

# **REVIEW PLAN**

## **Rough River Dam, Breckinridge, Hardin and Grayson Counties, Kentucky** **Dam Safety Modification Report**

### **Louisville District**

**April 2010**



**US Army Corps  
of Engineers®**

**REVIEW PLAN**

**Rough River Dam, Breckinridge, Hardin and Grayson Counties, Kentucky**  
**Dam Safety Modification Report**

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## 1. PURPOSE AND REQUIREMENTS

a. **Purpose.** This Review Plan defines the scope and level of peer review for the Rough River Dam Safety Modification Report (DSMR).

### b. References

- (1) EC 1105-2-407, Planning Models Improvement Program: Model Certification, 31 May 2005
- (2) Engineer Regulation (ER) 1110-2-12, Quality Management, 30 Sep 2006
- (3) Rough River Dam Project Management Plan, Latest Revision, 8 September 2009
- (4) Engineer Regulation (ER) 1110-2-1156, Safety of Dams – Policy and Procedures, July 2009
- (5) Engineer Circular (EC) 1165-2-209, Civil Works Review Policy, 31 Jan 2010

c. **Requirements.** This review plan was developed in accordance with EC 1165-2-209, which establishes the procedures for ensuring the quality and credibility of U.S. Army Corps of Engineers (USACE) decision documents through independent review. The EC outlines three levels of review: District Quality Control, Agency Technical Review, and Independent External Peer Review. In addition to these three levels of review, decision documents are subject to policy and legal compliance review and, if applicable, safety assurance review and model certification/approval.

- (1) District Quality Control (DQC). DQC is the review of basic science and engineering work products focused on fulfilling the project quality requirements defined in the Project Management Plan (PMP). It is managed in the home district and may be conducted by staff in the home district as long as they are not doing the work involved in the study, including contracted work that is being reviewed. Basic quality control tools include a Quality Management Plan providing for seamless review, quality checks and reviews (including quality control performed by contractors), supervisory reviews, Project Delivery Team (PDT) reviews, etc. Additionally, the PDT is responsible for a complete reading of the report to assure the overall integrity of the report, technical appendices and the recommendations before approval by the District Commander. The Major Subordinate Command (MSC)/District quality management plans address the conduct and documentation of this fundamental level of review; DQC is not addressed further in this review plan.
- (2) Agency Technical Review (ATR). ATR is an in-depth review, managed within USACE, and conducted by a qualified team outside of the home district that is not involved in the day-to-day production of the project/product. The purpose of this review is 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 assure that all the parts fit together in a coherent whole. ATR teams will be comprised of senior USACE personnel (Regional Technical Specialists (RTS), etc.), and may be supplemented by outside experts as appropriate. To assure independence, the leader of the ATR team shall be from outside the home MSC.
- (3) Independent External Peer Review (IEPR). IEPR 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 of USACE is warranted. IEPR is generally for feasibility and reevaluation studies and modification reports with Environmental Impact Statements (EISs). IEPR is managed by an outside eligible organization (OEO) that is described in Internal Revenue Code Section 501(c) (3), is exempt from Federal tax under section 501(a) of the Internal Revenue Code of 1986; is independent; is free from conflicts of interest; does not carry out or advocate for or against Federal water

resources projects; and has experience in establishing and administering IEPR panels. The scope of review will address all the underlying planning, engineering, including safety assurance, economics, and environmental analyses performed, not just one aspect of the project.

- (4) **Policy and Legal Compliance Review.** 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. Guidance for policy and legal compliance reviews is addressed further in Appendix H, ER 1105-2-100, Planning Guidance Notebook. When policy and/or legal concerns arise during DQC or ATR that are not readily and mutually resolved by the PDT and the reviewers, the District will seek issue resolution support from the MSC and HQUSACE in accordance with the procedures outlined in Appendix H, ER 1105-2-100. IEPR teams are not expected to be knowledgeable of Army and administration policies, nor are they expected to address such concerns. The home district Office of Counsel is responsible for the legal review of each decision document and certification of legal sufficiency.
- (5) **Safety Assurance Review.** In accordance with Section 2035 of Water Resources Development Act (WRDA) of 2007, EC 1165-2-209 requires that all projects addressing flooding or storm damage reduction undergo a safety assurance review of the design and construction activities prior to 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. A future circular will provide a more comprehensive Civil Works review policy that will address the review process for the entire life cycle of a Civil Works project. That document will address the requirements for a safety assurance review for the Pre-construction Engineering and Design Phase, the Construction Phase, and the Operations Phase. The decision document phase is the initial design phase; therefore, EC 1165-2-209 requires that safety assurance factors be considered in all reviews for decision documents .
- (6) **Model Certification/Approval.** EC 1105-2-407 requires certification (for Corps models) or approval (for non-Corps models) of planning models used for all planning activities. The EC defines planning models as any models and analytical tools that planners use to define water resources management problems and opportunities, to formulate potential alternatives to address the problems and take advantage of the opportunities, to evaluate potential effects of alternatives and to support decision-making. The EC does not cover engineering models used in planning. Engineering software is being addressed under the Engineering and Construction (E&C) Science and Engineering Technology (SET) initiative. Until an appropriate process that documents the quality of commonly used engineering software is developed through the SET initiative, engineering activities in support of planning studies shall proceed as in the past. The responsible use of well-known and proven USACE developed and commercial engineering software will continue and the professional practice of documenting the application of the software and modeling results will be followed.

## **2. STUDY INFORMATION**

- a. **Decision Document.** The Rough River Dam Safety Modification Study (DSMS) was prompted by the 2005 Screening Portfolio Risk Assessment (SPRA) cadre team's recommendation that Rough

River Dam receive a Dam Safety Action Classification (DSAC) of II, which is described as “Urgent” (Unsafe or Potentially Unsafe). A dam with this classification is considered to have failure initiation foreseen or very high risk. Since no additional authorization by Congress is required to address the dam safety issues, a DSMR has been prepared in accordance with Draft ER 1110-2-1156, 16 July 2009.

The DSMR was signed by the District Commander subsequent to completion of the ATR. The DSMR has been submitted to CELRD, the Risk Management Center, and HQUSACE for concurrent Policy Compliance Review. The Risk Management Center will review the risk estimate and verify that the risk estimate is in compliance with the current USACE risk methodology. The Risk Management Center will review the risk management recommendations and evaluate the estimated risk reductions.

The District DSO, CELRD DSO and the Chairman, HQUSACE Dam Safety Senior Oversight Group will sign the approval memorandum once all policy compliance review comments are resolved. This approval memorandum will state that all agency requirements, certifications, and reviews have been completed and the Environmental Assessment and signed Finding of No Significant Impact have been satisfactorily completed and signed.

The DSMR will then be sent to the HQUSACE DSO for concurrence, approval and transmittal to the Assistant Secretary of the Army for Civil Works indicating that the design phase of the project will be initiated. The intended outcome of this document is approval to initiate risk reduction action at Rough River Dam.

- b. Study Description.** The flood protection plan for the Ohio River Basin, which included the construction of the Rough River Dam, was authorized by the Flood Control Act approved 28 June 1938 (Public Law 761, 75<sup>th</sup> Congress, 3<sup>rd</sup> Session), revised under a report titled “Rough River and Tributaries, Kentucky” and published as House Document No. 535, 78<sup>th</sup> Congress, 2<sup>nd</sup> Session, 1944. Construction began in November 1955 and ended in December 1960.

A DSMR has been completed for this project and has been submitted for review and approval. This report was prepared in response to a Dam Safety Action Classification (DSAC) Class II (urgent-unsafe or potentially unsafe) ranking for Rough River Dam. This ranking was established by the Senior Oversight Group subsequent to an evaluation through the Screening Portfolio Risk Assessment (SPRA) program conducted in 2005. The SPRA identified seepage and piping through the soil foundation and embankment as the major risk contributor to project risk; however, the DSMR identified seepage and piping through the foundation bedrock as the major risk contributor.

The main objective of the DSMS is to evaluate dam safety issues or conditions at a dam that result in unacceptable life safety, economic and environmental risks, and consider various dam safety modifications to reduce the project risk below current USACE tolerable risk guidelines. The principal risk driver identified from the risk assessment performed in support of the DSMR is seepage and piping through untreated, solutioned, and/or excavation-damaged bedrock beneath the dam. A secondary component of the risk is associated with the potential seepage paths through the embankment along the conduit due to the lack of a proper filter around the conduit. The USACE seepage and piping guidance (Internal Erosion Toolbox – A Method for Estimating Probabilities of Failure of Embankment Dams due to Internal Erosion, Best Practices Guidance Document, August 2009) was used to select best estimate values for various input parameters in evaluating critical failure paths. Structural and non-structural risk reduction measures were identified and evaluated to formulate alternative plans associated with varying degrees of permanent risk reduction; and to ultimately recommend a cost effective, technically feasible alternative plan that minimizes adverse

environmental, economic and social effects. The intent of the selected alternative plan is to allow the project to operate within current USACE tolerable risk guidelines for the foreseeable future. An evaluation of the modified annual probability of failure, reduced life safety risks, As-Low-As-Reasonably-Practicable considerations, and current USACE tolerable risk guidelines form the basis for plan selection.

In accordance with EC-1110-2-6064, an Interim Risk Reduction Measures Plan (IRRMP) was developed and implemented for Rough River Dam subsequent to receiving its DSAC II Rating. The IRRMP included in the DSMR was approved on 20 November 2008.

Multiple Risk Management Alternative Plans were evaluated as part of the DSMR. The alternatives that were considered are: 1. Do Nothing, 2. Reservoir Restriction, 3. Foundation Grouting, Conduit Grouting and Conduit Filter, 4. Cutoff Wall with Foundation Grouting, Conduit Grouting and Conduit Filter, 5. Remove Structure, and 6. Remove and Replace Structure. From a risk analysis standpoint, the only alternative that adequately reduces the total project risk to an acceptable level and as-low-as-reasonably-practicable is the modification of the embankment and foundation with a full-length concrete cutoff wall with foundation grouting and the placement of a conduit filter. After integrating experience-based engineering judgment with the information obtained from the risk analysis, the study team agrees that the installation of a complete cutoff wall at the project is warranted. The approximate cost of this repair as presented in this report is \$181,100,000. The operation and maintenance of this Federally-owned dam is 100% Federal responsibility.

**c. Factors Affecting the Scope and Level of Review.** Challenging components of the study consisted of performing the DSMS under draft Dam Safety policy and guidelines, while utilizing new and developing tools and software applications to quantify the consequences, population at risk, probability of failure and baseline risk estimate. 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 is expected to generally receive favorable public support.

**d. In-Kind Contributions.** Not Applicable

### **3. AGENCY TECHNICAL REVIEW (ATR)**

**a. General.** ATR for decision documents covered by EC 1165-2-209 is managed by the appropriate Planning Center of Expertise (PCX) with appropriate consultation with the allied Communities of Practice such as engineering and real estate. The ATR shall ensure that the product 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 the results in a reasonably clear manner for the public and decision makers. Members of the ATR team will be from outside the home district. The ATR lead will be from outside the home MSC.

**b. Products for Review.** As previously stated, an ATR has been completed for the DSMR for Rough River Dam. A signed Certification of Agency Technical Review and signed Post-ATR Compliance Review form have been included as part of the DSMR.

**c. Required ATR Team Expertise.** The ATR team consisted primarily of senior USACE personnel (Regional Technical Specialists (RTS), etc.) primarily from LRD. The team also included Operations personnel familiar with the operation of the Dam. The disciplines on the ATR team reflected the key disciplines involved in the completion of the DSMR. The ATR team Leader was Richard Britzman, P.E. (CESPD-RBT). A list of the ATR members and disciplines is provided in Attachment 1. The

chief criterion for being a member of the ATR team is knowledge of the technical discipline and relevant experience.

**d. Documentation of ATR.** DrChecks review software was used to document all ATR comments, responses and associated resolutions accomplished throughout the review process. Comments should be limited to those that are required to ensure adequacy of the product. The four key parts of a quality review comment will normally include:

- (1) The review concern – identify the product’s information deficiency or incorrect application of policy, guidance, or procedures;
- (2) The basis for the concern – cite the appropriate law, policy, guidance, or procedure that has not been properly followed;
- (3) 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; and
- (4) The probable specific action needed to resolve the concern – identify the action(s) that the PDT must take to resolve the concern.

In some situations, especially addressing incomplete or unclear information, comments may seek clarification in order to then assess whether further specific concerns may exist. The ATR documentation in DrChecks will include the text of each ATR concern, the PDT response, a brief summary of the pertinent points in any discussion, including any vertical coordination, and lastly the agreed upon resolution. The Project Delivery Team (PDT) will prepare a Review Report which includes a summary of each unresolved issue; each unresolved issue will be raised to the vertical team for resolution. The PDT will consult with the ATR team if necessary in preparing the Review Report. Review Reports will be considered an integral part of the ATR documentation and shall also:

- Disclose the names of the reviewers, their organizational affiliations, and their disciplines;
- Describe the nature of their review and their findings and conclusions; and
- Include a verbatim copy of each reviewer's comments and the PDT's responses.

ATR may be certified when all ATR concerns are either resolved or referred to HQUSACE for resolution and the ATR documentation is complete. Certification of ATR should be completed, based on work reviewed to date, draft report, and final report. A sample certification is included in ER 1110-2-12. A copy of the ATR certification signature sheet for the Rough DSMR is included in Attachment 2. It should be noted that there were no unresolved issues on this project.

#### **4. INDEPENDENT EXTERNAL PEER REVIEW (IEPR)**

##### **I. Type I IEPR**

**a. General.** Type I IEPR is conducted for decision documents if there is a vertical team decision (involving the district, MSC, PCX, and HQUSACE members) that the covered subject matter meets certain criteria (described in EC 1165-2-209) where the risk and magnitude of the proposed project are such that a critical examination by a qualified team outside the USACE is warranted. Type I IEPR is coordinated by the appropriate PCX and managed by an Outside Eligible Organization (OEO) external to the USACE. Type I IEPR panels shall evaluate whether the interpretations of analysis and conclusions based on analysis are reasonable. To provide effective review, in terms of both usefulness of results and credibility, the review panels should be given the flexibility to bring important issues to the attention of decision makers; however, review panels should 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. Type I IEPR panels will accomplish a concurrent review that covers the entire decision document and will address all the underlying engineering, economics, and environmental work, not just one aspect of the study. Whenever feasible and appropriate, the office producing the document shall make the draft decision document available to the public for comment at the same time it is submitted for review (or during the review process) and sponsor a public meeting where oral presentations on scientific issues can be made to the reviewers by interested members of the public.

- b. Decision on Type I IEPR.** A Type I IEPR will be required for this project.
- c. Products for Review.** The DSMR is currently under review at CELRD. The Type I IEPR will be performed on the entire DSMR (including NEPA/environmental compliance documentation and technical appendices).
- d. Required IEPR Panel Expertise.** The Type I IEPR should consist of a three person panel to include members that have expertise in the following areas: a) Dam Safety & Embankment Dam Design; b) Seepage and Piping Analysis; c) Cutoff Wall Construction and Grouting; d) Alternative Plan Formulation and Economic Evaluation; and e) Compliance with the National Environmental Policy Act.
- e. Documentation of IEPR.** DrChecks review software will be used to document the Type I IEPR comments and aid in the preparation of the Review Report. Comments should address the adequacy and acceptability of the economic, engineering and environmental methods, models, and analyses used. Type I IEPR comments should generally include the same four key parts as described for ATR comments in Section 3. The OEO will be responsible for compiling and entering comments into DrChecks. The Type I IEPR team will prepare a Review Report that will accompany the publication of the final report for the project and shall:
  - Disclose the names of the reviewers, their organizational affiliations, and include a short paragraph on both the credentials and relevant experiences of each reviewer;
  - Include the charge to the reviewers prepared by the PCX;
  - Describe the nature of their review and their findings and conclusions; and
  - Include a verbatim copy of each reviewer's comments (either with or without specific attributions), or represent the views of the group as a whole, including any disparate and dissenting views.

The final Review Report will be submitted by the Type I IEPR panel no later than 60 days following the close of the public comment period for the draft decision document. The Review Report will be considered and documentation prepared on how issues were resolved, or will be resolved by the District Commander, before the district report is signed.

## **II. Type II IEPR Safety Assurance Review (SAR)**

- a. General.** A Type II IEPR (SAR) shall be conducted on design and construction activities for hurricane and storm risk management and flood risk management projects, as well as other projects where potential hazards pose a significant threat to human life. This applies to new projects and to the major repair, rehabilitation, replacement or modification of existing facilities. External panels 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.

- b. Decision on Type II IEPR.** A Type II IEPR will be required for this project.
- c. Products for Review.** The Type II IEPR will be performed on the Plans and specifications, during construction, and near completion of construction.
- d. Required IEPR Panel Expertise.** The Type II IEPR should consist of a three person panel to include members that have expertise in the following areas: a) Dam Safety & Embankment Dam Design; b) Seepage and Piping Analysis; c) Cut off Wall Construction and Grouting.
- e. Documentation of Type II IEPR.** DrChecks review software will be used to document the Type II IEPR comments and aid in the preparation of the Review Report. Comments should address the adequacy and acceptability of the economic, engineering and environmental methods, models, and analyses used. Type II IEPR comments should generally include the same four key parts as described for ATR comments in Section 3. The OEO will be responsible for compiling and entering comments into DrChecks. The Type II IEPR team will prepare a Review Report that will accompany the publication of the final report for the project and shall:
  - Disclose the names of the reviewers, their organizational affiliations, and include a short paragraph on both the credentials and relevant experiences of each reviewer;
  - Include the charge to the reviewers prepared by the RMC;
  - Describe the nature of their review and their findings and conclusions; and
  - Include a verbatim copy of each reviewer's comments (either with or without specific attributions), or represent the views of the group as a whole, including any disparate and dissenting views.

The final Review Report will be submitted by the Type II IEPR panel no later than 60 days following each milestone.

## 5. MODEL CERTIFICATION AND APPROVAL

- a. General.** The use of certified or approved models for all planning activities is required by EC 1105-2-407. This policy is applicable to all planning models currently in use, models under development and new models. The appropriate PCX will be responsible for model certification/approval. The goal of certification/approval is to establish that planning products are theoretically sound, compliant with USACE policy, computationally accurate, and based on reasonable assumptions. The use of a certified or approved model does not constitute technical review of the planning product. Independent review of the selection and application of the model and the input data and results is still required through conduct of DQC, ATR, and, if appropriate, IEPR. Independent review is applicable to all models, not just planning models. Both the planning models (including the certification/approval status of each model) and engineering models used in the development of the decision document are described below:
- b. Planning Models.** The following planning models are anticipated to be used:
  - Palisade Precision Tree, Version 1.0, is a generalized event tree analysis tool for risk analysis. The program is used to estimate probability of failure and consequences considering numerous event trees for the full range of hydrologic loading.

- HEC-FIA Version 2.1 Beta. The HEC-FIA program estimates total damages (structure damage, content damage, and vehicle damage) for a range of events including both dam failure and non-failure events. The FIA data feeds into the Issues Evaluation Study Consequence Toolbox.
- Bureau of Reclamation Loss of Life Methodology (DSO-99-06). DSO-99-06, A Procedure for Estimating Loss of Life Caused by Dam Failure by Wayne Graham, is a 7 step flood severity based methodology derived from case studies of nearly all US dam failures causing 50 or more fatalities along with a select number of foreign dam failure cases. This methodology was considered the most common dam failure loss of life methodology at the time of this study, and was used to evaluate population at risk and expected loss of life.

**c. Engineering Models.** The following engineering models are anticipated to be used:

- “Internal Erosion Toolbox, A Method for Estimating Probabilities of Failure of Embankment Dams due to Internal Erosion”, described in the Best Practices Guidance Document, August 2009, and supplemental documentation (“Risk Analysis for Dam Safety, A Unified Method for Estimating Probabilities of Failure of Embankment Dams by Internal Erosion and Piping, Supporting Document”, August 2008). The toolbox considers close to 30 initiation modes for internal erosion and generally employs a scripted event tree (with nodes for existence of a flaw, initiation, continuation, progression, intervention and breach) with prescriptive ranges of “best estimate” probabilities for each node that have been calibrated against engineering judgment and historic performances of dams around the world. The toolbox is executed using a series of Excel spreadsheets. The end product of the toolbox is a collection of system response curves for each internal erosion potential failure mode. The system response curves represent best estimates of probability of failure ( $P_f$ ) for a range of hydrologic and seismic loadings. The system response curves are one of the principal inputs included in the Precision Tree event tree model.
- SEEP/W, Version 7.14, developed by GeoStudio International. The program uses two-dimensional finite element modeling to estimate potential seepage and pore pressure conditions through an embankment dam or foundation. The exit gradients generated from the SEEP/W model are used to determine and evaluate the factor of safety against seepage. The SEEP/W model results are also incorporated into the internal erosion toolbox analyses.
- “Spillway Erosion Toolbox”, developed by Johannes L. Wibowo, PhD, Kenneth E. Henn III, PG, and Evelyn Villanueva, PG. The spillway erosion toolbox is a screening-level tool used to predict head-cut erosion effects. The system response curve generated by the toolbox is representative of the likelihood that 75 percent of the spillway cross-sectional area, evaluated from the control sill to the spillway exit, will experience erosion up to and including breach.
- SITES 2005, Water Resource Site Analysis Computer Program, developed by United States Department of Agriculture (USDA). The SITES program is used to generate comprehensive spillway erosion models based on flow parameters, rock mass properties, and the structural and stratigraphic characteristics of the rock mass.
- Micro Computer Aided Cost Estimating System (MCACES), Second Generation (MII) Version 3.0, developed by Tri-Services Cost Engineering System. MII is used for the development of detailed cost estimates.
- HEC-RAS - Version 4.0 - The U.S. Army Corps of Engineers’ River Analysis System (HEC-RAS) is software that allows you to perform one-dimensional steady and unsteady flow river hydraulics calculations. Used for the unsteady dam break model.
- HEC-GeoRAS - Version 4 - HEC-GeoRAS is a set of procedures, tools, and utilities for processing geospatial data in ArcGIS that allows the preparation of geometric data for import into HEC-RAS for unsteady dam break analysis.
- HEC-HMS - Version 3.2 - The Hydrologic Modeling System (HEC-HMS) is designed to simulate the precipitation-runoff processes of watershed systems. Hydrographs produced by the program are used directly or in conjunction with other software for studies of water availability,

urban drainage, flow forecasting, future urbanization impact, reservoir spillway design, dam break modeling, flood damage reduction, floodplain regulation, and systems operation.

- HEC-HMR52 - Version 1 – Software used to determine the Probable Maximum Flood (PMF) rainfall distribution to be used with HEC-HMS.
- ArcView - Version 3.3 – Used to support HEC-GeoHMS work.
- ArcGIS - Version 9.2 – Used to support HEC-GeoRAS dam break model.

## **6. REVIEW SCHEDULES AND COSTS**

- a. **ATR Schedule and Cost.** The ATR has been completed for this project and no further cost or schedule impacts are anticipated.
- b. **IEPR Schedule and Cost.** A Type I IEPR will be required for this project. Initial indications from the PCX are that the estimated cost for the Type IEPR is in the range of \$100,000 to \$250,000 and the process will take 3 to 6 months to complete. Due to the public life, health and safety risks associated with Rough River Dam, even with current IRRMs, the goal is to complete the Study as soon as possible but no later than 1 April 2011 so the project can be considered as a separable line item in the 2013 Budget submittal. The Type I IEPR will begin as soon as LRL is notified. Coordination with the FRM PCX will continue to ensure the Type I IEPR schedule is realistic. No schedule impact is anticipated with the Type II IEPR as review will occur concurrent with the preparation of plans and specifications and during construction. The estimated cost for the Type II IEPR is in the range of \$50,000.
- c. **Model Certification/Approval Schedule and Cost.** Not Applicable.

## **7. PUBLIC PARTICIPATION**

It is anticipated that public meetings will be held as necessary through completion of the DSMR. The public was provided the opportunity to review and comment on the Environmental Assessment. Since Congressional Authorization is not required to implement the recommended risk reduction alternative the DSMR will not be formally reviewed by the public.

## **8. PCX COORDINATION**

Review plans for decision documents and supporting analyses outlined in EC 1165-2-209 are coordinated with the appropriate Planning Center(s) of Expertise (PCXs) based on the primary purpose of the basic decision document to be reviewed. The lead PCX for this study is the Risk Management Center (RMC). No additional authorization by Congress is anticipated to be required to address the dam safety issues at Rough River Dam.

## **9. MSC APPROVAL**

The MSC that oversees the home district is responsible for approving the review plan. Approval is provided by the MSC Commander. The commander's approval should reflect vertical team input (involving district, MSC, PCX, and HQUSACE members) as to the appropriate scope and level of review for the decision document. Like the PMP, the review plan is a living document and may change as the study progresses. Changes to the review plan should be approved by following the process used for initially approving the plan. In all cases the MSCs will review the decision on the level of review and any changes made in updates to the project.

## **10. REVIEW PLAN POINTS OF CONTACT**

Questions and/or comments on this review plan can be directed to the following points of contact:

- Barry Schueler, Louisville District Project Manager (502) 315-6780
- Rob Taylor, Great Lakes and Ohio River Division Dam Safety Program Manager (513) 684-5067
- Eric Thaut, Flood Risk Management Center of Expertise (415) 503-6852

**ATTACHMENT 1: TEAM ROSTERS**

<b>TABLE 1: Project Delivery Team</b>		
<b>Functional Area</b>	<b>Name</b>	<b>Office Symbol</b>
<b>Key Team Members</b>		
<b>Project Manager</b>		PM-C
1. NEPA, Section 106 and Main Report		PM-P
2. Economics		PM-P
3. Cost Engineering		ED-M-C
4. Hydrology and Hydraulics		ED-T-H
5. Structural		ED-D-N
6. Civil Site		ED-T-C
7. Geotechnical		ED-T-G
8. Geologist		ED-T-G
9. Mechanical		ED-T
10. Real Estate Division		RE-C
11. Operations Division		OP-UW-H
12. Public Affairs		PA

<b>TABLE 2: Agency Technical Review Team</b>		
<b>NAME</b>	<b>DISCIPLINE</b>	<b>OFFICE SYMBOL</b>
	Team Leader	CESPD-RBT
	Geotechnical	CELRH-EC-GS
	Hydraulics	CELRP-TS-DD
	Cost Engineering	CELRL-ED-M-C
	Economics	CELRB-PM-PB
	Civil	CELRL-ED-T-C
	Geology	CESWL-EC-D
	Environmental	CELRN-PM-P
	Operations	CELRL-OP-TO
	Operations (Area)	CELRL-OP-GR

**Vertical Team**

The Vertical Team consists of members of the HQUSACE and CELRD Offices. The Vertical Team plays a key role in facilitating execution of the DSMS in accordance with the PMP. The Vertical Team is responsible for providing the PDT with Issue Resolution support and guidance as required. The Vertical Team will remain engaged seamlessly throughout the DSMS via

monthly telecons as required and will attend In Progress Reviews and other key decision briefings. The CELRD District Liaison is the District PM's primary Point of Contact on the Vertical Team.

**ATTACHMENT 2: ATR CERTIFICATION TEMPLATE**

**ROUGH RIVER DAM  
GREEN RIVER BASIN, KENTUCKY**

**DAM SAFETY MODIFICATION REPORT  
FINAL REPORT, JUNE, 2009**

**CERTIFICATION OF AGENCY TECHNICAL REVIEW**

The Louisville District has completed the Dam Safety Modification Report for Rough River Dam, Green River Basin, Kentucky. Notice is hereby given that an Agency Technical Review (ATR) has been conducted that is appropriate to the level of risk and complexity inherent in the project, as defined in the Quality Control Plan (QCP).

During the agency technical review, compliance with established policy principles and procedures, utilizing justified and valid assumptions, was verified. This included a review of assumptions; methods, procedures, and materials used in the analyses; alternatives evaluated; the appropriateness of data used and level of data obtained; and reasonableness of the results, including whether the product meets the customer's needs consistent with law and existing Corps of Engineers' policy.

The study was accomplished by a Louisville District team, and the Agency Technical Review was accomplished by an independent team with Louisville District personnel and personnel from Nashville, Huntington, Pittsburgh, Little Rock, Sacramento, and Buffalo Districts.

Study Team:



ATR Team:





**ATTACHMENT 3: ACRONYMS AND ABBREVIATIONS**

<b><u>Term</u></b>	<b><u>Definition</u></b>	<b><u>Term</u></b>	<b><u>Definition</u></b>
AFB	Alternative Formulation Briefing	NED	National Economic Development
ASA(CW)	Assistant Secretary of the Army for Civil Works	NER	National Ecosystem Restoration
ATR	Agency Technical Review	NEPA	National Environmental Policy Act
CSDR	Coastal Storm Damage Reduction	O&M	Operation and Maintenance
CWRB	Civil Works Review Board	OMB	Office of Management and Budget
DPR	Detailed Project Report	OMRR&R	Operation, Maintenance, Repair, Replacement and Rehabilitation
DQC	District Quality Control	OEO	Outside Eligible Organization
DX	Directory of Expertise	OSE	Other Social Effects
EA	Environmental Assessment	PCX	Planning Center of Expertise
EC	Engineer Circular	PDT	Project Delivery Team
EIS	Environmental Impact Statement	PAC	Post Authorization Change
EO	Executive Order	PMP	Project Management Plan
ER	Ecosystem Restoration	PL	Public Law
FDR	Flood Damage Reduction	QMP	Quality Management Plan
FEMA	Federal Emergency Management Agency	QA	Quality Assurance
FRM	Flood Risk Management	QC	Quality Control
FSM	Feasibility Scoping Meeting	RED	Regional Economic Development
GRR	General Reevaluation Report	RTS	Regional Technical Specialist
HQUSACE	Headquarters, U.S. Army Corps of Engineers	USACE	U.S. Army Corps of Engineers
IEPR	Independent External Peer Review	WRDA	Water Resources Development Act
ITR	Independent Technical Review		
LRR	Limited Reevaluation Report		
MSC	Major Subordinate Command		