CESAS-PD-E 12 September 2002

MEMORANDUM FOR PM-CM (Doug Plachy) 13 Sep 02

SUBJECT: Savannah Harbor Expansion Project;
Review of ATM Hydrodynamic & Salinity Model Approval Package,
dated August 2, 2002

1. I have reviewed the Model Approval; Package and compared it to the Expectations Document previously developed by Savannah District for this model. The model is a further improvement from both versions that ATM had previously provided for review and approval.

2. The model appears to replicate temperatures well, meeting the goals on every occasion.

3. As reported in Section 2.1.1, the (uncorrected) model doesn't predict salinity well at Station 22 (Kings Island Turning Basin), Station 4, (Old Fort Jackson) Station 8 (Houston Cut), Station 11 (Mulberry Grove), Stations 5 and 7 (Back River), and Station 3 (South Channel). The Transfer Functions developed for salinity substantially improve the ability of the model to reproduce the observed data. With the Transfer Function, the model meets the stated goals 92 percent of the time (61 out of 66), rather than only 43 percent (36 out of 84) without use of the Transfer Function. Therefore, Transfer Functions should be applied to all salinity model predictions during application of the model for impact evaluation purposes. To make the model truly useful for salinity predictions, the model developers (1) should develop Transfer Functions at the remaining data collection stations, (2) should develop Transfer Functions for both surface and bottom readings, since the field data indicates that salinity does not change uniformly at those locations across a stratified water column, and (3) will need to implement a procedure to translate the Transfer Functions to intermediate locations along the river where data was not collected but information may be needed to evaluate project impacts.

4. The uncorrected model appears to under-predict the water surface elevations at the 5th percentile (average of -5.3 cm), and over-predict for the 50th and 90th percentile (average of +4.6 and +10 cm, respectively). The corrections developed for water surface elevations described in Section 4 substantially improve the ability of the model to reproduce the observed data. With the correction, the model meets the stated goals 59 percent of the time (32 out of 54), rather than only 33 percent (9 out of 27) without use of the correction. With the correction, the average errors increase to +7.7 cm for the 5th percentile, but decrease to 0 for the 50th percentile, and 0.5 cm for the 90th percentile. This substantially improves the model's usefulness for wetland impact evaluations, which will use high tides and the less frequent events, such as spring tidal flooding. When looking at other performance statistics, the correction reduces the average Average Mean Error from 10.1 to 9.1 cm, and the Root Mean Square Error from 12.4 to 11.5 cm.

5. Section 2.7 of the Approval Report contained the results of numerous sensitivity runs. This was a good addition to the approval package. The Calibration Report should include these results, as well as the model developer's interpretation of them. Particular sensitivity of individual stations to variations in a parameter should be identified and suggestions proposed for why that may be occurring.

6. The final Calibration Report should include the performance goals for the model that were developed by the Federal agencies. The chart displaying the different tidal periods over the data collection period (developed by USGS) should also be included.

7. In summary, the present version of the Hydrodynamic and Salinity Model is a great improvement over previous versions. Use of salinity and water surface transfer functions has greatly improved the model's ability to accurately predict those parameters. To make the model truly useful for impact evaluation purposes related to salinity predictions, the model developers (1) should develop Transfer Functions at the remaining data collection stations, (2) should develop Transfer Functions for both surface and bottom readings, since the data indicates that salinity does not act uniformly at those locations across a stratified water column, and (3) will need to implement a procedure to translate the Transfer Functions to intermediate locations along the river where data was not collected but information may be needed to evaluate project impacts. To make the model truly useful for impact evaluation purposes related to water surface predictions, the model developers will need to implement a procedure to translate the correction to intermediate locations along the river between the measured data points. With the transfer functions, the model generally meets our performance goals and can be used as the basis for development of the Dissolved Oxygen Model and Chloride Model.

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