REVIEW PLAN
For
EAST BRANCH DAM, DAM SAFETY PROJECT

EAST BRANCH DAM, EAST BRANCH CLARION RIVER BASIN, PA

Design and Construction Activities

Pittsburgh District

August 2011
Revision 3

Document History:

	DATE	REASON FOR REVISION	DATE APPROVED	APPROVED BY
Draft for RMC Review	Apr 2010			
Revision 1	Jun 2011	Address RMC Review Comments		
Revision 2	Jun 2011	Address RMC Backcheck Comments		
Revision 3	Aug 2011	Change level of Review Required for Phase 1 – Site Development Work		

US Army Corps of Engineers ®

REVIEW PLAN

EAST BRANCH DAM, DAM SAFETY PROJECT
Design and Construction Activities

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1. PURPOSE AND REQUIREMENTS

a. Purpose. This Review Plan defines the scope and level of peer review for the design and construction activities of the East Branch Dam, Dam Safety Project based on the current approved Recommended Plan and Acquisition Strategy for permanent risk reduction. Therefore, if the scope of the Recommended Plan changes significantly or acquisition strategy and work phases change, the Review Plan will be revised as necessary. The Review Plan will also be amended and revised as necessary when Quality Control Plans for the future design and construction products are developed.

The East Branch Dam Safety Project is in the early stage of development. The Dam Safety Modification Report was approved in Oct 2010. The Project Background section presents a detailed history of the project, as well as explains the various phases of study, design, and construction.

b. References

(1) Draft ER 1110-2-1156, Chapter 9, Dam Safety Modification Studies and Documentation, Nov 2010
(2) Engineer Regulation (ER) 1110-1-12, Quality Management, 30 Sept 2006
(3) Engineer Circular (EC) 1165-2-209, Civil Works Review Policy, 31 January 2010
(4) EC 1105-2-407, Planning Models Improvement Program: Model Certification, 31 May 2005
(5) East Branch Dam, Dam Safety Project, Project Management Plan, Oct 2010
(6) East Branch Dam, Dam Safety Project, Phase 1 Site Development Contract, Quality Control Plan, March 2011
(7) East Branch Dam, Dam Safety Project, Alternative Refinement – Dam Safety Modification, Quality Control Plan, April 2011.
(8) East Branch Dam Safety Modification Report, August 2010.
(9) SPRA Documentation Report, May 2006

c. Requirements. This review plan was developed in accordance with EC 1165-2-209, which establishes an accountable, comprehensive, life-cycle review strategy for Civil Works products by providing a seamless process for review of all Civil Works projects from initial planning through design, construction, and Operation, Maintenance, Repair, Replacement and Rehabilitation (OMRR&R). It provides the procedures for ensuring the quality and credibility of U.S. Army Corps of Engineers (USACE) decision, implementation, and operations and maintenance documents and work products. The EC outlines three levels of review: District Quality Control (DQC), Agency Technical Review (ATR), and Independent External Peer Review (IEPR).

(1) District Quality Control. DQC is an internal review process 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 providing for seamless review, quality checks and reviews, supervisory reviews, and Project Delivery Team (PDT) reviews

throughout the life of the project. It is managed in the home district. Quality checks may be performed by staff responsible for the work, such as supervisors, work leaders, team leaders, designated individuals from the senior staff, or other qualified personnel. However, they should not be performed by the same people who performed the original work, including managing/reviewing the work in the case of contracted efforts. Additionally, the PDT is responsible for a complete reading of any reports and accompanying appendices prepared by or for the PDT to assure the overall coherence and 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.

(2) Agency Technical Review. 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 assures that all the parts fit together in a coherent whole. The chief criterion for being a member of the ATR team is knowledge of the technical discipline and relevant experience. ATR teams will be comprised of senior USACE personnel, preferably recognized subject matter experts with the appropriate technical expertise such as RTSs, and may be supplemented by outside experts as appropriate. To assure independence, the leader of the ATR team shall be from outside the home Major Subordinate Command (MSC). The disciplines represented on the ATR team will reflect the significant disciplines involved in the planning, engineering, design, and construction effort. These disciplines may include civil, geology, structural, hydraulics and hydrology, construction, and environmental.

ATR review comments, responses, and associated resolution of comments will be documented in DrChecks. The ATR documentation in DrChecks may 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 ATR team 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. Review Reports will be considered an integral part of the ATR documentation.

ATR shall be certified when all ATR concerns are either resolved or referred to HQUSACE for resolution and the ATR documentation is complete. Certification of ATR shall be completed for each phase of work based on work reviewed to date. Refer to APPENDIX 1 for sample statement of technical review for decision documents – completion of Agency Technical Review.

(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. For clarity, IEPR is divided into

two types, Type 1 is generally for decision documents and Type II is generally for implementation documents.

A Type II IEPR Safety Assurance Review (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 review the design and construction activities prior to initiation of physical construction and periodically thereafter until construction activities are completed. The review shall 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 that good science, sound engineering, and public health, safety, and welfare are the most important factors that determine a project's fate.

2. PROJECT INFORMATION

a. General Site Location and Description. East Branch Dam is located in Elk County, Pennsylvania on the East Branch of the Clarion River, about 7.5 miles upstream of the confluence of the East and West Branches of the Clarion River at Johnsonburg. The project was designed by USACE and constructed between 1947 and 1952 from on-site borrow materials predominantly containing clays, silts, sands, and shales. East Branch Dam is a zoned earth filled embankment with a crest length of 1,725 feet and a maximum height above the streambed of 184 feet. The dam crest is at Elevation (El.) 1,707 feet and has a width of 20 feet.

East Branch Dam was authorized for construction by the Flood Control Act of December 22, 1944. The authorized project work for the East Branch Dam included reduction of flood stages on the Clarion River, water conservation, water quality, low-flow augmentation, recreation, fish, and wildlife management. Construction of the rolled, earth embankment dam began in June 1947 when initial construction contract was awarded. The dam was completed and put into full operation by June 1952.

b. Decision Documents. In 1957, the East Branch Dam nearly failed due to internal erosion. Because of the 1957 incident and ongoing seepage concerns at the dam, East Branch was assigned a Dam Safety Action Classification (DSAC) rating of II during Screening Portfolio Risk Assessment in 2006.

A primary reason for the DSAC II classification was concern over the structural integrity of the 1957 repair near the right abutment. A subsequent potential failure mode analysis (PFMA) conducted by the United States Bureau of Reclamation (USBR) in January 2008 identified internal erosion at the location of previously detected internal erosion (repaired in 1957) near the right abutment as the most critical of several significant potential failure modes and a primary threat to public

safety. Estimated annualized probability of failure and estimated annualized loss of life were found to be above the threshold that, based on USBR and USACE criteria, justifies expedited action to reduce risk.

Potential Failure Modes: In March 2009, a team of USACE experts (Issue Evaluation Study Cadre, or IES Cadre) convened to identify all appropriate potential failure modes as part of the baseline risk assessment for the East Branch Dam Modification Study. In summary, the potential failure modes (PFM) are as follows:

(1) PFM 4C – Internal erosion of embankment due to a high permeability layer created by freezing at a seasonal shutdown layer during construction.
(2) PFM 5 – Internal erosion of embankment into fractured bedrock at the right abutment and exit at the toe of the embankment.
(3) PFM 7D – Backward erosion of overburden between STA 11+00 and STA 12+50 with an exit beyond the toe of the dam.
(4) PFM 8 – Internal erosion of overburden into fractured bedrock at the left abutment to an unfiltered exit outcropping in the vicinity of Weirs 4, 5, or 7.
(5) PFM 11 – Internal erosion of embankment at interface of grouted void and drilling and grouting program during the 1957 incident (approximate dam station 8+30) due to softened zones and exiting on the right abutment.

The PFMs indicate the potential for seepage and internal erosion failures to initiate at various stations across the entire dam.

Summary of Interim Risk Reduction Measures (IRRMs): In response to a risk assessment conducted by the Corps and Bureau of Reclamation in 2008, the District implemented various interim risk reduction measures (IRRMs). The primary IRRM was implementation of an interim water control plan which lowered the summer pool to El. 1650 and the target winter pool to El. 1623. Lowering the summer pool by 20 feet and the winter pool by 28 feet has reduced the hydraulic load on and within the dam to allow risk-improved operating conditions for an interim period until the long-range strategy is developed and implemented, while avoiding significant impacts either within the lake or downstream.

The Pittsburgh District also implemented the following secondary measures to closely monitor the areas of concern and to take rapid action upon evidence of initiating events (thereby either preventing or, more likely, reducing consequences of dam failure). The secondary measures are as follows:

(1) Implement an extensive communication plan to keep stakeholders and public informed of activity at East Branch Dam.
(2) Enhance and prioritize existing instrumentation, and obtain critical instrumentation readings more frequently to better monitor dam conditions.
(3) Implement cross-training of regional staff to support staff at the dam.
(4) Initiate 24-hour staffing to monitor the condition of the dam.

(5) Update existing Emergency Action Plan to re-evaluate emergency procedures and update calling tree.
(6) Develop new inundation mapping to better define floodway downstream of East Branch Dam.
(7) Conduct drills and exercises to better educate and prepare staff and local emergency management personnel.
(8) Pre-position contracts/materials for emergency response and improve lighting systems.

As of November 2009, all of these secondary IRRM measures have been fully implemented. These measures will be reviewed annually or as new information becomes available. The District will change or add to these secondary IRRMs, as warranted, until a permanent risk reduction measure is in-place.

East Branch Dam Safety Modification Report: A Dam Safety Modification Study (DSMS) was conducted in accordance with the latest draft Engineering Regulation ER 1110-2-1156, 30 April 2010. The purpose of the study was to address potential failure modes that drive the DSAC II classification, to reduce the associated risk to meet tolerable risk guidelines, and to identify what measures would need to be undertaken so that the dam would meet Army Corps of Engineers essential guidelines. Risk reduction measures were identified and incorporated into non-structural and structural risk reduction plans. The plans were compared against the baseline condition, and then against one another. Based on the long term reduction in risk at East Branch associated with construction of Plan S3 and the economic feasibility of this option, Plan S3 was recommended. The Study was approved in Oct 2010 by the District, Division and HQUSACE Dam Safety Officers.

Computation Model Certification was addressed in the Review Plan for the Dam Safety Modification Study and no longer applies. All legal and policy reviews and necessary checklists and approvals were included with the Dam Safety Modification Study.

Environmental Assessment: An environmental assessment (EA) was developed for the East Branch Dam Safety Modification project as a "stand-alone" document and distributed to the public during May 2010 for review and comment. Comments received from the public were answered, made a part of the public record, and incorporated into the Final EA/Finding of No Significant Impact (FONSI). The FONSI was signed by the District Engineer on 01 July 2010.

c. Recommended Plan and Factors That Could Affect Scope. The objective of the current work is to design and construct the recommended risk reduction plan from the Dam Safety Modification Study – that is, Plan S3 from the DSMS. Plan S3 is a full depth cut-off wall over the entire length of the embankment, and includes the zone of rock grouting along the downstream right abutment contact to address seepage anywhere along the embankment. The design and construction of the full depth cut-off wall (S3) is divided into six work phases, as follows:

(1) Phase 1 – Site Development: Project work involves widening and reconstructing the existing dam access road to the dam to accommodate large traffic loads, utility preparation, and site preparation for a future contractor laydown area and field office construction.

(2) Alternative Refinement Phase: This work is generated from comments by the Senior Oversight Group and their request for additional, detailed analysis of three possible alternatives stated in the Dam Safety Modification Study. Based on alternative refinement and screening level costs the approved recommended plan S3 is being optimized and will be retained. The alternative refinement work will be compiled in a Memorandum for Record (MFR) and includes basic sketch drawings, quantity/cost tables, a comparison matrix and technical narratives. No additional Quality Consistency and Control or Senior Oversight Group review is anticipated to be required.

(3) Phase 2 – Geotechnical investigations and potential foundation grouting: A geotechnical and environmental drilling program was initiated in the fall of 2010 to conduct the following work:

   (a) Geotechnical - Boreholes were drilled along the alignment of the proposed cutoff wall and at the toe if the dam. Geotechnical data was collected to characterize the soil for future cutoff wall properties and installation. The drilling program will also increase our understanding of the condition of the bedrock. The only test results to this point were 2008 – 2009 bedrock results, which showed that the bedrock layer was highly permeable.

   (b) Environmental – A Phase I Site Assessment showed that the dam and surrounding area had the potential to be contaminated due to the presence of legacy oil wells. The Phase II Site Investigation will collect samples from the boreholes and the testing results will confirm if the soil or groundwater is contaminated.

   The drilling program was expanded in the spring of 2011 by increasing the number of borings along the alignment of the proposed, full depth cut-off wall. Additional geotechnical tests will be conducted to further test the bedrock over the entire length of the grouted wall, with the advantage of not having to interpolate the data as much due to the increased number of borings. The additional geotechnical and mineralogy data will help design Phase 3 work (below) and grouting the entire length of the cutoff wall and right abutment.

   Phases 3 thru 6: The full scope of work involved in Phases 3 thru 6 is being refined at this time and will be updated based on the results of the Alternative Refinement Phase of work.

(4) Phase 3 – Full length, full depth cutoff wall: During this phase, project work will focus on constructing a hydromilled, panel wall over the entire length of the dam through overburden.

(5) Phase 4 – New instrumentation: Project work involves the installation of new instrumentation, such as piezometers that will be used to monitor the dam response and quantify the effectiveness of the constructed cutoff wall.
(6) Phase 5 – Post construction site remediation: Project work includes demolition of the work platform, regrading the dam crest, paving site lots and roads, site cleanup, and seeding former construction areas.
(7) Phase 6 – Project closeout.

d. In-Kind Contributions. A Non Federal Cost Share Sponsor is not required for this project.

3. RMO COORDINATION and VERTICAL TEAM

a. RMO Coordination. The review management organization will be the USACE Risk Management Center (RMC). In accordance with EC 1165-2-209 the RMC is responsible for managing the review effort.

b. Vertical Team. The Vertical Team consists of District Dam Safety Officer, RMC, CELRD and Headquarters team members. Technical vertical team members can come and go depending on the current project requirements. The District Dam Safety Officer, Dam Safety Program Managers at LRD and HQ and the LRD District Liaison/Flood Risk Management Business Line Manager are permanent members of the Vertical Team.

4. DISTRICT QUALITY CONTROL

DQC is an internal review process 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 providing for seamless review, quality checks and reviews, supervisory reviews, and Project Delivery Team (PDT) reviews throughout the life of the project. DQC efforts will include the necessary expertise to address compliance with published Corps policy.

The Project Engineer/Architect (PE/A) has responsibility for a specific project design product and should not be confused with the Technical Team Leader or Lead Engineer role. As indicated in the PDT roster in Appendix 2, Joe Premozic is the Lead Engineer and it is intended that he will be the Lead Engineer throughout the entire project.

Each Work Phase will have its own, unique Quality Control Plan. As the QCP's are developed, they will be integrated into the Review Plan and attached as appendices. The Quality Control Plan for Phase 1, Site Development work is shown in

APPENDIX 2. APPENDIX 3 presents the Quality Control Plan for the Alternative Refinement Phase of work.

The Review Plan is a living document. As such the construction PDT members for the construction of the Site Development Contract and the future Cutoff Wall contract have not been fully identified yet. It is expected that the design PDT members for the Site Development Contract will stay on board through the construction of the Site Development Contract to provide Engineering during Construction services. The future Cutoff Wall Contract will have its own Quality Control Plan which will be appended to the Review Plan.

5. REVIEWS

a. General. EC1165-2-209 requires the USACE Risk Management Center (RMC) to serve as the RMO for Dam Safety Modifications projects. At this time the RMC isn't staffed or organized to support ATR. In the interim, the Great Lakes & Ohio River Division will manage the ATR. There shall be appropriate coordination and processing through CoPs; relevant PCXs, the RMC, and other relevant offices to ensure that a review team with appropriate independence and expertise is assembled and a cohesive and comprehensive review are accomplished. 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. The site development work, design, and construction of the full depth cut-off wall will require the following reviews:

(1) Phase 1 – Site Development: Project work entails the following level of review:

(a) In accordance with EC 1165-2-209, a risk informed decision was made regarding the level of review for the Site Development work. This work does not involve any work activities on the East Branch Dam itself. The contract tasks involve minor grading, paving, and utility work along the entrance road to the facility – all work that is not technically complex. In addition, the majority of the work to be completed under this contract is site development and asphalt paving, which are not “Life Safety” features of work. Therefore, based on these facts, a risk informed decision was made to conduct the work under an expanded DQC. The Review Team Leader will come from outside LRD (Kansas City District) and will coordinate and perform a civil engineering review. The other review team members will be provided by the home district, Pittsburgh, since the design work involved with the electrical, mechanical and geotechnical features of work is minimal. This review includes all engineering and specialty reviews that are applicable to this contract, except BCOE which requires a separate and independent review process ending in an independent signed BCOE Certification. A list of the

review team members is enclosed in the Quality Control Plan as shown in APPENDIX 2. Also indicated on this list is the primary area of review assignment of each member of the Technical Review team and a list of any special or unusual review requirements that are pertinent to the specific project.

(2) Alternative Refinement Phase: Project work entails the following level of review:

(a) The MFR will undergo an ATR that includes RMC review team members from outside of the Pittsburgh District. Once this review is complete, the Senior Oversight Group will review the MFR and provide final, HQ acceptance. The member list for the ATR review, Alternative Refinement Phase, can be found in APPENDIX 3 (Quality Control Plan)

(3) Phase 2 – Geotechnical investigations and foundation grouting: Project ATR reviews will be provided when details are known (TBD).
(4) Phase 3 – Full length, full depth cutoff wall: TBD
(5) Phase 4 – New instrumentation: TBD
(6) Phase 5 – Post construction site remediation: TBD
(7) Phase 6 – Project closeout: TBD.

b. Products for Review. The products for review for Phase 1 and the Alternative Refinement Phase are based on the DSMS. The reviews involved in Phases 2 thru 6 are not clear at this time and will be updated based on the results of the Alternative Refinement Phase of work. The products for review of the various phases of the design and construction work are as follows:

(1) Phase 1 – Site Development:
(a) Plans and specifications
(b) Design Documentation Report (DDR).

(2) Alternative Refinement Phase:
(a) A MFR including basic sketch drawings, quantity/cost tables, a comparison matrix, and technical narratives.

(3) Phase 2 – Geotechnical investigations and foundation grouting: Project products for review will be provided when details are known (TBD).
(4) Phase 3 – Full length, full depth cutoff wall: TBD
(5) Phase 4 – New instrumentation: TBD
(6) Phase 5 – Post construction site remediation: TBD
(7) Phase 6 – Project closeout: TBD.

c. Required ATR Team Expertise. ATR teams may be comprised of senior USACE personnel (RTS, etc.), and may be supplemented by outside experts, as appropriate. The disciplines represented on the ATR team will reflect the significant disciplines involved in the planning, engineering, design, and construction effort. These

disciplines include geotechnical, civil, cost engineering, geology, structural, hydraulics and hydrology, construction, and environmental. 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 will be 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, ASA (CW)/USACE 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 may 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 ATR team 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. ATR may be certified when all ATR concerns are either resolved or referred to HQUSACE for resolution and the ATR documentation is complete.

6. INDEPENDENT EXTERNAL PEER REVIEW (IEPR)

a. General. IEPRs will not be conducted for Phase 1 – Site Development work or the Alternative Refinement Phase of work. Phase 2 and Phase 3 project work, as currently defined, will require Type II IEPRs. IEPR requirements for Phases 4 through 6 work will be determined as the work activities become more clearly defined. Type I IEPRs are conducted on project studies. It is of critical importance for those decision documents and supporting work products where there are public safety concerns, significant controversy, a high level of complexity, or significant economic, environmental and social effects to the nation. However, it is not limited to only those cases and most studies should undergo Type I IEPR. In accordance with EC 1165-2-209 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. 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. SARs will be conducted on the Design Documentation Report (DDR) and during the Plans and Specifications (P&S) phases and intermittently throughout the construction phases. 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.

b. Decision on Type II IEPR. In accordance with EC 1165-2-209 a Type II IEPR (SAR) shall be conducted on design and construction activities for flood risk management projects. This applies to new projects and to the major repair, rehabilitation, replacement, or modification of existing facilities.

c. Products for Review. Based on the currently defined work, Phase 2 and Phase 3 project work require Type II IEPRs. It is anticipated that the products for review will include a Design Documentation Report and Plans & Specifications.

d. IEPR Review Team. Type II IEPR Review Team will be established, in consultation with the RMC, through one of four contracts maintained by the Louisville District. The Review Team will be selected based on their technical qualifications and experience. Specialized disciplines may include:

(1) Cut-off wall expert
(2) Grouting expert
(3) Engineering geologist
(4) Dam safety risk expert
(5) Grouting construction expert.

The Review Team should be independent of USACE and free of conflicts of interests. The Review Team will be able to evaluate whether the interpretation of analysis and conclusions based on analysis are reasonable. The Review Team will be given the flexibility to bring important issues to the attention of decision makers. The Review Team will have experience in design and construction of projects similar in scope to the East Branch Dam Design and Construction Project. The intent will be to retain

the same Review Team for each Phase of work that requires IEPR and that the IEPR Review Team will be identified in their respective Quality Control Plan.

e. Documentation of IEPR. Dr Checks review software will be used to document 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. IEPR comments should generally include the same four key parts as described for ATR comments in Section 3. The IEPR team will prepare a Review Report that will accompany the publication of the final report for the project and may:

(1) Disclose the names of the reviewers, their organizational affiliations, and include a short paragraph on both the credentials and relevant experiences of each reviewer
(2) Include the charge to the reviewers prepared by the Contractor
(3) Describe the nature of their review and their findings and conclusions
(4) 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.

7. REVIEW SCHEDULES AND COSTS

a. DQC Schedule and Cost. The cost for DQC is included in the costs for PDT activities and is not broken out separately. DQC will occur seamlessly throughout each phase of project work. Quality checks and reviews occur during the development process and are carried out as a routine management practice.

b. Review Schedule and Cost. The Review schedules and costs for each phase of work are as follows:

(1) Phase 1 – Site Development:

(a) The review budget is $18,000 for Phase 1 work. Each reviewer will receive funding for 24 hours of labor to perform their review with the Review Team Leader receiving an additional 16 hours of labor for coordinating the review effort.
(b) The review milestones for Phase 1 work is as follows:

REVIEW MILESTONES AND SCHEDULE FOR PHASE 1 – SITE DEVELOPMENT	
MILESTONES	DATE
Quality Control Review	Seamless
Final Plans and Specs Tech review/BCOE Review	2 May 2011
Technical review/BCOE Kickoff Meeting	6 May 2011
BCOE and Technical Review Certification/Ready to Advertise	15 June 2011

(2) Alternative Refinement Phase:

(a) The estimated cost for the ATR (consisting of 5 representatives from the RMC and one representative from Cost DX) is $36,240. This level of effort is based on the following assumptions:

- 48 hrs for the ATR lead (from RMC)
- 40 hrs each for the remaining 4 RMC representatives
- 16 hrs for the Cost DX, and
- 24 hrs each for PDT evaluators (Joe Premozic, Sarah Jersey and Sean Weston).

b) The review milestones and schedule is as follows:

ATR MILESTONES AND SCHEDULE FOR ALTERNATIVE REFINEMENT PHASE	
MILESTONES	DATE
Quality Control Review	17 June 2011
Begin ATR	20 June 2011
Resolve ATR comments	8 July 2011
ATR Certification	15 July 2011

(3) Phase 2 – Geotechnical investigations and foundation grouting: Project work reviews will be provided when details are known (TBD)
(4) Phase 3 – Full length, full depth cutoff wall: TBD
(5) Phase 4 – New instrumentation: TBD
(6) Phase 5 – Post construction site remediation: TBD
(7) Phase 6 – Project closeout: TBD.

b. IEPR Schedule and Cost. Information will be provided when the details are known.

8. PUBLIC PARTICIPATION

Since initiation of the East Branch Dam Safety Assurance Program Evaluation Report in February 2008, numerous public meetings have been conducted. Public meetings were conducted to inform the public of the current condition of the East Branch Dam, the study efforts and the schedule for implementing the Dam Safety Assurance Project and to solicit public review and comment on the Draft Environmental Assessment. The last public meeting was held on May 4, 2009. Upon MSC approval of this Review Plan, it will be posted on the Pittsburgh District Internet for Public Review.

9. MSC APPROVAL

The Great Lakes and Ohio River Division 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, RMC, and HQUSACE members) as to the appropriate scope and level of review for the project. 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:

(1) Michael Rattay, Pittsburgh District, Project Manager
(2) Joseph Premozic, Pittsburgh District, Lead Engineer, Phase 1 and Alternative Refinement Phase
(3) Michael Debes, Pittsburgh District, Engineering Quality Management
(5) Rob Taylor, Great Lakes and Ohio River Division Dam Safety Program Manager
(6) Colin Krumdieck, Risk Management Center

APPENDIX 1: SAMPLE STATEMENT OF TECHNICAL REVIEW FOR DECISION DOCUMENTS

COMPLETION OF AGENCY TECHNICAL REVIEW

The Agency Technical Review (ATR) has been completed for the *<type of product>* for *<project name and location>*. The ATR was conducted as defined in the project's Review Plan to comply with the requirements of EC 1165-2-209. During the ATR, compliance with established policy principles and procedures, utilizing justified and valid assumptions, was verified. This included review of: assumptions, methods, procedures, and material used in analyses, alternatives evaluated, the appropriateness of data used and level obtained, and reasonableness of the results, including whether the product meets the customer's needs consistent with law and existing US Army Corps of Engineers policy. The ATR also assessed the District Quality Control (DQC) documentation and made the determination that the DQC activities employed appear to be appropriate and effective. All comments resulting from the ATR have been resolved and the comments have been closed in DrChecks[sm].

SIGNATURE _____ _____

Name Date
ATR Team Leader
Office Symbol/Company

SIGNATURE _____ _____

Name Date
Project Manager
Office Symbol

SIGNATURE _____ _____

Name Date
Architect Engineer Project Manager[1]
Company, location

SIGNATURE _____ _____

Name Date
Review Management Office Representative
Office Symbol

CERTIFICATION OF AGENCY TECHNICAL REVIEW

Significant concerns and the explanation of the resolution are as follows: *Describe the major technical concerns and their resolution.*

As noted above, all concerns resulting from the ATR of the project have been fully resolved.

SIGNATURE _____ _____

Name Date
Chief, Engineering Division
Office Symbol

SIGNATURE _____ _____

Name Date
Chief, Planning Division
Office Symbol

[1] Only needed if some portion of the ATR was contracted

APPENDIX 2

QUALITY CONTROL PLAN

PHASE 1 SITE DEVELOPMENT

US Army Corps
of Engineers®
Pittsburgh District

East Branch Dam
East Branch Clarion River
Elk County, Pennsylvania

Phase 1 Site Development Contract
Project No. 149566

QUALITY CONTROL PLAN

1. **Purpose.**

This plan identifies all the quality control features to be used in completing the technical products and services described in paragraph 4.

2. Applicability.

This plan applies to completion of all deliverables of technical products and services including interim design, and construction contract drawings and specifications associated with this civil works project. Project internal design review and coordination by senior staff design "checkers" shall be performed prior to and independent of the quality control measures outlined herein.

3. References.

a. ER 1110-1-12, Quality Management

b. EC 1165-2-209, Civil Works Review Policy

c. ER 1110-2-1150, Engineering and Design for CW Projects

d. Regional Business Processes (RBP) Doc. # 4921, QC/QA Processes for Civil Works

e. RBP Doc. # 3443, Biddability, Constructability, Operability, and Environmental (BCOE) Review

f. RBP Doc. # 2641, Design Process for Civil Works Projects

g. RBP Doc. # 187, Corrective Action

4. General.

a. Type: Civil Works type construction project.

b. Location: Elk County, Jones Township, Pennsylvania

c. Authorization: Construction General Funding

d. Project Description: This project consists of providing engineering services to perform investigations, calculations, and other analyses needed to develop the design; prepare plans, technical specifications, quantities and supporting documents for the Site Development Project at East Branch Dam. This project is the first phase of improvements resulting from the Dam Safety Modification Study of East Branch Dam. The project involves widening and reconstructing the existing dam access road at East Branch. These improvements are being made in preparation for heavy construction

equipment that will be utilized in future construction contracts on the dam at East Branch. This contract also includes paving and providing utilities to an area where future Government and contractor trailers will be located and site preparation for a future contractor laydown area. An NPDES permit and Erosion and Sediment Control plans will be submitted and approved by the Pennsylvania Department of Environmental Protection and the Elk County Conservation District.

e. Design Criteria: This project will be designed in accordance with current Corps of Engineers criteria contained in engineering regulations, manuals, and other guidance. Unified Facilities Guide Specifications (UFGS) shall be used for contract specifications, and Corps and Pittsburgh District CADD standards shall be used as the basis for production of drawing files and layout. Design will be based upon available Corps of Engineers Standardization Program Documents for this facility type.

5. Design Teams.

a. Project Design and Checker list is enclosed as Attachment 1.

b. Use of Centers of Expertise and Standardization do not apply to this project.

c. All necessary design expertise is located within the Pittsburgh District and/or Great Lakes and Ohio River Division.

6. Technical Review/BCOE Team.

a. Technical Review. In accordance with EC 1165-2-209, a risk informed decision was made regarding the level of review for the Site Development work. This work does not involve any work activities on the East Branch Dam itself. The contract tasks involve minor grading, paving, and utility work along the entrance road to the facility – all work that is not technically complex. In addition, the majority of the work to be completed under this contract is site development and asphalt paving, which are not "Life Safety" features of work. Therefore, based on these facts, a risk informed decision was made to conduct the work under an expanded DQC. The Review Team Leader will come from outside LRD (Kansas City District) as required by EC 1165-2-209. The Review Team Leader will coordinate and perform a civil engineering review. The other review team members will be provided by the home district, Pittsburgh, since the design work involved with the electrical, mechanical and geotechnical features of work is minimal. This review includes all engineering and specialty reviews that are applicable to this contract, except BCOE which requires a separate and independent review process ending in an independent signed BCOE Certification.

b. BCOE includes reviews performed by the Construction Branch and Real Estate Branch of Engineering, Construction and Technical Services Division; Facility Support Section and the East Branch Dam personnel in Operations Division; and the

Environmental and Cultural Resource Sections of Business Resource Division. The BCOE review team member list is enclosed as Attachment 2.

c. All necessary design expertise is located within the Pittsburgh District and/or Great Lakes and Ohio River Division.

7. Review Process.

a. Products will be prepared using in-house forces. Quality Control (QC) shall be completed using senior Pittsburgh District and Kansas City District personnel and in accordance with this QCP.

b. Engineering and design Quality Control shall be accomplished using the following review methods:

(1) Internal Reviews (IR). Throughout the design process, a seamless internal review will be performed by senior level Pittsburgh District staff and will focus on fulfilling the project quality requirements for the work products produced. Seamless QC review involves the review of sub-products and products as they are prepared. The QC is performed in a proactive manner throughout the entire planning and design process to take advantage of collective experience. This review is in the form of formal and informal meetings, telephone conversations, and other forms of informal communication that may involve one or more review team members. Also, detailed reviews and design checks, which must be carried out as routine management practice. A design check is a detailed evaluation of the engineering analysis and contract documents prepared by each engineering discipline as an extension of the design process. All checked drawings, computations, quantity estimates, and analyses will be annotated to show the initials of the designer and the checker and the date of action. The checker will be qualified to originate the design that they check. Design checklists may be developed by each engineering discipline to strengthen the design process. These checks are performed by staff responsible for the work, such as supervisors, work leaders, team leaders, or designated individuals from the engineering staff and shall be performed prior to review of the deliverable. A design check should include a comprehensive evaluation of:

- the correct application of methods,
- adequacy of basic data and assumptions,
- correctness of calculations (error free),
- quantity estimates
- completeness of documentation,
- testing, modeling, assumptions, calculations, text, and graphic presentations in all documents are complete, satisfy appropriate design criteria, and utilize sound engineering practice.
- compliance with guidance, standards, regulations, laws, and BCOE issues

A memorandum of record prepared by the PE/A will be prepared after each such meeting or conversation documenting significant decisions reached. Copies are located in the project file and sent to the Review Leader for distribution.

(2) Milestone Progress Review (MPR). This review process is conducted in the traditional approach using complete milestone deliverables. The Technical Review and BCOE reviews will be conducted using this approach. It occurs during a specified period after the design progress has reached a target milestone. Deliverables are reviewed, and written comments are prepared by reviewers and input into DrChecks. Design progress ceases during the review period. This review method reaches completion at a convened review conference where prepared comments are discussed in a formalized open meeting attended by all or most reviewers.

c. Dr Checks will be used to manage project review comments.

d. Review During Construction. During the construction period, an approved representative of the design agent shall make such visits to the project site as required by ER 1110-1-12. The construction site visitors shall comply with all rules and regulations of the facility. Upon completion of the site visit, the visitor shall prepare a written report documenting their observations/recommendations relative to the purpose of the visit or site safety. This shall then be included in the project file along with all photos taken on such site visit.

8. Risks Inherent in the Project.

There are no special considerations, crucial design features or potential catastrophic failures associated with the grading, asphalt or utility work being performed in this contract.

9. QC Budget.

The QC budget for the Technical Review is $18,000 and the budget for the BCOE review is $16,500. Each reviewer will receive funding for 24 hours of labor to perform their review with the Review Team Leader receiving an additional 16 hours of labor for coordinating the Technical Review effort. The cost of performing QC reviews by those noted as “Checkers” in attachment 1 is not tracked separately since this function is performed through internal design checks and seamless reviews throughout the design process on various products.

10. Schedule

The critical milestones for this contract are the NPDES permit submission date of May 2, 2011 and the Ready to Advertise Date of June 15, 2011. These dates are important to position the district for a contract award in FY 11.

11. Review Schedule.

All review milestones shall be scheduled in accordance with the Project Management Plan, and shall be conducted by the methods identified above. The review milestone and schedule is found on Attachment 3.

12. Construction Contract Document Quality Certifications.

Upon completion of corrected final design and normally prior to advertising, the 100 percent contract construction documents shall be adequately reviewed to assure quality control measures have been met and incorporated. Demonstrated commitment to fully and properly incorporate comments prior to and during BCOE Certification is considered part of the final design quality evaluation. The following documents shall be completed by the Technical Review and the BCOE teams:

a. To ensure accurate and complete inclusion of all BCOE comments in construction contract documents, a BCOE Certification form will be exchanged between Operations Division, Business Resource Division, and Engineering, Construction and Technical Services Division. The signed BCOE Certification form shall be placed in the permanent project file, and a copy furnished to Contracting Branch prior to bid opening.

b. To ensure accurate and complete inclusion of all review comments in construction contract documents, an Technical Review certification form will be signed by each member of the design/study team and the review team. In addition, a separate certificate will be signed by chiefs of each LRP organizational element having a stake in the final product.

13. Designer Quality Evaluations.

Various designer evaluations will be accomplished over the lifetime of the project QCP. These will indicate to the design team the level of performance in executing the project design responsibility, which includes the final and total responsibility for assuring the correctness and specifically the constructed product adequacy and safety.

14. Design Quality Improvement.

Design review comments recurrent on several projects and recurrent construction change documentation/communications will be analyzed in accordance with the procedures defined by the Regional Business Processes (RBP). Where possible, recurring problem areas will be evaluated for corrective action in accordance with the RBP Corrective Action procedure (Document ID # 187). Frequently this will result in changes of design criteria, guide specifications, technical manuals, regulations, etc. In other cases where a change of criteria is not the necessary corrective action, a lesson learned may be identified and added to the USACE Enterprise Lessons Learned System.

15. Records.

Complete versions of the QCP, review meeting minutes, review dates, certification sheets and copies of all annotated review comments shall be placed with project permanent files upon completion of the deliverables. Items indicated above shall be included.

ATTACHMENT 1

DESIGN TEAM

East Branch Dam
Phase 1 - Site Development Contract
Elk County, Pennsylvania

Area of Responsibility	Principal	Office Symbol
Technical Team Leader	Joe Premozic	EC-DS
PE/A	Leroy Bosetti	EC-NC
Civil/Site	Leroy Bosetti	EC-NC
Checker	Beth Schneller	EC-NC
Permits	Marc Glowczewski	EC-NC
Checker	Jennifer Savitz	EC-NC
Cost Engineer	Laura Gaudier	EC-NT
Checker	Paula Boren	EC-NT
Electrical Engineer	Daniel Nguyen	EC-NT
Checker	John Nites	EC-NT
Mechanical Engineer	Jim Lowe	EC-NT
Checker	Dave Buccini	EC-NT
Geotechnical Engineer	Sarah Jersey	EC-DS
Checker	Joe Premozic	EC-DS
Specification Engineer	Tom Andre	EC-NT
Checker	Sean Weston	EC-NT
Real Estate	Roger Wood	EC-RA
Survey Contractor	Pennoni Associates Inc. (Photo Science Sub)	A-E contract
Survey Checker	Jeff Jalbrzikowski	EC-DG

ATTACHMENT 2

DISTRICT QUALITY CONTROL TEAM

East Branch Dam
Phase 1 - Site Development Contract
Elk County, Pennsylvania

Primary Area of Review Responsibility	Name/Office Symbol	Unusual/Special Requirements Y/N_*
Technical Review Team Leader & Civil/Site	Ron Jansen, CENWK-ED-GC	N
Civil/Site	Pat Golden	N
Cost Engineer	Paula Boren	N
Electrical	Ron Gadomski	N
Geotechnical	Andrew Schaffer	N
Mechanical	Ian Vega	N

BIDDABILITY, CONSTRUCTABILITY, OPERABILITY AND ENVIRONMENTAL (BCOE) REVIEW TEAM

East Branch Dam
Phase 1 - Site Development Contract
Elk County, Pennsylvania

Primary Area of Review Responsibility	Name/Office Symbol	Unusual/Special Requirements Y/N_*
Construction	John Pontus	N
Construction	Kirk McWilliams	N
Operations	Neil Anderson	N
Operations	Gary Froelich	N
Environmental	Bruce Kish	N
Real Estate	Teri Tallo-West	N

ATTACHMENT 3

CIVIL WORKS
REVIEW MILESTONES

East Branch Dem
Phase 1 – Site Development Contract
Elk County, Pennsylvania

MILESTONE	DATE	REVIEW METHOD
Quality Control Review:	seamless	IR
Final Plans and Specs TR/BCOE Review	2 May 2011	MPR
Technical Review/BCOE Kick-off Mtg.	6 May 2011	MPR
BCOE and Technical Review Certification/Ready to Advertise	15 June 2011	MPR

APPENDIX 3

QUALITY CONTROL PLAN

ALTERNATIVE REFINEMENT PHASE

US Army Corps
of Engineers®

Pittsburgh District

East Branch Dam
East Branch Clarion River
Elk County, Pennsylvania

Alternatives Refinement – Dam Safety Mod.
Project No. 149566

QUALITY CONTROL PLAN

1. **Purpose.**

This plan identifies all the quality control features to be used in completing the technical products and services described in paragraph 4.

2. Applicability.

This plan applies to completion of deliverables associated with Alternatives Refinement. Project internal design review and coordination by senior staff design "checkers" shall be performed prior to and independent of the quality control measures outlined herein.

3. References.

a. ER 1110-1-12, Quality Management

b. EC 1165-2-209 Civil Works Review Policy

c. ER 1110-2-1150, Engineering and Design for CW Projects

d. Regional Business Process (RBP) Doc. # 4921, QC/QA Processes for Civil works

e. RBP Doc. # 3443, Biddability, Constructability, Operability, and Environmental (BCOE) Review

f. RBP Doc. # 5041, Design Process for Civil Works Projects

g. ER 1110-2-1156, Safety of Dams – Policy and Procedures

4. General.

a. Type: Civil Works type construction project.

b. Location: Elk County, Jones Township, Pennsylvania

c. Authorization: Construction General Funding.

d. Project Description: This project consists of providing engineering evaluations to further refine three of the alternatives presented in the Dam Safety Modification (DSM) Study identified by the Senior Oversight Group (SOG) during review of the DSM report. The three alternatives identified for further refinement consist of the following:

- Plan S3 – Full Length, Full Depth Cutoff Wall
- Plan S4 – Embankment Extension, and
- Plan S5 – Downstream Gravity Structure

Plan S3 was the recommended plan identified in the DSM Report. The impetus for Alternative Refinement is (taken from the text of the final DSM Report):

> "…some reviewers of this DSM study believe that there may be ways of altering Plan[s] S4 [and S5] to result in a more competitive implementation cost (by eliminating some or all of S4's costly excavated cutoff elements), while still meeting the tolerable risk guidelines. Therefore, Plan[s] S4 [and S5] will be pursued further in design (during the Preconstruction Engineering Design phase) to better gage [their relative] competiveness in comparison with Plan S3 – which, as discussed in Sections 4.5 and 4.6, was advanced to feasibility level of detail as part of this DSM study. The PDT and vertical team recognize that Plans S4 [and S5] would likely be more redundant, robust and resilient than Plan S3. Therefore, if Plan S4 [or S5 are] reconfigured in a way that results in relatively competitive implementation cost[s], Plan S4 or [S5] may become the recommended plan."

The goal of Alternatives Refinement is to discern which of these alternatives to carry forward into the Preconstruction Engineering and Design phase. The work associated with Alternatives Refinement include re-evaluating and changing (where warranted) the primary components and lateral and depth extents associated with the Plans S3, S4 and S5. The use of newly obtained and recently compiled subsurface data will be integral to this process. Once the components and their extents are defined, revised screening level cost estimates will be prepared for each plan that has been substantially changed during Alternatives Refinement.

e. Design Criteria: This project will be designed in accordance with current Corps of Engineers criteria contained in engineering regulations, manuals, and other guidance. Crucial design features include cutoff walls, depth of excavation, and availability of construction materials.

5. Design Teams.

a. Project Design and Checker list is enclosed as Attachment 1.

b. Use of Centers of Expertise and Standardization apply to this work, and will be engaged, where appropriated for review.

c. All necessary design expertise is located within the Pittsburgh District and/or Great Lakes and Ohio River Division.

6. Agency Technical Review/BCOE Team.

Agency Technical Review (ATR). An ATR is mandatory for all decision and implementation documents. The ATR team will be composed of recognized subject matter experts from the Risk Management Center (RMC) and the Cost Directory of Expertise. An ATR review team member list is enclosed as Attachment 2. Also

indicated on this list is the primary area of review assignment of each member of the ATR team.

7. Review Process.

a. Products will be prepared using in-house forces. Quality Control shall be completed using senior Pittsburgh District and RMC personnel and in accordance with this QCP.

b. Engineering and design Quality Control shall be accomplished using the following review methods:

(1) Seamless ATR. Due to the specialized nature of the design evaluations and the time-sensitive natures of the work, ATR will be conducted seamlessly during Alternatives Refinement.
(2) Milestone Progress Review (MPR). This review process is conducted in the traditional approach using complete milestone deliverables. It occurs during a specified period after design progress has reached a target milestone. Deliverables are reviewed, and written comments prepared by reviewers and provided to the PE/A. Design progress ceases during the review period. This review method reaches completion at a convened review conference where prepared comments are discussed in a formalized open meeting attended by all or many reviewers. One deliverable is identified for Alternatives Refinement, consisting of a memorandum illustrating the refined alternatives, summarizes the bases of the refinements and presenting screening level cost estimates.

c. DrChecks will be used to manage project review comments.

8. Risks Inherent in the Project.

Dam safety risk is inherent in East Branch Dam Safety Modification project and is the primary impetus for the DSM study and the follow on design efforts. Alternatives Refinement is considered an early design activity with the purpose of ensuring the design team and several of the review organizations (i.e., the SOG and RMC) that the appropriate dam remediation plan will be implemented. Risks to the timely execution of the project include availability of key reviewers and potential changes in dam safety policy.

9. QC Budget.

The QC budget for the ATR is $36,240. This level of effort is based on the following assumptions of effort:

- 48 hours for the ATR lead (from RMC),
- 40hours each for the remaining 4 RMC representatives,
- 16 hours for Cost DX, and
- 24 hours each for PDT evaluators.

The cost of performing QC reviews by those noted as "Checkers" in attachment 1 is not tracked separately since this function is performed through internal design checks and seamless reviews throughout the design process on various products.

10. Schedule
The critical milestones for this contract are as follows:

ATR MILESTONES AND SCHEDULE FOR ALTERNATIVES REFINEMENT	
MILESTONES	DATE
Alternatives Refinement Meeting	22 March 2011
Begin Quality Control Review	17 June 2011
Begin ATR	20 June 2011
Resolve ATR comments	8 July 2011
ATR Certification	15 July 2011

11. Designer Quality Evaluations.

Various designer evaluations will be accomplished over the lifetime of the project QCP. These will indicate to the design team the level of performance in executing the project design responsibility, which includes the final and total responsibility for assuring the correctness and specifically the constructed product adequacy and safety.

12. Design Quality Improvement.

Design review comments recurrent on several projects and recurrent construction change documentation/communications will be analyzed in accordance with the LRP PMBP Manual procedures. Where possible, recurring problem areas will be evaluated for corrective action in accordance with the Corrective Action procedure. Frequently this will result in changes of design criteria, guide specifications, technical manuals, regulations, etc. In other cases where a change of criteria is not the necessary corrective action, a lesson learned may be identified and added to the USACE Enterprise Lessons Learned System.

13. Records.

Complete versions of the QCP, review meeting minutes, review dates, certification sheets and copies of all annotated review comments shall be placed with project permanent files upon completion of the deliverables. Items indicated above shall be included.

ATTACHMENT 1

DESIGN TEAM

East Branch Dam
Alternatives Refinement
Elk County, Pennsylvania

Area of Responsibility	Principal	Office Symbol
Technical Team Leader	Joe Premozic	EC-DS
PE/A	Joe Premozic	EC-DS
Geotechnical	Sarah Jersey	EC-DS
Checker	Kristen Enzweiler	EC-DS
Cost Engineer	Sean Weston	EC-NT
Checker	Paula Boren	EC-NT

ATTACHMENT 2

AGENCY TECHNICAL REVIEW TEAM

East Branch Dam
Alternatives Refinement
Elk County, Pennsylvania

Primary Area of Review Responsibility	Name/Organization
ATR Team Leader (Geology/Geotechnical)	Pete Shaffner/RMC
Geology/Geotechnical	Jeff Schaefer/RMC
Geotechnical	Chuck Redlinger RMC
Geotechnical/Construction	Dave Paul/RMC
Geology/Construction	Kathy Bensko/RMC
Cost Engineer	Jim Neubauer/USACE Cost DX