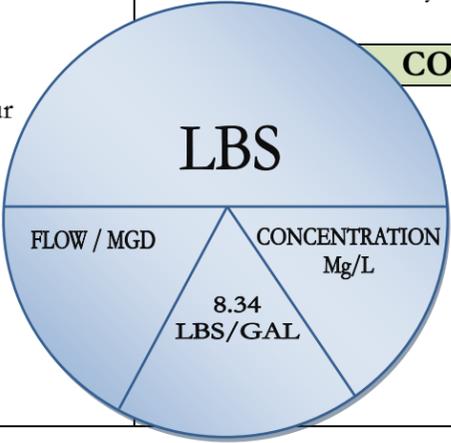


WASTEWATER TREATMENT CONVERSION FACTORS AND FORMULAS

CONVERSION TABLE	BASIC FORMULAS	BASIC FORMULAS (SLUDGE & SOLIDS)
<p>AREA</p> <p>1 Acre = 43,560 Sq Ft 1 Sq Ft = 144 Sq Inches</p> <p>TEMPERATURE</p> <p>°F = (°C x 1.8) + 32 °C = (°F - 32) ÷ 1.8</p> <p>FLOW</p> <p>1 MGD = 694 GPM 1 MGD = 11.57 GPM 1 MGD = 1.55 CFS</p> <p>LENGTH</p> <p>1 Foot = 12 Inches 1 Yard = 3 Ft 1 Mile = 5,280 Ft 1 Mile = 1,760 Yds</p> <p>POWER</p> <p>1 hp = 0.746 Kilowatts</p> <p>PRESSURE</p> <p>1 psi = 2.31 Feet 1 Ft Water = 0.433 psi</p> <p>TIME</p> <p>1 Minute = 60 Seconds 1 Hour = 60 Minutes 1 Day = 24 Hours 1 Day = 1,440 Minutes</p> <p>VOLUME</p> <p>1 Cu Ft = 7.48 Gallons 1 Cu Yd = 27 Cu Ft</p> <p>WEIGHT</p> <p>1 ml Water = 1 Gram 1 Gal. Water = 8.34 Pounds 1 Cu Ft Water = 62.4 Pounds 1 Ton = 2,000 Pounds</p>	<p>Pounds of BOD or TSS = Flow, MGD x Concentration, mg/l x 8.34</p> <p>BOD, mg/l = $\frac{(\text{Initial DO} - \text{Final DO}) \times \text{BOD Bottle Vol, ml}}{\text{Sample, ml}}$</p> <p>Population Equivalent = $\frac{\text{Flow, MGD} \times \text{BOD, mg/l} \times 8.34}{0.17 \text{ Lbs, BOD/Person/Day}}$</p> <p>Detention Time (Hours) = $\frac{(\text{Tank Volume, Cu Ft}) (7.48 \text{ Gal/Cu Ft}) 24 \text{ Hrs/Day}}{\text{Flow, Gal Per Day}}$</p> <p>Detention Time (Days) = $\frac{\text{Volume, MG}}{\text{Flow, MGD}}$</p> <p>FM Ratio = $\frac{\text{Flow, MGD} \times \text{BOD, mg/l} \times 8.34}{\text{Lbs MLVSS in Aeration Tank}}$</p> <p>or = $\frac{\text{BOD, mg/l} \times \text{Flow, MGD} \times 8.34}{\text{MLVSS, mg/l} \times \text{Vol in Aeration Tank, MG} \times 8.34}$</p> <p>Hydraulic Loading or Surface Loading, GPD/Sq Ft = $\frac{\text{Flow, GPD}}{\text{Surface Area, Sq Ft}}$</p> <p>Aerator Loading, Lbs/BOD, Day = Flow, MGD x BOD, mg/l x 8.34</p> <p>Organic Loading, Activated Sludge = $\frac{\text{Flow, MGD} \times \text{BOD, mg/l} \times 8.34}{\text{Volume in A.T., 1,000 Cu Ft}}$</p> <p>Organic Loading, Tr. Filter = $\frac{\text{Flow, MGD} \times \text{BOD, mg/l} \times 8.34}{\text{Volume of Filter Media, 1,000 Cu Ft}}$</p> <p>Organic Loading, RBC = $\frac{\text{Soluble BOD, Applied Lbs/Day}}{\text{Surface Area of Media, 1,000 Sq Ft}}$</p> <p>M.C.R.T., Days = $\frac{\text{Lbs, MLSS in Secondary System}}{\text{Lbs/Day SS Wasted} + \text{Lbs/Day SS in Effluent}}$</p> <p>Weir Overflow Rate, GPD/ft = $\frac{\text{Flow, GPD}}{\text{Length of Weir, Ft}}$</p> <p>Oxygen Uptake Rate (OUR) = $\frac{(\text{DO}_1, \text{mg/l} - \text{DO}_2, \text{mg/l}) \times 60 \text{ Min/Hour}}{\text{Mg O}_2/1/\text{Hour} (\text{Time}_2, \text{Min}) - (\text{Time}_1, \text{Min})}$</p> <p>Respiration Rate (RR) = $\frac{\text{O}_2 \text{ Uptake, mg/l/Hour} \times 1000 \text{ mg/gm}}{\text{MLSS, mg/l}} \text{ Mg O}_2/\text{Hour/Gm}$</p>	<p>Suspended Solids, mg/l = $\frac{(\text{W}_2) - (\text{W}_1) \times 1000 \times 1000}{\text{ml Sample}}$</p> <p>Volatile Suspended Solids, mg/l = $\frac{(\text{W}_2) - (\text{W}_3) \times 1000 \times 1000}{\text{ml Sample}}$</p> <p>Where W1 (Dish), W2 (Dish & Dry Solids), W3 (Dish & Ash)</p> <p>Volatile Solids, Lbs = $\frac{\text{Dry Solids, Lbs} \times \text{Raw Sludge, \% VS}}{100\%}$</p> <p>Aerator Solids, Lbs = Tank Vol, MG x MLSS, mg/l x 8.34</p> <p>Solids Applied, Lbs/Day = (Flow, MGD + RSF, MGD)(MLSS, mg/l x 8.34)</p> <p>Solids Loading, Lbs/Day/Sq Ft = $\frac{\text{Solids Applied, Lbs/Day}}{\text{Surface Area, Sq Ft}}$</p> <p>Sludge Volume Index (SVI), = $\frac{\text{SSV}_{30}, \text{ml/l} \times 1000 \text{ mg/g}}{\text{ml/gm MLSS, mg/l}}$</p> <p>Sludge Age = $\frac{\text{Lbs TSS in Aeration Basin}}{\text{Lbs/Day TSS in Influent}}$</p> <p>Reduction on Volatile Solids, % = $\frac{\text{In} - \text{Out}}{\text{In} - (\text{In} \times \text{Out})} \times 100$</p> <p>Percent Removal = $\frac{\text{Inf} - \text{Eff}}{\text{Inf}} \times 100$</p> <p>Dry Solids, Lbs = $\frac{\text{Raw Sludge, Gal} \times \text{Raw Sludge, \%} \times 8.34}{100\%}$</p> <p>Return Sludge Rate, MGD = $\frac{(\text{Total Flow, MGD})(\text{Settleable Solids, \%})}{100\%}$</p> <p>Digester Loading, = $\frac{\text{VS Added, Lbs/Day}}{\text{Lbs/Day/Cu Ft Digester Vol, Cu Ft}}$</p>
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, = $\frac{(\text{Flow, MGD})(\text{BOD, mg/l})(8.34)}{\text{BOD/Day/Acre Area, Acres}}$		



CONCENTRATIONS & SOLUTIONS	
1 mg/l = 1 ppm	
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	

