 | Minimum of Logged Data  |   |   |   |   | 1.386     | Mean of logged Data                                 |   |   |   |   | 2.141 |
| 528 | Maximum of Logged Data  |   |   |   |   | 4.787     | SD of logged Data                                   |   |   |   |   | 0.414 |
| 529 |   |   |   |   |   |           |   |   |   |   |   |       |
| 530 | <b>Assuming Lognormal Distribution</b>  |   |   |   |   |           |   |   |   |   |   |       |
| 531 | 95% H-UCL   |   |   |   |   | 9.847     | 90% Chebyshev (MVUE) UCL                            |   |   |   |   | 10.24 |
| 532 | 95% Chebyshev (MVUE) UCL  |   |   |   |   | 10.69     | 97.5% Chebyshev (MVUE) UCL                          |   |   |   |   | 11.3  |
| 533 | 99% Chebyshev (MVUE) UCL  |   |   |   |   | 12.52     |   |   |   |   |   |       |
| 534 |   |   |   |   |   |           |   |   |   |   |   |       |
| 535 | <b>Nonparametric Distribution Free UCL Statistics</b>   |   |   |   |   |           |   |   |   |   |   |       |
| 536 | <b>Data do not follow a Discernible Distribution (0.05)</b>   |   |   |   |   |           |   |   |   |   |   |       |
| 537 |   |   |   |   |   |           |   |   |   |   |   |       |
| 538 | <b>Nonparametric Distribution Free UCLs</b>   |   |   |   |   |           |   |   |   |   |   |       |
| 539 | 95% CLT UCL   |   |   |   |   | 11.02     | 95% Jackknife UCL                                   |   |   |   |   | 11.03 |
| 540 | 95% Standard Bootstrap UCL  |   |   |   |   | 11.04     | 95% Bootstrap-t UCL                                 |   |   |   |   | 12.85 |
| 541 | 95% Hall's Bootstrap UCL  |   |   |   |   | 16.39     | 95% Percentile Bootstrap UCL                        |   |   |   |   | 11.07 |
| 542 | 95% BCA Bootstrap UCL   |   |   |   |   | 11.95     |   |   |   |   |   |       |
| 543 | 90% Chebyshev(Mean, Sd) UCL   |   |   |   |   | 12.12     | 95% Chebyshev(Mean, Sd) UCL                         |   |   |   |   | 13.22 |
| 544 | 97.5% Chebyshev(Mean, Sd) UCL   |   |   |   |   | 14.74     | 99% Chebyshev(Mean, Sd) UCL                         |   |   |   |   | 17.75 |
| 545 |   |   |   |   |   |           |   |   |   |   |   |       |
| 546 | <b>Suggested UCL to Use</b>   |   |   |   |   |           |   |   |   |   |   |       |
| 547 | 95% Student's-t UCL   |   |   |   |   | 11.03     | or 95% Modified-t UCL                               |   |   |   |   | 11.13 |
| 548 |   |   |   |   |   |           |   |   |   |   |   |       |
| 549 | Note: Suggestions regarding the selection of a 95% UCL are provided to help the user to select the most appropriate 95% UCL |   |   |   |   |           |   |   |   |   |   |       |
| 550 | These recommendations are based upon the results of the simulation studies summarized in Singh, Singh, and Iaci (2002',     |   |   |   |   |           |   |   |   |   |   |       |
| 551 | and Singh and Singh (2003). However, simulations results will not cover all Real World data sets                            |   |   |   |   |           |   |   |   |   |   |       |
| 552 | For additional insight the user may want to consult a statistician.   |   |   |   |   |           |   |   |   |   |   |       |
| 553 |   |   |   |   |   |           |   |   |   |   |   |       |
| 554 | Lead  |   |   |   |   |           |   |   |   |   |   |       |
| 555 |   |   |   |   |   |           |   |   |   |   |   |       |
| 556 | <b>General Statistics</b>   |   |   |   |   |           |   |   |   |   |   |       |
| 557 | Total Number of Observations  |   |   |   |   | 148       | Number of Distinct Observations                     |   |   |   |   | 83    |
| 558 |   |   |   |   |   |           | Number of Missing Observations                      |   |   |   |   | 0     |
| 559 | Minimum   |   |   |   |   | 5.6       | Mean  |   |   |   |   | 15.74 |
| 560 | Maximum   |   |   |   |   | 45.5      | Median  |   |   |   |   | 15.15 |
| 561 | SD  |   |   |   |   | 4.422     | Std. Error of Mean                                  |   |   |   |   | 0.364 |
| 562 | Coefficient of Variation  |   |   |   |   | 0.281     | Skewness  |   |   |   |   | 2.809 |
| 563 |   |   |   |   |   |           |   |   |   |   |   |       |
| 564 | <b>Normal GOF Test</b>  |   |   |   |   |           |   |   |   |   |   |       |
| 565 | Shapiro Wilk Test Statistic   |   |   |   |   | 0.82      | <b>Shapiro Wilk GOF Test</b>                        |   |   |   |   |       |
| 566 | 5% Shapiro Wilk P Value   |   |   |   |   | 0         | Data Not Normal at 5% Significance Level            |   |   |   |   |       |
| 567 | Lilliefors Test Statistic   |   |   |   |   | 0.162     | <b>Lilliefors GOF Test</b>                          |   |   |   |   |       |
| 568 | 5% Lilliefors Critical Value  |   |   |   |   | 0.0728    | Data Not Normal at 5% Significance Level            |   |   |   |   |       |
| 569 | <b>Data Not Normal at 5% Significance Level</b>   |   |   |   |   |           |   |   |   |   |   |       |
| 570 |   |   |   |   |   |           |   |   |   |   |   |       |
| 571 | <b>Assuming Normal Distribution</b>   |   |   |   |   |           |   |   |   |   |   |       |
| 572 | <b>95% Normal UCL</b>   |   |   |   |   |           | <b>95% UCLs (Adjusted for Skewness)</b>             |   |   |   |   |       |
| 573 | 95% Student's-t UCL   |   |   |   |   | 16.34     | 95% Adjusted-CLT UCL (Chen-1995)                    |   |   |   |   | 16.42 |
| 574 |   |   |   |   |   |           | 95% Modified-t UCL (Johnson-1978)                   |   |   |   |   | 16.35 |
| 575 |   |   |   |   |   |           |   |   |   |   |   |       |
| 576 | <b>Gamma GOF Test</b>   |   |   |   |   |           |   |   |   |   |   |       |
| 577 | A-D Test Statistic  |   |   |   |   | 2.679     | <b>Anderson-Darling Gamma GOF Test</b>              |   |   |   |   |       |
| 578 | 5% A-D Critical Value   |   |   |   |   | 0.751     | Data Not Gamma Distributed at 5% Significance Level |   |   |   |   |       |
| 579 | K-S Test Statistic  |   |   |   |   | 0.121     | <b>Kolmogrov-Smirnoff Gamma GOF Test</b>            |   |   |   |   |       |
| 580 | 5% K-S Critical Value   |   |   |   |   | 0.0769    | Data Not Gamma Distributed at 5% Significance Level |   |   |   |   |       |
| 581 | <b>Data Not Gamma Distributed at 5% Significance Level</b>  |   |   |   |   |           |   |   |   |   |   |       |
| 582 |   |   |   |   |   |           |   |   |   |   |   |       |
| 583 | <b>Gamma Statistics</b>   |   |   |   |   |           |   |   |   |   |   |       |
| 584 | k hat (MLE)   |   |   |   |   | 15.8      | k star (bias corrected MLE)                         |   |   |   |   | 15.49 |
| 585 | Theta hat (MLE)   |   |   |   |   | 0.996     | Theta star (bias corrected MLE)                     |   |   |   |   | 1.016 |
| 586 | nu hat (MLE)  |   |   |   |   | 4678      | nu star (bias corrected)                            |   |   |   |   | 4584  |
| 587 | MLE Mean (bias corrected)   |   |   |   |   | 15.74     | MLE Sd (bias corrected)                             |   |   |   |   | 3.998 |
| 588 |   |   |   |   |   |           | Approximate Chi Square Value (0.05)                 |   |   |   |   | 4428  |
| 589 | Adjusted Level of Significance  |   |   |   |   | 0.0484    | Adjusted Chi Square Value                           |   |   |   |   | 4426  |
| 590 |   |   |   |   |   |           |   |   |   |   |   |       |
| 591 | <b>Assuming Gamma Distribution</b>  |   |   |   |   |           |   |   |   |   |   |       |
| 592 | 95% Approximate Gamma UCL (use when n>=50))   |   |   |   |   | 16.29     | 95% Adjusted Gamma UCL (use when n<50)              |   |   |   |   | 16.3  |
| 593 |   |   |   |   |   |           |   |   |   |   |   |       |
| 594 | <b>Lognormal GOF Test</b>   |   |   |   |   |           |   |   |   |   |   |       |
| 595 | Shapiro Wilk Test Statistic   |   |   |   |   | 0.954     | <b>Shapiro Wilk Lognormal GOF Test</b>              |   |   |   |   |       |
| 596 | 5% Shapiro Wilk P Value   |   |   |   |   | 3.9484E-4 | Data Not Lognormal at 5% Significance Level         |   |   |   |   |       |
| 597 | Lilliefors Test Statistic   |   |   |   |   | 0.106     | <b>Lilliefors Lognormal GOF Test</b>                |   |   |   |   |       |
| 598 | 5% Lilliefors Critical Value  |   |   |   |   | 0.0728    | Data Not Lognormal at 5% Significance Level         |   |   |   |   |       |
| 599 | <b>Data Not Lognormal at 5% Significance Level</b>  |   |   |   |   |           |   |   |   |   |   |       |

|     |   |   |   |   |   |           |   |   |   |   |   |       |
|-----|---|---|---|---|---|-----------|---|---|---|---|---|-------|
|     | A   | B | C | D | E | F         | G   | H | I | J | K | L     |
| 600 |   |   |   |   |   |           |   |   |   |   |   |       |
| 601 | Lognormal Statistics  |   |   |   |   |           |   |   |   |   |   |       |
| 602 | Minimum of Logged Data  |   |   |   |   | 1.723     | Mean of logged Data   |   |   |   |   | 2.724 |
| 603 | Maximum of Logged Data  |   |   |   |   | 3.818     | SD of logged Data   |   |   |   |   | 0.248 |
| 604 |   |   |   |   |   |           |   |   |   |   |   |       |
| 605 | Assuming Lognormal Distribution   |   |   |   |   |           |   |   |   |   |   |       |
| 606 | 95% H-UCL   |   |   |   |   | 16.28     | 90% Chebyshev (MVUE) UCL  |   |   |   |   | 16.69 |
| 607 | 95% Chebyshev (MVUE) UCL  |   |   |   |   | 17.13     | 97.5% Chebyshev (MVUE) UCL                                      |   |   |   |   | 17.75 |
| 608 | 99% Chebyshev (MVUE) UCL  |   |   |   |   | 18.95     |   |   |   |   |   |       |
| 609 |   |   |   |   |   |           |   |   |   |   |   |       |
| 610 | Nonparametric Distribution Free UCL Statistics  |   |   |   |   |           |   |   |   |   |   |       |
| 611 | Data do not follow a Discernible Distribution (0.05)  |   |   |   |   |           |   |   |   |   |   |       |
| 612 |   |   |   |   |   |           |   |   |   |   |   |       |
| 613 | Nonparametric Distribution Free UCLs  |   |   |   |   |           |   |   |   |   |   |       |
| 614 | 95% CLT UCL   |   |   |   |   | 16.33     | 95% Jackknife UCL   |   |   |   |   | 16.34 |
| 615 | 95% Standard Bootstrap UCL  |   |   |   |   | 16.33     | 95% Bootstrap-t UCL   |   |   |   |   | 16.45 |
| 616 | 95% Hall's Bootstrap UCL  |   |   |   |   | 16.57     | 95% Percentile Bootstrap UCL                                    |   |   |   |   | 16.37 |
| 617 | 95% BCA Bootstrap UCL   |   |   |   |   | 16.45     |   |   |   |   |   |       |
| 618 | 90% Chebyshev(Mean, Sd) UCL   |   |   |   |   | 16.83     | 95% Chebyshev(Mean, Sd) UCL                                     |   |   |   |   | 17.32 |
| 619 | 97.5% Chebyshev(Mean, Sd) UCL   |   |   |   |   | 18.01     | 99% Chebyshev(Mean, Sd) UCL                                     |   |   |   |   | 19.35 |
| 620 |   |   |   |   |   |           |   |   |   |   |   |       |
| 621 | Suggested UCL to Use  |   |   |   |   |           |   |   |   |   |   |       |
| 622 | 95% Student's-t UCL   |   |   |   |   | 16.34     | or 95% Modified-t UCL   |   |   |   |   | 16.35 |
| 623 |   |   |   |   |   |           |   |   |   |   |   |       |
| 624 | Note: Suggestions regarding the selection of a 95% UCL are provided to help the user to select the most appropriate 95% UCL |   |   |   |   |           |   |   |   |   |   |       |
| 625 | These recommendations are based upon the results of the simulation studies summarized in Singh, Singh, and Iaci (2002)      |   |   |   |   |           |   |   |   |   |   |       |
| 626 | and Singh and Singh (2003). However, simulations results will not cover all Real World data sets                            |   |   |   |   |           |   |   |   |   |   |       |
| 627 | For additional insight the user may want to consult a statistician.   |   |   |   |   |           |   |   |   |   |   |       |
| 628 |   |   |   |   |   |           |   |   |   |   |   |       |
| 629 |   |   |   |   |   |           |   |   |   |   |   |       |
| 630 | Nickel  |   |   |   |   |           |   |   |   |   |   |       |
| 631 |   |   |   |   |   |           |   |   |   |   |   |       |
| 632 | General Statistics  |   |   |   |   |           |   |   |   |   |   |       |
| 633 | Total Number of Observations  |   |   |   |   | 148       | Number of Distinct Observations                                 |   |   |   |   | 64    |
| 634 |   |   |   |   |   |           | Number of Missing Observations                                  |   |   |   |   | 0     |
| 635 | Minimum   |   |   |   |   | 4.9       | Mean  |   |   |   |   | 8.767 |
| 636 | Maximum   |   |   |   |   | 19.6      | Median  |   |   |   |   | 8.65  |
| 637 | SD  |   |   |   |   | 1.867     | Std. Error of Mean  |   |   |   |   | 0.153 |
| 638 | Coefficient of Variation  |   |   |   |   | 0.213     | Skewness  |   |   |   |   | 1.465 |
| 639 |   |   |   |   |   |           |   |   |   |   |   |       |
| 640 | Normal GOF Test   |   |   |   |   |           |   |   |   |   |   |       |
| 641 | Shapiro Wilk Test Statistic   |   |   |   |   | 0.932     | Shapiro Wilk GOF Test   |   |   |   |   |       |
| 642 | 5% Shapiro Wilk P Value   |   |   |   |   | 4.2120E-8 | Data Not Normal at 5% Significance Level                        |   |   |   |   |       |
| 643 | Lilliefors Test Statistic   |   |   |   |   | 0.0976    | Lilliefors GOF Test   |   |   |   |   |       |
| 644 | 5% Lilliefors Critical Value  |   |   |   |   | 0.0728    | Data Not Normal at 5% Significance Level                        |   |   |   |   |       |
| 645 | Data Not Normal at 5% Significance Level  |   |   |   |   |           |   |   |   |   |   |       |
| 646 |   |   |   |   |   |           |   |   |   |   |   |       |
| 647 | Assuming Normal Distribution  |   |   |   |   |           |   |   |   |   |   |       |
| 648 | 95% Normal UCL  |   |   |   |   |           | 95% UCLs (Adjusted for Skewness)                                |   |   |   |   |       |
| 649 | 95% Student's-t UCL   |   |   |   |   | 9.021     | 95% Adjusted-CLT UCL (Chen-1995)                                |   |   |   |   | 9.04  |
| 650 |   |   |   |   |   |           | 95% Modified-t UCL (Johnson-1978)                               |   |   |   |   | 9.024 |
| 651 |   |   |   |   |   |           |   |   |   |   |   |       |
| 652 | Gamma GOF Test  |   |   |   |   |           |   |   |   |   |   |       |
| 653 | A-D Test Statistic  |   |   |   |   | 0.826     | Anderson-Darling Gamma GOF Test                                 |   |   |   |   |       |
| 654 | 5% A-D Critical Value   |   |   |   |   | 0.75      | Data Not Gamma Distributed at 5% Significance Level             |   |   |   |   |       |
| 655 | K-S Test Statistic  |   |   |   |   | 0.0691    | Kolmogrov-Smirnoff Gamma GOF Test                               |   |   |   |   |       |
| 656 | 5% K-S Critical Value   |   |   |   |   | 0.0769    | Detected data appear Gamma Distributed at 5% Significance Level |   |   |   |   |       |
| 657 | Detected data follow Appr. Gamma Distribution at 5% Significance Level  |   |   |   |   |           |   |   |   |   |   |       |
| 658 |   |   |   |   |   |           |   |   |   |   |   |       |
| 659 | Gamma Statistics  |   |   |   |   |           |   |   |   |   |   |       |
| 660 | k hat (MLE)   |   |   |   |   | 24.02     | k star (bias corrected MLE)                                     |   |   |   |   | 23.54 |
| 661 | Theta hat (MLE)   |   |   |   |   | 0.365     | Theta star (bias corrected MLE)                                 |   |   |   |   | 0.372 |
| 662 | nu hat (MLE)  |   |   |   |   | 7110      | nu star (bias corrected)  |   |   |   |   | 6967  |
| 663 | MLE Mean (bias corrected)   |   |   |   |   | 8.767     | MLE Sd (bias corrected)   |   |   |   |   | 1.807 |
| 664 |   |   |   |   |   |           | Approximate Chi Square Value (0.05)                             |   |   |   |   | 6774  |
| 665 | Adjusted Level of Significance  |   |   |   |   | 0.0484    | Adjusted Chi Square Value                                       |   |   |   |   | 6772  |
| 666 |   |   |   |   |   |           |   |   |   |   |   |       |
| 667 | Assuming Gamma Distribution   |   |   |   |   |           |   |   |   |   |   |       |
| 668 | 95% Approximate Gamma UCL (use when n>=50)  |   |   |   |   | 9.017     | 95% Adjusted Gamma UCL (use when n<50)                          |   |   |   |   | 9.02  |
| 669 |   |   |   |   |   |           |   |   |   |   |   |       |
| 670 | Lognormal GOF Test  |   |   |   |   |           |   |   |   |   |   |       |
| 671 | Shapiro Wilk Test Statistic   |   |   |   |   | 0.978     | Shapiro Wilk Lognormal GOF Test                                 |   |   |   |   |       |
| 672 | 5% Shapiro Wilk P Value   |   |   |   |   | 0.296     | Data appear Lognormal at 5% Significance Level                  |   |   |   |   |       |
| 673 | Lilliefors Test Statistic   |   |   |   |   | 0.0703    | Lilliefors Lognormal GOF Test                                   |   |   |   |   |       |
| 674 | 5% Lilliefors Critical Value  |   |   |   |   | 0.0728    | Data appear Lognormal at 5% Significance Level                  |   |   |   |   |       |
| 675 | Data appear Lognormal at 5% Significance Level  |   |   |   |   |           |   |   |   |   |   |       |
| 676 |   |   |   |   |   |           |   |   |   |   |   |       |
| 677 | Lognormal Statistics  |   |   |   |   |           |   |   |   |   |   |       |



|     |                   |   |   |   |  |          |   |   |   |   |  |         |
|-----|-------------------|---|---|---|--|----------|---|---|---|---|--|---------|
|     | A                 | B | C | D | E  | F        | G | H | I | J | K  | L       |
| 678 |                   |   |   |   | Minimum of Logged Data   | 1.589    |   |   |   |   | Mean of logged Data  | 2.15    |
| 679 |                   |   |   |   | Maximum of Logged Data   | 2.976    |   |   |   |   | SD of logged Data  | 0.204   |
| 680 |                   |   |   |   |  |          |   |   |   |   |  |         |
| 681 |                   |   |   |   | Assuming Lognormal Distribution  |          |   |   |   |   |  |         |
| 682 |                   |   |   |   | 95% H-UCL  | 9.021    |   |   |   |   | 90% Chebyshev (MVUE) UCL                                     | 9.211   |
| 683 |                   |   |   |   | 95% Chebyshev (MVUE) UCL   | 9.414    |   |   |   |   | 97.5% Chebyshev (MVUE) UCL                                   | 9.694   |
| 684 |                   |   |   |   | 99% Chebyshev (MVUE) UCL   | 10.24    |   |   |   |   |  |         |
| 685 |                   |   |   |   |  |          |   |   |   |   |  |         |
| 686 |                   |   |   |   | Nonparametric Distribution Free UCL Statistics   |          |   |   |   |   |  |         |
| 687 |                   |   |   |   | Data appear to follow a Discernible Distribution at 5% Significance Level  |          |   |   |   |   |  |         |
| 688 |                   |   |   |   |  |          |   |   |   |   |  |         |
| 689 |                   |   |   |   | Nonparametric Distribution Free UCLs   |          |   |   |   |   |  |         |
| 690 |                   |   |   |   | 95% CLT UCL  | 9.02     |   |   |   |   | 95% Jackknife UCL  | 9.021   |
| 691 |                   |   |   |   | 95% Standard Bootstrap UCL   | 9.022    |   |   |   |   | 95% Bootstrap-t UCL  | 9.034   |
| 692 |                   |   |   |   | 95% Hall's Bootstrap UCL   | 9.067    |   |   |   |   | 95% Percentile Bootstrap UCL                                 | 9.022   |
| 693 |                   |   |   |   | 95% BCA Bootstrap UCL  | 9.031    |   |   |   |   |  |         |
| 694 |                   |   |   |   | 90% Chebyshev(Mean, Sd) UCL  | 9.228    |   |   |   |   | 95% Chebyshev(Mean, Sd) UCL                                  | 9.436   |
| 695 |                   |   |   |   | 97.5% Chebyshev(Mean, Sd) UCL  | 9.726    |   |   |   |   | 99% Chebyshev(Mean, Sd) UCL                                  | 10.29   |
| 696 |                   |   |   |   |  |          |   |   |   |   |  |         |
| 697 |                   |   |   |   | Suggested UCL to Use   |          |   |   |   |   |  |         |
| 698 |                   |   |   |   | 95% Approximate Gamma UCL  | 9.017    |   |   |   |   |  |         |
| 699 |                   |   |   |   |  |          |   |   |   |   |  |         |
| 700 |                   |   |   |   | Note: Suggestions regarding the selection of a 95% UCL are provided to help the user to select the most appropriate 95% UCL. |          |   |   |   |   |  |         |
| 701 |                   |   |   |   | These recommendations are based upon the results of the simulation studies summarized in Singh, Singh, and Iaci (2002)       |          |   |   |   |   |  |         |
| 702 |                   |   |   |   | and Singh and Singh (2003). However, simulations results will not cover all Real World data sets.                            |          |   |   |   |   |  |         |
| 703 |                   |   |   |   | For additional insight the user may want to consult a statistician.  |          |   |   |   |   |  |         |
| 704 |                   |   |   |   |  |          |   |   |   |   |  |         |
| 705 |                   |   |   |   |  |          |   |   |   |   |  |         |
| 706 | Plutonium-239/240 |   |   |   |  |          |   |   |   |   |  |         |
| 707 |                   |   |   |   |  |          |   |   |   |   |  |         |
| 708 |                   |   |   |   | General Statistics   |          |   |   |   |   |  |         |
| 709 |                   |   |   |   | Total Number of Observations   | 148      |   |   |   |   | Number of Distinct Observations                              | 109     |
| 710 |                   |   |   |   | Number of Detects  | 31       |   |   |   |   | Number of Non-Detects  | 117     |
| 711 |                   |   |   |   | Number of Distinct Detects   | 27       |   |   |   |   | Number of Distinct Non-Detects                               | 86      |
| 712 |                   |   |   |   | Minimum Detect   | 0.011    |   |   |   |   | Minimum Non-Detect   | -0.0319 |
| 713 |                   |   |   |   | Maximum Detect   | 0.998    |   |   |   |   | Maximum Non-Detect   | 0.04    |
| 714 |                   |   |   |   | Variance Detects   | 0.0303   |   |   |   |   | Percent Non-Detects  | 79.05%  |
| 715 |                   |   |   |   | Mean Detects   | 0.0859   |   |   |   |   | SD Detects   | 0.174   |
| 716 |                   |   |   |   | Median Detects   | 0.048    |   |   |   |   | CV Detects   | 2.027   |
| 717 |                   |   |   |   | Skewness Detects   | 5.098    |   |   |   |   | Kurtosis Detects   | 27.32   |
| 718 |                   |   |   |   |  |          |   |   |   |   |  |         |
| 719 |                   |   |   |   | Normal GOF Test on Detects Only  |          |   |   |   |   |  |         |
| 720 |                   |   |   |   | Shapiro Wilk Test Statistic  | 0.373    |   |   |   |   | Shapiro Wilk GOF Test  |         |
| 721 |                   |   |   |   | 5% Shapiro Wilk Critical Value   | 0.929    |   |   |   |   | Detected Data Not Normal at 5% Significance Level            |         |
| 722 |                   |   |   |   | Lilliefors Test Statistic  | 0.333    |   |   |   |   | Lilliefors GOF Test  |         |
| 723 |                   |   |   |   | 5% Lilliefors Critical Value   | 0.159    |   |   |   |   | Detected Data Not Normal at 5% Significance Level            |         |
| 724 |                   |   |   |   | Detected Data Not Normal at 5% Significance Level  |          |   |   |   |   |  |         |
| 725 |                   |   |   |   |  |          |   |   |   |   |  |         |
| 726 |                   |   |   |   | Kaplan-Meier (KM) Statistics using Normal Critical Values and other Nonparametric UCLs                                       |          |   |   |   |   |  |         |
| 727 |                   |   |   |   | Mean   | -0.00611 |   |   |   |   | Standard Error of Mean                                       | 0.00771 |
| 728 |                   |   |   |   | SD   | 0.0919   |   |   |   |   | 95% KM (BCA) UCL   | 0.018   |
| 729 |                   |   |   |   | 95% KM (t) UCL   | 0.00665  |   |   |   |   | 95% KM (Percentile Bootstrap) UCL                            | 0.0117  |
| 730 |                   |   |   |   | 95% KM (z) UCL   | 0.00657  |   |   |   |   | 95% KM Bootstrap t UCL                                       | 0.019   |
| 731 |                   |   |   |   | 90% KM Chebyshev UCL   | 0.017    |   |   |   |   | 95% KM Chebyshev UCL   | 0.0275  |
| 732 |                   |   |   |   | 97.5% KM Chebyshev UCL   | 0.042    |   |   |   |   | 99% KM Chebyshev UCL   | 0.0706  |
| 733 |                   |   |   |   |  |          |   |   |   |   |  |         |
| 734 |                   |   |   |   | Gamma GOF Tests on Detected Observations Only  |          |   |   |   |   |  |         |
| 735 |                   |   |   |   | A-D Test Statistic   | 1.638    |   |   |   |   | Anderson-Darling GOF Test                                    |         |
| 736 |                   |   |   |   | 5% A-D Critical Value  | 0.779    |   |   |   |   | Detected Data Not Gamma Distributed at 5% Significance Level |         |
| 737 |                   |   |   |   | K-S Test Statistic   | 0.19     |   |   |   |   | Kolmogrov-Smirnoff GOF                                       |         |
| 738 |                   |   |   |   | 5% K-S Critical Value  | 0.163    |   |   |   |   | Detected Data Not Gamma Distributed at 5% Significance Level |         |
| 739 |                   |   |   |   | Detected Data Not Gamma Distributed at 5% Significance Level   |          |   |   |   |   |  |         |
| 740 |                   |   |   |   |  |          |   |   |   |   |  |         |
| 741 |                   |   |   |   | Gamma Statistics on Detected Data Only   |          |   |   |   |   |  |         |
| 742 |                   |   |   |   | k hat (MLE)  | 0.934    |   |   |   |   | k star (bias corrected MLE)                                  | 0.865   |
| 743 |                   |   |   |   | Theta hat (MLE)  | 0.092    |   |   |   |   | Theta star (bias corrected MLE)                              | 0.0993  |
| 744 |                   |   |   |   | nu hat (MLE)   | 57.93    |   |   |   |   | nu star (bias corrected)                                     | 53.66   |
| 745 |                   |   |   |   | MLE Mean (bias corrected)  | 0.0859   |   |   |   |   | MLE Sd (bias corrected)                                      | 0.0924  |
| 746 |                   |   |   |   |  |          |   |   |   |   |  |         |
| 747 |                   |   |   |   | Gamma Kaplan-Meier (KM) Statistics   |          |   |   |   |   |  |         |
| 748 |                   |   |   |   | k hat (KM)   | 0.00442  |   |   |   |   | nu hat (KM)  | 1.308   |
| 749 |                   |   |   |   |  |          |   |   |   |   | Adjusted Level of Significance (β)                           | 0.0484  |
| 750 |                   |   |   |   | Approximate Chi Square Value (1.31, α)   | 0.124    |   |   |   |   | Adjusted Chi Square Value (1.31, β)                          | 0.124   |
| 751 |                   |   |   |   | 95% Gamma Approximate KM-UCL (use when n>=50)  | -0.0645  |   |   |   |   | 95% Gamma Adjusted KM-UCL (use when n<50)                    | -0.0643 |

|     |   |   |   |   |           |   |  |   |   |   |        |   |
|-----|---|---|---|---|-----------|---|--|---|---|---|--------|---|
|     | A   | B | C | D | E         | F | G  | H | I | J | K      | L |
| 752 | Gamma (KM) may not be used when k hat (KM) is < 0.1   |   |   |   |           |   |  |   |   |   |        |   |
| 753 |   |   |   |   |           |   |  |   |   |   |        |   |
| 754 | DL/2 Statistics   |   |   |   |           |   |  |   |   |   |        |   |
| 755 | Mean in Original Scale  |   |   |   | 0.0214    |   | SD in Original Scale   |   |   |   | 0.0856 |   |
| 756 | 95% t UCL (Assumes normality)   |   |   |   | 0.0331    |   |  |   |   |   |        |   |
| 757 | DL/2 is not a recommended method, provided for comparisons and historical reasons   |   |   |   |           |   |  |   |   |   |        |   |
| 758 |   |   |   |   |           |   |  |   |   |   |        |   |
| 759 | Nonparametric Distribution Free UCL Statistics  |   |   |   |           |   |  |   |   |   |        |   |
| 760 | Data do not follow a Discernible Distribution at 5% Significance Level  |   |   |   |           |   |  |   |   |   |        |   |
| 761 |   |   |   |   |           |   |  |   |   |   |        |   |
| 762 | Suggested UCL to Use  |   |   |   |           |   |  |   |   |   |        |   |
| 763 | 97.5% KM (Chebyshev) UCL  |   |   |   | 0.042     |   |  |   |   |   |        |   |
| 764 |   |   |   |   |           |   |  |   |   |   |        |   |
| 765 | Note: Suggestions regarding the selection of a 95% UCL are provided to help the user to select the most appropriate 95% UCL.              |   |   |   |           |   |  |   |   |   |        |   |
| 766 | Recommendations are based upon data size, data distribution, and skewness.  |   |   |   |           |   |  |   |   |   |        |   |
| 767 | These recommendations are based upon the results of the simulation studies summarized in Singh, Maichle, and Lee (2006).                  |   |   |   |           |   |  |   |   |   |        |   |
| 768 | However, simulations results will not cover all Real World data sets; for additional insight the user may want to consult a statistician. |   |   |   |           |   |  |   |   |   |        |   |
| 769 |   |   |   |   |           |   |  |   |   |   |        |   |
| 770 | Selenium  |   |   |   |           |   |  |   |   |   |        |   |
| 771 |   |   |   |   |           |   |  |   |   |   |        |   |
| 772 | General Statistics  |   |   |   |           |   |  |   |   |   |        |   |
| 773 | Total Number of Observations  |   |   |   | 148       |   | Number of Distinct Observations                              |   |   |   | 37     |   |
| 774 | Number of Detects   |   |   |   | 126       |   | Number of Non-Detects  |   |   |   | 22     |   |
| 775 | Number of Distinct Detects  |   |   |   | 26        |   | Number of Distinct Non-Detects                               |   |   |   | 15     |   |
| 776 | Minimum Detect  |   |   |   | 0.67      |   | Minimum Non-Detect   |   |   |   | 0.22   |   |
| 777 | Maximum Detect  |   |   |   | 1.9       |   | Maximum Non-Detect   |   |   |   | 1.2    |   |
| 778 | Variance Detects  |   |   |   | 0.0414    |   | Percent Non-Detects  |   |   |   | 14.86% |   |
| 779 | Mean Detects  |   |   |   | 1.135     |   | SD Detects   |   |   |   | 0.203  |   |
| 780 | Median Detects  |   |   |   | 1.1       |   | CV Detects   |   |   |   | 0.179  |   |
| 781 | Skewness Detects  |   |   |   | 0.662     |   | Kurtosis Detects   |   |   |   | 1.841  |   |
| 782 | Mean of Logged Detects  |   |   |   | 0.111     |   | SD of Logged Detects   |   |   |   | 0.178  |   |
| 783 |   |   |   |   |           |   |  |   |   |   |        |   |
| 784 | Normal GOF Test on Detects Only   |   |   |   |           |   |  |   |   |   |        |   |
| 785 | Shapiro Wilk Test Statistic   |   |   |   | 0.95      |   | Normal GOF Test on Detected Observations Only                |   |   |   |        |   |
| 786 | 5% Shapiro Wilk P Value   |   |   |   | 4.1380E-4 |   | Detected Data Not Normal at 5% Significance Level            |   |   |   |        |   |
| 787 | Lilliefors Test Statistic   |   |   |   | 0.128     |   | Lilliefors GOF Test  |   |   |   |        |   |
| 788 | 5% Lilliefors Critical Value  |   |   |   | 0.0789    |   | Detected Data Not Normal at 5% Significance Level            |   |   |   |        |   |
| 789 | Detected Data Not Normal at 5% Significance Level   |   |   |   |           |   |  |   |   |   |        |   |
| 790 |   |   |   |   |           |   |  |   |   |   |        |   |
| 791 | Kaplan-Meier (KM) Statistics using Normal Critical Values and other Nonparametric UCLs  |   |   |   |           |   |  |   |   |   |        |   |
| 792 | Mean  |   |   |   | 1.045     |   | Standard Error of Mean                                       |   |   |   | 0.0317 |   |
| 793 | SD  |   |   |   | 0.305     |   | 95% KM (BCA) UCL   |   |   |   | 1.105  |   |
| 794 | 95% KM (t) UCL  |   |   |   | 1.097     |   | 95% KM (Percentile Bootstrap) UCL                            |   |   |   | 1.1    |   |
| 795 | 95% KM (z) UCL  |   |   |   | 1.097     |   | 95% KM Bootstrap t UCL                                       |   |   |   | 1.1    |   |
| 796 | 90% KM Chebyshev UCL  |   |   |   | 1.14      |   | 95% KM Chebyshev UCL   |   |   |   | 1.183  |   |
| 797 | 97.5% KM Chebyshev UCL  |   |   |   | 1.243     |   | 99% KM Chebyshev UCL   |   |   |   | 1.36   |   |
| 798 |   |   |   |   |           |   |  |   |   |   |        |   |
| 799 | Gamma GOF Tests on Detected Observations Only   |   |   |   |           |   |  |   |   |   |        |   |
| 800 | A-D Test Statistic  |   |   |   | 1.427     |   | Anderson-Darling GOF Test                                    |   |   |   |        |   |
| 801 | 5% A-D Critical Value   |   |   |   | 0.75      |   | Detected Data Not Gamma Distributed at 5% Significance Level |   |   |   |        |   |
| 802 | K-S Test Statistic  |   |   |   | 0.131     |   | Kolmogrov-Smirnoff GOF                                       |   |   |   |        |   |
| 803 | 5% K-S Critical Value   |   |   |   | 0.0825    |   | Detected Data Not Gamma Distributed at 5% Significance Level |   |   |   |        |   |
| 804 | Detected Data Not Gamma Distributed at 5% Significance Level  |   |   |   |           |   |  |   |   |   |        |   |
| 805 |   |   |   |   |           |   |  |   |   |   |        |   |
| 806 | Gamma Statistics on Detected Data Only  |   |   |   |           |   |  |   |   |   |        |   |
| 807 | k hat (MLE)   |   |   |   | 32.08     |   | k star (bias corrected MLE)                                  |   |   |   | 31.32  |   |
| 808 | Theta hat (MLE)   |   |   |   | 0.0354    |   | Theta star (bias corrected MLE)                              |   |   |   | 0.0362 |   |
| 809 | nu hat (MLE)  |   |   |   | 8085      |   | nu star (bias corrected)                                     |   |   |   | 7894   |   |
| 810 | MLE Mean (bias corrected)   |   |   |   | 1.135     |   | MLE Sd (bias corrected)                                      |   |   |   | 0.203  |   |
| 811 |   |   |   |   |           |   |  |   |   |   |        |   |
| 812 | Gamma Kaplan-Meier (KM) Statistics  |   |   |   |           |   |  |   |   |   |        |   |
| 813 | k hat (KM)  |   |   |   | 11.74     |   | nu hat (KM)  |   |   |   | 3476   |   |
| 814 | Approximate Chi Square Value (N/A, $\alpha$ )   |   |   |   | 3340      |   | Adjusted Chi Square Value (N/A, $\beta$ )                    |   |   |   | 3339   |   |
| 815 | 95% Gamma Approximate KM-UCL (use when n>=50)   |   |   |   | 1.087     |   | 95% Gamma Adjusted KM-UCL (use when n<50)                    |   |   |   | 1.088  |   |
| 816 |   |   |   |   |           |   |  |   |   |   |        |   |
| 817 | Gamma ROS Statistics using Imputed Non-Detects  |   |   |   |           |   |  |   |   |   |        |   |
| 818 | GROS may not be used when data set has > 50% NDs with many tied observations at multiple DLs  |   |   |   |           |   |  |   |   |   |        |   |
| 819 | GROS may not be used when kstar of detected data is small such as < 0.1   |   |   |   |           |   |  |   |   |   |        |   |
| 820 | For such situations, GROS method tends to yield inflated values of UCLs and BTVs  |   |   |   |           |   |  |   |   |   |        |   |
| 821 | For gamma distributed detected data, BTVs and UCLs may be computed using gamma distribution on KM estimates                               |   |   |   |           |   |  |   |   |   |        |   |
| 822 | Minimum   |   |   |   | 0.657     |   | Mean   |   |   |   | 1.081  |   |
| 823 | Maximum   |   |   |   | 1.9       |   | Median   |   |   |   | 1.1    |   |
| 824 | SD  |   |   |   | 0.229     |   | CV   |   |   |   | 0.212  |   |
| 825 | k hat (MLE)   |   |   |   | 22.44     |   | k star (bias corrected MLE)                                  |   |   |   | 21.99  |   |
| 826 | Theta hat (MLE)   |   |   |   | 0.0482    |   | Theta star (bias corrected MLE)                              |   |   |   | 0.0492 |   |
| 827 | nu hat (MLE)  |   |   |   | 6643      |   | nu star (bias corrected)                                     |   |   |   | 6510   |   |
| 828 | MLE Mean (bias corrected)   |   |   |   | 1.081     |   | MLE Sd (bias corrected)                                      |   |   |   | 0.231  |   |
| 829 |   |   |   |   |           |   | Adjusted Level of Significance ( $\beta$ )                   |   |   |   | 0.0484 |   |
| 830 | Approximate Chi Square Value (N/A, $\alpha$ )   |   |   |   | 6323      |   | Adjusted Chi Square Value (N/A, $\beta$ )                    |   |   |   | 6321   |   |
| 831 | 95% Gamma Approximate UCL (use when n>=50)  |   |   |   | 1.113     |   | 95% Gamma Adjusted UCL (use when n<50)                       |   |   |   | 1.114  |   |
| 832 |   |   |   |   |           |   |  |   |   |   |        |   |
| 833 | Lognormal GOF Test on Detected Observations Only  |   |   |   |           |   |  |   |   |   |        |   |
| 834 | Lilliefors Test Statistic   |   |   |   | 0.14      |   | Lilliefors GOF Test  |   |   |   |        |   |

|     |  |   |   |   |         |  |   |   |   |         |   |   |
|-----|--|---|---|---|---------|--|---|---|---|---------|---|---|
|     | A  | B | C | D | E       | F  | G | H | I | J       | K | L |
| 835 | 5% Lilliefors Critical Value   |   |   |   | 0.0789  | Detected Data Not Lognormal at 5% Significance Level         |   |   |   |         |   |   |
| 836 | Detected Data appear Approximate Lognormal at 5% Significance Level  |   |   |   |         |  |   |   |   |         |   |   |
| 837 |  |   |   |   |         |  |   |   |   |         |   |   |
| 838 | Lognormal ROS Statistics Using Imputed Non-Detects   |   |   |   |         |  |   |   |   |         |   |   |
| 839 | Mean in Original Scale   |   |   |   | 1.084   | Mean in Log Scale  |   |   |   | 0.0594  |   |   |
| 840 | SD in Original Scale   |   |   |   | 0.225   | SD in Log Scale  |   |   |   | 0.208   |   |   |
| 841 | 95% t UCL (assumes normality of ROS data)  |   |   |   | 1.115   | 95% Percentile Bootstrap UCL                                 |   |   |   | 1.115   |   |   |
| 842 | 95% BCA Bootstrap UCL  |   |   |   | 1.117   | 95% Bootstrap t UCL  |   |   |   | 1.114   |   |   |
| 843 | 95% H-UCL (Log ROS)  |   |   |   | 1.116   |  |   |   |   |         |   |   |
| 844 |  |   |   |   |         |  |   |   |   |         |   |   |
| 845 | UCLs using Lognormal Distribution and KM Estimates when Detected data are Lognormally Distributed  |   |   |   |         |  |   |   |   |         |   |   |
| 846 | KM Mean (logged)   |   |   |   | -0.0254 | 95% H-UCL (KM -Log)  |   |   |   | 1.142   |   |   |
| 847 | KM SD (logged)   |   |   |   | 0.434   | 95% Critical H Value (KM-Log)                                |   |   |   | 1.793   |   |   |
| 848 | KM Standard Error of Mean (logged)   |   |   |   | 0.0592  |  |   |   |   |         |   |   |
| 849 |  |   |   |   |         |  |   |   |   |         |   |   |
| 850 | DL/2 Statistics  |   |   |   |         |  |   |   |   |         |   |   |
| 851 | DL/2 Normal  |   |   |   |         | DL/2 Log-Transformed   |   |   |   |         |   |   |
| 852 | Mean in Original Scale   |   |   |   | 1.026   | Mean in Log Scale  |   |   |   | -0.0476 |   |   |
| 853 | SD in Original Scale   |   |   |   | 0.325   | SD in Log Scale  |   |   |   | 0.432   |   |   |
| 854 | 95% t UCL (Assumes normality)  |   |   |   | 1.07    | 95% H-Stat UCL   |   |   |   | 1.116   |   |   |
| 855 | DL/2 is not a recommended method, provided for comparisons and historical reasons  |   |   |   |         |  |   |   |   |         |   |   |
| 856 |  |   |   |   |         |  |   |   |   |         |   |   |
| 857 | Nonparametric Distribution Free UCL Statistics   |   |   |   |         |  |   |   |   |         |   |   |
| 858 | Detected Data appear Approximate Lognormal Distributed at 5% Significance Level  |   |   |   |         |  |   |   |   |         |   |   |
| 859 |  |   |   |   |         |  |   |   |   |         |   |   |
| 860 | Suggested UCL to Use   |   |   |   |         |  |   |   |   |         |   |   |
| 861 | 95% KM (BCA) UCL   |   |   |   | 1.105   |  |   |   |   |         |   |   |
| 862 |  |   |   |   |         |  |   |   |   |         |   |   |
| 863 | Note: Suggestions regarding the selection of a 95% UCL are provided to help the user to select the most appropriate 95% UCL              |   |   |   |         |  |   |   |   |         |   |   |
| 864 | Recommendations are based upon data size, data distribution, and skewness.   |   |   |   |         |  |   |   |   |         |   |   |
| 865 | These recommendations are based upon the results of the simulation studies summarized in Singh, Maichle, and Lee (2006)                  |   |   |   |         |  |   |   |   |         |   |   |
| 866 | However, simulations results will not cover all Real World data sets; for additional insight the user may want to consult a statistician |   |   |   |         |  |   |   |   |         |   |   |
| 867 |  |   |   |   |         |  |   |   |   |         |   |   |
| 868 | Silver   |   |   |   |         |  |   |   |   |         |   |   |
| 869 |  |   |   |   |         |  |   |   |   |         |   |   |
| 870 | General Statistics   |   |   |   |         |  |   |   |   |         |   |   |
| 871 | Total Number of Observations   |   |   |   | 148     | Number of Distinct Observations                              |   |   |   | 76      |   |   |
| 872 | Number of Detects  |   |   |   | 94      | Number of Non-Detects  |   |   |   | 54      |   |   |
| 873 | Number of Distinct Detects   |   |   |   | 59      | Number of Distinct Non-Detects                               |   |   |   | 19      |   |   |
| 874 | Minimum Detect   |   |   |   | 0.028   | Minimum Non-Detect   |   |   |   | 0.22    |   |   |
| 875 | Maximum Detect   |   |   |   | 11.6    | Maximum Non-Detect   |   |   |   | 1.6     |   |   |
| 876 | Variance Detects   |   |   |   | 1.466   | Percent Non-Detects  |   |   |   | 36.49%  |   |   |
| 877 | Mean Detects   |   |   |   | 0.269   | SD Detects   |   |   |   | 1.211   |   |   |
| 878 | Median Detects   |   |   |   | 0.0695  | CV Detects   |   |   |   | 4.509   |   |   |
| 879 | Skewness Detects   |   |   |   | 9.048   | Kurtosis Detects   |   |   |   | 84.95   |   |   |
| 880 | Mean of Logged Detects   |   |   |   | -2.358  | SD of Logged Detects   |   |   |   | 0.948   |   |   |
| 881 |  |   |   |   |         |  |   |   |   |         |   |   |
| 882 | Normal GOF Test on Detects Only  |   |   |   |         |  |   |   |   |         |   |   |
| 883 | Shapiro Wilk Test Statistic  |   |   |   | 0.186   | Normal GOF Test on Detected Observations Only                |   |   |   |         |   |   |
| 884 | 5% Shapiro Wilk P Value  |   |   |   | 0       | Detected Data Not Normal at 5% Significance Level            |   |   |   |         |   |   |
| 885 | Lilliefors Test Statistic  |   |   |   | 0.429   | Lilliefors GOF Test  |   |   |   |         |   |   |
| 886 | 5% Lilliefors Critical Value   |   |   |   | 0.0914  | Detected Data Not Normal at 5% Significance Level            |   |   |   |         |   |   |
| 887 | Detected Data Not Normal at 5% Significance Level  |   |   |   |         |  |   |   |   |         |   |   |
| 888 |  |   |   |   |         |  |   |   |   |         |   |   |
| 889 | Kaplan-Meier (KM) Statistics using Normal Critical Values and other Nonparametric UCLs   |   |   |   |         |  |   |   |   |         |   |   |
| 890 | Mean   |   |   |   | 0.208   | Standard Error of Mean                                       |   |   |   | 0.0799  |   |   |
| 891 | SD   |   |   |   | 0.964   | 95% KM (BCA) UCL   |   |   |   | 0.368   |   |   |
| 892 | 95% KM (t) UCL   |   |   |   | 0.34    | 95% KM (Percentile Bootstrap) UCL                            |   |   |   | 0.363   |   |   |
| 893 | 95% KM (z) UCL   |   |   |   | 0.34    | 95% KM Bootstrap t UCL                                       |   |   |   | 0.813   |   |   |
| 894 | 90% KM Chebyshev UCL   |   |   |   | 0.448   | 95% KM Chebyshev UCL   |   |   |   | 0.556   |   |   |
| 895 | 97.5% KM Chebyshev UCL   |   |   |   | 0.707   | 99% KM Chebyshev UCL   |   |   |   | 1.003   |   |   |
| 896 |  |   |   |   |         |  |   |   |   |         |   |   |
| 897 | Gamma GOF Tests on Detected Observations Only  |   |   |   |         |  |   |   |   |         |   |   |
| 898 | A-D Test Statistic   |   |   |   | 14.38   | Anderson-Darling GOF Test                                    |   |   |   |         |   |   |
| 899 | 5% A-D Critical Value  |   |   |   | 0.809   | Detected Data Not Gamma Distributed at 5% Significance Level |   |   |   |         |   |   |
| 900 | K-S Test Statistic   |   |   |   | 0.265   | Kolmogrov-Smirnoff GOF                                       |   |   |   |         |   |   |
| 901 | 5% K-S Critical Value  |   |   |   | 0.097   | Detected Data Not Gamma Distributed at 5% Significance Level |   |   |   |         |   |   |
| 902 | Detected Data Not Gamma Distributed at 5% Significance Level   |   |   |   |         |  |   |   |   |         |   |   |
| 903 |  |   |   |   |         |  |   |   |   |         |   |   |
| 904 | Gamma Statistics on Detected Data Only   |   |   |   |         |  |   |   |   |         |   |   |
| 905 | k hat (MLE)  |   |   |   | 0.593   | k star (bias corrected MLE)                                  |   |   |   | 0.581   |   |   |
| 906 | Theta hat (MLE)  |   |   |   | 0.453   | Theta star (bias corrected MLE)                              |   |   |   | 0.462   |   |   |
| 907 | nu hat (MLE)   |   |   |   | 111.5   | nu star (bias corrected)                                     |   |   |   | 109.3   |   |   |
| 908 | MLE Mean (bias corrected)  |   |   |   | 0.269   | MLE Sd (bias corrected)                                      |   |   |   | 0.352   |   |   |
| 909 |  |   |   |   |         |  |   |   |   |         |   |   |
| 910 | Gamma Kaplan-Meier (KM) Statistics   |   |   |   |         |  |   |   |   |         |   |   |
| 911 | k hat (KM)   |   |   |   | 0.0466  | nu hat (KM)  |   |   |   | 13.78   |   |   |
| 912 | Approximate Chi Square Value (13.78, $\alpha$ )  |   |   |   | 6.423   | Adjusted Chi Square Value (13.78, $\beta$ )                  |   |   |   | 6.374   |   |   |
| 913 | 95% Gamma Approximate KM-UCL (use when n>=50)  |   |   |   | 0.447   | 95% Gamma Adjusted KM-UCL (use when n<50)                    |   |   |   | 0.45    |   |   |
| 914 | Gamma (KM) may not be used when k hat (KM) is < 0.1  |   |   |   |         |  |   |   |   |         |   |   |
| 915 |  |   |   |   |         |  |   |   |   |         |   |   |
| 916 | Gamma ROS Statistics using Imputed Non-Detects   |   |   |   |         |  |   |   |   |         |   |   |
| 917 | GROS may not be used when data set has > 50% NDs with many tied observations at multiple DLs   |   |   |   |         |  |   |   |   |         |   |   |
| 918 | GROS may not be used when kstar of detected data is small such as < 0.1  |   |   |   |         |  |   |   |   |         |   |   |
| 919 | For such situations, GROS method tends to yield inflated values of UCLs and BTVs   |   |   |   |         |  |   |   |   |         |   |   |

|      |  |   |   |   |        |   |   |                                  |   |  |   |        |
|------|--|---|---|---|--------|---|---|----------------------------------|---|--|---|--------|
|      | A  | B | C | D   | E      | F | G | H                                | I | J  | K | L      |
| 920  | For gamma distributed detected data, BTVs and UCLs may be computed using gamma distribution on KM estimates                              |   |   |   |        |   |   |                                  |   |  |   |        |
| 921  |  |   |   | Minimum                                     | 0.01   |   |   |                                  |   | Mean   |   | 0.221  |
| 922  |  |   |   | Maximum                                     | 11.6   |   |   |                                  |   | Median   |   | 0.061  |
| 923  |  |   |   | SD  | 0.975  |   |   |                                  |   | CV   |   | 4.403  |
| 924  |  |   |   | k hat (MLE)                                 | 0.513  |   |   |                                  |   | k star (bias corrected MLE)                          |   | 0.507  |
| 925  |  |   |   | Theta hat (MLE)                             | 0.432  |   |   |                                  |   | Theta star (bias corrected MLE)                      |   | 0.437  |
| 926  |  |   |   | nu hat (MLE)                                | 151.8  |   |   |                                  |   | nu star (bias corrected)                             |   | 150    |
| 927  |  |   |   | MLE Mean (bias corrected)                   | 0.221  |   |   |                                  |   | MLE Sd (bias corrected)                              |   | 0.311  |
| 928  |  |   |   |   |        |   |   |                                  |   | Adjusted Level of Significance (β)                   |   | 0.0484 |
| 929  |  |   |   | Approximate Chi Square Value (150.03, α)    | 122.7  |   |   |                                  |   | Adjusted Chi Square Value (150.03, β)                |   | 122.5  |
| 930  |  |   |   | 95% Gamma Approximate UCL (use when n>=50)  | 0.271  |   |   |                                  |   | 95% Gamma Adjusted UCL (use when n<50)               |   | 0.271  |
| 931  |  |   |   |   |        |   |   |                                  |   |  |   |        |
| 932  | Lognormal GOF Test on Detected Observations Only   |   |   |   |        |   |   |                                  |   |  |   |        |
| 933  |  |   |   | Lilliefors Test Statistic                   | 0.187  |   |   |                                  |   | Lilliefors GOF Test                                  |   |        |
| 934  |  |   |   | 5% Lilliefors Critical Value                | 0.0914 |   |   |                                  |   | Detected Data Not Lognormal at 5% Significance Level |   |        |
| 935  | Detected Data Not Lognormal at 5% Significance Level   |   |   |   |        |   |   |                                  |   |  |   |        |
| 936  |  |   |   |   |        |   |   |                                  |   |  |   |        |
| 937  | Lognormal ROS Statistics Using Imputed Non-Detects   |   |   |   |        |   |   |                                  |   |  |   |        |
| 938  |  |   |   | Mean in Original Scale                      | 0.207  |   |   |                                  |   | Mean in Log Scale                                    |   | -2.387 |
| 939  |  |   |   | SD in Original Scale                        | 0.967  |   |   |                                  |   | SD in Log Scale                                      |   | 0.814  |
| 940  |  |   |   | 95% t UCL (assumes normality of ROS data)   | 0.338  |   |   |                                  |   | 95% Percentile Bootstrap UCL                         |   | 0.359  |
| 941  |  |   |   | 95% BCA Bootstrap UCL                       | 0.447  |   |   |                                  |   | 95% Bootstrap t UCL                                  |   | 0.871  |
| 942  |  |   |   | 95% H-UCL (Log ROS)                         | 0.147  |   |   |                                  |   |  |   |        |
| 943  |  |   |   |   |        |   |   |                                  |   |  |   |        |
| 944  | DL/2 Statistics  |   |   |   |        |   |   |                                  |   |  |   |        |
| 945  |  |   |   | DL/2 Normal                                 |        |   |   | DL/2 Log-Transformed             |   |  |   |        |
| 946  |  |   |   | Mean in Original Scale                      | 0.294  |   |   |                                  |   | Mean in Log Scale                                    |   | -1.932 |
| 947  |  |   |   | SD in Original Scale                        | 0.97   |   |   |                                  |   | SD in Log Scale                                      |   | 0.979  |
| 948  |  |   |   | 95% t UCL (Assumes normality)               | 0.426  |   |   |                                  |   | 95% H-Stat UCL                                       |   | 0.279  |
| 949  | DL/2 is not a recommended method, provided for comparisons and historical reasons  |   |   |   |        |   |   |                                  |   |  |   |        |
| 950  |  |   |   |   |        |   |   |                                  |   |  |   |        |
| 951  | Nonparametric Distribution Free UCL Statistics   |   |   |   |        |   |   |                                  |   |  |   |        |
| 952  | Data do not follow a Discernible Distribution at 5% Significance Level   |   |   |   |        |   |   |                                  |   |  |   |        |
| 953  |  |   |   |   |        |   |   |                                  |   |  |   |        |
| 954  | Suggested UCL to Use   |   |   |   |        |   |   |                                  |   |  |   |        |
| 955  |  |   |   | 95% KM (BCA) UCL                            | 0.368  |   |   |                                  |   |  |   |        |
| 956  |  |   |   |   |        |   |   |                                  |   |  |   |        |
| 957  | Note: Suggestions regarding the selection of a 95% UCL are provided to help the user to select the most appropriate 95% UCL              |   |   |   |        |   |   |                                  |   |  |   |        |
| 958  | Recommendations are based upon data size, data distribution, and skewness.   |   |   |   |        |   |   |                                  |   |  |   |        |
| 959  | These recommendations are based upon the results of the simulation studies summarized in Singh, Maichle, and Lee (2006)                  |   |   |   |        |   |   |                                  |   |  |   |        |
| 960  | However, simulations results will not cover all Real World data sets; for additional insight the user may want to consult a statistician |   |   |   |        |   |   |                                  |   |  |   |        |
| 961  |  |   |   |   |        |   |   |                                  |   |  |   |        |
| 962  |  |   |   |   |        |   |   |                                  |   |  |   |        |
| 963  | Uranium  |   |   |   |        |   |   |                                  |   |  |   |        |
| 964  |  |   |   |   |        |   |   |                                  |   |  |   |        |
| 965  | General Statistics   |   |   |   |        |   |   |                                  |   |  |   |        |
| 966  |  |   |   | Total Number of Observations                | 18     |   |   |                                  |   | Number of Distinct Observations                      |   | 18     |
| 967  |  |   |   |   |        |   |   |                                  |   | Number of Missing Observations                       |   | 0      |
| 968  |  |   |   | Minimum                                     | 1.59   |   |   |                                  |   | Mean   |   | 3.641  |
| 969  |  |   |   | Maximum                                     | 10.7   |   |   |                                  |   | Median   |   | 2.36   |
| 970  |  |   |   | SD  | 2.821  |   |   |                                  |   | Std. Error of Mean                                   |   | 0.665  |
| 971  |  |   |   | Coefficient of Variation                    | 0.775  |   |   |                                  |   | Skewness   |   | 1.555  |
| 972  |  |   |   |   |        |   |   |                                  |   |  |   |        |
| 973  | Normal GOF Test  |   |   |   |        |   |   |                                  |   |  |   |        |
| 974  |  |   |   | Shapiro Wilk Test Statistic                 | 0.711  |   |   |                                  |   | Shapiro Wilk GOF Test                                |   |        |
| 975  |  |   |   | 5% Shapiro Wilk Critical Value              | 0.897  |   |   |                                  |   | Data Not Normal at 5% Significance Level             |   |        |
| 976  |  |   |   | Lilliefors Test Statistic                   | 0.334  |   |   |                                  |   | Lilliefors GOF Test                                  |   |        |
| 977  |  |   |   | 5% Lilliefors Critical Value                | 0.209  |   |   |                                  |   | Data Not Normal at 5% Significance Level             |   |        |
| 978  | Data Not Normal at 5% Significance Level   |   |   |   |        |   |   |                                  |   |  |   |        |
| 979  |  |   |   |   |        |   |   |                                  |   |  |   |        |
| 980  | Assuming Normal Distribution   |   |   |   |        |   |   |                                  |   |  |   |        |
| 981  |  |   |   | 95% Normal UCL                              |        |   |   | 95% UCLs (Adjusted for Skewness) |   |  |   |        |
| 982  |  |   |   | 95% Student's-t UCL                         | 4.797  |   |   |                                  |   | 95% Adjusted-CLT UCL (Chen-1995)                     |   | 4.995  |
| 983  |  |   |   |   |        |   |   |                                  |   | 95% Modified-t UCL (Johnson-1978)                    |   | 4.838  |
| 984  |  |   |   |   |        |   |   |                                  |   |  |   |        |
| 985  | Gamma GOF Test   |   |   |   |        |   |   |                                  |   |  |   |        |
| 986  |  |   |   | A-D Test Statistic                          | 1.801  |   |   |                                  |   | Anderson-Darling Gamma GOF Test                      |   |        |
| 987  |  |   |   | 5% A-D Critical Value                       | 0.749  |   |   |                                  |   | Data Not Gamma Distributed at 5% Significance Level  |   |        |
| 988  |  |   |   | K-S Test Statistic                          | 0.286  |   |   |                                  |   | Kolmogrov-Smirnoff Gamma GOF Test                    |   |        |
| 989  |  |   |   | 5% K-S Critical Value                       | 0.206  |   |   |                                  |   | Data Not Gamma Distributed at 5% Significance Level  |   |        |
| 990  | Data Not Gamma Distributed at 5% Significance Level  |   |   |   |        |   |   |                                  |   |  |   |        |
| 991  |  |   |   |   |        |   |   |                                  |   |  |   |        |
| 992  | Gamma Statistics   |   |   |   |        |   |   |                                  |   |  |   |        |
| 993  |  |   |   | k hat (MLE)                                 | 2.496  |   |   |                                  |   | k star (bias corrected MLE)                          |   | 2.117  |
| 994  |  |   |   | Theta hat (MLE)                             | 1.458  |   |   |                                  |   | Theta star (bias corrected MLE)                      |   | 1.72   |
| 995  |  |   |   | nu hat (MLE)                                | 89.86  |   |   |                                  |   | nu star (bias corrected)                             |   | 76.22  |
| 996  |  |   |   | MLE Mean (bias corrected)                   | 3.641  |   |   |                                  |   | MLE Sd (bias corrected)                              |   | 2.502  |
| 997  |  |   |   |   |        |   |   |                                  |   | Approximate Chi Square Value (0.05)                  |   | 57.11  |
| 998  |  |   |   | Adjusted Level of Significance              | 0.0357 |   |   |                                  |   | Adjusted Chi Square Value                            |   | 55.52  |
| 999  |  |   |   |   |        |   |   |                                  |   |  |   |        |
| 1000 | Assuming Gamma Distribution  |   |   |   |        |   |   |                                  |   |  |   |        |
| 1001 |  |   |   | 95% Approximate Gamma UCL (use when n>=50)) | 4.859  |   |   |                                  |   | 95% Adjusted Gamma UCL (use when n<50)               |   | 4.998  |
| 1002 |  |   |   |   |        |   |   |                                  |   |  |   |        |
| 1003 | Lognormal GOF Test   |   |   |   |        |   |   |                                  |   |  |   |        |
| 1004 |  |   |   | Shapiro Wilk Test Statistic                 | 0.814  |   |   |                                  |   | Shapiro Wilk Lognormal GOF Test                      |   |        |

|      |      |   |   |        |   |   |   |   |   |   |       |   |
|------|------|---|---|--------|---|---|---|---|---|---|-------|---|
|      | A    | B | C   | D      | E | F | G   | H | I | J | K     | L |
| 1005 |      |   | 5% Shapiro Wilk Critical Value  | 0.897  |   |   | Data Not Lognormal at 5% Significance Level         |   |   |   |       |   |
| 1006 |      |   | Lilliefors Test Statistic   | 0.25   |   |   | Lilliefors Lognormal GOF Test                       |   |   |   |       |   |
| 1007 |      |   | 5% Lilliefors Critical Value  | 0.209  |   |   | Data Not Lognormal at 5% Significance Level         |   |   |   |       |   |
| 1008 |      |   | Data Not Lognormal at 5% Significance Level   |        |   |   |   |   |   |   |       |   |
| 1009 |      |   |   |        |   |   |   |   |   |   |       |   |
| 1010 |      |   | Lognormal Statistics  |        |   |   |   |   |   |   |       |   |
| 1011 |      |   | Minimum of Logged Data  | 0.464  |   |   | Mean of logged Data                                 |   |   |   | 1.079 |   |
| 1012 |      |   | Maximum of Logged Data  | 2.37   |   |   | SD of logged Data                                   |   |   |   | 0.622 |   |
| 1013 |      |   |   |        |   |   |   |   |   |   |       |   |
| 1014 |      |   | Assuming Lognormal Distribution   |        |   |   |   |   |   |   |       |   |
| 1015 |      |   | 95% H-UCL   | 4.937  |   |   | 90% Chebyshev (MVUE) UCL                            |   |   |   | 5.156 |   |
| 1016 |      |   | 95% Chebyshev (MVUE) UCL  | 5.895  |   |   | 97.5% Chebyshev (MVUE) UCL                          |   |   |   | 6.92  |   |
| 1017 |      |   | 99% Chebyshev (MVUE) UCL  | 8.934  |   |   |   |   |   |   |       |   |
| 1018 |      |   |   |        |   |   |   |   |   |   |       |   |
| 1019 |      |   | Nonparametric Distribution Free UCL Statistics  |        |   |   |   |   |   |   |       |   |
| 1020 |      |   | Data do not follow a Discernible Distribution (0.05)  |        |   |   |   |   |   |   |       |   |
| 1021 |      |   |   |        |   |   |   |   |   |   |       |   |
| 1022 |      |   | Nonparametric Distribution Free UCLs  |        |   |   |   |   |   |   |       |   |
| 1023 |      |   | 95% CLT UCL   | 4.734  |   |   | 95% Jackknife UCL                                   |   |   |   | 4.797 |   |
| 1024 |      |   | 95% Standard Bootstrap UCL  | 4.721  |   |   | 95% Bootstrap-t UCL                                 |   |   |   | 5.335 |   |
| 1025 |      |   | 95% Hall's Bootstrap UCL  | 4.666  |   |   | 95% Percentile Bootstrap UCL                        |   |   |   | 4.738 |   |
| 1026 |      |   | 95% BCA Bootstrap UCL   | 5.007  |   |   |   |   |   |   |       |   |
| 1027 |      |   | 90% Chebyshev(Mean, Sd) UCL   | 5.635  |   |   | 95% Chebyshev(Mean, Sd) UCL                         |   |   |   | 6.539 |   |
| 1028 |      |   | 97.5% Chebyshev(Mean, Sd) UCL   | 7.793  |   |   | 99% Chebyshev(Mean, Sd) UCL                         |   |   |   | 10.26 |   |
| 1029 |      |   |   |        |   |   |   |   |   |   |       |   |
| 1030 |      |   | Suggested UCL to Use  |        |   |   |   |   |   |   |       |   |
| 1031 |      |   | 95% Chebyshev (Mean, Sd) UCL  | 6.539  |   |   |   |   |   |   |       |   |
| 1032 |      |   |   |        |   |   |   |   |   |   |       |   |
| 1033 |      |   | Note: Suggestions regarding the selection of a 95% UCL are provided to help the user to select the most appropriate 95% UCL |        |   |   |   |   |   |   |       |   |
| 1034 |      |   | These recommendations are based upon the results of the simulation studies summarized in Singh, Singh, and Iaci (2002'      |        |   |   |   |   |   |   |       |   |
| 1035 |      |   | and Singh and Singh (2003). However, simulations results will not cover all Real World data sets                            |        |   |   |   |   |   |   |       |   |
| 1036 |      |   | For additional insight the user may want to consult a statistician.   |        |   |   |   |   |   |   |       |   |
| 1037 |      |   |   |        |   |   |   |   |   |   |       |   |
| 1038 | Zinc |   |   |        |   |   |   |   |   |   |       |   |
| 1039 |      |   |   |        |   |   |   |   |   |   |       |   |
| 1040 |      |   | General Statistics  |        |   |   |   |   |   |   |       |   |
| 1041 |      |   | Total Number of Observations  | 148    |   |   | Number of Distinct Observations                     |   |   |   | 119   |   |
| 1042 |      |   |   |        |   |   | Number of Missing Observations                      |   |   |   | 0     |   |
| 1043 |      |   | Minimum   | 12.3   |   |   | Mean  |   |   |   | 47.72 |   |
| 1044 |      |   | Maximum   | 812    |   |   | Median  |   |   |   | 32.05 |   |
| 1045 |      |   | SD  | 77.74  |   |   | Std. Error of Mean                                  |   |   |   | 6.39  |   |
| 1046 |      |   | Coefficient of Variation  | 1.629  |   |   | Skewness  |   |   |   | 7.694 |   |
| 1047 |      |   |   |        |   |   |   |   |   |   |       |   |
| 1048 |      |   | Normal GOF Test   |        |   |   |   |   |   |   |       |   |
| 1049 |      |   | Shapiro Wilk Test Statistic   | 0.327  |   |   | Shapiro Wilk GOF Test                               |   |   |   |       |   |
| 1050 |      |   | 5% Shapiro Wilk P Value   | 0      |   |   | Data Not Normal at 5% Significance Level            |   |   |   |       |   |
| 1051 |      |   | Lilliefors Test Statistic   | 0.328  |   |   | Lilliefors GOF Test                                 |   |   |   |       |   |
| 1052 |      |   | 5% Lilliefors Critical Value  | 0.0728 |   |   | Data Not Normal at 5% Significance Level            |   |   |   |       |   |
| 1053 |      |   | Data Not Normal at 5% Significance Level  |        |   |   |   |   |   |   |       |   |
| 1054 |      |   |   |        |   |   |   |   |   |   |       |   |
| 1055 |      |   | Assuming Normal Distribution  |        |   |   |   |   |   |   |       |   |
| 1056 |      |   | 95% Normal UCL  |        |   |   | 95% UCLs (Adjusted for Skewness)                    |   |   |   |       |   |
| 1057 |      |   | 95% Student's-t UCL   | 58.3   |   |   | 95% Adjusted-CLT UCL (Chen-1995)                    |   |   |   | 62.55 |   |
| 1058 |      |   |   |        |   |   | 95% Modified-t UCL (Johnson-1978)                   |   |   |   | 58.97 |   |
| 1059 |      |   |   |        |   |   |   |   |   |   |       |   |
| 1060 |      |   | Gamma GOF Test  |        |   |   |   |   |   |   |       |   |
| 1061 |      |   | A-D Test Statistic  | 15.94  |   |   | Anderson-Darling Gamma GOF Test                     |   |   |   |       |   |
| 1062 |      |   | 5% A-D Critical Value   | 0.767  |   |   | Data Not Gamma Distributed at 5% Significance Level |   |   |   |       |   |
| 1063 |      |   | K-S Test Statistic  | 0.284  |   |   | Kolmogrov-Smirnoff Gamma GOF Test                   |   |   |   |       |   |
| 1064 |      |   | 5% K-S Critical Value   | 0.0782 |   |   | Data Not Gamma Distributed at 5% Significance Level |   |   |   |       |   |
| 1065 |      |   | Data Not Gamma Distributed at 5% Significance Level   |        |   |   |   |   |   |   |       |   |
| 1066 |      |   |   |        |   |   |   |   |   |   |       |   |
| 1067 |      |   | Gamma Statistics  |        |   |   |   |   |   |   |       |   |
| 1068 |      |   | k hat (MLE)   | 1.871  |   |   | k star (bias corrected MLE)                         |   |   |   | 1.837 |   |
| 1069 |      |   | Theta hat (MLE)   | 25.51  |   |   | Theta star (bias corrected MLE)                     |   |   |   | 25.97 |   |
| 1070 |      |   | nu hat (MLE)  | 553.7  |   |   | nu star (bias corrected)                            |   |   |   | 543.8 |   |
| 1071 |      |   | MLE Mean (bias corrected)   | 47.72  |   |   | MLE Sd (bias corrected)                             |   |   |   | 35.21 |   |
| 1072 |      |   |   |        |   |   | Approximate Chi Square Value (0.05)                 |   |   |   | 490.7 |   |
| 1073 |      |   | Adjusted Level of Significance  | 0.0484 |   |   | Adjusted Chi Square Value                           |   |   |   | 490.3 |   |
| 1074 |      |   |   |        |   |   |   |   |   |   |       |   |
| 1075 |      |   | Assuming Gamma Distribution   |        |   |   |   |   |   |   |       |   |
| 1076 |      |   | 95% Approximate Gamma UCL (use when n>=50))   | 52.88  |   |   | 95% Adjusted Gamma UCL (use when n<50)              |   |   |   | 52.94 |   |
| 1077 |      |   |   |        |   |   |   |   |   |   |       |   |
| 1078 |      |   | Lognormal GOF Test  |        |   |   |   |   |   |   |       |   |
| 1079 |      |   | Shapiro Wilk Test Statistic   | 0.817  |   |   | Shapiro Wilk Lognormal GOF Test                     |   |   |   |       |   |
| 1080 |      |   | 5% Shapiro Wilk P Value   | 0      |   |   | Data Not Lognormal at 5% Significance Level         |   |   |   |       |   |
| 1081 |      |   | Lilliefors Test Statistic   | 0.219  |   |   | Lilliefors Lognormal GOF Test                       |   |   |   |       |   |
| 1082 |      |   | 5% Lilliefors Critical Value  | 0.0728 |   |   | Data Not Lognormal at 5% Significance Level         |   |   |   |       |   |
| 1083 |      |   | Data Not Lognormal at 5% Significance Level   |        |   |   |   |   |   |   |       |   |
| 1084 |      |   |   |        |   |   |   |   |   |   |       |   |
| 1085 |      |   | Lognormal Statistics  |        |   |   |   |   |   |   |       |   |
| 1086 |      |   | Minimum of Logged Data  | 2.51   |   |   | Mean of logged Data                                 |   |   |   | 3.575 |   |
| 1087 |      |   | Maximum of Logged Data  | 6.7    |   |   | SD of logged Data                                   |   |   |   | 0.582 |   |
| 1088 |      |   |   |        |   |   |   |   |   |   |       |   |
| 1089 |      |   | Assuming Lognormal Distribution   |        |   |   |   |   |   |   |       |   |

