

Operations And Maintenance Cost Curve

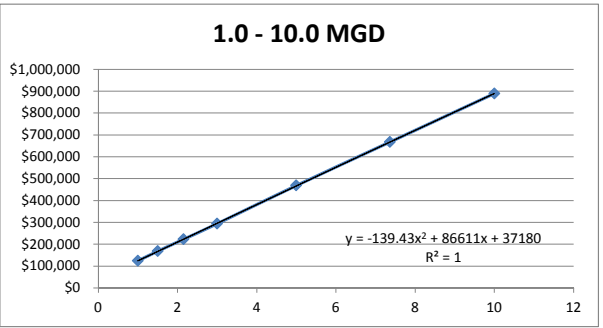
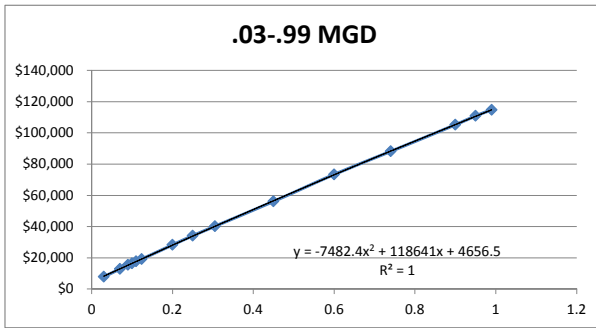
| Design Flow (MGD) | Total O&M Cost | Flow Range    | Slope  | Y-int | O&M Cost Equation        | 0.03      | 0.07      | 0.09      | 0.1       | 0.11      | 0.124     | 0.2       | 0.25      | 0.305     | 0.45      | 0.6       |
|-------------------|----------------|---------------|--------|-------|--------------------------|-----------|-----------|-----------|-----------|-----------|-----------|-----------|-----------|-----------|-----------|-----------|
| 0.03              | \$7,836        | <0.03         |        | 7836  | cost = 7836              | \$7,836   | \$7,836   | \$7,836   | \$7,836   | \$7,836   | \$7,836   | \$7,836   | \$7,836   | \$7,836   | \$7,836   | \$7,836   |
| 0.07              | \$12,860       | 0.03 - <0.07  | 125603 | 4068  | cost = 500204Q + 83413   | \$7,836   | \$12,860  | \$15,372  | \$16,628  | \$17,884  | \$19,642  | \$29,188  | \$35,468  | \$42,377  | \$60,589  | \$79,429  |
| 0.09              | \$15,507       | 0.07 - <0.09  | 132368 | 3594  | cost = 291078Q + 98052   | \$7,565   | \$12,860  | \$15,507  | \$16,831  | \$18,155  | \$20,008  | \$30,068  | \$36,686  | \$43,966  | \$63,160  | \$83,015  |
| 0.1               | \$16,461       | 0.09 - <0.1   | 95394  | 6922  | cost = 291100Q + 98050   | \$9,784   | \$13,599  | \$15,507  | \$16,461  | \$17,415  | \$18,751  | \$26,001  | \$30,770  | \$36,017  | \$49,849  | \$64,158  |
| 0.11              | \$17,738       | 0.1 - <0.11   | 127664 | 3695  | cost = 290947Q + 98065   | \$7,525   | \$12,631  | \$15,185  | \$16,461  | \$17,738  | \$19,525  | \$29,228  | \$35,611  | \$42,632  | \$61,144  | \$80,293  |
| 0.124             | \$19,178       | 0.11 - <0.124 | 102841 | 6425  | cost = 204182Q + 107609  | \$9,511   | \$13,624  | \$15,681  | \$16,709  | \$17,738  | \$19,178  | \$26,994  | \$32,136  | \$37,792  | \$52,704  | \$68,130  |
| 0.2               | \$28,239       | 0.124 - <0.2  | 119229 | 4393  | cost = 416894Q + 81233   | \$7,970   | \$12,739  | \$15,124  | \$16,316  | \$17,508  | \$19,178  | \$28,239  | \$34,200  | \$40,758  | \$58,046  | \$75,930  |
| 0.25              | \$34,115       | 0.2 - <0.25   | 117520 | 4735  | cost = 240060Q + 116600  | \$8,261   | \$12,961  | \$15,312  | \$16,487  | \$17,662  | \$19,307  | \$28,239  | \$34,115  | \$40,579  | \$57,619  | \$75,247  |
| 0.305             | \$40,197       | 0.25 - <0.305 | 110582 | 6470  | cost = 617673Q + 22197   | \$9,787   | \$14,210  | \$16,422  | \$17,528  | \$18,634  | \$20,182  | \$28,586  | \$34,115  | \$40,197  | \$56,231  | \$72,819  |
| 0.45              | \$56,094       | 0.305 - <0.45 | 109634 | 6758  | cost = 310469Q + 115894  | \$10,048  | \$14,433  | \$16,626  | \$17,722  | \$18,818  | \$20,353  | \$28,685  | \$34,167  | \$40,197  | \$56,094  | \$72,539  |
| 0.6               | \$73,383       | 0.45 - <0.6   | 115260 | 4227  | cost = 282169Q + 128629  | \$7,685   | \$12,295  | \$14,600  | \$15,753  | \$16,906  | \$18,519  | \$27,279  | \$33,042  | \$39,381  | \$56,094  | \$73,383  |
| 0.74              | \$88,139       | 0.6 - <0.74   | 105400 | 10143 | cost = 232912Q + 158183  | \$13,305  | \$17,521  | \$19,629  | \$20,683  | \$21,737  | \$23,212  | \$31,223  | \$36,493  | \$42,290  | \$57,573  | \$73,383  |
| 0.9               | \$105,205      | 0.74 - <0.9   | 106663 | 9209  | cost = 337475Q + 80807   | \$12,409  | \$16,675  | \$18,808  | \$19,875  | \$20,942  | \$22,435  | \$30,541  | \$35,874  | \$41,741  | \$57,207  | \$73,206  |
| 0.95              | \$110,898      | 0.9 - <0.95   | 113867 | 2725  | cost = 285915Q + 127210  | \$6,141   | \$10,695  | \$12,973  | \$14,111  | \$15,250  | \$16,844  | \$25,498  | \$31,191  | \$37,454  | \$53,965  | \$71,045  |
| 0.99              | \$114,746      | 0.95 - <0.99  | 96198  | 19510 | cost = 271517Q + 140889  | \$22,396  | \$26,244  | \$28,168  | \$29,130  | \$30,092  | \$31,439  | \$38,750  | \$43,560  | \$48,851  | \$62,799  | \$77,229  |
| 1                 | \$123,824      | 0.99 - 1.0    |        |       | cost = 1275084           | \$123,824 | \$123,824 | \$123,824 | \$123,824 | \$123,824 | \$123,824 | \$123,824 | \$123,824 | \$123,824 | \$123,824 | \$123,824 |
| 1.5               | \$167,990      | 1.0 - <1.5    | 88331  | 35493 | cost = 507600Q + 767484  | \$38,143  | \$41,676  | \$43,443  | \$44,326  | \$45,210  | \$46,446  | \$53,159  | \$57,576  | \$62,434  | \$75,242  | \$88,492  |
| 2.152             | \$222,393      | 1.5 - <2.152  | 83440  | 42830 | cost = 488280Q + 796464  | \$45,333  | \$48,671  | \$50,340  | \$51,174  | \$52,008  | \$53,176  | \$59,518  | \$63,690  | \$68,279  | \$80,378  | \$92,894  |
| 3                 | \$293,582      | 2.152 - <3.0  | 83949  | 41734 | cost = 404161Q + 977488  | \$44,252  | \$47,610  | \$49,289  | \$50,129  | \$50,968  | \$52,144  | \$58,524  | \$62,721  | \$67,338  | \$79,511  | \$92,104  |
| 5                 | \$468,265      | 3.0 - <5.0    | 87342  | 31557 | cost = 445635Q + 853066  | \$34,177  | \$37,671  | \$39,418  | \$40,291  | \$41,165  | \$42,388  | \$49,025  | \$53,393  | \$58,196  | \$70,861  | \$83,962  |
| 7.365             | \$667,488      | 5.0 - <7.365  | 84238  | 47074 | cost = 324533Q + 1458578 | \$49,602  | \$52,971  | \$54,656  | \$55,498  | \$56,341  | \$57,520  | \$63,922  | \$68,134  | \$72,767  | \$84,982  | \$97,617  |
| 10                | \$889,163      | 7.365 - 10    | 84127  | 47892 | cost = 306551Q + 1591011 | \$50,415  | \$53,781  | \$55,463  | \$56,304  | \$57,146  | \$58,323  | \$64,717  | \$68,923  | \$73,550  | \$85,749  | \$98,368  |

Design Flows generated from pre-built flows in the U.S. EPA cost model and user-generated flows. Total O&M Cost values

LINEST was run on the cost vs flow values for each flow range to derive miniature cost curves - if the full-spectrum cost curves were unable to sufficiently calculate costs each of these linear curves could

Cells highlighted in blue represent where the derived curves intersect; if the formula is correct then the values should be identical between two equations at the same flow. The non-shaded cells represent further estimates of the curves but are not likely to be useful, and are mostly artifacts of doing a big copy/paste instead of individual cells.

|                    |   |           |       |                       |         |          |          |          |          |          |          |          |          |          |          |
|--------------------|---|-----------|-------|-----------------------|---------|----------|----------|----------|----------|----------|----------|----------|----------|----------|----------|
| Based on LINEST    | 0.3-.99                                 | 111118    | 5600  | cost = 111118Q + 5600 | \$8,933 | \$13,378 | \$15,601 | \$16,712 | \$17,823 | \$19,379 | \$27,824 | \$33,379 | \$39,491 | \$55,603 | \$72,271 |
|                    | percent higher than specific flow range |           |       |                       | 14.01   | 4.03     | 0.60     | 1.52     | 0.48     | 1.05     | (1.47)   | (2.16)   | (1.76)   | (0.88)   | (1.52)   |
| Based on LINEST    | 1.0 - 10.0                              | 85111     | 39703 | cost = 85111Q + 39703 |         |          |          |          |          |          |          |          |          |          |          |
|                    | percent higher than specific flow range |           |       |                       |         |          |          |          |          |          |          |          |          |          |          |
| Based on trendline | 0.3-.99                                 | see below |       |                       | \$8,209 | \$12,925 | \$15,274 | \$16,446 | \$17,616 | \$19,253 | \$28,085 | \$33,849 | \$40,146 | \$56,530 | \$73,147 |
|                    | percent higher than specific flow range |           |       |                       | 4.76    | 0.50     | (1.51)   | (0.09)   | (0.68)   | 0.39     | (0.54)   | (0.78)   | (0.13)   | 0.78     | (0.32)   |
| Based on trendline | 1.0 - 10.0                              | see below |       |                       |         |          |          |          |          |          |          |          |          |          |          |
|                    | percent higher than specific flow range |           |       |                       |         |          |          |          |          |          |          |          |          |          |          |



Known flow rates were inserted into the LINEST and polynomial trendline equations to verify the predictive accuracy of the equations. The percentage indicates how much above or below the calculated cost is from the actual number. Based on the percentages the polynomial trendlines are more accurate than the linear trendlines.

The EPA cost model uses flow rates of 1 MGD to separate SMALL from MEDIUM sources, and a significant increase in cost estimate occurs when that threshold is crossed. Separate cost curves were modeled for those flow rate ranges for capital cost, O&M cost, and GAC recharge in order to produce more reliable curve equations.

The final trendlines were used to estimate O&M costs at estimated flow rates from sources identified as likely requiring treatment for 1,2,3-TCP.

| Design flow (MGD) | q <sup>2</sup> | q      | y-int  |
|-------------------|----------------|--------|--------|
| 0.3-0.99          | -7482.4        | 118641 | 4656.5 |
| 1.0-10.0          | -139.43        | 86611  | 37180  |

XY plots based off the flow and cost data with a polynomial trendline. The goal is to get a trendline that closely matches the known data points to predict costs based on flow.

The numbers to the left are copied from the calculated trendlines for ease in Excel calculations.

Operations And Maintenance Cost Curve

| <u>0.74</u> | <u>0.9</u> | <u>0.95</u> | <u>0.99</u> | <u>1</u>  | <u>1.5</u> | <u>2.152</u> | <u>3</u>  | <u>5</u>  | <u>7.365</u> | <u>10</u>   |
|-------------|------------|-------------|-------------|-----------|------------|--------------|-----------|-----------|--------------|-------------|
| \$7,836     | \$7,836    | \$7,836     | \$7,836     | \$7,836   | \$7,836    | \$7,836      | \$7,836   | \$7,836   | \$7,836      | \$7,836     |
| \$97,014    | \$117,110  | \$123,390   | \$128,415   | \$129,671 | \$192,472  | \$274,365    | \$380,876 | \$632,082 | \$929,133    | \$1,260,096 |
| \$101,546   | \$122,725  | \$129,344   | \$134,638   | \$135,962 | \$202,146  | \$288,450    | \$400,697 | \$665,433 | \$978,483    | \$1,327,271 |
| \$77,513    | \$92,776   | \$97,546    | \$101,362   | \$102,316 | \$150,013  | \$212,209    | \$293,103 | \$483,891 | \$709,498    | \$960,860   |
| \$98,166    | \$118,593  | \$124,976   | \$130,082   | \$131,359 | \$195,191  | \$278,428    | \$386,687 | \$642,016 | \$943,941    | \$1,280,336 |
| \$82,527    | \$98,982   | \$104,124   | \$108,238   | \$109,266 | \$160,686  | \$227,738    | \$314,947 | \$520,628 | \$763,846    | \$1,034,831 |
| \$92,622    | \$111,699  | \$117,660   | \$122,430   | \$123,622 | \$183,236  | \$260,973    | \$362,079 | \$600,536 | \$882,511    | \$1,196,679 |
| \$91,700    | \$110,503  | \$116,379   | \$121,080   | \$122,255 | \$181,015  | \$257,638    | \$357,295 | \$592,335 | \$870,270    | \$1,179,935 |
| \$88,300    | \$105,993  | \$111,522   | \$115,946   | \$117,051 | \$172,342  | \$244,442    | \$338,215 | \$559,379 | \$820,905    | \$1,112,288 |
| \$87,888    | \$105,430  | \$110,911   | \$115,297   | \$116,393 | \$171,210  | \$242,692    | \$335,662 | \$554,931 | \$814,216    | \$1,103,103 |
| \$89,519    | \$107,961  | \$113,724   | \$118,334   | \$119,487 | \$177,117  | \$252,266    | \$350,006 | \$580,526 | \$853,115    | \$1,156,825 |
| \$88,139    | \$105,003  | \$110,273   | \$114,489   | \$115,543 | \$168,243  | \$236,964    | \$326,344 | \$537,144 | \$786,416    | \$1,064,145 |
| \$88,139    | \$105,205  | \$110,538   | \$114,805   | \$115,871 | \$169,203  | \$238,746    | \$329,196 | \$542,521 | \$794,778    | \$1,075,834 |
| \$86,986    | \$105,205  | \$110,898   | \$115,453   | \$116,592 | \$173,525  | \$247,767    | \$344,326 | \$572,060 | \$841,356    | \$1,141,396 |
| \$90,697    | \$106,088  | \$110,898   | \$114,746   | \$115,708 | \$163,807  | \$226,529    | \$308,105 | \$500,501 | \$728,010    | \$981,492   |
| \$123,824   | \$123,824  | \$123,824   | \$123,824   | \$123,824 | \$123,824  | \$123,824    | \$123,824 | \$123,824 | \$123,824    | \$123,824   |
| \$100,858   | \$114,991  | \$119,408   | \$122,941   | \$123,824 | \$167,990  | \$225,582    | \$300,487 | \$477,149 | \$686,053    | \$918,805   |
| \$104,576   | \$117,926  | \$122,098   | \$125,436   | \$126,270 | \$167,990  | \$222,393    | \$293,150 | \$460,030 | \$657,366    | \$877,230   |
| \$103,856   | \$117,288  | \$121,486   | \$124,844   | \$125,683 | \$167,658  | \$222,393    | \$293,582 | \$461,480 | \$660,020    | \$881,227   |
| \$96,190    | \$110,165  | \$114,532   | \$118,025   | \$118,899 | \$162,569  | \$219,516    | \$293,582 | \$468,265 | \$674,828    | \$904,973   |
| \$109,411   | \$122,889  | \$127,101   | \$130,470   | \$131,313 | \$173,432  | \$228,355    | \$299,789 | \$468,265 | \$667,488    | \$889,455   |
| \$110,146   | \$123,606  | \$127,812   | \$131,177   | \$132,019 | \$174,082  | \$228,933    | \$300,273 | \$468,527 | \$667,488    | \$889,163   |

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|          |           |           |           |           |           |           |           |           |           |           |
|----------|-----------|-----------|-----------|-----------|-----------|-----------|-----------|-----------|-----------|-----------|
| \$87,827 | \$105,606 | \$111,162 | \$115,607 |           |           |           |           |           |           |           |
| (0.35)   | 0.38      | 0.24      | 0.75      |           |           |           |           |           |           |           |
|          |           |           |           | \$124,814 | \$167,370 | \$222,862 | \$295,037 | \$465,259 | \$666,547 | \$890,815 |
|          |           |           |           | 0.80      | (0.37)    | 0.21      | 0.50      | (0.64)    | (0.14)    | 0.19      |
| \$88,353 | \$105,373 | \$110,613 | \$114,778 |           |           |           |           |           |           |           |
| 0.24     | 0.16      | (0.26)    | 0.03      |           |           |           |           |           |           |           |
|          |           |           |           | \$123,652 | \$166,783 | \$222,921 | \$295,758 | \$466,749 | \$667,507 | \$889,347 |
|          |           |           |           | (0.14)    | (0.72)    | 0.24      | 0.74      | (0.32)    | 0.00      | 0.02      |