FINAL
EXTERNAL PEER REVIEW REPORT

for

Sabine-Neches Waterway (SNWW) Channel Improvement Plan (CIP) Draft Feasibility Report, Draft Environmental Impact Statement, and Supporting Documentation

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EXECUTIVE SUMMARY

Under a resolution from the Senate Committee on Environment and Public Works dated June 5, 1997, Congress directed the U.S. Army Corps of Engineers (USACE) to begin investigating the feasibility of modifying the existing Sabine-Neches Waterway (SNWW) channels serving the ports of Beaumont, Port Arthur, and Orange, Texas, in the interests of commercial navigation. In March 2000, the USACE joined in an agreement with Jefferson County Waterway and Navigation District (JCWND) to conduct a feasibility study and prepare a Draft Feasibility Report (DFR) and Draft Environmental Impact Statement (DEIS) for proposed improvements to the SNWW. In order to strengthen quality control processes and help ensure that the SNWW Channel Improvement Plan (CIP) is supported by the best scientific and technical information, an external peer review (EPR) process has been implemented by USACE to complement the internal technical review (ITR). This report describes the EPR process, summarizes final comments of the EPR panel, and describes the panel members and their selection.

Eight panel members were selected for the EPR from more than 40 identified candidates. The potential external reviewers were screened for potential conflicts of interest and expertise relative to predetermined technical criteria. These criteria focused on navigation channel enhancement, estuarine and riverine habitat management and restoration, and economic analyses. The reviewers selected were from academe or were independent engineering consultants. Corresponding to the technical content of the SNWW CIP DFR and DEIS, the areas of technical expertise of the selected peer reviewers included: engineering (civil, cost, geotechnical); hydraulics/sedimentation; dredging and dredged materials management; sediment transport modeling; deep-draft navigation planning and economics; ship simulation and vessel effects; hydrology/coastal hydrology; hydrodynamic-salinity modeling; biology/ecology with Gulf Coast experience; estuarine habitat evaluation/ecological modeling; and experience with review of EISs and Coastal Shoreline Impacts assessments.

The peer reviewers were provided with copies of the DFR, DEIS, and supporting documentation on July 2, 2007, along with a charge that solicited their comments on specific sections of the documents that were to be reviewed. The peer reviewers had four weeks for the review of the documents. More than 400 comments (i.e., verbatim comments) were received from the EPR panel in response to the charge questions.

Following the individual reviews of the DFR, DEIS, and supporting documentation by the EPR panel members, a consensus discussion was conducted to identify key technical comments and common themes that emerged from the verbatim comments. This resulted in the preparation of an EPR consensus comment document, which contained a topically organized discussion of

comments deemed "high-level" by the EPR panel, detailed justifications behind the comments, and cross-references to specific, relevant sections of the SNWW review documents.

The consensus comments were developed into final comments that included, (1) nature of the comment, (2) basis or justification for the comment, (3) significance of the comment (high, medium, and low), and (4) a recommendation on how to resolve the comment. Eighteen overall final EPR comments were identified and prepared in the previously described four-part format. Of the 18 comments, 16 were classified as of high or medium significance. Two comments were identified as having a low level of significance.

Overall, the external peer reviewers thought that the presentation, documentation, and analysis of technical information throughout the DFR, DEIS, and supporting documentation requires significant reconsideration. The following table summarizes the final comments by level of significance. Clarifications of each comment are contained in Appendix A of this report.

Significance – High	
#	Comment
1	The Plan Formulation as described in DFR section IV appears questionable.
2	The report does not present a strong analysis of the current and future vessel fleet, or of vessel dimensions.
3	The crucial analysis of vessel design and sailing drafts is inadequately supported by data and appears questionable.
4	The benefits estimates cannot be validated from the report material, and include some questionable uses of ranges and averages.
12	Many issues of significance regarding dredging and sedimentation are not thoroughly evaluated or analyzed (e.g., regional sediment management plan, potential for sea-level rise and its implications, improved understanding of hurricane storm surge in the Gulf, the effects of hurricane Rita on shorelines and interior wetlands).
14	Risk and uncertainty are mostly ignored.
17	The analysis and conclusions are based on what appears to be over-reliance on the pilots or at least a lack of documentation of their opinions.
18	The prediction of salinity changes and their impact on plant and animal communities conveys a false sense of certainty about future conditions that result from cumulative impacts and physiographic and climatic changes that may take place over the project life.
Significance – Medium	
5	There is no comprehensive description of existing vessel operations.
6	The commodity discussions and forecasts are fragmented and incomplete, and do not adequately support the forecasts used for the benefits estimates.
7	The choice of project design vessel appears to drive the project design and benefits estimates, yet remains unjustified in the report.
8	The ERDC, HarborSym, and @risk models were used in crucial analyses, but the analyses lack documentation.
9	The report is written at a summary level and lacks proper documentation throughout.
11	Need to conform to post-Katrina changes in policy and to incorporate changes in scientific understanding of the Gulf Coast.
13	Wave transformation and sediment transport processes are inadequately evaluated using STWAVE and GENESIS models.
15	The presentation of data in maps, figures, and tables needs to be substantially improved.
Significance – Low	
10	Public involvement in the feasibility analysis process was carried out well.
16	The report needs an extensive editorial review and detailed copy-editing.

1. INTRODUCTION

1.1 Background of Report Reviewed

Under a resolution from the Senate Committee on Environment and Public Works, dated June 5, 1997, Congress directed the U.S. Army Corps of Engineers (USACE) to begin investigating the feasibility of modifying the existing Sabine-Neches Waterway (SNWW) channels serving the ports of Beaumont, Port Arthur, and Orange, Texas, in the interests of commercial navigation. As authorized by the 1997 resolution, USACE has reviewed previous USACE reports on the SNWW and other pertinent reports to consider the feasibility of modifying the SNWW channels. In March 2000, the USACE joined in an agreement with Jefferson County Waterway and Navigation District (JCWND) to conduct a feasibility study and prepare a Draft Feasibility Report (DFR) and Draft Environmental Impact Statement (DEIS) for proposed improvements to the SNWW.

The region covered by the proposed SNWW Channel Improvement Plan (CIP) is located on the northwest Gulf of Mexico coast at the state boundary between Texas and Louisiana, and is intended to improve the efficiency and safety of the deep-draft navigation system while fully mitigating impacts to coastal and estuarine resources. The recommended plan for the SNWW project includes:

- Deepening the entire channel from 40 feet to 48 feet from the Gulf of Mexico to Beaumont.
- Widening the channel from 500 feet to 700 feet from the Gulf to Port Arthur, and construction of turning basins on the Neches River.
- Increasing the length of the channel from 64 miles to 77 miles (a 13-mile extension in the Gulf of Mexico).
- Dredging approximately 110 million cubic yards (mcy) of new work material (nearly 44 mcy in the Gulf).
- Expected doubling of maintenance dredging (from 7.1 mcy/yr to 14.7 mcy/per yr) with over half the increase from the offshore channels.

The recommended plan also includes marsh and oyster mitigation, and a 50-year dredged material management plan (DMMP) with marsh restoration and nourishment, upland placement areas, and offshore placement. The DMMP features will restore 3,973 acres of degraded marsh and improve 1,412 acres of shallow water habitat on the Neches River. Mitigation measures will replace 499 acres of marsh predicted to be lost as a result of the project and restore an additional 3,003 acres of emergent marsh. In addition, six miles of Gulf shoreline will be regularly nourished with maintenance material over the 50-year life of the project. All restoration and nourishment features are part of the base plan.

This report describes the external peer review (EPR) process that was conducted, and summarizes comments on the DFR and DEIS that were received from the external peer reviewers. Detailed information on the comments is provided in Appendix A.

1.2 Purpose of External Peer Review

The purpose of EPR, in general, is to strengthen USACE's quality control processes for the development of decision documents in support of its Civil Works program. Independent, objective peer review is regarded as a critical element in ensuring the reliability of scientific analyses.

To help ensure that USACE documents are supported by the best scientific and technical information, a peer review process has been implemented by USACE that utilizes EPR to complement the internal technical review (ITR), as described in the Department of the Army, U.S. Army Corps of Engineers, guidance *Peer Review of Decision Documents* (EC 1105-2-408) dated May 31, 2005, and CECW-CP Memorandum dated March 30, 2007. In this case, the EPR of the SNWW CIP DFR and DEIS was conducted and managed using contract support from an independent 501(c)(3) organization (Battelle Memorial Institute; hereafter Battelle) to ensure independent objectivity, along with a high degree of flexibility and responsiveness, which was essential for USACE to meet deadlines to Congress.

2. METHODOLOGY

This section describes the methodology followed in selecting external peer reviewers, and in planning and conducting the EPR. The EPR was conducted following procedures described in USACE's guidance just cited and in accordance with the Office of Management and Budget's *Final Information Quality Bulletin for Peer Review*, released December 16, 2004. Supplemental guidance on evaluation for conflicts of interest used the National Academies' *Policy on Committee Composition and Balance and Conflicts of Interest for Committees Used in the Development of Reports*, dated May 12, 2003.

2.1 Planning and Schedule

Table 1 defines the schedule followed in execution of the EPR.

2.2 Identification and Selection of External Peer Reviewers

More than 40 potential peer reviewers were initially identified. Of these, 22 confirmed their availability during the review period and worked with Battelle to evaluate their technical expertise and potential conflicts of interest. Six of the potential reviewers were contacted but did not confirm their interest or availability. Fourteen of the potential candidates were contacted and declined either due to conflicts with the schedule and anticipated level of effort, or because of disclosed conflicts of interest.

Table 1. Schedule

Action	Completed by Date
Notice to proceed received	June 1, 2007
Potential external peer reviewers identified and screened	June 8, 2007
EPR panel selected and contracts completed	June 29, 2007
DFR, DEIS, supporting documentation, and charge sent to EPR panel	July 2, 2007
Verbatim comments completed	July 30, 2007
EPR panel consensus meeting	August 7, 2007
Consensus comments completed	August 24, 2007
Final comments completed	October 5, 2007
Working draft peer review report completed	December 4, 2007
EPR panel provides comments on working draft peer review report	December 7, 2007
Final peer review report submitted	December 13, 2007

Preliminary information about the 22 available reviewers, including their expertise, level of previous engagement in applied evaluations, and their requested rates of compensation, was evaluated in consultation with USACE. The reviewers were primarily from academic institutions, but consultants (company-affiliated and independent) or experts associated with industry, non-governmental organizations, and non-USACE government agencies were also considered.

The credentials of the peer reviewers were evaluated according to the overall scope of the SNWW CIP DFR and DEIS, focusing on two key areas: 1) navigation channel enhancement and 2) habitat management and restoration. Detail on these technical criteria, as well as other areas of expertise considered, is provided in Table 2.

Table 2. Technical Criteria/Areas of Expertise for Potential External Peer Reviewers

Navigation Channel Enhancement	Habitat Management and Restoration	Other Desirable Areas of Expertise
• Engineering (civil, cost, geotechnical) • Hydraulics/sedimentation with oceanography and numerical modeling expertise • Hydrology/coastal hydrology with oceanography and numerical modeling expertise • Deep-draft navigation planning • Deep-draft navigation economics	• Biology/ecology with Gulf Coast experience • Habitat evaluation/ecological modeling	• Dredging and dredged materials management • Economic analysis (resource economics) and real estate planning • Experience with review of EISs and Coastal Shoreline Impacts assessments • Hydrodynamic-salinity modeling • Ship simulation and vessel effects • Sediment transport modeling

The following factors were also considered:

- Participation in previous USACE technical review committees;
- Other technical review panel experience; and
- Gulf Coast experience.

The peer reviewers were additionally screened for the following *potential* exclusion criteria or conflicts of interest:

- Involved in producing the DFR, DEIS, or supporting documentation;
- Current USACE employee;
- Involvement in any USACE/southeast Texas area projects;
- Other USACE affiliation [Scientist employed by the USACE (except as described in NAS criteria, see EC 1105-2-4 section 9d)][a];
- Current or future financial interests in SNWW-related contracts/awards from USACE[a];
- Other possible perceived conflict of interest for consideration, e.g.,
    - Former USACE employee
    - Repeatedly served as USACE technical reviewer.

In selecting final peer reviewers from the list of potential peer review candidates, an effort was also made to balance the number of experts in a given area of technical expertise with the technical content of the DFR and DEIS (see Table 2). Based on a review of a preliminary internal version of the SNWW documents and information provided by the USACE, it was determined that a balanced external review committee would preferably contain:

- One to two engineers with expertise in civil or geotechnical engineering;
- One to two engineers/scientists with expertise in deep-draft navigation and sediment management;
- One to two engineers/scientists with expertise in economics and plan formulation; and
- One to two engineers/scientists with expertise in environmental engineering, Gulf Coast ecology/biology, and/or coastal ecosystem restoration.

Based on these considerations, eight peer reviewers were selected from the potential list (see Section 3 for names and biographical information on the selected peer reviewers). Battelle established subcontracts with the peer reviewers indicating their willingness to participate and confirmation of the absence of conflicts of interest (through a signed conflict of interest form).

Battelle identified a Lead Peer Reviewer, Dr. Gregory Baecher, to provide specific support to Battelle. In addition to his role as a member of the peer review panel, Dr. Baecher's role was to support Battelle in planning the consensus meeting and the process to develop the final EPR

[a] Note: Battelle evaluated whether scientists in universities and consulting firms that are receiving USACE funding have sufficient independence from USACE to be appropriate peer reviewers. See the OMB memo p. 18, "….when a scientist is awarded a government research grant through an investigator-initiated, peer-reviewed competition, there generally should be no question as to that scientist's ability to offer independent scientific advice to the agency on other projects. This contrasts, for example, to a situation in which a scientist has a consulting or contractual arrangement with the agency or office sponsoring a peer review. Likewise, when the agency and a researcher work together (e.g., through a cooperative agreement) to design or implement a study, there is less independence from the agency. Furthermore, if a scientist has repeatedly served as a reviewer for the same agency, some may question whether that scientist is sufficiently independent from the agency to be employed as a peer reviewer on agency-sponsored projects."

comments. He also assisted Battelle in ensuring that the communications and directives to the EPR panel were focused and efficient.

2.3 Preparation of the Charge and Conduct of the Peer Review

A charge for peer review, which contained specific questions regarding the DFR, DEIS, and supporting documentation, as well as guidance on key types of input of interest to USACE, was developed to assist the EPR panel. The draft charge was prepared by Battelle with input from USACE and guidance provided in USACE's guidance *Peer Review of Decision Documents* (EC1105-2-408) and the Office of Management and Budget's *Final Information Quality Bulletin for Peer Review*, released December 16, 2004. A draft charge was prepared by Battelle and submitted to the USACE for consideration and evaluation. The USACE provided additional charge questions, edited draft questions, and recommended eliminating some questions. The charge was finalized based on the USACE's input and the DFR and DEIS when they became available. The charge was presented in table format, and was organized according to the order of the documents to be reviewed. The charge consisted of approximately 55 specific questions on the DEIS and its appendices, and 45 specific questions on the DFR and its appendices. The EPR panel was instructed to respond to the charge questions pertaining to the DEIS and DFR within the table format. The final charge is shown in Appendix B of this report.

The peer reviewers were provided with copies of the final charge, DFR, DEIS, and supporting documentation on July 2, 2007. The peer reviewers had four weeks for the review of the documents.

2.4 Review of Verbatim Comments

The comments in response to the charge received from each individual reviewer were merged and collated as verbatim comments. Each panel member was assigned a code to maintain anonymity when the comments were submitted to the USACE. More than 400 individual comments in response to the charge questions were received. The collated verbatim comments were shared with the EPR panel. Battelle reviewed the verbatim comments to identify significant issues, potential areas of conflict, and other noteworthy comments. As a result of this review, Battelle developed a preliminary list of overall themes that emerged from the EPR panelists' verbatim comments, and reviewed this list with the Lead Peer Reviewer, Dr. Baecher.

2.5 External Peer Review Panel Consensus Discussion

Battelle convened a consensus discussion conference call with the EPR panel on August 7, 2007. The goals of the consensus discussion were, first, to ensure the exchange of technical information among the panel experts, many of whom are from diverse scientific backgrounds. This information exchange ensured that the EPR report represents the synergy of the panel and avoided isolated or conflicting information and analyses. The second goal was to review the themes and ascertain and confirm their importance to the EPR panel, remove points having a lack of consensus, and identify and add any missing issues of high-level importance to the EPR panel.

The panel discussion resulted in an overall consensus on the themes. A brief summary explaining the key points of each theme, as defined by the EPR panel, was also developed. In addition to identifying the themes, the EPR panel discussed responses to about a dozen specific charge questions where there appeared to be disagreement among the reviewers. The disagreement was resolved and the comment was either incorporated into the theme summary or determined to stand as is (i.e., was not important enough to include as a theme).

A summary of the consensus discussion was prepared by Battelle and the Lead Peer Reviewer and distributed to the EPR panel for review. The panel was directed to review the themes and the summary to ensure that they accurately reflected the discussion. These themes and the summaries formed the bases for developing the EPR consensus comments.

2.6 Preparation of Consensus Comments

The EPR consensus comments were generated from the themes identified by the EPR panel during the consensus discussion and finalized during subsequent communications. Battelle added cross-references to the primary relevant verbatim comments for each consensus comment, with the intent of providing examples (i.e., not every relevant verbatim comment has a cross-reference to a consensus comment). A quality control check of Battelle's cross referencing was conducted by the Lead Peer Reviewer. Some verbatim comments from individual external peer reviewers were not addressed in the consensus comments because they were not identified as themes by the panel during the conference call. The draft consensus comments were submitted to USACE for review.

2.7 Preparation of Final Comments

The EPR panel, working in four groups, used the consensus comments as a basis for preparing the final comments. A memorandum was distributed on September 11, 2007, to the EPR panel providing detailed instructions on developing the final comments. A summary of the directive is provided below:

- Working Groups: Each working group was assigned four consensus comments. The working groups were dredging and sediments, economics, engineering, environmental. A lead was assigned for each group.

- Directive to the Working Groups: The groups were encouraged to communicate directly with the lead of another group. If a significant issue was identified that was not covered by one of the consensus comments, the appropriate working group was instructed to draft a new comment. As a result, two additional comments were identified and prepared by the working groups.

- Format for Final Comments: Each final comment was presented as part of a four-part structure, including:

    1. Nature of comment
    2. Basis or Justification for comment

3. Significance (high, medium, low; see description below)
4. Recommendation (see description below).

- Criteria for Significance: The following were used as criteria for assigning a significance level to each final comment:
  - High Describes a fundamental problem with the project that could affect the recommendation or justification of the project
  - Medium Affects the completeness or understanding of the reports
  - Low Affects the technical quality of the reports but will not affect the recommendation of the project.

- Guidance for Developing the Recommendation: The recommendation was to include specific actions that the USACE should consider to resolve the comment (e.g., suggestions on how and where to incorporate data into the analysis, how and where to address insufficiencies, areas where additional documentation is needed, etc.).

As a result of this process, 18 final comments were prepared. Battelle reviewed and edited all final comments for clarity and adherence to requested format. The final EPR comments were assembled and submitted to the USACE on October 5, 2007 (see Appendix A).

3. BIOGRAPHICAL INFORMATION ON EXTERNAL PEER REVIEWERS

An overview of the credentials of the eight reviewers selected for the SNWW EPR panel and their qualifications in relation to the technical evaluation criteria is presented in Table 3. Reviewer identities were unknown to the USACE authors of the DFR and DEIS during the EPR process. More detailed biographical information regarding each candidate and his or her technical areas of expertise is presented following the table.

Table 3. External Peer Reviewer Panel for the SNWW CIP DFR and DEIS: Technical Criteria and Areas of Expertise

Name	Affiliation	Engineering/Geotech							Deep-Draft Navigation		Biology/ Ecology	
		Civil Engineer	Geotechnical Engineer	Dredging	Hydraulics/Sedimentation	Hydrology/Coastal Hydrology	Oceanography	Numerical Modeling Expertise	Planner	Economist	Gulf Coast Biologist/Ecologist	Habitat Evaluation/Modeling
	totals -->	3	2	2	3	2	2	1	3	2	1	2
Greg Baecher	University of Maryland	1	1					1				
Donald F. Boesch	University of Maryland, Center for Environmental Science						1				1	1
Ken Casavant	Washington State University								1	1		
Billy Edge	Texas A&M Division, Coastal & Ocean Engineering Division	1		1	1				1			
Denise Reed	University of New Orleans				1	1						1
Daniel Smith	The Tioga Group, Inc.								1	1		
R. Bruce Taylor	Taylor Engineering	1		1	1	1						
John T. Wells	Virginia Institute of Marine Science, College of William and Mary		1				1					

Gregory B. Baecher, Ph.D.
Role: Served as the Lead Peer Reviewer and was chosen primarily for his expertise in engineering (civil, cost, geotechnical).
Affiliation: University of Maryland, Department of Civil and Environmental Engineering, College Park, MD

Dr. Baecher is a geotechnical engineer by training, but has spent much of his career as an active consultant to government and industry on risk and reliability of constructed facilities, especially in water resources development, dam safety, and national security. He currently is a Professor and past-Chairman of the Department of Civil and Environmental Engineering. He is a member of the National Academy of Engineering, has authored several National Research Council (NRC) reports pertaining to risk analysis and water resource policy, has served on numerous NRC committees, and is currently the Chairman of the NRC's Committee on Geotechnical and Geological Engineering. His areas of expertise include water resources engineering and policy, risk and safety analysis, dam safety, flood risk management, environmental impacts of dams and water projects, natural hazards, and infrastructure security. Dr. Baecher holds both an M.S. and a Ph.D. in civil engineering from Massachusetts Institute of Technology.

Donald F. Boesch, Ph.D.
Role: This reviewer was chosen primarily for his expertise in biology/ecology with Gulf Coast experience.
Affiliation: University of Maryland Center for Environmental Science, Cambridge, MD

Dr. Boesch is Professor of Marine Science and President of the University of Maryland Center for Environmental Science (UMCES). Dr. Boesch is a biological oceanographer who has conducted research in coastal and continental shelf environments along the Atlantic Coast and in the Gulf of Mexico, eastern Australia, and the East China Sea. He has published two books and numerous papers on marine benthos, estuaries, wetlands, continental shelves, oil pollution, nutrient over-enrichment, environmental assessment and monitoring, and science policy. He has served as science advisor to many state and federal agencies and regional, national, and international programs. He has chaired numerous committees and scientific assessment teams that have produced reports on a wide variety of coastal environmental issues. He holds a Ph.D. in marine science from the College of William and Mary in Williamsburg, Virginia.

Kenneth L. Casavant, Ph.D.
Role: This reviewer was chosen primarily for his expertise in economic analysis, planning experience, and deep-draft navigation experience.
Affiliation: Washington State University, School of Economic Sciences, Pullman, WA

Dr. Casavant is Professor and Transportation Economist at the School of Economic Sciences, where he teaches classes in Economics and Management, Agricultural Marketing/Transportation, and Policy. Since 2002, he has also served as an Adjunct Professor at the Upper Great Plains Transportation Institute (UGPTI), North Dakota State University. His areas of expertise include transportation economics, international trade, public policy, and marketing. With more than 35

years of experience, Dr. Casavant has been asked to testify before congressional and state legislatures on the needs and policy alternatives for transportation, as well as to international trade agencies. He has provided consulting services to state and national commodity groups, legal firms, and private railroad and trucking firms on issues ranging from the development of intelligent transportation systems (ITS) applications to logistical designs for port physical distribution systems, to competitive impacts from investments in infrastructure and regulatory changes. He holds an M.S. in agricultural economics, emphasizing transportation and logistics, from North Dakota State University and a Ph.D. in agricultural economics from Washington State University.

Billy Edge, Ph.D., P.E.
Role: This reviewer was chosen primarily for his expertise in engineering (coastal), dredging, and sediment experience.
Affiliation: Texas A&M University, Ocean Engineering Program, College Station, TX

Dr. Edge is Professor and Head of the Ocean and Civil Engineering Division of the Zachry Department of Civil Engineering at Texas A&M University and also serves as Director of the Haynes Coastal Engineering Laboratory. His areas of expertise include coastal engineering, dredging technology, coastal zone management, hydraulic engineering, and water quality modeling. He has authored refereed journal articles and numerous technical reports and serves on several engineering societies and committees. He currently is the President of the Association of Coastal Engineers, the Associate Editor of the *Journal of Ocean Engineering*, and a member of the Marine Board, National Academy of Engineering and Executive Committee NAS/NAE Marine Board, and Committee for Coastal Engineering Research and Education, NAS/NAE Marine Board. Dr. Edge is recognized internationally as an expert in coastal engineering and dredging technology. His research focuses on coastal hazards, hurricanes, erosion control, navigation, and dredging. He holds an M.S. in civil engineering from Virginia Polytechnic Institute and a Ph.D. in civil engineering from Georgia Institute of Technology.

Denise J. Reed, Ph.D.
Role: This reviewer was chosen primarily for her expertise in the Gulf Coast related to hydraulics/sedimentation, coastal hydrology, and habitat evaluation and modeling.
Affiliation: University of New Orleans, Department of Earth and Environmental Sciences, New Orleans, LA

Dr. Reed is a Professor in the Department of Earth and Environmental Sciences at the University of New Orleans. Her areas of research include geomorphology and hydrology of coastal marshes and estuaries, sediment dynamics, sediment deposition, and processes necessary for marshes to combat relative sea-level rise. She has worked on coastal issues in northwest Europe, and the Atlantic, Pacific, and Gulf coasts of the United States and has authored numerous papers and technical reports. She was a 2006 Aldo Leopold Leadership Program Fellow. Dr. Reed has served on numerous boards and panels concerned with the effects of human alterations on coastal environments and the role of science in guiding ecosystem restoration. She holds a Ph.D. from the Department of Geography at the University of Cambridge, England.

Daniel Smith
Role: This reviewer was chosen primarily for his expertise in economic analysis, planning experience, and deep-draft navigation experience.
Affiliation: The Tioga Group, Inc., Moraga, CA

Mr. Smith is a Principal and Co-Founder of The Tioga Group, a consulting firm specializing in freight transportation and logistics whose clients include ports, railroads, shippers, leasing companies, industry organizations, and government agencies. Mr. Smith has over 25 years of consulting experience in freight transportation operations, economic, policy, and planning, with special emphasis on truck, rail, and marine intermodal transportation. He has authored numerous articles in trade journals, is a contributor to industry conferences and publications, and is a member of the Intermodal Association of North America. He has testified before Congress on the economic conditions in the world shipping industry. He received his M.S. from the Graduate School of Public Policy at the University of California at Berkeley and did further postgraduate work in transportation economics and policy.

R. Bruce Taylor, Ph.D.
Role: This reviewer was chosen primarily for his expertise in engineering (coastal), dredging, navigation, hydraulics/sedimentation, and coastal hydrology.
Affiliation: Taylor Engineering, Jacksonville, FL

Dr. Taylor formed Taylor Engineering, Inc., a consulting firm specializing in water resource and coastal engineering, in 1983. He has consulted on a variety of coastal engineering and water resource projects, including the analyses of navigation project impacts on littoral processes; coastal erosion and shore protection projects; flood hazard studies in support of the National Flood Insurance Program; harbor engineering and dredging operations; and the mathematical modeling of coastal hydrodynamics, discharge plumes, and pollutant transport. Dr. Taylor has authored refereed journal articles and numerous technical reports and has served on several advisory boards and committees. He served as technical advisor to the State of Florida on coastal management issues related to river basin and estuarine systems. In 1997 Dr. Taylor received the Outstanding Technical Achievement Award from the Florida Engineering Society. In the following year, he received the Regional Engineer of the Year Award from the Florida Engineering Society. In 1999, he received the nationwide National Society of Professional Engineers Award. He holds an M.S. in oceanographic engineering from the University of Miami and a Ph.D. in civil and coastal engineering from the University of Florida.

John T. Wells, Ph.D.
Role: This reviewer was chosen primarily for his expertise in marine geology and oceanography experience.
Affiliation: Virginia Institute of Marine Science, Williamsburg, VA

Dr. Wells is the Dean of the School of Marine Science and Director of the Virginia Institute of Marine Science. For the past 25 years, his research has focused on coastal marine geology. Specific topics of research include dynamics of fine-grained sediments; estuarine and deltaic

sedimentation; and beach and shelf processes. Dr. Wells has authored refereed journal articles, numerous scholarly papers, and talks; has served on several advisory boards and committees; and is the Editor-in-Chief of *Marine Geology*. He holds an M.S. in geological oceanography from Old Dominion University and a Ph.D. in marine sciences (minor in statistics), from Louisiana State University.

4. RESULTS – SUMMARY OF PEER REVIEW COMMENTS

Overall, the reviewers found that the presentation, documentation, and analysis of technical information throughout the DFR, DEIS, and supporting documentation requires significant improvement. Although the reports were viewed as a good starting point for further work in the final technical report, the consensus of the EPR panel was that the documents require substantial consideration before finalization, specifically with regard to documentation and quality of data sources, and to the rigor of analysis. Reviewers recognized that they had received only draft reports and assumed that final copy-editing would improve readability and data presentation; therefore, their focus was primarily on technical content, clarity, and completeness.

As a result of the consensus discussion process, the EPR panel identified 18 comments, segmented into rankings of high, medium, and low significance. In total, as shown in Table 4, eight (8) comments were categorized as highly significant by the panel, eight (8) were categorized as moderately significant, and two (2) comments were considered to be of relatively low significance.

Table 4. Overview of 18 Final Comments/Themes Identified by the SNWW CIP DFR and DEIS EPR Panel

Significance – High	
#	Comment
1	The Plan Formulation as described in DFR section IV appears questionable.
2	The report does not present a strong analysis of the current and future vessel fleet, or of vessel dimensions.
3	The crucial analysis of vessel design and sailing drafts is inadequately supported by data and appears questionable.
4	The benefits estimates cannot be validated from the report material, and include some questionable uses of ranges and averages.
12	Many issues of significance regarding dredging and sedimentation are not thoroughly evaluated or analyzed (e.g., regional sediment management plan, potential for sea-level rise and its implications, improved understanding of hurricane storm surge in the Gulf, the effects of hurricane Rita on shorelines and interior wetlands).
14	Risk and uncertainty are mostly ignored.
17	The analysis and conclusions are based on what appears to be over-reliance on the pilots or at least a lack of documentation of their opinions.
18	The prediction of salinity changes and their impact on plant and animal communities conveys a false sense of certainty about future conditions that result from cumulative impacts and physiographic and climatic changes that may take place over the project life.

Significance – Medium	
5	There is no comprehensive description of existing vessel operations.
6	The commodity discussions and forecasts are fragmented and incomplete, and do not adequately support the forecasts used for the benefits estimates.
7	The choice of project design vessel appears to drive the project design and benefits estimates, yet remains unjustified in the report.
8	The ERDC, HarborSym, and @risk models were used in crucial analyses, but the analyses lack documentation.
9	The report is written at a summary level and lacks proper documentation throughout.
11	Need to conform to post-Katrina changes in policy and to incorporate changes in scientific understanding of the Gulf Coast.
13	Wave transformation and sediment transport processes are inadequately evaluated using STWAVE and GENESIS models.
15	The presentation of data in maps, figures, and tables needs to be substantially improved.
Significance – Low	
10	Public involvement in the feasibility analysis process was carried out well.
16	The report needs an extensive editorial review and detailed copy-editing.

As indicated in Table 4, public involvement in the feasibility analysis process was viewed very positively by the EPR panel, but the remaining comments all focus on areas viewed by the reviewers as needing improvement. The final EPR comments in their entirety, as submitted to the USACE on October 5, 2007, are included in Appendix A.

APPENDIX A

FINAL PEER REVIEW COMMENTS FROM THE SNWW CIP FEASIBILITY STUDY AND DEIS EXTERNAL PEER REVIEW PANEL

KEY TO ABBREVIATIONS IN THE FINAL PEER REVIEW COMMENT TABLES

References to the USACE SNWW CIP Draft Feasibility Report and Draft Environmental Impact Statement Documents

DFR = SNWW CIP Draft Feasibility Report – Main Report (June 2007)
Example cross-referencing:
DFR Section IV = SNWW CIP Draft Feasibility Report, Volume 1, Section IV
DFR IV-44 = page 44 of the DFR Section IV
DFR IV, Tables 1 through 4 = Tables 1 through 4 in the DFR Section IV

DEIS = Draft Environmental Impact Statement

DFR EA = Economic Appendix of the DFR (DFR Appendix A)

Comment 1:

The Plan Formulation as described in DFR section IV appears questionable.

Basis for Comment:

The Plan Formulation does not adequately address either structural or non-structural alternatives, and fails to address at least one key project element. The screening process is unclear, and seems to have been cursory in some areas.

No Action Alternative. The No Action alternative is not developed in sufficient detail. On the No Action alternative the report states, "the current dimensions will continue to limit the efficient movement of commodities," "safety will continue to be a concern," "the need to lighter products and/or light load vessels will increase," etc., but does not quantify any of these statements. In the absence of a detailed No Action alternative it is difficult to understand the problem being addressed or justify the need for the project.

Structural Alternatives. Neither alternative channel depths nor alternative channel widths are discussed in sufficient detail. The Draft Feasibility Report does not explain why it is necessary or cost-effective to widen the channel to 700' rather than some other width. Virtually no attention is given to possible widths between 500' and 700', and there appears to have been no incremental analysis of channel widths.

The report is unclear why both turning basins and channel widening are part of the plan. On page DFR VI-44, the report says that the Sabine Pilots suggested the use of turning basins "as a less costly and more practical alternative to the Neches River widening." The notes from meetings with the pilots also make it clear that the turning basins and anchorages are a higher priority than channel widening.

Non-Structural Alternatives. Insufficient attention is paid to non-structural alternatives. The report does not consider the obvious non-structural alternative: relaxation of the Sabine Pilots' rules. The entire project justification rests on the need to accommodate more traffic and larger vessels under the existing rules. The rules themselves, however, are never analyzed to determine if they are necessary or if they optimize the balance between productivity and safety. Relaxing the 50% rule for passing vessels, for example, would significantly reduce the need to widen the channel.

The use of offshore oil terminals is discussed but not analyzed. USACE's initial response to comments notes that expansion of Louisiana Offshore Oil Port (LOOP) or development of another offshore facility would reduce the economic viability of the SNWW project. The discussion of off-shore terminals remains general, and as noted in the text no quantitative analysis was performed. The contention that crude petroleum importers have not found LOOP to be a cost effective alternative is not documented. Moreover, that assertion seems to be contradicted by the reported operation of LOOP at full capacity and the expectation of two expansion proposals in December. There was apparently no attempt to estimate the cost of

Basis for Comment (Continued):

expanding LOOP or making the necessary pipeline connections. Given that there are active proposals to expand LOOP and parties actively pursuing developments elsewhere, a detailed quantitative analysis of offshore terminal expansion is mandatory. LOOP, or the proposed LOOP expansions, should be analyzed as an alternative to widening and deepening SNWW for the largest vessels, not as a replacement for all crude petroleum movements.

The report contains almost no information on the vessel lightering/lightening processes being used. Additional lightering/lightening is not considered as an alternative means of handling larger vessels. The total system costs of lightering, lightening and direct shipment should be compared to verify that the proposed shipment system is economically superior.

The VMS/VTS system is too quickly dismissed, especially since it is lauded elsewhere in connection with the "barge shelf" concept. The appendix cites the success of the VMS system in several places.

The EPR panel suggests that several non-structural approaches be given more thorough analysis as stand-alone alternatives or as components of alternatives focused on deepening and widening:

- Expanding and connecting to the LOOP is likely a viable alternative for crude petroleum, the dominant commodity on the SNWW and the only commodity carried in the largest, widest vessels. USACE seems to dismiss this alternative as expensive and hard to implement without thorough analysis. LOOP, or the proposed LOOP expansions, should be analyzed as an alternative to widening and deepening SNWW, not as a replacement for all crude petroleum movements. The contention that crude petroleum importers have not found LOOP to be a cost effective alternative is not documented. Moreover, that assertion seems to be contradicted by the reported operation of the current LOOP facility at full capacity and the expectation of two expansion proposals in December.

- Relaxation of the Sabine Pilots rules should be evaluated as an alternative. The current rules are never analyzed to determine if they are necessary and if they optimize the balance between productivity and safety. Easing the pilot's rules to permit vessels with greater beam to pass and adding night operations should be fully evaluated.

- A more detailed assessment of the VMS/VTS system is also warranted. The report includes discussion of the effectiveness of the VTS system and plans for upgrading this system to better control vessel traffic in restricted reaches of the SNWW. Non-structural VTS should be considered as a component of the channel modification alternatives. The inclusion of VTS as a component allows for a reduced need for channel widening in selected reaches thereby enhancing the efficiency of the channel modification alternatives.

Basis for Comment (Continued):

Missing Element. There is no analysis of the 13-mile channel extension in the Plan Formulation section or elsewhere, yet the channel extension appears to be a key element of the project. The project depth is given as 48'. No economic analysis for deepening the Sabine Bank Extension channel to 50' was found in the report. The proposed dredging of the outer channel to 50' and the resulting 13.2 mile extension is thus far unjustified.

Screening Process. The screening process described in DFR section V is difficult to follow or understand. The description of the screening process left reviewers uncertain of the choice criteria and the original selection of alternatives. It is shortsighted to only look at crude petroleum and petroleum products in the initial screening when the subsequent LNG analysis has significant impacts on findings. In the absence of maps or diagrams the list of options on page DFR V-1 is largely incomprehensible. T he relationship between the commodities handled, the choice of project draft, and the plan formulation is unclear. There is a confusing discussion of commodity impacts on optimal draft that is hard to reconcile with the screening process described in DFR section V. DFR V, Tables 1 through 4 are difficult to follow and require better explanation. The "analysis conducted for other studies" mentioned on page DFR V-4 needs a complete citation, and copies should be presented in an appendix and made available for this review.

Significance – High:

The apparent problems with the Plan Formulation are highly significant, as they call into question the basic elements of the proposed project. It is unclear that the proposed widening and dredging of the SNWW is in fact the best plan to address the situation.

Comment Cross-referencing:

(3) Comment: The crucial analysis of vessel design and sailing drafts is inadequately supported by data and appears questionable.

(7) Comment: The choice of project design vessel appears to drive the project design and benefits estimates, yet remains unjustified in the report.

(15) Comment: The presentation of data in maps, figures, and tables needs to be substantially improved.

(17) Comment: The analysis and conclusions are based on what appears to be over-reliance on the pilots or at least a lack of documentation of their opinions.

Recommendations for Resolution:

To resolve these concerns, the report would need to be expanded to include:

- A detailed, quantified description of the No Action alternative.
- Detailed examination of incremental widening and deepening alternatives, and a "turning basins and anchorage" alternative.
- Thorough consideration of non-structural alternatives, including lightering larger vessels, handling large vessels at off-shore terminals, VMS/VTS improvements, and relaxing or altering the Pilots' rules.
- An analysis of the channel extension portion of the project.
- A clear, well-documented description of the screening process.
- A quantitative economic analysis of the use of the existing or an expanded LOOP facility and the pipelines and other facilities necessary utilize it.
- A detailed examination of how modification of the Sabine Pilots' rules and operations could improve productivity and how safety would be impacted.
- Explicitly consider the contributions of VMS/VTS systems in reducing the need for channel widening.

Comment 2:

The report does not present a strong analysis of the current and future vessel fleet, or of vessel dimensions.

Basis for Comment:

While there is extensive discussion of current and future vessel fleets, there is little in the way of solid data or clear explanation of reasoning. Fox example:

- The discussions of vessel fleets for chemical, grain, steel slab, ore, limestone, rock, and wood product carriers provide no data or documentation.
- The Taylors Bayou vessels have a 124' beam, clearly intended to allow passing and meeting under the Pilot's rules in the 500' channel. Yet the analysis claims that these vessels are regularly impacted by delays. An explanation is needed.
- The Appendix refers to "transportation analysis conducted for SNWW and other coastal ports" in connection with tanker size limits (DFR EA p. 4). A complete citation should be provided and the analysis presented in an appendix.

Significance – High:

The Plan Formulation and the benefits depend on the future vessel fleet and its dimensions.

Comment Cross-referencing:

(3) Comment: The crucial analysis of vessel design and sailing drafts is inadequately supported by data and appears questionable.

(5) Comment: There is no comprehensive description of existing vessel operations.

(7) Comment: The choice of project design vessel appears to drive the project design and benefits estimates, yet remains unjustified in the report.

(9) Comment: The report is written at a summary level and lacks proper documentation throughout.

Recommendations for Resolution:

The report requires clear, organized data on current vessel fleets, clear explanation of how future vessel fleets were predicted, documentation of trends, and appropriate sensitivity analysis.

Comment 3:

The crucial analysis of vessel design and sailing drafts is inadequately supported by data and appears questionable.

Basis for Comment:

As noted above, no data are provided on actual sailing drafts of loaded vessels compared to available channel draft and vessel design draft. This is a crucial shortcoming. Several points in the draft discussion need more explanation. For example:

- A greater percentage of crude petroleum carriers were loaded to drafts of 38' or more for Port Arthur than for Beaumont (DFR EA p. 25). Why?

- Vessels are claimed to be loaded to deeper drafts for longer voyages (DFR EA p. 25). Why?

The discussion of loaded and ballast drafts (DFR EA p. 83) is vague, and lacks data or documentation.

Commodity Fleets and Drafts. The discussion of commodity fleets contains unsupported assertions regarding the future percentage of tonnage with loaded drafts over 40 feet. No data, analysis, or citations are provided for these crucial assumptions. These percentages are then used to estimate the benefits of channel deepening without a sensitivity analysis. There is no explanation or justification given for the estimated proportions of each commodity that would use greater draft.

"Draft Constrained" Vessels. Although the economic analysis repeatedly refers to "draft-constrained" conditions, **there is no demonstration that existing vessels are actually draft-constrained**. The report notes: **"**The emphasis throughout the report is that the result of a deeper and wider channel will be increased utilization of existing vessel sizes." This is a critical unverified assumption, and very risky. While shippers would be expected to exploit deeper drafts once they became available, the report authors must make an effort to verify that no other factors are limiting vessel loads. In the absence of such an effort the assumption cannot be accepted. The same assumption was the result of strenuous external review panel objections in the Columbia River project.

In 2002–2004 only 36% of the vessels had loaded drafts over 35' (e.g. less than 5' of underkeel clearance in a 40' channel). In the absence of some industry contact or analysis it cannot be said with any certainty that those vessels would have used more draft had it been available. For example, virtually all Port Arthur crude carriers are currently loaded at or over 38' of draft, and investigation is required to determine if loading them deeper is really practical or likely. There is no analysis or investigation of why the other 64% of the vessels are not taking advantage of the available draft. There is no reason to assume, as the analysis does, that 36% of the vessels would then use 45' of draft (i.e., load to 40' with 5' under keel).

Basis for Comment (Continued):

Vessels might be "light-loaded" for a number of reasons beside draft restrictions, including:

- Restrictions at loading docks or ports.
- Preferred shipment or batch size.
- "Normal" capacity utilization of 90-97% (DFR Table 71)
- Limitations on receiving berths such as transfer rates, occupancy limits, or storage tank capacity.

Taylors Bayou Fleet. The Taylors Bayou fleet is a case in point. The analysis argues that Taylors Bayou vessels would be more fully loaded with more draft available. Yet most of the vessels serving Taylors Bayou were designed for current conditions, so treating them as underutilized requires some explanation. These vessels have a 43' design draft. Why would they have a 43' design draft for a 40' channel unless something less that 43' of sailing draft was acceptable? Table DFR 71 on vessel utilization indicates that vessel capacity is typically 90-97% utilized. This suggests that the 43' draft vessels might routinely be loaded to 38'+ of draft consistent with their use in a 40' channel. They would have to achieve unusually high utilization to use their full 43' of draft in a 48' channel.

LNG Vessel Drafts. The LNG vessel draft discussion is cursory. The analysis claims benefits for decreased LNG vessel delays due to deepening and widening despite acknowledging that all LNG vessels require one-way movement. No explanation is given. The report actually says on page DFR VI-49 that "LNG vessels represent a large increase in vessels that travel shorter distances than the existing tanker fleet going to the Neches River and, therefore will not be subject to delays." The text concludes that a depth of 43-44' would be required for vessels of 39-40', yet 87% of the tonnage shown has design drafts of 37' or 38', and depth of more than 40' would only be required if they are loaded completely full. The ERDC LNG simulation vessels had 37.4' and 39.4' of draft. There is no support for the assertion that the majority of LNG vessels will be loaded to 39 feet, especially since most have design drafts of 37' or 38' feet. The "multiport analysis" for LNG shipments is not presented anywhere.

Significance – High:

Much of the project justification depends on transportation cost savings achieved through greater vessel loading to deeper drafts. Without thorough investigation and analysis it *cannot* be safely concluded that vessels are light loaded solely due to draft constraints or that vessels would use the post-project draft proportionately.

Comment Cross-referencing:

(2) Comment: The report does not present a strong analysis of the current and future vessel fleet, or of vessel dimensions.

(5) Comment: There is no comprehensive description of existing vessel operations.

(7) Comment: The choice of project design vessel appears to drive the project design and benefits estimates, yet remains unjustified in the report.

(9) Comment: The report is written at a summary level and lacks proper documentation throughout.

Recommendations for Resolution:

The report requires a thorough analysis of current design and sailing drafts, and a convincing demonstration that:

- some specified portion of the existing (or future) vessels are (or will be) constrained by available draft, rather than by some other factor; and
- some portion of future vessels will be able to use additional draft and will not be limited by another factor.

The "multiport analysis" for LNG shipments should be presented in an appendix.

Comment 4:

The benefits estimates cannot be validated from the report material, and include some questionable uses of ranges and averages.

Basis for Comment:

The discussion of projected cost savings is much too general and cannot be validated from the material presented. Compared to the long discussions of commodities and vessel fleets the account of the actual benefits estimate is relatively cursory.

- HarborSym was not used for the Neches River Turning Basins (DFR EA p. 95), but it is not clear what was used instead.
- The benefits calculations used savings of "6–14 hours" (DFR EA p. 99), but it is not clear what values were actually used or how the values were chosen.
- The basis of the time savings estimates (DFR EA p. 102) and the means of reconciling different estimates are not documented or explained.
- DFR Tables 77, 78, 79, 82, 83, and 84 all need more extensive documentation and explanation.
- The vessel cost and savings discussion (DFR EA p.104-107) is cursory, and does not explain the calculations in the example (Table 76) or document the various cost and time factors used.
- The "detailed analyses of crude oil, petrochemical products, breakbulk, and LNG fleet utilization in relationship to existing and future" (p. DFR VI-3) are likewise not presented.
- The "port depth, trade route, and historical vessel utilization data…used to identify the percentage of tonnage anticipated to benefit" are also missing from the report.

The costs appear to include the correct subsystem costs but how each is derived is not consistently available to the reader in this report. Essentially they are presented in an economic spreadsheet but all cost elements and cost savings need verification and sourcing. Sensitivity analyses on some of the cost elements, relative to impact on BCR, are needed. This will strengthen the report and provide the decision maker with the appropriate sense of confidence in the decision.

Basis for Comment (Continued):

Transportation Cost Estimates. The transportation cost estimates as demonstrated in DFR VI Table 18 are not sufficiently explained or documented. There are no sources or explanation for the unloading rates and costs, or the loads at each draft. The basis of the cost savings estimates in DFR VI Table 48 is not given, nor are many of the cost factors sourced.

Lightering and lightening are mentioned but are not explained in any detail. The cost savings claimed on DFR VI-20 are not documented. DFR VI Tables 19 through 20 require additional explanation. The cost savings calculated for other commodities likewise require more detailed backup.

The report also discusses the sailing distances used in the cost analysis. These are all averages or representative values rather than actual distributions of distances from different ports. There is not enough information presented for the EPR panel to determine whether or not this was a legitimate analytic shortcut. In particular, there was no sensitivity analysis.

Significance – High:

In the absence of proper documentation and explanation the benefits estimates cannot be considered reliable or complete.

Comment Cross-referencing:

(9) Comment: The report is written at a summary level and lacks proper documentation throughout.

Recommendations for Resolution:

The benefits analysis should be documented in detail, with appropriate source citations for input values, careful analysis of any ranges or averages, and provision of actual data.

Comment 5:

There is no comprehensive description of existing vessel operations.

Basis for Comment:

The report lacks detailed information on current SNWW vessel and barge operations, and the information that is presented is fragmented.

- The "historic(al) SNWW traffic data" (p. DFR VI-1) is not provided anywhere.
- The economic analysis refers to lightering and lightening practices but there is no explanation of which vessels are involved or where and how these operations take place.
- There is a confusing discussion of vessel convoys and turning basins, but there are no maps or diagrams and the report text itself indicates that more information is needed.
- There are references to barge operations on the GIWW where it coincides with the SNWW, but no complete description and no diagrams or data.

Significance – Medium:

In the absence of a clear explanation of SNWW vessel operations it is difficult to understand or validate the claimed benefits. It is also difficult to explain or analyze a No Action alternative without documenting current operations.

Comment Cross-referencing:

(2) Comment: The report does not present a strong analysis of the current and future vessel fleet, or of vessel dimensions.

(3) Comment: The crucial analysis of vessel design and sailing drafts is inadequately supported by data and appears questionable.

(7) Comment: The choice of project design vessel appears to drive the project design and benefits estimates, yet remains unjustified in the report.

(15) Comment: The presentation of data in maps, figures, and tables needs to be substantially improved.

Recommendations for Resolution:

The report and its appendices should be expanded to include:

- Data on current and past vessel fleets, design drafts, and sailing drafts
- A detailed description of the convoy system, the lightering/lightening process, and barge operations, with appropriate data and diagrams.

Comment 6:

The commodity discussions and forecasts are fragmented and incomplete, and do not adequately support the forecasts used for the benefits estimates.

Basis for Comment:

The individual commodity forecasts have minimal documentation, and for most there is no documentation of how the forecast growth rate was chosen. In some cases the SNWW commodity outlook is expected to follow the U.S. growth rate and in other cases the SNWW outlook is expected to differ, but in neither case is the reasoning given or a sensitivity analysis performed. The complete commodity forecast is not shown anywhere in the report.

Most crucially, the crude petroleum imports forecast calls for a doubling of volume by 2030, but the comparison with refinery capacity is cursory and undocumented. According to EIA, domestic refining capacity is expected to increase at only 0.6% annually, raising serious questions about the ability of the Beaumont and Port Arthur refineries to accommodate the projected flows.

Per the abbreviated sensitivity analysis the LNG traffic appears to be crucial to project justification. The LNG analysis, however, relies on multiple assumptions that are not tested or verified, "in spite of obvious uncertainty" (DFR EA p. 22). The analysis assumes an even utilization rate across all LNG facilities despite data showing uneven utilization. The analysis assumes that SNWW LNG facilities will have 1/3 of US imports, without documentation.

Significance – Medium:

The forecasts may indeed be appropriate, but cannot be verified from the report as written. The analysis presented in the report does not create confidence in the reader or solid support for the benefits estimates.

Comment Cross-referencing:

(9) Comment: The report is written at a summary level and lacks proper documentation throughout.

(14) Comment: Risk and uncertainty are mostly ignored.

Recommendations for Resolution:

The commodity analyses and forecasts need to be redone to show clearly:

- The history of each commodity
- The chosen future growth rate, why that growth rate was chosen, and where it was obtained.
- The steps taken to verify the realism of the forecasts and to identify any sensitivity to future events.

Comment 7:

The choice of project design vessel appears to drive the project design and benefits estimates, yet remains unjustified in the report.

Basis for Comment:

There is no justification given for the choice of the project design vessel (899 feet long, 164 feet wide, with unspecified draft, corresponding to a 158,000 DWT Suezmax tanker), nor any sensitivity analysis performed on the choice. There is nothing in the report to indicate how common such vessels would be or how often they might be required to meet in the channels.

The vessel beam data reveal that vessels of wider than 155 feet constituted only 3% of the trips, and suggest that meets between these large vessels would be rare. This observation calls the selection of a 164' project design vessel into question. Why was the 164' standard chosen instead of a 144' standard, which would have accounted for 95% of the vessel trips? Is more recent data available?

- DFR VI Table 46 indicates that 92% of the crude imports are carried in vessels of less than 115,000 DWT, much smaller than the project design vessel at 158,000 DWT.
- DFR VI Table 47 shows that 95% of the piloted vessels in 2004 had beams of less than 145 feet versus a project design beam of 164'.
- The project design vessel at 899 feet would not be able to enter the Taylors Bayou complex, where the limit is 758 feet (VI-7).
- The design vessel actually corresponds only to the very largest vessels serving Beaumont (p. DFR VI-6).

By the Pilots' 50% guideline a meet of two 164' design vessels would require a 676' channel. If the design vessel was 145', however, the channel width could be just 580'.

The notes for the 2/9/01 pilots meeting state that the 164' design vessel was recommended by PE-Economics in a May 2000 design vessel paper. Given the critical role of the design vessel in the project design and benefits estimates, this paper should be presented in an appendix and reviewed. What steps were taken to insure that the May 2000 recommendation was still valid?

Significance – Medium:

Since the simulation analysis is not documented and there was no sensitivity analysis, the review panel cannot reliably determine the impact of design vessel choice on the findings.

Comment Cross-referencing:
(2) Comment: The report does not present a strong analysis of the current and future vessel fleet, or of vessel dimensions. (3) Comment: The crucial analysis of vessel design and sailing drafts is inadequately supported by data and appears questionable. (5) Comment: There is no comprehensive description of existing vessel operations.
Recommendations for Resolution:
The report needs: • a detailed description of the justification for the project design vessel; • a review of the 2000 PE Economics report; and • a sensitivity analysis of the project design vessel choice (see below).

Comment 8:

The ERDC, HarborSym, and @risk models were used in crucial analyses, but the analyses lack documentation.

Basis for Comment:

The report makes numerous general references to ERDC and HarborSym modeling, but details are not provided.

The ERDC vessel simulation is discussed on pages DFR V-5 but not in sufficient detail. This is a striking omission, since the ERDC modeling is given as the justification for the 700' channel width.

The Ship Simulation Study (ERDC) and Harbor Simulation (the widening analysis, not just the model itself) need to be available for the external review. The brief overview in the report is inadequate given how critically the economic analysis depends on these two studies. The "more detailed information" referenced on page DFR V-8 is not actually provided in the Economic Appendix.

The @risk model is mentioned on DFR EA page 4 but not thereafter. Much of the needed documentation and information likely resides in project files.

It is risky to use the results of HarborSym selectively, and difficult to defend. The report should explain more fully why and when HaborSym's findings are ignored and the opinions of the pilots are followed.

Significance – Medium:

In the absence of documentation the EPR panel cannot determine whether or not the modeling was done correctly, or how the result might be sensitive to assumptions and input choices. Model documentation itself is not the same thing, as it is not the models but the use of the models that is at issue.

Comment Cross-referencing:

(9) Comment: The report is written at a summary level and lacks proper documentation throughout.

Recommendations for Resolution:

The report needs detailed documentation of:

- where and why each model was used;
- how assumptions and input choices were made;
- how results were interpreted; and
- the sensitivity of model outcomes to assumptions and inputs.

Comment 9:

The report is written at a summary level and lacks proper documentation throughout.

Basis for Comment:

As noted under other comments, the analysis and conclusions are under-documented. Data behind the conclusions are not given, including several instances where the main report says the data are in the appendix. There are multiple references to other studies and analyses that are not presented or sourced. Most of the commodity analysis and forecasting is only described, not actually documented.

Throughout the DEIS, DFR and appendices, complex issues are addressed in ways that rely on existing knowledge, data and previous studies. This is an entirely reasonable approach; however the reports do not adequately reference these knowledge bases. The technical basis of the report is thus undermined as the reader cannot assess the adequacy or credibility of the knowledge resources used to support the analysis presented. Also many of the sources used in the reports are dated and may not reflect the current state of knowledge, e.g., only 60% of the 440 or so references that are cited in the DEIS are from the last decade.

These concerns cover all technical areas encompassed by the report with illustrative examples provided below:

With and without project conditions. It appears that there is more information on the differences between the with and without project conditions than is offered in this report. Recent auditing information on pilots meetings, etc. does provide some useful data and understanding. More of these sources need to be incorporated into the report for the public so searches of models, meeting notes and rationale for critical assumptions will not be necessary. This report should stand on its own, without a need to drill down in other information to analyze the results.

Other examples include:

- "Review of the historical transit data and vessel fleet trends resulted in detailed analyses for these groups." – *Where are the detailed analyses?*
  "The detailed analysis included examination of port depths and associated trade route constraints." – *Where are the port depths and trade route constraints documented and analyzed?*

- "The vessel fleet projections are based on analysis of existing fleet utilization and anticipated trends.." – *Where are those trends documented?*

Basis for Comment (Continued)

- "The project benefits reflect consideration of risk-based evaluation parameters" – *How and where was this done?*

- "..indices developed from historical trend data and Global Insights forecasts." – *Where are the indices and how were they developed?*

- "Specific data on vessel trends is contained in the economic appendix". – *Actually, there are no such data in the appendix.*

- "Vessel-on-order data was examined in order to help determine the likelihood of higher concentration and potential transitions to larger vessels for chemicals, iron ore, aggregate, and grain" – *Where are these data and how were they analyzed?* The section describing the future conditions of the without project is far too general, with no quantitative or systematic consideration of commodity changes, vessel sizes, loading values and even safety or environmental conditions.

Economic Analysis. The DEIS does not include any numbers to support either existing or future traffic volumes or specific future vessel characteristics, and the arguments for volumes of crude oil imports and rates of projected growth are not backed-up with references.

Given that safety is one of the key factors the channel improvement seeks to address, the DEIS assumes that increases in traffic are "…expected to increase overall congestion and result in an increase in the total number of accidents" but no studies or references are provided to support this important relationship.

The individual commodity forecasts have minimal documentation, and for most commodities there is no documentation of how the forecast rate was chosen. The expected trends in ship traffic and tonnage need substantiation and references.

Safety and accidents. In the Problems and Opportunities section the report claims concerns over safety and the existence of draft restrictions. Neither of these alleged problems are documented in the report. No analysis of safety and accidents is presented; this is particularly suspect since much of the project design relies on the Sabine Pilots' assertions about safety practices or rules. It is critical that documentation about the lack of accidents, the need for the rules and any safety savings be presented. If there is not safety issue, why the strident Pilot rules? These statements continue on page DFR II-37 with allegations of congestion, shipping delays, and inefficiencies due to draft restrictions. Here, too, none of these statements are supported with data.

In the Navigational Safety section the graphics appear to be reproductions of PowerPoint slides and are not an acceptable substitute for data on vessel operations, delays, and accidents.

Basis for Comment (Continued)

The National Security section (p. DFR II-43) describes the role of Beaumont in military mobilization but does not contain any comparison of with and without project conditions. Again, there are no data relevant to the project.

The report says that costs and benefits were estimated for all the alternatives (DFR V p.9). These estimates should be provided in an appendix.

Environmental Analysis. Various issues in the economic analyses are poorly documented or referenced; some of these include:

The impact of vessel wakes on erosion and thus the relationship between the increase in vessel traffic and increase in erosion need to be supported by a reference.

The discussion of coastal restoration planning needs to be updated to include the efforts and authorities post-*Coast 2050*. These include the Louisiana Coastal Area (LCA) Ecosystem Restoration Study and Plan (authorized in WRDA 2007 as passed both the House and Senate), the State Comprehensive Master Plan (http://www.lacpra.org), and the ongoing LACPR planning.

The estimate that 50% of the dredged material used for beach nourishment that remains after placement will erode away by the end of the 6-yr cycle is not supported other than by brief reference to an unspecified project at Texas Point where 60% remained. Considerably more discussion and data are needed in this section of the report to assess the fate of material placed on the beach.

The biological effects of turbidity used in the No Action Alternative are based on studies that are 35 to 45 years old while other sections of the report (e.g., Aquatic Ecology) use more recent studies and data to evaluate the effects of TSS. Insofar as possible, the same quality of information needs to be used throughout the report to support each issue.

Citations to support the scientific and technical recognition of the WVA variables as important in overall habitat quality need to be provided.

The relationship between vegetative productivity and land loss used to support the WVA is apparently based on a single reference to a textbook (and a reference that implies that both salinity *and* inundation are important drivers of coastal habitat *distribution*). As V1 is such an important driver of the WVA models, this relationship must be more thoroughly substantiated based on a significantly larger literature.

Basis for Comments (Continued):

Dredging and sedimentation. The purpose and need for the project is also tied to transportation efficiency primarily for large volumes of crude oil imports and rates of projected growth for crude and LNG. The channel was designed for 40,000 DWT vessels and the project now serves 90,000 DWT vessels. The case looks compelling and import growth seems logical, but for the most part the arguments are not backed up with references.

Although the environmental setting is adequately presented, most of the references are very dated. A considerable amount of much newer scientific work has been done relevant to the study area. For example, the broad statement that the Chenier Plain has been eroding should be qualified (some sections have been accreting over the past two or more decades) as sediment discharge is now making its way west from the Atchafalaya Delta system. Also, storms can have an enormous impact on the study area (e.g. Hurricane Rita) and the section on climate should discuss magnitude and frequency of these events as well as continuing and possibly accelerated sea level rise. Although much of the work in the DEIS may predate the recent hurricane activity and estimates of sea level rise, it must be reviewed to the best of our knowledge.

QA/OC Documents. No Quality Assurance or Quality Control documentation was included in the review material so we cannot tell if appropriate steps were taken to cross-check and validate the analysis.

Significance – Moderate:

The omission of supportive data causes lack of certainty and confidence in the analysis and findings. Until such time as the analysis is documented in sufficient detail, it cannot be verified or validated.

Comment Cross-referencing:

(3) Comment: The crucial analysis of vessel design and sailing drafts is inadequately supported by data and appears questionable.

(8) Comment: The ERDC, HarborSym, and @risk models were used in crucial analyses, but the analyses lack documentation.

(17) Comment: The analysis and conclusions are based on what appears to be over-reliance on the pilots or at least a lack of documentation of their opinions.

Recommendations for Resolution:

- The report needs to be examined to provide enough information for the reader to follow the analysis. Data behind the calculations and referenced in the text should be displayed. Other studies and reports on which this report depends should be provided for review or reproduced in appendices.

- Ideally, USACE should be able to document the source, derivation, and impact of every number, assumption, or analytic step that supports the benefit-cost analysis. Complete point-by-point documentation is impractical and analytic documentation in general is admittedly tedious, time-consuming, and expensive. Yet in today's contentious environment the USACE needs to do its homework thoroughly and be able to explain and document exactly what was done.

- It is not sufficient to supply undocumented Excel spreadsheets or working papers, as an outside reader would be unable to understand or follow them. The HarborSym output provided in this project is a case in point. Absent a parallel written account of how the analysis was performed, what assumptions were made, where data were obtained, etc. it is impossible for an independent reviewer to understand what was done or determine if it was done correctly.

- Adequate documentation should be submitted to capture the statistics on channel safety including collisions, sinkings, groundings and loss to life and injuries.

- It is imperative that the data demonstrating the growth of traffic be adequately documented with suitable references and not just by referring to interviews with pilots and captains.

- Update the references and evaluation of the environmental setting including the more recent estimates of sea level rise and the effect of recent hurricanes.

- If no appropriate documentation can be found, the report will need to be revised to clearly acknowledge and identify the limited nature of the information on which the reports are based.

Comment 10:

Public involvement in the feasibility analysis process was carried out well.

Basis for Comment:

In general the review panel was impressed with the level of effort which had been devoted to public engagement. The outreach program seems to have been appropriately aggressive and engaged both the public and state and federal agencies. The comments are numerous indicating both good publicity concerning the opportunity for comment and input, and excellent participation. The report indicates that the list of 244 suggestions from workshop participants was transferred to electronic maps and supplied to the Galveston District. The panel identified two areas of concern which could be addressed to improve the report:

- There is no documentation of contacts with the Sabine Pilots Association or industry stakeholders. The Pilots are an especially important group so it seems likely that they were engaged but to nature of the contact and their comments is not clear.

- The report could do a better job of documenting how the public comments were incorporated into the plan.

Significance – Low:

If the two remaining issues identified above are addressed the overall quality of the report would be improved.

Comment Cross-referencing:

(17) The analysis and conclusions are based on what appears to be over-reliance on the pilots or at least a lack of documentation of their options.

Recommendations for Resolution:

To resolve the concerns raised relative to this comment, the report would need to be revised to:

- Include documentation of the contacts with Pilots and a summary of their comments.

- Include some cross reference between the comments included in the report and any modifications which were made as a result (e.g., a Table cross referencing major comments and text which was modified as a result of the comment).

Comment 11:

Need to conform to post-Katrina changes in policy and to incorporate changes in scientific understanding of the Gulf Coast.

Basis for Comment:

Major post-Katrina changes have occurred in USACE policy (e.g., the Chief's 12 Actions for Change) and in scientific understanding of the Gulf Coast environment. To a large extent these are not incorporated into the analysis. In the aftermath of Katrina, USACE policy with respect to systems approaches, risk-based decision making, sustainability, and public involvement has been significantly updated. Many, but not all, of these changes in USACE approach do not seem well represented in the current DFR or DEIS. Also, the scientific understanding of hurricane physics and coastal sediment regimes in the Gulf of Mexico has been profoundly increased, but this does not appear to be included in the engineering and environmental analysis.

Major points among the Chief's 12 Actions for Change do not appear to be addressed in the studies and report. The Chief's 12 Actions for Change include,

- Employ integrated, comprehensive and systems-based approach
- Employ risk-based concepts in planning, design, construction, operations, and maintenance
- Reassess and update policy for program development, planning guidance, design and construction standards
- Employ dynamic independent review
- Employ adaptive planning and engineering systems
- Focus on sustainability
- Review and inspect completed works
- Assess and modify organizational behavior
- Effectively communicate risk
- Establish public involvement risk reduction strategies
- Manage and enhance technical expertise and professionalism
- Invest in research

Some of these, such as stakeholder involvement and communication, are well represented in the analyses and reports, but others are notable missing. Those missing include, a systems-based approach, risk-based planning and analysis and adaptive planning.

Changes in understanding of the Gulf Coast environment. Regarding hurricanes, a tremendous amount of work following Katrina has been done by ERDC and the IPET projects on improved understanding of hurricane climates and physics in the Gulf. The increased understanding needs to inform the DFR and DEIS. One of the fundamental weaknesses in the DEIS and supporting documents is the absence of discussion on tropical storms and hurricanes. They are clearly of concern.

Basis for Comment (Continued)

Regarding sediment, a considerable amount of much newer scientific work has been done (e.g. Texas Bureau of Economic Geology and the Louisiana Geological Survey), some immediately relevant to the study area. For example, the broad statement that the Chenier Plain has been eroding should be qualified (some sections have been accreting over the past two or more decades) as sediment discharge is now making its way west from the Atchafalaya Delta system. Also, storms can have an enormous impact on the study area (e.g. Hurricane Rita) and the section on climate should discuss magnitude and frequency of these events. Much attention has been focused on hurricanes over the past decade and the historical record is quite good. The section on erosion should be expanded to include, insofar as possible, new information from hurricanes over the past five years or so. The erosion rates are enormous already, but they may be impacted by the channel deepening, and may accelerate over the life of the project owing to an increased rate of sea level rise. Hurricanes are an important factor in long-terms erosion rates and should be discussed as a contributing component to the evolution of the coastal region.

The four accounts — NED, RED, EQ, and OSE — are not adequately addressed in the report. The inclusion of the four evaluation accounts is not apparent from the DEIS. The preferred alternative is stated to be the alternative that best satisfies the NED plan alone. This harkens back to an earlier period when economic benefit-cost consideration were the main driver of project evaluation.

Significance – Medium:

The lack of conformance to updated USACE policy with respect to engineering and economic analysis, and to planning is a significant shortcoming of the studies. However, in some aspects the studies appear to do a reasonably good job, for example in stakeholder involvement; but the reports do not comply with current policies for systems approaches and risk-based decision making.

Comment Cross-referencing:

(10) Comment: Public involvement in the feasibility analysis process was carried out well.

(14) Comment: Risk and uncertainty are mostly ignored.

Recommendations for Resolution:

- Specific incorporation of systems engineering considerations, risk-based analysis, and adaptive planning and management in conformance with the 12 Actions for Change need to be in the DFR and DEIS.
- The significant advancement in scientific understanding of (1) Gulf hurricane physics and (2) sediment regimes and processes resulting from the Interagency Performance Evaluation Taskforce studies need to be incorporated in the engineering and environmental modeling for the SNWW plan.
- Considerations other than just NED need to be made in evaluating chosen alternatives. This is especially true given the significant ecological aspects of the project impacts, and the need to conform to a regional sediment management plan.

Comment 12:

Many issues of significance regarding dredging and sedimentation are not thoroughly evaluated or analyzed (e.g., regional sediment management plan, potential for sea-level rise and its implications, improved understanding of hurricane storm surge in the Gulf, the effects of Hurricane Rita on shorelines and interior wetlands.)

Basis for Comment:

The basis for comments made here are rooted in (1) the disposal of 417 mcy of dredged material in ODMDS's without consideration of the regional littoral system response, regional sediment management considerations, and a full understanding of littoral processes and cumulative impacts, (2) an incomplete consideration of project alternatives and their impacts, (3) the use of inappropriate models to assess impacts of interior channel dredging and mitigation strategies, (4) apparent non-compliance with existing state Coastal Zone Management Plans.

Regional Sediment Management and Analysis. The DMMP, as presented, focuses primarily on the interior waters, marshes, and wetlands located north of the coastline and entrance to the Sabine Neches harbor channel. Little or no discussion was devoted in the plan presentation to the proposed placement of materials offshore, a discussion that was reserved primarily for DEIS Appendix B, Ocean Dredged Material Disposal Site Designation (ODMDS). Unfortunately, the material presented in this appendix addresses a very limited set of proposed alternatives, all of which include the use of designated (existing or proposed) ODMDSs, the selection of which was based almost entirely on least cost considerations arising from transport distances and handling considerations.

Nowhere in any of the USACE documents provided was there mention or indication that the recommended placement of dredged material in the eight ODMDSs was arrived at using accepted Corps guidelines for Regional Sediment Management (RSM). This omission becomes even more disturbing given the fact that both the DMMP and Ocean Disposal Plan propose the placement of 417 $\pm$ mcy offshore over the life of the project without any discussion or consideration of the expected cumulative impacts over the life of the project caused by the proposed action. This represents a very significant loss of valuable sediment from the active littoral system in this region of the Gulf of Mexico coast which historically has been sediment starved, with chronic shoreline recession and an ongoing loss of coastal wetlands.

RSM requires the consideration of sediment as a resource that is to be managed for the optimum benefit of the affected region. In the case of the SNWW project the region includes not only the interior watersheds, but also the offshore, nearshore, and coastal shorelines of both Texas and Louisiana that function as a littoral system. This requires the development of a regional context of historical coastal behaviors and framed in a sediment budget, or balance, for the area, including quantifiable sediment fluxes and pathways, and the sediment volume changes within designated major littoral components. Unfortunately, neither the DEIS nor the DFR provided sufficient information to develop a clear characterization of the historical behavior of the coast in the area of interest, its long term temporal and spatial patterns of erosion and accretion, and the impacts of storms.

Basis for Comments (Continued)

While limited information on littoral processes is provided in the DFR, it is based upon the supporting work of the ERDC Coastal Shoreline Impact Study, Gravens and King (2003). The primary focus of this study, however, was to examine the incremental impacts of littoral drift, shoreline response, and channel shoaling due to the incremental deepening of the entrance channel. This limitation in scope does not provide the needed understanding of the littoral behavior of the area.

Finally, the proposed DMMP and ODMDS DEIS include a relatively small placement of 1.5 mcy of sand on the Texas and Louisiana shorelines at alternative 6-year intervals. However, the rationale for quantities and frequencies of beach placement are not provided, nor was any attempt made to evaluate the suitability of the materials to be placed on the beach and the native beach material characteristics. Without this information, it is not possible to accurately predict the behavior of the beach fills and the fate of materials placed on the beach. This, in turn, raises questions regarding the adequacy of the proposed placement volumes and frequencies. What is the rationale for beach placement?

Incomplete Consideration of Project Alternatives. A rigorous analysis of littoral processes and sediment characteristics in a regional sediment management framework would facilitate the identification and evaluation of a more representative set of offshore, nearshore, and beach placement alternatives. The lack of such information coupled with an apparent mandate to restrict the alternative selection to least cost navigation project solutions, without consideration of other short and long term benefits associated the broader regional context, results in a limited and unimaginative set of alternatives. This represents a serious deficiency in both the DEIS and the DFR. For example, it is noted from DEIS Appendix. B (ODMDS) DEIS Appendix B Table 1-1 and the table shown in DEIS Appendix B Sect 3.1.1, the two closest ODMDSs, PA# and PA$, will receive a total of 205 mcy of maintenance and new construction material over the 50-year project life. This represents 50 percent of all maintenance material scheduled for placement in all eight ODMDSs, i.e., PA's 1,2,3,4,A,B,C, and D. With these sites located 7.8 and 4.8 miles offshore, respectively, the transport distances to place this material in shallow water, shore parallel placement areas in close proximity to the Texas and Louisiana coasts east and west of the channel merits further consideration.

The evaluation of the alternative designs to minimize or reduce future channel shoaling and maintenance requirements is not rigorously presented in the DEIS. The cumulative impacts in all areas are expected to be minimal to none according to the DEIS. However, the information here is not adequately convincing. The dredging of over 800 mcy over the life of the project will have cumulative impacts greater, in the readers' opinion, than presented in the conclusions. The studies have focused mostly on independent components and short time scales. The 50 year horizon fails to even identify the future growth in vessel size and traffic.

Basis for Comments (Continued)

The DEIS concludes that the Preferred Alternative would not create additional ballast water impacts because, even though the ship traffic will increase, there will be no changes in foreign ports of call. Is this a supportable statement for the 50-yr projected life of the project? Nevertheless an increase in ship traffic is expected to create more ballast exchanges and thereby a higher risk of impacts.

The study casually dismisses concerns in comments related to shrimp and fish being mobile enough to avoid high concentrations of pollutants and to birds being accustomed to noise of maintenance dredging. Moreover, the conclusions drawn about impacts on recreation and commercial fisheries seem to be little more than guesses and are not supported by rational analysis.

Inappropriate Models Used for Interior Waters Dredging Impacts and Mitigation. The WVA models, while widely accepted within Louisiana and the agency community, focus solely on wetland parts of the system. Specifically, they do not consider the value of open water areas, except those within wetland areas, and even then coverage with vegetation is considered the most desirable condition for the ecosystem. This bias results in the non-consideration of either negative or positive effects of a mitigation strategy in non-wetland areas. A good example of this would be the extensive dredging of Sabine Lake.

Non-compliance with Existing State Coastal Zone Management Plans. The removal of 417 +mcy of sediment from the active littoral system of the SNWW area appears to be in contradiction to the Coastal Zone Management Plans of both Texas and Louisiana. Specifically, the DEIS does not adequately address the following plan elements: Texas CZMP Section 501.25 (d), and Louisiana CZMP, Part 1, Chapter 7, Sections 700-729, Guideline 1.7 (i), Guideline 1.7 (s), Guideline 4.2.

Significance – High:

The removal of 417 $\pm$ mcy of sediment from the active littoral system of a sediment starved environment has very significant long term implications, none of which have been addressed.

Comment Cross-referencing:

(1) Comment: The Plan Formulation as described in DFR section IV appears questionable.

Recommendations for Resolution:

- Adequate documentation of historical behaviors and littoral processes in the region, as well as an expanded documentation of regional characteristics, sediment characteristics, and climatology, including storms and their impacts on the area. Information obtained should be used to develop a sediment budget and regional sediment management plan for the study area. More specific actions in this area of concern are provided earlier in this Final Comment document.

- Evaluation of expanded set of alternatives for offshore and beach disposal that returns more sediment to the active littoral system consistent with RSM principles. More specific actions in this area of concern are provided earlier in this Final Comment document.

- Re-examination of appropriateness of WVA models to evaluate project effects on the ecosystem, given their treatment of open water areas. Justify model(s) selected and include discussion of model limitations and implications.

- Justify compliance of offshore disposal actions vis-à-vis the Texas and Louisiana Coastal Zone Management Plans.

- The design alternatives need to properly identify the effect of each alternative on the future channel shoaling and maintenance requirements.
- Predictions of environmental consequences must be reviewed; the predictions must consider fundamental alterations that the FWP will make in the system.
- Eliminate reliance upon professional opinion and instead rely on validating assumptions, supporting documentation and provide complete analysis summaries.

Comment 13:

Wave transformation and sediment transport processes are inadequately evaluated using STWAVE and GENESIS models.

Basis for Comment:

STWAVE and GENESIS are well-known, widely-used models that represent state of the practice in forecast modeling. However, little information is provided on the specifics of the model applications, and results are presented in a general summary format that is unacceptable. As presented, applications have not shown that the models are providing accurate information that will answer the fundamental questions about shoreline impacts due to channel modifications in the SNWW. Specific areas of deficiency include:

Model Assumptions. Assumptions and potential limitations in the application of STWAVE and GENESIS models have not been presented. Two offshore features, Sabine Bank and a prominent asymmetric bulge at 15 ft, add bathymetric complexity and significant challenges to the modeling effort. How robust are the models in this particular environment? What is the uncertainty in calculations? How sensitive is STWAVE to modest inaccuracies in bathymetry, and is the node size appropriate to capture the important bathymetric changes, including those at the shoreline. What are the implications of using 70-year old (1937) surveys to "fill gaps" in the bathymetry? How well does STWAVE handle dissipation over a relatively fine-grained, as opposed to sandy, substrate? The above information must be included in the Engineering Appendix so that the description of the study is not only rigorous but fully accessible.

Input Conditions. The 30 unique input conditions with different combinations of wave period and wave angle appear to have been run with a single input height of 1 m. This may be reasonable for fair-weather conditions at the 20 m outer edge of the study grid, but the single height fails to take into account storm waves. The northern Gulf of Mexico is subjected to ~15 cold fronts each winter that have associated wave heights much greater than the input wave. In developing the combinations of wave angle and period, the wave data were analyzed in angle bands (±5, 25, 90 degrees) symmetrically distributed about the shore normal azimuth from which mean direction and period values were derived from a 10-yr record of hindcast data. The angles of wave approach used for each of the sectors bounded by these angles were ±0, 15, 40 degrees relative to the shore normal. The results of this analysis are thus highly questionable because 1) the angular sectors that were used are relatively coarse, effectively two for each 90 degree quadrant on each side of the shore normal, 2) the sectors are not uniform which, when combined with the small number of sectors used, provides only a crude approximation of the actual wave climatology, and 3) the rate at which sediment is transported alongshore is very sensitive to angle of wave approach, particularly around the angle of 45 degrees.

Basis for Comment (Continued):

Model Output. Output from the models is not reconciled with net transport directions shown by the local geology (Chenier ridges), and the results have not been examined in a broader context that allows explanation of model outputs in terms of shoreline processes. The only explanation for the ridge pattern on the Texas side of the inlet is flow reversal, to the east, at Sabine Pass, presumably a result of wave refraction around the shoreline bulge at the pass. Yet, GENESIS predicts net sand transport to the west for the full 10 miles of coast under consideration. In contrast, transport on the Louisiana side is predicted to be to the east for the 3-mile stretch east of the pass. Clearly, here, the transport (at least historically) has been to the west, also borne out by the local geology. It is not possible to have confidence in the predictions if the current conditions cannot be modeled, or the results explained in light of other contradictory indicators such as Chenier ridge formation. Sabine Pass appears to be a classic case of flow (transport) convergence toward the channel which, presumably, would have been one of the reasons for building the jetties in the first place. Development of a sediment budget, which is necessary for reconciling local versus regional sediment transport, is completely missing.

Overall Model Capabilities. Related to the above concern, the results from application of the GENESIS model show transport spikes in the immediate vicinity of Sabine Pass (one-half mile on either side). It can be extraordinarily difficult to simply get the correct net transport direction very close to deep inlets, even with observational data, and all indications are that the model is being called upon to provide information that is beyond its capability. There is particular concern about the 4.1 mile long jetties on either side of the pass. These are very long features that impact the ability of GENESIS to model shoreline changes close to the pass. It appears that the jetties were not included as physical features in the model runs; if included, what is a reasonable assertion regarding their impact on the model output? Finally, it is not clear how GENESIS is equipped to handle the relatively fine-grained but mixed sediment (as opposed to clean sand) along this shoreline, and other processes such as wave-current interactions.

Significance – Medium:

Given that the final combined output after running both models is determination of shoreline erosion and accretion, which in turn is transmitted through the DEIS as one of the environmental impacts, it is essential to have confidence that the numbers are correct. The level of confidence that the models have provided credible predictions of shoreline erosion and accretion, is low at the present time.

Comment Cross-referencing:

(14) Comment: Risk and uncertainty are mostly ignored.

Recommendations for Resolution:

The following steps need to be taken in order to provide the necessary level of background and credibility for the effective application of STWAVE and GENESIS.

- Model assumptions and potential limitations in application must be clearly stated, together with an assessment of the impact of assumptions, simplifications and/or other model shortcomings. Uncertainty and sensitivity must be fully evaluated.

- Model input scenarios must be re-evaluated and models re-run with particular reference to the role of storms, angle of wave approach, the influence of the 4.1 mile long jetties, and provisions in STWAVE for frictional effects that arise from the muddy offshore conditions.

- Model output must be reconciled with shoreline features on the Texas side that indicate localized transport to the east. An expanded and more rigorous examination of littoral processes, including a sediment budget for the study area, must be undertaken.

- Model results from STWAVE and GENESIS must be placed in a probabilistic or risk-based context as opposed to a simple deterministic framework. Effective application of results from these models will require that long-term fate of offshore ODMP material over the 50-yr life of the project be evaluated using LTFATE and incorporated into a sediment budget.

Comment 14:

Risk and uncertainty are mostly ignored.

Basis for Comment:

The plan formulation, engineering analyses, environmental assessments, and economic evaluations largely ignore the impact of uncertainty in underlying assumptions, models, and parameter values on the validity of the study conclusions. Risk and uncertainty considerations are mandated by the Chief's 12 Actions for Change.

Risk and uncertainty considerations may substantially affect the conclusions drawn by the study but are not systematically addressed. A critical weakness of the report is the lack of examination of the inherent risks and uncertainties of projections. The report and the analyses on which conclusions are based are principally reasoned from best estimates of models and parameter values. In some cases, positive benefit/cost projections are within the window of uncertainty and could easily become negative if adverse outcomes of the uncertainties are realized.

The economics sections lack meaningful sensitivity analysis, leaving the reliability of the findings in doubt. The current report falls critically short on sensitivity analysis. A major report weakness is the lack of examination of the inherent risks and uncertainties in projections. Sensitivity analysis is the appropriate vehicle for risk analyses, yet the sensitivity analysis in the Draft Feasibility Report and in the Economic Appendix is minimal.

The benefits estimates are based on numerous assumptions regarding commodity outlook, vessel fleets, vessel utilization, delay reductions, and other factors. USACE must determine the sensitivity of the benefit estimates (and thus the BCR) to each assumption and convention – otherwise it is not clear which are major factors and which are minor. Without a thorough sensitivity analysis the benefits estimate must be regarded as fragile and risky.

Sensitivity analysis also provides a means to identify critical variables or inputs. Where the project justification (e.g. the BCR) is found to be sensitive to key inputs, those inputs should be subjected to additional analysis and the sensitivities acknowledged. For instance:

- The Sensitivity Analysis for crude petroleum forecasts is not adequate as presented. The forecast numbers shown in DFR Table 100 do not match the forecast growth rates in DFR Table 26, and there is no explanation of the difference. The alternative forecast examined is a different U.S. forecast (actually an arbitrary midpoint of two forecasts, which minimizes the potential difference from the project forecast), not an alternate SNWW forecast. Moreover, the sensitivity analysis does not discuss the sensitivity of the benefits estimate to the crude import forecast.

- The LNG forecast is a prime example. There is a brief sensitivity analysis showing that the benefit/cost ratio is *very* sensitive to the LNG forecast. Yet the analysis does not delve further into the LNG outlook or examine the sensitivity to issues such as LNG vessel design.

Basis for Comment (Continued)

There is no sensitivity analysis of:

- Port commodity shares;
- Commodity forecasts from other sources;
- Future vessel specifications;
- Estimates of draft-constrained commodity shares;
- Estimates of post-project vessel loading;
- Estimates of time saved; or
- Pilots' passing and meeting rules or the prohibition on nighttime operations.

As a concrete example, the average annual savings for turning basin deepening is based on the midpoint of an un-weighted average of unverified ranges of time savings whose sole source is an email from the Pilots' Association. According to the spreadsheet the average annual savings are $8,967,354. If the average time savings were an hour less, the average annual savings would decline by $919,729 and the savings over the project life would decline by $17,120,058 or 10%. The project benefits and thus the BCR are clearly sensitive to this estimate of time savings, yet there is no indication of efforts to cross-check the estimates given in the Pilots' Association email or any sensitivity analysis.

Lack of consideration of uncertainties in hydraulic and other engineering modeling. The modeling of Gulf shoreline impacts, for example, used STWAVE to investigate the wave field offshore the entrance to the channel, and evaluated alternative channel modifications on adjacent shorelines due to waves and sediment transport. STWAVE is a well-known model that has been widely used and calibrated in the Gulf. The GENESIS sediment transport model was used to translate STWAVE output to coastal impacts. This is solid, state of practice modeling, but does not involve significant sensitivity analysis or risk and uncertainty calculations. Thus, the output can be seen as best estimates based on current information and conditions, but not the range of possible outcomes. The qualitative patterns of impact generated by the pair of models is likely to be as good a forecast as is possible without more detailed, design level data and further calculations.

Uncertainty about environmental consequences of dredging and sedimentation. The predictions of environmental consequences convey a false sense of certainty that is not supported by empirical data or the assumptions used. The primary way the system has been altered to this point is by hydrological modification that has affected, among other things, salinity distribution and the plant and animal communities so affected. The FWP will make addition fundamental alterations in that regard. Furthermore, likely environmental changes in the future (sea-level rise and potentially reduced precipitation and streamflow) may profoundly complicate the effects of the new geometry created by the CIP. These changes add to the aforementioned limitations to the modeling methodology and its assumptions and thereby create considerable uncertainty of the environmental consequences of the CIP that are not acknowledged in this section.

Significance – High:

The lack of risk and uncertainty considerations in plan formulation and economic and engineering modeling throws the whole conclusions of the study into questions, as variations in model and parameter assumptions from those best estimates used in the analysis may fundamentally change the conclusions. Also, the present DFR is non-conforming to current USACE guidance on the incorporation of R&U.

Comment Cross-referencing:

(11) Comment: Need to conform to post-Katrina changes in policy and to incorporate changes in scientific understanding of the Gulf Coast.

(13) Comment: Wave transformation and sediment transport processes are inadequately evaluated using STWAVE and GENESIS models.

(17) Comment: The analysis and conclusions are based on what appears to be over-reliance on the pilots or at least a lack of documentation of their opinions

(18) Comment: The prediction of salinity changes and their impact on plant and animal communities conveys a false sense of certainty about future conditions that result from cumulative impacts and physiographic and climatic changes that may take place over the project life.

Recommendations for Resolution:

To resolve the concerns described above, the reports would need to include:

- At a minimum, sensitivity analyses of major modeling assumptions.
- Better, uncertainty analysis using error propagation or Monte Carlo simulation of all important engineering, environmental, and economic forecasts.
- Evaluation of the impact of the uncertainties in forecasts on chosen plan alternative and performance predictions.

Comment 15:

The presentation of data in maps, figures, and tables needs to be substantially improved.

Basis for Comment:

The DFR, DEIS, and engineering and environmental appendices include detailed spatial and temporal information. It is critical that these reports be supplemented by very high quality maps, graphics, quantitative charts, and easily understood tables. At present, this is not the case. Given the availability of CAD-GIS technology and other computer-enhanced graphics, it should be expected that data be clearly and well presented.

More and better maps are needed to show and explain data and predictions. The DFR and DEIS fundamentally treat geographic data, and these cannot be understood by most readers in purely text formats. Given the ready access to GIS, CAD, and other graphic capabilities, there seems reason to expect that these reports would be well supported by such maps and graphics, and yet that is not the case at present. The EPR panel was of the opinion that better maps are especially needed in order to clearly communicate technical issues and plans.

For example, there was a general frustration about the lack of clear maps and diagrams keyed to the geographic features and operational issues mentioned in the economic analyses: none of the maps show the Port Arthur or Beaumont port facilities; the various turning basins are not shown on any of the maps; the vessel limitations of Taylors Bayou are mentioned in several places but there are no maps or diagrams; the various channel width restrictions are not shown in a clear fashion on any of the maps..

The report lacks clear diagrams keyed to the geographic features and operational issues mentioned in the economic analyses. The existing maps and diagrams are inadequate and require improvement in detail and clarity. Several of the critical ports are not even identified or presented on those maps.

- None of the maps show the Port Arthur or Beaumont port facilities.
- The various turning basins are not shown on any of the maps.
- The vessel limitations of Taylors Bayou are mentioned in several places but there are no maps or diagrams.
- The various channel width restrictions are not shown in a clear fashion on any of the maps.

Most of the maps provided appear to have been prepared for the dredging and spoils disposal plans and are not very useful for understanding SNWW vessel movements or plan features.

Improved and more clearly organized data tables are needed throughout the documents. Many existing tables also require sourcing so that the origin of the data presented can be identified. Many tables are presented without a clear description of how the data were derived or where the data originated.

Significance – Medium:
The public and other stakeholders will not be able to understand technical descriptions and forecasts in the absence of high quality maps and graphics.
Comment Cross-referencing:
(1) Comment: The Plan Formulation as described in DFR section IV appears questionable. (5) Comment: There is no comprehensive description of existing vessel operations.
Recommendations for Resolution:
• Many more and better maps are needed throughout all the documents. • More and more clearly laid out data tables are needed to portray information.

Comment 16:

The report needs an extensive editorial review and detailed copy-editing.

Basis for Comment:

Many sections of the DFR, DEIS, and their appendices are desperately in need of copy editing. Large sections of text are repeated *verbatim* in separate parts of the reports, and clarity could be importantly increased by changes to English usage.

Much of the report and appendices is poorly written and redundant. Writing by committee is unfortunately part of such a study (and well understood by the EPR panel), but a serious editing must be undertaken before being released to the public. The editing would also have made the review easier. A brief outline of the Economic Appendix, early in the General section would improve the presentation. Also, the General section is really an Executive Summary and could be identified as such. Otherwise it appears as if many unsupported statements are being made when this review finds that some support is available within the appendix itself. Documentation of the correctness of input should be made available.

There is considerable overlap among the various sections of the documents. Material does not seem well organized in the current draft. Much of the needed support information and data may exist in other documents or in project files, but this is not clear in the current reports. Cross-referencing among different parts of the documents is poor.

The DEIS is far better written than the DFR but, more specifically, the DFR Economic Appendix is woefully in need of editing and clarification. The Economic Appendix duplicates most of the material in the DFR chapters and would also benefit from better organization and editing, and better maps and diagrams. The "General" section at the beginning of the appendix is very difficult to follow and does not appear to reach any conclusion.

Significance – Low:

Readability is not a technical issue, but is important in clearly communicating findings to the public and other stakeholders. The EPR panel understands the impediments to producing a well-edited large report in a timely and cost-effective manner; but it is important.

Comment Cross-referencing:

This issue of copy-editing is addressed in the following consensus comments:

(15) Comment: The presentation of data in maps, figures, and tables needs to be substantially improved.

Recommendations for Resolution:

- Careful copy-editing by competent personnel.

Comment 17:

The analysis and conclusions are based on what appears to be over-reliance on the pilots or at least a lack of documentation of their opinions.

Basis for Comment:

The analysis, project design, and chosen alternatives for the DFR relied heavily on the wisdom, knowledge or assertions of the Sabine River Pilots. Information from the Sabine River Pilots was not documented or subjected to critical review as part of the DEIS, the DFR, or in the DFR Economic Appendix.

Over-Reliance on River Pilots. The analysis that led to the changes between the "with" and "without" project conditions depended too heavily on information and opinions from the pilots. It appears that statements made by the Pilots, or sometimes even individual pilots, in the pilot meeting notes served as the "truth" for design when engineering analysis should have been done to support the statements. Indicative of the problem are statements such as "…pilots not comfortable…" or "…driven by pilot input…". Further, when the modeling disagreed with the Pilots statements regarding the time savings, as presented and discussed in the Economic Appendix, resolution in the DFR was unclear. Is the Pilots Association the final voice on operating rules and restrictions? If so, under what authority and can this be changed? Can the Sabine Pilots river rules be modified as a non-structural alternative?

As presented, safety concerns have been generally dismissed as an issue in the economic evaluation. They received no analysis and are not documented in the DFR. The channel widening analysis does not provide any data in support of the pilots safety rules. Yet, the justification for widening is based on the risk of vessels passing next to each other. This again suggests that Pilots Rules receive more attention and scrutiny, as to importance, possible modification and sensitivity of those changes. More information on the interaction and documentation of the Sabine River Pilots Association is required.

Lack of Documentation. The Sabine Pilots Association and its rules were mentioned frequently (DFR EA pp. 3, 4, 7, 10, 89, 97), but no documentation of contacts was provided. The pilots apparently indicated that the rules would change with the project, but there was no documentation and the results appeared to be highly uncertain (DFR EA pp. 10, 12, 13, 84, 95). Pilot estimates of times, costs and other factors were apparently accepted without verification (DFR EA pp. 95, 97, 98). It was not clear throughout the report whether the pilot logs were historical or developed for the study, nor was there any indication of whether the Pilots Association data were publicly available. Although recent auditing information on pilots meetings provides useful data and understanding, more of these sources needed to be incorporated into the report for the public so that searches of models, meeting notes and rationale for critical assumptions would not be necessary. This aspect of the report should stand on its own and not require that readers drill down into other information in order to analyze the results.

Basis for Comments (Continued)

Problems with Supplemental Information. On the basis of lack of documentation, the EPR panel requested additional information, noting that referenced discussions with the pilots appeared to be crucial but generally unavailable. Supplemental materials, provided by the USACE, were found to be useful in understanding the benefits analysis and the sources of information. The notes did, however, raise some additional questions concerning 1) anchorage and dock tie-up times, 2) vessel beam data, 3) vessel convoy times, 4) travel at night, 5) questions about Pilots Rules, 6) sensitivity analysis, and 7) project benefits from time savings. Even with the supplemental information, far too much analysis is "offline" and simply cannot be retrieved or verified.

Significance – High:

The lack of transparency, availability and verification of pilot's data is of high significance. This is a fundamental problem that could affect the justification for the project.

Comment Cross-referencing:

(9) Comment: The report is written at a summary level and lacks proper documentation throughout.

Recommendations for Resolution:

The following steps need to be taken to provide the necessary level of analysis and documentation for reaching rigorous conclusions as they relate to the pilot contacts:

- The DFR should address and justify the role that the Pilots Association has played in the analysis and formulation of the plan. Any divergence of the pilot's assertions and the modeling analysis should be reconciled and fully explained. Reanalysis may be necessary in order to reach credible conclusions.

- The DFR should provide documentation within the body of the report or in an accompanying appendix for the data that originated with the pilots. The report should discuss how the data were screened and verified.

- The DFR should explicitly answer the questions concerning pilot contacts and working notes that have been presented previously by the EPR panel (August 6, p. 123-128). These questions are succinctly presented yet vitally important.

Comment 18:

The prediction of salinity changes and their impact on plant and animal communities conveys a false sense of certainty about future conditions that result from cumulative impacts and physiographic and climatic changes that may take place over the project life.

Basis for Comment:

This comment is based on the combined effects of 1) uncertainties in the prediction of salinity, 2) the sensitivity of plant and animal communities to changes in salinity, and 3) assumptions regarding the role of salinity in landscape change both in the past and in the future. These challenges for coastal planning are compounded here by the fact that the model used to predict salinity changes associated with the project does not consider future sea-level rise.

Future Predictions. The model used to predict salinity distributions for FWOP and FWP is a standard model for this type of application. However, a fundamental problem with its application to 50 year project lifespan in this case is its lack of consideration of future sea-level rise, even though projected increases in sea level of 1 to 1.5 feet over the project period are used in considerations of wetland land mitigation design. The model also fails to account for any future changes in precipitation and streamflow. On a macro-scale the model may predict variations due to the project well, but it is not clear that the model is precise for micro-scale salinity changes, especially in the upper reaches of the estuary where it tends to under-predict salinity. The reviewers recognize that the high degree of variability resulting from drought and freshwater inflows complicate any assessment of salinity, and the selection of hypothetical worst-case scenarios is thus a good approach for evaluating future changes. However, providing the output only for these conditions implies that the highest salinity impacts under the low or median flows (2-4 ppt) could persist for some time. Predictions which included temporal variability in the areas of highest salinity impacts based on knowledge of temporal variability of low and median flows would be more helpful in interpreting the ecological consequences of the salinity changes.

Salinity Tolerance. The use of the salinity model output to predict ecological changes must more explicitly consider the salinity tolerance of the vegetative communities relative to predicted salinity changes. In the upper reaches of the estuary where changes in salinity are small (and likely under-predicted - see comment above) the report assumes a negligible loss of function in swamps but this is assumed rather than demonstrated. Salinity is a key driver in the WVA models used in the report, however for the most part the salinity tolerance of vegetative communities is inadequately considered. For example, the V2 marsh relationship is based on the percent change in salinity with a change from 0.5ppt to 1ppt (a 100% increase) resulting in a 50% change in SAV coverage. It seems that the effect of salinity should take into account the salinity tolerance of SAV vegetative. Moreover, a change in salinity produces a change in productivity and thus land loss in V1 while the same change in salinity, it if stays within the optimal range for that marsh type, will cause no change in V5.

Basis for Comment (Continued):

Landscape Change. Predictions of how salinity changes associated with the project will impact the wetland landscape are largely based on implicit assumption in the text that much of the existing loss of wetlands in this area has been caused by saline intrusion and subsidence. However, little evidence is presented for this and the assumption greatly affects the use of historical loss rates to predict FWOP loss rates. Given that the major effect of the project, and thus the difference between FWOP and FWP, are changes in salinity, a clearer assessment of the role of salinity vs. other factors in the loss rates is needed. This is especially true as many of the wetlands in this area have been subject to hydrologic management. The effect of periodic salinity incursions, e.g., during droughts or hurricanes, on marshes which are artificially isolated from normal salinity fluctuations by management structures is likely to be greater. The role of historic (and current) management of these marshes and how this affects their vulnerability to salinity is not considered.

The combined effect of these problems with the prediction of salinity changes and their implications is especially problematic for the report as the margin of mitigation compensation claimed (just over 1% in terms of AAHUs) is so close. A more detailed assessment of the implications of the assumptions and limitations the EPR panel found in the report regarding the prediction of salinity and its consequences may reveal that the mitigation plan is inadequate.

Significance – High:

This comment is of High Significance as it highlights some basic problems with the analysis on which the mitigation plan is based and this could substantially alter the justification for the project.

Comment Cross-referencing:

(9) Comment: The report is written at a summary level and lacks proper documentation throughout.

(14) Comment: Risk and uncertainty are mostly ignored.

Recommendations for Resolution:

To resolve the concerns raised by this comment, the report would need to include:

- An estimate of the effects of future sea-level rise and freshwater delivery scenarios on the salinity impacts of the project.
- A more detailed consideration of these predicted salinity changes, their spatial distribution and temporal variability, on the vegetative communities including an assessment of salinity tolerance.
- A revised WVA analysis showing the AAHUs associated with the different sea-level rise scenarios and varying assumptions regarding the salinity tolerance of the vegetative communities and the role of salinity in future land loss.

A reexamination of the mitigation plan based on these analyses.

APPENDIX B

FINAL CHARGE TO THE EXTERNAL PEER REVIEWERS

Final Charge to the Peer Reviewers
for
Sabine-Neches Waterway (SNWW) Channel Improvement Project (CIP)
Draft Feasibility Report and Draft Environmental Impact Statement

BACKGROUND

The primary work efforts of the SNWW CIP will focus on improving the efficiency and safety of the deep-draft navigation system while fully mitigating impacts to the areas coastal and estuarine resources. This will include:

- Deepening the entire channel from 40 feet to 48 feet from the Gulf of Mexico to Beaumont,
- Widening from 500 feet to 700 feet from the Gulf to Port Arthur, and construction of Turning Basins on the Neches River.
- Increased the channel in length from 64 miles to 77 miles (a 13-mile extension in the Gulf of Mexico)
- Dredging approximately 110 million cubic yards (mcy) of new work material (nearly 44 mcy in the Gulf)
- Maintenance dredging is expected to double (from 7.1 mcy/yr to 14.7 mcy/per yr) with over half the increase from the offshore channels
- Marsh and oyster mitigation
- 50-year dredged material management plan (DMMP) with marsh restoration and nourishment, upland placement areas, and offshore placement.
    - The DMMP features will restore 3,973 acres of degraded marsh and improve 1,412 acres of shallow water habitat on the Neches River, and the mitigation measures will replace 499 acres of marsh projected to be lost as a result of the project and restore an additional 3,003 acres of emergent marsh.
    - In addition, six miles of Gulf shoreline will be regularly nourished with maintenance material over the 50-year life of the project. All restoration and nourishment features are part of the base plan.

DOCUMENTS PROVIDED

The following documents will be provided to the peer reviewers (refer to Table 1):

Primary Documents

- Draft Feasibility Report (includes the Economic Appendix, Real Estate Plan, and Cost Estimate)
- Draft Environmental Impact Statement

Reference Documents

- Revised Draft Engineering Appendix
- MII Cost Estimate
- Hydrodynamic-Salinity Modeling for the SNWW Project (including Desktop Off-Channel Wetland Salinity Mitigation Model)
- Coastal Shoreline Impacts Study
- Desktop Study for Sediment-Related Problems at SNWW
- Vessel Effects Before and After SNWW Deepening
- Ship Simulation
- Ecological Modeling Report
- Ocean Dredged Material Disposal Study Report

SCHEDULE

1.	Battelle confirms final selection of candidates	NLT June 8, 2007
2.	All peer reviewer contracts finalized	June 29, 2007
3.	SNWW documents distributed to EPR Panel with charge [19 business days for review]	July 2, 2007
4.	EPR Panel submits technical review comments to Battelle	July 30, 2007
5.	Battelle distributes merged EPR comments to panel	August 2, 2007
6.	Facilitated teleconference on key issues/consensus	Week of August 6, 2007
7.	EPR Panel reviews key issues/consensus document	August 14, 2007
8.	EPR Panel submits comments on key issues/consensus document to Battelle	August 21, 2007
9.	USACE authors respond to EPR Panel comments	August 22, 2007[a]
10.	Battelle provides the Draft EPR Report[b] to EPR panel for final feedback (including review of USACE responses to EPR comments)	August 29, 2007[b]
11.	EPR Panel submits any final comments to Battelle	September 12, 2007[b]
12.	Battelle submits final EPR report to USACE	NLT September 21, 2007[b]

(NLT = no later than)

CHARGE FOR PEER REVIEW

Members of this peer review are asked to determine whether technical approach and scientific rationale presented in the SNWW CIP Feasibility Report and DEIS are credible and whether the conclusions are valid. The reviewers are asked to determine whether the modeling work is

[a] Note that the schedule as originally planned was modified to accommodate a change in USACE process for responding to EPR comments; in November 2007 the decision was made to proceed with the finalization of the final EPR report without the inclusion of USACE responses. The final schedule is included in Section 2 of this report.
[b] Battelle Draft EPR Report will include a summary of panelists and their qualifications, verbatim (anonymous) comments organized/collated by report section, USACE responses to comments, and a brief discussion based on the key issues/consensus document prepared as a result of the consensus meeting.

technically adequate, competently performed, properly documented, satisfies established quality requirements, and yields scientifically credible conclusions. The peer reviewers are not being asked whether they would have conducted the work in a similar manner. In addition, the reviewers are asked to determine whether the models and the associated findings are appropriate to help answer the following principal study questions that USACE will consider in its decision-making process for the site:

Specific questions for the peer reviewers, by report section, are provided below.

General Charge Guidance

1. Please answer the scientific and technical questions listed below and conduct a broad overview of the SNWW CIP Feasibility Study and DEIS. Please focus on your areas of expertise and technical knowledge.
2. Identify, explain, and comment on assumptions that underlie economic, engineering, or environmental analyses.
3. Evaluate the soundness of models and planning methods as applicable and relevant to your area of expertise. Comment on whether models explain past events and how models will be validated.
4. Evaluate whether the interpretations of analysis and conclusions are reasonable.
5. Please focus review on scientific information, including factual inputs, data, the use and soundness of models, analyses, assumptions, and other scientific and engineering matters that inform decision makers.
6. If appropriate, you can offer opinions as to whether there are sufficient analyses upon which to base a recommendation for construction, authorization, or funding.
7. Please **do not** make recommendations on whether a particular alternative should be implemented, or whether you would have conducted the work in a similar manner. Also please **do not** comment on or make recommendations on policy issues and decision making.
8. If desired, EPR panel members can contact each other. However, EPR panel members **should not** contact anyone who is or was involved in preparing the draft SNWW CIP Feasibility Study and DEIS or that were part of the Internal Technical Review.
9. Please contact the Battelle project manager (Karen Foster, foster@battelle.org) for requests or additional information.
10. In case of media contact, notify the Battelle project manager immediately.
11. Your name will appear as one of the panelists in the peer review. Your comments will be included in the peer report verbatim, but will remain anonymous. Attributed comments will be shared with the U.S. Army Corps of Engineers, Galveston District staff.

Please submit your comments in electronic form to Karen Foster, foster@battelle.org , no later than Monday, July 30, 2007, 7 pm EDT,

Specific Charge and Focus Questions

Preliminary Draft Environmental Impact Statement (DEIS) - Charge

Executive Summary

Comment on the completeness and clarity of the Executive Summary. Has the cumulative environmental impacts of this project been appropriately addressed?

1.0 Need for and Objectives of Action

Comment on whether you agree upon the needs and planning objectives. Has the increased volume of traffic and type of traffic been clearly defined and does it match projections involving the design life of this project?

2.0 Alternatives

Comment if you agree with how the preferred alternative was derived. Are all four accounts (NED, RED, EQ, and OSE) addressed in the report?

3.0 Affected Environment

Comment on whether you agree with the general analysis of the affected environment within the study area. For your particular area of expertise, provide an in-depth review of the DEIS analysis.

4.0 Environmental Consequences

Discuss whether you agree and why with the environmental consequences on the no-action alternative and preferred alternative. For your particular area of expertise, provide an in-depth review of the DEIS analysis.

Comment on whether any estuary shoreline erosion issues have been adequately addressed. While Texas Point National Wildlife Refuge shoreline will be improved by beach nourishment, was the likelihood of shoreline erosion caused by hydrodynamic changes in the waterway. Will the deeper and wider channel by itself or in conjunction with the changed hydrodynamics of the waterway cause slumping of sediments near the shore down into the channel and thereby cause erosion of the shoreline?

Comment on the applicability, accuracy, and completeness of the analysis of wave climate and sediment transport changes caused by the deepening and widening of the offshore channel and their predicted effect on the adjacent gulf coast shoreline as presented in the Shoreline Impacts Study.

Comment on the adequacy of the analyses of salinity intrusion, hydrodynamics, wave climate, and shoreline erosion. How important are the episodic effects of tropical storms and

hurricanes to this deepening and are they of concern? If they are important and of concern, have they been adequately addressed?

5.0 Mitigation

Explain if you are in agreement with the mitigation plan, including mitigation of direct and indirect impacts.

Is the relationship between mitigation and restoration properly explained and appropriately addressed in the mitigation plan?

Is the mitigation methodology appropriate and reasonable?

Discuss the appropriateness of the modeling efforts (H-S and Ecological) used in the mitigation development.

Does the report adequately address incremental justification for the mitigation plan? Does the proposed mitigation only account for impacts caused by the proposed modifications to the existing project?

6.0 Consistency with other State and Federal Regulations

Has the DEIS adequately been prepared to satisfy the requirements of all applicable environmental laws and regulations?

7.0 Any Adverse Environmental Impacts Which Cannot Be Avoided Should the Preferred Alternative be Implemented.

Explain if you agree with the DEIS in that there are no adverse impacts associated with the implementation of the preferred alternative

8.0 Any Irreversible or Irretrievable Commitments of Resources Involved in the Implementation of the Recommended Plan

Explain if you agree with the DEIS position on irreversible or irretrievable commitments of resources.

9.0 Relationship Between Local Short-term Uses of Man's Environment and the Maintenance and Enhancement of Long-term Productivity

Explain if you agree with the DEIS position on the above relationship.

10.0 Energy and Natural or Depletable Resource Requirements and Conservation Potential of Various Alternatives and Mitigation Measures

Explain if you agree with the overall assessment of energy (fuel) requirements.

Appendix A. Coordination

Section 5. Were the program objectives of the public involvement program properly developed and were the program objectives met?

Appendix B. Ocean Dredged Material Disposal Sites (ODMDS) Draft Environmental Impact Statement

Explain whether or not you are in agreement with the preferred ocean dredged material disposal sites alternative.

Comment on the validity of the engineering assumptions used for disposal.

Comment on the hydrodynamic and sediment transport related information in the SNWW Ocean Dredged Material Disposal Site EIS as appropriate keeping in mind that this is intended as a dispersive site.

Comment on whether the Site Management and Monitoring Plan (SMMP) of ODMDS is adequate enough to provide protection to the human health and the environment.

Comment on the selection of disposal site size and location.

Appendix C. Wetlands Value Assessment Ecological Modeling Report

Please comment on the selection of the Wetlands Value Assessment models for this study (including the Emergent Marsh Community Models, the Swamp Community Model, and the Bottomland Hardwood Community Model). Are these models appropriate for this project? Why or why not? Are there other habitat models that should be considered?

Please comment on the data parameterization efforts for each of the Wetlands Value Assessment Models. Are they appropriate? Why or why not?

Comment on the applicability, accuracy, and completeness of the hydrodynamic-salinity model with regard to predictions of any significant changes to the spatial salinity structure. Were, in your opinion, simplifying assumptions reasonable, and were all relevant factors considered (e.g., sea level rise)?

Appendix D. Dredged Material Management Plan (DMMP)

Were sound-engineering practices and principles used in the development of the DMMP? If not, explain.

Comment on the validity of the engineering assumptions for dredging and disposal.

Are the disposal alternatives and applicable capacities for dredged material disposal described?

Comment on whether adequate disposal alternative including restoration and beneficial use have been considered.

Comment on whether cumulative effects have been characterized and evaluated.

Appendix E. Clean Water Act Section 404(b)(1) Evaluation

Discuss if you agree or disagree that the proposed plan meets the requirements of and guidelines of the Section 404 (b)(1) concerning the discharged of dredged or fill material into the waters of the United States.

Appendix F. Draft General Conformity Determination

Explain if you agree with the DEIS position that the proposed SNWW CIP will comply with the requirements of the General Conformity Rule especially as it pertains to nitrogen oxides.

Appendix G. Biological Assessment and Biological Opinion

Is the analysis of the direct and indirect impacts on the listed species accurate and complete? Will the voluntary avoidance and conservation measures be effective? Explain.

Please comment on the acceptability of the beach nourishment activities at Louisiana Point and Texas Point in terms of the spatial, temporal, material and design adequacy. Are there any ecological concerns with beach nourishment activities in these areas as proposed by this project? Please describe.

Please comment on the measures to avoid/protect sea turtles during project activities. Are they appropriate? Are there other measures that should be considered? Is so, what are those measures?

Please comment on whether the proposed marsh restoration and beach nourishment will be effective in protecting wildlife habitat and fishery nursery areas, including critical habitat for the piping plover.

Appendix H. Historic Properties Programmatic Agreement

Provide any suggested improvements to the programmatic agreement regarding compliance with the Section 106 of the National Historic Preservation Act.

Appendix I. Compliance with the Texas and Louisiana Coastal Management Programs.

Identify any major areas where the SNWW DEIS does not comply the two state's coastal management programs.

Draft Feasibility Report - Charge

Syllabus

Comment on the clarity of the syllabus. Is the syllabus appropriately derived from the analysis of the report?

I. Study Information

Comment on the completeness and accuracy of the description of the project area.

II. Problems and Opportunities

Comment on how well the problems and opportunities are analyzed in terms of safety and economic impact. Is the projection of these problems and opportunities clearly defined to coincide with the project life (50 years) of this proposed project?

III. Formulation Objectives, Constraints, and Criteria

Comment on whether or not you agree with the public concerns, planning objectives, planning constraints, and the technical criteria that will be used as a basis for this study.

IV. Plan Formulation

Comment on the plan formulation. Should the plan consider other non-structural measures than the two listed?

Are the future conditions expected to exist in the absence of the proposed project logical and adequately described and documented?

Are the changes between the without and with project conditions adequately described?

Is the plan formulation rational for developing screening and combining measures into alternative plans adequately described?

Are risks and uncertainties of benefits, costs, and impacts adequately addressed and described?

V. Evaluation of Alternatives

Comment if you are in agreement with the preliminary analysis and how the alternatives for detailed screening were arrived?

Are you in agreement with the reformulation of the screened alternatives?

VI. Economic Evaluation of Alternatives

Comment on whether or not you are in agreement with how the benefits (widening and deepening) and costs (vehicle delay costs and construction costs) were derived for each alternative. Were all factors considered? Are the benefits and costs to the military clearly identified?

Are commodity and fleet forecasts thorough, reasonable and based on well founded assumptions and related to economic factors?

Are all costs, direct and indirect, recognized and discussed?

Comment how safety concerns have been accounted for in this economic evaluation. Should the study include more information analysis of accidents and their impacts?

Comment on the results of the HarborSym model that was used to evaluate widening of the entrance channel.

VII. Description of Selected Plan

Is the description of the Selected Plan provided in enough detail to be clearly understood?

Is the rational for plan selection adequately described?

VIII. Evaluation of Alternatives for the Management of Dredged Material

Comment on the process used and the analysis conducted in evaluating the dredged material placement alternative and selection of a placement plan. Address initial construction and maintenance material for the following types of placement alternatives: for restoration and nourishment sites, upland placement areas, and Ocean Dredged Material Disposal Sites. Is the selected placement plan adequately described?

IX. Economic Evaluation of Alternatives

Comment on how the mitigation alternatives were evaluated. Discuss whether you agree with the mitigation plan for intertidal marshes and regionally significant oyster reef.

Discuss whether you agree that the mitigation plan is justified.

Are mitigation and restoration properly distinguished and evaluated?

X. Recommended Plan

Provide any recommended suggestions, if any, to improve the description of the recommended plan, which will be provided to Congress. Is it complete and clear?

XI. Plan Implementation

Is the total project cost for the recommended plan appropriate given the future escalation in fuel and construction costs during the construction of the project?

XII. Summary of Coordination, Public Views, and Comments

Is the outreach program sufficient to solicit comments and concerns from the general public, state and Federal resource agencies, and any other interested party?

XIII. Recommendations

Is the recommended plan and associated requirements clearly described?

Appendix A. Economic Appendix

Refer to the charge listed above under IX. Economic Evaluation of Alternatives.

Appendix B. Real Estate Plan

Does the plan adequately address all real estate interests and requirements?

Are the real estate cost estimates reasonable?

Appendix C. Baseline Cost Estimate

N/A.