Attachment U
Total Residual Chlorine Limitation
Sample Calculation
for Combined Sewer Overflows (CSOs)
NPDES Permit No. MA0103284
Boston, MA

Given:
Dr = dilution ratio = (4 parts receiving water to 1 part effluent) = 4 : 1
Df = dilution factor = (dilution ratio plus one) = 5
A = acute water quality limitation (maximum hourly limit) = 0.1 mg/l
C = chronic water quality limitations (average of the samples taken during the discharge event) = 0.05 mg/l

Calculations:
1. Acute Limitation (A)

MA Water Quality Standard for total residual chlorine = salt water, 0.013 mg/l; fresh water, 0.019 mg/l.
Salt Water Limit = Water Quality Standard x dilution factor = (0.013 mg/l x 5) = 0.065 mg/l = 0.1 mg/l
Fresh Water Limit = Water Quality Standard x dilution factor = (0.019 mg/l x 5) = 0.095 mg/l = 0.1 mg/l
Therefore, the hourly maximum limitation for all CSOs listed under Part I.16.a. of the Permit = 0.1 mg/l

2. Chronic Limitation (C)

*Water Quality Limitation for total residual chlorine = 0.05 mg/l (salt and fresh water).
Salt Water Limit = Water Quality Standard x dilution factor = (0.05 mg/l x 5) = 0.25 mg/l.
Fresh Water Limit = Water Quality Standard x dilution factor = (0.05 mg/l x 5) = 0.25 mg/l.
Therefore, the average chronic limitation for all CSOs listed under Part I.16.a. of the Permit = 0.25 mg/l.\

*Based on a study called: *Acute Toxic Effects of Chlorinated Primary Sewage Effluent on Brook Trout and Brown Trout*, Manchester, Vermont, Batten Kill River, by Peter M. Nolan, U.S.E.P.A., Region I.