USEFUL WATER and WASTEWATER FORMULAS

Dosage mg/l = (chemical feed, lbs/day) ÷ (MGD x 8.34)

Chemical feed, lbs/day = MGD x 8.34 x mg/l Note: Divide your answer by the % purity of the chemical if it is not 100%.

1% = 10,000 mg/l

$^oF = (^oC \times 9 \div 5) + 32^o$ –or- $(^oC \times 1.8) + 32^o$

$^oC = (^oF - 32^o) \times 5 \div 9$ –or- $(^oF - 32^o) \div 1.8$

Efficiency, % = [(in – out) ÷ in] x 100

1 HP = 0.746 Kw

Water HP = (gpm x head, ft) ÷ 3960

Brake HP = (gpm x head, ft) ÷ (3960 x pump efficiency)

Motor HP = (gpm x head, ft) ÷ (3960 x pump efficiency x motor efficiency)

Motor efficiency = (gpm x head, ft x 0.746) ÷ (3960 x Kw)

Average (geometric mean) = [(X1)(X2)(X3)(X4)(Xn)] 1/n [The nth root of the product of n numbers]

Detention time = volume ÷ flow

Flow, ft^3/sec = (area, ft^2) x (velocity, ft/sec)

Velocity = distance ÷ time

Surface Loading, gpd/ft^2 = (flow, gpd) ÷ surface area, ft^2

Weir overflow, gpd/ft = flow/gpd ÷ weir length, feet

Lagoon organic loading, lbs BOD/acre = BOD applied, lbs ÷ surface area, acres

Trickling filter organic loading, lbs BOD/day/1,000 ft^3 = BOD applied, lbs per day ÷ 1,000 ft^3

MLVSS, lbs = (BOD, mg/l x flow, MGD x 8.34) ÷ F/M desired

F/M = BOD lbs/day ÷ MLVSS, lbs

SVI = (settleability, ml/l x 1000) ÷ MLSS, mg/l

TSS, mg/l = [(crucible & dry sample wt, g – crucible wt, g) ÷ sample volume, ml] x 1,000,000

BOD, mg/l = [(initial DO, mg/L – final DO, mg/l) ÷ sample volume, ml] x sample size (1000 or 300)

Concentration: concentration (1) x volume (1) = concentration (2) x volume (2)

$V_2 = (C_1 \times V_1) \div C_2$ $C_2 = (C_1 \times V_1) \div V_2$

Filtration rate gpm/ft^2 = flow, gpm ÷ surface area, ft^2

Backwash rate, gpm/ft^2 = backwash flow, gpm ÷ surface area, ft^2

Specific capacity = yield ÷ drawdown

yield = gpm drawdown = static level – pumping level