

CONVERSION TABLE

AREA	TEMPERATURE
1 Acre = 43,560 Sq Ft 1 Sq Ft = 144 Sq Inches	$^{\circ}F = (^{\circ}C \times 1.8) + 32$ $^{\circ}C = (^{\circ}F - 32) \div 1.8$
FLOW	TIME
1 MGD = 694 GPM 1 MGD = 11.57 CFS 1 MGD = 1.55 CFS	1 Minute = 60 Seconds 1 Hour = 60 Minutes 1 Day = 24 Hours 1 Day = 1,440 Minutes
LENGTH	VOLUME
1 Foot = 12 Inches 1 Yard = 3 Ft 1 Mile = 5,280 Ft 1 Mile = 1,760 Yds	1 Cu Ft = 7.48 Gallons 1 Cu Yd = 27 Cu Ft
POWER	WEIGHT
1 hp = 0.746 Kilowatts	1 ml Water = 1 Gram 1 Gal Water = 8.34 Pounds 1 Cu Ft Water = 62.4 Pounds 1 Ton = 2,000 Pounds
PRESSURE	
1 psi = 2.31 Feet 1 Ft Water = 0.433 psi	
AREA (SQ FT)	VOLUME (CU FT)
Circle $(\pi)(\text{Radius})^2$ or $(0.785)(\text{Diameter})^2$	n/a
Cube n/a	(Length)(Width)(Height)
Cylinder n/a	$(\pi)(\text{Radius})^2(\text{Height})$ or $(0.785)(\text{Diameter})^2(\text{Height})$
Rectangle (Length)(Width)	(Length)(Width)(Height)
Square (Length)(Width)	(Length)(Width)(Height)
Circumference = $\pi(\text{Diameter})$	$\pi = 3.14$

BASIC FORMULAS (PONDS)

Population Loading, Person/Acre = $\frac{\text{Population Served, Persons}}{\text{Pond Surface Area, Acres}}$
Organic Loading, Lbs, = $\frac{\text{Flow, MGD}(\text{BOD, mg/l})(8.34)}{\text{BOD/Day/Acre Area, Acres}}$

WASTEWATER TREATMENT CONVERSION FACTORS AND FORMULAS

BASIC FORMULAS

Pounds of BOD or TSS = Flow, MGD x Concentration, mg/l x 8.34

BOD, mg/l = $\frac{(\text{Initial DO} - \text{Final DO}) \times \text{BOD Bottle Vol, ml}}{\text{Sample, ml}}$

Population Equivalent = $\frac{\text{Flow, MGD} \times \text{BOD, mg/l} \times 8.34}{0.17 \text{ Lbs, BOD/Person/Day}}$

Detention Time (Hours) = $\frac{\text{Tank Volume, Cu Ft} (7.48 \text{ Gal/Cu Ft}) 24 \text{ Hrs/Day}}{\text{Flow, Gal Per Day}}$

Detention Time (Days) = $\frac{\text{Volume, MG}}{\text{Flow, MGD}}$

F/M Ratio = $\frac{\text{Flow, MGD} \times \text{BOD, mg/l} \times 8.34}{\text{Lbs MLVSS in Aeration Tank}}$

$or = \frac{\text{BOD, mg/l} \times \text{Flow, MGD} \times 8.34}{\text{MLVSS, mg/l} \times \text{Vol in Aeration Tank, MG} \times 8.34}$

Hydraulic Loading or Surface = Flow, GPD
Loading, GPD/Sq Ft Surface Area, Sq Ft

Aerator Loading, Lbs/BOD, Day = Flow, MGD x BOD, mg/l x 8.34

Organic Loading, Activated Sludge = Flow, MGD x BOD, mg/l x 8.34
Volume in A.T., 1,000 Cu Ft

Organic Loading, Tr. Filter = Flow, MGD x BOD, mg/l x 8.34
Volume of Filter Media, 1,000 Cu Ft

Organic Loading, RBC = Soluble BOD Applied Lbs/Day
Surface Area of Media, 1,000 Sq Ft

M.C.R.T., Days = $\frac{\text{Lbs, MLSS in Secondary System}}{\text{Lbs/Day SS Wasted} + \text{Lbs/Day SS in Effluent}}$

Weir Overflow Rate, GPD/ft = $\frac{\text{Flow, GPD}}{\text{Length of Weir, Ft}}$

Oxygen Uptake Rate (OUR) = $\frac{(\text{DO}_1 \text{ mg/l} - \text{DO}_2 \text{ mg/l}) \times 60 \text{ Min/Hour}}{(\text{Time}_2 \text{ Min}) - (\text{Time}_1 \text{ Min})}$
Mg O₂/1/Hour

Respiration Rate (RR) = $\frac{\text{O}_2 \text{ Uptake, mg/l/Hour} \times 1000 \text{ mg/gm}}{\text{MLSS, mg/l}}$

BASIC FORMULAS (SLUDGE & SOLIDS)

Suspended Solids, mg/l = $\frac{(\text{W}_2) - (\text{W}_1)}{\text{ml Sample}} \times 1000 \times 1000$

Volatile Suspended Solids, mg/l = $\frac{(\text{W}_2) - (\text{W}_3)}{\text{ml Sample}} \times 1000 \times 1000$

Where W1 (Dish), W2 (Dish & Dry Solids), W3 (Dish & Ash)

Volatile Solids, Lbs = Dry Solids, Lbs x Raw Sludge, % VS
100%

Aerator Solids, Lbs = Tank Vol, MG x MLSS, mg/l x 8.34

Solids Applied, Lbs/Day = (Flow, MGD + RSR, MGD)(MLSS, mg/l x 8.34)

Solids Loading, Lbs/Day/Sq Ft = Solids Applied, Lbs/Day
Surface Area, Sq Ft

Sludge Volume Index (SVI), = $\frac{\text{SSV}_{15} \text{ ml/l} \times 1000 \text{ mg/g}}{\text{MLSS, mg/l}}$

Sludge Age = Lbs TSS in Aeration Basin
Lbs/Day TSS in Influent

Reduction on Volatile Solids, % = $\frac{\text{In} - \text{Out}}{\text{In}} \times 100$
In - (In x Out)

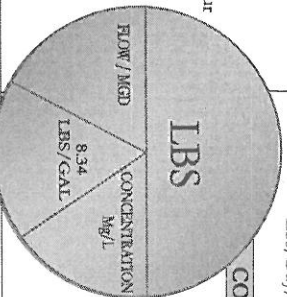
Percent Removal = $\frac{\text{Inf} - \text{Eff}}{\text{Inf}} \times 100$

Dry Solids, Lbs = Raw Sludge, Gal x Raw Sludge, % x 8.34
100%

Return Sludge Rate, MGD = $\frac{\text{Total Flow, MGD}(\text{Settleable Solids, \%})}{100\%}$

Digester Loading, = VS Added, Lbs/Day
Lbs/Day/Cu Ft Digester Vol, Cu Ft

CONCENTRATIONS & SOLUTIONS



Lbs, Chemical = $\frac{\text{Desired ppm} \times \text{Flow, MGD} \times 8.34}{\text{Purity of Chemical}}$
ppm = $\frac{\text{Lbs Chemical Fed}}{\text{MGD} \times 8.34}$
1% Solution = 10,000 mg/l