APPENDIX VII
DILUTION FACTOR CALCULATIONS FOR MASSACHUSETTS AND NEW HAMPSHIRE

Prior to completing the NOI requirements for the PWTF GP, facilities that discharge in New Hampshire *must* contact the state permitting authority at the e-mail address listed in Appendix VI of the PWTF GP to determine and/or confirm the 7Q10 of the receiving water, dilution factor, other appropriate hydrologic conditions, or to request consideration of diffuser dilution. For facilities that discharge in Massachusetts, it is *highly recommended* to contact MassDEP to determine and/or confirm the 7Q10 and dilution factor prior to submitting the NOI.

The calculations provided below are used in calculating and determining water quality-based effluent limitations for discharges to freshwater rivers and streams.

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. Additionally, New Hampshire requires a 10% reserve of the river's assimilative capacity according to Env-Wq 1705.01.

For 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

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

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

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

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

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