



DEPARTMENT OF THE ARMY
PHILADELPHIA DISTRICT, CORPS OF ENGINEERS
WANAMAKER BUILDING, 100 PENN SQUARE EAST
PHILADELPHIA, PENNSYLVANIA 19107-3390

CENAP-EC

MEMORANDUM FOR Commander, North Atlantic Division (CENAD-RB-T)

SUBJECT: Review Plan for General Edgar Jadwin Dam Issue Evaluation Study (IES),
Phase 1

1. Respectfully request that the attached review plan be approved for an Issue Evaluation Study (IES), Phase 1 authorized for General Edgar Jadwin Dam. The purpose of the IES Phase 1 quantitative study is to verify the existing Dam Safety Action Classification (DSAC) for the Dam; guide the selection and gauge the effectiveness of interim risk reduction measures; and, determine if a Phase 2 or Dam Safety Modification Study is required.
2. This Review Plan was developed from an examination of the nature and scope of the Phase 1 IES and in accordance with the requirements set forth in the Civil Works Review Policy (EC 1165-2-214).
3. Risk Management Center (RMC) has reviewed the Plan and an endorsement letter is enclosed.
4. Point of contact. Please direct your questions or concerns regarding this Review Plan to the Dam Safety Officer, Peter Tranchik at (215) 656-6600.

Encls.

1. Review Plan
2. RMC Letter of Endorsement

A handwritten signature in black ink, appearing to read "A Bliss".

MICHAEL A. BLISS
LTC, EN
Commanding



DEPARTMENT OF THE ARMY
US ARMY CORPS OF ENGINEERS, NORTH ATLANTIC DIVISION
FORT HAMILTON MILITARY COMMUNITY
302 GENERAL LEE AVENUE
BROOKLYN, NY 11252-6700

CENAD-RBT

JL 6 2016

MEMORANDUM FOR Dam Safety Officer, Philadelphia District, US Army Corps of Engineers (CENAP-EC/ Mr. Tranchik), Wanamaker Building, 100 Penn Square East Philadelphia, PA 19107-3390

SUBJECT: Approval of the Review Plan (RP) for the General Edgar Jadwin Dam Issue Evaluation Study (NID #PA00009)

1. References:

- a. Issue Evaluation Study Review Plan for the General Edgar Jadwin Dam, Dyberry Creek, PA (NID #PA00009), 6 May 2016
- b. Memorandum, CEIWR-RMC, 17 May 2016, subject: Risk Management Center Endorsement – General Edgar Jadwin Dam, NID #PA00009, Dyberry Creek, PA, Phase I Issue Evaluation Study
- c. EC 1165-2-214, Water Resources Policies and Authorities – Civil Works Reviews.

2. The enclosed Review Plan for the General Jadwin Dam Issue Evaluation Study (IES) has been prepared in accordance with Reference 1.b. The North Atlantic Division and the Risk Management Center (RMC) have reviewed the Review Plan, and it is satisfactory.

3. The RMC will be the Review Management Organization (RMO) for the Agency Technical Review (ATR). The Review Plan does not include Independent External Peer Review since the IES is not a decision document.

4. The Review Plan for the General Jadwin IES is approved. Subsequent revisions to this Review Plan or its execution will require new written approval from this office.

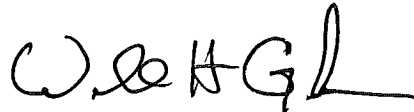
5. In accordance with Reference 1.b, Appendix B, Paragraph 6, this approved Review Plan shall be posted on your district website for public review and comment. The plan will also be posted on NAD's website.

CENAD-RBT

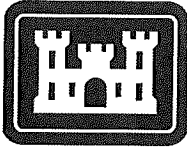
SUBJECT: Approval of the Review Plan (RP) for the General Edgar Jadwin Dam Issue
Evaluation Study (NID #PA00009)

6. The point of contact for this action is Mr. Daniel Rodriguez at 347-370-4595 or
daniel.j.rodriguez@usace.army.mil.

Encl

A handwritten signature in black ink, appearing to read 'W. H. G.' followed by a stylized flourish.

WILLIAM H. GRAHAM
Brigadier General, USA
Commanding



**US Army Corps
of Engineers®**

Review Plan

U.S. Army Corps of Engineers North Atlantic Division Philadelphia District

**GENERAL EDGAR JADWIN DAM NID # PA00009
DYBERRY CREEK, PENNSYLVANIA**

ISSUE EVALUATION STUDY

**Prepared on 05 August 2015¹
Last Revised on 06 May 2016**

PREPARED BY:



Peter M. Tranchik, P.E.
Dam Safety Officer, CENAP-EC

RECOMMENDED BY:



Michael A. Bliss
LTC, EN
Commanding

APPROVED BY:



William H. Graham
Brigadier General, USA
Commanding

MSC Approval Date: 6 July 2016 *rs.*

¹ The General Edgar Jadwin Issue Evaluation study was initiated in 2015 as a Semi-Quantitative Risk Assessment (SQRA). See information under "Jadwin Dam" below and the Project Management Plan for information about prior study actions.

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1.0 REFERENCES

- EC 1165-2-214, Water Resources Policies and Authorities, Civil Works Review Policy
- ER 1110-2-1156, USACE Safety of Dams-Policies and Procedures
- ER 1110-1-12, Engineering Design and Quality Management
- General Edgar Jadwin Dam Interim Risk Reduction Measures Plan, updated October 2014
- Project Management Plan (PMP) for this Issue Evaluation Study

2.0 RESPONSIBILITIES

2.1 Review Management Organization (RMO)/ Coordinating Actions

The USACE Risk Management Center (RMC) is the Center of Expertise that supports USACE Civil Works by managing and assessing risks for dams and levee systems. The RMC, in consultation with the Dam Safety and Levee Safety Senior Oversight Groups and Head Quarters U.S. Army Corps of Engineers (HQUSACE), manages resource queues for Issue Evaluation Studies and Dam Safety Modification Studies. The RMC will function as the RMO for this Issue Evaluation Study (IES).²

Contents of this review plan have been coordinated with the RMC Review Management Office and the North Atlantic Division (NAD), the Major Subordinate Command (MSC). Informal coordination with NAD will occur throughout the IES development, including briefings to the NAD Dam Safety Committee and Program Review Board updates. In-Progress Review (IPR) team meetings with the RMC, NAD, and HQ will be scheduled on an “as needed” basis to discuss programmatic, policy, and technical matters. The NAD Dam Safety Program Manager will be the POC for vertical team coordination. The vertical team is listed in Attachment 2, Table 4. This review plan will be updated for each new project phase.

2.2 Owning District

Philadelphia District owns and operates General Edgar Jadwin Dam (Jadwin Dam) and has assigned a Project Manager (PM) and District members of the Project Delivery Team (PDT) for this study. The PM and PDT are responsible for developing the review plan. Philadelphia District is responsible for ensuring the study undergoes necessary and appropriate District Quality Control/Quality Assurance (DQC).

² EC 1165-2-214, 09 Agency Technical Review

2.3 Risk Cadre

The Risk Cadre assigned out of USACE, New Orleans District has been tasked as the technical lead organization for the Jadwin Dam IES beginning with the Semi-Quantitative Risk Assessment (SQRA) and continuing into the Phase 1 IES. The Risk-Cadre personnel are selected for their specialized expertise pertinent to the assessment of the potential risks posed by Jadwin Dam. The Cadre personnel will serve on the PDT along with the personnel assigned by Philadelphia District.

2.4 Major Subordinate Command (MSC)

USACE, North Atlantic Division is the Major Subordinate Command (MSC) and is responsible for concurrent Quality Assurance Review and will approve this plan.²

2.5 Contacts

Table 1 located in Attachment 2 lists the principal contacts for inquiries about the study and the reviews.

3.0 PURPOSE AND REVIEW REQUIREMENTS

3.1 Purpose

It is the policy of USACE that all of its planning, engineering and scientific work will undergo an open, dynamic, and rigorous review process. Technical, scientific and engineering information that is relied upon to support recommendations in decision documents or form the basis of designs, specifications, and/or O&M requirements will be reviewed to ensure technical quality and practical application. USACE, Philadelphia District will conduct an Issue Evaluation Study (IES) Phase 1 Quantitative Risk Assessment for Jadwin Dam. The results of this study are subject to review in accordance with USACE policy. This Review Plan defines the scope and level of peer review for the study.

The overall objective of an IES is to evaluate dam safety issues, found during previous studies, in relation to the USACE tolerable risk guidelines and determine if the issues warrant further actions either through interim measures, formal study or both.

3.2 Requirements

Following is a brief discussion of the basic requirements for review of the Jadwin Dam IES, Phase 1 study that was preceded by a Semi-Quantitative Risk Assessment (SQRA) for which this Plan was originally written. The plan also specifies actions that will be taken to fulfill the requirements.

3.2.1 Guidance

This Review Plan was developed in accordance with EC 1165-2-214, Civil Works Review Policy. The Engineering Circular (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.

3.2.2 Disciplines Required

Reviewers must be selected who have expertise in civil-geotechnical engineering, geology, structural engineering, hydrology & hydraulics, and economics as these disciplines relate to the determination of risk associated with Jadwin Dam.

3.2.3 Type of Work Product under Review

The results of the IES Phase 1 will not be used for an agency decision to obtain project authorization to commit Federal funds for project implementation or project modification. The report resulting from this study is therefore *not* a decision document and is *not* subject to a Policy and Legal Compliance Review. Further, this study will *not* result in implementation documents (plans and specifications) in response to any other decision document. The resulting report is therefore *not* an implementation document.³ There is no known necessity for National Environmental Policy Act (NEPA) documents or other environmental compliance products. For this study there is no local sponsor and no in-kind services will be provided.

This IES Phase 1 falls into the broad category “Other Work Product.” For other work products, a case specific risk-informed decision shall be made as to whether ATR is appropriate. USACE, Risk Management Center (RMC) determined that an IES at the Phase 1 (quantitative risk assessment level of effort) must undergo ATR.⁴

3.3 Summary of Planned Review Steps

3.3.1 District Quality Control/Quality Assurance (DQC)

As with all USACE projects, this study will be subject to District Quality Control/Quality Assurance (DQC). Further details are provided below in Section 7.0.

3.3.2 Agency Technical Review

ATR will be performed. Further details are provided below in Section 8.0.

3.3.3 Quality Control and Consistency Review (QCC)

RMC will conduct a Quality Control and Consistency Review (QCC) in accordance with policy the RMC implemented to ensure that each issue evaluation study is consistent with the level of effort and attention to detail for similar risk assessments.

³ EC 1165-2-214, Glossary provides definitions for “Decision Documents” and “Implementation Documents.”

⁴ EC1165-2-214, 15, Risk Informed Decisions on Appropriate Reviews provides a series of questions used to determine whether undertaking an ATR is appropriate.

3.3.4 Dam Safety Senior Oversight Group (DSOG)

Upon satisfactory completion of the QCC, and certification of the review effort, the District Dam Safety Officer (DSO) will present the final report to the Dam Safety Senior Oversight Group (DSOG). All revisions resulting from the DSOG review must be completed prior to the report being forwarded to the MSC and HQUSACE for approval.

This IES is not a decision document and does not cover work requiring a Type I or Type II IEPR or Policy and Legal Compliance Reviews. Issue Evaluation Studies are used to justify Dam Safety Modification Studies. If this project requires a Dam Safety Modification Study, both Type I and Type II IEPR and a Policy and Legal Compliance Review will be conducted.

3.4 Documentation

DQC activities will be documented in accordance with the District's Engineering and Construction Division (E&C) Quality Management Plan. All DQC and ATR review comments, responses, and associated resolutions accomplished throughout the review process will be documented through the use of DrChecks™ review software. DQC records will be provided to each review team for review activities.

4.0 APPROVAL OF THE REVIEW PLAN

The North Atlantic Division (NAD) Commander is responsible for approving this Review Plan. The Commander's approval reflects vertical team input (involving Philadelphia District, MSC, RMO/(RMC), and HQUSACE members) as to the appropriate scope and level of review for the IES product and endorsement by the RMO. Like the Project Management Plan (PMP), the Review Plan is a living document and may change as the study progresses. Philadelphia District is responsible for keeping the Review Plan up to date. Significant changes to the Review Plan (such as changes to the scope and/or level of review) should be re-endorsed by the RMC and 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 Commander's approval memorandum, should be posted on the Home District's webpage: <http://www.nap.usace.army.mil/Missions/CivilWorksReviewPlans.aspx>.

The latest Review Plan should also be provided to the RMO and NAD and linked to the HQUSACE webpage.

5.0 JADWIN DAM

5.1 Impetus for the Study

A Screening for Portfolio Risk Analysis (SPRA) was conducted for Jadwin Dam in 2009. The SPRA assigned Jadwin Dam a level-2 Dam Safety Action Classification (DSAC 2). For projects where the DSAC rating was established by an SPRA, a Semi-Quantitative Risk Assessment (SQRA) is conducted first to re-evaluate the assigned classification and to justify the need for a Phase-1 IES.⁵ An SQRA, beginning with a new Potential Failure Mode Analysis (PFMA) was conducted from July through November 2015.

The Risk Management Center (RMC) was briefed on the SQRA team findings on 03 December 2015. RMC determined, based on that briefing that the study team should move directly to a Phase 1 quantitative study, while retaining the DSAC 2 classification.

5.2 Objective of the IES and Charge to the Reviewers

In addition to verifying that the existing project authorized purposes warrant continued Federal investment, the results of this Phase 1 IES will facilitate the following determinations:⁶

- Verify that the existing project authorized purposes warrant continued Federal investment;
- Confirm that dam safety issues do or do not exist;
- Verify or reclassify the current DSAC based on these findings;
- Gauge the effectiveness, and guide the selection, of current and additional interim risk reduction measures;
- Use the results to review effectiveness of the IRRMPs, identify data deficiencies, develop DSMS plans, and prioritize DSMS; and
- Determine if there is a basis (or not) to proceed with a Dam Safety Modification Study (DSMS).

⁵ ER 1110-2-1156, 8.8.3.1

⁶ ER1110-2-1156, 8.2.5

5.3 Dam Location and Function

Jadwin Dam is owned and operated by USACE, Philadelphia District. It is located on Dyberry Creek north of the Borough of Honesdale, in Wayne County, Pennsylvania. The Jadwin Dam project is part of an integrated reservoir flood damage reduction system. In conjunction with Prompton Reservoir it provides flood risk management in varying degrees, to communities along the Lackawaxen River. Flood control is the only authorized purpose for this project. This flood control project is a dry dam that impounds no pool during normal operation. There are 24,500 acre-feet of storage to the spillway crest and a total of 47,300 acre-feet of storage at maximum pool. The dam controls 64.5 square miles of the Dyberry Creek watershed in Wayne County. Construction began in May 1957, diversion of the Dyberry Creek started in June 1957 and the Dam was dedicated in June 1959.

5.4 Embankment

Jadwin Dam is built on natural overburden soils consisting of silts, sands, and gravels up to 80 feet deep, which have been deposited on bedrock. The dam embankment is a zoned earth and rock-fill structure. The crest of the embankment, at elevation 1082 feet NGVD29, is 1255 feet long with a crest width of 30 feet; the maximum section rises 112 feet above the original streambed. The embankment consists of an upstream compacted earth-fill silty gravelly sand zone, followed by a ten-foot wide transition zone, and a downstream dumped rock-fill zone. The transition zone consists of the same silty, gravelly sand earth fill but with a greater percentage of boulder size particles. Additional upstream protection is provided by a semi-impervious un-compacted earth-fill blanket placed on the transition of existing ground and upstream toe of the compacted earth-fill. Downstream protection is enhanced by a rock toe-berm placed on the transition of downstream toe of the rock-fill and existing ground. The top of the toe-berm is at elevation 1005 NGVD29, which is designed to be above the maximum tail-water. The toe-berm extends approximately 125 feet out from the downstream shell.

5.5 Outlet and Spillway

The outlet works is located in the left abutment and consists of: an uncontrolled intake structure; which transitions to an eight-foot diameter, 530-foot long concrete-lined rock tunnel; and a stilling basin for energy dissipation. The spillway is a perched-type, uncontrolled open channel that is excavated through the left abutment. A concrete ogee section with a crest eight feet above the upstream channel bottom was built at the upstream entrance to the open channel spillway.

5.6 Prior Study and Modification

A potential leakage zone through the Jadwin embankment was identified, investigated, remediated and reported in 1971. At that time uncertainties existed because construction records recovered were incomplete and did not include photographs of the area of interest. This uncertainty will remain as this team conducts its IES.

5.7 Instrumentation

Jadwin Dam is outfitted with 18 open-tube piezometers installed at locations and tip depths intended to provide an effective picture of the phreatic surface within the dam. Note that during impoundment of water in 2005 and 2006, piezometers located on the downstream toe of the embankment became artesian. The source of water pressure in these holes is not fully understood.

5.8 Interim Risk Reduction Measures Plan (IRRMP)

An IRRMP was prepared in 2011 for Jadwin Dam and was reviewed and updated in 2014. Five Interim Risk Reduction Measures (IRRM) are included in the plan:

- Complete a Facilitated Potential Failure Mode Analysis (PFMA)
- Increase visual inspection
- Update and test Emergency Action Plan
- Install an early warning system
- Prepare for emergency placement of seepage berm

As of the date of this Review Plan, a facilitated PFMA has taken place; a threshold has been established for increasing visual inspection; and preparation for emergency placement of a seepage berm has been completed.

6.0 OBJECTIVES OF THE REVIEW

6.1 Overview

Review of the study should be conducted to identify, examine, and comment upon assumptions that underlie analyses of public safety, economic, engineering, environmental, real estate, and others appropriate to making the above listed determinations. Additionally the reviewers must evaluate the soundness of models and analytic methods used by the study team. Review panels should also be able to evaluate whether the interpretations of analyses and conclusions are reasonable.

6.2 Factors Affecting the Scope and Level of Review

6.2.1 Documentation

All data including construction drawings and specifications, reports, and data collected from monitoring instrumentation has been made available to the IES PDT. However there is only a limited construction photo record and limited construction reporting available. Further, since the dam is not designed to impound water except during high-flow flooding conditions there is very limited piezometer data that is useful in analysis of the embankments performance under load. Limited data will require that the reviewers consider whether the data is sufficient to insure confidence in any or all conclusions about the risk, which Jadwin dam poses to downstream communities.

6.2.2 Prior investigation and remediation of a potential leakage zone

During installation of piezometers in the summer of 1968, losses in drilling fluid (air) were experienced. Water loss tests were conducted, which supported the conclusion that a potentially dangerous seepage zone existed in the compacted earth portion of the fill. Further investigations including direct observations of the questionable zone from within a 48-inch diameter calex hole identified a zone of cobble size pieces in the embankment. In 1971, a 95-foot deep (average), five-line grout curtain was installed between Stations 6+80 and 8+00. This was to ensure coverage of the identified cobble zone at an approx. 69- to 78-foot depth. This cobble zone was believed to be the remnants of the temporary rock-covered end slope built adjacent to the diversion channel at the end of the first construction season. The conditions identified and remedial activities introduced conditions within the embankment that are not in accordance with the original design. Though the 1971 report concluded that the suspect zone had been repaired, the effects of the remedial grouting will be difficult to quantify. The reviewers will be required to consider whether the study team has appropriately established a position with regard to the need to collect new data.

6.2.3 Response of Piezometer at the Downstream-Toe, 2005 and 2006 Impoundments

During impoundment of water in 2005 and 2006, downstream, open system piezometers were observed to be flowing because the tops of the piezometers were lower than the piezometric pressure in the underlying aquifer. The source of water pressure in these holes is not fully understood. The reviewers will be required to consider whether the study team has appropriately established a position with regard to the need to collect new data to understand the nature of this observation.

6.2.4 Design of the Dam

The feature deficiencies of Jadwin Dam, identified by the SPRA, included the following:

- The embankment does not have an impervious core or a properly designed filter.
- The embankment is founded on pervious material with minimal seepage control measures.

Reviewers will be required to consider whether the study team has been able to verify that the original assumptions contributing to the design are appropriate and whether team has appropriately established a position with regard to the need to collect new data.

6.2.5 Parallel Modeling/Study Contributions

During this IES Phase 1 study, the HEC-HMS model and the PMF developed in 2015 to support the SQRA will be updated. The updates may not be complete until after the failure mode elicitation. Reviewers will be required to consider how the state of supporting H&H modeling and related Consequence modeling impacts the uncertainty of the failure modes being considered. If the updated HEC-HMS and PMF are available after elicitation but before reports are finalized, there may be time for additional failure model consideration with the updated modeling results. It should also be noted that neither an extreme storms analysis nor a site specific Probable Maximum Precipitation (PMP) analysis will be developed within the timeframe of this Phase 1 study.

7.0 DISTRICT QUALITY CONTROL/QUALITY ASSURANCE (DQC)

Philadelphia District prepared and updated this review plan and is responsible for District Quality Control/Quality Assurance (DQC). Pursuant to USACE guidance, all assumptions, work procedures and products including model output and reports must undergo the necessary and appropriate DQC Review. The DQC Review will be performed in accordance with EC 1165-2-214 and portions of ER 1110-1-12 that are appropriate to a DQC process.

7.1 Internal Review Process

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

7.2 Quality Checks and Reviews

Quality checks and reviews occur during the study development process and are carried out as a routine management practice. Quality checks may be performed by staff responsible for the work, such as supervisors, work leaders, team leaders, designated individuals from the senior staff, or other qualified personnel. However reviews and checks conducted by individuals for their own work are not acceptable.

7.3 PDT Responsibilities

PDT reviews are performed by members of the PDT to ensure consistency and effective coordination across all project disciplines. Additionally, the PDT is responsible for a complete reading of any reports and accompanying appendices prepared by or for the PDT to assure the overall coherence and integrity of the report, technical appendices, and the recommendations before the product of the study is presented for consistency review at the Risk Management Center.⁷

The PDT will assist the technical lead in the following ways:

- Ensure that all discoverable pertinent data is posted in RADS II in a sensible arrangement
- Read all reporting and model results to insure consistency and accuracy in particular discipline and across disciplines
- Ensure all facts have been considered and consider carefully whether anything is missing from the risk assessment
- Strictly adhere to the rules of conduct especially regarding the free sharing of ideas and information (see critical assumptions in the PMP)
- Be personally responsible for all of the above and for assisting other team members

7.4 DQC Roster

The members of the PDT are listed in Attachment 2, Table 2. DQC reviewers are listed in Table 3, also located in Attachment 2.

8.0 AGENCY TECHNICAL REVIEW

ATR is an in-depth review, managed within USACE, and conducted by a qualified team outside of the home district that is not involved in the day-to-day production of the project/product. The purpose of this review is to ensure the proper application of clearly established criteria, regulations, laws, codes, principles and professional practices. The ATR team reviews the various work products and assure that all the parts fit together as a coherent whole. ATR teams will be comprised of senior USACE personnel (Regional Technical Specialists, etc.) certified in CERCAP and may be supplemented by outside experts as appropriate. To assure independence, the leader of the ATR team shall be from outside the home Major Subordinate Command (MSC). The ATR Team should have early involvement and should be engaged at Milestone Event 19, see the flowchart at the following link:

<https://team.usace.army.mil/sites/IWR/PDT/rmc/QMUSACE/Shared%20Documents/IES%20Process%20DRAFT%20v5%2020141119.jpg>. To help reviewers assess the product see “Questions

⁷ EC 1165-2-214, District Quality Control/Quality Assurance

for Issue Evaluation Studies or Baseline Risk Assessments” at the following link:

<https://team.usace.army.mil/sites/IWR/PDT/rmc/QMUSACE/Shared%20Documents/Forms/AllItems.aspx?InitialTabId=Ribbon%2EDocument&VisibilityContext=WSSTabPersistence>.

8.1 Responsibilities⁸

The Risk Management Center is the Review Management Organization and as such will assign the ATR team members and draft the “Charge” to the ATR team.⁹ The ATR team shall be established shortly after the PDT is established.

The PDT will coordinate the Review Plan with the appropriate RMO to ensure that ATR activities are reasonably represented in the PMP, particularly the schedule and resource needs.

The ATR leader must complete a statement of technical review for all final products and final documents.

8.2 Documentation

The ATR team leader, project manager, RMO, and the chief of the function shall certify that the issues raised by the ATR team have been resolved. By signing the ATR certification, the District leadership certifies policy compliance of the document and also that the District Quality Control (DQC) activities were sufficient and documented. Before the ATR certification is completed, the PDT shall ensure that all agreed upon changes have been incorporated into the final product.

8.3 Review Reports

Review reports will be considered an integral part of the ATR documentation and shall also function as follows:

- Disclose the names of the reviewers, their organizational affiliations, and include a short paragraph on both the credentials and relevant experiences of each reviewer;
- Include the charge to the reviewers prepared by the RMC in accordance with EC 1165-2-214, 7c;
- Describe the nature of their review and their findings and conclusions;
- Include a verbatim copy of each reviewer's comments and the PDT's responses.

⁸ EC1165-2-214 Appendix C delineates responsibilities and includes a template for completion and certification of a final ATR.

⁹ EC1165-2-214, 09 *Agency Technical Review*

8.4 Certification

ATR may be certified when all ATR concerns are either resolved or referred to HQUSACE for resolution and the ATR documentation is complete. Certification of ATR should be completed, based on work reviewed to date, for the final report. A draft certification is included as Attachment 1.

8.5 Agency Technical Review Team

The ATR team will be chosen based on each individual's qualifications and experience with similar projects. Members of the ATR team are listed in Attachment 2, Table 5. The following are descriptions of roles and disciplines required for the ATR of this issue evaluation study:

8.5.1 ATR Lead

The ATR Lead is a senior professional with extensive experience in preparing Civil Works documents and conducting ATRs (or ITRs). The lead has 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 associated with this ATR.

8.5.2 Geotechnical Engineer

The Geotechnical Engineer shall have experience in the field of geotechnical engineering, analysis, design, and construction of earthen embankment dams. The geotechnical engineer shall have experience in subsurface investigations, rock and soil mechanics, internal erosion (seepage and piping), slope stability evaluations, erosion protection design, and earthwork construction. The geotechnical engineer shall have knowledge and experience in the forensic investigation of seepage, settlement, stability, and deformation problems associated with high head dams and appurtenances constructed on rock and soil foundations.

8.5.3 Engineering Geologist

The Engineering Geologist shall have experience in assessing internal erosion (seepage and piping) beneath earthen embankment dams constructed on natural overburden soils consisting of silts, sands, and gravels, which have been deposited on bedrock. The engineering geologist shall be familiar with identification of geological hazards, exploration techniques, field and laboratory testing, and instrumentation. The engineering geologist shall be experienced in the design of grout curtains and must be knowledgeable in grout theory, concrete mix designs, and other materials used in foundation seepage barriers.

8.5.4 Hydraulic Engineer

The Hydraulic Engineer shall have experience in the analysis and design of hydraulic structures related to dams including the design of hydraulic structures (e.g., spillways, outlet works, and stilling basins). The hydraulic engineer shall be knowledgeable and experienced with the routing of inflow hydrographs through multipurpose flood control reservoirs utilizing multiple discharge devices, Corps application of risk and uncertainty analyses in flood damage reduction studies, and standard Corps hydrologic and hydraulic computer models used in drawdown studies, dam break inundation studies, hydrologic modeling and analysis for dam safety investigations.

8.5.5 Structural Engineer

The structural Engineer shall have experience and be proficient in performing stability analysis, finite element analysis, seismic time history studies and external-stability analysis applicable to outlet tunnel lining and large concrete ogee-weir construction for the dam.

8.5.6 Economist (or Consequence Specialist)

The Consequence Specialist shall be knowledgeable of policies and guidelines of ER 1110-2-1156 as well as experienced in analyzing flood risk management projects in accordance with ER 1105-2-100, the Planning Guidance Notebook. The economist shall be knowledgeable and experienced with standard Corps computer models and techniques used to estimate population at risk, life loss, and economic damages.

9.0 PUBLIC PARTICIPATION

Public participation will not take place until the IES phase is completed, however this Review Plan will be posted on the district website at:

<http://www.nap.usace.army.mil/Missions/CivilWorksReviewPlans.aspx>.

Public and stakeholder coordination has been performed to inform interested parties about the DSAC rating and ongoing IES. Findings of the Final IES will also be shared with appropriate stakeholders. If this project results in a Dam Safety Modification Study (DSMS), future public coordination will occur for NEPA compliance.

10.0 COST ESTIMATE

Task Description	Review Start	Review Cost
DQC Review	22 April 2016	77,860
ATR Review	16 August 2016	65,000
QCC Review	16 August 2016	34,177
SOG Review	28 September 2016	

*ATTACHMENT 1
COMPLETION OF AGENCY TECHNICAL REVIEW*

The Agency Technical Review (ATR) has been completed for the [Issue Evaluation Study](#) for [General Edgar Jadwin Dam, Dyberry Creek, Wayne Co. PA](#). 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 DrCheckssm.

SIGNATURE

[Name](#)
 ATR Team Leader
[Office Symbol/Company](#)

 Date

SIGNATURE

[Reuben Wade](#)
 Project Manager (home district)
[CENAP-ECEG](#)

 Date

SIGNATURE

[Name](#)
 Architect Engineer Project Manager¹
[Company, location](#)

 Date

SIGNATURE

 Nathan Snorteland
 CEIWR-RMC

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

SIGNATURE

[Peter M. Tranchik, PE](#)
 Chief, Engineering Division (home district)
[CENAP-EC](#)

 Date



DEPARTMENT OF THE ARMY
U.S. ARMY CORPS OF ENGINEERS
RISK MANAGEMENT CENTER
12596 WEST BAYAUD AVE., SUITE 400
LAKEWOOD, CO 80228

REPLY TO
ATTENTION OF

CEIWR-RMC

17 May 2016

MEMORANDUM FOR: Commander, Philadelphia District, ATTN: CENAP-EC-EG

SUBJECT: Risk Management Center Endorsement – General Edgar Jadwin Dam,
NID# PA00009, Dyberry Creek, Pennsylvania, Phase I Issue Evaluation Study

1. The Risk Management Center (RMC) has reviewed the Review Plan (RP) for General Edgar Jadwin Dam, NID# PA00009, Dyberry Creek, Pennsylvania, Phase I Issue Evaluation Study, dated 06 May 2016, and concurs that this RP complies with the current peer review policy requirements outlined in EC 1165-2-214 "Civil Works Review Policy", dated 15 December, 2012.
2. This review plan was prepared by Philadelphia District, reviewed by NAD, and the RMC, and all RMC review comments have been satisfactorily resolved.
3. The RMC endorses this document to be approved by the MSC Commander. Upon approval of the RP, please provide a copy of the approved RP, a copy of the MSC Commander's approval memorandum, and a link to where the RP is posted on the District website to the RMC Senior Review Manager (rmc.review@usace.army.mil).
4. Thank you for the opportunity to assist in the preparation of this RP. Please coordinate all aspects of the Agency Technical Review efforts defined in the RP. For further information, please contact me at 601-631-5896.

Sincerely,

Dustin C. Herr, PE
Review Manager
Risk Management Center

CF:
CEIWR-RMC (Mr. Snorteland)
CENAD-RBT (Division Quality Manager)