REVIEW PLAN
for
MOHAWK DAM, MAJOR REHABILITATION PROJECT
WALHONDING RIVER, COSHOCTON COUNTY
U.S. ARMY CORPS OF ENGINEERS, HUNTINGTON DISTRICT
March 2009, Revised December 2009, Revised September 2010

TABLE OF CONTENTS

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WALHONDING RIVER, COSHOCTON COUNTY
NELLIE, OHIO

U.S. ARMY CORPS OF ENGINEERS, HUNTINGTON DISTRICT

I. PURPOSE AND REQUIREMENTS

A. Purpose. This document outlines the Review Plan (RP) for Mohawk Dam Major Rehabilitation Project[1]. Engineer Circular 1165-2-209, dated 31 Jan 2010, Civil Works Review Policy, provides procedures for ensuring the quality and credibility of U.S Army Corps of Engineers decision documents through independent review and presents a framework for establishing the appropriate level of independence of reviews as well as detailed requirements, including documentation and dissemination. EC 1165-2-209 applies to all decision documents. The Mohawk Major Rehabilitation Project meets the applicability requirements outlined in EC 1165-2-209. This Review Plan will be made available for public comment by being placed on the Huntington District's web site for the Mohawk Major Rehabilitation Project. The authority for approval of this review plan is the Commander, Great Lakes and Ohio River Division. Following approval of this review plan and prior to initiation of Type I IEPR, the Chief of Engineers shall notify the Committee on Environment and Public Works of the Senate and the Committee on Transportation and Infrastructure of the House of Representatives of the review. For inquiries related to this Review Plan, contact Rodney Cremeans, Project Manager, (304) 399-5170, U.S. Army Corps of Engineers, Huntington District, Robert Taylor, Dam Safety Program Manager, (513) 684-3804, U.S. Army Corps of Engineers, Great Lakes and Ohio River Division, or Dave Carlson, Risk Management Center, (412) 395-7334, U.S. Army Corps of Engineers, Institute for Water Resources.

B. Requirements. EC 1165-2-209 outlines the requirement of the three review approaches; district quality control (DQC), agency technical review (ATR) and independent external peer review (IEPR) and provides guidance on Corps Planning Centers of Expertise (PCX) involvement in the approaches. This document addresses review of the decision document and following products. The public and professional societies will not be asked to nominate potential external peer reviewers. Unbiased recognized experts will be utilized in the independent external peer reviews.

1. DQC. District Quality Control is an internal review of basic science and engineering work products focused on fulfilling the project quality requirements defined in the Project Management Plan (PMP). Basic quality control tools include a Quality Management Plan (QMP) providing for seamless review, quality checks and reviews, supervisory reviews, Project Delivery Team (PDT) reviews, etc.

[1] This Review Plan (RP) is a component of the Quality Management Plan (QMP) which is a part of the Project Management Plan (PMP) for the Mohawk Dam, Major Rehabilitation Project.

2. ATR. Agency Technical Review, which replaces the level of review formerly known as Independent Technical Review (ITR), is an independent in-depth review to ensure the proper application of clearly established criteria, regulations, laws, codes, principles and professional practices. The ATR team reviews the various work products and assures that all the parts fit together in a coherent whole.

3. IEPR. Independent External Peer Review is the most independent level of review, and is applied in cases that meet certain criteria where the risk and magnitude of the proposed project are such that a critical examination by a qualified team outside USACE is warranted. There are two types of IEPR – one addressing project studies for all purposes and one addressing design and construction activities for significant public health, safety and welfare concerns.

a. Type I IEPR is generally for feasibility, reevaluation, modification, and assessment reports with an EIS and is managed by an outside eligible organization (OEO). The scope of review will address all the underlying planning, engineering, including safety assurance, economics and environmental analysis performed, not just one aspect of the project.

b. Type II IEPR, or Safety Assurance Review (SAR), is generally for design and construction activities for flood damage reduction or coastal storm damage reduction projects or for other activities that affect public safety, and will also be conducted for reviewing the relevancy and effectiveness of the Corps inspection of completed works and safety programs in promoting safety and competent performance. They are not required to be managed by OEOs and may be managed by the Corps MSC or by an outside organization. While all aspects of the project may be included in the review, it will focus on the public safety aspects.

4. Policy and Legal Compliance Reviews. In addition to the technical reviews described above, decision documents will be reviewed throughout the study process for their compliance with law and policy. These reviews culminate in Washington-level determinations that the recommendations in the reports and the supporting analyses and coordination comply with law and policy, and warrant approval or further recommendation to higher authority by the Chief of Engineers.

C. Applicability. The Mohawk Major Rehabilitation Project shall undergo DQC and ATR to "ensure the quality and credibility of the government's scientific information" in accordance with EC 1165-2-209 and the Huntington District's Quality Management Plan. The Mohawk Major Rehabilitation Report will undergo DQC, ATR and Type I IEPR. The Mohawk Design Documentation Report (DDR) will undergo DQC, ATR and Type II IEPR. The Mohawk Plans and Specifications will undergo DQC, ATR and Type II IEPR. During the construction phase, intermittently, Type II IEPRs will be conducted. These products and reports include any necessary National Environmental Policy Act (NEPA) documents and other environmental compliance products.

An independent external peer review panel will conduct review of the Mohawk Major Rehabilitation Report to evaluate whether the interpretations of analyses and conclusions based on analysis are reasonable. The independent external review panel will conduct a review that covers the entire decision document and address all underlying engineering, economic and environmental work.

An independent external peer review panel will conduct reviews of the design and construction activities prior to the initiation of physical construction and, until construction activities are completed, periodically thereafter on a regular schedule. The reviews shall consider the adequacy, appropriateness and acceptability of the design and construction activities in assuring public health, safety and welfare.

D. Implementation. The Corps' designation for the element responsible for managing the review is known as the Review Managing Organization (RMO). For this study, the RMO is the Risk Management Center (RMC), Institute for Water Resources (IWR).

II. PROJECT DESCRIPTION

A. Decision Document. The project is a Major Rehabilitation to address reliability problems related to Mohawk Dam. Action is needed because the excessive uncontrolled seepage and potential spillway erodibility are negatively affecting the integrity of the dam, increasing risks to the downstream public. These concerns contributed to its classification by the USACE Screening for Portfolio Risk Assessment (SPRA) as a Dam Safety Action Class II – Urgent (unsafe or potentially unsafe) project. Rehabilitation is needed to correct these instability issues and to minimize the potential for catastrophic failure of the dam. The project is considered to be single purpose. The decision document will present planning, engineering and implementation details of the recommended plan to allow final design and construction to proceed subsequent to the approval of the plan. This project will not require Congressional authorization. An Environmental Assessment (EA) has been prepared. A Cost and Schedule Risk Analysis is scheduled for March and April 2009 by the Walla Walla District.

B. General Site Location and Description. Mohawk Dam is located in Coshocton County, Ohio, on the Walhonding River (Figure 1), a tributary of the Muskingum River. The dam is located 17.4 miles above the mouth of the Walhonding River and approximately 129.8 miles above the mouth of the Muskingum River. The town located the nearest to Mohawk Dam is Nellie, Ohio. The population of Nellie Village is 134. More sizable population centers in the inundation area of the dam are Coshocton (located 15 miles to the southeast) and Zanesville (located 36 miles to the southwest) with populations of 11,682 and 25,586 respectively. The floodplain between Mohawk Dam and the larger downstream population centers can generally be described as consisting of broad, gently sloping valleys. Development is sparse downstream of the dam, and is comprised primarily of small towns, some light industrial sites and farmland.

Mohawk Dam was completed in September 1937. Mohawk Dam is a "dry dam" and does not retain a permanent pool during any season of the year. The official plan for

Mohawk Dam did not provide for a permanent lake to be maintained behind the dam and this policy has remained in effect for the 70 year life of the project. However, since the sluice intake elevation at the dam is approximately 5 feet higher than the original stream bed, a small backwater pool extends upstream about 1.5 miles, but is contained within the stream banks. At the maximum flood control pool level (elevation 890.0), the reservoir has a surface area of 7,950 acres and a flood control capacity of 285,000 acre-feet.

Mohawk Dam also controls the outflow from four other USACE flood control dams located in the Mohawk drainage basin. The projects include Mohicanville Dam, Charles Mill Lake, Pleasant Hill Lake, and North Branch of Kokosing Lake. Refer to Appendix J Reservoir Routing Procedure for a description of how the project is operated during flood events. The project has an upstream drainage area of approximately 1,504 square miles (821 square miles net area excluding Charles Mill, Pleasant Hill and Mohicanville lake drainage areas), and 285,000 acre feet of storage at the maximum flood control pool level (elevation 890.0).

Figure 1. Location of Mohawk Dam

C. Non Federal Cost Share Partner. The Non Federal Cost Share Sponsor for this project is the Muskingum Watershed Conservancy District (MWCD). There are no in kind services anticipated as part of the cost share.

D. Project Scope. The study will focus on alternatives aimed at reducing the risk and increasing the reliability associated with Mohawk Dam. Total project cost estimate prior to fully-funding is $163,789,000 at the FY09 price level. The total fully-funded project cost estimate is $187,349,000.

E. Problems and Opportunities. The primary problem associated with Mohawk Dam is excessive seepage through and under the left abutment and main embankment. This uncontrolled seepage is negatively affecting the structural integrity of the dam, increasing risks to the downstream public. Due to the history of excessive seepage through and under the dam and through the left abutment during events with frequent return periods, it was ranked by the U.S. Army Corps of Engineers Screening for Portfolio Risk Assessment (SPRA) process as a Dam Safety Action Class II – Urgent (unsafe or potentially unsafe) project. Rehabilitation is needed to correct these seepage problems and to minimize the potential for catastrophic failure of the dam during these and greater events.

Deferral of action may result in catastrophic dam failure resulting in loss of life and severe property and economic damages. There is an opportunity to significantly reduce the potential for these consequences and also avoid emergency action expenditures.

F. Potential Methods. The following is the initial array of alternatives that will be considered during the Major Rehabilitation Study.

- Advanced Maintenance Strategy
- Scheduled Repair Strategy
- Scheduled Rehabilitation
- Immediate Rehabilitation
    - Main Embankment Alternatives
        - Main Embankment Full Depth Offset Seepage Cutoff Wall
        - Main Embankment Full Depth Centerline Seepage Cutoff Wall
        - Main Embankment Partial Depth Offset Seepage Cutoff Wall/Trench Drain
        - Main Embankment Partial Depth Centerline Seepage Cutoff Wall/Trench Drain
    - Left Abutment Alternatives
        - Left Abutment Shotcrete on Upstream Cut Slope
        - Left Abutment Grout Curtain and Radial Grouting of the Outlet Tunnels
        - Left Abutment Cutoff Wall and Radial Grouting of the Outlet Tunnels
    - Spillway Alternatives
        - Spillway Erosion Control Key
- Nonstructural Measures
    - Modified Operational Procedures and Pool Restrictions
    - Expanded Seepage Monitoring
- No Action Alternative

G. Study Challenges. The biggest challenge associated with this Major Rehabilitation Report is the team's task of analyzing Mohawk Dam as an individual flood risk management structure, while recognizing that the dam is a part of the larger Muskingum River Basin System. Mohawk Dam is one in a system of 14 original Muskingum River Basin projects constructed by the Corps between 1934 and 1938 under the authority of

the Public Works Administration. Presently, there are 16 dams located in the system including the original 14 and two others – North Branch of Kokosing Dam and Dillon Dam, built in 1972 and 1961, respectively. Mohawk Dam was completed in 1937. The system is operated in cooperation with the Muskingum Watershed Conservancy District of Ohio to provide flood control, recreation, and conservation of fish and wildlife throughout the watershed. Any changes to the operation of the dam can and will have impacts on the other dams throughout the system.

Individually challenging components of the study are the economics/risk and uncertainty analysis required, as well as the geotechnical analysis. The project will not contain influential scientific information nor will it contain a highly influential scientific assessment. The project study will not be controversial and generally will receive favorable public support.

H. Project Delivery Team. The project delivery team (PDT) is comprised of those individuals directly involved in the development of the decision document, the design documentation report and the plans and specifications. The PDT members are as follows:

[redacted], Real Estate
[redacted], Mechanical
[redacted], Project Manager
[redacted], Contracting
[redacted], Construction
[redacted], Geotechnical
[redacted], Formulation
[redacted], Environmental
[redacted], Operations
[redacted], Public Affairs
[redacted], Dam Safety
[redacted], Structural
[redacted], Cost
[redacted], Geology
[redacted], Civil Engineer/Lead Engineer
[redacted], Archeology
[redacted], HTRW
[redacted], Hydraulics and Hydrology

I. Vertical Team. The Vertical Team includes District management, District Support Team (DST), and Regional Integration Team (RIT) staff as well as members of the Planning Community of the Practice (PCoP) and the Risk Management Center. The Agency Technical Review (ATR) Leader will be outside of the Great Lakes and Ohio River Division (LRD) for all ATRs.

J. Certification. The computational models to be employed in the Mohawk Dam Major Rehabilitation Study have either been developed by or for the USACE. More specifically, the models to be employed in the completion of this study are:

- MCACES 2nd Generation (MII) Version 3.01 : Developed by Project Time and Cost, Inc. (PT&C), MII is a detailed cost estimating application used by the USACE and its A-E contractors for military, civil works and hazardous, toxic and radioactive waste (HTRW) projects. MII was first released in June 2003 and replaced the MCACES and MCACES for Windows programs.
- Crystal Ball Fusion Edition, Release 11.1.3.00 (Build 11.1.1077.0 on 7/23/2009): Developed by Oracle, this Excel add-in is used to perform a risk analysis based on the Monte-Carlo principles. It involves selecting a distribution type for an identified risk, determining the input parameters to fit the selected distribution, completing the correlation matrix, running the simulation, allocating the risk dollars back to the appropriate line items, and running final reports on the analysis. The forecasts that result from these simulations help quantify areas of risk so decision-makers can have as much information as possible to support wise decisions.
- Primavera Project Management (P5) Release 5.0 SP1 (Build #: 10000002): Developed by Primavera Systems, Inc., P5 is a comprehensive planning application built on Oracle and Microsoft SQL Server relational databases. P5 was used to develop a detailed, resource-loaded construction schedule from the MII estimate as a basis construction duration and fully-funding.
- HEC-FDA Version 1.2.4: This model, developed by the Corps' Hydrological Engineering Center (HEC), will assist the PDT in applying risk analysis methods of flood risk management studies as required by EM 1110-2-1419. This program:
    - Provides a repository for both economic and hydrologic data required for the analysis
    - Provides the tools needed to understand the results
    - Calculates the expected damages per storm event
    - Implements the risk-based analysis procedures contained in EM 1110-2-1619
- HEC-RAS Version 4.0 and the BETA VERSION 4.0: The function of this model is to complete one-dimensional hydraulic calculations for a full network of natural and man made channels. HEC-RAS major capabilities are:
    - User interface
    - Hydraulic analysis
    - Data storage and management
    - Graphics and reporting
- HEC-HMS, Version 3.2: By applying this model the PDT is able to:
    - Define the watersheds' physical features
    - Describe the metrological conditions
    - Estimate parameters
    - Analyze simulations
    - Obtain GIS connectivity
- SEEP/W and SLOPE/W – GeoStudio 2007 (Version 7.13, Build 4419) Copyright 1991-2008 GEO-SLOPE International, Ltd.
    - Seepage analysis – Finite Element Software
    - Slope stability analysis – capable of probabilistic analyses

- LRP Risk and Uncertainty Model: The model used to incorporate risk and uncertainty into the economic analysis was designed by Pittsburg District and modified for use as part of this study.

Model certification and approval for all identified planning models will be coordinated through the PCX as needed. Project schedules and resources will be adjusted to address this process for certification and PCX coordination.

III. DISTRICT QUALITY CONTROL

The DQC will be managed by the Huntington District in accordance with ER 1110-1-12 and the Great Lakes and Ohio River Division and Huntington District Quality Management Plans.[2]

IV. AGENCY TECHINCAL REVIEW

As outlined above in paragraph I.B.2, the District is responsible for ensuring adequate technical review of decision documents. The responsible PDT for this decision document and following engineering documents including DDR and P&S is the Huntington District (LRH). The PDT will coordinate this RP with the Risk Management Center (RMC) to ensure that ATR activities are reasonably represented in the PMP, particularly the schedule and resource needs.

A. ATR Objective. The ATR shall ensure that the report is consistent with established criteria, guidance, procedures and policy. The ATR will assess whether the analyses presented are technically correct and comply with published USACE guidance, and that the document explains the analyses and results in a reasonably clear manner for the public and decision makers.

B. Scope of ATR. The ATR will examine the draft Mohawk Major Rehabilitation Report, Design Documentation Report (DDR) and Plans and Specifications (P&S) and supporting documents and other supporting analyses to ensure the adequacy of the presented methods, assumptions, criteria, decision factors, applications and explanations. Policy compliance is explicitly within the scope of ATR. An ATR of the Draft Mohawk Major Rehabilitation Report was completed in February 2009. ATR of each product is estimated to cost $30,000.

C. ATR Team. The disciplines represented on the ATR team will reflect the significant disciplines involved in the planning and engineering and design effort. These disciplines will include plan formulation, economics, environmental sciences, real estate and engineering disciplines such as hydraulics and hydrology, design, geotechnical, and cost estimating. A list of the Mohawk ATR team members is as follows and the members have not been involved in District Quality Control (DQC) or the development of project documents:

[2] The Mohawk Major Rehabilitation Study Quality Management Plan is available upon request.

[redacted], Geotechnical, Nashville District
[redacted], Plan Formulation, Nashville District
[redacted], Construction and Civil Engineering, Chicago District
[redacted], Economics, Buffalo District
[redacted], Environmental, Nashville District
[redacted], Real Estate, Pittsburgh District
[redacted], Hydraulics and Hydrology, Pittsburgh District
[redacted], Cost, Walla Walla District
[redacted], Risk & Reliability, New England District
[redacted], Mechanical, Louisville District
[redacted], Geotechnical and Dam Safety, New England District
[redacted], HTRW, Nashville District
[redacted], Geology, Engineering Research & Development Center, Vicksburg

D. ATR Timing. ATR will occur during key stages in the planning process and will be discussed in the draft decision and NEPA documents, and the final decision and NEPA documents. Additionally, interim ATR reviews will occur for key technical products, such as hydraulics and hydrology, prior to performing subsequent analyses that depend on these products. All portions of the final report submittal will have undergone ATR, including revisions. ATR will be seamless and will result in comments to be entered in DrChecks near the conclusion of the Draft Mohawk Major Rehabilitation Report, DDR and P&S.

E. Review Criteria for ATR. Products will be reviewed against published guidance, including Engineering Regulations, Engineering Circulars, Engineering Manuals, Engineering Technical Letters, Engineering Construction Bulletins, Policy Guidance Letters, implementation guidance, project guidance memoranda, and other formal guidance memoranda issued by HQUSACE.

Recognizing that the quality of each decision document has a direct and immediate impact on the credibility of the Corps of Engineers and the Department of the Army, the ATR shall address the basic communication aspects of the document.

F. ATR Comments. Each review comment should be succinct and enable timely resolution of the concern. Comments should be limited to those that are required to ensure adequacy of the product. Comments should be composed of the following:

- The review concern – identify the product's information deficiency or incorrect application of policy, guidance, or procedures
- The basis for the concern – cite the appropriate law, ASA (CW)/USACE policy, guidance or procedure that has not been properly followed
- The significance of the concern – indicate the importance of the concern with regard to its potential impact on the plan selection, recommended plan components, efficiency (cost), effectiveness (function/outputs), implementation responsibilities, safety, Federal interest, or public acceptability

- The probable specific action needed to resolve the concern – identify the action(s) that the reporting officers must take to resolve the concern

ATR comments should generally not include the following:

- Attempts to enforce personal preferences over otherwise acceptable practices, i.e., alternate solutions or analysis methods when the practitioners have already used appropriate methods to develop an adequate solution
- Any other issues that do not add value towards the planning decisions and recommendations, or do not make the recommended plan safe, functional, or more economical

G. ATR Process. The ATR process will be conducted using DrChecks review software. The ATR team will provide a written summary of its actions and written specific concerns to the PDT. Upon receipt of the ATR comments, the PDT will develop responses to the specific concerns and coordinate those responses with the ATR team. The responses and ensuing discussion are to seek resolution of the ATR concerns to the mutual satisfaction of the PDT and the ATR team. If resolution is not readily achievable, the ATR team should engage the RMC or MSC subject matter experts (SMEs) to help facilitate resolution, and they in turn may choose to engage HQUSACE SMEs. If a specific concern remains unresolved, the district will pursue resolution through the policy issue resolution process described in Appendix H of ER 1105-2-100.

The ATR documentation will include text of each ATR comment, the PDT response, a brief summary of the pertinent points in the ensuing discussion, including any vertical coordination and the agreed upon resolution. The ATR shall be certified in accordance with ER 1110-1-12 when all ATR concerns are documented as either resolved or deferred by HQUSACE to a separate process.

The ATR team will identify significant issues that they believe are not satisfactorily resolved and will note these concerns in the Technical Review Certification documentation. The ATR team will prepare a Review Report which includes a summary if there are unresolved issues.

V. INDEPENDENT EXTERNAL PEER REVIEW (IEPR)

A. Type I IEPR. In accordance with EC 1165-2-209, dated 31 Jan 2010, the following factors require a Type I IEPR: Significant threat to human life and Total Project Cost is estimated to exceed $45 million. Therefore a Type I IEPR will be performed. The Type I IEPR is estimated to cost $200,000. The Huntington District will contract through the Army Research Organization (ARO) to access an Outside Eligible Organization (OEO).

1. Type I IEPR Panel. Establishment of the panel will be through contract with an independent scientific and technical advisory organization that must be a 501(c)(3)(Internal Revenue Code of 1986) organization or with the National Academy of Sciences. An Outside Eligible Organization (OEO) will select the

reviewers, all of whom should be independent of USACE and free of conflicts of interests. The panel will be able to evaluate whether the interpretation of analysis and conclusions based on analysis are reasonable. The panel will be given the flexibility to bring important issues to the attention of decision makers. However, the panel will be instructed to not make a recommendation on whether a particular alternative should be implemented, as the Chief of Engineers is ultimately responsible for the final decision on a planning or reoperations study. The panel may, however, offer their opinion as to whether there are sufficient analyses upon which to base a recommendation for construction or funding. The panel will accomplish a concurrent review that covers the entire decision document. The panel will address all underlying engineering, economic and environmental work. The panel will consist of experts in the following fields of study and consist of 6 panel members; economics, plan formulation, engineering geolgy, soils engineering, hydrology and hydraulics and NEPA and biology/ecology.

2. Panel Recommendations. The panel will submit a final report containing the panel's economic, engineering and environmental analysis of the Major Rehabilitation Report, including an assessment of the adequacy and acceptability of the economic, engineering and environmental methods, models and analyses. The Draft Major Rehabilitation Report will have a thirty calendar day public review, commensurate with the requirement for public comment on an Environmental Assessment, which is being prepared for the project. The recommendations of the IEPR Panel and responses will be presented to the Civil Works Review Board by the District Engineer, Huntington District with an IEPR Panel member or Outside Eligible Organization representative in attendance and the ATR Team Leader present. Written recommendations of an IEPR Panel member and the responses of HQUSACE will be made available to the public on the Mohawk Major Rehabilitation Project web site.

B. Type II IEPR, Safety Assurance Review. The following is a list of factors that determine whether or not a project requires Type II IEPR:

- where the failure of the project would pose a significant threat to human life
- where information is based on novel methods, presents complex challenges for interpretations, contains precedent-setting methods or models, or presents conclusions that are likely to change prevailing practices
- where the project involves the use of innovative materials or techniques
- where the project design lacks redundancy, resiliency, or robustness
- where the project has unique construction sequencing or acquisition plans
- where the project has a reduced or overlapping design construction schedule
- as directed by the Chief of Engineers

Whereas failure of Mohawk Dam would pose a significant threat to human life, it is determined that the Mohawk Major Rehabilitation Project will undergo Type II IEPR, Safety Assurance Review. These reviews will be conducted for the DDR, Plans and Specifications and throughout construction. The Type II IEPR is estimated to cost $300,000.

WRDA 2007, Section 2035, Safety Assurance Review, requires a review of the design and construction activities prior to initiation of physical construction and periodically thereafter until construction activities are completed. This review will be 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. The decision document phase is the initial design phase. SARs will be conducted during the Design Documentation Report (DDR) phase, the Plans and Specifications (P&S) phase and intermittently throughout the construction phase.

The purpose of the SAR is to ensure that good science, sound engineering, and public health, safety and welfare are the most important factors that determine a project's fate. The SAR shall focus on whether the assumptions made for hazards remain valid as additional knowledge is gained and the state-of-the-art evolves. Additionally, the SAR team shall advise whether project features adequately address redundancy, robustness, and resiliency; and findings during construction reflect the assumptions made during design.

The responsibility for insuring the SAR rests with the Chief of Engineering and Construction, Huntington District. The Chief of Engineering and Construction, working with the Project Manager, shall insure that the review is complete. The Huntington District will contract with an OEO on capacity on a work order granted from a contract that the Louisville District currently has.

1. Type II IEPR Panel. The Type II IEPR Panel will be established and the contract managed by the Risk Management Center. Panel members will be selected based on their technical qualifications and experience. The work of the Type II IEPR panel members will be rendered through an existing contract with an Architectural/Engineering (AE) firm. The panel members should be independent of USACE and free of conflicts of interests. The panel will be able to evaluate whether the interpretation of analysis and conclusions based on analysis are reasonable. The panel will be given the flexibility to bring important issues to the attention of decision makers. However, the panel will be instructed to not make a recommendation on whether a particular alternative should be implemented, as the Chief of Engineers is ultimately responsible for the final decision on a planning or reoperations study. The panel may, however, offer their opinion as to whether there are sufficient analyses upon which to base a recommendation. The panel will consist of experts in the following fields of study and consist of 5 panel members; engineering geology, soils engineering, hydrology and hydraulics, civil engineering and construction, and NEPA and biology/ecology.

2. Panel Recommendations. The panel of experts established for the review shall:

- Follow the "charge", but when deemed appropriate by the team lead, feel free to request other products relevant to the project and purpose of the review

- Receive from USACE any public written and oral comments provided on the project
- Provide timely written and oral comments throughout the development of the project as requested
- Submit a written report for each SAR
- The team panel lead shall be responsible for representing the group, be non-attributable to individuals and where there is lack of consensus, note the non-concurrence and why

SAR panel members should identify, explain and comment upon assumptions that underlie engineering analyses, as well as evaluate the soundness of models, surveys, investigations and methods. The SAR panel should bring important issues to the attention of USACE and evaluate whether the interpretations of analysis and the conclusions based on analysis are reasonable. However, the SAR panel should not present a final judgment on whether a project should be constructed, as the Chief of Engineers is ultimately responsible for this final decision.

Panel members should aim to draw distinctions between criticisms of the regulations and guidelines and criticism of how well USACE conformed to the guidance. The SAR panel should focus on assumptions, data, methods and models. The panel members should avoid findings that become "directives" in that they call for modifications or additional studies or suggest new conclusions and recommendations.

The SAR panel members should communicate frequently with the PDT by whatever communication means deemed necessary. This will allow the panel members to understand the technical and practical implications of their recommendations. The SAR panel should highlight areas of disagreement and controversies that may need resolution.

DrChecks will be used to manage all reviews documenting the SAR panel comments and USACE responses. This will serve as the Record of Review. The Huntington District will make all written recommendations of the SAR panel and related USACE responses available to the public by placing the comments and responses on the Mohawk Major Rehabilitation Project web site.

The SAR will be an extension, not a replacement, of the ATR requirements outlined in ER 1110-1-12, Engineering and Design Quality Management; however the intent of the reviews is to complement the existing process and to avoid impacts to program schedules and cost.