REVIEW PLAN
for
BOLIVAR DAM, MAJOR REHABILITATION PROJECT
SANDY CREEK OF TUSCARAWAS RIVER,
TUSCARAWAS AND STARK COUNTIES
Design and Construction Activities
Huntington District

March 2010
Revised 1 June 2011

US Army Corps
of Engineers ®

REVIEW PLAN

BOLIVAR DAM, MAJOR REHABILITATION 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 Bolivar Dam, Major Rehabilitation Project.

b. References

(1) Engineer Circular (EC) 1165-2-209, Civil Works Review Policy, 31 September 2010
(2) Engineer Regulation (ER) 1110-2-12, Quality Management, 30 Sep 2006
(3) Bolivar Dam, Major Rehabilitation Project, Project Management Plan
(4) Draft ER 1110-2-1156 Chapter 9, Dam Safety Modification Studies and Documentation, 16 July 2009

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, Agency Technical Review, and Independent External Peer Review.

(1) District Quality Control (DQC). 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, Project Delivery Team (PDT) reviews, etc. 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. 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, preferably recognized subject matter experts with the appropriate technical expertise such as regional technical specialists (RTS), 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. 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 (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. Project. The project is a Major Rehabilitation to address reliability problems related to Bolivar Dam. Action is needed because the excessive uncontrolled seepage is negatively affecting the integrity of the dam, increasing risks to the downstream public. These concerns contributed to its classification by the USACE Screening for Portfolio Risk Assessment (SPRA) as a Dam Safety Action Class II – Urgent (unsafe or potentially unsafe) project. Rehabilitation is needed to correct these instability issues and to minimize the potential for catastrophic failure of the dam. The project is considered to be single purpose. The Bolivar Dam Major Rehabilitation Report was approved on 12 June 2009. This project does not require Congressional authorization. An Environmental Assessment (EA) has been prepared. A Cost and Schedule Risk Analysis was conducted June 2008 by the Walla Walla District. A Value Engineering Study was conducted in October 2009 by Strategic Value Solutions, Inc.

b. General Site Location and Description. Bolivar Dam is located on the Tuscarawas and Stark County line, Ohio, on Sandy Creek of the Tuscarawas River (Figure 1), a tributary of the Muskingum River. The dam is located 183.4 miles above the mouth of the Muskingum River. The town located the nearest to Bolivar Dam is Bolivar, Ohio. The population of Bolivar is 888. More sizable population centers in the inundation area of the dam are Dover and New Philadelphia (located 15 miles to the southeast) with a population of approximately 30,000. The floodplain between Bolivar Dam and the larger downstream population centers can generally be described as consisting of broad, gently sloping valleys.

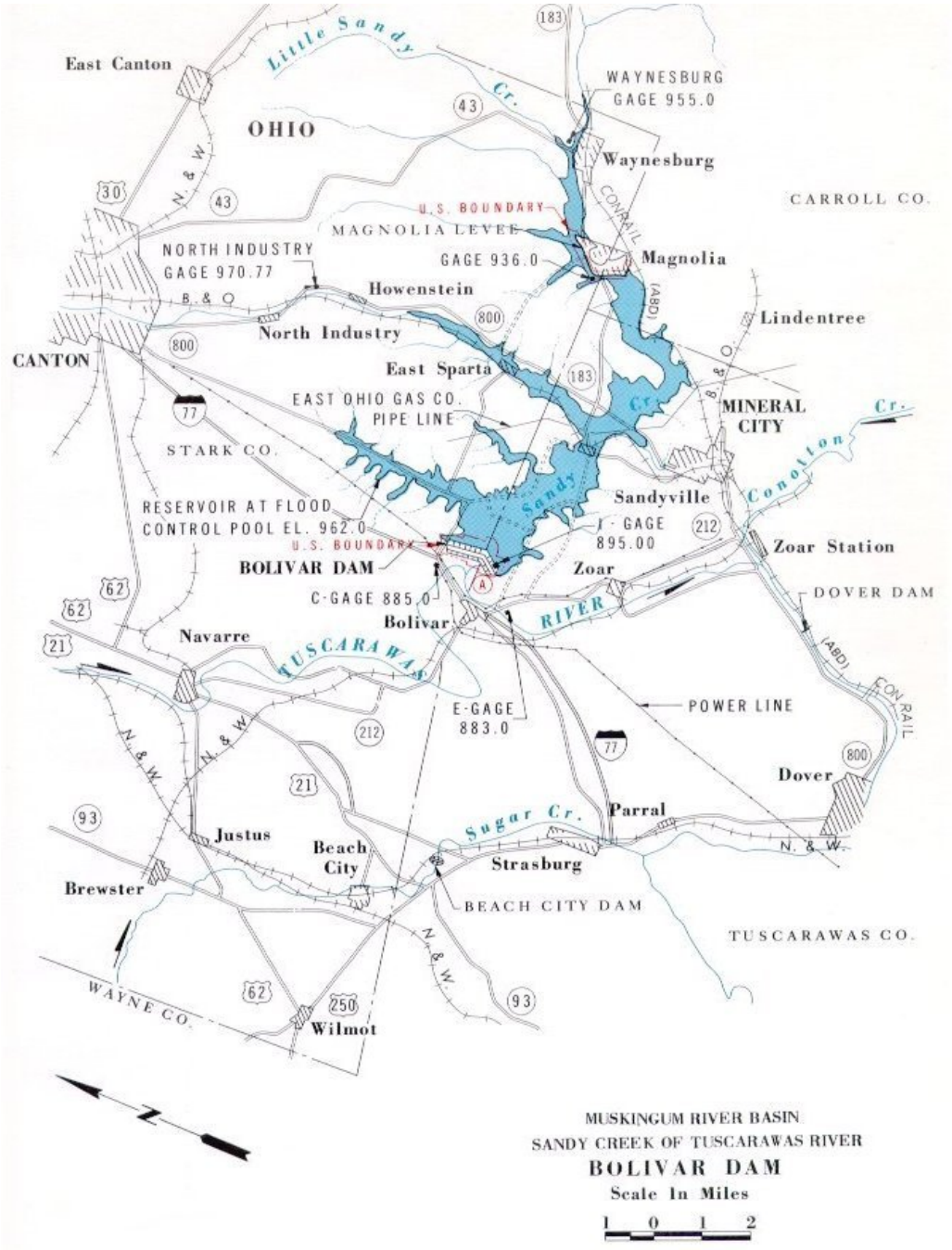

Figure 1

The Bolivar Dam Safety Assurance Project, as originally constructed in December 1938, is a “dry dam” and does not retain a permanent pool during any season of the year; however, forms a retarding pool for control of flood waters below the dam. The crest length is 6,300 feet at elevation 982, msl. with a 3.5-foot high concrete parapet wall on the upstream side of the crest.

The outlet works are located in the left (south) abutment and are composed of an approach channel, an intake structure housing six 7-foot x 15-foot gated sluices, two horseshoe shaped tunnels, a stilling

basin, and outlet channel. Access to the intake structure is provided by a 12-foot wide single span service bridge. The outlet works normally pass the entire flow of Sandy Creek, except during periods of flood retention. The amount of time required for flood retention varies from year to year. However, based on historical records, water is usually impounded for about 10% of a typical year.

The spillway is located just beyond the left abutment. It is an uncontrolled, saddle type, having a crest length of 540-feet and a crest elevation of 962.0.

The 6,300 foot long embankment is rolled earth with an impervious core, having a maximum height of 87 feet and is founded on overburden.

The dam was built on pervious glacial outwash deposits (sands and gravels) up to 200 feet deep. The design of the dam predated many current methods for evaluating seepage and slope stability. Although scale models of the dam were built to predict seepage quantities, no evaluations of exit gradients or uplift pressures, or slope stability analyses are contained in the original design documents.

Bolivar Dam has a history of excessive downstream seepage and the potential of underseepage instability at design pools. The Sandy Creek Valley is a broad, deeply filled pre-glacial valley consisting of sorted glacial outwash materials with possible lenses of open work gravels. The glacial deposit, upon which the dam is founded, is composed of pervious, fine to coarse gravelly sand, generally about 150-feet thick. Based on a review of the subsurface and instrumentation data, unsatisfactory performance of similar projects across the U.S. Army Corps of Engineers (USACE) inventory, and based on observed performance in 2005, it is believed that several areas of the embankment and/or foundation would become unstable due to piping at some pool less than the spillway crest level. This instability would threaten the integrity of the dam and could lead to a complete dam failure.

c. Factors Affecting the Scope and Level of Review. The primary problem associated with Bolivar Dam is excessive seepage through and under the left abutment and main embankment. This uncontrolled seepage is negatively affecting the structural integrity of the dam, increasing risks to the downstream public. Due to the history of excessive seepage through and under the dam and through the left abutment during events with frequent return periods, it was ranked by the U.S. Army Corps of Engineers Screening for Portfolio Risk Assessment (SPRA) process as a Dam Safety Action Class II – Urgent (unsafe or potentially unsafe) project. Rehabilitation is needed to correct these seepage problems and to minimize the potential for catastrophic failure of the dam during these and greater events. Deferral of action may result in catastrophic dam failure resulting in loss of life and severe property and economic damages. There is an opportunity to significantly reduce the potential for these consequences and also avoid emergency action expenditures.

d. Recommended Plan. Major construction features of the recommended plan include a partial-depth and partial-length concrete seepage barrier on the upstream toe of the dam, a seepage barrier cutoff wall in the left abutment of the dam, augmentation of the existing downstream seepage blanket, rehabilitation of the operating machinery and gates, the maintenance and/or rehabilitation of the existing relief well system as necessary to maintain adequate efficiency, instrumentation-related improvements (for existing piezometers and relief wells), and the installation of additional instrumentation (piezometers, surface displacement monuments, and inclinometers) to provide adequate post-remediation monitoring capability.

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

3. AGENCY TECHNICAL REVIEW (ATR)

a. General. ATR will be managed and performed outside of the Huntington District. EC 1165-2-209 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 FRM PCX and the Great Lakes & Ohio River Division will manage the ATR. There shall be appropriate coordination and processing through CoPs; relevant PCXs, and other relevant offices to ensure that a review team with appropriate independence and expertise is assembled and a cohesive and comprehensive review is 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. Members of the ATR team will be from outside the Huntington District. The ATR lead will be from outside the Great Lakes & Ohio River Division.

b. Products for Review. The ATR team will be reviewing the Design Documentation Report, and the Plans & Specifications.

c. Required ATR Team Expertise. ATR teams will comprise senior USACE personnel (Regional Technical Specialists (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 dam safety, civil, geotechnical, geology, structural, mechanical, hydraulics and hydrology, environmental and archeological, cost engineering and construction. To assure independence, the leader of the ATR team is Mark Vance from CENAE. 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 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 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 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 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, for the draft and final report. See ATTACHMENT 2.

4. INDEPENDENT EXTERNAL PEER REVIEW (IEPR)

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

b. Decision on Type I IEPR. In accordance with EC 1165-2-209, Draft, the Major Rehabilitation Report did not include an Environmental Impact Statement (EIS). Therefore a Type I IEPR was not be performed. See ATTACHMENT 3 for the Type I IEPR Waiver.

c. 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.

d. Products for Review. Type II IEPR will be performed on the Major Rehabilitation Report; 100% Design Documentation Report (DDR); 90% Plans & Specifications, during the midpoint of the construction, and before substantial completion of construction. Note that the Major Rehabilitation Report will not be evaluated/reviewed in its entirety and only reviewed by the Economist. Only the portions of the report that addresses the economics of the alternatives will be evaluated/reviewed and commented upon. A set of Plans and Specifications will be developed during FY11 that addresses a portion of the overall risk reduction plan. These plans and specifications will be for a seepage berm downstream of the main embankment between stations 60+00 and 25+00 at approximately elevation 906 and between stations 50+00 and 30+00 at approximately elevation 920, a seepage berm between stations 23+00 and 5+00 at approximately elevation 950 and clearing of trees around the outlet structure and intake structure. The clearing of trees is based on recommendations of the Risk Management Center cadre. The overall risk reduction plan for the project consists of additional seepage berms, additional relief wells and instrumentation and a partial depth and partial length cut-off wall between stations 66+00 and 20+00 extending approximately 100 feet below the base of the dam. A Type II IEPR (SAR) will not be performed for the Plans and Specifications developed in FY11 which address only the tree clearing and berm construction. These features are not high risk

construction features. These features do not use innovative materials or techniques, unique construction sequencing, or a reduced or overlapping design construction schedule. These risk reduction components do not pose a significant threat to human life. The seepage berm is routine, ordinary work consisting of placing and compacting granular material. The tree removal is selective clearing of trees less than 4 inch in diameter so that below dam monitoring can be easily accomplished. These features were reviewed during the IEPR of the DDR.

e. IEPR Expert Reviewers. Type II IEPR Expert Reviewers will be established, in consultation with the RMC, through a contract with Battelle that is administered by the Army Research Organization. Expert Reviewers will be selected based on their technical qualifications and experience. The Expert Reviewers should be independent of USACE and free of conflicts of interests. The Expert Reviewers will be able to evaluate whether the interpretation of analysis and conclusions based on analysis are reasonable. The Expert Reviewers will be given the flexibility to bring important issues to the attention of decision makers. However, the Expert Reviewers will be instructed to not make a recommendation on whether a particular alternative should be implemented, as the Chief of Engineers is ultimately responsible for the final decision on a planning or reoperations study. The Expert Reviewers may, however, offer their opinion as to whether there are sufficient analyses upon which to base a recommendation. The Expert reviewers will have experience in design and construction of projects similar in scope to the Bolivar Dam, Major Rehabilitation Project. Expert reviewers shall be registered professional engineers in the United States, or similarly credentialed in their home country. The expert reviewers must also have an engineering degree. A Master's degree in engineering is preferable, but not required, as hands-on relevant engineering experience in the listed disciplines is more important. Expert reviewers shall have a minimum of 15 years experience and responsible charge of engineering work. See ATTACHMENT 1 for the required experience in the required disciplines.

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 OEO (Battelle) will be responsible for compiling and entering comments into DrChecks. The 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 OEO (Battelle);
- 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.

5. MODEL CERTIFICATION AND APPROVAL

a. General. The computational models to be employed in the Bolivar Dam Major Rehabilitation Study have either been developed by or for the USACE. Model certification and approval for all identified planning models will be coordinated through the PCX as needed. Project schedules and resources will be adjusted to address this process for certification and PCX coordination.

b. Models. The models to be employed in the completion of this project are:

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

6. REVIEW SCHEDULES AND COSTS

a. ATR Schedule and Cost. The estimated cost for ATR is $80,000. ATR will occur during key stages in the DDR and the P&S. The ATR team is invited to take part in weekly team meetings and monthly vertical team meetings. ATR of the DDR is scheduled to begin 27 May 2010 and be

complete by 28 Jun 2010 including resolution of all comments. ATR of the P&S is scheduled to occur in FY2011.

b. IEPR Schedule and Cost. The estimated cost for Type II IEPR (SAR) is in the range of $300,000 to $400,000. The current project schedule provides for IEPR of the DDR to occur in the May 2010 timeframe with resolution of all comments in the June 2010 timeframe and IEPR of the P&S to occur in FY2011. IEPR during the construction phase has not been scheduled at this time.

c. Model Certification/Approval Schedule and Cost. Not Applicable

7. PUBLIC PARTICIPATION

Since initiation of the Bolivar Major Rehabilitation Report in October 2005, numerous public meetings have been conducted. Close coordination with Tuscarawas County officials regarding the current condition of Bolivar Dam, the study efforts and implementation of interim risk reduction measures has occurred. As a result, Tuscarawas County updated their Emergency Evacuation Plan in June 2007. Portions of the Plan were utilized in March 2008 as a result of significant precipitation in the region. A scoping meeting for the Bolivar Major Rehabilitation Report was conducted with other agencies, including the U.S. Fish and Wildlife Service, on 19 June 2007. A public meeting was conducted on 28 May 2008 to inform the public of the current condition of Bolivar Dam, the progress of the Major Rehabilitation Report, the entire implementation schedule for the project and to solicit public review and comment on the Draft Environmental Assessment and Major Rehabilitation Report. Additional public meetings will be conducted, as necessary, through the DDR, plans and specifications and construction phases. Information will also be conveyed to the public through the use of press releases and media interviews as necessary and through the use of posting information to the Huntington District's web site. The project manager will also schedule office hours at the project site after construction is initiated.

8. PCX COORDINATION

This review plan will be coordinated with the USACE Risk Management Center (RMC) and the Flood Risk Management PCX. No additional authorization by Congress is anticipated to be required to address the dam safety issues at Boliver.

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, PCX, 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:

- [redacted], Huntington District Project Manager [redacted]
- [redacted], Huntington District Lead Engineer [redacted]
- [redacted], Huntington District Chief, Quality Management [redacted]
- [redacted], Great Lakes and Ohio River Division Dam Safety Program Manager [redacted]

- [redacted], Flood Risk Management Center of Expertise [redacted]

ATTACHMENT 1: TEAM ROSTERS

TABLE 1: Product Delivery Team		
Functional Area	**Name**	**Office**
Project Manager	[redacted]	CELRH
Lead Engineer / Civil Design	[redacted]	CELRH
Formulation	[redacted]	CELRH
Real Estate	[redacted]	CELRH
Contracting	[redacted]	CELRH
Operations	[redacted]	CELRH
Public Affairs	[redacted]	CELRH
Geology	[redacted]	CELRH
Economics	[redacted]	CELRH
Cost Engineering	[redacted]	CELRH
Hydrology and Hydraulics	[redacted]	CELRH
Structural	[redacted]	CELRH
Dam Safety	[redacted]	CELRH
Geotechnical	[redacted]	CELRH
Mechanical Engineer	[redacted]	CELRH
Archeology	[redacted]	CELRH
Geotechnical	[redacted]	CELRH
Construction	[redacted]	CELRH
Environmental	[redacted]	CELRH
HTRW	[redacted]	CELRH

TABLE 2: Agency Technical Review Team		
NAME	**DISCIPLINE**	**OFFICE**
[redacted]	Dam Safety/Geotechnical/Team Leader	CENAE
[redacted]	Civil/Site	CELRP
[redacted]	Hydrology and Hydraulics	CELRP
[redacted]	Construction	CELRP
[redacted]	Environmental/Archeological	CELRN
[redacted]	Structural	CELRP
[redacted]	Mechanical	CENWW
[redacted]	Cost Engineering	CENWW
[redacted]	Cost Engineering	CENWW
[redacted]	Engineering Geology	CELRL

TABLE 3: Independent External Peer Review Expert Reviewers		
NAME	**DISCIPLINE**	**EXPERIENCE**
TBD	Geotechnical Engineer	Recognized expert in the field of geotechnical engineering analysis, design and construction of embankment dams and levees on alluvial foundations with extensive experience in subsurface investigations, soil mechanics, retaining wall design, seepage and slope stability evaluations, erosion protection design and construction and earthwork construction. The Geotechnical Engineer shall be a licensed professional engineer.
TBD	Instrumentation Engineer	Senior-level person with extensive experience in the type of geotechnical monitoring being performed on the project. The Engineer shall have a minimum of two years experience in installing, maintaining and monitoring instruments for geotechnical engineering purposes. In addition, the Engineer shall also have a minimum of two years experience in all aspects of Automated Data Acquisition Systems (ADAS). First hand knowledge of Inclinometers, Piezometers and Velocity Flow Meters as well as the collection / reduction / presentation / evaluation of instrumentation data from these type instruments is critical to the position. Experience with the USACE Application WinIDP would also be highly beneficial.
TBD	Hydraulic Engineer	Extensive experience in the analysis and design of hydraulic structures related to flood control reservoirs. The Hydraulic Engineer must have performed work in hydrologic analysis and design of hydraulic structures including spillways, outlet works, and stilling basins. The Hydraulic Engineer must demonstrate knowledge and experience with physical modeling and the application of data from physical model testing to the design of stilling basins and scour protection, and in the ability to coordinate, interpret, and explain testing results with other engineering disciplines, particularly structural engineers, geotechnical engineers, and geologists. In regard to hydrologic analysis, the Hydraulic Engineer must demonstrate knowledge and experience with the routing of inflow hydrographs through multipurpose flood control reservoirs utilizing multiple discharge devices, including gated

		sluiceways and gated spillways.
TBD	Engineering Geologist	Senior-level person with extensive experience in the type of work being performed. The Engineering Geologist shall be proficient in assessing seepage through sedimentary rock, exploration and testing, grouting, and instrumentation. The Engineering Geologist shall be experienced in the design of cutoff walls and must be knowledgeable in mix designs and materials for concrete cutoffs. The Engineering Geologist shall have a working knowledge of all applicable USACE design criteria and shall be a licensed Professional Geologist.
TBD	Civil Engineer	Extensive experience in the design, layout, and construction of flood control structures including dams and levees. Demonstrated knowledge regarding hydraulic structures, erosion control, earthwork, concrete placement, design of access roads, and relocation of underground utilities. The Civil Engineer shall be a licensed Professional Engineer, familiar with USACE regulations and industry building codes.
TBD	Economist	Degrees in economics or a related field and should be able to evaluate the appropriateness cost/benefit analysis used. Experience dealing directly with HEC-FDA is encouraged. The Economist should also be familiar with risk and uncertainty analysis (i.e. Monte Carlo type simulation). Economist should also have experience with National Economic Development analysis procedures, particularly as they relate to flood risk management projects. At least 5 years experience directly working for or with USACE is highly recommended.

Vertical Team

The Vertical Team consists of members of the HQUSACE and Great Lakes & Ohio River Division Offices. The Vertical Team plays a key role in facilitating execution of the project 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 project via monthly telecons as required and will attend In Progress Reviews and other key decision briefings as required. The District Liaison [redacted], CELRD-PDS-H, is the District PM's primary Point of Contact on the Vertical Team.

ATTACHMENT 2: ATR CERTIFICATION TEMPLATE

COMPLETION OF AGENCY TECHNICAL REVIEW

The District has completed the Bolivar Dam, Major Rehabilitation Project (*DDR / P&S*). Notice is hereby given that an agency technical review has been conducted as defined in the Review Plan that is appropriate to the level of risk and complexity inherent in the project. During the agency technical review, compliance with established policy principals and procedures, utilizing justified and valid assumptions, was verified. This included review of: assumptions; methods, procedures, and material used in analysis; alternatives evaluated; the appropriateness of data used and level obtained; and reasonableness of the result, including whether the product meets the customer's needs consistent with law and existing Corps policy. The agency technical review team members were from outside the home district. The ATR team leader was from outside the home MSC.

(Signature)_____ (Date)_____
Agency Technical Review Team Leader

(Signature)_____ (Date)_____
Project Manager

CERTIFICATION OF AGENCY TECHNICAL REVIEW

Significant concerns and the explanation of the resolution are as follows:

(Describe the major technical concerns, possible impact, and resolution)

As noted above, all concerns resulting from the agency technical review of the Bolivar Dam, Major Rehabilitation Project (*DDR / P&S*). have been fully resolved.

(Signature)_____ (Date)_____
Chief, Engineering & Construction Division

ATTACHMENT 3: Type I IEPR Waiver

DEPARTMENT OF THE ARMY
U.S. ARMY ENGINEER DIVISION, GREAT LAKES AND OHIO RIVER
CORPS OF ENGINEERS
550 MAIN STREET
CINCINNATI, OH 45202

APR 10 2009

CELRD-DB

MEMORANDUM FOR Commander, Huntington District (CELRH-DE), 502 Eighth Street, Huntington, WV 25701-2070

SUBJECT: Request for Waiver of Type I Independent External Peer Review (IEPR) of Bolivar Dam Major Rehabilitation Report

1. Reference:

a. CELRH-DE memorandum, same subject, dated 26 January 2009

b. EC 1105-2-410, 22 August 2008, Review of Decision Documents

c. EC 1165-2-209 Draft, 6 January 2009, Civil Works Review Policy

2. Reference 1.a. provided a summary of Bolivar Dam Major Rehabilitation Report and requested a waiver of a Type I Independent External Peer Review (IEPR) for that report.

3. Paragraph 6.d. of references 1.b. states that the decision to conduct an IEPR rests with the MSC Commander. Furthermore, paragraph 7.f. of reference 1.c. says, "the vertical team (involving district, MSC, RMO, and HQ members) will advise the MSC Commander as to whether IEPR is appropriate. The decision to conduct IEPR rests with the MSC Commander."

4. Based on advice from the vertical team, I have determined that a Type I IEPR is not required for Bolivar Dam Major Rehabilitation provided that:

a. The work does not require an Environmental Impact Statement (EIS);

b. The work is within the footprint of the existing dam;

c. The work is for an activity for which there is ample experience within the Corps of Engineers and industry to treat the activity as being routine; and

d. A Type II, Independent External Peer Review (Safety Assurance Review), with the addition of a review of economics of the alternatives, is started as one of the first activities in the design phase of the modification.

5. POC for this item is [redacted] CELRD-RBT, [redacted]

[redacted]
Brigadier General, U.S. Army
Commanding