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SAVANNAH DISTRICT, CORPS OF ENGINEERS
100 W. OGLETHORPE AVE
SAVANNAH, GEORGIA 31401-3640

CESAS-DE

26 MAY '04

MEMORANDUM FOR RECORD

SUBJECT: Savannah Harbor Expansion Project Plan A and Plan B Modeling Development Decision

1. The purpose of this Memorandum for Record is to establish a record of the decision on the acceptability of the Georgia Port Authority's (GPA) Plan A and US Environmental Protection Agency's (EPA) Plan B models for further development as predictive tools for water quality and biological impact assessments for the Savannah Harbor Expansion (SHE) Project. The basis for this decision is described in detail in the 18 May 2004 Information Paper prepared by the Savannah District (CESAS) and provided to GPA and other Federal (EPA, National Marine Fisheries Service (NMFS), and US Fish and Wildlife Service (USFWS)) and state agencies (Georgia Department of Natural Resources Environmental Protection Division (GAEPD) and South Carolina Department of Health and Environmental Control (SCDHEC)) on 19 May 2004.

2. Relevant background on this Plan A and Plan B modeling decision is as follows:

a. The Executive Management Group (EMG) for the SHE Project met on 7 April 2004 to put forth the Federal agencies' formal positions on the Plan A Hydrodynamic and Salinity (H&S) model (based on the Boundary Fitted Hydrodynamic Model – BFHYDRO) developed by the GPA's consultant, Applied Technology and Management, Inc. (ATM), and to discuss the status of the H&S model for Plan B that has been under development by the EPA's consultant, Tetra Tech. The formal positions put forth at this meeting by the Federal agencies were that based on the January 2004 final calibration report provided by ATM, the Plan A model vertical mixing scheme was fundamentally flawed and not technically defensible due to the unique modifications of the BFHYDRO model.

b. At the 7 April 2004 EMG meeting, EPA provided an update on its Plan B H&S model that is based on the Environmental Fluid Dynamics Computer Code (EFDC). A calibration report for the Plan B H&S model had been provided to the agency reviewers in March 2004 and was currently under review. EPA indicated that the EFDC model has a very good track record and has proven to be defensible on a number of applications over the years. EPA anticipated no major problems with this Plan B model; however, additional review and runs were required to confirm this. EPA indicated that the agencies should be in a position to determine the

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technical defensibility of the Plan B hydrodynamic model, and its acceptability for further development, at the end of April.

c. The EMG agreed to make a decision on the Plan A and Plan B modeling approaches in a special EMG meeting to be held in mid-May after the Plan B calibration report review is complete and costs and schedules for further development of Plan A and Plan B have been estimated. The EMG asked that CESAS prepare a decision document for the Federal agencies' consideration/concurrence at the mid-May meeting.

d. The GPA issued a letter to the Federal agencies on 11 May 2004, requesting that they delay the decision on the Plan A and Plan B modeling approaches. GPA stated that it believed that there was not sufficient time and information to make an informed decision on a modeling approach nor to prepare the estimated costs and time required for upgrading Plan A and further development of Plan A and Plan B models. It expressed concerns that the two modeling approaches had not received the same level of review. GPA also indicated that the Stakeholders Evaluation Group (SEG) had discussed a multi-model approach and that this should be a consideration in the decision. GPA suggested that the scheduled EMG meeting on 21 May 2004 should be a forum for establishing a plan of action for making a future decision on the appropriate modeling approach.

e. The Federal agencies' technical reviewers have carefully reviewed GPA's concerns and prepared a detailed response to these concerns in a Memorandum For Record. A final draft of this response MFR was submitted to GPA and other agencies for informational purposes on 20 May 2004. In summary, the final draft response MFR states that the Federal agencies believe that:

(1) They have sufficient information to determine the technical defensibility of the Plan A and Plan B hydrodynamic models and the associated costs and time required for further development;

(2) There was an appropriate level of review of the Plan A and Plan B models, since the same reviewers and evaluation criteria were used;

(3) That the Federal agencies have provided GPA's consultant sufficient information to prepare an estimated cost and schedule for upgrading and calibrating Plan A; and

(4) The Federal agencies have sufficient information to make an informed decision on the Plan A and Plan B modeling approaches.

f. The Federal agencies regularly attend the SEG meetings and attended the SEG meeting referenced in GPA's letter. They participated in the discussion on the multi-model approach, which was related to resolving the Plan A and Plan B modeling issue. After reviewing GPA's

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recommendation for considering this model approach, the Federal agencies concluded that:

- (1) the multi-model approach is a complete divergence from the original study plan;
- (2) this approach would entail establishing procedures for interpreting, reconciling, and resolving different model results and their implications to affected parties;
- (3) the significant costs and time required for the multi-model approach could not be justified; and
- (4) all models have inherent error factors, making comparisons and selection difficult.

Multi-parameter sensitivity and uncertainty analysis testing were a part of this SEG discussion and, because this testing concept is also applicable to a single model approach, merit consideration in the further development of the Plan A or Plan B models.

g. The EMG met on 21 May 2004 to make a decision on whether to move forward with the Plan A or Plan B modeling approach. After considerable discussion between GPA, the Federal agencies, and state agencies, the Federal agencies concurred that the SHE Project resources should be utilized for further development of the Plan B model approach.

3. Results of the review of the Plan B calibration report are as follows:

a. The review of the Plan B calibration report by the Federal agencies technical staff found no major technical flaws with the Plan B model, and have all agreed that it appears to be defensible. The expectations and evaluation criteria were the same as used for the Plan A model. Based on comments by the Federal and state agency technical reviewers, additional modifications are needed for the Plan B model in terms of the grid resolution and tidal marsh interactions. The current coarse grid resolution is sufficient to meet EPA needs; however, a finer grid resolution is needed to accurately account for the changes in flows and mixing due to deepening and other geometry changes of the Savannah River estuary. Production of a finer grid resolution will require additional model development time, but no major changes to the model code are anticipated. Therefore, the defensibility of the Plan B hydrodynamic model should not change as a result of this additional model development.

4. At the 7 April 2004 meeting, the EMG asked that a comparison be made of the estimated costs and schedules for upgrading and further development of Plan A and for further development of Plan B hydrodynamic models. Prior to the 21 May 2004 meeting, GPA indicated that it was unable to prepare these estimates for Plan A since it had insufficient information on what was required to revise Plan A and what further development was needed. Subsequent to this meeting, estimated cost and schedule information for upgrading and further development of the Plan A hydrodynamic model was provided by GPA. CESAS has used this,

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and information provided by EPA's consultant, to prepare estimates for the Plan A and for Plan B hydrodynamic models based on the following assumptions:

a. Plan A is not defensible in its current form and would require extensive revision to develop a physics-based vertical mixing scheme to replace the existing empirical-based scheme. Additionally, there are other technical issues with the Plan A model that would need to be corrected. Development time would be required to calibrate the revised model and make it acceptable for application for water quality and biological impact assessments for the SHE Project.

b. Plan B appears to be defensible in its current form, but requires additional work to develop a finer grid resolution and to conduct sensitivity analysis and convergence testing. Additional development time would be needed to calibrate the revised model and make it acceptable for application for water quality and biological impact assessments for the SHE Project. CESAS reviewed cost and schedule estimates from data provided by GPA's and EPA's consultants and found that, based on comparable evaluation criteria, there were no major differences in the estimates for further development of the Plan A and Plan B hydrodynamic models.

5. Considerations relevant to decision-making for Plan A and Plan B include the following:

a. At the 07 April 2004 EMG there was considerable discussion on whether Plan A was fixable and/or could portions of Plan A be used for some of the impact assessments. There was also a suggestion that both models be developed and run side-by-side for comparative purposes. Following these discussions, the Federal agencies agreed that the original basic premise of one model for the SHE Project should be maintained. Therefore, the decision to be made is whether to proceed with Plan A or Plan B.

b. The estimated costs and schedules for continuing the development/calibration of the Plan A and Plan B hydrodynamic models are about the same.

c. There have been extensive delays in completing the GPA (Plan A) models over the past several years. There continues to be uncertainty among the Federal agencies with regard to the timely completion of the necessary revisions, calibration, and applications to Plan A. Additionally, the Plan A model may not be readily available to, and usable by, all potential users because of its uniqueness. On the other hand, EPA's Plan B calibration report was produced in a much shorter period of time. A Federal agency technical review, using the same evaluation criteria used for Plan A, indicated that Plan B model is technically defensible. This more timely execution and performance for the further development work on the Plan B model are expected to continue. Also, the Plan B model will be readily available to, and usable by, all potential users, because it utilizes public domain models.

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d. Although the current Plan B calibration report was primarily based on EPA's specific needs for court-mandated TMDL and DO standards development, the models capability to be applied to SHE Project needs was also evaluated. EPA has committed to working with the Federal and state agencies to further refine the Plan B model to meet the specific needs of the SHE Project.

6. While the Federal agencies recognize that GPA has invested considerable resources into the development of the Plan A models, the lack of technical defensibility, concerns about the ability to upgrade and develop a technically defensible model in a timely and cost-effective manner, and the potential limited availability of the unique Plan A model to all users do not favor its selection for further development at the present time. For the Plan B models, there are several considerations that favor its selection for further development, including:

a. The Federal and state reviewing agencies have not identified any foundational problems with the Plan B H&S model, as they did with the Plan A H&S model.

b. The Federal and state agencies have concurred that the Plan B H&S model warrants further development.

c. The Plan A models would require the substitution of a physics-based vertical mixing scheme before further model development could proceed, whereas the vertical mixing scheme in Plan B is already defensible and further model development can move forward now.

d. The Plan B models will be in the public domain, and more widely distributed than the Plan A models.

e. The initial Plan B H&S model development was completed in a timely manner, and there is confidence among the Federal agencies that the remaining development/calibration and application/runs work will also be completed in a timely manner.

7. After reviewing and considering all the information and agencies' input on the Plan A and Plan B modeling approaches, CESAS, as the Lead Agency, has determined that further development of the Plan B H&S model represents the best use of resources for developing the fundamental model for analysis of impacts for the SHE Project GRR/Tier II EIS. CESAS, the Federal Cooperating Agencies (EPA, NMFS, and USFWS), and state agencies (GAEPD and SCDHEC) recognize that there are also issues to be resolved with the Plan B H&S model. Therefore, although no further development work is warranted on the Plan A H&S model at this time, a final decision on the use of the Plan A model will be deferred until the final calibration report for the Plan B model has been reviewed and evaluated. CESAS understands from the agencies' technical reviewers that the Plan A H&S and DO model development was crucial to the timely development of the Plan B models and the associated costs are eligible for consideration as part of the project costs. However, no further development costs are

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warranted for Plan A, pending the results of the Plan B final calibration report review and evaluation.

8. In accordance with Section 101 (b)(9) of the Water Resources Development Act of 1999 and the Chief of Engineers Report of October 1999, CESAS is requesting the US Environmental Protection Agency, US Fish and Wildlife Service, and National Marine Fisheries Service to indicate their concurrence.

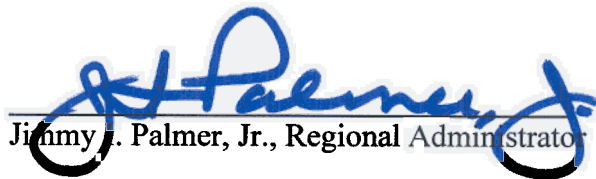


ROGER A. GERBER
COL, EN
Commanding

Federal Cooperating Agency Concurrence/Non-concurrence

US Environmental Protection Agency, Region 4

	Concur	Not Concur
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Jimmy J. Palmer, Jr., Regional Administrator

US Fish and Wildlife Service, Region 4



Mitch King, Deputy Regional Director

National Marine Fisheries Service, SE Region



Miles M. Croom, Assistant Regional Administrator