Land Application Loading Equations

1. **Hydraulic Loading**

   \[ L_w + P_r = E_T + W_p + R \]

   Where 
   - \( L_w \) = wastewater hydraulic loading rate, (in/mo)
   - \( P_r \) = design precipitation, (in/mo)
   - \( E_T \) = evapotranspiration, (in/mo)
   - \( W_p \) = percolating water, (in/mo) [must = 0 for overland flow systems]
   - \( R \) = net runoff, (in/mo) [must = 0 for slow rate system]

2. **Nitrogen Loading**

   \[ L_n + K = U + D + 2.7 W_p C_p \]

   where 
   - \( L_n = 2.7 C_n L_w \) = wastewater nitrogen loading (lb/acre-yr)
   - \( C_n \) = applied nitrogen concentration from the pretreatment facility (mg/l).
   - \( L_w \) = wastewater hydraulic loading, (ft/yr)
   - 2.7 = conversion factor.
   - \( K \) = All other nitrogen sources, (lb/acre-yr)
   - \( U \) = Crop nitrogen uptake, (lb/acre-yr)
   - \( D \) = Denitrification, (lb/acre-yr)
   - \( W_p \) = Percolating water, (ft/yr)
   - \( C_p \) = Percolate nitrogen concentration, (mg/l)

3. **Nitrogen Loading**

   Total Effluent Nitrogen concentration = mg/L
   Total Wastewater volume to be land applied from storage cell = MG
   Total Effluent Nitrogen mass with 20% loss (Conc. Mg/L X volume MG x 8.34) = lb
   Available Land application area = Acres
   Effluent Nitrogen Loading Rate (Mass lb/Area Acres) = lb/Acre

4. **Phosphorous Loading**

   Total Effluent Phosphorous concentration = mg/L
   Total Wastewater volume to be land applied from storage cell = MG
   Total Effluent Phosphorous mass (Conc. Mg/L X volume MG x 8.34) = lb
   Available Land application area = Acres
   Effluent Phosphorous Loading Rate (Mass lb/Area Acres) = lb/Acre