

Important Runoff Flow and Peak Algorithm Formulas PDF



Formulas Examples with Units

List of 13 Important Runoff Flow and Peak Algorithm Formulas

1) Flow-Duration Curve Formulas ↻

1.1) Number of Data Points given Percentage Probability of Flow Magnitude Formula ↻

Formula

$$N = \left(m \cdot \frac{100}{P_p} \right) - 1$$

Example

$$26.027 = \left(4 \cdot \frac{100}{14.8} \right) - 1$$

Evaluate Formula ↻

1.2) Order Number of Discharge given Percentage Probability of Flow Magnitude Formula ↻

Formula

$$m = P_p \cdot \frac{N + 1}{100}$$

Example

$$3.996 = 14.8 \cdot \frac{26 + 1}{100}$$

Evaluate Formula ↻

1.3) Percentage Probability of Flow Magnitude Formula ↻

Formula

$$P_p = \left(\frac{m}{N + 1} \right) \cdot 100$$

Example

$$14.8148 = \left(\frac{4}{26 + 1} \right) \cdot 100$$

Evaluate Formula ↻

2) Natural Flow Formulas ↻

2.1) Change in Storage Volumes Formula ↻

Formula

$$\Delta S_v = R_N - R_o + V_r - V_d - E_M - F_x$$

Evaluate Formula ↻

Example with Units

$$20 = 174 \text{ m}^3/\text{s} - 50 \text{ m}^3/\text{s} + 10 \text{ m}^3/\text{s} - 12 \text{ m}^3/\text{s} - 2 - 100$$



2.2) Natural Flow Volume Formula

Formula

Evaluate Formula 

$$R_N = (R_o - V_r) + V_d + E_M + F_x + \Delta S_v$$

Example with Units

$$174 \text{ m}^3/\text{s} = (50 \text{ m}^3/\text{s} - 10 \text{ m}^3/\text{s}) + 12 \text{ m}^3/\text{s} + 2 + 100 + 20$$

2.3) Net Evaporation Losses from Reservoir on Stream Formula

Formula

Evaluate Formula 

$$E_M = R_N - R_o + V_r - V_d - F_x - \Delta S_v$$

Example with Units

$$2 = 174 \text{ m}^3/\text{s} - 50 \text{ m}^3/\text{s} + 10 \text{ m}^3/\text{s} - 12 \text{ m}^3/\text{s} - 100 - 20$$

2.4) Net Export of Water from Basin Formula

Formula

Evaluate Formula 

$$F_x = R_N - R_o + V_r - V_d - E_M + \Delta S_v$$

Example with Units

$$140 = 174 \text{ m}^3/\text{s} - 50 \text{ m}^3/\text{s} + 10 \text{ m}^3/\text{s} - 12 \text{ m}^3/\text{s} - 2 + 20$$

2.5) Observed Flow Volume at Terminal Site given Natural Flow Volume Formula

Formula

Evaluate Formula 

$$R_o = R_N + V_r - V_d - E_M - F_x - \Delta S_v$$

Example with Units

$$50 \text{ m}^3/\text{s} = 174 \text{ m}^3/\text{s} + 10 \text{ m}^3/\text{s} - 12 \text{ m}^3/\text{s} - 2 - 100 - 20$$

2.6) Volume Diverted Out of Stream Formula

Formula

Evaluate Formula 

$$V_d = R_N - R_o + V_r - E_M - F_x - \Delta S_v$$

Example with Units

$$12 \text{ m}^3/\text{s} = 174 \text{ m}^3/\text{s} - 50 \text{ m}^3/\text{s} + 10 \text{ m}^3/\text{s} - 2 - 100 - 20$$

2.7) Volume of Return Flow Formula

Formula

Evaluate Formula 

$$V_r = -R_N + R_o + V_d + E_M + F_x + \Delta S_v$$

Example with Units

$$10 \text{ m}^3/\text{s} = -174 \text{ m}^3/\text{s} + 50 \text{ m}^3/\text{s} + 12 \text{ m}^3/\text{s} + 2 + 100 + 20$$



3) Sequent Peak Algorithm Formulas

3.1) Inflow Volume given Net Flow Volume Formula

Formula

$$x_i = V_f + D_i$$

Example with Units

$$15.1 \text{ m}^3/\text{s} = 10.1 \text{ m}^3/\text{s} + 5 \text{ m}^3/\text{s}$$

Evaluate Formula 

3.2) Net Flow Volume Formula

Formula

$$V_f = x_i - D_i$$

Example with Units

$$10 \text{ m}^3/\text{s} = 15 \text{ m}^3/\text{s} - 5 \text{ m}^3/\text{s}$$

Evaluate Formula 

3.3) Outflow Volume given Net Flow Volume Formula

Formula

$$D_i = x_i - V_f$$

Example with Units

$$4.9 \text{ m}^3/\text{s} = 15 \text{ m}^3/\text{s} - 10.1 \text{ m}^3/\text{s}$$

Evaluate Formula 



Variables used in list of Runoff Flow and Peak Algorithm Formulas above

- D_i Outflow Volume (Cubic Meter per Second)
- E_M Net Evaporation Losses
- F_x Net Export of Water from Basin
- m Order Number of Discharge
- N Number of Data Points
- P_p Percentage Probability
- R_N Natural Flow Volume (Cubic Meter per Second)
- R_o Observed Flow Volume (Cubic Meter per Second)
- V_d Volume Diverted Out of Stream (Cubic Meter per Second)
- V_f Net Flow Volume (Cubic Meter per Second)
- V_r Volume of Return Flow (Cubic Meter per Second)
- x_i Inflow Volume (Cubic Meter per Second)
- ΔS_v Change in Storage Volumes

Constants, Functions, Measurements used in list of Runoff Flow and Peak Algorithm Formulas above

- **Measurement: Volumetric Flow Rate** in Cubic Meter per Second (m^3/s)
Volumetric Flow Rate Unit Conversion 



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