Board of Certification of Operators of Wastewater Treatment Facilities

WASTEWATER FORMULA SHEET

π (pi) = 3.1416

Circumference of a Circle = (π) (Diameter)

SURFACE AREA:

Circle = (π) (Radius)^2 OR (1/4) (π) (Diameter)^2 OR 0.785 (Diameter) (Diameter)

Rectangle = (Length) (Width)

Triangle = (1/2) (Base) (Height)

VOLUME:

Circular Tank = (π) (Radius)^2 (Height) OR (1/4) (π) (Diameter)^2 (Height) OR 0.785 (Diameter) (Diameter) (Height)

Rectangular Tank = (Length) (Width) (Height)

Cone = (1/3) (π) (Radius)^2 (Height)

TEMPERATURE CONVERSIONS:

F° = (C° + 17.78) (1.8)

C° = (F° - 32) (0.555)

ELECTRICAL:

Watts = (VOLTS) (AMPS)

Volts = (AMPS) (RESISTANCE)

1Kw - hr = 2.93 X 10^{-4} BTU's

MISCELLANEOUS CONVERSIONS:

1 Acre = 43,560 Feet^2

1 Feet^3 = 7.48 Gallons

1 Gallon (H_2O) = 8.34 Pounds

1 Meter^3 = 35.3 Feet^3

1 Gallon = 3.78 Liters

1 Pound = 0.45 Kilograms

Pounds (Lbs.) = (flow MGD) (mg/l) (8.34 Lbs/Gal)

Detention Time (hrs) $= \frac{\text{(Tank Vol. ft}^3\text{) (7.48 gal/ft}^3\text{) (24 hrs/day)}}{\text{Flow (gal/day)}}$

Sludge Age (days) $= \frac{\text{(MLSS mg/l) (Aeration Tank Vol. MG) (8.34 lb/gal)}}{\text{(Prim. Eff. SS mg/l) (Flow MGD) (8.34 lb/gal)}}$

Sludge Volume Index (ml/g) $= \frac{\text{(30 min. sett. solids in ml/l) (1000)}}{\text{MLSS (mg/l)}}$

Wasting Rate (MGD) $= \frac{\text{Solids to be wasted in Lbs/day}}{\text{(RAS Conc. mg/l) (8.34 lb/gal)}}$

Wasting Rate (pounds) $= \frac{\text{(Vol. of Aera. Tank in MG + Clarifiers in MG)}}{\text{(Present MLSS – Desired MLSS) (8.34 lb/gal)}}$

MCRT (days) $= \frac{\text{(Vol. of Aera. Tank + Clarifiers in MG) (MLVSS)}}{\text{[(Flow in MGD) (Effluent VSS)] + [(WAS Flow) (Was VSS)]}}$

RAS Rate (% of Flow) $= \frac{\text{30 min settleability in ml.}}{\text{(1000 ml. – 30 min. settleability in ml.)}}$

RAS Rate (MGD) $= \frac{\text{(RAS Settleable Solids in ml/l) (Flow in MGD)}}{\text{(1000 ml/l – RAS Settleable Solids in ml/L)}}$

Surface
Loading Rate (gpd/ft^2) $= \frac{\text{Flow in gpd}}{\text{Area in (ft.}^2\text{)}}$

Weir Overflow Rate (gpd/ft) $= \frac{\text{Flow in gpd}}{\text{Weir Length in ft.}}$

B.O.D. (mg/l) $= \frac{\text{(Initial D.O. – Final D.O.) (300)}}{\text{Sample in ml.}}$

B.O.D. (mg/l) $= \frac{\text{(Initial D.O. – Final D.O.) (100)}}{\text{\% Sample}}$

Suspended Solids (mg/l) $= \frac{\text{(Wt.}_2\text{ – Wt.}_1\text{) (1,000,000)}}{\text{Sample Size in ml.}}$

Efficiency (%) $= \frac{\text{(Value IN – Value OUT) (100)}}{\text{Value IN}}$

Reduction of
Volatile Matter (%) $= \frac{\text{(Value IN – Value OUT) (100)}}{\text{(Value IN – [(Value IN)(Value OUT)]}}$

$\frac{\text{FOOD}}{\text{MASS}} = \frac{\text{LBS of Incoming “food”}}{\text{LBS of Available Biomass}} = \frac{\text{(Flow MGD) (Aera. Tank Influent BOD in mg/l)(8.34lb/gal)}}{\text{(MLVSS) (Aera. Tank Volume in MG) (8.34 lb.gal)}}$

Geometric Mean = (all the individual results multiplied together)$^{1/\text{total no. of samples}}$