# EFDC Read Me for EPA Version 1.01

This is the Read Me file for EFDC – EPA Version 1.01. The Environmental Fluid Dynamics Code (EFDC) is a multifunctional surface water modeling system, which includes hydrodynamic, sediment-contaminant, and eutrophication components. The public domain EFDC model was developed by Dr. John M. Hamrick at the Virginia Institute of Marine Science and is currently maintained by Tetra Tech, Inc. with support from the U.S. EPA. EFDC has been used for more than 80 modeling studies of rivers, lakes, estuaries, coastal regions and wetlands in the United States and abroad.

Questions regarding EFDC and its supporting software and documents should be submitted to the Center for Exposure Assessment Modeling (CEAM) that is located at the Ecosystems Research Division of EPA's National Exposure Research Laboratory in Athens, GA. Questions should be submitted using the following web page: https://www.epa.gov/ceam/forms/contact-us-about-environmental-modeling-community-practice

The folder created by EFDC's install program copies the following material to your system:

**EFDC_Brochure.pdf** – one page brochure that summarizes the capabilities of EFDC.

**EFDC_References.pdf** – list of journal papers, book chapters, conference proceedings, technical and application reports that describe the application of EFDC. Note – this is a slightly dated list.

**EFDC Manuals** – This directory contains for following four manuals:

EFDC_User_Manual_EPA_Ver-101.pdf – this is the user manual for EFDC.

EFDC_Hydrodynamics_&_Mass_Transport_Manual.pdf – This is the first volume of the theoretical and computational documentation for the Environmental Fluid Dynamics Code (EFDC). It describes the hydrodynamics and mass transport aspects of the EFDC three-dimensional computer code for environmental fluid flows.

EFDC_Sediment_Contaminant_Transport_Manual.pdf – This is the second volume of the theoretical and computational documentation for the Environmental Fluid Dynamics Code (EFDC). It describes the internally linked sediment and contaminant transport modules in EFDC.

EFDC_Water_Quality_Manual.pdf - This is the third volume of the theoretical and computational documentation for the Environmental Fluid Dynamics Code (EFDC). It describes the internally linked water quality module in EFDC.

**Model Applications** – This directory contains four subdirectories that contain the input files and the efdc.exe file for four EFDC applications. The four model applications are:

**Charles River GVC Model** – This is a three-dimensional (3D) hydrodynamic, salinity, heat, and water quality model of a portion of the Charles River, MA. 16 water quality state variables are simulated. A GVC (generalized vertical coordinate) grid with a maximum of eight layers is used, with 3 sigma layers used in the sigma region. The number of active cells is 56, and the numerical grid is 45 rows by 5 columns. Please refer to the technical memo entitled "Theoretical and Computational Aspects of the Generalized Vertical Coordinate Option in the EFDC Model" for more information about the use of GVC grids.

**Charles River Sigma Model** – This is a three-dimensional (3D) hydrodynamic, salinity, heat, and water quality model of a portion of the Charles River, MA. 16 water quality state variables are simulated. A standard sigma vertical grid with eight layers is used, the number of active cells is 56, and the numerical grid is 45 rows by 5 columns. A report on this modeling is included in this folder.

**Green River** – This is a two-dimensional (2D), vertically averaged hydrodynamic, and cohesive and non-cohesive sediment transport model of the Green River in MA. A standard sigma vertical grid is used, the number of active cells is 2304, and the numerical grid is 130 rows by 30 columns. Wetting and drying of grid cells is also simulated. This directory also contains a technical memorandum entitled Green_River_Report.pdf that describes this model application.

**Simple Estuary** - This is a three-dimensional (3D) hydrodynamic, salinity and a conservative dye transport model of a small estuary. A standard sigma vertical grid is used, the number of active cells is 120, and the numerical grid is 17 rows by 13 columns. Wetting and drying of grid cells is also simulated.

The efdc.exe files included in this package are for use on computers with IA-32 architecture with the Windows Operating System (OS). If an executable that operates on a Linux OS is needed, please submit this request to CEAM along with the pertinent information regarding the computer's architecture.

**Reports** – This directory contains three EFDC application reports.

**Reprints** – This directory contains four journal article and conference paper reprints that described different EFDC applications.

**Tech Memos** – Two technical memos describing model extensions not documented in the current versions of the theory reports are included in this directory. One document describes the new bed thermal model, and the other describes the generalized vertical coordinate option. It is important to note that it is not possible to simulate sediment or contaminant transport using the generalized vertical coordinate option (i.e., vertical grids that contain both sigma and rescaled height regions) the current version of EFDC. Sediment and/or contaminant transport simulations need to be performed using a sigma vertical grid.

**Utility Programs** – Grid generation, initialization, harmonic analysis, and time series analysis programs are included in this directory. Note that the GEFDC grid generator Fortran program is documented in the main EFDC user manual.