Appendix VII

Dilution Factor Calculations for Massachusetts and New Hampshire

The calculations provided below are for your information, if needed, to use in calculating and determining your effluent limitations for Total Residual Chlorine. The state permitting authority must be contacted, via email at the addresses listed below to confirm the annual 7Q10 low flow for the facility prior to completing the NOI requirements for the permit.

Massachusetts: robert.kubit@state.ma.us New Hampshire: amy.clark@des.nh.gov

Prior to contacting the state permitting authority, new applicants may wish to view the 7Q10 data posted at the **USGS StreamStats** website at http://water.usgs.gov/osw/streamstats/index.html.

Note: The dilution factor in New Hampshire is calculated using two different equations based on the use of the receiving water as the applicant's public water supply. Also, New Hampshire requires a 10% reserve of the river's assimilative capacity according to Env-Wq 1705.01.

Massachusetts:

Equation used to calculate the dilution factor at the outfall

$$\text{Dilution Factor} = \frac{Q_R + (Q_P \times 1.55)}{Q_P \times 1.55}$$

Where:

- Q_R = Estimated 7Q10 low flow for the receiving water at the outfall, in cubic feet per second (cfs).
- Q_P = Discharge rate, in million gallons per day (MGD)
- 1.55 = Factor to convert mgd to cfs.

EXAMPLE:

Q_R = 325 cfs
Q_P = 3.2 mgd

$$\text{Dilution Factor} = \frac{Q_R + (Q_P \times 1.55)}{Q_P \times 1.55} = \frac{325 + (3.2 \times 1.55)}{3.2 \times 1.55} = \mathbf{66.5}$$

For New Hampshire:

Method 1: When the water supply is from outside the drainage basin.

Equation used to calculate the dilution factor at the outfall

$$\text{Dilution Factor} = \frac{Q_R + (Q_P \times 1.55)}{Q_P \times 1.55} \times 0.9$$

Where:

- Q_R = Estimated 7Q10 low flow for the receiving water at the outfall, in cubic feet per second (cfs).
- Q_P = Discharge rate, in million gallons per day (mgd).
- 1.55 = Factor to convert mgd to cfs.
- 0.9 = Factor to reserve of 10 percent of river's assimilative capacity.

EXAMPLE

Q_R = 325 cfs
Q_P = 3.2 mgd

$$\text{Dilution Factor} = \frac{Q_R + (Q_P \times 1.55)}{Q_P \times 1.55} \times 0.9 = \frac{325 + (3.2 \times 1.55)}{3.2 \times 1.55} \times 0.9 = \mathbf{59.9}$$

Method 2: When the water supply is from the drainage basin.

Equation used to calculate the dilution factor at the outfall

$$\text{Dilution Factor} = \frac{Q_R}{Q_P \times 1.55} \times 0.9$$

Where:

- Q_R = Estimated 7Q10 low flow for the receiving water at the outfall, in cubic feet per second (cfs).
- Q_P = Discharge rate, in million gallons per day (mgd).
- 1.55 = Factor to convert mgd to cfs.
- 0.9 = Factor to reserve 10 percent of river's assimilative capacity.

EXAMPLE

Q_R = 325 cfs
Q_P = 3.2 mgd

$$\text{Dilution Factor} = \frac{Q_R}{Q_P \times 1.55} \times 0.9 = \frac{325}{(3.2 \times 1.55)} \times 0.9 = \mathbf{59.0}$$