

Users Guide for Nutrient Loadings Tables

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In early 2008, HydroQual prepared tabulations of nutrient loadings used in the System Wide Eutrophication Model (SWEM) for the HEP Nutrient Work Group (NWG). The purpose of the loadings tables is to remind the HEP Nutrient Work Group of the loading conditions used for modeling work to this point as well as to illustrate the level of detail to which loadings would need to be specified in the future if alternative loadings are desired for TMDL related modeling work. The loadings tabulations are available as a 141-page PDF in either English or metric units. It is intended that these loading tables will be made web available by EPA.

Pages 1-12 of the PDF summarize all carbon and nitrogen loading source categories to a given water body. These pages are handy for quickly getting a sense of the largest loading to a given waterway.

Pages 13-47 address tributary loadings of nitrogen, carbon, and dissolved oxygen. The tables include both mass per time loadings resulting from 1988 and 1989 upstream water flow records and user-defined concentrations specified in a SWEM input file (i.e., lbs/day) as well as a listing of the user-specified concentrations from a SWEM input file (i.e., mg/L). The user-specified concentrations in the baseline column are based on data collected during the 1994-95 field program conducted in support of the development of SWEM. These input concentrations, based on 1994-95 data were further verified by comparing to data more recently collected by the Passaic Valley Sewerage Commissioners (PVSC) and the New Jersey Harbor Dischargers Group (NJHDG). The comparisons are summarized in a HydroQual technical memorandum of September 23, 2005 to NJDEP. A concurrence letter was written by the NJDEP in March 2006. With NJDEP's permission, EPA Region 2 can make both of these documents web available.

Pages 48-71 display SW and CSO loadings in mass/time units. The time variable flow components of these loadings are related to 1988 and 1989 precipitation records and landside/watershed/sewershed volumetric loading models. The constant concentration portions of these loadings, as specified in the baseline column, are based on measurements collected largely in 1994-95 in support of the calibration of SWEM.

Pages 72-105 display STP loadings in mass/time units. The basis of the loadings shown in the baseline column are 1994-95 DMRs and effluent sampling conducted in 1994-95 in support of

SWEM.

All of the tabulations displayed on pages 1-105 include four distinct conditions for tabulating loadings with column headings labeled as: baseline; baseline plus Clean Air Interstate Rule (CAIR) benefits plus the Long Island Sound Study (LISS) TMDL plus the Jamaica Bay (JB) Consent Order; HydroQual Scenario; and Pastoral. Each of these conditions is briefly described below and where possible a reference is given. It is intended that EPA will make the references web available.

Baseline - The baseline loading condition was carefully selected by the Nutrient Work Group in fall 2002. The baseline includes the rainfall of calendar years 1988 and 1989 with nutrient loadings based largely on 1994-95 measurements. The baseline conditions include the hydrologic and meteorological conditions of the 24 month period 1988 and 1989 as well as point source loadings representative of the attainment of secondary treatment at all STPs. Point source loadings used in the model are based primarily on measurements collected during 1994-95 for the calibration of SWEM and 1994-95 Discharge Monitoring Reports (DMRs) obtained from EPA's Permit Compliance System (PCS). Where necessary, adjustments were made to include upgrades to secondary treatment occurring subsequent to 1994-95 (i.e., Owls Head and Newtown Creek). Notes of numerous Work Group meetings and conference calls prior to and including 12-17-2002 document the selection process. The 1994-95 concentration measurements defining baseline loadings and used initially to calibrate SWEM are described and presented in two documents:

HydroQual, Inc, 2002. *Calibration Enhancement of the System-Wide Eutrophication Model (SWEM) in the New Jersey Tributaries*. Final technical report prepared for the State of New Jersey Department of Environmental Protection under contract agreement with the Passaic Valley Sewerage Commissioners.

HydroQual, Inc. 1999. *Newtown Creek Water Pollution Control Project East River Water Quality Plan Task 10.0 System-Wide Eutrophication Model (SWEM) Sub-task 10.2 Obtain and Reduce Loading/Water Quality Data*. Final technical report prepared for the City of New York Department of Environmental Protection under contract agreement with Greeley and Hansen, New York, NY.

Baseline plus Clean Air Interstate Rule (CAIR) benefits plus the Long Island Sound Study (LISS) TMDL plus the Jamaica Bay (JB) Consent Order - This SWEM simulation was a first attempt to upgrade SWEM NWG baseline loadings to reflect expected loadings through planned improvements. This loading condition was approved by the Nutrient Work Group as

representing a conservative estimate of expected conditions resulting from major planned improvements. It was intended that these loadings could serve as an improved baseline from which sub-regional planned improvements and other potential future actions could be evaluated. Individual portions of the loading conditions are described in several places including: for the Jamaica Bay Consent Order, an April 2, 2007 memorandum from HydroQual to Bob Nyman; for CAIR related loadings, a July 2006 HydroQual report, *Use of SWEM to Address HEP TMDL Oversight Group Nutrient Management Questions*; and for LISS TMDL loadings, July 2006 and August 2006 memoranda from HydroQual to Mark Tedesco, Paul Stacey, and Ron Entringer, *Loadings for TMDL Scenario and C Loadings for TMDL Scenario*.

HydroQual Scenario - This SWEM simulation was particularly useful in addressing the “What Would It Take?” question posed by the TMDL Oversight Group. Essentially, this loading condition illustrates one example of nutrient loadings that could result in a Harbor near attainment of water quality standards. The July 2006 HydroQual report, *Use of SWEM to Address HEP TMDL Oversight Group Nutrient Management Questions* provides a description.

Pastoral - This SWEM simulation attempts to define an upper limit on what water quality in the Harbor could be absent anthropogenic influences. This loading condition is described in the HydroQual August 2005 document, *Second Pastoral Scenario Results*.

Tabulations on pages 106-139 repeat the STP loadings from tables on pages 72-105 and also include tabulations of the loadings considered in costing analyses performed for HEP by the dischargers. The additional columns presented here correspond to the various levels of treatment considered in the costing analysis.

Tabulations on pages 140 and 141 display atmospheric loadings considered in SWEM.