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DEPARTMENT OF THE ARMY
U.S. ARMY ENGINEER DIVISION, GREAT LAKES AND OHIO RIVER
CORPS OF ENGINEERS
550 MAIN STREET
CINCINNATI, OH 45202-3222

9 July 2013

CELRD-PD-O

MEMORANDUM FOR Commander, U.S. Army Engineers, Huntington District, Attention: Amy Jo Riffee (CELRH-EC-Q), 502 Eighth Street, Huntington, WV 25701

SUBJECT: Updated Review Plan for Bluestone Dam Safety Assurance (DSA) Project and Dam Safety Modification Report Supplement

1. The attached Updated Review Plan (RP) for Bluestone Dam Safety Assurance (DSA) Project and Dam Safety Modification Report Supplement was presented to the Great Lakes and Ohio River Division for approval in accordance with EC 1165-2-214 "Civil Works Review" dated 15 December 2012.

2. The RP defines the location, scope, and level of peer review for the activities to be performed for the subject project. The USACE LRD Review Management Organization (RMO) has reviewed the attached RP and concurs that it describes the scope of review for work phases and addresses all appropriate levels of review consistent with the requirements described in EC 1165-2-214.

3. I concur with the recommendations of the RMO and approve the enclosed updated RP for the Bluestone Dam Safety Assurance (DSA) Project and Dam Safety Modification Report Supplement.

4. The District is requested to post the RP to its website. Prior to posting, the names of all individuals identified in the RP should be removed.

5. If you have any questions please contact Dr. Hank Jarboe, CELRD-PD-P, at (513) 684-6050 or Robert Iseli, CELRD-PD-O at (513)684-2997.

Margaret W. Burcham
MARGARET W. BURCHAM
Brigadier General, USA
Commanding

Encls
1. Memo : CELRH-EC-GW, dated 25 February 2013
2. Review Plan

DECISION AND IMPLEMENTATION PHASE REVIEW PLAN

Bluestone Dam Safety Assurance Project
Dam Safety Modification Report Supplement and
Implementation Documents for Phases 3 and 4

Huntington District

MSC Approval Date: 9 July 2013
(Original Approval Date – February 2011)

Last Revision Date: 16 July 2013

US Army Corps
of Engineers ®

DECISION AND IMPLEMENTATION PHASE REVIEW PLAN

Bluestone Dam Safety Assurance Project
Dam Safety Modification Report Supplement

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1. PURPOSE AND REQUIREMENTS

a. Purpose. This Review Plan defines the scope and level of peer review associated with the decision and implementation documents being prepared for Bluestone Dam, which is located in Hinton, West Virginia. This Review Plan outlines the peer review requirement for both the preparation of a Dam Safety Modification Report Supplement (DSMRS) and the design and implementation of features approved by the Dam Safety Assurance (DSA) Evaluation Report completed in 1998. Given Phases 1, 2A, and 2B associated with the DSA Evaluation Report have been completed, this Review Plan only addresses approved features being accomplished under Phases 3 and 4 in terms of design and implementation. A detailed explanation of construction phases is contained in Section 3 of this Review Plan.

b. References

(1) Engineering Circular (EC) 1165-2-214 (formerly EC 1165-2-209), Civil Works Review, 15 Dec 2012
(2) EC 1105-2-412, Assuring Quality of Planning Models, 31 Mar 2011
(3) Engineering Regulation (ER) 1110-1-12, Quality Management, 30 Sep 2006
(4) ER 1105-2-100, Planning Guidance Notebook, Appendix H, Policy Compliance Review and Approval of Decision Documents, Amendment #1, 20 Nov 2007
(5) ER 1110-2-1150, Engineering and Design for Civil Works Projects, 31 August 1999
(6) ER 1110-2-1156, Safety of Dams – Policy and Procedures, 28 October 2011 (and 31 Oct 12 Draft)
(7) Bluestone DSA Project #112490 Electronic Project Management Plan (e-PMP) document on https://pmbp.usace.army.mil/portal
(8) LRD Regional ISO 9001 Manual in Qualtrax

c. Requirements. This review plan was developed in accordance with EC 1165-2-214, 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). The EC outlines four general levels of review: District Quality Control/Quality Assurance (DQC), Agency Technical Review (ATR), Independent External Peer Review (IEPR), and Policy and Legal Compliance Review. In addition to these levels of review, decision documents are subject to cost engineering review and certification (per EC 1165-2-214), planning model certification/approval (per EC 1105-2-412), Quality Control and Consistency (QCC) review (per ER 1110-2-1156), and Senior Oversight Group (SOG) review (per ER 1110-2-1156).

2. REVIEW MANAGEMENT ORGANIZATION (RMO) COORDINATION

The RMO is responsible for managing the overall peer review effort described in this Review Plan. The RMO for decision and implementation documents is typically either a Planning Center of Expertise (PCX) or the Risk Management Center (RMC), depending on the primary purpose of the document. The RMO for the peer review effort described in this Review Plan is the RMC with facilities located in Denver, Colorado and Pittsburgh, Pennsylvania.

The RMO will coordinate with the Cost Engineering Mandatory Center of Expertise (MCX) to ensure the appropriate expertise is included on the review teams to assess the adequacy of cost estimates, construction schedules and contingencies.

3. PROJECT INFORMATION

a. Decision Document. The DSMRS being prepared for Bluestone Dam, which is located in Summers County, West Virginia within the New River Basin, will serve as a supplement to the original DSA Evaluation Report approved in 1998. The DSMRS will include a more detailed and complete baseline risk estimate, which will focus on residual risk during two snapshots in time – following the completion of Phase 3 construction and following the completion of Phase 4 construction. After quantifying residual risk, alternative plans will be formulated, evaluated, and compared in accordance with tolerable risk guidelines, as-low-as-reasonably-practicable (ALARP) considerations, and essential USACE policies and regulations and a plan for implementation will be tentatively selected. While life safety and the reduction of risk to the public will govern the decision making process, economic and environmental consideration will also be taken into account during the plan formulation process. The overarching goal of the supplement will be to identify and tentatively select a plan for reducing risk to a tolerable level upon completion of the project.

Since no additional authorization by Congress is required to address dam safety issues, the DSMRS will be prepared in accordance with ER 1110-2-1156. As part of this effort, a supplement to the original Environmental Impact Statement (EIS) will also be prepared. The USACE Dam Safety Officer (DSO) has been delegated approval authority from the Assistant Secretary of the Army for Civil Works (ASA(CW)) and is the responsible approval official for Dam Safety Modification Reports. The District and MSC DSOs along with the chairman of the HQUSACE Dam Safety Senior Oversight Group (SOG) will sign a memorandum recommending approval once the review process is completed. This memorandum will document all agency requirements, certifications, and reviews have been completed and all National Environmental Policy Act (NEPA) compliance requirements have been satisfied. Once the USACE DSO has approved the DSMRS and executes the Record of Decision (ROD), the USACE and MSC Commanders along with the ASA (CW) will be notified.

b. Implementation Documents. Implementation documents covered within this Review Plan include Design Documentation Reports and plans and specifications for Phases 3 and 4. A Design Documentation Report (DDR) provides the technical basis for the plans and specifications and serves as a summary of the final design. According to ER 1110-2-1150, the approval level for a DDR is at the District Command. While a single DDR covering Phases 3 and 4 was initially being prepared, the decision was made to separate the design documentation in order to expedite the construction of Phase 3. The Phase 3 DDR is underway while the Phase 4 DDR is complete. While DDRs are prepared in support of plans and specifications, this type of document cannot be completely finalized until plans and specifications and construction are completed.

Plans and specifications define construction requirements. Plans and specifications for Phase 3 were completed and the construction contract was awarded in September 2010. Plans and specifications for Phase 4 were completed in June 2012 and the construction contract was awarded September 2012.

Implementation documents being prepared for Phases 3 and 4 do not require any additional NEPA compliance documentation as features being implemented under these phases fall under the

purview of the Environmental Impact Statement prepared in conjunction with the Bluestone DSA Evaluation Report completed in 1998.

c. Project Description.

BACKGROUND: Bluestone Dam is located in southern West Virginia in Summers County within the New River Basin, which is a sub-basin of the Kanawha River Basin. Bluestone Dam is located approximately one and a half miles upstream of the City of Hinton and a half mile upstream of the confluence of the New and Greenbrier Rivers. The project began operations in 1949 and controls an approximate 4,600 square mile drainage area upstream of the dam (See Figure 1).

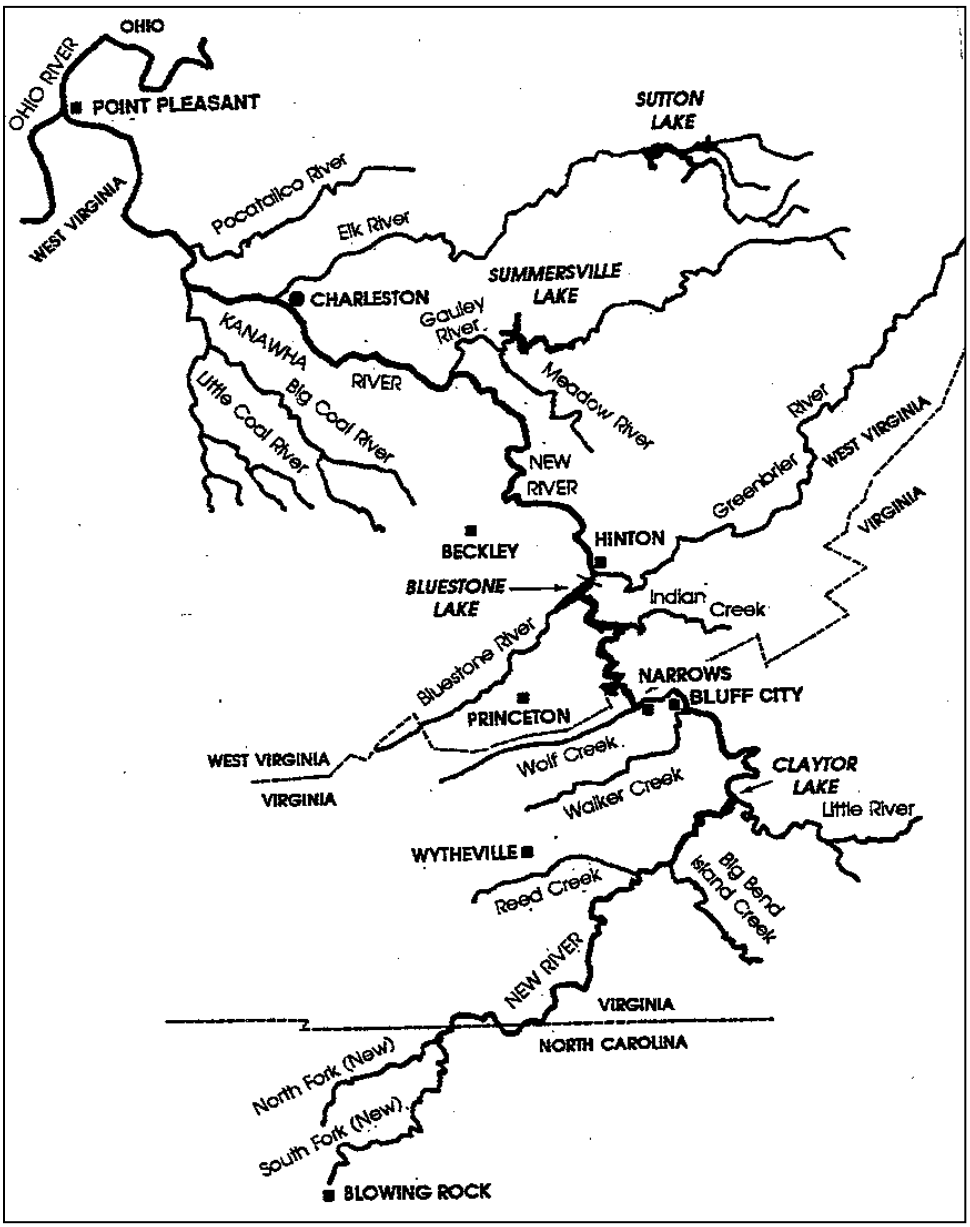


Figure 1: Kanawha River Basin with Bluestone Dam Drainage Area

Bluestone Dam and reservoir was authorized by Executive Order 7183 in September 1935 and the Flood Control Acts of 1936 and 1938 for the purposes of flood control and power development. The stated purposes were later expanded under the Flood Control Act of 1944 to include recreation activities and under the Fish and Wildlife Coordination Act of 1958 to include fish and wildlife enhancement. Section 102(ff) of the Water Resource Development Act (WRDA) of 1992, as amended by Section 357 of WRDA 1996, further modified the original project authorization to address the accumulation and disposal of drift and debris at the project.

Construction of the Bluestone project was started in January 1942 and continued until March 1944. The War Production Board stopped the project construction for the duration of World War II. The project resumed construction in 1946 and was completed in December 1948. While the original plans for Bluestone Dam called for hydropower development, extensive electric power development during wartime resulted in a decision to defer hydropower development at the project and use all available storage for flood control. This lowered the elevation of the lake 80 feet from 1490 to 1410. Bluestone Dam was constructed at full Federal expense for $28,600,000.

As seen in Figure 2, Bluestone Dam is a straight, concrete gravity structure with an overall length of 2,060 feet and a maximum height of 165 feet above the streambed. Discharge capacity of the existing structure consists of gated sluices and a gated auxiliary spillway. The spillway section is 790 feet long and includes 21 bays with vertical lift gates. The total design discharge capacity of the dam is 430,000 cfs. Operation of the reservoir is by 16 gated sluices with a total discharge capacity of 72,000 cfs.

Figure 2: Bluestone Dam

During the planning of Bluestone Dam, a hypothetical flood was created by shifting the center of the hurricane storm of July 1916 to the New River drainage basin. This hypothetical flood, the Spillway Design Flood, had an estimated peak inflow of 430,000 cubic feet / second (cfs). Since the completion of Bluestone Dam, the National Weather Service (NWS) has developed estimates of Probable Maximum Precipitation applicable to the New River Basin. Precipitation estimates were coupled with detailed terrain, soil, and runoff data and other information to develop a new design flood. The resultant flood – the Probably Maximum Flood (PMF) – has an estimated peak flow of

1,086,000 cfs, which is more than double the peak of the original design inflow. In order to address this hydrologic deficiency, a Dam Safety Assurance (DSA) Evaluation Report and EIS was prepared and later approved in 1998.

The plan approved under the 1998 decision document is currently under construction. This plan modifies Bluestone Dam to safely withstand the PMF. Features of the approved plan include: modification of the six hydropower penstocks to supplement the discharge capacity; parapet wall on top of the dam; an additional gravity monolith on the east abutment; a floodgate closure across State Route 20 on the west abutment; removable closures at each end of the spillway; high-strength, multi-strand anchors; mass concrete thrust blocks against the downstream face of the dam; and scour protection downstream of the penstocks.

In June 2005, a Screening Portfolio Risk Assessment (SPRA) was completed on Bluestone Dam. During this assessment, Bluestone Dam was classified as a Dam Safety Action Class (DSAC) II project. ER 1110-2-1156 defines a Class II project as URGENT and characterizes this class as FAILURE INITIATION FORSEEN. Class II is assigned to dams where failure could begin during normal operations or be initiated by the consequence of an event.

In July 2008, a risk assessment team comprised of members of the U.S. Bureau of Reclamation and the Corps Risk and Reliability Directorate of Expertise Cadre performed a Potential Failure Mode Analysis (PFMA) and prepared a qualitative risk assessment. The findings of this effort identified five dam safety concerns – scour, factors of safety, rock strength, loss of life, and flood frequency curves – and the following potentially-significant failure modes:

(1) Sliding Stability of Spillway Monoliths
(2) Penstock Erosion
(3) Failure of Non-overflow Monoliths
(4) Sliding Stability of Spillway Sections due to Stagnation Pressures
(5) Overtopping of Spillway Left Training Wall leading to Monolith Instability
(6) Cavitation of the Spillway Surface

Ultimately, the assessment concluded residual risk following the completion of Phase 2C was unacceptable and expedited action was needed. As a result, a workshop was held in October 2008 in order to reach a resolution for addressing the identified issues of concern and failure modes. While ongoing design and construction efforts of features approved under the DSA Evaluation Report address many of the identified issues of concern and failure modes, the District was instructed to prepare a DSMRS examining alternatives for reducing risk associated with the failure modes not covered by the 1998 decision document. These failure modes are predominately related to the spillway component of the dam.

The DSMRS will serve as a supplement to the original DSA decision document and include a more detailed and complete baseline risk estimate. This baseline risk estimate will focus on residual risk during two snapshots in time – following the completion of Phase 3 construction and following the completion of Phase 4 construction. After quantifying residual risk, alternative plans will be formulated, evaluated, and compared in accordance with tolerable risk guidelines, ALARP considerations, and essential USACE policies and regulations and a plan for implementation will be tentatively selected. While life safety and the reduction of risk to the public will govern the decision making process, economic and environmental consideration will also be taken into account during

the plan formulation process. The overarching goal of the supplement will be to identify and tentatively select a plan for reducing risk to a tolerable level upon completion of the project.

Some of the alternatives which will be considered during the development of the DSMRS will include the construction of a remote control stilling basin, modification of the downstream weir, installation of a side channel spillway, construction of a flip bucket, addition of armor to the spillway floor, and modification to the crest grates. To assess the performance of these alternatives, physical models of the spillway will be utilized by the Corps' Engineering, Research, and Development Center (ERDC) in Vicksburg, Mississippi. While cost estimates have not been developed at this time, all cost associated with the development of the DSMRS and the implementation of the recommended plan will be Federally funded as Bluestone Dam was constructed prior to the enactment of cost sharing provisions and thereby did not require a non-Federal sponsor.

EXPLANATION OF CONSTRUCTION PHASES: Construction of the DSA project has been divided into phases, briefly described as follows.

Phase 1 contract was awarded in September 2000 for approximately $20M. Features of Phase 1 included construction of a temporary two-lane bailey type bridge built over the stilling basin and glory hole for construction traffic. In addition, a mass concrete thrust block was built on the downstream side of monoliths 15-21. Six penstocks were extended and three of the six sacrificial bulkheads were installed. Construction of Phase 1 was completed in November 2004.

Phase 2A contract was awarded May 2004 for approximately $7.5M. Work included installing a swing gate closure across State Route 20, upgrading the access roadway to stilling basin, installing a new handicap fisherman pier on the west abutment, adding an east abutment gravity wall and relocating primary power and telephone lines. Construction of Phase 2A was completed in February 2007.

Phase 2B contract was awarded for $31M in May 2005. Phase 2B consisted of the installation of 150 high capacity anchors in critical monoliths and the installation of sacrificial bulkheads on the three remaining penstocks. Construction was originally scheduled to be complete in December 2009. However, American Recovery & Reinvestment Act (ARRA) funding was received and a modification to the contract was negotiated to include the installation of gallery drains and 66 additional anchors. Construction of Phase 2B was completed in November 2011.

Phase 2C was intended to complete all remaining actions necessary to carryout the 1998 DSA Evaluation Report. Following the risk assessment conducted in 2008, this nomenclature was abandoned and replaced with Phases 3, 4, and 5.

Phase 3 contract was awarded in September 2010 for approximately $49M. The purpose of this phase is to reduce the risk of scour and threat to the stability of the dam in the event the penstocks are used to increase discharge capacity. Work includes the installation of a scour pad immediately downstream of the penstock extension, construction of two training walls adjacent to each side of the scour pad, addition of five divider walls and two partial divider walls designed to separate flow of the penstock discharge, and the incorporation of an ogee section and baffle blocks with an end sill into the scour pad. A modification to the Phase 3 contract has been issued to reduce the height of the divider walls and add 12 anchors in the existing right stilling basin training wall.

Phase 4 contract was awarded in September 2012 for approximately $55M. This phase of work includes installing approximately 278 high strength steel strand anchors in the spillway and non-overflow monoliths.

Phase 5 will be used to designate the design and construction activities associated with the remaining features approved by the DSA Evaluation Report (i.e. parapet wall, anchors within the apron, and vertical extensions of the spillway stilling basin training walls) and the plan recommended within the DSMRS. It is important to note the remaining features approved by the DSA Evaluation Report may or may not be implemented depending on the outcome of the DSMRS. The goal of the DSMRS, and thereby Phase 5, is to reduce risk to a tolerable level upon completion of the project.

d. Factors Affecting the Scope and Level of Review. Many of the alternatives, such as modifying the weir, constructing a remote control stilling basin, armoring the spillway floor, installing a side channel spillway, and adding a flip bucket, to be considered during the plan formulation process of the DSMRS are not novel measures. Alone these measures do not present high risk and would not require high levels of review. However, when considered with respect to dam safety concerns, possible failure modes, and ongoing construction efforts, additional modification of the dam would require careful consideration. Furthermore, design and construction of projects where potential hazards pose a significant threat to human life require a high level of review. The remainder of this section will present information regarding the factors affecting the appropriate scope and level of review for the DSMRS and implementation documents for Phases 3 and 4.

- Bluestone Dam has unacceptable risks of failure, and the Imminent Failure Flood (IFF) is currently well below design level. The penstocks have been retrofitted with sacrificial bulkheads to provide additional discharge capacity for the dam. In the event the penstocks must be used to increase discharge capacity to reduce the possibility of reaching or exceeding the IFF, control of the dam cannot be regained until the pool reaches the invert of the penstock at elevation 1410. Without modification of the spillway to address scour and cavitation concerns, the probability of utilizing the penstocks is unacceptably high. Currently, the dam functions well below the IFF level.
- Failure of Bluestone Dam would have significant economic, environmental, and social effects. During a PMF event, dam failure is estimated to have significant loss of life associated with a population at risk of approximately 175,000. Critical facilities and infrastructure located downstream would also be impacted. Impacts associated with inundation at chemical facilities would have devastating effects both economically and to health and human safety.
- According to the US Fish and Wildlife Service, the tailwater area is designated as a Resource 1 Habitat. Habitats of this nature are considered of high value for evaluation species and are unique and irreplaceable on a national basis. Modification of the spillway may require work outside the footprint of the existing project – impacting the New River, an invaluable resource.
- Operation of the project during the construction of Phase 5 will likely be challenging depending on the recommendation of the DSMRS. If modification of the spillway is necessary and sluice gates cannot be used, it may become necessary to route flow through the penstocks, which are retrofitted with sacrificial bulkheads instead of operational gates.
- Experience gained from more than ten years in planning, design, and construction of the Bluestone DSA project have not proven controversial to the public except with certain very local issues primarily concerning construction traffic and similar effects. As a result, significant public

dispute regarding the plan recommended within the DSMRS or the implementation of Phases 3 and 4 is not anticipated.

- Throughout the implementation of the approved plan within the DSA Evaluation Report, interagency interests have been typical of any water resource project (e.g. fish and wildlife, recreation, etc.) with the exception of emergency service agencies. Given the risk associated with the dam, emergency services agencies have been more involved and are continually apprised of the project. Considering the economic and loss of life consequences associated with dam failure and the potential impacts to the New River if the recommended plan requires work outside the existing footprint of the project, the DSMRS will likely generate significant interagency interest.
- A peer review by independent experts will not likely be requested by the Governor of West Virginia or the head of a Federal or State agency.
- Additional congressional authorization is not necessary to implement Phases 3 and 4 or the plan recommended by the DSMRS.
- Planning, engineering, and design of the recommended alternative plan within the DSMRS will use models and methods common to USACE practices and will not require influential scientific information.
- Planning, engineering, and design of Phases 3 and 4 used models and methods common to USACE practices. Internal resources were supplemented by outside experts as necessary.
- Construction of Phases 3 and 4 are scheduled to overlap and coordination of lay-down areas and construction work limits with multiple contractors could be challenging.
- Phase 5 construction is scheduled to commence following the completion of Phase 4; therefore, no overlapping of construction phases or contractors is anticipated during the implementation of the plan recommended by the DSMRS.
- While a cost estimate has not been developed at this time, the recommended plan associated with Phase 5 will require work within the spillway and will likely exceed the threshold limit for Type I IEPRs of $45M.

e. In-Kind Contributions. Products and analyses provided by non-Federal sponsors as in-kind services are subject to DQC, ATR, and IEPR. Given Bluestone Dam was constructed prior to the enactment of cost sharing provisions and did not require a non-Federal sponsor, all work under the dam safety project will be completed at full Federal expense and will not be subject to in-kind contributions.

4. DISTRICT QUALITY CONTROL (DQC)

All work products and reports, evaluations, and assessments shall undergo 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). The home district shall manage DQC. Documentation of DQC activities is required and should be in accordance with the Quality Manual of the District and the home MSC.

a. Decision Document. Throughout the development of the DSMRS, DQC will be handled in the following manner:

(1) **Documentation of DQC.** Following the completion of DQC by the PDT members and their respective counterparts as necessary, the PDT will sign a certification sheet documenting that the methodology employed during the development of the DSMRS was in compliance

with current Corps policies and regulations. Members outside the PDT reviewing products for quality control will sign a separate certification sheet documenting their review. In addition, documentation of the DQC review of the 100% Draft DSMRS will be accomplished using DrChecks. Upon request, both certification sheets along with a DrChecks report showing all comments and resolutions will be provided to the ATR team prior to their review of the draft DSMRS.

(2) **Products to Undergo DQC.** DQC will be performed throughout the development of the DSMRS. Limited reviews will be performed by the PDT members and their respective counterparts as necessary following the completion of the baseline risk estimate and the transmittal packages associated with the Risk Reduction and Management Measures Identification Meeting, Risk Management Plan Meeting, and Tentatively Selected Plan Meeting. An additional DQC review will be held once the engineering analysis and risk assessment of the final array of alternatives has been completed and when the DSMRS is 70% complete. A more comprehensive DQC review will be conducted by all PDT members and their respective counterparts upon completion of the 100% Draft DSMRS including NEPA /environmental compliance documentation and technical appendices.

(3) **Required DQC Expertise.** All PDT members are expected to perform a comprehensive review of the 100% Draft DSMRS prior to ATR to assure the overall coherence and integrity of the DSMRS and supporting documentation. In addition, PDT counterparts with journeyman or senior level of experience will also be asked to review their counterparts' respective sections of the products undergoing review. Counterparts should be selected from outside the PDT. The disciplines represented on the DQC team will reflect the significant disciplines involved in the planning and engineering and design effort. These disciplines include plan formulation, environmental, economics, geotechnical, geology, structures, hydrology and hydraulics, cost engineering, civil design, electrical and mechanical, construction, operations, and real estate.

b. Implementation Documents. Throughout the development of implementation documents for Phases 3 and 4, DQC will be handled in the following manner:

(1) **Documentation of DQC.** Historically, DQC has been accomplished through a series of "red-dot" reviews during which engineering counterparts perform design checks. According to local ISO procedures, 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 are annotated to show the initials of the designer and the checker and the date of action.

(2) **Products to Undergo DQC.** DQC has been completed for the plans and specifications, 50% DDR for Phases 3 and 4, and 100% DDR for Phase 4. The only remaining product requiring DQC is the 100% DDR for Phase 3.

(3) **Required DQC Expertise.** All design team members are expected to perform a comprehensive review of the implementation documents prior to ATR. In addition, design team counterparts with journeyman or senior level of experience will also be asked to review their counterparts' respective sections of the products undergoing review. Counterparts should be selected from outside the PDT. The disciplines represented on the

DQC team will reflect the significant disciplines involved in the engineering and design effort. These disciplines will be tailored to each product, but will likely include environmental, geotechnical, geology, structures, hydrology and hydraulics, cost engineering, civil design, electrical and mechanical, and construction.

5. AGENCY TECHNICAL REVIEW (ATR)

ATR is mandatory for all decision and implementation documents (including supporting data, analyses, environmental compliance documents, etc.). The objective of ATR is to ensure consistency with established criteria, guidance, procedures, and policy. The ATR will assess whether the analyses presented are technically correct and comply with published USACE guidance, and that the document explains the analyses and results in a reasonably clear manner for the public and decision makers. The ATR team will also examine DQC records and provide written comment in the ATR Report as to the apparent adequacy of the DQC effort for the associated product. ATR is managed within USACE by the designated RMO and is conducted by a qualified team from outside the home district that is not involved in the day-to-day production of the project/product. ATR teams will be comprised of senior USACE personnel and may be supplemented by outside experts as appropriate. The ATR team lead will be from outside the home MSC.

a. Decision Document. Throughout the development of the DSMRS, ATR will be handled in the following manner:

(1) **Products to Undergo ATR.** The 100% Draft DSMRS including NEPA/environmental compliance documentation and technical appendixes will require ATR. Additional review of key interim products, such as the Baseline Risk Estimate and 70% Draft DSMRS, will be undertaken as necessary. In addition, a constructability review will be conducted by members of the ATR team once the final array of alternatives has been identified, but before the evaluation of alternatives has been completed. The ATR of the project cost estimate, construction schedules, and contingencies will be coordinated with the Cost Engineering MCX.

(2) **Required ATR Team Expertise.** The ATR team will be comprised of 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 and engineering and design effort. These disciplines include plan formulation, environmental, economics, geotechnical, geology, structures, hydrology and hydraulics, cost engineering, civil design, electrical and mechanical, construction, operations, and real estate. To assure independence, a leader will be chosen from a division other than LRD while the remaining ATR members will be selected from a district outside LRH. A list of the ATR members, disciplines and required expertise will be provided once identified by the RMO. The chief criterion for being a member of the ATR team is knowledge of the technical discipline and relevant experience. While the ATR Lead should have at least 15 years of experience, all remaining ATR team members should have a minimum of 10 years of experience.

ATR Team Members/Disciplines	Expertise Required
ATR Lead	The ATR lead should be a senior professional with extensive experience in preparing Civil Works decision documents and conducting ATR. The lead should also have the necessary skills and experience to lead a virtual team through the ATR process. The ATR lead may also serve as a reviewer for a specific discipline (such as planning, economics, cultural resources, etc). The ATR lead should also have a minimum of 15 years of experience.
Plan Formulation	The Plan Formulation reviewer should be a senior water resource planner with extensive experience associated with the six-step planning process outlined in ER 1105-2-100. In addition to having a strong understanding of the applicable guidance and policy governing the planning process, the reviewer should be familiar with ER 1110-2-1156 and the development of Dam Safety Modification Reports. The reviewer should be able to assess the plan formulation effort, ensure alternatives were evaluated with a sufficient level of detail, and confirm the recommended plan meets the study objectives. The Plan Formulation reviewer should have a minimum of 10 years of experience.
Economics	The Economics reviewer should have a strong understanding of economic models relative to flood risk management and dam safety projects. The reviewer should have experience with HEC-FDA and HEC-FIA and be familiar with the process of computing consequences associated with a dam failure. The Economics reviewer should have a minimum of 10 years of experience.
Environmental / NEPA Compliance	The Environmental / NEPA Compliance reviewer should have a strong background in inland riverine ecosystems (e.g. riparian, aquatic, wetland), NEPA and other State and Federal environmental laws and regulations. The reviewer should also have extensive experience in performing incremental cost analysis, developing appropriate mitigation measures, and evaluating environmental impacts and other social effects. The Environmental / NEPA Compliance reviewer should have a minimum of 10 years of experience.
Civil Design	The Civil Design reviewer should be a senior level, professionally registered civil engineer with extensive experience with civil site layout and dam safety projects. The Civil Design reviewer should also have a minimum of 10 years of experience.
Geotechnical Engineering	The Geotechnical reviewer should be a professionally registered engineer with extensive experience in subsurface investigations, soil mechanics, retaining wall design, erosion protection, and earthwork construction. The reviewer should also have a working knowledge of all applicable Corps of Engineers geotechnical design criteria and dam safety guidance. The Geotechnical reviewer should also have a minimum of 10 years of experience.
Engineering Geology	The reviewer should be a senior-level, professionally registered geologist with extensive experience in dam safety analysis. The

	reviewer should be proficient in assessing rock strengths and performing stability analyses. The reviewer should be experienced in the design of high strength anchors used to stabilize mass concrete gravity dams and structures. The reviewer should also have a working knowledge of all applicable Corps of Engineers design criteria and dam safety guidance. The Geologist reviewer should have a minimum of 10 years of experience.
Hydraulic Engineering	The H&H reviewer should be a professionally registered engineer with experience with engineering analysis related to flood risk management and dam safety projects. This reviewer should be familiar with standard Corps hydrologic and hydraulic computer models (HEC-RAS, HEC-HMS, & HEC-ResSim), and have experience with unsteady flow dam failure analysis modeling. The H&H reviewer should also be experienced in the analysis and design of hydraulic structures including spillways, outlet works, and stilling basins related to flood control reservoirs, and have knowledge and experience with the routing of inflow hydrographs through multipurpose flood control reservoirs utilizing multiple discharge devices, including gated sluiceways and gated spillways. The H&H reviewer should possess knowledge and experience with physical modeling and the application of data from physical model testing to the design of stilling basins and scour protection. The H&H reviewer should also have a minimum of 10 years of experience.
Structural Engineering	The Structural Engineer reviewer should be a senior level, professionally registered engineer with extensive experience with dam safety projects. The reviewer should be proficient in performing stability analyses and designing high strength anchors to stabilize mass concrete gravity dams and structures. The review should also have a working knowledge of all applicable Corps of Engineers design criteria and dam safety guidance. The Structural Engineer reviewer should have a minimum of 10 years of experience.
Electrical/Mechanical Engineering	The Electrical / Mechanical reviewer should be a professionally registered engineer with extensive knowledge of electrical works, gates and operating equipment on flood risk management dams. The Electrical / Mechanical reviewer should also have a minimum of 10 years of experience.
Cost Engineering	ATR of the project cost estimate is performed by the Walla Walla District Cost Center of Expertise. The Cost reviewer should have a minimum of 10 years of experience.
Engineering Construction	Reviewer should be a senior level, professionally registered engineer with extensive experience in the engineering construction field with particular emphasis on dam safety projects. The Construction reviewer should have a minimum of 10 years of experience.
Operations	Reviewer should be a senior level operations specialist with extensive experience working with the operations and maintenance of Flood Risk Management Dams. The Operations reviewer should have a minimum of 10 years of experience.

Real Estate	The reviewer should have experience in real estate issues associated with existing Corps projects, as well as a working knowledge of USACE real estate policy and regulation. The Real Estate reviewer should have a minimum of 10 years of experience.

(3) **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:

(i) The review concern – identify the product's information deficiency or incorrect application of policy, guidance, or procedures;
(ii) The basis for the concern – cite the appropriate law, policy, guidance, or procedure that has not be properly followed;
(iii) 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
(iv) The probable specific action needed to resolve the concern – identify the action(s) that the reporting officers 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 team coordination (the vertical team includes the district, RMO, MSC, and HQUSACE), and the agreed upon resolution. If an ATR concern cannot be satisfactorily resolved between the ATR team and the PDT, it will be elevated to the vertical team for further resolution in accordance with the policy issue resolution process described in either ER 1110-1-12 or ER 1105-2-100, Appendix H, as appropriate. Unresolved concerns can be closed in DrChecks with a notation that the concern has been elevated to the vertical team for resolution.

At the conclusion of each ATR effort, the ATR team will prepare a Review Report summarizing the review. Review Reports will be considered an integral part of the ATR documentation and shall:

- Identify the document(s) reviewed and the purpose of the review;
- 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;
- Describe the nature of their review and their findings and conclusions;
- Identify and summarize each unresolved issue (if any); 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.

ATR may be certified when all ATR concerns are either resolved or referred to the vertical team for resolution and the ATR documentation is complete. The ATR Lead will prepare a Statement of Technical Review certifying that the issues raised by the ATR team have been resolved (or elevated to the vertical team). A Statement of Technical Review should be completed, based on work reviewed to date, for the baseline risk assessment, draft report, and final report. A draft Statement of Technical Review Completion and Certification associated with the DSMRS is included in Attachment 2.

b. Implementation Documents. Throughout the development of the implementation documents for Phases 3 and 4, ATR will be handled in the following manner:

(1) **Products to Undergo ATR.** ATR has been completed for the plans and specifications, 50% DDR for Phases 3 and 4, and 100% DDR for Phase 4. The only remaining product requiring ATR is the 100% DDR for Phase 3.

(2) **Required ATR Team Expertise.** The ATR team responsible for reviewing the implementation documents associated with Phases 3 and 4 has been assembled. This team is comprised of senior USACE personnel (Regional Technical Specialists (RTS), etc.) with disciplines reflective of the engineering and design effort associated with Phases 3 and 4. These disciplines include civil design, geotechnical, geology, structures, hydrology and hydraulics, materials, and cost engineering. To assure independence, a leader was chosen from a division other than LRD while the remaining ATR members were selected from a district outside LRH. A list of the ATR members associated with the implementation of Phases 3 and 4 is available in Attachment 1. Listed below is the criterion from which the ATR team members were selected. It is important to note the ATR Lead also serves as the Geologist reviewer and all team members have a minimum of 10 years of experience.

ATR Team Members/Disciplines	Expertise Required
ATR Lead	The ATR lead should be a senior professional with extensive experience in preparing Civil Works decision documents and conducting ATR. The lead should also have the necessary skills and experience to lead a virtual team through the ATR process. The ATR lead may also serve as a reviewer for a specific discipline (such as planning, economics, cultural resources, etc). The ATR lead should also have a minimum of 15 years of experience.
Civil Design	The Civil Design reviewer should be a senior level, professionally registered civil engineer with extensive experience with civil site layout and dam safety projects. The Civil Design reviewer should also have a minimum of 10 years of experience.
Geotechnical Engineering	The Geotechnical reviewer should be a professionally registered engineer with extensive experience in subsurface investigations, soil mechanics, retaining wall design, erosion protection, and earthwork construction. The reviewer should also have a working knowledge of all applicable Corps of Engineers geotechnical design criteria and dam safety guidance. The Geotechnical reviewer should also have a minimum of 10 years of experience.
Engineering Geology	The reviewer should be a senior-level, professionally registered

	geologist with extensive experience in dam safety analysis. The reviewer should be proficient in assessing rock strengths and performing stability analyses. The reviewer should be experienced in the design of high strength anchors used to stabilize mass concrete gravity dams and structures. The reviewer should also have a working knowledge of all applicable Corps of Engineers design criteria and dam safety guidance. The Geologist reviewer should have a minimum of 10 years of experience.
Structural Engineering	The Structural Engineer reviewer should be a senior level, professionally registered engineer with extensive experience with dam safety projects. The reviewer should be proficient in performing stability analyses and designing high strength anchors to stabilize mass concrete gravity dams and structures. The review should also have a working knowledge of all applicable Corps of Engineers design criteria and dam safety guidance. The Structural Engineer reviewer should have a minimum of 10 years of experience.
Hydraulic Engineering	The H&H reviewer should be a professionally registered engineer with experience with engineering analysis related to flood risk management and dam safety projects. This reviewer should be familiar with standard Corps hydrologic and hydraulic computer models (HEC-RAS, HEC-HMS, & HEC-ResSim), and have experience with unsteady flow dam failure analysis modeling. The H&H reviewer should also be experienced in the analysis and design of hydraulic structures including spillways, outlet works, and stilling basins related to flood control reservoirs, and have knowledge and experience with the routing of inflow hydrographs through multipurpose flood control reservoirs utilizing multiple discharge devices, including gated sluiceways and gated spillways. The H&H reviewer should possess knowledge and experience with physical modeling and the application of data from physical model testing to the design of stilling basins and scour protection. The H&H reviewer should also have a minimum of 10 years of experience.
Materials	The Materials reviewer should be a senior level, professionally registered engineer or geologist. This reviewer should have extensive knowledge in mix designs and materials for mass concrete placement. This reviewer should also have experience in preparing plans and specifications and field applications of mass concrete placement. The Materials reviewer should have a minimum of 10 years of experience.
Cost Engineering	The Cost reviewer should have extensive experience preparing cost estimates for dam safety projects. Specific experience costing the installation of high strength anchors is desirable, but not required. The Cost reviewer should have a working knowledge of all applicable Corps of Engineers design criteria and dam safety guidance. The Cost reviewer should be a professionally registered engineer with a minimum of 10 years of experience.

(3) **Documentation of ATR.** The documentation of ATR for the implementation documents associated with Phases 3 and 4 will be handled in the same manner as the documentation of

ATR for the DSMRS. Please refer to Section 5.a.(3) for information regarding this process. Signed ATR certification sheets for Phases 3 and 4 are available in Attachment 2.

6. QUALITY CONTROL AND CONSISTENCY (QCC)

QCC is a detailed technical review similar to an ATR performed by a panel of experts from inside and outside the Corps of Engineers selected by the RMO. A QCC review is unique to dam safety projects and was briefly described in the version of ER 1110-2-1156 dated 28 October 2011. The revised version of ER 1110-2-1156, which has not been officially published at this time, no longer references the QCC review. The vertical team has directed the District PDT to conduct a QCC review of the baseline risk assessment and to perform a similar review with the vertical team of the 100% Draft DSMRS concurrent to ATR.

During the QCC review of the baseline risk assessment, the review panel will be given one month to review the products provided. Following the 30-day review, the PDT along with members of the risk assessment cadre will brief the QCC panel and work to resolve comments raised during the review. All comments will be documented in DrChecks. Implementation documents are not subject to QCC review.

7. INDEPENDENT EXTERNAL PEER REVIEW (IEPR)

IEPR may be required for decision documents under certain circumstances. 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. A risk-informed decision, as described in EC 1165-2-214, is made as to whether IEPR is appropriate. IEPR panels will consist of independent, recognized experts from outside of the USACE in the appropriate disciplines, representing a balance of areas of expertise suitable for the review being conducted. There are two types of IEPR:

- Type I IEPR. Type I IEPR reviews are managed outside the USACE and are conducted on project studies. Type I IEPR panels assess the adequacy and acceptability of the economic and environmental assumptions and projections, project evaluation data, economic analysis, environmental analyses, engineering analyses, formulation of alternative plans, methods for integrating risk and uncertainty, models used in the evaluation of environmental impacts of proposed projects, and biological opinions of the project study. Type I IEPR will cover the entire decision document or action and will address all underlying engineering, economics, and environmental work, not just one aspect of the study. For decision documents where a Type II IEPR (Safety Assurance Review) is anticipated during project implementation, safety assurance shall also be addressed during the Type I IEPR per EC 1165-2-214.

- Type II IEPR. Type II IEPR, or Safety Assurance Review (SAR), are managed outside the USACE and are conducted on design and construction activities for hurricane, storm, and flood risk management projects or other projects where existing and potential hazards pose a significant threat to human life. Type II IEPR panels will conduct reviews of the design and construction activities prior to initiation of physical construction and, until construction activities are completed, periodically thereafter on a regular schedule. The reviews shall consider the adequacy, appropriateness, and acceptability of the design and construction activities in assuring public health safety and welfare.

a. Decision Document. Throughout the development of the DSMRS, IEPR will be handled in the following manner:

(1) **Decision on IEPR.** A Type I IEPR will be conducted on the Bluestone DSMRS based upon the criteria set forth in EC 1165-2-214. The guidance states that Type I IEPR is mandatory if any of several factors are true. The first factor of "significant threat to human life" triggers the mandatory requirement for Bluestone. Therefore, a Type I IEPR is necessary on the DSMRS including NEPA /environmental compliance documentation and technical appendixes. Safety Assurance will also be evaluated during the Type I IEPR as a Type II IEPR will be necessary during the implementation of the plan recommended in the DSMRS.

(2) **Products to Undergo Type I IEPR.** A Type I IEPR will be performed on the 100% Draft DSMRS including the NEPA /environmental compliance documentation and technical appendixes. However, to allow for a more seamless review, the Type I IEPR will be initiated following the SOG review of the baseline risk estimate and will not be closed out until the DSMRS is approved.

(3) **Required Type I IEPR Panel Expertise.** The disciplines required for the Type I IEPR team will reflect the significant disciplines involved in the development of the DSMRS. The following table provides an estimate of the number of Type I IEPR panel members required and the respective level of expertise required. All Type I IEPR panel members should have a minimum of 20 years of experience and be recognized as an expert in their field.

Type I IEPR Panel Members/Disciplines	Expertise Required
Plan Formulation / Economist	The panel member should have a degree in planning or a related field and should have extensive experience in the plan formulation process, particularly with the Corps' six step planning process. Panelist should be familiar with evaluation of alternative plans for flood risk management. The panel member should have a degree in economics or a related field and should be able to evaluate the appropriateness cost/benefit analysis used. Experience dealing directly with HEC-FDA and HEC-FIA is encouraged. The panel member should also be familiar with risk and uncertainty analysis (i.e. Monte Carlo type simulation). Panel Member should also have experience with National Economic Development analysis procedures, particularly as they relate to flood risk management projects. While the panel members should have a minimum of 20 years of experience, at least five years of experience working directly for or with the Corps is highly recommended.
Environmental / NEPA Compliance	The panel member should have, at minimum, a Masters Degree in ecology/biology or related science. Panelist should also have particular knowledge of flood risk management, the National Environmental Policy Act (NEPA) process and requirements, and other pertinent environmental statutes and policies. The panel member should also have a minimum of 20 years of experience.
Engineering Geologist	The Panel Member should be a senior-level engineering geologist

	with a minimum of 20 years of experience in the type of work being performed. The Engineering Geologist should be proficient in assessing rock strengths and evaluating uplift for performing stability analyses using limit equilibrium. The Engineering Geologist should be experienced in the design of post tensioned high strength steel anchors to stabilize mass concrete gravity dams and structures. The Engineering Geologist should have a working knowledge of all applicable Corps of Engineers design criteria and should be a licensed Professional Geologist.
Hydraulic Engineer	The panel member should have 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. The Hydraulic Engineer should be a licensed professional engineer and at a minimum have a Masters Degree in hydrology and hydraulic or civil engineering. The panel member should also have a minimum of 20 years of experience.
Structural Engineer	The panel member should be a senior-level person with a minimum of 20 years of experience in the type of work being performed. The Structural Engineer should be proficient in performing stability analysis using limit equilibrium analysis and in the design of post tensioned high strength steel anchors to stabilize mass concrete gravity dams and structures. The Structural Engineer should be experienced in the stability analysis and structural design of mass concrete scour protection and stilling features including the design of baffles, end sills, and training walls. The Structural Engineer should have a working knowledge of all applicable Corps of Engineers design criteria. The Structural Engineer should be a licensed professional engineer and at a minimum have a Masters Degree in structural or civil engineering.

(4) **Documentation of Type I IEPR.** The IEPR panel will be selected and managed by an Outside Eligible Organization (OEO) per EC 1165-2-214, Appendix D. Panel comments will be compiled by the OEO and 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 5.a.(3) above. The OEO will prepare a final Review Report that will accompany the publication of the final decision document 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;
- Describe the nature of their review and their findings and conclusions; and
- Include a verbatim copy of each reviewer's comments (either with or without specific attributions), or represent the views of the group as a whole, including any disparate and dissenting views.

The final Review Report will be submitted by the OEO no later than 60 days following the close of the public comment period for the draft decision document. USACE shall consider all recommendations contained in the Review Report and prepare a written response for all recommendations adopted or not adopted. The final decision document will summarize the Review Report and USACE response. The Review Report and USACE response will be made available to the public, including through electronic means on the internet.

b. Implementation Documents. Throughout the development of Phases 3 and 4, IEPR will be handled in the following manner:

(1) **Decision on IEPR.** In accordance with EC 1165-2-214, 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. Given failure of Bluestone Dam would pose a significant threat to human life and would have considerable economic, environmental, and social effects, Type II IEPRs will be integrated throughout the development of Phases 3 and 4.

(2) **Products to Undergo Type II IEPR.** Type II IEPR has been completed on the 50% DDR for Phases 3 and 4 and the 100% DDR for Phase 4. Type II IEPR will also be performed on the 100% DDR for Phase 3, during the midpoint of construction for both Phases 3 and 4, and before substantial completion of construction for both Phases 3 and 4. Type II IEPRs were not conducted on the plans and specification packages for Phases 3 and 4 considering either the District team had adequate experience performing similar scopes of work or performance of the work was considered routine for industry.

(3) **Required Type II IEPR Panel Expertise.** Expert reviewers should have experience in design and construction of projects similar in scope to the Bluestone Dam project. Expert reviewers should 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. The following table provides an estimate of the number of Type II IEPR panel members required and the respective level of expertise required. All Type II IEPR panel members should have a minimum of 15 years of experience and be recognized as an expert in their field.

Type II IEPR Panel Members/Disciplines	Expertise Required
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, erosion protection design and construction and earthwork construction. The Geotechnical Engineer should be a licensed professional engineer and have a minimum of 15 years of experience.
Structural Engineer	Senior-level person with extensive experience in the type of work being performed. The Structural Engineer should be proficient in performing stability analysis using limit equilibrium analysis and in the design of post tensioned high strength steel anchors to stabilize mass concrete gravity dams and structures. The Structural Engineer should be experienced in the stability analysis and structural design of mass concrete scour protection and stilling features including the design of baffles, endsills, and training walls. The Structural Engineer should have a working knowledge of all applicable Corps of Engineers design criteria. The Structure Engineer should also be a licensed Professional Engineer with a minimum of 15 years of experience.
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. The Hydraulic Engineer should be a licensed professional engineer and have a minimum of 15 years of experience.
Engineering Geologist	Senior-level person with extensive experience in the type of work being performed. The Engineering Geologist should be proficient in assessing rock strengths and evaluating uplift for performing stability analyses using limit equilibrium. The Engineering Geologist should be experienced in the design of post tensioned high strength steel anchors to stabilize mass concrete gravity dams and structures. The Engineering Geologist should have a working knowledge of all applicable Corps of Engineers design criteria and should be a licensed Professional Geologist with a minimum of 15 years of experience.
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 should be a licensed Professional Engineer, familiar with USACE regulations and industry building codes. The Civil Engineer should also have a minimum of 15 years of experience.

Materials	Registered professional engineer or professional geologist with a minimum of Master's Degree in Materials Engineering. The Materials Engineer must have extensive knowledge in mix designs and materials for mass concrete placements. He should also have experience in preparing plans and specifications and field applications of mass concrete placements. The Materials reviewer should also have a minimum of 15 years of experience.

(4) **Documentation of Type II IEPR.** The Type II IEPR panel is responsible for preparing a review report. All review panel comments shall be entered as team comments representing the group not a specific individual. The team lead is to seek consensus, but where there is a lack of consensus, note the non-concurrence and why. A suggested report outline includes the following:

- Introduction;
- Composition of the review team;
- Summary of the review during design;
- Summary of the review during construction;
- Lessons learned in both the process and/or design and construction; and
- Appendices for conflict of disclosure forms and for comments to include any appendices for support analyses and assessments of the adequacy and acceptability of the methods, models, and analyses used.

All comments in the report will be finalized by the panel prior to their release to the District for each Type II IEPR review milestone.

The host District Chief of Engineering is responsible for coordinating with the RMO, for attending review meetings with the Type II IEPR panel, communicating with the agency or contractor selecting the panel members, and for coordinating the approval of the final report with the MSC Chief of Business Technical Division.

After receiving a report on a project from the peer review panel, the District Chief of Engineering, with full coordination with the Chiefs of Construction and Operations, shall consider all comments contained in the report and prepare a written response for all comments and note concurrence and subsequent action or non-concurrence with an explanation. The District Chief of Engineering shall submit the panel's report and the District's responses to the MSC Chief of Business Technical Division for final review and concurrence. The final report is then presented to the MSC Commander for approval. After MSC Commander approval, the report and responses shall be made available to the public on the District's website.

8. POLICY AND LEGAL COMPLIANCE REVIEW

All decision documents will be reviewed throughout the study process for their compliance with law and policy. Guidance for policy and legal compliance reviews is addressed in Appendix H, ER 1105-2-100. These reviews culminate in determinations that the recommendations in the reports and the supporting analyses and coordination comply with law and policy, and warrant approval or further recommendation to higher authority by the home MSC Commander. DQC, ATR, and QCC augment and complement the policy review processes by addressing compliance with pertinent published Army

policies, particularly policies on analytical methods and the presentation of findings in decision documents. Implementation documents are not subject to the same level of policy and legal compliance review required for decision documents.

9. SENIOR OVERSIGHT GROUP (SOG) REVIEW

Following the policy compliance review, the SOG will review the 100% Draft DSMRS and related documentation and recommend approval of the report following resolution of all comments. Interim SOG reviews will also occur following the completion of the baseline risk assessment and identification of the tentatively selected plan.

Based on ER 1110-2-1156, the SOG generally consists of the following members: Special Assistant for Dam and Levee Safety (Chair); Headquarter Dam Safety Program Manager (DSPM); Community of Practice (CoP) & Regional Representatives to include Geotechnical and Materials CoP Leader, Structural CoP Leader, Hydraulics and Hydrologic CoP Leader, Planning CoP Leader, and Construction CoP Leader; Regional representatives determined by Special Assistant for Dam and Levee Safety; Corps Business Line & Program Representatives to include Flood Damage Reduction and Navigation; Programs Integration Representative, Director, Risk Management Center; Dam Safety Modification Mandatory Center or Expertise; and any other Representatives determined by the Special Assistant for Dam and Levee Safety.

Once the Type I IEPR along with all other reviews associated with the 100% Draft DSMRS have been completed, the District and MSC DSOs along with the chairman of the HQUSACE Dam Safety SOG will sign a memorandum recommending approval of the DSMRS. This memorandum will state all agency requirements, certifications, and reviews have been completed and all National Environmental Policy Act (NEPA) compliance requirements have been satisfied.

It is important to note implementation documents are not subject to SOG review.

10. COST ENGINEERING MANDATORY CENTER OF EXPERTISE (MCX) REVIEW AND CERTIFICATION

According to EC 1165-2-214, all decision documents shall be coordinated with the Cost Engineering MCX, located in the Walla Walla District. The MCX will assist in determining the expertise needed on the ATR team and Type I IEPR team (if required) and in the development of the review charge(s). The MCX will also provide the Cost Engineering MCX certification. The RMO is responsible for coordination with the Cost Engineering MCX.

11. MODEL CERTIFICATION AND APPROVAL

EC 1105-2-412 mandates the use of certified or approved models for all planning activities to ensure the models are technically and theoretically sound, compliant with USACE policy, computationally accurate, and based on reasonable assumptions. Planning models, for the purposes of the EC, are defined as any models and analytical tools that planners use to define water resources management problems and opportunities, to formulate potential alternatives to address the problems and take advantage of the opportunities, to evaluate potential effects of alternatives and to support decision making. The use of a certified / approved planning model does not constitute technical review of the planning product. The selection and application of the model and the input and output data is still the responsibility of the users and is subject to DQC, ATR, and IEPR (if required).

EC 1105-2-412 does not cover engineering models used in planning. The responsible use of well-known and proven USACE developed and commercial engineering software will continue and the professional practice of documenting the application of the software and modeling results will be followed. As part of the USACE Scientific and Engineering Technology (SET) Initiative, many engineering models have been identified as preferred or acceptable for use on Corps studies and these models should be used whenever appropriate. The selection and application of the model and the input and output data is still the responsibility of the users and is subject to DQC, ATR, and IEPR (if required).

a. Planning Models. The following planning models are anticipated to be used in the development of the decision and implementation documents:

Model Name and Version	Brief Description of the Model and How It Will Be Applied in the Study	Certification / Approval Status
HEC-FDA 1.2.5 (Flood Damage Analysis)	The Hydrologic Engineering Center's Flood Damage Reduction Analysis (HEC-FDA) program provides the capability for integrated hydrologic engineering and economic analysis for formulating and evaluating flood risk management plans using risk-based analysis methods. The program will be used to evaluate and compare the future without- and with-project plans for dam safety at Bluestone Dam and aid in selecting a recommended plan to manage risk.	Certified
HEC-FIA Version 2.1 Beta: HEC-FIA (Flood Impact Analysis)	GIS-based software program that estimates direct damages (structure damage, content damage, and car damage), population at risk, and loss of life (daytime and nighttime) for a range of events (both dam failure and non-failure). The program uses inundation depth grids, river cross sections, and hydrographs to estimate flood depths and arrival times for each individual structure. Damage and population estimates are then determined using depth-damage curves, Census data, and the LifeSim methodology developed by the Utah State University's Institute for Dam Safety Risk Management. The program is currently under development by the Corps of Engineers Hydraulic Engineering Center.	Pending Certification
Habitat Evaluation Procedure (HEP) & Habitat Suitability Indices (HSI)	The purpose of HEP/HSI is to document the quality and quantity of available habitat for selected wildlife species. HEP and HSI may be used to evaluate direct in-stream impacts that would occur should an alternative be considered that would directly impact the New River (e.g. construct weir downstream of current stilling weir).	Approved for Use
IWR Planning Suite 2.0	IWR Planning Suite assists with plan formulation by combining user-defined solutions to planning problems and calculating the effects of each combination, or "plan." The program can assist with plan comparison by conducting cost effectiveness and incremental cost analyses, identifying the plans which are best financial investments, and displaying the effects of each on a range of decision variables. This model expands Version 1.0.11.0 by adding an "annualizer" module.	Certified

Engineering Models. The following engineering models are anticipated to be used in the development of the decision and implementation documents:

Model Name and Version	Brief Description of the Model and How It Will Be Applied in the Study	Approval Status
HEC-RAS 4.0 (River Analysis System)	The Hydrologic Engineering Center's River Analysis System (HEC-RAS) program provides the capability to perform one-dimensional steady and unsteady flow river hydraulics calculations. The program will be used for steady flow analysis to evaluate the future without- and with-project conditions along the New River and its tributaries.	HH&C CoP Preferred Model
HEC-GeoRAS 4.9.2	The Hydrologic Engineering Center's Geo River Analysis System (HEC-GeoRAS) is a set of procedures, tools, and utilities for processing geospatial data in ArcGIS that allows the preparation of geometric data for import into HEC-RAS for unsteady dam break analysis.	HH&C CoP Preferred Model
HEC-ResSIM 3.0	The Hydrologic Engineering Center's Reservoir Simulation program provides the capability to route flood hydrographs through a reservoir to determine resulting peak pool elevations and discharges. The program will be used to route historical hydrographs, PMF hydrograph and percentage PMF hydrographs through the Bluestone reservoir to update the Frequency of Filling curve.	HH&C CoP Preferred Model
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.	Cost Engineering Directory of Expertise (DX) Preferred Model
Crystal Ball Fusion Edition, Release 11.1.3.00	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.	Cost Engineering Directory of Expertise (DX) Preferred Model
DAMRAE (DAM safety Risk Analysis Engine)	DAMRAE (Dam safety Risk Analysis Engine) is a software tool developed by Utah State University's Institute for Dam Safety Risk Management for performing event tree risk model computations for dam safety risk analysis. DAMRAE includes a graphical user interface for developing and populating event tree inputs and functionalities for calculating and post-processing results. It provides estimates of the probabilities of various failure modes and their associated consequences for	RMC Preferred Model

	an existing dam. The post processing step allows the user to combine results for various loading types (e.g. flood and earthquake) and to make comparisons against USACE tolerable risk guidelines. It can be applied to analyze structural and non-structural risk reduction measures, considered as alternatives or staged measures, including obtaining estimates of the risk reduction and the cost effectiveness of risk reduction. The effects of changes in the event tree structure or changes to probability, state function relationships or consequences inputs on risk estimates and evaluations can be explored using a sensitivity analysis functionality incorporated in DAMRAE.	
Physical Model – Spillway Sectional Model 1:36	The sectional physical model for Phase 5 consists of a 114-ft-wide section through the spillway section of the dam (three full spillway gate bays, two full piers and sluices, and two half piers and sluices), a 1,200-ft reach of the tailrace and a 1,000-ft reach of the upper pool at an undistorted linear 1:36 scale. The model is constructed of sheet metal, aluminum, acrylic, plastic, and wood. The left side of the flume was made of acrylic to allow for flow visualization. The model was initially designed and used with a fixed bed channel bottom for earlier Phases of the DSA project to provide measurement of pressures on the upstream and downstream faces of the baffle blocks and upstream and downstream of the end sills for both basins. Pressures were measured in the channel bottom between the upper basin and the stilling weir and downstream of the lower basin. Pressures were also measured at the toe of the spillway and on the stilling weir. The fixed channel bottom downstream of the upper end sill was removed and then replaced with erodible material to demonstrate scour potential. For Phase 5, the same sectional physical model is being used to evaluate alternatives for preventing scour of the bedrock downstream of the spillway section of the dam to ensure that the stability of the structure is not compromised.	PDT Preferred Model
Physical Model – General Model 1:65	The general physical model was designed to accommodate reproduction of the Bluestone Dam structures, a 2,200-ft reach of the tailrace and a 1,000-ft reach of the upper pool topography at an undistorted linear 1:65 scale. All pertinent topography was reproduced with molded cement mortar over sand. The structures were constructed of sheet metal, acrylic, and wood. The model is used to document surface current patterns, pressures, and velocities. These data are used to assist in evaluation of effectiveness of potential alternatives.	PDT Preferred Model
Physical Model – Penstock Sectional	The penstock sectional physical model for Phase 3 consists of a section of the dam through the penstock monoliths (three full	PDT Preferred Model

Model 1:25	penstocks), a reach of the tailrace and a reach of the upper pool at an undistorted linear 1:25 scale. The model is constructed of sheet metal, aluminum, acrylic, plastic, and wood. The left side of the flume was made of acrylic to allow for viewing and photography of flow conditions. Use of the penstocks to safely pass additional flow during high discharge events or IRRM flows will require a stilling basin to prevent erosion or scour immediately downstream of the dam. The primary purpose of this investigation is to determine stilling basin design features and components that will reduce scour potential. The model will also be used to evaluate the influence of these additional modifications that are specific to the basin design of this project, such as a gap (for pressure relief) between the penstock extension and the upstream end of the proposed stilling basin, a gate (sacrificial bulkhead) recess in the upper portion of the basin, and a 40 foot long concrete channel bottom protection beginning at the stilling basin end sill to reduce scour potential of the 1:10 upslope to daylight with the existing channel topography. A movable bed material will be utilized in the outlet channel downstream of the basin to demonstrate the hydraulic trends and tendencies of discharges for various flow conditions. The model, in and of itself, cannot provide conclusive results of scour potential. Velocity and pressure data will be collected from the model and provided to the District for use by the District's A/E contracted scour expert in computations of streampower and scour potential.	
Primavera Project Management (P5)	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.	USACE Preferred Model

12. REVIEW SCHEDULES AND COSTS

a. Decision Document. Listed below are anticipated schedule dates and costs associated with the peer reviews of the DSMRS and supporting documentation.

(1) **ATR Schedule and Cost.** ATR team participation will be seamless throughout the development of the DSMRS. ATR team members will be invited to participate in all vertical team coordination including the required Risk Reduction and Management Measures Identification Meeting and the Risk Management Plan Meeting described in ER 1110-2-1156. Based on the current schedule, the Risk Reduction and Management Measures Identification Meeting to be held with the vertical team is anticipated to be held in August 2013 while the Risk Management Plan Meeting is tentatively scheduled for November 2013. A Tentatively Selected Plan Meeting is also currently scheduled for January 2015.

The ATR of the 100% Draft DSMRS is anticipated to require four weeks – two weeks for the ATR panel to provide comments and two weeks for the team to develop comment responses and for all comments to be closed out in DrChecks. Based on the current schedule, the ATR of the 100% Draft DSMRS and related documentation will be initiated in March 2015. The ATR team was also provided approximately six weeks to perform an interim review of the baseline risk estimate. The interim review of the Baseline Risk Estimate began in May 2012 and was completed by the end of June 2012. The team is currently in the process of resolving comments. The completion of the baseline risk estimate has been delayed until April 2013. The review schedule for the ATR of the DSMRS and supporting documentation is summarized in Section 12.c.

All ATR efforts including participation in vertical team coordination, reviews of all products, and development of comment responses are anticipated to cost no more than $1,000,000 – $350,000 for the work provided by the ATR team members and $650,000 for the development of comment responses by the PDT. This cost is largely driven by the significant comments received during the ATR of the baseline risk estimate and the corresponding need to revamp this product in order to resolve all ATR comments.

(2) **QCC Schedule and Cost.** Throughout the development of the DSMRS, two QCC-like reviews will be conducted – one following the completion of the baseline risk estimate and the second concurrent to the ATR of the 100% Draft DSMRS and related documentation. Based on the current schedule, the QCC review of the baseline risk estimate is scheduled to be initiated in April 2013 while the QCC-like review of the 100% Draft DSMRS and related documentation is tentatively scheduled to be initiated in March 2015. During the QCC review of the baseline risk assessment, the review panel will be given one month to review the products provided. Following this 30-day review, the PDT along with members of the risk assessment cadre will brief the QCC panel and work to resolve comments raised during the review. The QCC reviews are generally funded by the RMC through the WEDGE program and are anticipated to cost approximately $25,000 to $50,000 per session based on prior reviews.

(3) **Type I IEPR Schedule and Cost.** Based upon similar Type I IEPR cost estimates, the Bluestone IEPR should cost between $350,000 and $500,000. Based on guidance from the vertical team, the Type I IEPR will be initiated following the SOG review of the baseline risk estimate should funding be available and will not be closed out until the DSMRS is approved. According to the current schedule, the Type I IEPR is tentatively scheduled to begin in July 2013.

(4) **Model Certification/Approval Schedule and Cost.** Not applicable, considering all planning models to be used during the development of the DSMRS are certified, approved for use, or pending certification.

b. Implementation Documents. Listed below are anticipated schedule dates and costs associated with the remaining peer reviews of the implementation documents for Phases 3 and 4.

(1) **ATR Schedule and Cost.** ATR has been completed for the plans and specifications, 50% DDR for Phases 3 and 4, and 100% DDR for Phase 4. The only remaining product requiring ATR is the 100% DDR for Phase 3. The ATR for the 100% DDR for Phase 3 is scheduled for October

2013 and is anticipated to cost $45,000 – $35,000 for the work provided by the ATR team members and $10,000 for the development of comment responses by the PDT.

(2) **Type II IEPR Schedule and Cost.** Type II IEPRs have been completed on the 50% DDR for Phases 3 and 4 and the 100% DDR for Phase 4. Type II IEPRs will also be performed on the 100% DDR for Phase 3, during the midpoint of construction for both Phases 3 and 4, and before substantial completion of construction for both Phases 3 and 4. The Type II IEPR for the 100% DDR for Phase 3 is scheduled for January 2014 and is anticipated to cost $250,000 based on prior reviews. While the Type II IEPRs have not been awarded for the construction milestones, the midpoint reviews for Phases 3 and 4 are tentatively scheduled for FY 2013 and FY 2016 respectively. A Type II IEPR before construction of Phase 3 is substantially complete is scheduled for FY 2015 and a Type II IEPR before construction of Phase 4 is substantially complete is scheduled for FY 2018. The Type II IEPRs during the construction milestones are anticipated to cost $100,000 per review.

(3) **Model Certification/Approval Schedule and Cost.** Not applicable, considering all planning models to be used during the development of the implementation documents are certified, approved for use, or pending certification.

c. Review Schedule Summary and Key Project Milestones. Listed below are key dates associated with the development of the decision and implementation documents including a summary of anticipated reviews. All dates are based on the current version of the project schedule and are subject to change.

Activity	Approximate Dates	
	Start	Finish
Development of DSMRS		
Kick-off Meeting	-	March 2013
DQC Review of Baseline Risk Assessment	April 2012	May 2012
ATR of Baseline Risk Assessment	May 2012	April 2013
QCC Review of Baseline Risk Assessment	April 2013	July 2013
SOG Review of Baseline Risk Assessment	July 2013	July 2013
Risk Reduction and Management Measures Identification Meeting	-	August 2013
Public Scoping	August 2013	September 2013
Risk Management Plan Meeting	-	November 2013
ATR / Constructability Review	November 2013	November 2013
DQC / ATR of 70% DSMRS / EIS	October 2014	October 2014
Tentatively Selected Plan Meeting	January 2015	January 2015
SOG Review of Tentatively Selected Plan	January 2015	January 2015
DQC of 100% Draft DSMRS and Supporting Documentation	March 2015	March 2015
ATR / QCC of 100% Draft DSMRS and Supporting Documentation	March 2015	April 2015
Public Review of 100% Draft DSMRS and Supporting Documentation	April 2015	June 2015
LRD / HQ Policy Compliance Review and Report Revision	June 2015	August 2015
State and Agency Review	June 2015	July 2015

SOG Review	August 2015	August 2015
Type I IEPR and Report Revision	July 2013	August 2015
Report Approval and ROD Execution	-	August 2015
Implementation Documents for Phases 3 and 4		
Phase 3 Contract Awarded	-	September 2010
Phase 4 Contract Awarded	-	September 2012
ATR of 100% DDR for Phase 3	September 2013	October 2013
Type II IEPR of 100% DDR for Phase 3	September 2013	October 2013
Type II IEPR of Construction Midpoint for Phase 3	FY 2013	FY 2013
Type II IEPR of Construction Midpoint for Phase 4	FY 2016	FY 2016
Type II IEPR before Substantial Construction Completion of Phase 3	FY 2015	FY 2015
Type II IEPR before Substantial Construction Completion of Phase 4	FY 2018	FY 2018

13. PUBLIC PARTICIPATION

The nature of risk identified and associated with the Bluestone Dam has required public meetings throughout the basin on a regular basis. The District has been proactive in keeping the public and stakeholders informed and involved. Given the continued risk to life and safety until the completion of the DSA project, regular public meetings will continue to be held.

Throughout the development of the DSMRS, several opportunities for public comment will be provided. In compliance with NEPA, formal public scoping will be conducted following the completion of the baseline risk estimate and a public hearing along with a 45-day public comment period will be provided following the completion of the draft DSMRS including the NEPA/environmental compliance documentation and technical appendixes. Based on the current project schedule, public scoping is anticipated to being in August 2013 while the 45-day comment period is tentatively scheduled to begin in April 2015. All significant and relevant public comments will be provided to the IEPR panel to help facilitate their review.

14. REVIEW PLAN APPROVAL AND UPDATES

The Great lakes and Ohio River Division Commander is responsible for approving this Review Plan. The Commander's approval reflects vertical team input (involving district, MSC, RMO, and HQUSACE members) as to the appropriate scope and level of review for the decision and implementation documents. Like the PMP, the Review Plan is a living document and may change as the study progresses. The home district is responsible for keeping the Review Plan up to date. Minor changes to the review plan since the last MSC Commander approval are documented in Attachment 3. Significant changes to the Review Plan (such as changes to the scope and/or level of review) should be re-approved by the MSC Commander following the process used for initially approving the plan. The latest version of the Review Plan, along with the Commanders' approval memorandum, should be posted on the Home District's webpage. The latest Review Plan should also be provided to the RMO and home MSC.

15. REVIEW PLAN POINTS OF CONTACT

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

- [redacted], Huntington District, Project Manager, 304-399-5545
- [redacted], Huntington District, Lead Planner, 304-399-5143
- [redacted], Huntington District, Lead Engineer, 304-399-5035
- [redacted], Great Lakes and Ohio River Division, Dam Safety Program Manager, 513-684-3804
- [redacted], Risk Management Center, Senior Review Manager, 303-963-4556

ATTACHMENT 1: TEAM ROSTERS

Project Delivery Team Members			
Name	**Functional Responsibility**	**E-Mail Address**	**Telephone**
[redacted]	Project Manager	[redacted]	[redacted]
[redacted]	Project Analyst	[redacted]	[redacted]
[redacted]	Lead Engineer	[redacted]	[redacted]
[redacted]	Program Analyst	[redacted]	[redacted]
[redacted]	Geologist	[redacted]	[redacted]
[redacted]	Geologist	[redacted]	[redacted]
[redacted]	Geologist	[redacted]	[redacted]
[redacted]	Civil Engineering Technician	[redacted]	[redacted]
[redacted]	Geotechnical Engineer, RMC Liaison	[redacted]	[redacted]
[redacted]	Structural Engineer	[redacted]	[redacted]
[redacted]	Hydraulics Engineer	[redacted]	[redacted]
[redacted]	Hydraulics Engineer	[redacted]	[redacted]
[redacted]	Water Management Specialist	[redacted]	[redacted]
[redacted]	Civil Engineer	[redacted]	[redacted]
[redacted]	Civil Engineering Technician	[redacted]	[redacted]
[redacted]	Cost Engineer	[redacted]	[redacted]
[redacted]	Value Engineering	[redacted]	[redacted]
[redacted]	Civil Engineering Technician	[redacted]	[redacted]
[redacted]	Resident Engineer	[redacted]	[redacted]
[redacted]	Civil Engineer, Construction Office	[redacted]	[redacted]
[redacted]	Geologist, Construction Office	[redacted]	[redacted]
[redacted]	Lead Planner	[redacted]	[redacted]
[redacted]	Economist	[redacted]	[redacted]
[redacted]	Community Planner	[redacted]	[redacted]
[redacted]	Wildlife Biologist	[redacted]	[redacted]
[redacted]	Landscape Architect	[redacted]	[redacted]
[redacted]	Archeologist	[redacted]	[redacted]
[redacted]	Real Estate Specialist	[redacted]	[redacted]
[redacted]	Real Estate Lead	[redacted]	[redacted]
[redacted]	Public Affairs Specialist	[redacted]	[redacted]
[redacted]	Contract Specialist	[redacted]	[redacted]
[redacted]	Park Manager	[redacted]	[redacted]

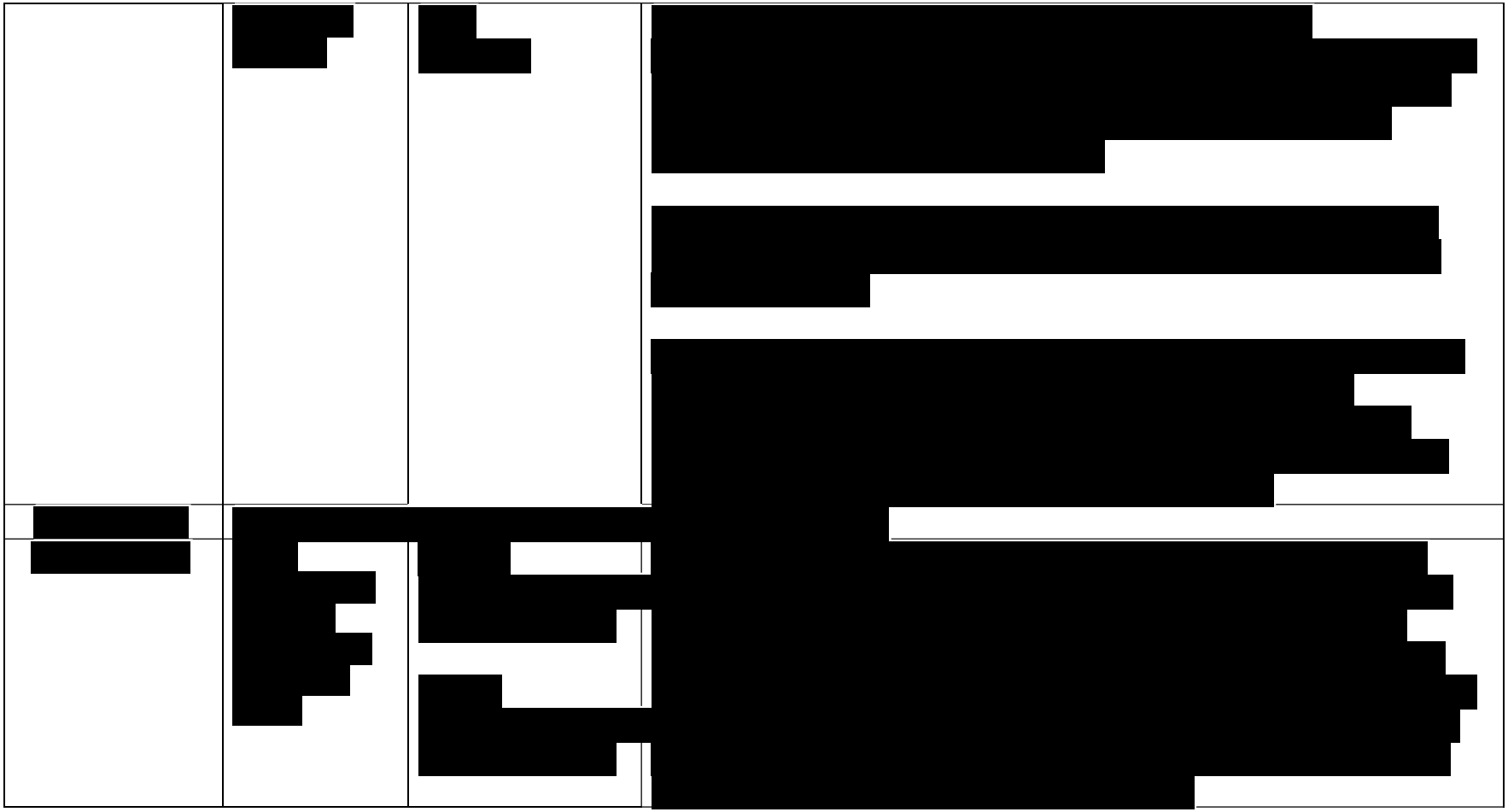
Phase 5 Risk Cadre			
Name	Functional Responsibility	E-Mail Address	Telephone
[redacted]	DSMRS Lead	[redacted]	[redacted]
[redacted]	Facilitator	[redacted]	[redacted]
[redacted]	Report Writer	[redacted]	[redacted]
[redacted]	Geologist Risk Assessor	[redacted]	[redacted]
[redacted]	Electrical / Mechanical Risk Assessor	[redacted]	[redacted]
[redacted]	Structural Risk Assessor	[redacted]	[redacted]
[redacted]	H&H Risk Assessor	[redacted]	[redacted]
[redacted]	H&H Risk Assessor	[redacted]	[redacted]
[redacted]	MMC Modeler	[redacted]	[redacted]
[redacted]	Consequence Estimator	[redacted]	[redacted]

Phase 5 Experts and Consultants used during the development of the Baseline Risk Assessment			
Name	Functional Responsibility	E-Mail Address	Telephone
[redacted]	RMC Senior Advisor	[redacted]	[redacted]
[redacted]	Expert Consultant	[redacted]	[redacted]
[redacted]	Expert Consultant	[redacted]	[redacted]
[redacted]	Expert Consultant	[redacted]	[redacted]
[redacted]	Expert Consultant	[redacted]	[redacted]
[redacted]	Expert Consultant	[redacted]	[redacted]
[redacted]	Drift/Debris Expert	[redacted]	[redacted]
[redacted]	ERDC Hydraulic Engineer	[redacted]	[redacted]
[redacted]	ERDC Hydraulic Modeler	[redacted]	[redacted]
[redacted]	ERDC Hydraulic Modeler	[redacted]	[redacted]
[redacted]	Hydraulic Engineer	[redacted]	[redacted]
[redacted]	USBR Structural Engineer	[redacted]	[redacted]
[redacted]	USBR Structural Engineer	[redacted]	
[redacted]	Structural Engineer	[redacted]	[redacted]

Phase 5 Baseline Risk Assessment District Quality Control Review Team			
Name	**Functional Responsibility**	**E-Mail Address**	**Telephone**
[redacted]	Geologist	[redacted]	[redacted]
[redacted]	Mechanical Engineer	[redacted]	[redacted]
[redacted]	Supervisory Mechanical Engineer	[redacted]	[redacted]
[redacted]	Structural Engineer	[redacted]	[redacted]
[redacted]	Structural Engineer	[redacted]	[redacted]
[redacted]	Structural Engineer	[redacted]	[redacted]
[redacted]	Hydraulic Engineer	[redacted]	[redacted]
[redacted]	Water Management Specialist	[redacted]	[redacted]
[redacted]	Regional Economist	[redacted]	[redacted]
[redacted]	Ecologist	[redacted]	[redacted]
[redacted]	Project Lead Engineer	[redacted]	[redacted]
[redacted]	Project Lead Planner	[redacted]	[redacted]
[redacted]	Supervisory Geologist	[redacted]	[redacted]
[redacted]	Structural Engineer	[redacted]	[redacted]
[redacted]	Cost Engineer	[redacted]	[redacted]
[redacted]	Hydraulic Engineer	[redacted]	[redacted]
[redacted]	Supervisory Ecologist	[redacted]	[redacted]

Phase 5 Agency Technical Review Team				
Name	**Functional Responsibility**	**Organization**	**E-Mail Address**	**Telephone**
[redacted]	ATR Lead	[redacted]	[redacted]	[redacted]
[redacted]	Structural Engineering	[redacted]	[redacted]	[redacted]
[redacted]	Geotechnical Engineering	[redacted]	[redacted]	[redacted]
[redacted]	Geology	[redacted]	[redacted]	[redacted]
[redacted]	Geology	[redacted]	[redacted]	[redacted]
[redacted]	Hydraulic Engineering	[redacted]	[redacted]	[redacted]
[redacted]	Economics	[redacted]	[redacted]	[redacted]
[redacted]	Environmental/ NEPA Compliance	[redacted]	[redacted]	[redacted]
[redacted]	Mechanical/ Electrical Engineering	[redacted]	[redacted]	[redacted]
[redacted]	Plan Formulation	[redacted]	[redacted]	[redacted]
TBD	Civil Design			
TBD	Cost Engineering			
TBD	Construction			
TBD	Operations			
TBD	Real Estate			

Phase 5 Quality Control and Consistency Panel			
Name	**Title**	**Education**	**Experience**
[redacted]	[redacted]	[redacted]	[redacted]
[redacted]	[redacted]	[redacted]	[redacted]
[redacted]	[redacted]	[redacted]	[redacted]



Phase 5 Independent Peer Review Panel		
Name	**Discipline**	**Experience**
	Plan Formulation / Economics	
	Environmental / NEPA Compliance	
	Geology	
	Hydraulic Engineering	
	Structural Engineering	

Phase 3 & 4 Agency Technical Review Team		
Name	**Discipline**	**Office**
[redacted]	Engineering Geology /Team Leader	[redacted]
[redacted]	Civil/Site	[redacted]
[redacted]	Hydrology and Hydraulics	[redacted]
[redacted]	Structural	[redacted]
[redacted]	Materials	[redacted]
[redacted]	Cost Engineering	[redacted]
[redacted]	Geotechnical / Soils	[redacted]

Phase 3 & 4 Independent External Peer Review Expert Reviewers		
Name	**Discipline**	**Experience**
[redacted]	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, erosion protection design and construction and earthwork construction. The Geotechnical Engineer shall be a licensed professional engineer.
[redacted]	Structural Engineer	Senior-level person with extensive experience in the type of work being performed. The Structural Engineer shall be proficient in performing stability analysis using limit equilibrium analysis and in the design of post tensioned high strength steel anchors to stabilize mass concrete gravity dams and structures. The Structural Engineer shall be experienced in the stability analysis and structural design of mass concrete scour protection and stilling features including the design of baffles, endsills, and training walls. The Structural Engineer shall have a working knowledge of all applicable Corps of Engineers design criteria and shall be a licensed Professional Engineer.
[redacted]	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.
[redacted]	Engineering Geologist	Senior-level person with extensive experience in the type of work being performed. The Engineering Geologist shall be proficient in assessing rock strengths and evaluating uplift for performing stability analyses using limit equilibrium. The Engineering Geologist shall be experienced in the design of post tensioned high strength steel anchors to stabilize mass concrete gravity dams and structures. The Engineering Geologist shall have a working knowledge of all applicable Corps of Engineers design criteria and shall be a licensed Professional Geologist.
[redacted]	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.
[redacted]	Materials Engineer	Registered professional engineer or professional geologist with a minimum of Master's Degree in Materials Engineering. The Materials Engineer must have extensive knowledge in mix designs and materials for mass concrete placements. He shall also have experience in preparing plans and specifications and field applications of mass concrete placements.

ATTACHMENT 2: DRAFT STATEMENT OF TECHNICAL REVIEW COMPLETION AND CERTIFICATION

BLUESTONE DAM SAFETY MODIFICATION REPORT AND ENVIRONMENTAL IMPACT STATEMENT SUPPLEMENT

COMPLETION OF AGENCY TECHNICAL REVIEW

The Agency Technical Review (ATR) has been completed for the Dam Safety Modification Report and Environmental Impact Statement Supplement developed for Bluestone Dam located in Hinton, West Virginia. The ATR was conducted as defined in the project's Review Plan to comply with the requirements of EC 1165-2-214. 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].

[redacted]
ATR Team Leader
[redacted]

Date

[redacted]
Project Manager
[redacted]

Date

[redacted]
Review Management Office Representative
[redacted]

Date

CERTIFICATION OF AGENCY TECHNICAL REVIEW

Significant concerns and the explanation of the resolution are as follows: ***Describe the major technical concerns and their resolution and specifically list and agreed-upon deferrals to be completed in the next phase of work.***

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

[redacted]
Director, Risk Management Center
[redacted]

Date

ATTACHMENT 3: COMPLETED TECHNICAL REVIEW CERTIFICATION SHEETS

Bluestone Dam Safety Assurance
Phase 3 Plans and Specifications
23 June 2010

CERTIFICATION OF AGENCY TECHNICAL REVIEW

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

None

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

[redacted]

STATEMENT OF TECHNICAL REVIEW (ATR)

Bluestone DSA - Phase 3
Plans and Specifications
June 24, 2010

COMPLETION OF AGENCY TECHNICAL REVIEW

The District has completed the Plans and Specifications for the Bluestone Dam Safety Assurance Phase 3. 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. The agency technical review team members were from outside the home district. The ATR team leader was from outside the home MSC.

Design Team **ATR**

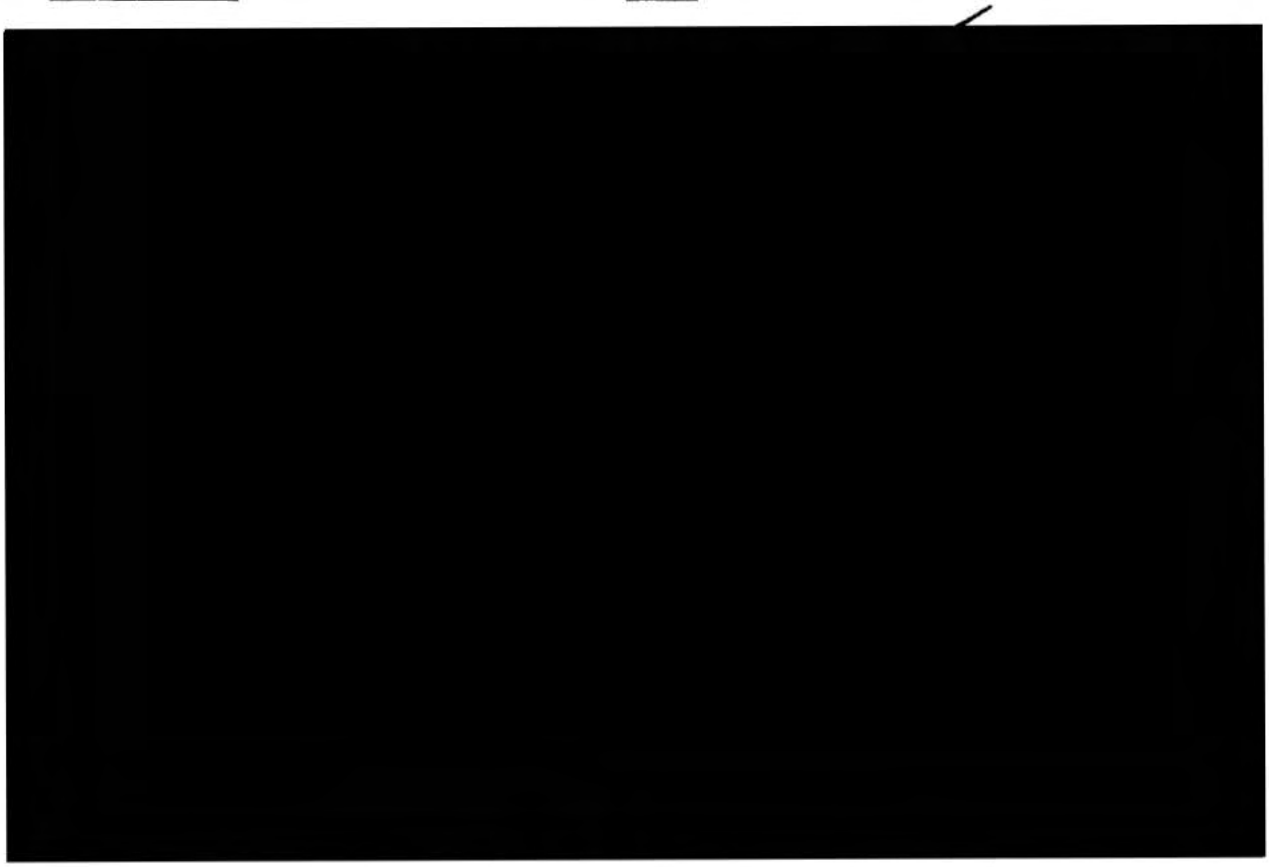
STATEMENT OF TECHNICAL REVIEW (ATR)

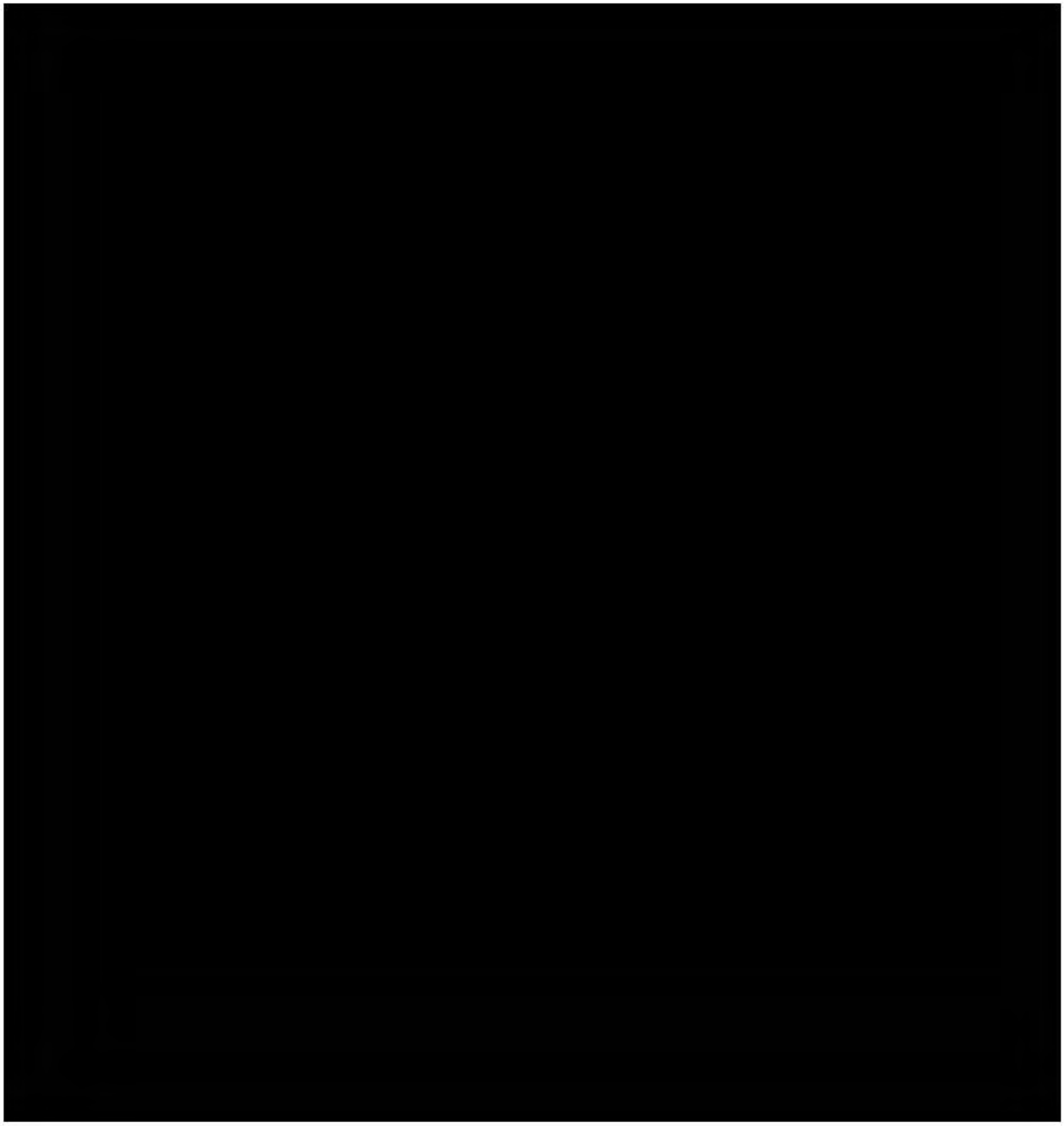
Bluestone DSA - Phase 3
Plans and Specifications
June 24, 2010

COMPLETION OF AGENCY TECHNICAL REVIEW

The District has completed the Plans and Specifications for the Bluestone Dam Safety Assurance Phase 3. 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. The agency technical review team members were from outside the home district. The ATR team leader was from outside the home MSC.

Design Team **ATR**





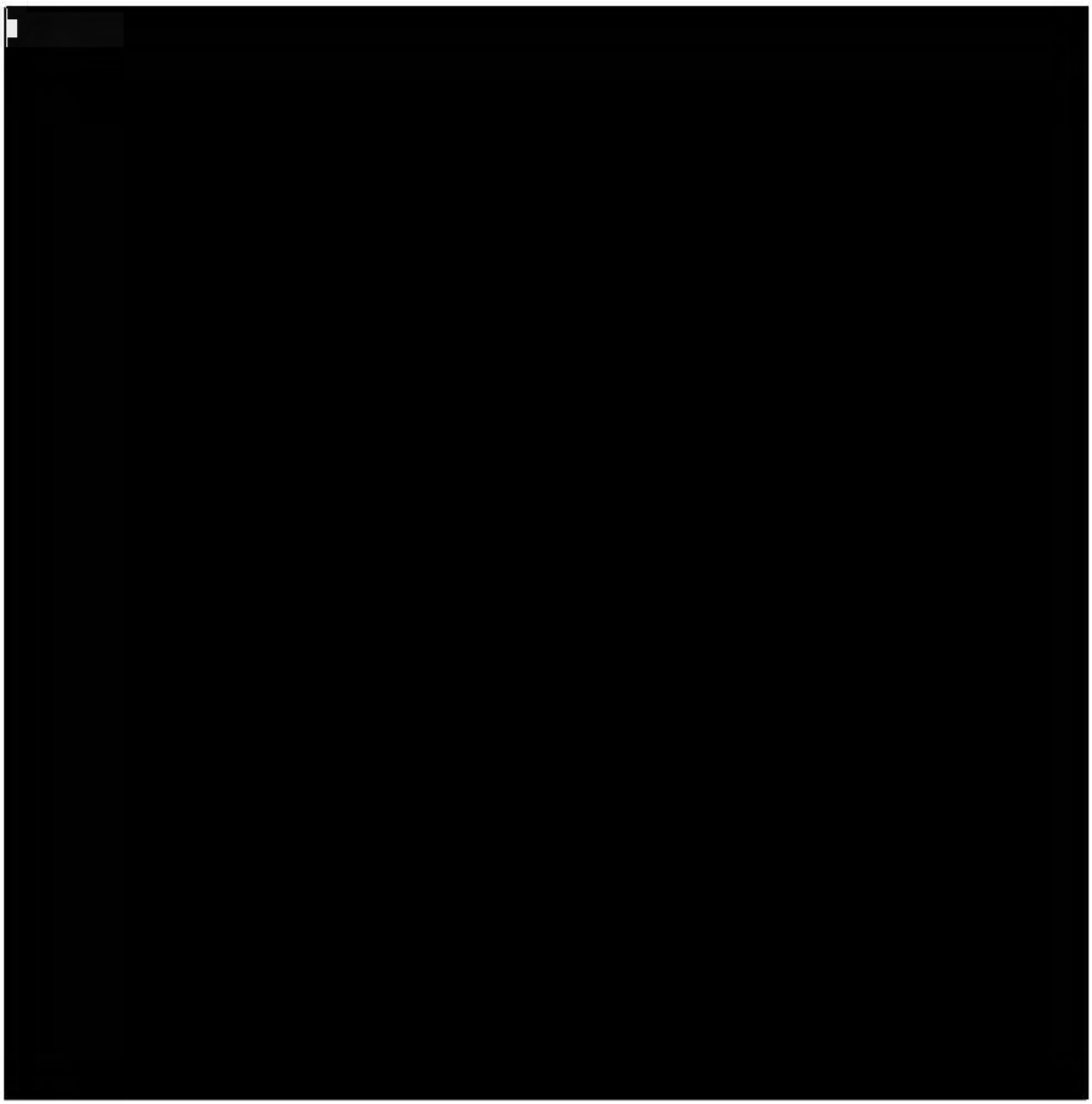
STATEMENT OF TECHNICAL REVIEW (ATR)

Bluestone DSA - Phase 3
Plans and Specifications
June 24, 2010

COMPLETION OF AGENCY TECHNICAL REVIEW

The District has completed the Plans and Specifications for the Bluestone Dam Safety Assurance Phase 3. 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. The agency technical review team members were from outside the home district. The ATR team leader was from outside the home MSC.

Design Team **ATR**



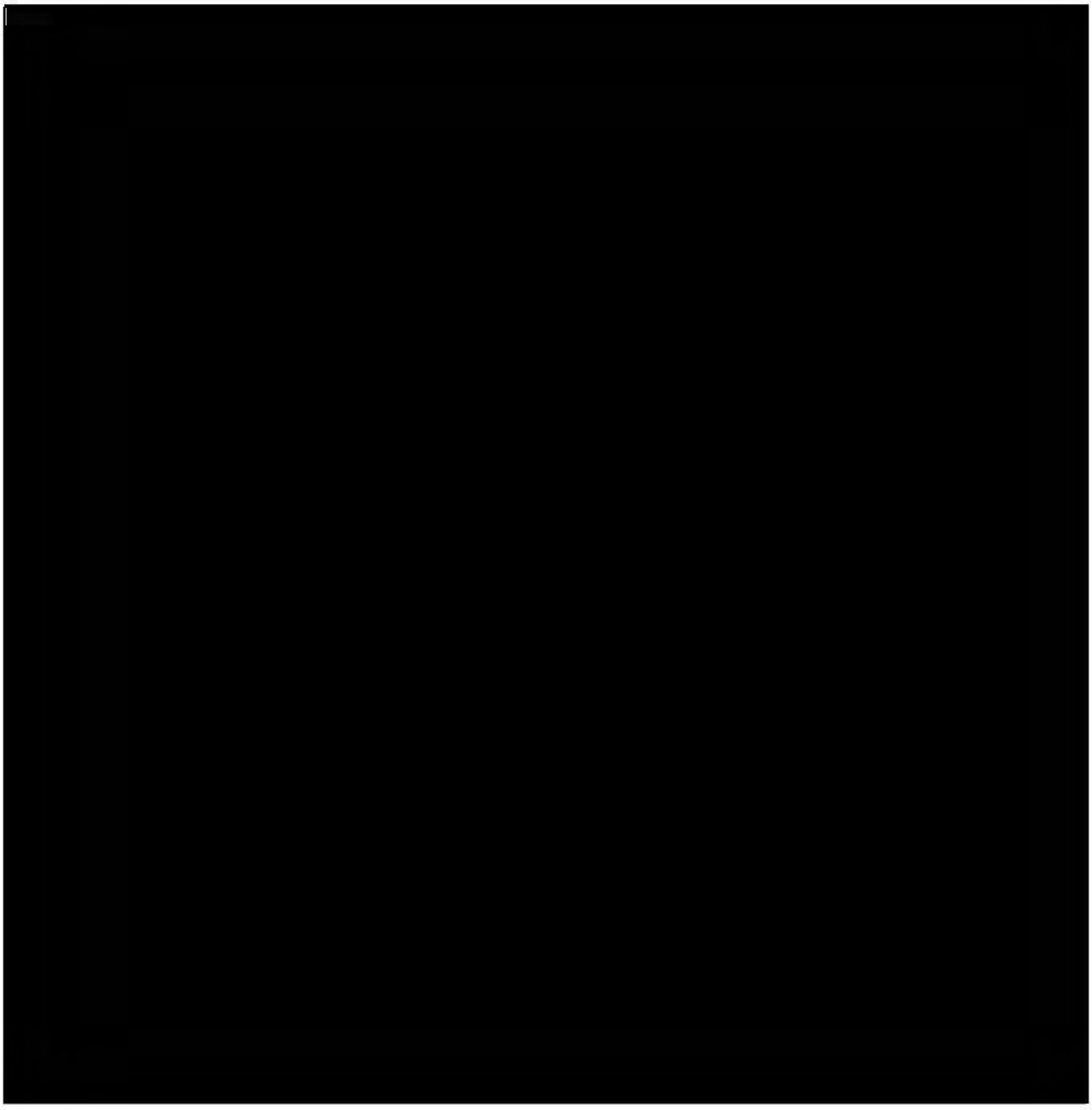
STATEMENT OF TECHNICAL REVIEW (ATR)

Bluestone DSA - Phase 3
Plans and Specifications
June 24, 2010

COMPLETION OF AGENCY TECHNICAL REVIEW

The District has completed the Plans and Specifications for the Bluestone Dam Safety Assurance Phase 3. 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. The agency technical review team members were from outside the home district. The ATR team leader was from outside the home MSC.

Design Team **ATR**



STATEMENT OF TECHNICAL REVIEW (ATR)

Bluestone DSA - Phase 3
Plans and Specifications
June 24, 2010

COMPLETION OF AGENCY TECHNICAL REVIEW

The District has completed the Plans and Specifications for the Bluestone Dam Safety Assurance Phase 3. 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. The agency technical review team members were from outside the home district. The ATR team leader was from outside the home MSC.

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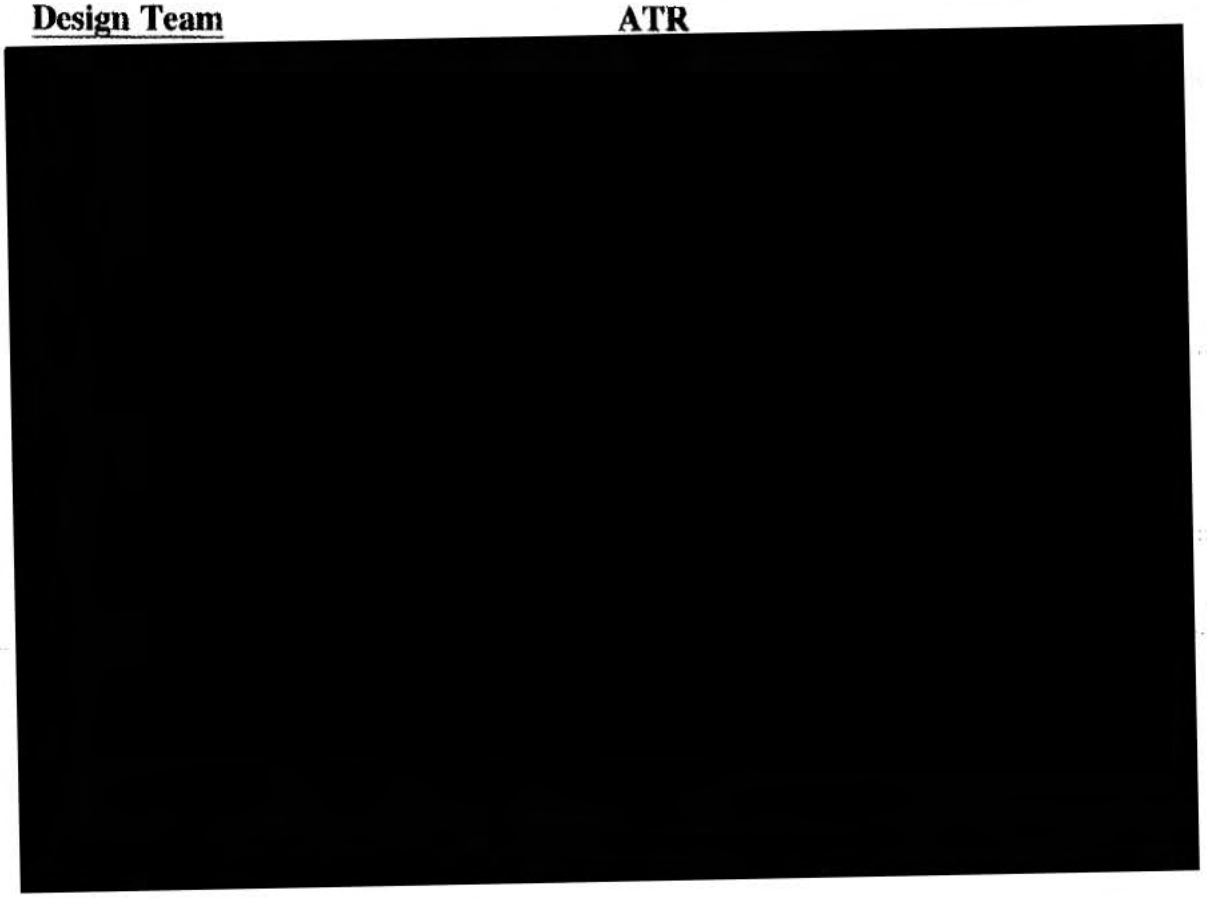

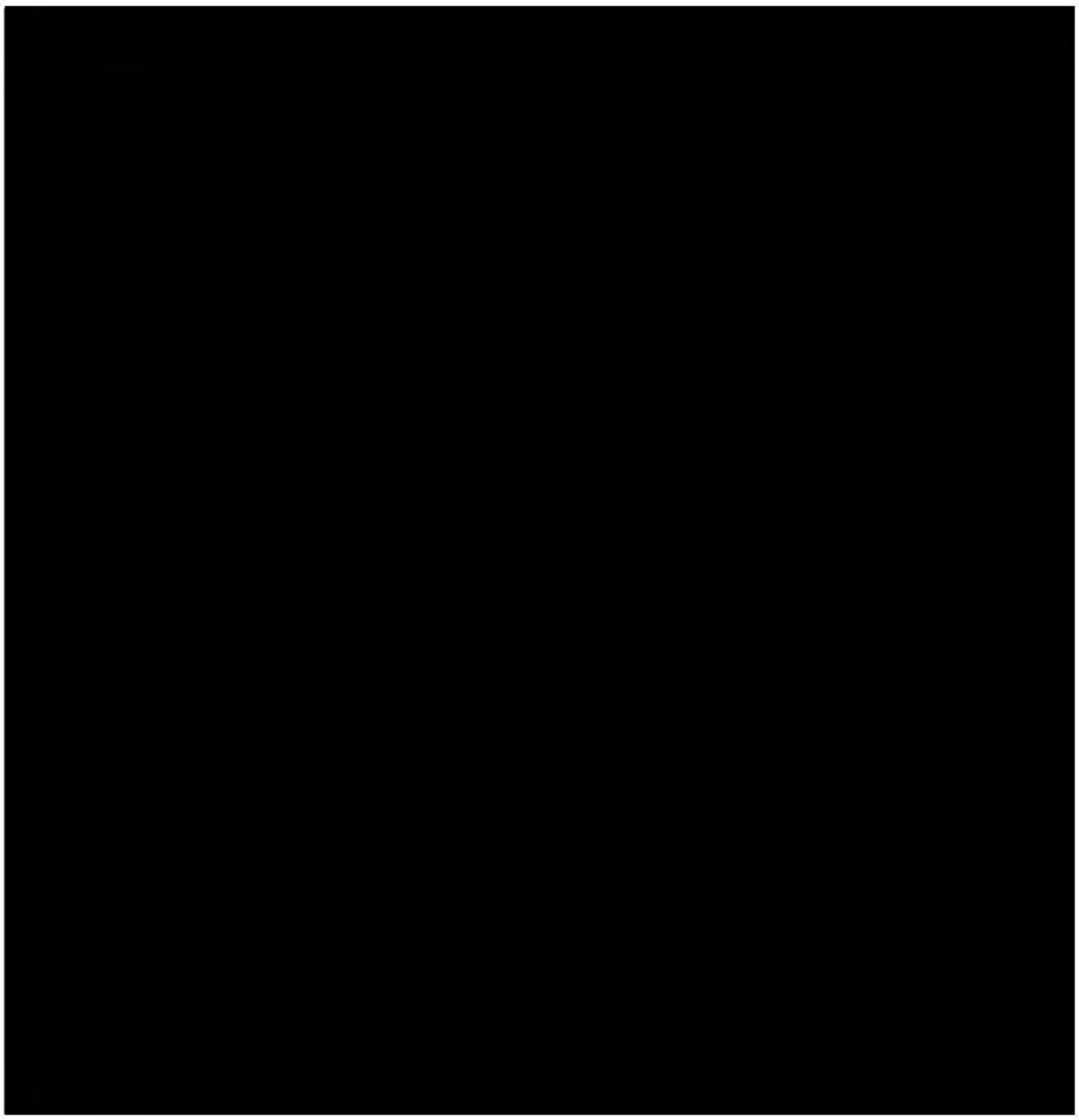

STATEMENT OF TECHNICAL REVIEW (ATR)

Bluestone DSA - Phase 3
Plans and Specifications
June 24, 2010

COMPLETION OF AGENCY TECHNICAL REVIEW

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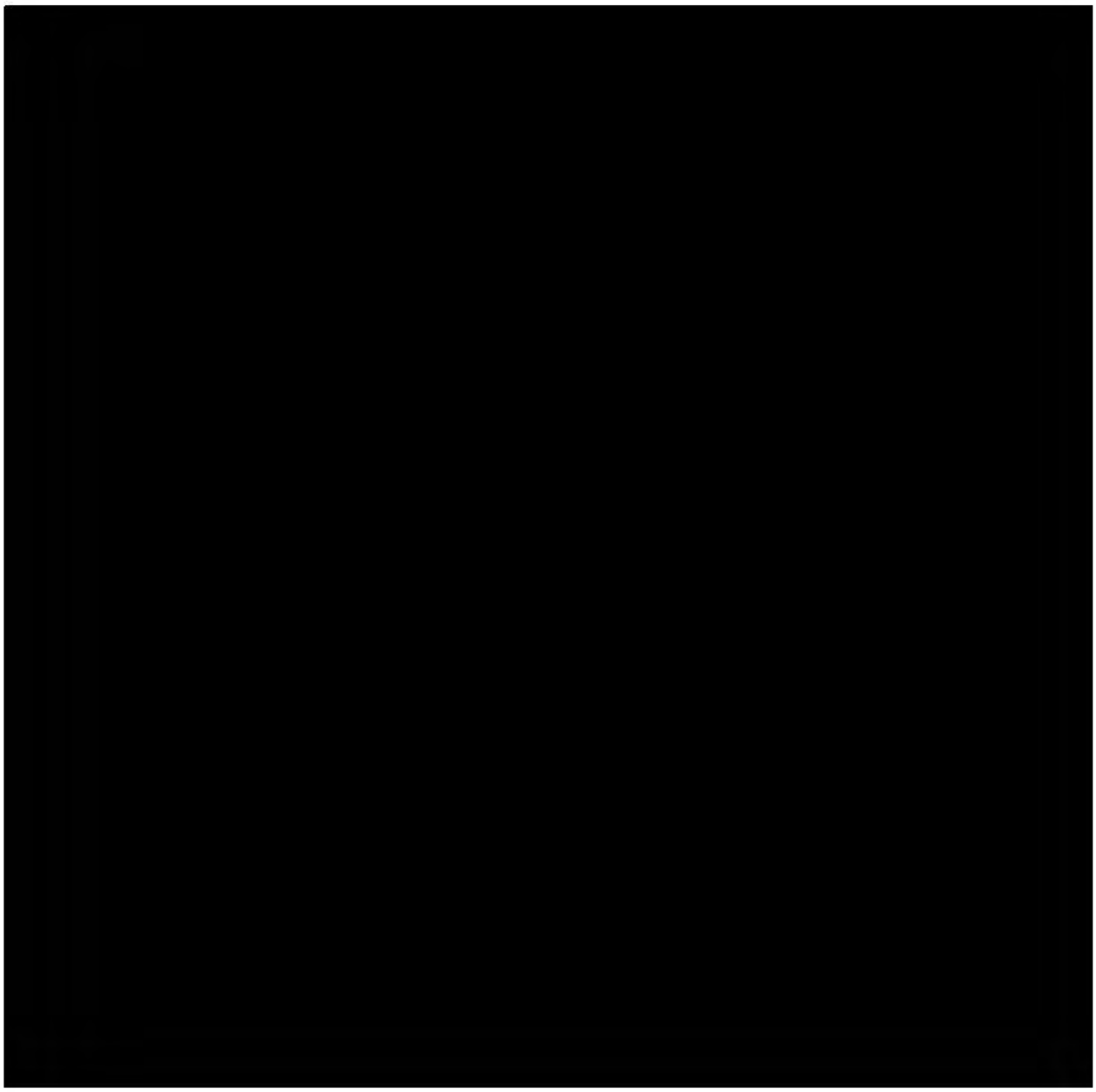

STATEMENT OF TECHNICAL REVIEW (ATR)

Bluestone DSA - Phase 3
Plans and Specifications
June 24, 2010

COMPLETION OF AGENCY TECHNICAL REVIEW

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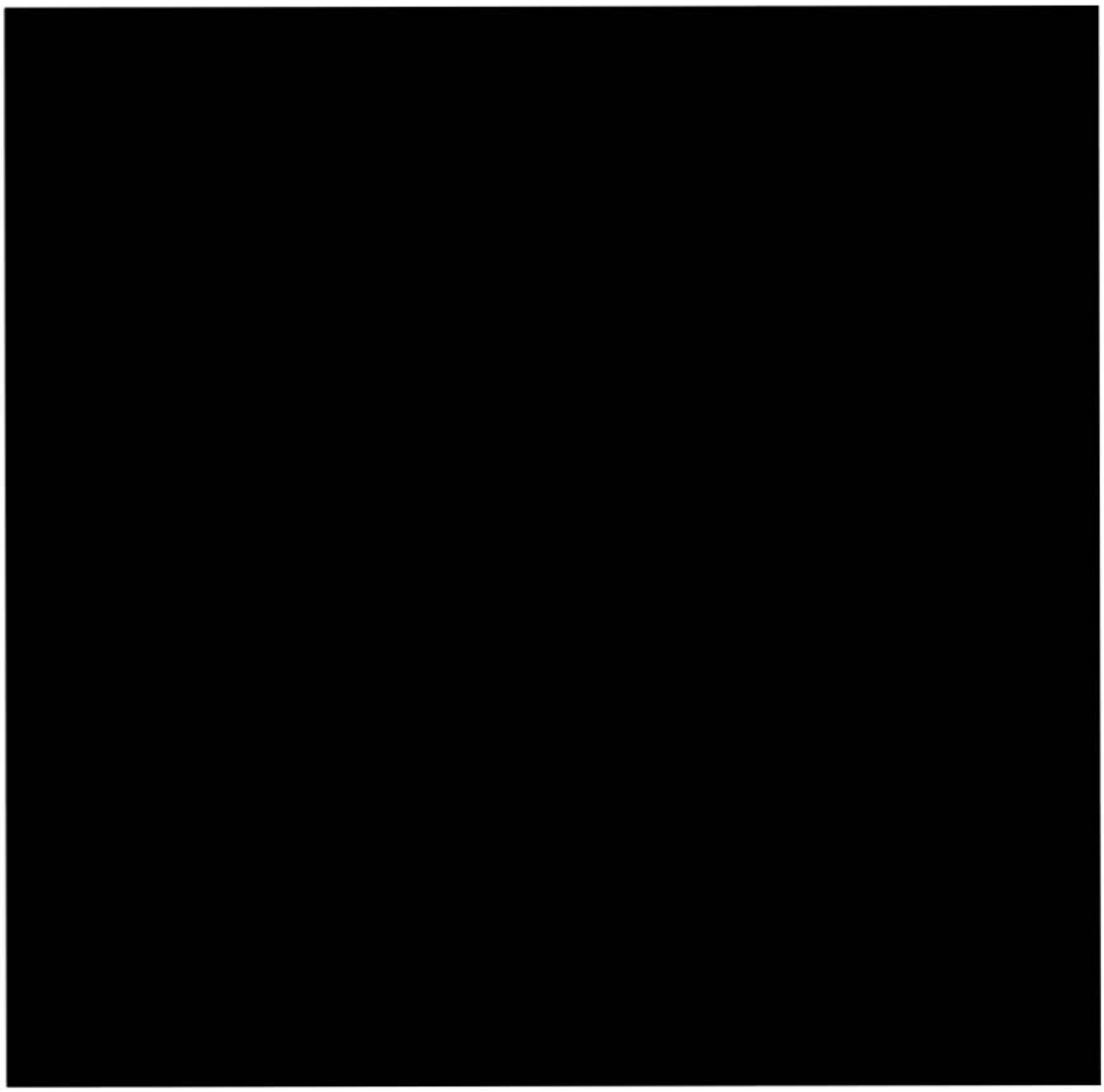
Design Team **ATR**

[redacted]



BCOE Certification

Bluestone Dam Safety Assurance
Phase 4 Plans and Specifications
16 April 2012

Office Elements listed below have had the opportunity to review the 100% Plans and Specifications for **Biddability**, **Constructibility**, **Operability**, and **Environmental** in accordance with ER 415-1-11. Offices with comments have entered them into DrChecks and have been "checked-off" below. Office with "No Comments" have documented the response with initials below.

- ✓ Construction Branch, Engineering & Construction Div.
- ✓ Operations Division
- ✓ Project Management Branch
- ✓ Safety Office
- ✓ Cost & Technical Support Branch, Engineering & Construction Div.
- ✓ Real Estate
- ✓ Environmental Analysis Section, Planning Branch
- ✓ Office of Council
- ✓ Quality Management Section, Engineering & Construction Div.
- ✓ Contracting Division
- ✓ Environmental & Remediation Section, Engineering & Construction Div.

Relocations Certifications

✓ Arrangements for all necessary relocations to accommodate work proposed in the subject plans and specifications have been made. All work has been performed or is scheduled to be performed, such that award can proceed on the current schedule. See comments below.

COMMENTS:

[redacted]

Status of Real Estate

Bluestone Dam Safety Assurance
Phase 4 Plans and Specifications
16 April 2012

✓ **REAL ESTATE IS AVAILABLE.** All necessary real estate to accommodate the work proposed in the subject plans and specifications is available, including the execution of all required relocation contracts. See comments below.

COMMENTS:
CONTRACTOR REQUIRED TO OBTAIN A WVDOH PERMIT FOR LAYDOWN AREA. CONTRACTOR MUST COORDINATE WITH WV STATE PARK FOR LAUNCH RAMP AREA. [redacted]

_____ **REAL ESTATE IS NOT AVAILABLE.** Real estate is not available to accommodate work proposed in the subject plans and specifications. See comments below. When the required real estate is available certification shall be sent to CT, EC-DC and PM-P.

COMMENTS:

[redacted]

Value Engineering Certification

I certify that this procurement action has completed the Value Engineering process. A VE study was completed on 24-28 October, 2011. All VE proposals indicating potential savings over $1,000,000 have been resolved with approval of Major Subordinate Command (MSC) and Engineering Center Commander.

[redacted]

All appropriate BCOC comments have either been incorporated into the Plans and Specifications or otherwise satisfactorily resolved. Feedback has been provided to reviews for all comments.

[redacted]

Bluestone Dam Safety Assurance
Phase 4 Plans and Specifications
16 April 2012

CERTIFICATION OF AGENCY TECHNICAL REVIEW

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

None

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

STATEMENT OF TECHNICAL REVIEW (ATR)

Bluestone DSA – Phase 4

Plans and Specifications

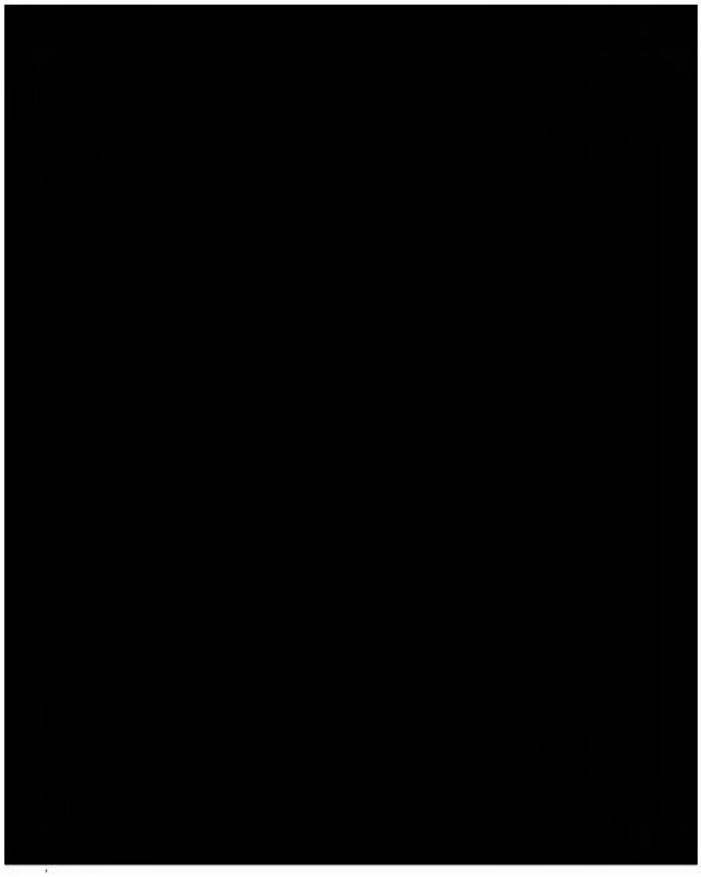
April 30, 2012

COMPLETION OF AGENCY TECHNICAL REVIEW

The District has completed the Plans and Specifications for the Bluestone Dam Safety Assurance Phase 4. 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 results. The agency technical review team members were from outside the home district. The ATR team leader was from outside the home MSC.

Design Team **ATR**

[redacted]



ATTACHMENT 4: REVIEW PLAN REVISIONS

Revision Date	Description of Change	Page / Paragraph Number
May 2012	Incorporate reviews specific to dam safety projects, update review milestones based on the current schedule, and rearrange the format and expand the content in accordance with the latest version of the Review Plan template	Throughout Entire Review Plan
December 2012	Addressed RMC comments; Consolidated review plans to address beer review requirements for both planning and implementation documents; Documented additional ATR reviews associated with the Dam Safety Modification Report Supplement; Updated review milestones based on the current project schedule	Throughout Entire Review Plan
February 2013	Updated Review Plan with respect to the current draft of 1110-2-1156, newly published EC 1165-2-214, revamped project schedule, and new team member assignments	Throughout Entire Review Plan
July 2013	Following MSC approval received on 9 July 13, Attachment 1 was updated to include new DQC team members responsible for reviewing the Baseline Risk Assessment. The credentials of QCC panel members were added to a table in Attachment 1.	Attachment 1

ATTACHMENT 5: ACRONYMS AND ABBREVIATIONS

Term	Definition	Term	Definition
AFB	Alternative Formulation Briefing	IFF	Imminent Failure Flood
ALARP	As-Low-As Reasonably Practicable	IPR	In Progress Review
ARRA	American Recovery & Reinvestment Act	ITR	Independent Technical Review
ASA(CW)	Assistant Secretary of the Army for Civil Works	IWR	Institute for Water Resources
ATR	Agency Technical Review	LRR	Limited Reevaluation Report
CFS	Cubic Feet / Second	MSC	Major Subordinate Command
CoP	Community of Practice	NED	National Economic Development
CSDR	Coastal Storm Damage Reduction	NEPA	National Environmental Policy Act
DAMRAE	DAM safety Risk Analysis Engine	NER	National Ecosystem Restoration
DDR	Design Documentation Report	NWS	National Weather Service
DQC	District Quality Control/Quality Assurance	O&M	Operation and maintenance
DSA	Dam Safety Assurance	OEO	Outside Eligible Organization
DSAC	Dam Safety Action Class	OMB	Office and Management and Budget
DSMRS	Dam Safety Modification Report Supplement	OMRR&R	Operation, Maintenance, Repair, Replacement and Rehabilitation
DSO	Dam Safety Officer	OSE	Other Social Effects
DX	Directory of Expertise	PAC	Post Authorization Change
EA	Environmental Assessment	PCX	Planning Center of Expertise
EC	Engineer Circular	PDT	Project Delivery Team
EIS	Environmental Impact Statement	PL	Public Law
EO	Executive Order	PMF	Probably Maximum Flood
ER	Ecosystem Restoration	PMP	Project Management Plan
ERDC	Engineering, Research, and Development Center	QA	Quality Assurance
FDA	Flood Damage Analysis	QC	Quality Control
FDR	Flood Damage Reduction	QCC	Quality Control and Consistency
FEMA	Federal Emergency Management Agency	QMP	Quality Management Plan
FIA	Flood Impact Analysis	RAS	River Analysis System
FRM	Flood Risk Management	RED	Regional Economic Development
FSM	Feasibility Scoping Meeting	RMC	Risk Management Center
GRR	General Reevaluation Report	RMO	Review Management Organization
HEC	Hydrologic Engineering Center	ROD	Record of Decision
HEP	Habitat Evaluation Procedure	RTS	Regional Technical Specialist
HIS	Habitat Suitability Indices	SAR	Safety Assurance Review
Home District/MSC	The District or MSC responsible for the preparation of the decision document	SOG	Senior Oversight Group
HQUSACE	Headquarters, U.S. Army Corps of Engineers	USACE	U.S. Army Corps of Engineers
IEPR	Independent External Peer Review	WRDA	Water Resources Development Act

AGENCY TECHNICAL REVIEW
CHARGE TO PROJECT DELIVERY TEAM AND REVIEWERS

Bluestone Dam
Huntington District

Bluestone Dam Safety Assurance Project
Dam Safety Modification Study Supplement
Baseline Risk Estimate

Prepared by: [redacted]
Date: 18 April 2012
Revised: 22 May 2012

TABLE OF CONTENTS

AGENCY TECHNICAL REVIEW
CHARGE TO THE PROJECT DELIVERY TEAM & REVIEWERS

1. General.

EC 1165-2-209 "Civil Works Review Policy" establishes procedures to ensure the quality and credibility of Corps documents and work products. The Corps' Planning Centers of Expertise (PCX) are generally responsible for the accomplishment and quality of Agency Technical Review (ATR) for decision documents. Reviews will be assigned to the appropriate Corps PCX based on business programs. A Review Plan (RP) describes the scope of review for the current and/or upcoming phase of work (Feasibility, Preconstruction Engineering and Design, construction, etc.) and is a component of the Quality Management Plan (QMP) in the Project Management Plan (PMP) or Program Management Plan (PgMP). This charge to the Project Delivery Team (PDT) and reviewers is an attachment to the RP and serves as the scope of work for the conduct of the PDT and ATRT for this specific review.

ATR is a critical examination by a qualified agency technical review team (ATRT) whose members were not involved in the day-to-day technical work that supports the decision document. ATRT members should not work within the supervisory structure of anyone conducting the technical work. The intent of ATR is to not only ensure technical analyses meet the requirements of technical regulations, but also to ensure policy compliance. The ATR process should ensure that appropriate problems and opportunities are addressed; confirm that a reasonable array of solutions are considered; confirm that an appropriate solution is recommended; assure that appropriate costs, schedules, and risks are presented; confirm the recommended solution warrants Corps participation; is in accord with policies; can be implemented in accordance with environmental laws and statutes; and has a sponsor willing and able to fulfill the non-Federal responsibilities; and ensure that the decision document appropriately represents the views of the Administration.
The ATRT is charged with the detailed review of the materials in the submission package, both directly and indirectly related to their field of expertise. The ATRT is to review all documents in the submission package for the intent of verifying overall consistency of the report information among their respective disciplines.

ATR on decision documents should address the basic communication aspects of the submission package. Quality decision documents allow the public and stakeholders to understand the planning effort, process, and its results. The decision document should enable decision makers to reach the same conclusions and recommendations as the PDT.

2. Project Delivery Team (PDT) Responsibilities. The PDT, as identified in the RP, is comprised of those individuals directly involved in the development of the decision document. The members of this team have the following responsibilities during the ATR process:

a. A PDT Lead from the PDT shall be designated for the ATR process. [redacted] RMC will serve as the PDT Lead for this review.

b. The PDT Lead shall provide the ATRT with contact information for any PDT member as required.

c. An electronic version of the submission package in Word or searchable Adobe Acrobat format shall be uploaded to DrChecks at least one business day prior to the start of the comment period.

d. Other submission documentation and technical products required by the Directory of Expertise (DX) or Mandatory Center of Expertise (MX) representative(s) on the ATRT may be submitted directly to the DX or MX.

e. The review shall be established in DrChecks to allow access by all PDT and ATRT members. The ATRT Lead shall be assigned the role of review manager and at the discretion of the lead PCX, have the PCX POC assigned access.

f. The Project Manager (PM) shall provide labor funding by cross charge labor codes to the ATRT as indicated below. See Table in Section 3.b.

g. The PDT is responsible for the ATR kick-off meeting in coordination with the ATR Lead to orient the ATRT no later than the first week of the comment period. Travel funding will be provided for a site visit if a site visit is warranted to understand the problems, opportunities and conditions of the project area. A site visit to Bluestone Dam and the baseline risk assessment briefing by the PDT members to the ATR Team members will be conducted on 10 May 2012. A webinar for the baseline risk assessment briefing by the PDT members will be conducted for the ATR Team members that cannot attend the site visit. Travel funds shall be coordinated through the ATRT Lead. Coordinate with Table 1 in Section 3.b.

h. The PDT will evaluate comments provided by the ATRT in DrChecks. Responses of *Concur* must include a discussion of what action was taken and provide revised text from the submission package if applicable. *Non-Concur* responses shall state the basis for the disagreement or clarification of the concern and suggest actions to negotiate the closure of the comment. PDT members shall coordinate all “Non-Concur” responses with the PDT Lead who will consolidate then discuss these “Non-Concur” responses directly with and the ATRT Lead to attempt to resolve any *Non-Concur* responses prior to submission of evaluation responses.

i. The PDT Lead shall inform the ATRT Lead when all evaluations have been entered into DrChecks.

j. The PDT Lead may conduct an in progress review to summarize comment evaluations as needed in cases of complex, interrupted, or extended reviews to facilitate the review process .

k. PDT members shall contact ATRT members or Lead as appropriate to seek clarification of a comment’s intent or provide clarification of information in the submission package. These discussions shall occur outside of DrChecks, but a summary of significant discussions should be provided in DrChecks.

l. The PDT Lead shall coordinate the proposed schedule and time for the relevant milestone such as AFB and CWRB with the ATRT Lead to ensure that the ATRT Lead will be able to participate.

3. Agency Technical Review Team Responsibilities. The ATRT is comprised of individuals that have not been involved in the development of the decision document and were chosen based on expertise, experience, and or skills. The members compliment the composition of the PDT. The responsibilities of this team are as follows:

a. An ATRT Lead shall be designated for the ATR process. [redacted] of the Risk Management Center will serve as the ATRT Lead for this review.

b. The ATRT Lead shall provide the PDT Lead with a roster of contact and financial information for ATRT members. Contact information is provided in the following table:

Table 1: ATR Team Roster

Name	Role	Office Symbol	Telephone	Email
[redacted]				

c. The ATRT Lead shall provide the PDT Lead with a roster of contact and financial information for ATRT members. Contact information is provided in table 2.

d: The ATRT Lead shall provide organization codes for each team members and a responsible financial point of contact (CEFMS responsible employee) as needed to the PDT Lead for creation of cross charge labor codes. Funding Request Forms were be sent to each ATR member and are to be provided to [redacted] LRH.

e. The ATRT shall review the submission package documents to confirm that work was done in accordance with established professional principles, practices, codes, and criteria and for compliance with laws and policy.

f. The ATRT members shall focus on their respective disciplines, but should review other submission package sections to ensure consistency throughout the documents. Reviewers that do not have any significant comments pertaining to their assigned discipline shall provide a comment stating this.

g. Review comments shall follow the four part comment structure as stated in EC 1165-2-209:

1. The review concern
2. The basis for the concern
3. The significance of the concern
4. The probable specific action needed to resolve the concern

Table 2: PDT Roster

Name	Functional Responsibility	E-Mail Address	Telephone
[redacted]			

h. In some situations, especially addressing incomplete or unclear information, comments entered into DrChecks may seek clarification in order to then assess whether further specific concerns may exist. For these instances, the ATRT member will coordinate the comment with the ATRT Lead prior to submission into DrChecks.

i. Flagging a comment as "*Critical*" in DrChecks indicates that the concern could have significant impacts on the study schedule or results. The use of the "*Critical*" comment flag should be reserved for those comments that the reviewer feels are of high significance.

j. Grammatical comments shall not be submitted into Dr Checks. Grammatical comments should be submitted to the ATRT Lead via electronic mail as a Word document in track changes or as a

separate Word document that outlines the comments. The ATRT Lead should consolidate and shall provide these grammatical comments to the PDT Lead outside of Dr Checks.

k. The ATRT shall backcheck PDT evaluations to the review comments and either closes the comment or attempt to resolve any disagreements. Conference calls shall be used to resolve any conflicting comments and responses. A summary of these discussions will be included in backcheck documentation in DrChecks. ATRT members may "agree to disagree" with any comment response and close the comment with a detailed explanation for "*Non-Critical"* comments.

l. ATRT members shall keep the ATRT Lead aware of the status of "*Critical" and* unresolved comments. If the ATRT and the PDT are not able to reach agreement on those comments, the Review Management Organization will be engaged to provide direction and facilitate resolution of the comments. If a comment cannot be resolved, then it shall be documented and brought to the attention of the Regional Integration Team as part of the submission package.

m. The ATRT members shall regularly monitor their respective labor code balances and alert the ATRT Lead to any possible funding shortages. Additional funding requirements by the ATRT will be coordinated through the ATRT and PDT Leads in advance of a negative charge occurring.

4. Considerations for Review.

Products will be reviewed for compliance with guidance, including Engineer Regulations, Engineer Circulars, Engineer Manuals, Engineer Technical Letters, Engineering and Construction Bulletins, Policy Guidance Letters, implementation guidance, project guidance memoranda, and other formal guidance memoranda issued by HQUSACE. As an initial guide, the ATRT should consider ER 1110-2-1156, Safety of Dams – Policy and Procedures, EC 1165-2-209 Civil Works Review Policy, and the Project Study Issue Checklist in Exhibit H-2, Appendix H, ER 1105-2-100 (20 Nov 07), which includes many of the more frequent and sensitive policy areas encountered in studies.

a. Project Specific Review Considerations:

- Include any project specific issues, concerns, or questions that the PDT or RMO has identified for particular consideration by the ATRT.

b. Key Review Considerations include for Baseline Risk Estimate:

- Are background, geology, instrumentation, Geotech, dam safety issues, potential failure modes, consequences, hydrology, expert elicitation(s), risk estimate, past and on-going construction, and performance adequately explained?
- Are there other failure modes that should be considered?
- Are there branches in the risk event trees that require further evaluation, reassessment or investigation before being judged as a reasonable representation of the risk?
- Are significant potential failure modes well supported?
- Are consequences well supported and reasonable?
- Are risk analyses well supported and reasonable

- Are interim risk reduction measures (IRRM) reasonable?
- Do you suggest consideration of other IRRMs?
- Do the portrayal and level of risks agree with your understanding of the project's current condition and its' ability to withstand potential loads, based on your review of information provided?
- Based on the information provided, is it reasonable to expect that the facility can be safely operated if operations continue in the same way they have been?
- Do the overall report and report conclusions appear to make sense and support the objectives of the DMS study, based on the information provided for your review?
- Are there any deviations from USACE policy documented in the submission package?
- Is the formulation and evaluation of alternatives consistent with applicable regulations and guidance?
- Was the selection of models appropriate for use in evaluations?
- Was the application of data within those models appropriate?
- Was the interpretation of and conclusions drawn from model results reasonable?
- Are the sources, amounts, and levels of detail of the data used in the analysis appropriate for the complexity of the project?
- Do the main decision document and appendices form an integrated and consistent product?

c. Following are minimum considerations that ATR reviewers should address per ER 1105-2-100. Similar review submittal requirements will apply to In Progress Reviews (IPR) or Issue Resolution Conferences (IRC).

For a Final Report Submittal:

- Have all issues in previous reviews been resolved?
- Has District clearly identified significant changes (such as a document in Track Changes) to Draft document based on Draft review, Independent External Peer Review, and Public comment?

5. Schedule.

Table 3 – ATR Schedule for Baseline Risk Assessment

Task	Date
Baseline Risk Assessment:	
• Review Begins	21 May 2012
• Site Visit / Baseline Risk Assessment Briefing	10 May 2012
• ATRT Comments Due	22 June 2012
• PDT Responses Due	06 July 2012
• Backcheck Responses	13 July 2012
• Resolution of Comments[\1]	20 July 2012
• Review Report / Certification	27 July 2012
• After Action Report	04 August 2012

[\1] Contact PDT member(s) directly by telephone to resolve comments.