MEMORANDUM

To: File, Taunton WWTP, NPDES No. MA0100897

From: Susan Murphy, Permit Writer

Date: December 15, 2014

Re: September 16, 2014 Supplemental Comments submitted by John Hall

EPA received the above document, characterized by the sender as "supplemental comments" on the Taunton WWTP Draft Permit, by email on September 16, 2014. Note the public comment period on the Draft Permit closed on June 17, 2013 and therefore this is not a timely comment pursuant to 122 C.F.R. 40 C.F.R. § 124.17(a)(2), and therefore no response is required. EPA has included the document in the Administrative Record for the Final Permit and considered the content of the comment as follows:

Professor Chapra mischaracterizes the nitrogen analysis, which does not contend that DO is the "single factor controlling the DO regime". Rather, TN discharges have reasonable potential to cause, or contribute to, cultural eutrophication leading to DO impacts, and reductions in TN loads are therefore necessary. This issue is addressed in the timely submitted comments.

Professor Chapra also seeks to distinguish estuaries as flowing, advective systems for which choice of TN as a stressor would be inappropriate. This characterization of estuarine systems is incorrect, as estuaries have both advective and dispersive transport. This aspect of estuarine water quality analysis is recognized in Professor Chapra's own textbook on water quality modelling:

> In particular we focus on aspects of estuarine transport that have a bearing on water-quality modeling. . . . Depending on the scale of the problem being addressed, the tidal motion can be perceived as being either advective or dispersive. For short-scale problems such as the discharge of highly reactive substances or spills, the motion would be perceived primarily as advection. On a longer time scale, however, the tides would move water back and forth in a cyclical fashion and the motion might be characterized as dispersive.
>
> In this lecture we limit ourselves primarily to the long-term perspective. Thus we focus on the steady-state condition averaged over a number of tidal cycles.

Chapra, *Surface Water Quality Modeling*, pp. 260-61 (1997). Professor Chapra's appendix concerns a purely advective system so is not on point; further it supports the relationship between total nutrient concentration and phytoplankton growth at downstream points where steady state has been reached; the nitrogen analysis at issue concerns downstream impacts under longer term steady state conditions. (EPA notes that the long time frame for reaching steady state in the Appendix plots is related to a low value assumed for the parameter k_g of 0.5 d^{-1}; whereas Chapra's textbook states, "It is known that the phytoplankton growth rate is on the order

of 2 d^{-1}" *Id.* at 604). The choice of TN as a stressor is addressed in the timely submitted comments.

EPA notes that all modeling involves simplifications; for example steady state analysis of water quality issues is always a simplification of dynamic processes but is recognized as having utility under appropriate time scales. See *id.* The specific assumptions identified by Chapra are addressed in the timely submitted comments.