INDEPENDENT EXTERNAL PEER REVIEW REPORT
for
BIRD'S POINT-NEW MADRID FLOODWAY
LETTER REPORT: INTERIM LEVEL OF PROTECTION

Prepared by:

K. S. Ware and Associates, LLC
54 Lindsley Avenue
Nashville, Tennessee 37210

for

Mr. David P. Berretta, PE
U.S. Army Corps of Engineers
Memphis District
167 North Main Street, B-202
Memphis, TN 38103-1894

20 April 2012

Contract No. W912QR-10-D-0027/EB01

Architect/Engineer Services ID/IQ Contract for Independent External Peer Review within the USACE Civil Works Mission Boundaries

The views, opinions, and/or findings contained in this report are those of the author and should not be construed as an official Department of the Army position, policy, or decision, unless so designated by other documentation

Table of Contents

1.0 INTRODUCTION 3
1.1 Background 3
1.2 Purpose of the Independent External Peer Review 4
1.3 Project Documents Reviewed 4
2.0 INDEPENDENT EXTERNAL PEER REVIEW PROCESS 5
2.1 Identification and Selection of Independent External Peer Reviewers 5
2.2 Biographical Information on the External Peer Reviewers 6
2.3 Schedule of Events 8
2.4 USACE Site Orientation Briefing 8
2.5 Initial Summary Assessment 9
2.6 Execution of the Peer Review 9
2.7 Review and Consolidation of Individual Panel Comments 9
2.8 IEPR Comment Review Teleconference 9
2.9 The General Charge for the Birds Point-New Madrid Floodway Reconstruction 10
3.0 SUMMARY 12
3.1 Findings 12
3.2 Conclusions 12

APPENDICES

Appendix A - Reviewer Resumes 14
Appendix B NAS – COI Forms 16
Appendix C General Charge 18
Appendix D KSWA Comments and USACE Responses 21
Appendix E Certification of Independent External Review 23

1.0 INTRODUCTION

1.1 Background

The Birds Point-New Madrid Floodway is a component of the Mississippi River and Tributaries (MR&T) Project and is located on the right descending bank of the Mississippi River in Mississippi and New Madrid Counties, Missouri, just below the confluence of the Ohio and Mississippi Rivers. The Floodway is located in southeastern Missouri, approximately 15 miles east of Sikeston, Missouri and about 145 miles north of Memphis, Tennessee. The drainage area of the Mississippi River Basin at the confluence is about 917,340 square miles.

Legal authority for construction and operation of the Birds Point-New Madrid Floodway stems originally from the Flood Control Act of 15 May 1928, which adopted the report of the Chief of Engineers published in House Document No. 90, 70th Congress and authorized the MR&T Project. Modification to the Birds Point-New Madrid Floodway was authorized by the Flood Control Act of 27 October 1965, substantially as recommended by the report of the Chief of Engineers, published in House Document 308 and 319, 88th Congress. The 1965 FCA provided for more protection to the Floodway area by raising the Frontline Levee forming the east boundary of the Birds Point-New Madrid Floodway and modifying operation thereof to include breaching of the levee during floods which reach 58 feet and threaten to exceed 60 feet at Cairo.

The Birds Point-New Madrid Floodway is about 33 miles long and 10 miles wide. Its area comprises about 205 square miles of alluvial valley land and is enclosed by Mississippi River project levees, except for a 1,500-foot authorized but not constructed closure at the lower end. This opening provides a drainage outlet and allows flood backwaters to enter. The Mississippi River project levees enclosing the Floodway are the lower portion of the Upper St. Francis Levee (hereinafter called the Floodway Frontline Levee) which forms the eastern boundary, and the Birds Point-New Madrid Levee (hereinafter called the Floodway Setback Levee) which forms the western boundary. The Frontline Levee consists of three parts: the upper fuseplug section, 11 miles in length; the lower fuseplug section, 5 miles in length; and the section between the two fuseplugs. The fuseplug sections are about 2 feet lower in grade than the remainder of the Frontline Levee except for 12,500 feet in the upper fuseplug for the Inflow Crevasse and 7,500 feet in the lower fuseplug for Inflow/Outflow No. 2. The Setback Levee extends from its junction with the Frontline Levee at Birds Point, Missouri, directly across the Mississippi River from Cairo, Illinois, southwesterly for a distance of about 36 miles and ties in with the St. Johns Bayou Levee near New Madrid, Missouri.

Presently the 1965 Flood Control Act controls the features of the Floodway. The Frontline Levee provides protection to a grade equivalent to 62.5 feet on the Cairo gage, except for the fuseplug sections which provide protection equivalent to 60.5 feet on the Cairo gage. The 1,500-foot opening, which has been authorized for closure, remains open allowing backwater to enter the lower end of the Floodway.

The Floodway was placed in operation in May, 2011 when the flood crested at 61.72 feet on the Cairo gage. The Floodway operation was assisted by using explosives to create one artificial Inflow Crevasse, approximately 9,000 feet long; a crevasse at Inflow/Outflow No. 2, approximately 4,500 feet long and a crevasse at Inflow/Outflow No. 1, approximately 800 feet long. At that time the top of the Cairo floodwall was at 65.3 feet. At time of operation, NWS was forecasting a crest stage at Cairo of 63 feet. However, with intense rains continuing to fall in the unregulated areas of the Ohio River Basin, this crest forecast had the potential of being raised. Estimates following the flood indicated that the Floodway operation reduced stages adjacent to and upstream of the Floodway by a minimum of 3.5 feet. Without operation of the Floodway, it is estimated that the stage at Cairo would have overtopped the protection works at Cairo and induced flooding in other areas upstream of the Floodway. Further, if the Floodway had not been operated by artificial crevasses, most of the lands within the Floodway would have still been flooded as a result of Mississippi River flows overtopping the Frontline Levee, additional uncontrolled crevasses occurring and water backing through the opening at the lower end of the levee.

Following the operation of the Birds Point-New Madrid Floodway in May, 2011, the Commander, Mississippi Valley Division, issued a memorandum directing the Memphis District to implement make safe and stability operations based on a target elevation (stage) of 51 feet on the Cairo gage to provide a stable base for flood fight operation and

subsequent reset operation by 30 November 2011. Based on previous physical model studies and the design of the operation plan, a stage of 51 feet is required to safely pass 550,000 cfs of the total Mississippi River Project Design Flood (PDF) discharge of 2,360,000 cfs. However, at that stage the level of protection for the Floodway is minimal as compared to the pre-operation level of protection.

At the MVM Commander's request, the levee elevation was evaluated to determine the maximum elevation feasible so as to provide interim protection to the Floodway without placing undue risk on the remaining MR&T system components.

In compliance with the Water Resources Development Act (WRDA) 2007 (Public Law 110-114), Section 2035 and Water Resources Policies and Authorities, Civil Works Review Policy (EC 1165-2-209), a Type II Independent External Peer Review (IEPR), Safety Assurance Review (SAR) was conducted for the Bird's Point – New Madrid Floodway Letter Report: Interim Level of Protection. This report describes the IEPR Process, summarizes the thoughts of the IEPR Panel regarding the Letter Report, provides their answers to the General Charge that was provided in Appendix B of the SOW, and describes the panel members and their selection.

1.2 Purpose of the Independent External Peer Review

The purpose of an IEPR/SAR, in general, is to strengthen the USACE's safety assurance as outlined in Water Resources Development Act (WRDA) 2007, Section 2035 (Type II). Independent, objective, external peer review is regarded as a critical element in ensuring the reliability of scientific and engineering analysis.

The SAR is one part of a three part quality improvement process instituted by USACE in the Engineer Circular, EC 1165-2-209, Civil Works Review Policy. The EC outlines three levels of review: District Quality Control, Agency Technical Review, and Independent External Peer Review (Both Type I and II IEPR/SAR). The EC states that SAR shall include a review of the design and construction activities prior to the initiation of physical construction and periodically thereafter until construction activities are completed on a regular schedule sufficient to inform the Chief of Engineers on the adequacy, appropriateness, and acceptability of the design and construction activities for the purpose of assuring public health, safety and welfare. IEPR is one of the important procedures used to ensure that the quality of published materials meets the standards of the scientific and technical community. This peer review typically evaluates the clarity of hypotheses, the validity of the research design, the quality of data collection procedures, the robustness of the methods employed, the appropriateness of the methods for the hypotheses being tested, the extent to which the conclusions follow from the analysis, and the strengths and limitations of the overall products.

The objective of this work is to assess, analyze, interpret, and evaluate design/engineering and construction criteria through an IEPR – SAR for the Interim Level of Protection of the Bird's Point – New Madrid Floodway during design phase of the project in accordance with the Water Resources Development Act (WRDA) 2007 (Public Law 110-114), Section 2035.

1.3 Project Documents Reviewed

The IEPR reviewed the following documents which were provided by the USACE in whole or in part.

- Letter Report: Interim Level of Protection for the Bird's Point – New Madrid Floodway.
- Bird's Point – New Madrid "Make Safe" Photo Book
- Various Geotechnical and related reports, including:
    - Center Crevasse: Bayouville Seepage Study borings (1976) and 2012 CPT Data
    - Lower Crevasse: Geotechnical Design Report, and Settlement Assumptions
    - Upper Crevasse: Geotechnical Reports, Boring Logs (Borrow Pit Information, Wyatt Seepage Study Profiles), CPT Data, Analysis (Slope Stability, Seepage and Settlement) and Drawings

2.0 INDEPENDENT EXTERNAL PEER REVIEW PROCESS

The following sections describe the methodology followed in selecting the independent external reviewers, and in planning and conducting the IEPR. The IEPR was conducted following procedures described in USACE's guidance documents cited in Section 1.0 and as outlined in the Task Order, including:

- EC 1165-2-209, Civil Works Review Policy, Change 1, 31 January 2012;
- ER 1110-1-12, Engineering and Design - Quality Management, 31 March 2011 (change 2);
- ER 1110-1-8159, Engineering and Design - DrChecks, 10 May 2001.
- National Academy of Sciences, Background Information and Confidential Conflict Of Interest Disclosure, BI/COI FORM 3, Current Edition

2.1 Identification and Selection of Independent External Peer Reviewers

KSWA, in the course of preparing for the IEPR Contract, identified and established sub-contractual relationships with several engineering firms as team members, all with the required areas of expertise. Within each of these team members, specific, highly qualified engineers were identified using personal contacts within each of the member companies; from these contacts an extensive database of engineers of all disciplines was established.

For the Bird's Point – New Madrid Floodway project, KSWA selected candidates from within our firm or those contracted with us. The candidates were screened for their technical expertise, potential conflicts of interest (COI), previous performance on similar reviews, and availability to meet the project schedule. One reviewer for the Letter Report: Interim Level of Protection for the Bird's Point – New Madrid Floodway came from within KSWA. An additional reviewer came from Stanley Consultants.

The areas of technical expertise of the selected IEPR external peer reviewers were geotechnical and hydraulic engineering, which corresponded to the technical content of the Bird's Point – New Madrid Floodway review materials. KSWA evaluated the credentials of the peer reviewers according to the overall scope of the Bird's Point - New Madrid Floodway Project, focusing on these key areas of expertise. Participation in previous USACE technical review committees and engineering projects was considered. Resumes of the selected reviewers are provided in Appendix A.

The peer reviewers were screened for the following potential exclusion criteria or COIs:

- Involvement in any part of or work related to the Bird's Point-New Madrid Floodway System: Letter Report for the Interim level of projection or any other part of the Bird's Point-New Madrid Floodway System Project.
- Involvement in the conceptual or actual design, construction or O&M of the Bird's Point-New Madrid Floodway System project or related projects.
- Involvement with paid or unpaid expert testimony related to the Bird's Point-New Madrid Floodway System Project or related projects.
- Financial or litigation association with USACE, Bird's Point-New Madrid Floodway System Design A/E, their engineering teams, subcontractors or construction contractors.
- Current or previous employment or affiliation with members of the Bird's Point-New Madrid Floodway System Project and currently working on Bird's Point-New Madrid Floodway System related projects.
- Past, current or future interests or involvements (Financial or otherwise) related to Bird's Point-New Madrid Floodway System.
- Current personal involvement with other USACE projects including whether involvement was to author any manuals or guidance documents for USACE.
- Current firm involvement with other USACE projects, specifically those projects/contracts that are with the Memphis District.
- Previous employment by the USACE as a direct employee or contractor (either as an individual or as a firm), notably if those projects/contracts are with the Memphis District.

- Pending, current or future financial interests in Bird's Point-New Madrid Floodway System Project related contracts/awards from USACE.
- Any publically documented statement (including, for example, advocating for or discouraging against) related to Bird's Point-New Madrid Floodway System Project

In selecting final peer reviewers, KSWA pursued experts who were not conflicted by the above COI and who met the criteria and experience factors described in Section 2.2 of this report and outlined in Task 2 of the Task Order. The selected peer reviewers provided statements indicating willingness to participate and absence of a COI. Each reviewer completed a NAS COI form which KSWA in turn submitted to USACE for approval (Appendix B).

2.2 Biographical Information on the External Peer Reviewers

Potential peer review candidates were identified as described in section 2.1, above. All IEPR peer reviewers met the following minimum requirements:

- Registered professional engineer in their discipline
- College Degree in their discipline
- Level 3 Reviewers (minimum 15 years experience, recognized experts) with relevant dam and levee experience and experience in failure mode analysis and risk assessment of large complex systems with emphasis on dam and levee safety issues.

Peer reviewers in each discipline also were required to have specific technical experience in the areas summarized in Table 1, below.

Table 1 – Required Technical Experience, Bird's Point-New Madrid Floodway System Project

Discipline	Required Experience
Geotechnical Engineer	• Experience in the field of geotechnical engineering, analysis, design, and construction of embankment dams and levees. • Experience in subsurface investigations, soil mechanics, retaining wall design, underseepage, slope stability evaluations, erosion protection design, and unconsolidated earthwork construction. • Knowledge and experience in the investigation of seepage, including blanket theory, stability and deformation problems associated with embankments constructed on alluvial soils.
Hydraulic Engineer	• Experience in hydraulic engineering with an emphasis on large public works projects with a minimum MS degree or higher in engineering. • Experience in hydrologic and hydraulic analysis as it relates to riverine flood risk management projects. • Knowledge of the MR&T Project or similar flood risk management systems. • Knowledge and experience with physical modeling and the application of data from physical model testing and in the ability to coordinate, interpret and explain testing results with other engineering disciplines. • Knowledge and experience with the routing of flood hydrographs and coincidence of frequency analysis. • Familiarity with Corps application of risk and uncertainty analyses on flood risk management projects and also have a familiarity with standard Corps hydrologic and hydraulic computer models.

Both reviewers were required to have ancillary experience in flood fighting, clay levee construction and performance, and a thorough knowledge of the USACE Levee Safety Program. The final list of peer reviewers was determined by KSWA (Table 2) based on their specific experience in the areas of expertise specified in the scope of work.

Table 2 – Final List of Peer Reviewers

Discipline/Name	Affiliation	Location	Education	P.E.	Years of Experience
Geotechnical Engineer					
John D. Godfrey	K.S. Ware and Associates, LLC	Nashville, TN	BSCE, MSGE	X	32
Hydraulic Engineer					
Mark D. Werner	Stanley Consultants	Muscatine, IA	BSCE, MSCE	X	20

The selected peer reviewers were found to have met the requirements shown in Table 1. Both are Level 3 Peer Reviewers with more than 15 years experience and are licensed professional engineers. A summary of the credentials of the three peer reviewers selected for the IEPR panel is presented below. A resume for each reviewer, including more detailed biographical information, is included in Appendix A.

John D. Godfrey, Jr., P.E. serves as a Senior Geotechnical Engineer and Project Manager for KSWA. Mr. Godfrey has over 32 years of experience in Geotechnical and Construction Materials engineering. Mr. Godfrey is responsible for all aspects of preparing geotechnical reports, foundation design, project oversight, slope failure analysis, remedial recommendations and design, karst studies, hydrogeologic and groundwater studies, field observations of various aspects of construction including foundations, fill placement, and material failure analysis and providing engineering support to associate engineers and technicians. Mr. Godfrey has expertise in the latest AASHTO LRFD geotechnical design procedures. Responsibility also includes providing technical review/evaluation of geotechnical and technical reports for the Nashville, Knoxville and Jacksonville offices. Mr. Godfrey's project experience includes low- to high-rise commercial and industrial buildings, communication and radio towers, airport runways, taxiways, and aprons, ground and elevated water storage tanks, tunnels, earthen dams, landfills, water and waste-water treatment plants, water and sewer lines, pump stations, amusement park rides, super-speedways, parking lots and private, local and State bridges and roadways.

Mr. Godfrey was Lead Field Inspector for inspection of 15 different levee flood protection systems located throughout Indiana, Illinois, and Kentucky. Elements of the inspection of each system include evaluating: the performance of each system during high water events, maintenance of each system, the performance and effectiveness of erosion control measures, functionality of pumping systems, and integrity of the embankments and structures. This work was performed under a contract with USACE, Louisville District. Other key projects include:

- Wolf Creek Dam Seepage Investigation and Mitigation – Jamestown, Kentucky
- Center Hill Dam Seepage Remediation – DeKalb County, Tennessee
- Oak Hill Reservoir Slope Failure Study for Metro Water Services – Davidson County, Tennessee
- Herbert Hoover Dike Culvert Replacements IEPR - USACE Jacksonville District

Mark D. Werner, P.E. serves as a Principal Water Resources Engineer for Stanley Consultants, Inc. Water resources project experience includes serving as Hydraulic Engineer with the U.S. Army Corps of Engineers, Chicago District from 1994 to 2000 and with Stanley Consultants since 2000. Principal Water Resources Engineer responsibilities include investigation and design of site drainage, utilities design, hydrology, stormwater management, open channel flow, pipe flow, flood protection, reservoirs, dam failure analysis, bridge backwater analysis, streambank stabilization, and floodplain development permits. Mr. Werner's studies involve the use of various

computer models. Mr. Werner's computer model proficiency includes HEC-1, HEC-2, HEC-HMS, HEC-RAS, UNET, HEC-GeoHMS, HEC-GeoRAS, SMS (Storm Water Modeling System, 2-D model), DAMBRK, FLDWAV, and XPSWMM. His professional experience encompasses conceptual through detailed design, including studies, reports, permits, construction drawings, specifications, and cost estimates.

Some of Mr. Werner's key projects include:

- Millwood Dam Design; U.S. Army COE, Little Rock District, Arkansas
- Cedar Rapids Flood Study-Project Coordination; U.S. Army COE, Rock Island District; Cedar Rapids, IA
- Flood Protection Study; City of Cedar Rapids; Cedar Rapids, IA

2.3 Schedule of Events

Table 3 defines the schedule that was to be followed in the execution of the IEPR. This schedule was modified slightly in order to ensure that the USACE's target end date was accomplished.

Table 3 – Schedule of Events

Task #	Action/Activity	Due Date
2	Submit list of final IEPR expert reviewers	3/15/12
	USACE Approves Expert Reviewer List	3/15/12
	Expert reviewers under contract	3/16/12
3	Corps provides review materials	3/15/12
	Orientation Briefing at Bird's Point-New Madrid Floodway System	3/20/12
4	Reviewers meeting/Draft Initial IEPR Summary	3/21/12
	Submit Draft Initial IEPR Summary to USACE	3/22/12
	USACE Approves or Comments on Draft Initial IEPR Summary Report	3/23/12
	Submit Final Initial IEPR Summary Report	3/23/12
	Design Phase Review Complete	3/30/12
	Design Phase Review Comments Closed in DrChecks	4/6/12
	Comment Review Conference Call	4/16/12
5	Submit Draft IEPR Review Report on Letter Report: Interim Level of Protection for the Bird's Point-New Madrid Floodway	4/20/12
	Submit Final IEPR Review Report on Letter Report: Interim Level of Protection for the Bird's Point-New Madrid Floodway	4/27/12

2.4 USACE Site Orientation Briefing

On March 15, 2012, USACE provided the review materials as outlined in Section 1.3 so that the peer reviewers would be able to review some of the materials prior to the Site Orientation Briefing. On March 20, 2012 USACE conducted an On-site Orientation meeting, attended by the KSWA Team, on the Bird's Point-New Madrid Floodway System Project. During the visit, KSWA and the external peer reviewers were provided an overview of the reviewed project, as well as a tour of the various project sites. This enabled the external peer reviewers and the corresponding

USACE personnel to interact and engage in technical conversations on the particulars of the project. Following the tour, USACE asked for and answered any further questions on the project.

On March 21, 2012, the KSWA review team toured the Fulton County Levy sites and met privately so the reviewers would have the opportunity to review the plans together and discuss the plans on a "big picture" scale in order to make an Initial Summary Assessment as discussed below.

2.5 Initial Summary Assessment

Due to milestones required by USACE for the Mississippi River Conference (MRC), and the resulting rapid time frame involved in this IEPR-SAR, USACE requested that KSWA provide an Initial IEPR Summary Assessment of Review Documents after a cursory review of the documents and the extensive site visit as discussed in section 2.4, above. The summary assessment was the result of a cursory review and was not intended to be the final product. This assessment was submitted to USACE on March 23, 2012 and was accepted by USACE shortly thereafter. For this assessment, each reviewer provided a brief narrative discussing their initial thoughts on the Letter Report: Interim Level of Protection.

2.6 Execution of the Peer Review

A charge for the peer review, which contained specific questions to be answered in regard to the Bird's Point – New Madrid Floodway System Project, was given to the IEPR Panel by USACE. The charge included general guidance for the reviewers on conduct of a Type II IEPR SAR (as shown in Appendix C of this report). The charge consisted of ten questions with three evaluation factors to consider in addressing each question.

The peer reviewers were provided electronic versions of the Letter Report: Interim Level of Protection and additional review materials as outlined in Section 1.3 and the Charge for review. The IEPR panel was instructed to respond to the charge questions using a Comment Form.

The team provided 13 comments in response to the charge questions and evaluation factors. There was no communication between the IEPR panel and the authors during the peer review process, but communication between the KSWA project manager and the reviewers was conducted as needed.

2.7 Review and Consolidation of Individual Panel Comments

In response to the charge questions and the related evaluation factors, a total of 13 individual design review comments were received from the IEPR panel members. KSWA reviewed and entered the comments considered appropriate into DrChecks. KSWA found no duplication of comments, conflicting comments or inappropriate comments. As a result, a total of 13 comments were presented as "Team" comments in DrChecks. Twelve of these comments were on the Letter Report, the remainder on the "Make Safe Photo Book and the Geotechnical Report. All Team comments are included in Appendix D.

The USACE Team evaluated and reviewed the IEPR comments in DrChecks and provided evaluation responses back via DrChecks for all comments. All comments were satisfactorily closed.

2.8 IEPR Comment Review Teleconference

Mr. David Berretta of USACE and Ms. Heidi Wilbarger of KSWA conducted a teleconference on April 16 to discuss the remainder of the IEPR SAR review process and milestones. It was determined that a comment review conference call including all reviewers was not required on this phase of the review, as all comments were satisfactorily resolved and closed. The purpose of the Comment Review Teleconference is normally to provide a forum for a discussion of specific comments that the IEPR external peer reviewers consider inadequately addressed regarding this project.

2.9 The General Charge for the Birds Point-New Madrid Floodway Reconstruction

The KSWA Project Manager specifically requested that each expert reviewer answer the General Charge questions not only during the review process, tailoring their comments to reflect the charge, but at the conclusion of the review. The Charge Questions and their answers are:

1. Are the models used to assess hazards appropriate?

   Hydraulic Reviewer: The use of the original Mississippi Basin Model, HEC-2, HEC-RAS, and model results are all appropriate for the analysis to meet the objectives of the Letter Report.

   Geotechnical Reviewer: Yes

2. Are the assumptions made for the hazards appropriate?

   Hydraulic Reviewer: The assumptions for the Inflow Crevasse weir elevation, length of weir, and extent of degradation of the weir during overtopping within the hydraulic analysis are appropriate to the hydraulic analysis of the Letter Report.

   Geotechnical Reviewer: Yes

3. Has the condition of the Birds Point-New Madrid Floodway been adequately described?

   Yes

4. Are the methods used to evaluate the condition of the Birds Point-New Madrid Floodway adequate and appropriate given the circumstances?

   Yes

5. Is the quality and quantity of the surveys, investigations and engineering for the design in accordance with ER 1110-2-1150 sufficient to support models and assumptions made for determining the hazards?

   Yes

6. Is the risk to the system performance in the confluence area for raising the interim level of the Birds Point-New Madrid Floodway Frontline Levee above 55 feet on the Cairo gage appropriate as presented?

   Yes

7. Is the risk associated with the establishment of the interim level of Frontline Levee of the Birds Point-New Madrid Floodway at a stage corresponding to 55 feet on the Cairo gage appropriate? Is this supported by sound engineering analysis and judgment that appropriately balances risk to system performance in the confluence area?

   Yes

8. Are there any additional analyses or information available or obtainable that would affect decisions regarding the Birds Point-New Madrid Floodway?

   Hydraulic Reviewer: The interim condition of the Birds Point-New Madrid Floodway is scheduled to be a five year service life. At the end of the five year service life the system will be restored to the original design conditions. The analysis and available information used in the Interim Letter Report

is appropriate for this short term condition. No additional analysis is recommended and no other readily available information is known that would affect decisions regarding the Birds Point-New Madrid Floodway.

Geotechnical Reviewer: No, the analysis as based on the provided information used in compiling the Letter Report is appropriate for this interim condition

9. Does the analysis adequately address the uncertainty given the consequences associated with the potential for loss of life for this type of project?

Hydraulic Reviewer: Up to this date the USACE has made progress in the repair of the Floodway system and are confident of completing repairs within the stated five year service life of the interim condition. If a large flood occurs during the interim condition, the Letter Report has demonstrated the available capacity of the Inflow Crevasse in its current state. The USACE also have the ability to activate the full length of the Inflow Crevasse during the interim condition. Therefore the analysis address the different scenarios that may occur during the interim condition.

Geotechnical Reviewer: Yes

10. Has anything significant been overlooked in the development of the plan to reconstruct the Birds Point-New Madrid Floodway?

Hydraulic Reviewer: The Interim Letter Report is intended for internal use and the information presented within the document meets the requirements of the intended use and decision document. If this document is used to convey information to the public in the future, there are two topics that have limited information for the public understanding of the document:

- Schedule. Adding a detailed project schedule showing the phases of construction and timing convey to the public the plan on how the Floodway will be restored. I believe this helps convey to the public the many steps (construction phases) required to restore the floodway.

- Presentation of risk. The report only covers the five year service life, but adding risk for four, six, and seven year service life would show the reduction of risk if the project is completed earlier or the increased risk if the project is delayed.

Geotechnical Reviewer: No

More detail on the findings and conclusions is discussed in Section 3.0, below. A "Certification of Independent External Review" is included in Appendix E.

3.0 SUMMARY

3.1 Findings

A summary of the overall observations/conclusions are:

- The geotechnical portion of the review focused on seepage berms and the sand boils resulting from the flood of 2011. Also discussed was the Geotechnical Assessment and Geotechnical Design Report provided by USACE in addition to the Letter Report: Interim Level of Protection. There was also a question about a reference made in the "Make Safe" Photo Book that appeared to contradict a reference in the Geotechnical Design Report about a seepage berm not being needed.
- The Hydraulic reviewer focused on the stage at the Cairo gage pre and post operation of the floodway and on the operation of the floodway itself. Additional review comments included:
    - Discussion of the activation of a portion the inflow crevasse and a question about the ability of the USACE to activate the additional 2,099 unactivated feet in a future flood situation.
    - A question about why only 4,500 feet of the lower crevasse was activated during the flood.
    - A discussion about an apparent conflict regarding crevasse erosion between section 6 and section 9 of the Letter Report.
    - Discussion about the service life of five years versus the schedule of repairs to the floodway and factors that may impact the schedule, in addition to discussion about the amount of risk in the 5 year service life with a 55.0 Cairo stage.
- The review included: assessment of project features; suitability of assumptions and models; methods used to evaluate the condition of the floodway; the quality and quantity of the surveys, investigations and engineering; and the appropriateness of the risk associated with system performance and establishment of the interim level at a stage corresponding to 55 feet on the Cairo gage.
- The Reviewers noted, per the charge, that the direction of the project seemed appropriate, that no critical items were overlooked and they had no additional observations than those provided in DrChecks.
- All comments were satisfactorily addressed in the DrChecks evaluations.

3.2 Conclusions

The IEPR process was used to analyze the adequacy and acceptability of engineering methods, models, data and analyses used for the Interim Level of Protection for the Birds Point-New Madrid Floodway system. Although there were several comments, questions and observations posed during the review, all concerns were addressed in a satisfactory manner. The design assumptions, models and methods used during the decision document phase for hazards remain valid, and the risks associated with the establishment of the interim level appear appropriate.

PAGE LEFT INTENTIONALLY BLANK

APPENDIX A -
Reviewer Resumes

Education	BS, Civil Engineering Tech., 1979, Western Ky. University, Bowling Green, KY ME, Geotechnical Engineering, 1988, Vanderbilt University, Nashville, TN
Registrations	Registered Engineer in Tennessee (00100425), Kentucky (16201), Georgia (PE019157), North Carolina (034192), Alabama (24505), and Mississippi (17435)
Professional Affiliations	American Society of Civil Engineers
Publications	J. Godfrey, L.M., R.M., "Case History – Remediation of Portland City Lake Dam, Tennessee", Association of State Dam Safety Officials, 1996. J. Godfrey, L.M., R.M., "Foundation Remedies for Residential Construction over Karst Limestone in Nashville, Tennessee", 6th Multidisciplinary Conference on Sinkholes and the Engineering and Environmental Impacts of Karst, 1996. J. Godfrey, "LRFD Implementation – Kennedy Interchange", 29th Southeastern Transportation Geotechnical Engineering Conference, 2007.

Mr. Godfrey serves as a Senior Geotechnical Engineer and Project Manager. Mr. Godfrey has over 30 years of experience in Geotechnical and Construction Materials engineering. Mr. Godfrey is responsible for all aspects of preparing geotechnical reports; foundation design; retaining wall design; project oversight; slope stability analysis, remedial recommendations and design; karst studies; hydrogeologic and groundwater studies; seepage analysis (foundation and embankment); settlement analysis; erosion control measures; field observations of various aspects of construction including foundations; fill placement; and material failure analysis and providing engineering support to associate engineers and technicians. Mr. Godfrey has expertise in the latest AASHTO LRFD geotechnical design procedures and USACE Levee Safety Program. Responsibility also includes providing technical review/evaluation of geotechnical and technical reports for the Nashville, Bowling Green, Knoxville and Jacksonville offices. Mr. Godfrey's project experience includes low- to high-rise commercial and industrial buildings, communication and radio towers, airport runways, taxiways, and aprons, ground and elevated water storage tanks, tunnels, earthen dams, levees, landfills, water and waste-water treatment plants, water and sewer lines, pump stations, amusement park rides, super-speedways, parking lots and private, local and State bridges and roadways. Mr. Godfrey's representative projects include:

Independent External Peer Review (IEPR) of Herbert Hoover Dike (HHD) Culvert Replacements Project, Lake Okeechobee, Florida - United States Army Corps of Engineers (Jacksonville District): Expert Geotechnical Reviewer for the Independent External Peer Review (IEPR) of Herbert Hoover Dike (HHD) Culvert Replacements Project. Mr. Godfrey was responsible for the Geotechnical Expert Review on the design of culvert replacements at Culverts 1, 1A 3, 4A, 11, and 16. Culverts 1, 1A and 3 will have pile foundations and Culverts 4A, 11 and 16 will have soil foundations. The culverts are either two barrel or three barrel. The methodology for replacing culverts is to remove the existing culverts and replace them with water control structures that provide the same operational function. Each water control structure was designed to meet current dam safety criteria and design criteria for outlet works in accordance with EM 1110-2-2400. During construction temporary cofferdams will be placed at both ends of the culvert so the site can be dewatered for the removal of the existing culvert. The operational function of the culvert during construction will be provided via the use of the existing water control structures and system that serve the adjacent landside properties. Once the existing culvert is removed, the foundation of the new water control structure would be prepared to minimize future seepage and piping around and below the structure. A cutoff feature will be constructed beneath the water control structure to intercept and cutoff existing seepage paths. The new water control structure would then be constructed and the HHD embankment would be restored to the authorized embankment height. The temporary cofferdams would be removed and the new water control structure would resume full operational function. As the Geotechnical Expert Reviewer for this project, Mr. Godfrey reviewed the Design Documentation Report, two sets of Pre-Final Plans and Specifications (one for Culverts 1, 1A and 3 and a second set for culverts 3, 4A, 11, and 16) and the Hydraulics Report. Mr. Godfrey conducted his review in accordance with and then answered the General Charge for the Project:

i. Are the models used to assess the design hazards appropriate?

ii. Are the assumptions made for the design hazards appropriate?
iii. Do the analyses adequately address the uncertainty given the consequences associated with the potential for loss of life for this type of project?
iv. Do the project features adequately address redundancy, resiliency, or robustness with an emphasis on interfaces between structures, materials, members, and project phases?

Independent External Peer Review (IEPR) of Canton Dam Safety Assurance Project, Canton, Oklahoma - United States Army Corps of Engineers (Tulsa District): Expert Geotechnical Reviewer for the Independent External Peer Review (IEPR) of Canton Dam Safety Assurance Project. Mr. Godfrey was responsible for the Geotechnical Expert Review on the design of Canton Dam which, as originally constructed in 1948, is an earthen embankment with authorized purposes of flood control, water supply, and irrigation. The crest length is 15,140 feet at elevation 1648, msl. In 2001, the U.S. Army Corps of Engineers, Tulsa District, completed a Dam Safety Assurance Program Evaluation for Canton Lake which identified deficiencies that are now being corrected. A fuse-gated auxiliary spillway and channel currently under construction are designed to increase discharge capacity. The 339,200 cfs capacity of the existing spillway had to be increased to accommodate the revised PMF inflow of 626,000 cfs. The Fusegate Hydraulic System, weir, intake port, conduit, wet well, upstream and downstream aprons are in the design phase. The Fusegate Hydraulic System will be comprised of a set of 9, 32 feet tall and 53.10 feet wide independent units made of concrete placed side by side on the spillway weir to form a watertight barrier. When a flood of a specified magnitude occurs, the units start to overturn in a designed sequence with the uplift pressure generated in the chamber. A concrete weir approximately 35 feet deep and 70 feet long provides the foundation for the fusegates. An inlet port in the channel upstream of the gates allows water to flow through a conduit into the wet well tower. The wet well tower accommodates all the intake wells of each Fusegate. To accommodate excavation of the new channel, a portion of highway 58-A was taken out of service and demolished. A contract to construct a new bridge over the channel is underway. As the Geotechnical Expert Reviewer for this project, Mr. Godfrey prepared a Critical Items List, and reviewed the Interim and Final Design Documentation Reports and Plans and Specifications for the design of the hydraulic structures discussed above and seepage control measures. Concurrently, Mr. Godfrey reviewed construction documentation for the new bridge over the channel. Mr. Godfrey conducted his reviews in accordance with and then answered the General Charge for the Design portion of the project:

1. Do the design assumptions made during the decision document phase for hazards remain valid through the completion of design as additional knowledge is gained and the state-of-the-art evolves?

2. Do the project features adequately address redundancy, resiliency, or robustness with an emphasis on interfaces between structures, materials, members, and project phases?

(1) Redundancy. The use of multiple lines of defense that are linked to potential failure modes. The most vulnerable failure modes need the greatest redundancy.

(2) Resilience. The use of enhancements to improve the ability of the system to sustain loads greater than the design load to achieve gradual failure modes over some duration rather than sudden failure modes.

(3) Robustness. The use of more conservative assumptions to increase capacity to compensate for greater degrees of uncertainty and risk.

3. Do the project features and/or components effectively work as a system?

For the construction phase, Mr. Godfrey answered the following General Charge questions

1. Do the assumptions made during design remain valid through construction as additional knowledge is gained and the state-of-the-art evolves? (Final DDRs, CO QMPs, site visits, and other similar appropriate documents will be provided to expert reviewers for this assessment.)

2. For O&M manuals, do the requirements stipulated in the O&M manuals adequately maintain the operating conditions of the design feature that were assumed during design and validated during construction;

3. Will the project monitoring adequately reveal any deviations from the assumptions made for performance?

Wolf Creek Dam Seepage Investigation and Mitigation – Jamestown, Kentucky: Senior Geotechnical Engineer for exploratory drilling and pressure testing of more than 2,500 feet of HQ coring advanced through the base of the concrete dam from within the grouting gallery. The project includes logging the core in accordance with USACE guidelines and pressure testing the borings in ten foot intervals to determine Lugeon values for each interval.

Center Hill Dam Seepage Remediation – DeKalb County, Tennessee: Project Manager for the analysis and design of slope configurations yielding factors of safety greater than 1.5 for cuts and fills along the working platforms. Cuts and fills ranged in height from 25 to over 300 feet. In addition, Mr. Godfrey was responsible for review of construction drawings for rock cuts and fills as well as development of recommendations for stabilization of rock cuts and soil nailing where sinkholes, or "cutters", were encountered. Mr. Godfrey also managed quality control testing associated with the placement of soil fill, concrete, and grout.

Clarksville Waste Water Treatment Plant and Levee Remediation – Clarksville, Tennessee: Project Manager for the analysis and design of new waste water treatment facility structures and levee repair and upgrades after historic May, 2010 flood inundated the property. The Clarksville WWTP property is located along the alluvial plain of the Red River. Senior geotechnical engineer for exploratory drilling of up to 15 new structures and about 0.5 miles of earthen levee. Analysis and evaluation of structures included slope stability; deep foundations including mat foundations, driven H-piles and micro piles; settlement and downdrag; liquefaction; and lateral squeeze. The earthen levee and levee foundation was analyzed for foundation underseepage, embankment seepage stability and structural integrity and provided recommendations. All analysis of levee was per USACE design and engineering manuals. Laboratory testing included moistures, atterbergs, grain size analysis, consolidation testing and cu tri-axial testing.

Oak Hill Reservoir Slope Failure Study for Metro Water Services – Davidson County, Tennessee: Senior Geotechnical Engineer for geotechnical study to evaluation and provide recommendations regarding the stabilization of the North slope where slope failures had occurred within colluvial soils. The landslides probably occurred as a result of the flooding rains which south Nashville and the surrounding communities had on May 1 and 2, 2010. Work included lab and field testing and slope stability analysis and recommendations. Also, as lead geotechnical engineer, Mr. Godfrey provided recommendations of continued monitoring of potential slope movement with inclinometers.

United States Army Corps of Engineers (Louisville District) Periodic Inspections of Levee Systems – Various Locations throughout Indiana, Illinois, and Kentucky: Lead Field Inspector for inspection of 15 different levee flood protection systems located throughout Indiana, Illinois, and Kentucky. Elements of the inspection of each system include evaluating: the performance of each system during high water events, maintenance of each system, the performance and effectiveness of erosion control measures, the performance and effectiveness of foundation underseepage and embankment seepage control measures, functionality of pumping systems, and integrity of the embankments and structures. Evaluation of levee systems was per the USACE Levee Safety Program and USACE design and engineering manuals.

Red River - Bank Failure Analysis and Recommendations, City of Clarksville, Tennessee: Senior Geotechnical Engineer and supervised drilling services on land and from a barge in the Red River. The study was requested for evaluation and recommendations regarding the stabilization of the river bank alluvial soils where slope failures were occurring. Also, the cities newly installed, treated waste water outflow pipe was located along the river bank. Work included lab and field testing and slope stability and recommendations for stabilization.

US17/SR404 Back River Bridge and Approach Reconstruction, Savannah, Georgia: Senior Geotechnical Engineer and supervised drilling services for the proposed bridge approach and ramps along marsh lands of the Back River. The study included drilling and sampling and field vane shear testing to evaluate the very soft to soft alluvial marsh soils for support of earthen embankments ranging in heights from about 6 to 25 feet. Portions of the ramps were also utilized as levees against storm surges. The analysis included settlement, slope stability, erosion

protection, and embankment construction analysis and recommendations. Provided recommendations regarding the stabilization of the foundation alluvial soils and embankment stability. Laboratory testing included moistures, atterbergs, grain size analysis, consolidation testing and cu tri-axial testing.

Portland City Dam Seepage Remediation – Portland, Tennessee: Senior geotechnical engineer for the analysis of the Portland City Dam seepage remediation. Several large seepage boils were present downstream of the earthen dam. Further, the dam was constructed upon alluvial soils and karstic limestone bedrock. Conventional drilling and air-track drilling was performed and piezometers installed to evaluate the seepage condition through the dam embankment and foundation materials. Dye tracing determined connections between the reservoir and the seepage boils through the embankment and bedrock. Mr. Godfrey provided recommendations for seepage control and monitored grouting operations of the embankment and karstic bedrock. Stability analysis of the embankment was performed and recommendations for stabilization of the embankment were provided.

Ohio River Bridges, Kennedy Interchange – Louisville, Kentucky: Senior Geotechnical Engineer for geotechnical investigation, evaluation and recommendations for design and construction of 33 bridges and 3 retaining walls for relocation of Kennedy Interchange located in Louisville, Kentucky for the Kentucky Transportation Cabinet. Project involved widening existing bridges and construction of new bridges along Interstates 65, 64 and 71. Analysis and evaluation included slope stability; deep foundations including driven H-piles, drilled piers and auger cast piles; settlement and downdrag; liquefaction; and lateral squeeze. All analysis of design and evaluation was per AASHTO LRFD specifications and design procedures, 4th Edition, 2007 with 2008 interims.

Cumberland River Pedestrian Bridge – Nashville, Tennessee: Senior Geotechnical Engineer for the geotechnical assessment and development of foundation recommendations for a 745 foot pedestrian suspension bridge across the Cumberland River in Nashville, Tennessee. To complete the assessment, Mr. Godfrey designed an angled drilling approach that included advancing two borings at an inclination of 45 degrees more than 180 feet from the top of a bluff along the river bank to the proposed pier location. The angled drilling approach resulted in a cost savings of nearly $50,000 when compared to the alternate approach of drilling at the pier locations from a barge.

Tinnin Road Pavement and Slope Failure – Nashville, Tennessee: Senior Geotechnical Engineer for the geotechnical assessment and development of remedial recommendations for a 900 foot section of Tinnin road in North Davidson County, Tennessee. The road is located on the side of a steep slope approximately 50 feet above a creek. Various types of stabilization methods were considered to increase the apparent strength of the soils. The repair methods considered included secant pile walls, soil nails and excavate and replace.

Three Nature Centers for Shelby Bottoms Greenway, Beaman Park and Belles Bend Park, Metropolitan Board of Parks and Recreation – Davidson County, Tennessee: Senior geotechnical engineer for geotechnical investigation, evaluation and recommendations for design and construction of Three Nature Centers. Analysis, evaluation and recommendations for shallow and deep foundations including driven timber piles; settlement and downdrag; and construction.

East Park and Coleman Park Community Centers, Metropolitan Board of Parks and Recreation – Nashville, Tennessee: Senior geotechnical engineer for geotechnical investigation, evaluation and recommendations for design and construction of East Park and Coleman Park Community Centers. Analysis, evaluation and recommendations for shallow foundations; indoor pools; settlement; seismic; pavements; and construction.

Metro Water Services 8th Avenue Reservoir Stability and Seepage Monitoring – Nashville, Tennessee: Project manager overseeing the monitoring of slope and reservoir wall stability along with hydraulic seepage from the reservoir. Measurements to the nearest 1/1000th of an inch are collected bi weekly to identify potentially catastrophic movement in the reservoir walls and/or supporting slope and piezometer data is collected and analyzed bi-weekly to evaluate potential seepage from the reservoir.

Whites Creek Pumping Station Improvements – Nashville, Tennessee: Senior geotechnical engineer for geotechnical investigation, evaluation and recommendations for design and construction of a new 16 MGD (approximate) wet-pit/dry-pit pumping station, a new force main consisting of 36-inch and 30-inch pipe to parallel the existing 30-inch and 36-inch pipes, respectively, between the Whites Creek Pumping Station and WCWWTP, abandoning and/or replacing the existing 24-inch force main, and a 40 ft by 25 ft Influent structure constructed as part

of the improvements at WCWWTP improvements. Mr. Godfrey provided analysis and evaluation along with recommendations for shallow and deep foundations, settlement and construction.

Whites Creek Waste Water Treatment Plant - Chlorine Contact Tank Improvements – Nashville, Tennessee: Senior geotechnical engineer for evaluation of subsurface materials for additions to Chlorine Contact Tanks. Provided general recommendations for shallow foundations; settlement; and construction.

K.R. Harrington WTP Sludge Disposal Investigation – Nashville, Tennessee: Senior Geotechnical engineer for geotechnical investigation to determine the general subsurface profile at the site; the extent and consistency of the existing sludge; and address concerns relating to the containment and stability of the on-site sludge disposal area. The depth, consistency and extent of the sludge disposal area were identified. A slope stability analysis was performed to determine the stability of the banks along the Stones River which contain the sludge material. Inclinometers were also installed along the banks of the Stone River and monitored for potential slope movement.

Omohundro and West Park Storm Water Equalization Basins – Nashville, Tennessee: Senior project manager for geotechnical investigation, evaluation and recommendations for site preparation and foundation designs equalization basins. Analysis, evaluation and recommendations for shallow and deep foundations including driven H-piles; settlement and downdrag; and construction.

Harpeth River Greenway, Metropolitan Board of Parks and Recreation – Davidson County, Tennessee: Senior geotechnical engineer for geotechnical investigation, evaluation and recommendations for design and construction of pedestrian bridges along the proposed Harpeth River Greenway project. Analysis, evaluation and recommendations for shallow and deep foundations including driven H-piles; settlement and downdrag; and construction.

Mark D. Werner, P.E., C.F.M.

Senior Water Resources Engineer

Education: B.S.E., University of Iowa, Civil Engineering, 1992
M.S., University of Iowa, Civil Engineering (Hydraulics), 1993

Professional Registration/License: Civil Engineering, 062-053285, IL, 11/30/2013, 07/22/1999
Civil Engineering, 15418, IA, 12/31/2013, 09/21/2000
Civil Engineering, 17536, MS, 12/31/2012, 08/30/2006
Civil Engineering, 48639, AZ, 09/30/2014, 08/28/2008
Certified Floodplain Manager, US-10-04922, 07/31/2012, 03/26/2010

Professional Societies: Member - American Society of Civil Engineers (ASCE); National Society of Professional Engineers (NSPE); Society of American Military Engineers (SAME); Association of State Floodplain Managers (ASFPM).

Experience Summary

Water resources project experience includes serving as Hydraulic Engineer with the U.S. Army Corps of Engineers, Chicago District from 1994 to 2000 and with Stanley Consultants since 2000. Principal Water Resources Engineer responsibilities include investigation and design of site drainage, utilities design, hydrology, stormwater management, open channel flow, pipe flow, flood protection, reservoirs, dam failure analysis, bridge backwater analysis, streambank stabilization, and floodplain development permits. Studies involve the use of various computer models. Computer model proficiency includes HEC-1, HEC-2, HEC-HMS, HEC-RAS, UNET, HEC-GeoHMS, HEC-GeoRAS, SMS (Storm Water Modeling System, 2-D model), DAMBRK, FLDWAV, and XPSWMM. Professional experience encompasses conceptual through detailed design, including studies, reports, permits, construction drawings, specifications, and cost estimates. Project Manager responsibilities include budget and schedule control, client liaison, preparing reports, and quality control.

Relevant Project Experience:

Millwood Dam Design; U.S. Army COE, Little Rock District, AR —Stanley Consultants delivered 60 percent, 100 percent, and construction design documents to support design-build process for installation of a bypass pipeline and valve assembly at Millwood Dam. Prior to design, Stanley Consultants completed a geotechnical investigation, lead-based paint and asbestos inspection of piping, and a structural inspection of the existing 78-inch diameter steel-lined concrete pipe. The design included additional piping to attach to the end of the existing 78-inch reinforced concrete cylinder pipe, and ran approximately 1,220 feet to a new outfall structure on the bank of the former riverbed. This new pipe was constructed with a section of pipe in a new valve vault that could be removed to install a valve in the future. The new vault was designed to prevent water entry at maximum tail water elevation of 282.2 feet. The entire system was designed for a 60-year life, and operating range of lake pool elevations from 252 feet MSL (minimum flow of 155 cfs

required at outfall) to 293.30 feet MSL (for thrust blocks, maximum flow velocity, erosion prevention design, etc.).

Flood Mitigation; Confidential Client --Lead Water Resources Engineer responsible for updating the flow frequency analysis and calculating the water surface elevations for large flood events. The project site suffered damage during the devastating 2008 flood. The analysis was updated to include the 2008 data. Acquired existing FEMA HEC-2 model and USACE HEC-RAS model. Updated hydraulic model with the road geometry for Highway 65 so the flow of flood water over the highway could be estimated. Recalibrated the model to the 2008 and 2010 floods. Documented results in a study letter report.

The study determined that the 2008 flood flow was between a 0.5 percent and 0.2 percent annual chance (200-year and 500-year) flood event. Higher than anticipated flood elevations have been observed at the site due to changed downstream conditions, including construction of a highway and bridge in the downstream floodplain. The study recommended protecting the site to elevation 790, which provides protection above the 0.2 percent (500-year) flood event.

CeMar Trail Pedestrian Bridge; Anderson-Bogert Engineers & Surveyors, Inc.; Marion, IA --Lead Water Resources Engineer responsible for the hydraulic modeling of a new 114-foot long pedestrian bridge crossing Indian Creek in the City of Marion, Iowa. An electronic copy of the HEC-2 model was obtained from the FEMA Engineering Library. HEC-2 model converted into HEC-RAS for the bridge analysis. Entire bridge is located in the floodway. Analysis determined the backwater affect and required bank shaping to mitigate due to the bridge location. Model output was compiled for inclusion with the application for floodplain development permit. Project required a no-rise certification. A new recreation trail for the City of Marion required a pedestrian bridge over Indian Creek. Stanley Consultants was a subconsultant on the project to provide HEC-RAS modeling to develop a bridge design that could provide the zero-rise in backwater elevation required by Iowa DNR.

Wastewater Treatment Plant Upgrade; City of Iowa City; Iowa City, IA--Lead Water Resources Engineer responsible for hydraulic modeling of two adjacent creeks to determine the flood hazard associated with the WWTP expansion. Flat floodplain allows overland flow between the creeks. Flows determined from published regression equations. Steady flow HEC-RAS model developed with the two creeks, and a weir connection between the creeks, to represent the overland flow. Cross sections developed from LiDAR and survey data using HEC-GeoRAS. Developed alternatives to reduce the flood risk. Analysis documented in a final report. Analysis and results included in a LOMR.

Cedar Rapids Flood Study-Project Coordination; U.S. Army COE, Rock Island District; Cedar Rapids, IA--Water Resources Engineer responsible for exporting the results from the client-provided HEC-RAS model for use by the project team in both GIS and CAD programs. Provided technical support in applying the HEC-RAS results to various flood protection projects throughout Cedar Rapids in support of the ongoing Feasibility Study. Projects included levee/floodwall systems and non-structural flood protection. Stanley Consultants provided comprehensive engineering support for the overall USACE Feasibility Study. Responsibilities included project coordination and engineering support. Project coordination included participation on the Corps' Product Delivery Team; support of USACE organized

public meetings, documentation of meeting, and scheduling support. Engineering support included the development and evaluation of various structural and non-structural alternatives to manage flood risk. Major engineering responsibilities included: preparation of 35 percent level design plans for the preferred plan; and the preparation of the Geotechnical, Structural Assessment, and Cost Estimate Appendices.

Kandahar Intelligence, Surveillance, and Reconnaissance Ramp Design; U.S. Army COE, Middle East District; Kandahar, AF --Water Resources Engineer responsible for stormwater drainage and water distribution piping for the fire protection system of the new ISR ramp. Drainage design reviewed the runoff from both the 10-year and 100-year rainfall events with the addition of an oil water separator in the system to capture fuel from refueling operations on the ramp. This design-build project is being executed with Contrack International as the prime construction contractor. It includes a 58,000 square meters Intelligence, Surveillance and Reconnaissance concrete apron, 4,800 square meters concrete taxiway, eight fabric hangars, two fabric sunshades, a fire water pump house, two fire water storage tanks, associated distribution piping, and a fire protection system within the hangars. The project facilities will house and service unmanned aircraft used for ISR activities in-country. Special features of the project include the fabric shelters, the fire protection system requirements, a closed drainage system and the use of structural concrete as apron pavement under the shelters.

Flood Protection Study; City of Cedar Rapids; Cedar Rapids, IA -- Principal Water Resources Engineer for design of riprap bank stabilization on the west bank of the Cedar River in Cedar Rapids, Iowa. The devastating flood in June 2008 caused bank erosion along the existing levee in the Time Check neighborhood. Project received funding from the NRCS Emergency Watershed Protection program. Project included a Phase I Letter Report to confirm the method of bank stabilization and Phase II with development of plans and specifications. The overall project required approximately 1,500 feet of bank stabilization with riprap. **Flood Response Manual Updates** - Principal Water Resources Engineer supporting the 2009 update of the City of Cedar Rapids' Flood Response Manual. Utilized the existing HEC-RAS hydraulic model to generate water surface profiles through the City correlated to the stream gage stage. Profiles were generated in 2-foot increments from 20 feet to 32 feet. Water surface elevations were transferred to GIS and inundation maps created over a base map of aerial imagery. The inundation maps were included in the update of the Flood Response Manual. **Flood Protection Study** - Principal Water Resources Engineer providing flood protection engineering services to support the City's multi-disciplinary planning and design team. The team was formed immediately after the devastating flood of June 2008 to assist with the recovery and rebuilding. Responsibilities included hydraulic modeling of 30 structural and 10 non-structural flood mitigation options. Structural options included bridge modifications, dam modifications, detention, diversions, increasing conveyance, flood protection systems, and removing obstructions. Non-structural options included floodproofing, watershed management, acquire properties, flood warning, stormwater management, elevate structures, and relocating structures. Developed conceptual cost estimates for each option. Generated a Flood Mitigation Options Report documenting the results. Participated in public Open Houses to present results and address questions. Provided Cedar River velocities for the varying frequencies to support design for streambank restoration through the City. This work, along with the multi-disciplinary planning and design team work, formed the basis of the City's Cedar Rapids River Corridor Redevelopment Plan. The U.S. Army Corps of Engineers, Rock Island District, is utilizing the plan in their ongoing Feasibility Study of the Cedar River corridor with the city limits of Cedar Rapids.

Since the devastating flood of June 2008, Stanley Consultants has been engaged by the City of Cedar Rapids to provide Flood Protection consultation services. Stanley Consultants provided engineering services to support the City's multi-disciplinary planning and design team. This work forms the basis of the City's Cedar Rapids River Corridor Redevelopment Plan. Responsibilities include: Hydraulic modeling of 30 structural and 10 non-structural flood mitigation options. Structural options included bridge modifications, dam modifications, detention, diversions, increasing conveyance, flood protection systems, and removing obstructions. Non-structural options included floodproofing, watershed management, acquire properties, flood warning, stormwater management, elevate structures, and relocating structures.

Breckenridge Flood Control; U.S. Army COE, St. Paul District, MN --Lead Water Resources Engineer responsible for reviewing the hydraulic analysis, plans, specifications and design documentation report for the project. Project involves final design of levees, flood walls, gate wells, bank stabilization, interior drainage, closure structures, and utility crossings to protect the City of Breckenridge from flooding on the Ottertail and Red Rivers. Flood protection for Breckenridge using a system of levees and associated structural works.

Lake Ponchartrain and Vicinity Closure Structures; U.S. Army COE, Vicksburg District; New Orleans, LA --Project Manager responsible for the development of a Preliminary Engineering Report with recommendations for the final design of 15 road closure structures located along Lake Pontchartrain in Orleans Parish. The existing structures were analyzed for the new design criteria and recommendations presented for interim protection measures. Concepts of replacement structures were developed along with construction schedules and detailed cost estimates.

Levee Reconstruction; U.S. Army COE, New Orleans District; New Orleans, LA --Project Manager assisting with the exchange of information between Task Force Hope, Task Force Guardian, Mississippi Valley Division, and New Orleans District. Coordination of meetings and meeting materials. Assisted in the preparation and updating of the Weekly Report. Preparation of presentation materials for people/groups/Congressional Delegations touring the region. Provided general assistance and support to the Task Force Hope members.

APPENDIX B
NAS – COI FORMS

BI/COI FORM 3

THE NATIONAL ACADEMIES
Advisers to the Nation on Science, Engineering, and Medicine

National Academy of Sciences
National Academy of Engineering
Institute of Medicine
National Research Council

BACKGROUND INFORMATION AND CONFIDENTIAL CONFLICT OF INTEREST DISCLOSURE

For General Scientific and Technical Studies and Assistance

NAME: JOHN GODFREY, JR., P.E. TELEPHONE: 615-255-9702

ADDRESS: KSWA - 54 LINDSLEY AVE.

NASHVILLE, TN 37210

EMAIL ADDRESS: jgodfrey@kswarellc.com

CURRENT EMPLOYER: KS WARE & ASSOCIATES, LLC

NAS/NAE/IOM/NRC COMMITTEE: _____

There are two parts to this form, Part I Background Information, and Part II Confidential Conflict of Interest Disclosure. Complete both parts, **sign** and **date** this form on the last page, and return the form to the responsible staff officer for *The National Academies* project and committee activity to which this form applies. **Retain a copy for your records.**

PART I **BACKGROUND INFORMATION**

INSTRUCTIONS

Please provide the information requested below regarding **relevant** organizational affiliations, government service, public statements and positions, research support, and additional information (if any). Information is "relevant" if it is related to -- and might

reasonably be of interest to others concerning -- your knowledge, experience, and personal perspectives regarding the subject matter and issues to be addressed by the committee activity for which this form is being prepared. If some or all of the requested information is contained in your curriculum vitae, you may if you prefer simply attach your CV to this form, supplemented by additional responses or comments below as necessary.

I. ORGANIZATIONAL AFFILIATIONS. Report your relevant business relationships (as an employee, owner, officer, director, consultant, etc.) and your relevant remunerated or volunteer non-business relationships (e.g., professional organizations, trade associations, public interest or civic groups, etc.).

Senior Geotechnical Engineer (employee) for KS Ware & Associates, LLC

Member - American Society of Civil Engineers (ASCE)

Member - American Society of Highway Engineers (ASHE)

Member - Society of American Military Engineers (SAME)

Member - Geo-Institute (Subgroup of ASCE)

II. GOVERNMENT SERVICE. Report your relevant service (full-time or part-time) with federal, state, or local government in the United States (including elected or appointed positions, employment, advisory board memberships, military service, etc.).

NONE

III. RESEARCH SUPPORT. Report relevant information regarding both public and private sources of research support (other than your present employer), including sources of funding, equipment, facilities, etc.

NONE

IV. PUBLIC STATEMENTS AND POSITIONS. List your relevant articles, testimony, speeches, etc., by date, title, and publication (if any) in which they appeared, or provide relevant representative examples if numerous. Provide a brief description of relevant positions of any organizations or groups with which you are closely identified or associated.

"Case History-Remediation of Portland City Lake Dam, Tennessee", Proceeding of Association of State Dam Safety Officials, Southeastern RegionalConference, Nashville, Tennessee, June 1996.

"Foundation Remedies for Residential Construction over Karst Limestone in Nashville, Tennessee", 6th Multidisciplinary Conference on Sinkholes and the Environmental Impacts of Karst, Springfield, Missouri, April, 1997.

"LRFD Implementation - Kennedy Interchange",Annual Southeastern Transportation Geotechnical Engineering Conference, Bowling Green, Kentucky,October, 2007.

"Automated Laboratory Data Collection and Database Management", Annual Southeastern Transportation Geotechnical Engineering Conference, Wilmington, North Carolina, November, 2009.

V. ADDITIONAL INFORMATION. If there are relevant aspects of your background or present circumstances not addressed above that might reasonably be construed by others as affecting your judgment in matters within the assigned task of the committee or panel on which you have been invited to serve, and therefore might constitute an actual or potential source of bias, please describe them briefly.

NONE

PART II **CONFIDENTIAL CONFLICT OF INTEREST DISCLOSURE**

INSTRUCTIONS

It is essential that the work of committees of the institution used in the development of reports not be compromised by any significant conflict of interest. For this purpose, **the term "conflict of interest" means any financial or other interest which conflicts with the service of the individual because it (1) could significantly impair the individual's objectivity or (2) could create an unfair competitive advantage for any person or organization.** Except for those situations in which the institution determines that a conflict of interest is unavoidable and promptly and publicly discloses the conflict of interest, no individual can be appointed to serve (or continue to serve) on a committee of the institution used in the development of reports if the individual has a conflict of interest that is relevant to the functions to be performed.

The term "conflict of interest" means something more than individual bias. There must be an *interest,* ordinarily financial, that could be directly affected by the work of the committee.

Conflict of interest requirements are *objective* and *prophylactic.* They are not an assessment of one's actual behavior or character, one's ability to act objectively despite the conflicting interest, or one's relative insensitivity to particular dollar amounts of specific assets because of one's personal wealth. Conflict of interest requirements are objective standards designed to eliminate certain specific, potentially compromising situations from arising, and thereby to protect the individual, the other members of the committee, the institution, and the public interest. The individual, the committee, and the institution should not be placed in a situation where others could reasonably question, and perhaps discount or dismiss, the work of the committee simply because of the existence of conflicting interests.

The term "conflict of interest" applies only to *current interests.* It does not apply to past interests that have expired, no longer exist, and cannot reasonably affect current behavior. Nor does it apply to possible interests that may arise in the future but do not currently exist, because such future interests are inherently speculative and uncertain. For example, a pending formal or informal application for a particular job is a current interest, but the mere possibility that one might apply for such a job in the future is <u>not</u> a current interest.

The term "conflict of interest" applies not only to the personal interests of the individual but also to the *interests of others* with whom the individual has substantial common financial interests if these interests are relevant to the functions to be performed. Thus, in assessing an individual's potential conflicts of interest, consideration must be given not only to the interests of the individual but also to the interests of the individual's spouse and minor children, the individual's employer, the individual's business partners, and others with whom the individual has substantial common financial interests. Consideration must also be given to the interests of those for whom one is acting in a

fiduciary or similar capacity (e.g., being an officer or director of a corporation, whether profit or nonprofit, or serving as a trustee).

Much of the work of this institution involves scientific and technical studies and assistance for sponsors across a broad range of activities. Such activities may include, for example: defining research needs, priorities, opportunities and agendas; assessing technology development issues and opportunities; addressing questions of human health promotion and assessment; providing scientific and technical assistance and supporting services for government agency program development; assessing the state of scientific or technical knowledge on particular subjects and in particular fields; providing international and foreign country science and technology assessments, studies and assistance. Such activities frequently address scientific, technical, and policy issues that are sufficiently broad in scope that they do not implicate specific financial interests or conflict of interest concerns.

However, where such activities address more specific issues having significant financial implications -- e.g., funding telescope A versus telescope B, government development or evaluation of a specific proprietary technology, promotion or endorsement of a specific form of medical treatment or medical device, connecting foreign research facilities to specific commercial interests, making recommendations to sponsors regarding specific contract or grant awards, etc. -- careful consideration must be given to possible conflict of interest issues with respect to the appointment of members of committees that will be used by the institution in the development of reports to be provided by the institution to sponsoring agencies.

The overriding objective of the conflict of interest inquiry in each case is to identify whether there are interests – primarily financial in nature – that conflict with the committee service of the individual because they could impair the individual's objectivity or could create an unfair competitive advantage for any person or organization. The fundamental question in each case is does the individual, or others with whom the individual has substantial common financial interests, have identifiable interests that could be directly affected by the outcome of the project activities of the committee on which the individual has been invited to serve? For projects involving advice regarding awards of contracts, grants, fellowships, etc., this institution is also guided by the principle that an individual should not participate in any decision regarding the award of a contract or grant or any other substantial economic benefit to the individual or to others with whom the individual has substantial common financial interests or a substantial personal or professional relationship.

The application of these concepts to specific scientific and technical studies and assistance projects must necessarily be addressed in each case on the basis of the particular facts and circumstances involved. The questions set forth below are designed to elicit information from you concerning possible conflicts of interest that are relevant to the functions to be performed by the particular committee on which you have been invited to serve.

1. FINANCIAL INTERESTS. (a) Taking into account stocks, bonds, and other financial instruments and investments including partnerships (but excluding broadly diversified mutual funds and any investment or financial interests valued at less than $10,000), do you or, to the best of your knowledge others with whom you have substantial common financial interests, have financial investments that could be affected, either directly or by a direct effect on the business enterprise or activities underlying the investments, by the outcome of the project activities of the committee on which you have been invited to serve?

(b) Taking into account real estate and other tangible property interests, as well as intellectual property (patents, copyrights, etc.) interests, do you or, to the best of your knowledge others with whom you have substantial common financial interests, have property interests that could be directly affected by the outcome of the project activities of the committee on which you have been invited to serve?

(c) Could your employment or self-employment (or the employment or self-employment of your spouse), or the financial interests of your employer or clients (or the financial interests of your spouse's employer or clients) be directly affected by the outcome of the project activities of the committee on which you have been invited to serve?

(d) Taking into account research funding and other research support (e.g., equipment, facilities, industry partnerships, research assistants and other research personnel, etc.), could your current research funding and support (or that of your close research colleagues and collaborators) be directly affected by the outcome of the project activities of the committee on which you have been invited to serve?

(e) Could your service on the committee on which you have been invited to serve create a specific financial or commercial competitive advantage for you or others with whom you have substantial common financial interests?

If the answer to all of the above questions under FINANCIAL INTERESTS is either "no" or "not applicable," check here __X__ (NO).

If the answer to any of the above questions under FINANCIAL INTERESTS is "yes," check here ____ (YES), and briefly describe the circumstances on the last page of this form.

2. OTHER INTERESTS. (a) Is the central purpose of the project for which this disclosure form is being prepared a critical review and evaluation of your own work or that of your employer?

(b) Do you have any existing professional obligations (e.g., as an officer of a scientific or engineering society) that effectively require you to publicly defend a previously established position on an issue that is relevant to the functions to be performed in this committee activity?

(c) To the best of your knowledge, will your participation in this committee activity enable you to obtain access to a competitor's or potential competitor's confidential proprietary information?

(d) If you are or have ever been a U.S. Government employee (either civilian or military), to the best of your knowledge are there any federal conflict of interest restrictions that may be applicable to your service in connection with this committee activity?

(e) If you are a U.S. Government employee, are you currently employed by a federal agency that is sponsoring this project? If you are not a U.S. Government employee, are you an employee of any other sponsor (e.g., a private foundation) of this project?

(f) If the committee activity for which this form is being prepared involves reviews of specific applications and proposals for contract, grant, fellowship, etc. awards to be made by sponsors, do you or others with whom you have substantial common financial interests, or a familial or substantial professional relationship, have an interest in receiving or being considered for awards that are currently the subject of the review being conducted by this committee?

(g) If the committee activity for which this form is being prepared involves developing requests for proposals, work statements, and/or specifications, etc., are you interested in seeking an award under the program for which the committee on which you have been invited to serve is developing the request for proposals, work statement, and/or specifications -- or, are you employed in any capacity by, or do you have a financial interest in or other economic relationship with, any person or organization that to the best of your knowledge is interested in seeking an award under this program?

If the answer to all of the above questions under OTHER INTERESTS is either "no" or "not applicable," check here _X__ (NO).

If the answer to any of the above questions under OTHER INTERESTS is "yes," check here ____ (YES), and briefly describe the circumstances on the last page of this form.

EXPLANATION OF "YES" RESPONSES:

During your period of service in connection with the activity for which this form is being completed, any changes in the information reported, or any new information, which needs to be reported, should be reported promptly by written or electronic communication to the responsible staff officer.

YOUR SIGNATURE

3/15/2012
DATE

Reviewed by:
Executive Director

3/15/2012
Date

BI/COI FORM 3

THE NATIONAL ACADEMIES
Advisers to the Nation on Science, Engineering, and Medicine

National Academy of Sciences
National Academy of Engineering
Institute of Medicine
National Research Council

BACKGROUND INFORMATION
AND
CONFIDENTIAL CONFLICT OF INTEREST DISCLOSURE
For General Scientific and Technical Studies and Assistance

NAME: Mark Werner TELEPHONE: 563.264.6462

ADDRESS: 225 Iowa Avenue
Muscatine, IA 52761

EMAIL ADDRESS: WernerMark@stanleygroup.com

CURRENT EMPLOYER: Stanley Consultants, Inc.

NAS/NAE/IOM/NRC COMMITTEE: _____

There are two parts to this form, Part I Background Information, and Part II Confidential Conflict of Interest Disclosure. Complete both parts, **sign** and **date** this form on the last page, and return the form to the responsible staff officer for *The National Academies* project and committee activity to which this form applies. **Retain a copy for your records**.

PART I **BACKGROUND INFORMATION**

INSTRUCTIONS

Please provide the information requested below regarding **relevant** organizational affiliations, government service, public statements and positions, research support, and additional information (if any). Information is "relevant" if it is related to -- and might

reasonably be of interest to others concerning -- your knowledge, experience, and personal perspectives regarding the subject matter and issues to be addressed by the committee activity for which this form is being prepared. If some or all of the requested information is contained in your curriculum vitae, you may if you prefer simply attach your CV to this form, supplemented by additional responses or comments below as necessary.

I. ORGANIZATIONAL AFFILIATIONS. Report your relevant business relationships (as an employee, owner, officer, director, consultant, etc.) and your relevant remunerated or volunteer non-business relationships (e.g., professional organizations, trade associations, public interest or civic groups, etc.).

Employee - Stanley Consultants, 2000 - present

Member - American Society of Civil Engineers (ASCE)
Member - National Society of Professional Engineers (NSPE)
Member - Society of American Military Engineers (SAME)
Member - Association of State Floodplain Managers (ASFPM)

II. GOVERNMENT SERVICE. Report your relevant service (full-time or part-time) with federal, state, or local government in the United States (including elected or appointed positions, employment, advisory board memberships, military service, etc.).

Full-time employee, Hydraulic Engineer, US Army Corps of Engineers, Chicago District, 1994-2000.

III. RESEARCH SUPPORT. Report relevant information regarding both public and private sources of research support (other than your present employer), including sources of funding, equipment, facilities, etc.

None.

IV. PUBLIC STATEMENTS AND POSITIONS. List your relevant articles, testimony, speeches, etc., by date, title, and publication (if any) in which they appeared, or provide relevant representative examples if numerous. Provide a brief description of relevant positions of any organizations or groups with which you are closely identified or associated.

None.

V. ADDITIONAL INFORMATION. If there are relevant aspects of your background or present circumstances not addressed above that might reasonably be construed by others as affecting your judgment in matters within the assigned task of the committee or panel on which you have been invited to serve, and therefore might constitute an actual or potential source of bias, please describe them briefly.

None.

PART II **CONFIDENTIAL CONFLICT OF INTEREST DISCLOSURE**

INSTRUCTIONS

It is essential that the work of committees of the institution used in the development of reports not be compromised by any significant conflict of interest. For this purpose, **the term "conflict of interest" means any financial or other interest which conflicts with the service of the individual because it (1) could significantly impair the individual's objectivity or (2) could create an unfair competitive advantage for any person or organization.** Except for those situations in which the institution determines that a conflict of interest is unavoidable and promptly and publicly discloses the conflict of interest, no individual can be appointed to serve (or continue to serve) on a committee of the institution used in the development of reports if the individual has a conflict of interest that is relevant to the functions to be performed.

The term "conflict of interest" means something more than individual bias. There must be an *interest,* ordinarily financial, that could be directly affected by the work of the committee.

Conflict of interest requirements are *objective* and *prophylactic.* They are not an assessment of one's actual behavior or character, one's ability to act objectively despite the conflicting interest, or one's relative insensitivity to particular dollar amounts of specific assets because of one's personal wealth. Conflict of interest requirements are objective standards designed to eliminate certain specific, potentially compromising situations from arising, and thereby to protect the individual, the other members of the committee, the institution, and the public interest. The individual, the committee, and the institution should not be placed in a situation where others could reasonably question, and perhaps discount or dismiss, the work of the committee simply because of the existence of conflicting interests.

The term "conflict of interest" applies only to *current interests.* It does not apply to past interests that have expired, no longer exist, and cannot reasonably affect current behavior. Nor does it apply to possible interests that may arise in the future but do not currently exist, because such future interests are inherently speculative and uncertain. For example, a pending formal or informal application for a particular job is a current interest, but the mere possibility that one might apply for such a job in the future is <u>not</u> a current interest.

The term "conflict of interest" applies not only to the personal interests of the individual but also to the *interests of others* with whom the individual has substantial common financial interests if these interests are relevant to the functions to be performed. Thus, in assessing an individual's potential conflicts of interest, consideration must be given not only to the interests of the individual but also to the interests of the individual's spouse and minor children, the individual's employer, the individual's business partners, and others with whom the individual has substantial common financial interests. Consideration must also be given to the interests of those for whom one is acting in a

fiduciary or similar capacity (e.g., being an officer or director of a corporation, whether profit or nonprofit, or serving as a trustee).

Much of the work of this institution involves scientific and technical studies and assistance for sponsors across a broad range of activities. Such activities may include, for example: defining research needs, priorities, opportunities and agendas; assessing technology development issues and opportunities; addressing questions of human health promotion and assessment; providing scientific and technical assistance and supporting services for government agency program development; assessing the state of scientific or technical knowledge on particular subjects and in particular fields; providing international and foreign country science and technology assessments, studies and assistance. Such activities frequently address scientific, technical, and policy issues that are sufficiently broad in scope that they do not implicate specific financial interests or conflict of interest concerns.

However, where such activities address more specific issues having significant financial implications -- e.g., funding telescope A versus telescope B, government development or evaluation of a specific proprietary technology, promotion or endorsement of a specific form of medical treatment or medical device, connecting foreign research facilities to specific commercial interests, making recommendations to sponsors regarding specific contract or grant awards, etc. -- careful consideration must be given to possible conflict of interest issues with respect to the appointment of members of committees that will be used by the institution in the development of reports to be provided by the institution to sponsoring agencies.

The overriding objective of the conflict of interest inquiry in each case is to identify whether there are interests – primarily financial in nature – that conflict with the committee service of the individual because they could impair the individual's objectivity or could create an unfair competitive advantage for any person or organization. The fundamental question in each case is does the individual, or others with whom the individual has substantial common financial interests, have identifiable interests that could be directly affected by the outcome of the project activities of the committee on which the individual has been invited to serve? For projects involving advice regarding awards of contracts, grants, fellowships, etc., this institution is also guided by the principle that an individual should not participate in any decision regarding the award of a contract or grant or any other substantial economic benefit to the individual or to others with whom the individual has substantial common financial interests or a substantial personal or professional relationship.

The application of these concepts to specific scientific and technical studies and assistance projects must necessarily be addressed in each case on the basis of the particular facts and circumstances involved. The questions set forth below are designed to elicit information from you concerning possible conflicts of interest that are relevant to the functions to be performed by the particular committee on which you have been invited to serve.

1. FINANCIAL INTERESTS. (a) Taking into account stocks, bonds, and other financial instruments and investments including partnerships (but excluding broadly diversified mutual funds and any investment or financial interests valued at less than $10,000), do you or, to the best of your knowledge others with whom you have substantial common financial interests, have financial investments that could be affected, either directly or by a direct effect on the business enterprise or activities underlying the investments, by the outcome of the project activities of the committee on which you have been invited to serve?

(b) Taking into account real estate and other tangible property interests, as well as intellectual property (patents, copyrights, etc.) interests, do you or, to the best of your knowledge others with whom you have substantial common financial interests, have property interests that could be directly affected by the outcome of the project activities of the committee on which you have been invited to serve?

(c) Could your employment or self-employment (or the employment or self-employment of your spouse), or the financial interests of your employer or clients (or the financial interests of your spouse's employer or clients) be directly affected by the outcome of the project activities of the committee on which you have been invited to serve?

(d) Taking into account research funding and other research support (e.g., equipment, facilities, industry partnerships, research assistants and other research personnel, etc.), could your current research funding and support (or that of your close research colleagues and collaborators) be directly affected by the outcome of the project activities of the committee on which you have been invited to serve?

(e) Could your service on the committee on which you have been invited to serve create a specific financial or commercial competitive advantage for you or others with whom you have substantial common financial interests?

If the answer to all of the above questions under FINANCIAL INTERESTS is either "no" or "not applicable," check here x____ (NO).

If the answer to any of the above questions under FINANCIAL INTERESTS is "yes," check here ____ (YES), and briefly describe the circumstances on the last page of this form.

2. OTHER INTERESTS. (a) Is the central purpose of the project for which this disclosure form is being prepared a critical review and evaluation of your own work or that of your employer?

(b) Do you have any existing professional obligations (e.g., as an officer of a scientific or engineering society) that effectively require you to publicly defend a previously established position on an issue that is relevant to the functions to be performed in this committee activity?

(c) To the best of your knowledge, will your participation in this committee activity enable you to obtain access to a competitor's or potential competitor's confidential proprietary information?

(d) If you are or have ever been a U.S. Government employee (either civilian or military), to the best of your knowledge are there any federal conflict of interest restrictions that may be applicable to your service in connection with this committee activity?

(e) If you are a U.S. Government employee, are you currently employed by a federal agency that is sponsoring this project? If you are not a U.S. Government employee, are you an employee of any other sponsor (e.g., a private foundation) of this project?

(f) If the committee activity for which this form is being prepared involves reviews of specific applications and proposals for contract, grant, fellowship, etc. awards to be made by sponsors, do you or others with whom you have substantial common financial interests, or a familial or substantial professional relationship, have an interest in receiving or being considered for awards that are currently the subject of the review being conducted by this committee?

(g) If the committee activity for which this form is being prepared involves developing requests for proposals, work statements, and/or specifications, etc., are you interested in seeking an award under the program for which the committee on which you have been invited to serve is developing the request for proposals, work statement, and/or specifications -- or, are you employed in any capacity by, or do you have a financial interest in or other economic relationship with, any person or organization that to the best of your knowledge is interested in seeking an award under this program?

If the answer to all of the above questions under OTHER INTERESTS is either "no" or "not applicable," check here x____ (NO).

If the answer to any of the above questions under OTHER INTERESTS is "yes," check here ____ (YES), and briefly describe the circumstances on the last page of this form.

EXPLANATION OF "YES" RESPONSES:

During your period of service in connection with the activity for which this form is being completed, any changes in the information reported, or any new information, which needs to be reported, should be reported promptly by written or electronic communication to the responsible staff officer.

Mark D Werner
YOUR SIGNATURE

3/15/2012
DATE

Reviewed by: _____
Executive Director

3/15/2012
Date

APPENDIX C
GENERAL CHARGE

General Charge Guidance

Charge to the IEPR Type II Panel for the Birds Point-New Madrid Floodway Reconstruction.

The Review panel will conduct a review of the "Letter Report: Interim Level of Protection for the Birds Point-New Madrid Floodway", dated 6 October 2011 and answer the charge questions below. The reviewers shall address each of the following evaluation factors for each of the charge questions below:

- Is the direction of the project appropriate?
- Has USACE overlooked any critical items?
- Does the panel have any other observations to add?

1. Are the models used to assess hazards appropriate?
2. Are the assumptions made for the hazards appropriate?
3. Has the condition of the Birds Point-New Madrid Floodway been adequately described?
4. Are the methods used to evaluate the condition of the Birds Point-New Madrid Floodway adequate and appropriate given the circumstances?
5. Is the quality and quantity of the surveys, investigations and engineering for the design in accordance with ER 1110-2-1150 sufficient to support models and assumptions made for determining the hazards?
6. Is the risk to the system performance in the confluence area for raising the interim level of the Birds Point-New Madrid Floodway Frontline Levee above 55 feet on the Cairo gage appropriate as presented?
7. Is the risk associated with the establishment of the interim level of Frontline Levee of the Birds Point-New Madrid Floodway at a stage corresponding to 55 feet on the Cairo gage appropriate? Is this supported by sound engineering analysis and judgment that appropriately balances risk to system performance in the confluence area?
8. Are there any additional analyses or information available or obtainable that would affect decisions regarding the Birds Point-New Madrid Floodway?
9. Does the analysis adequately address the uncertainty given the consequences associated with the potential for loss of life for this type of project?
10. Has anything significant been overlooked in the development of the plan to reconstruct the Birds Point-New Madrid Floodway?

APPENDIX D
KSWA COMMENTS AND USACE RESPONSES

Comment Report: All Comments
Project: SAR for Letter Report: Interim Level of Protection for the Birds Point New Madrid Floodway
Review: SAR
Displaying 13 comments for the criteria specified in this report.

Id	Discipline	Section/Figure	Page Number	Line Number
4530328	Geotechnical	n/a'	n/a	n/a

In the "Birds Point - New Madrid "Make Safe" Photo Book" power point, dated January 26, 2012, the power point page titled Center Crevasse indicates restoring a seepage berm along the landside, is this just in the vicinity of the blue hole? I understand from the Geotechnical Design Report document that as long as the St John's Bayou is not controlled, seepage berms were determined not to be needed.

Submitted By: Heidi Wilbarger (615-255-9702). Submitted On: 02-Apr-12

1-0 Evaluation **Concurred**

Seepage berm is recommended at blue hole and in adjacent areas where high gradients were calculated. The hole on riverside will serve as an entrance condition for seepage and increase the gradients in areas where no seepage issues existed previouly. Althought the lower site will be completedly inundated during a flood, the middle crevasse site has only limited backwater and is expected to be only a few feet near activation stages.

Submitted By: Cory Williams (901-544-0667) Submitted On: 03-Apr-12

1-1 Backcheck Recommendation **Close Comment**

Closed without comment.

Submitted By: Heidi Wilbarger (615-255-9702) Submitted On: 09-Apr-12

Current Comment Status: **Comment Closed**

4530329	Geotechnical	n/a'	n/a	n/a

The Geotechnical Design Report should be a part, as an Appendix, of the Letter Report. I believe the Geotechnical Design Report aids in understanding the design at the interim level of protection and ultimate full levee height.

Submitted By: Heidi Wilbarger (615-255-9702). Submitted On: 02-Apr-12

1-0 Evaluation **Concurred**

The geotechnical reports were prepared after the interim level of protection report. The geotech reports are very large and will be available for viewing to district and division staff.

Submitted By: Cory Williams (901-544-0667) Submitted On: 03-Apr-12

1-1 Backcheck Recommendation **Close Comment**
Closed without comment.

Submitted By: Heidi Wilbarger (615-255-9702) Submitted On: 09-Apr-12
Current Comment Status: **Comment Closed**

4530336 Hydraulics Section 3 n/a n/a

Since this section describes the operation of the floodway for the 2011 flood, it would be helpful to readers to know flow information at that time. What was the stage at the Cairo gage pre and post floodway operation? What was the flow in the Mississippi pre and post floodway operation? What was the flow diverted through the floodway?

Submitted By: Heidi Wilbarger (615-255-9702). Submitted On: 02-Apr-12

1-0 Evaluation **For Information Only**
Comment noted. The information is available in numerous reports associated with the 2011 Floodway operation but is not considered relevant to the purpose of the hydraulic analysis to assess and evaluate various Floodway interim levels of protection. Information available at the time of the operation of the Floodway is included for your information. The stage at Cairo just prior to operation was 61.72 feet. The first measured stage approximately 1 hour later was 61.29 feet. Immediate flow measurements at the time of Floodway operation were not able to be made. The measured flow in the vicinity of the Floodway Inflow Crevasse was approximately 1,900,000 cfs during the day prior to Floodway operation. The first measured flow through the Floodway Inflow Crevasse was measured the day following Floodway operation and was approximately 400,000 cfs.

Submitted By: Barry Bruchman (901 544-0671) Submitted On: 06-Apr-12

1-1 Backcheck Recommendation **Close Comment**
As an internal document the response is adequate, if the document is publicly released the additional information I believe would improve the public understanding of the Letter Report.

Submitted By: Heidi Wilbarger (615-255-9702) Submitted On: 09-Apr-12
Current Comment Status: **Comment Closed**

4530338 Hydraulics Section 3 n/a n/a

This section reports that the Inflow Crevasse has a total length of 11,099 feet. A discussion of why only 9,000 feet was activated during the 2011 flood would be helpful.

Submitted By: Heidi Wilbarger (615-255-9702). Submitted On: 02-Apr-12

1-0 Evaluation **For Information Only**
Comment noted. The purpose for the shorter length of activation of the Inflow Crevasse was an operational command decision made during the 2011 event. An assessment or discussion of operational decisions is beyond the scope of the report being reviewed.

Submitted By: Barry Bruchman (901 544-0671) Submitted On: 06-Apr-12

1-1 Backcheck Recommendation **Close Comment**
As an internal document the response is adequate, if the document is publicly released the additional information I believe would improve the public understanding of the Letter Report.

Submitted By: Heidi Wilbarger (615-255-9702) Submitted On: 09-Apr-12
Current Comment Status: **Comment Closed**

4530347	Hydraulics	Section 3	n/a	n/a

A description of the activtivation of the Middle and Lower Crevasse during the 2011 flood, and a discussion of why only 4,500 feet of the Lower Crevasse was activiated, would be helpful

Submitted By: Heidi Wilbarger (615-255-9702). Submitted On: 02-Apr-12

1-0 Evaluation **For Information Only**
Comment noted. The comment refers to an operational command decision for which any discussion or assessment is beyond the scope of the report being reviewed.

Submitted By: Barry Bruchman (901 544-0671) Submitted On: 06-Apr-12

1-1 Backcheck Recommendation **Close Comment**
Closed without comment.

Submitted By: Heidi Wilbarger (615-255-9702) Submitted On: 09-Apr-12
Current Comment Status: **Comment Closed**

4530350	Hydraulics	Section 3	n/a	n/a

Section 3. Can the unactivated 2,099 feet of the Inflow Crevasse be activated for future floods during the interim level of protection?

Submitted By: Heidi Wilbarger (615-255-9702). Submitted On: 02-Apr-12

1-0 Evaluation **For Information Only**
Yes, the unactivated 2,099 feet length of the Inflow Crevasse can be activated for future floods during the interim level of protection.

Submitted By: Barry Bruchman (901 544-0671) Submitted On: 06-Apr-12

1-1 Backcheck Recommendation **Close Comment**
The ability to activate the full 11,099 feet during the interim period allows for the 550,000 cfs floodway design flow, if required.

Submitted By: Heidi Wilbarger (615-255-9702) Submitted On: 09-Apr-12
Current Comment Status: **Comment Closed**

4530353 Hydraulics Section 5B n/a n/a

Section 5B. Were alternatives investigated on how to activate the 2,099 feet of the Inflow Crevasse and maintain the 550,000 cfs floodway design flow?

Submitted By: Heidi Wilbarger (615-255-9702). Submitted On: 02-Apr-12

1-0 Evaluation **For Information Only**
The comment refers to operational command decisions for which any discussion or assessment is beyond the scope of the report being reviewed. However, this reach would be activated in the same manner.

Submitted By: Barry Bruchman (901 544-0671) Submitted On: 06-Apr-12

1-1 Backcheck Recommendation **Close Comment**
Closed without comment.

Submitted By: Heidi Wilbarger (615-255-9702) Submitted On: 09-Apr-12
Current Comment Status: **Comment Closed**

4530356 Hydraulics Section 6 27 n/a

Section 6, page 27 states "assume that no erosion of the Crevasse occurs after overtopping" and Section 9 "based on the expectation the Crevasse will erode to natural ground after activation". These statements appear to be conflicting and should be corrected to be consistent throughout the letter report.

Submitted By: Heidi Wilbarger (615-255-9702). Submitted On: 02-Apr-12

1-0 Evaluation **For Information Only**
Comment noted. The statement in Section 6 refers to the hydraulic analysis that was conducted to evaluate the safety of the levee system should the Inflow Crevasse not erode after overtopping; this condition assumes no explosive activation of the Inflow Crevasse. However, the statement in section 9 predicts that the Inflow Crevasse will erode to natural ground after activation, based on historical events and judgment. The interim levee constructed in 2011 is not to full grade and section. The contexts within which the two statements are presented are different and, as such, do not create a conflict.

Submitted By: Barry Bruchman (901 544-0671) Submitted On: 06-Apr-12

1-1 Backcheck Recommendation **Close Comment**
Closed without comment.

Submitted By: Heidi Wilbarger (615-255-9702) Submitted On: 09-Apr-12
Current Comment Status: **Comment Closed**

4530358 Hydraulics Section 6 27 n/a

Section 6, page 27 service life of 5 years assumed. What is the anticipated schedule for repairs? Are there factors that may impact or change the schedule? This information should be addressed.

Submitted By: Heidi Wilbarger (615-255-9702). Submitted On: 02-Apr-12

1-0 Evaluation **For Information Only**
Comment noted. Certainly, there are factors that may impact or change the schedule. The District has not only made progress in repair work since the report was written, but continuously updates its schedules and methods. Repairs completed to date provide an approximate level of protection to the Floodway from Mississippi River headwater flooding that corresponds to a stage of 55 feet at Cairo. Repair activities have progressed to a level beyond the intent of the report being reviewed. Therefore, the points you raise are unable to be addressed with finality.

Submitted By: Barry Bruchman (901 544-0671) Submitted On: 06-Apr-12

1-1 Backcheck Recommendation **Close Comment**
As an internal document the response is adequate, if the document is publicly released the inclusion of an overall schedule helps the public understand the steps, timeline, & assumptions of the schedule that was the basis of the Letter Report. The schedule also shows how the Cairo and Kentucky repairs are part of the process to repair the floodway levees.

Submitted By: Heidi Wilbarger (615-255-9702) Submitted On: 09-Apr-12
Current Comment Status: **Comment Closed**

4530359 Hydraulics Section 6 n/a n/a

Section 6, the risk to property in the Floodway for a 55.0 Cairo stage during the 5 year service life is 46%. How does the risk change if the repairs are completed earlier or later than the assumed 5 year service life?

Submitted By: Heidi Wilbarger (615-255-9702). Submitted On: 02-Apr-12

1-0 Evaluation **For Information Only**
Comment noted. Computation of risk for additional service periods was not a purpose of the report and was not determined. Separate evaluations will be conducted as needed to assess risk to assist in future decisions regarding Floodway repair and construction activities.

Submitted By: Barry Bruchman (901 544-0671) Submitted On: 06-Apr-12

1-1 Backcheck Recommendation **Close Comment**

As an internal document the response is adequate, if the document is publicly released a table showing how risk varies with the service life would be helpful for residents / landowners to understand how they are impacted by changes in the schedule.

Submitted By: Heidi Wilbarger (615-255-9702) Submitted On: 09-Apr-12

Current Comment Status: **Comment Closed**

4530361 Hydraulics n/a' n/a n/a

Use of HESCO's on the Inflow Crevasse. Exposure to UV typically will degrade the HESCO fabric liner, so the product may not last through the entire service life. How long will HESCO's be used during the service life and what measures will be taken to ensure the HESCO's function during this time?

Submitted By: Heidi Wilbarger (615-255-9702). Submitted On: 02-Apr-12

1-0 Evaluation **For Information Only**

Comment noted.

Submitted By: Barry Bruchman (901 544-0671) Submitted On: 06-Apr-12

1-1 Backcheck Recommendation **Close Comment**

Closed without comment.

Submitted By: Heidi Wilbarger (615-255-9702) Submitted On: 09-Apr-12

Current Comment Status: **Comment Closed**

4530369 Geotechnical n/a' n/a n/a

We received a Geotechnical Design report for the lower crevasse. Are there Geotechnical Design reports for the upper and middle crevasses? Did you base your analysis of the upper and middle crevasses on the lower?

Submitted By: Heidi Wilbarger (615-255-9702). Submitted On: 02-Apr-12

Revised 02-Apr-12.

1-0 Evaluation **Concurred**

Reports for all three sites were made available on the following ftp site... ftp://ftp.usace.army.mil/pub/mvm/

Submitted By: Cory Williams (901-544-0667) Submitted On: 03-Apr-12

1-1 Backcheck Recommendation **Open Comment**
It appears the files have been added for the upper crevasse - is USACE in the process for adding files for the center crevasse also?

Submitted By: Heidi Wilbarger (615-255-9702) Submitted On: 09-Apr-12

1-2 Backcheck Recommendation **Close Comment**
Closed without comment.

Submitted By: Heidi Wilbarger (615-255-9702) Submitted On: 16-Apr-12

Current Comment Status: **Comment Closed**

4530372	Geotechnical	n/a'	n/a	n/a

The Geotechnical Assessment provides a good assessment of the Sand Boils and their relationship to the Cairo gage reading of 55 feet and history of sand boils in the area; however, there was nothing directly stated that the interim level of protection was based on the presence of sand boils occuring at Cairo gage readings above 55 feet, geotechnical investigations, etc.

Submitted By: Heidi Wilbarger (615-255-9702). Submitted On: 02-Apr-12

1-0 Evaluation **Concurred**
The sand boil activity in Cairo and Fulton County, KY were the basis of the geotechnical recommendation for interim level of protection. Although not stated directly, the recommendation is implied in the first sentence that states in part..."the risk to failure of project levees due to sand boils is significantly lower at Cairo gage readings below 55 feet"

Submitted By: Cory Williams (901-544-0667) Submitted On: 03-Apr-12

1-1 Backcheck Recommendation **Close Comment**
Closed without comment.

Submitted By: Heidi Wilbarger (615-255-9702) Submitted On: 09-Apr-12

Current Comment Status: **Comment Closed**

APPENDIX E
CERTIFICATION OF INDEPENDENT EXTERNAL REVIEW

Certification of Independent External Peer Review

I John Godfrey, Jr., P.E. have performed an independent review of the Interim Level of Protection in accordance with the following national and international standards and regulations. for the Birds Point-New Madrid Floodway

1. EC 1165-2-209 - Civil Works Review Policy
2. ER 1110-2-1150 - Engineering and Design for Civil Works Projects
3. EM 1110-2-1913 Design and Construction of Levees
4. ETL 1110-2-569 Design Guidance for Levee Underseepage
5. EM 1110-1-1904 Settlement Analysis 6. EM 1110-2-1902 - Slope Stability

I have also entered all findings into the DrChecks[SM] system and presented all findings to the appropriate personnel associated with the Design Submittals and Construction.

Signature: John P. Godfrey Jr.

Discipline: Geotechnical

Date: 4/18/12

Certification of Independent External Peer Review

I Mark D. Werner have performed an independent review of the Letter Report Interim Level of Protection For The Birds Point – New Madrid Floodway in accordance with the following national and international standards and regulations.

1. ER1110-2-1150
2. EC 1165-2-209
3. EM 1110-2-1603

I have also entered all findings into the DrChecks[SM] system and presented all findings to the appropriate personnel associated with the Design Submittals and Construction.

Signature: Mark D Werner

Discipline: Hydraulics

Date: 4-18-2012