APPENDIX VII
DILUTION FACTOR CALCULATIONS FOR
MASSACHUSETTS AND NEW HAMPSHIRE

Prior to completing the NOI requirements for the PWTF GP, the state permitting authority must be contacted at the 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. New applicants with discharges in Massachusetts may wish to view the 7Q10 data posted at the USGS StreamStats website at http://water.usgs.gov/osw/streamstats/index.html, before contacting the state permitting authority.

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

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

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

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