

COMMONLY USED FORMULAS FOR DMR COMPLETION

TO CONVERT TO MILLION GALLONS PER DAY (mgd)

From gallons per minute

$$\text{Gallons per Minute (gpm)} \times 1440 \text{ minutes in a day} = \text{Gallons per Day (gpd)}$$

Example:

$$35 \text{ gpm} \times 1440 \text{ minutes in a day} = 50,400 \text{ gpd}$$

From gallons per day

$$\frac{\text{Gallons per Day}}{1,000,000 \text{ gallons}} = \text{Million Gallons per Day (mgd)}$$

Example:

$$\frac{50,400 \text{ gpd}}{1,000,000 \text{ gallons}} = 0.0504 \text{ mgd}$$

TO CALCULATE POUNDS PER DAY (lbs/d)

$$\text{Million gallons per day (mgd)} \times \text{concentration (mg/L)} \times 8.34 = \text{lbs/d}$$

$$\text{Effluent Flow Rate (gpm)} \times \text{Concentration (mg/L)} \times (0.012) = \text{lbs/d}$$

Example:

$$0.0504 \text{ mgd} \times 27 \text{ mg/L} \times 8.34 = 11.3 \text{ lbs/d}$$

$$35 \text{ gpm} \times 27 \text{ mg/L} \times 0.012 = 11.3 \text{ lbs/d}$$

TO CALCULATE PERCENT REMOVAL

$$\frac{\text{Influent Concentration mg/L} - \text{Effluent Concentration mg/L}}{\text{Influent Concentration mg/L}} \times 100\% = \% \text{ Removal}$$

Example:

$$\frac{189 \text{ mg/L Influent BOD}_5 - 26 \text{ mg/L BOD}_5}{189 \text{ mg/L Influent BOD}_5} \times 100\% = 86.2\%$$

TO CALCUALATE AVERAGES

Add all the sample results together and divide by the number of samples

Example:

$$\begin{array}{l} 26 \text{ mg/L Total Suspended Solids (TSS)} \\ 15 \text{ mg/L TSS} \\ 10 \text{ mg/L TSS} \\ \underline{23 \text{ mg/L TSS}} \\ 74 \text{ mg/L TSS} \end{array} \quad \frac{74 \text{ mg/L TSS}}{4 \text{ samples}} = 18.5 \text{ mg/L TSS Average}$$

TO CALCULATE GEOMETRIC MEAN

(Used to calculate average for *Fecal Coliform* and *E. Coli*)

1. Take the log value of each sample
2. Add the log value of each sample together
3. Divide by the number of samples
4. Take the antilog of the number for the geometric mean for the coliform result

Example:

1.

<u># of</u> <u>Colonies</u>	<u>Log</u>
6	= 0.77815
14	= 1.14612
31	= 1.49136
<u>12</u>	<u>= 1.07918</u>
2.	Total =4.494822

3. Divide the total by the number of samples (4) = 1.123706
4. Take the Antilog = 13.2955
5. Geometric Mean = 13 colonies/100 mL
6. Report the Geometric Mean as 13 colonies/100 mL

Easiest way? Use Excel

1. Enter numbers into a column on the spreadsheet, one number per cell
2. At the next empty row down type the command: =geomean
3. Select the cells with the numbers in parentheses: =geomean(A1:A5)
4. Press enter!

Or

1. Enter numbers into a column on the spreadsheet, one number per cell
2. Under 'Insert', select '**fx** Function' OR click '**fx**' on the Formula Bar (right above the spreadsheet)
3. Type 'geomean' in the 'Search for a function:' box and click 'Go' or press enter
4. GEOMEAN should be highlighted in the 'Select a function:' box, click 'OK' or press enter
5. A 'Function Arguments' box will open next. In the 'Number 1' box, the cell range should match the cells containing your sample values. Press 'OK'
6. The Geometric Mean is now displayed in the bottom cell.

CALCULATING GEOMETRIC MEAN WITH A CALCULATOR:

y^x button:

1. convert all zeros to 1 and drop all < symbols
2. multiply all of the numbers
3. divide one by the number of values
4. enter answer from step #2 into calculator
5. press button marked y^x or x
6. enter answer from step #3 into calculator
7. press '=' key

$x\sqrt[y]{}$ button:

1. convert all zeros to 1 and drop all < symbols
2. Multiply all sample results together
3. press the $x\sqrt[y]{}$ function key
4. enter the number of samples
5. press '='