

**Status Report**  
**Modeling Technical Review Group (MTRG)**  
**Savannah Harbor Expansion Project**  
**April 30, 2002**

A meeting was held on Tuesday, April 30, 2002 in Atlanta, GA at the EPA offices. The goals of the meeting were as follows:

- Review comments on the Hydrodynamic and Salinity Model Approval Package dated April 2, 2002.
- Present the set-up and preliminary calibration of 2-D and 3-D BFWASP water quality models.

The following persons attended the meeting and participated in the MTRG discussions:

Bo Ellis	ATM	843-884-8750	boellis@worldnet.att.net
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**Introduction**

Roy Burke began the meeting by introducing Paul Lamarre to the group. Paul is the manager of the GAEPD modeling group. He will be a new member to the MTRG group and will also be involved in the TMDL coordination with EPA.

Bo Ellis presented the meeting agenda: (1) address any approval package comments, and (2) present the preliminary water quality model set-up and calibration.

**Comments on the Hydrodynamic and Salinity Model Approval Package**

Dan Mendelsohn began with the following explanations why some data requested in the Federal Expectations Document was not included in the Approval Package:

- (1) Water surface elevation data are not available in the Little Back River for the 1997 and 1999 monitoring stations (GPA stations) because the stations used surface instruments, and water surface elevation was not recorded.

- (2) The missing comparison to measured salinity at USGS stations is an oversight, and this data will be presented in the forthcoming revision to the Approval Package.

Also, Dan explained that the restart in early September was the result of a bump in the new 6-minute interval offshore boundary file. The boundary file has been smoothed, and the model no longer requires a restart. The fix did not significantly alter the model calibration statistics.

Larry Neal Comments:

- (1) Asked why temperature was not simulated for 1997. Dan Mendelsohn responded that temperature forcing data is not available for 1997, and therefore, the 1997 temperatures can not be accurately modeled.
- (2) Noted that the model is generally overestimating the temperature and salinity, and therefore, the water quality model may have a bias toward lower dissolved oxygen saturation.

Harvey Seim Comments:

- (1) Noted that measured temperature looks erroneous at times. Dan Mendelsohn responded that some bad data was left in the measured data files (temperatures recorded when the instruments were out of the water), and the data has been subsequently removed.
- (2) Pointed out that the model does not accurately replicate the temperature front (i.e., the area of high temperature gradient in Front River). Dan Mendelsohn responded that the model smooths out the gradient similar to the simulated salinity gradient (this smoothing occurs in all models of this type due to discretization of the modeled system). It was also noted that over-mixing might also contribute to the over-smoothing of the temperature gradient.
- (3) The Approval Package focuses on the modeled and measured percentiles. However, the color contour plots of salinity and salinity gradient along the river versus time are instructive. Additionally the color contours of current velocity versus depth and time are also useful.
- (4) Asked Dan Mendelsohn to discuss the sensitivity analysis results. There appears to be a lot of scatter for the bottom salinity simulations. Dan Mendelsohn stated that the open boundary salinity is the most sensitive model input. The bottom friction in conjunction with the vertical viscosity comprise the second most influential model input.

Sung-Chan Kim Comments:

- (1) The convergence test table is missing from the Approval Package. Dan Mendelsohn replied that the table is included in the Draft Calibration Report and will be included in the forthcoming revision to the Approval Package.

Bo Ellis gave a brief synopsis of why the Approval Package was put together and what future action is required. The Approval Package was compiled at the request of the Federal Agencies. The document provides the information needed by the Agencies to review the model performance, determine the model's strengths and weaknesses, and evaluate how the model can be used to determine harbor expansion impacts. The Federal Agencies will provide their written comments within the next month, and issue a letter stating the agency position on the acceptability of the model for determining harbor expansion impacts. The MTRG has the opportunity to provide feedback during this period; however, the ultimate decision of model acceptability will be determined by the Federal Agencies. It is expected that revision to the hydrodynamic model may be required as identified during the water quality model calibration process. For this reason, the final model calibration report will not be completed until the finalization of the water quality model calibration (in order to avoid production of multiple revisions of the calibration report).

Larry Neal asked if everyone was comfortable with using the water quality model for evaluation of deepening related impacts as well as development of a Savannah Harbor TMDL. Jim Greenfield responded that it appears at this time that the model will likely be used for both purposes.

Jim Greenfield asked if a sensitivity analysis was performed for bathymetric change. The bathymetry in the harbor is constantly changing and maybe a source of error in the model. Dan Mendelsohn agreed to perform a sensitivity analysis for bathymetry (plus and minus 0.5 m in the Lower Savannah Estuary) for the forthcoming revision to the Approval Package.

### **Presentation of the Water Quality Model Set-up and Preliminary Calibration**

Eduardo Yassuda presented the model set-up and preliminary calibration. The water quality model was set-up for both a two-dimensional simulation and three-dimensional simulation. The 2-D model was used to get the model started and ensure that all of the proper input files were in place. Because of the much shorter model run-time, it is convenient to use the 2-D model for the initial set-up and for model testing. The initial 3-D simulations look promising; however, the vertical mixing scheme (i.e., the tidal energy related mixing) employed in the hydrodynamic model has not yet been incorporated to the BFWASP model. The Powerpoint presentation is included Attachment A.

Comments on the Water Quality Modeling Presentation:

Roy Burke requested that the calibration time-series plots included selected shorter time-period plots such that the model replication of the diurnal and semi-diurnal variation can be easily evaluated.

Paul Conrads suggested that the measured data be reviewed to ensure that no "bad data" are presented in the comparison plots.

Larry Neal stated that most of the variation in dissolved oxygen (DO) is a function of DO saturation. The model/data comparison should focus on the DO saturation and replicating the DO deficit.

Harvey Seim stated that the larger range of measured DO at stations GPA-08 and GPA-09 are the result of physical transport. If the hydrodynamic model does not replicate the salinity range well in this area, then the water quality model cannot be expected to replicate the range of DO in the area.

The topic of internal boundaries in the water quality model was discussed. It was agreed that GPA-17 and GPA-02 could be used as internal boundaries for calibration of the model. This allows adjustment of the offshore and upriver boundaries iteratively until good agreement is achieved at the internal boundaries (as long as the upriver and offshore boundaries remain within reasonable limits).

### **Future Activity**

- (1) The MTRG is to provide feedback on the water quality model presentation, shown as Attachment A, as soon as possible.
- (2) The latest model results will be distributed to the MTRG several days prior to the next meeting.
- (3) A draft water quality model calibration is to be completed by the end of June.

Comments and questions related to this Status Report should be directed to Chris Ahern of ATM ([cahern@appliedtm.com](mailto:cahern@appliedtm.com)). The MTRG will meet again on June 6<sup>th</sup>, 2002 in the Atlanta Federal Building. Please contact Chris Ahern if you have any comments or recommendations for the next meeting.