



REPLY TO  
ATTENTION OF

**DEPARTMENT OF THE ARMY**  
SOUTH PACIFIC DIVISION, CORPS OF ENGINEERS  
1455 MARKET STREET  
SAN FRANCISCO, CALIFORNIA 94103-1399

*6-Dec-2012*

CESPD-PDC

MEMORANDUM FOR Commander, Sacramento District US Army Corps of Engineers,

Subject: Review Plan Approval For America River Watershed – Folsom Dam Raise  
Review Plan

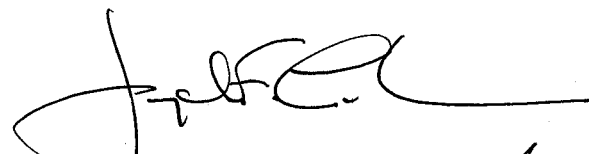
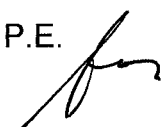
1. The attached Review Plan for the America River Watershed – Folsom Dam Raise dated 27 November, 2012 has been prepared in accordance with EC 1165-2-209. The Review Plan has been coordinated internally within the District Support Team and with the Risk Management Center. The Risk Management Center will serve as the Review Management Office.

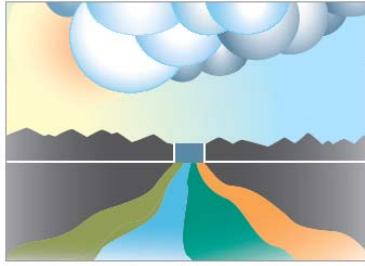
2. The Review Plan does include independent external peer review.

3. I hereby approve this Review Plan, which is subject to change as circumstances require, consistent with study development under the Project Management Business Process. Subsequent revisions to this Review Plan or its execution will require new written approval from this office.

4. For any additional information or assistance, contact Karen Berresford, District Support Team Lead, (415) 503-6557, [Karen.G.Berresford@usace.army.mil](mailto:Karen.G.Berresford@usace.army.mil).

Encl

  
MICHAEL C. WEHR, P.E.  
BG, USA  
Commanding 



American River Watershed Project

# **FOLSOM DAM RAISE PROJECT**

## **REVIEW PLAN**



**US Army Corps  
of Engineers®  
Sacramento District**

July 2012

Revised 27 November 2012

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# 1. Introduction

## A. Purpose

The Review Plan (RP) defines the scope and level of quality management activities for the Folsom Dam Raise Project. This project includes four major design components, including Main Dam Tainter Gate Refinements, Embankment and dike modifications, modifications to Temperature Control Shutter System and downstream ecosystem restoration sites. Quality management activities for all of these components include:

- (1) Engineering Document Report (EDR) for a refined tainter gate designs.
- (2) Plans, specifications and design documentation report (DDR) for all four components.
- (3) Construction of features associated with all four components..
- (4) Environmental Impact Statement / Environmental Impact Report (EIS/EIR)
- (5) Operations and Maintenance (O&M) Manual.

## B. References

- (1) ER 1110-2-1150, Engineering and Design for Civil Works Projects, 31 Aug 1999
- (2) ER 1110-1-12, Engineering and Design Quality Management, 21 Jul 2006
- (3) ER 11-1-321, Army Programs Value Engineering, 28 Feb 2005
- (4) WRDA 2007 H. R. 1495 Public Law 110-114, 8 Nov 2007
- (5) EC 1165-2-209, Civil Works Review Policy, 31 Jan 2012
- (6) Army Regulation 15-1, Committee Management, 27 November 1992 (Federal Advisory Committee Act Requirements)
- (7) National Academy of Sciences, Background Information and Confidential Conflict Of Interest Disclosure, BI/COI FORM 3, May 2003

## C. Review Requirements

This RP was developed in accordance with EC 1165-2-209, which establishes the procedures for ensuring the quality and credibility of U.S. Army Corps of Engineers (USACE) decision and implementation documents through independent review. The RP describes in general the scope of reviews that will take place throughout the design phases of the project.

All appropriate levels of review are addressed in the RP and include District Quality Control (DQC), Agency Technical Reviews (ATR), Independent External Peer Reviews (IEPR), and Value Engineering Study (VE). Any levels deemed inapplicable will require documentation in the RP of the risk-informed decision not to undertake that level of review. The RP will also identify the most important skill sets needed in the reviews, the objective of the reviews and the specific advice sought.

## D. Review Objectives

The objective of the RP is to ensure that the Dam Raise Project features are designed and constructed to the highest quality standards. The Corps is committed to the very highest standards of quality in engineering products and design services rendered. This commitment manifests itself in the attitude of the staff at all levels of project involvement. Achievement of

quality control is a management attitude activated by the application of established procedures and standards. The procedures, standards and lists outlined in the RP are based on industry practices, Corps planning, engineering and construction policies, and regulations found to be conducive to good quality control.

The purpose of the RP is to define and achieve the following goals and objectives:

- (1) Assure production of high quality engineering design and construction documents that comply with customer and Corps requirements and meet or surpass the customer's expectations all while remaining on schedule and within budget.
- (2) Consistently provide high quality planning services and products on schedule and within budget that comply with regulations, policies, guidelines, procedures, and client needs. Whether produced by in-house staff or contractors, ensure that all personnel recognize applicable lessons-learned and see that these are incorporated into the process.
- (3) Maintain and improve awareness by all planning, design and construction personnel of the need and responsibility for adhering to rigorous, upfront Quality Control (QC) procedures.
- (4) Produce effective and coordinated documentation.
- (5) Focus on doing the job effectively and efficiently, followed with a thorough yet efficient check and review system.
- (6) Define the roles, responsibilities, and the accountability of project team members for quality control.
- (7) Address cooperative efforts of Project Delivery Team (PDT) and Agency Technical Review (ATR) team members for accomplishing Seamless Review throughout the product development phase.
- (8) Define interagency coordination with respect to quality control.
- (9) Reduce construction cost growth by "acting" to control quality during the design phase rather than "reacting" to problems during construction.
- (10) Promote safety and the well-being of the public.

The Agency Technical Review under the RP does not replace the need for conducting design checks or supervisory review of products, as required by District Quality Control (DQC).

## **E. Quality Guidelines**

Quality control is defined as the evaluation of technical products and processes to ensure that they comply with applicable laws, Corps planning, engineering and construction regulations and policies, sound technical practices, and customer requirements and expectations.

Commensurate with the high profile and risk (consequences of failure) associated with the Dam Raise Projects, review of the implementation documents and critical design features will receive a high level of technical quality verification by each discipline. Products will be reviewed to ensure that the following objectives are met:

- (1) The plan is economically and technically feasible and environmentally acceptable; is compatible with existing projects; and will be safe, functional, and meet the project's authorized purpose and customer requirements.

- (2) The engineering concepts, assumptions and methods are appropriate and valid, and analyses are correct.
- (3) The design complies with engineering policy and accepted engineering practice both within the Corps and industry-wide.
- (4) The cost estimate, including escalation and contingencies, is reasonable.

In general, the following guidance will be followed for the technical review.

- a) Quality Management Plan for Sacramento District
- b) ER 1110-1-12, Engineering and Design Quality Management
- c) ER 1110-1-8159, Engineering and Design Dr Checks
- d) ER 1110-2-1150, Engineering and Design for Civil Works
- e) ER 1105-2-100, Planning Guidance Notebook
- f) EC 1165-2-203, Implementation of Technical Policy Compliance Review
- g) CESP R 1110-1-8, Quality Management Plan
- h) CESP ED, Quality Management Plan
- i) ER 1110-1-12, Quality Management for Engineering and Design
- j) ER 200-2-2, Procedures for Implementing NEPA
- k) ER 1165-2-501, Civil Works Ecosystem Restoration Policy
- l) EC 1165-2-209, Civil Works Review Policy
- m) ER 11-1-321, Value Engineering
- n) ER 415-1-11, Biddability, Constructability, Operability and Environmental Review

## 2. Project Description

### A. Project Authority

Study of the American River Watershed by the Corps was authorized in the Flood Control Act of 1962 (Public Law 87-874) with direction from Congress given to the Corps to survey for flood control and allied purposes. More specific direction from Congress was provided in Section 101(a) (6) of the Water Resources Development Act of 1999 (WRDA 1999) (Public Law 106-53), in Section 128 of the Energy and Water Development Act of 2006 (Public Law 109-103) for modifications of Folsom Dam related to flood damage reduction, and in Section 3029 of the Water Resources Development Act of 2007 (Public Law 110-114). The Energy and Water Development Appropriations Act of 2004 (PL 108-137) endorsed raising Folsom Dam in accordance with the findings of the *2002 American River Watershed Long-Term Study Final Supplemental Plan Formulation Report*.

The originally authorized Folsom Dam Raise and Folsom Modification Projects were reevaluated in the Post Authorization Change Report for the American River Watershed Project, dated March 2007. This report resulted in refined authorized projects to include a Joint Federal Project auxiliary spillway at Folsom Dam (to be constructed jointly with USBR); a 3.5 foot dam raise, increasing the height of the reservoir dikes and replacing the emergency spillway tainter gates; and three ecosystem restoration projects (automating and reconfiguring the temperature

control shutters at Folsom Dam and restoration of the Bushy Lake and Woodlake sites downstream).

## B. Project Objectives

The objective of the Folsom Dam Raise authorization is to provide flood damage reduction by increased flood protection to the Sacramento area along the main stem of the American River. The Dam Raise project, combined with other authorized American River Watershed projects, would significantly reduce the probability of flooding in Sacramento. The Dam Raise project will accomplish this through raising the left and right embankment wing dams, Mormon Island Auxiliary Dam, eight dikes, as well as refined emergency spillway tainter gates. These flood damage reduction elements enhance the utilization of the existing flood storage capacity, as well as increase the flood storage capacity of the reservoir. In addition to flood damage reduction, a secondary objective is to restore degraded habitat conditions in the lower American River through ecosystem restoration. As referenced above, the associated restoration elements include automating the existing Temperature Control Shutters and restoration of the Bushy Lake and Woodlake sites downstream of Folsom Dam.

The project management structure, is provided in Appendix A. An aerial view of the project features is shown in Figure 1.

**Figure 1. Project Features.**



### **C. Work Products**

The RP covers the design documentation and the cost estimate for the Dam Raise Projects. The products developed and certified under the RP are as follows: (1) Engineering Documentation Report (EDR); (2) Design Document Report (DDR); (3) plans and specifications; (4) MCACES cost estimate; (5) EIS/EIR for the Dam Raise design for the emergency gate refinements, embankment and dikes; (6) O&M Manuals; and (7) Updated Water Control Manual.

### **D. Project Non-Federal Sponsors**

State of California	Sacramento Area Flood Control Agency
Central Valley Flood Protection Board	1007 Seventh Street, 7th Floor
3310 El Camino Ave., Room LL40	Sacramento, CA 95814
Sacramento, CA 95821	Phone: (916) 874-7606
Phone: (916) 574-0609	Fax: (916) 874-8289
Fax: (916) 574-0682	

## **3. Scope of Review**

The scope of this RP is for the Plans, Specifications and project documentation being developed for the Dam Raise Projects. A decision on the appropriate levels and types of quality control was made in accordance with Corps risk assessment guidelines, namely the risk informed decision directives of EC 1165-2-209. The levels of review required are: DQC, VE, ATR and Type II IEPR (also known as Safety Assurance Review (SAR)). 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); VE is required by ER 11-1-321 for all construction projects greater than \$1,000,000; and ATR is undertaken to “ensure the quality and credibility of the government’s scientific information” in accordance with EC 1165-2-209. The Type II IEPR (or SAR) is an independent external peer review in accordance with EC 1165-2-209 and applicable to design and construction activities for flood risk management projects, as well as other projects where potential hazards pose a significant threat to human life.

### **A. District Quality Control**

All work products and reports, evaluations, and assessments shall undergo the necessary and appropriate District Quality Control/Quality Assurance (DQC). This review is managed by the home district in accordance with the Major Subordinate Command (MSC) and district Quality Management Plans. The DQC includes seamless quality checks and reviews, supervisory reviews, and Project Delivery Team (PDT) reviews including input from the Local Sponsor. To ensure specific discipline efforts are on target with regard to compliance with policy and criteria and an acceptable level of quality, sub-products will be technically coordinated and reviewed before they are integrated into the overall project. Comments received for sub-product reviews shall be submitted to the appropriate discipline (via email, hard copy mark-up or other written form) and addressed prior to incorporation of sub-product content in the EDR. Several such sub-products relate to the Main Dam Emergency Tainter Gate Refinements that will be developed and documented in an EDR. The development of the EDR includes four tainter gate refinement



variations (sub-products) that will each require concept level design efforts. While the resulting EDR document will undergo specific DQC review, the sub-products shall undergo quality checks, supervisory checks and PDT review as described above before final documentation in the EDR. DQC will further be conducted at the 35, 65, 95 and 100% design milestones, as well for the Biddability, Constructability, Operability and Environmental (BCOES) certification. BCOES reviews will also be conducted at 35%, 65% and 95% design milestones. The Design Review and Checking System (Dr. Checks) will be used to document all DQC comments, responses and associated resolutions throughout the review processes. QA review will be administered by the appropriate discipline section chiefs.

## **B. Agency Technical Review**

According to EC 1165-2-209, Agency Technical Review (ATR) is mandatory for all decision and implementation documents and is undertaken to “ensure the quality and credibility of the government’s scientific information.” 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 a project/product. The purpose of this review is to ensure the proper application of clearly established criteria, regulations, laws, codes, principles and professional practices. Dr. Checks (the online comment review application) will be used to document all ATR comments, responses and associated resolutions accomplished throughout the review process. Plans and specifications are implementation documents; therefore ATR is required for this project. ATR’s will also be conducted for the EDR and 35, 65 and 95% milestones.

## **C. Independent External Peer Review**

EC 1165-2-209 requires that a Type II IEPR (also known as a Safety Assurance Review (SAR)) shall be conducted for any project addressing hurricane and storm risk management or flood risk management, or any other project where the Federal action is justified by life safety, or where failure of the project would pose a significant threat to human life. The SAR team is an independent external panel that conducts reviews at various work phases, and is to be approved by the Review Management Organization (RMO), which is currently the South Pacific Division until such time the Risk Management Center (RMC) is sufficiently staffed. The SAR shall consider the adequacy, appropriateness, and acceptability of the design and construction activities in assuring public health, safety, and welfare.

Factors to consider for conducting a Type II review of a project or components of a project are:

- (1) The project involves the use of innovative materials or techniques where the engineering is based on novel methods, presents complex challenges for interpretations, contains precedent-setting methods or models, or presents conclusions that are likely to change prevailing practices.
- (2) The project design requires redundancy, resiliency, and robustness.
  - a) Redundancy is the duplication of critical components of a system with the intention of increasing reliability of the system, usually in the case of a backup or failsafe.
  - b) Resiliency is the ability to avoid, minimize, withstand, and recover from the effects of adversity, whether natural or manmade, under all circumstances of use.

- c) Robustness is the ability of a system to continue to operate correctly across a wide range of operational conditions (the wider the range of conditions, the more robust the system), with minimal damage, alteration or loss of functionality, and to fail gracefully outside of that range.
- (3) The project has unique construction sequencing or a reduced or overlapping design construction schedule; for example, significant project features accomplished using the Design-Build or Early Contractor Involvement (ECI) delivery systems.

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

After receiving the report 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 shall be submitted to the MSC for final MSC Commander approval. The report and responses will be made available to the public on the District's website.

A SAR will be conducted at the 65% and 100% design milestones and for the EIS/EIR review. This panel will review the DDR, plans, and specifications for these milestones, as well as review on-going construction operations. The most recent design activities with assumptions and preliminary conclusions will be presented to the SAR for review and comment.

#### **D. Policy Compliance and Legal Review**

The Emergency Gate Refinements plans and specifications will be reviewed for compliance with law and policy by the Corps legal team. The EIS/EIR will be reviewed for compliance with law and policy by the Corps and the State of California.

#### **E. Value Engineering Study**

USACE ER 11-1-321 requires VE studies for all construction projects greater than \$1,000,000. Value Management (VM) utilizes a functional analysis decision-making approach with multi-disciplinary teams to optimize overall value. The VM approach will increase teamwork by improving team understanding, consideration, and integration of the needs of all customers, PDT members, partners, and stakeholders. The Value Engineering Officer (VEO) will be included as a member of the PDT. The VE study will be performed concurrently with the 35% DQC. The overarching objective of a value study is to improve the value of the project.

#### **F. Modeling**

Several multidiscipline engineering analysis models (physical, numerical, computer) will be utilized throughout the design process for the Dam Raise Project. Results of these models will be included with appropriate design milestones and subject to DQC, ATR and SAR reviews. As such,

review teams should include the necessary expertise to evaluate the modeling expectations highlighted below.

A hydraulic physical model will be constructed of the emergency spillway and tainter gates to assess hydraulic performance associated with flood conditions up to PMF. Modeling objectives include identification of hydraulic impacts from the existing seismic struts between spillway piers; updated discharge rating curves; potential negative pressures and/or vibrations affecting structural loads on refined tainter gates, as well as on the existing ogee spillway; hydraulic loads on the existing bridge; and nappe profiles to verify that trunnions remain out of the flow. The development and results of the physical model will be included in ATR and SAR reviews.

Finite element models, both 2D and 3D, will be developed to mesh different structural components of the tainter gates. The analysis will be performed in phases in order of increasing complexity progressing from 2D to 3D and from simple pseudo-static to dynamic analysis. The finite element types (frame, shell and solid elements) and boundary conditions will be adopted to capture reasonably accurate behavior in the structural components for design. The design criteria and static/dynamic loads will be incorporated into the finite element models in compliance with EM 1110-2-2702, considering the amplification of bedrock ground motions to the trunnion level for dynamic analysis.

Water management analysis will include routings generated for the Folsom Dam Raise Project using HEC-ResSim.

Geotechnical analyses associated with raising the left and right embankment wing dams, dikes and MIAD will include general seepage and stability numerical models.

A Road Construction Emissions Model will be used to determine environmental impacts of construction and commuting on air quality. Other environmental models include a Habitat Evaluation Procedure, and noise models.

## **4. Review Team**

### **A. Review Management Organization**

The management of a review effort is a critical factor in assuring the level of independence of the review. With the exception of District Quality Control/Quality Assurance, all reviews shall be managed by an office outside the home district and shall be accomplished by professionals that are not associated with the work that is being reviewed. For the Folsom Dam Raise Project, the USACE Risk Management Center is the RMO, managing all dam safety related review efforts. The RMO will coordinate the review plan, assign and manage the Agency Technical Review (ATR) team, obtain Cost Engineering Directory of Expertise review and certification services, prepare "charge" to reviewers on ATR and IEPR panels, as well as assist the District with responses to IEPR review reports..

## B. Project Delivery Team

The Plans and Specifications for the Folsom Dam Raise Projects will be prepared by USACE Sacramento District. Certification of the quality control activities will be on file with the District upon completion. The Project Manager is Nikole May (916) 557-6989 and Technical Lead for this project is Jeff Qunell, PE, who can be reached at 916-557-7408. DQC will be managed in the Sacramento District (District) in accordance with Major Subordinate Command (MSC) and district Quality Management Plans.

<b>SACRAMENTO DISTRICT PROJECT DELIVERY TEAM (PDT)</b>			
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Pete Ghelfi	SAFCA – NF Sponsor	<a href="mailto:ghelfip@saccounty.net">ghelfip@saccounty.net</a>	916-574-7606
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SACRAMENTO DISTRICT QUALITY CONTROL/ASSURANCE TEAM			
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Nathan Cox	Hydraulics	<a href="mailto:Nathan.C.Cox@usace.army.mil">Nathan.C.Cox@usace.army.mil</a>	916-557-6686
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TBD	Geotech		
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Sherman Fong	Cost Engineering	<a href="mailto:Sherman.C.Fong@usace.army.mil">Sherman.C.Fong@usace.army.mil</a>	916-557-6983
TBD	Scheduling	<a href="mailto:Erik.S.Sandberg@usace.army.mil">Erik.S.Sandberg@usace.army.mil</a>	916-557-7722

**C. Value Engineering Study (VE)**

The Sacramento District Value Engineering Officer, Mary Diel, is responsible for selecting members on the VE Team (VEST). Members of the VEST will represent the various disciplines included in the project and must be currently working in the technical discipline for which they are providing commentary. Effort is taken to make sure the VEST is comprised of experienced personnel capable of maximizing the value of this project.

**D. Peer and Seamless Reviews**

During project development, seamless review is encouraged for all aspects of the project. The PDT members will initiate seamless reviews at appropriate times in order to reach a common understanding with their ATR counterparts, thereby minimizing significant comments/impacts during final agency technical review. Although several of the technical disciplines working on the Dam Raise project are assigned to the American River Section, the Section Chiefs representing each of the technical disciplines will provide in-progress design checks, advice, and supervisory review (as well as Quality Assurance) of the products.

**E. Agency Technical Review**

The ATR Lead will be selected with input from the South Pacific Division (SPD) District Support Team (DST). Engineering Circular 1165-2-209 states, “ATR teams will be comprised of senior USACE personnel, preferably recognized subject matter experts with the appropriate technical expertise such as regional technical specialists, and may be supplemented by outside experts as appropriate. ATR will be conducted by a qualified team outside of the home district that is not involved in the day-to-day production of a project/product.” Therefore, the ATR will be coordinated outside the Sacramento District. Its members will be selected from outside the district and will represent disciplines that have a major part in the design of the project features. Dr. Checks will be used for managing and documenting the ATR comments, evaluations, and back checks as well as the resolution of controversial comments, if any. Upon completion of the ATR and resolution of all comments, the review shall be certified using the certification form included as “Attachment 1.”

- (1) **Review Team Members.** The ATR reviewers must have a minimum of ten years experience in their discipline and with design of hydraulic structures; have a professional license or equivalent qualifying experience; and not be involved in the design or supervision of the project. For the disciplines that play a crucial part in the project, Subject Matter Experts (SMEs) are preferred for filling the ATR roster and they should also have experience in physical modeling of hydraulic structures specifically related to gated spillways. The following disciplines will be represented on the ATR: concrete materials, civil, environmental, hydraulics, hydrology, structural (to include seismic expertise), mechanical, geotechnical, construction, risk assessment, air and water quality, and cost engineering. The ATR roster will be provided upon assembly in Appendix C and will be updated, if necessary, to reflect any changes.
- (2) **Review Team Leader.** EC 1165-2-209 states, “to assure independence, the leader of the ATR team shall be from outside the home MSC.” EC 1165-2-209 also states, “the ATR shall be managed and performed outside of the home district.” The review team leader is responsible for assembling the team – which will be exclusive of SPK and may include AE contractors for specific disciplines or tasks, as necessary – as well as coordinating all activities of the review. The review team leader will communicate with the ATR team members to make sure they know their responsibilities and objectives. The ATR team leader will monitor the products and ATR comments, the PDT responses, and the reviewer's back-check of responses. The ATR team leader will eliminate any conflicting comments and will consolidate similar or related comments. In the event of a disagreement on a comment or issue that cannot be resolved between the reviewer and the designer, the ATR team leader and the PDT design lead will review the situation and determine the fate of the comment.

## **F. Safety Assurance Review**

During design and construction, a panel of experts will be assembled and will be in place to ensure the highest level of technical excellence, and provide comments and guidance as outlined in Paragraph 3(C) above. The advice of technical experts is utilized by the Corps on projects of exceptional size or complexity, containing unique features, and of particular importance to public safety. Independent External Peer Review (IEPR) is made up of “independent, recognized experts from outside of the USACE.” Having the characteristics specified in EC 1165-2-209, this project falls under the requirements of a Type II IEPR of Safety Assurance Review (SAR). A contractor will be used to assemble and oversee each panel, including the selection of qualified panel members, to ensure independence.

The appropriateness, in composition and scope, of the Type II IEPR ultimately falls under the Review Management Organization (RMO). For Type II IEPR of the Folsom Dam Raise Projects, the RMO is the USACE Risk Management Center (RMC) led by Nathan Snorteland, the RMC Director, (571) 232-9189.

The A-E shall provide review comments in Dr. Checks after the review conference.

The SAR team shall be composed of licensed engineers with experience in design of dams, dikes, hydraulic steel structures and large construction projects. The members will represent the

following disciplines (at a minimum). The final make-up, in size and composition, will be established by the contractor.

- (1) Civil/construction engineer(s) with significant experience with civil works construction quality assurance and control with a minimum 20 years of experience in flood control projects, including dams. The member(s) shall have significant experience in the construction and/or remediation of dams. The member shall be a registered Professional Engineer (PE) or equivalent qualifying experience.
- (2) Hydraulic engineering specialist(s) with a minimum 20 years of experience in hydraulic design and physical/numerical modeling for dam projects on major river systems. The member(s) shall be a registered Professional Engineer (PE) or equivalent qualifying experience.
- (3) Geotechnical Engineering specialist(s) with a minimum 20 years of experience in design, inspection and construction of levee or dam projects. The member(s) shall be registered Professional Engineers (PE) and preferably a registered Geotechnical Engineers (GE), or equivalent qualifying experience.
- (4) Structural engineering specialist(s) with a minimum 20 years of experience in complex dam projects and hydraulic structures, including dynamic modeling. The member(s) shall be a registered Professional Engineer (PE) or equivalent qualifying experience.
- (5) Concrete materials specialist(s) with a minimum 20 years experience in evaluating and developing materials for heavy civil projects, with a minimum of 3 completed dam projects.
- (6) The sixth member shall be an environmental and NEPA specialist with 10 years of West Coast experience in analyzing and developing mitigation measures for potential effects on hydrology, fisheries and air quality as related to construction activities for large civil works projects. The member shall have worked on a minimum of 3 completed large civil works projects on the West Coast, preferably within California with 10 years. The reviewer shall have experience in evaluating and conducting NEPA impact assessments, including cumulative effects analyses, for complex multi-objective public works projects with competing trade-offs. The member shall have a minimum MS degree or higher in an appropriate field of study. Experience shall encompass determining the scope and appropriate methodologies for impact assessment and analyses for a variety of projects and programs with high public and interagency interests and having project impacts to nearby sensitive habitats.

A list of the SAR team members will be included as Appendix D.

#### **G. Biddability, Constructability, Operability, Environmental & Sustainability (BCOES)**

Sacramento District cost engineering, construction, and scheduling DQC personnel will be performing BCOES reviews at each of the design milestones (35, 65, 95 and 100%). Input will also be provided from our local sponsor and Bureau of Reclamation representatives. Upon completion of the final design submittal, USACE personnel will perform one final review which will result in BCOES certification.

## 5. Public Comment

To ensure that the peer review approach is responsive to the wide array of stakeholders and customers, both within and outside the Federal Government, this Review Plan will be published on the district's public internet site following approval by SPD at <http://www.spk.usace.army.mil/>. The opportunity for public comment remains open as there is no formal comment period and no set closure date at this time. If and when comments are received, the PDT will consider them and decide if revisions to the review plan are necessary. The public is invited to review and submit comments on the plan as described on the web site.

## 6. Documentation

The work products will be reviewed using an interdisciplinary team approach. The products will be reviewed for scope and adequate level of detail; compliance with guidelines, policy, and customer needs; and consistency, accuracy, and comprehensiveness. Review comments will be identified with author and affiliation, and are expected to be constructive and relevant to the product. Review comments will contain the following elements: (a) a clear statement of the concern, (b) the basis for the concern, (c) the significance of the concern, and (d) the specific actions needed to resolve the concern. Reviewers must identify any significant deficiency; however, comments should be limited to those required to ensure adequacy of the product in meeting the stated objectives. Typographic errors and other minor stylistic changes should not be part of the formal technical review comments. Such comments will be provided separately to the PDT for their use and to the ATR team leader. A partial checklist for reviewers to consider is as follows:

- a) Constructability versus actual site conditions;
- b) Maintainability and operability by USBR;
- c) Accuracy and reasonableness test of computations;
- d) Compliance with governing policies, criteria, and project requirements;
- e) Seamless review (discussions and agreements with PDT counterparts); and
- f) Product review comment/response/actions taken are documented in Dr. Checks.

### A. Comment Resolution

Review comments do not necessarily have to be complied with, but each comment must be addressed and resolved. If a PDT member disagrees with a comment, the PDT member will try to resolve the comment through discussions with the ATR team member. The ATR team leader will help facilitate those discussions as needed. When this does not result in resolution, the issue will be elevated through the PDT member's chain of command as necessary. If this level of interaction does not resolve the issue, the responsible Functional Chief will make the final decision. The Functional Chief may consult with the Branch Chief, the CESP (Corps of Engineers South Pacific Division) staff, SMEs, or other appropriate sources. Resolution of disputes will be documented in Dr. Checks as appropriate.



## **B. Technical and Policy Issue Resolution**

Issues involving technical and policy interpretation shall be brought to the attention of the chief of the functional element for resolution. In some cases the chief of the responsible functional element may request that CESPDP hold an issue resolution conference to resolve major policy or technical issues. CESPDP may also arrange for HQUSACE participation in the issue resolution conference.

## **C. Certification**

For final products, a certification will be signed stating that issues raised by the ATR team have been resolved. The ATR certification will be signed by: the A-E (if appropriate), the Engineering Division Lead Engineer, the Planning Division Chief (as appropriate), the ATR team leader, the Project Manager (PDT Leader), other functional chiefs at the Section and Branch levels (as appropriate), the Chief of Engineering Division, the Office of Counsel, Risk Management Center Director and the District Commander. Standard Corps certification forms will be used.

## **D. Unique, Sensitive, or High Visibility Items**

The design of a modification of Folsom Dam to reduce flood damage is highly complex, and an inadequate or deficient design has the potential to significantly and adversely affect life and property. Therefore, it is imperative that the Sacramento District provide a total quality product. Following are some of the unique and highly sensitive aspects of the project:

- (1) Two Federal agencies, the Corps of Engineers and the Bureau of Reclamation, have jurisdiction over Folsom Dam for their respective responsibilities of flood damage reduction (FDR) and dam safety (DS). Since the dam raise project involves utilization of surcharge reservoir space above the currently authorized gross pool (top of flood control pool), operational rules have to be developed and agreed to by both the Corps and Reclamation.
- (2) Main Dam Emergency Tainter Gate Refinements may affect the 2011 USBR seismic upgrades to the existing emergency gates and spillway structure.
- (3) Coincident construction activities with multiple contractors will be required for multiple projects including the Joint Federal Project auxiliary spillway and control structure. Extensive planning, coordination and contract management will be required.
- (4) Construction of the project must minimize impacts to the ongoing operation of Folsom Dam for flood control, water supply, environmental releases, hydropower, recreation and adverse traffic impacts resulting from the transport of construction materials to the dam site.
- (5) The resolution of existing dam safety concerns will be an integral part of design and construction involving close coordination with the non-Federal sponsors and the Bureau of Reclamation.
- (6) The selected construction approach to raising the top of the dikes needs to be sensitive to potential adverse aesthetic impacts. For example, concepts involving the use of retaining, floodwalls may invite vandalism and graffiti.

## 7. Schedule/Costs

### A. Past and Scheduled Review Periods

The schedule and cost of the reviews are presented below. Cost estimates are based on the hourly rate of the personnel involved in the review process for the allotted time period. The start and end dates represent that amount of time necessary for reviewers to provide comments, designers to address them, and for the reviewers to agree to the provided changes. The schedule also provides the technical lead time to resolve any lingering comments or points of contention.

**Table 1. Review Milestones**

#### Main Dam Emergency Tainter Gate Refinements

Review Activity	Approximate Schedule	Reviews
EDR Review	2 Jan – 5 Feb 2013	DQC
	6 Feb – 12 Mar 2013	ATR
	13 Mar – 7 May 2013	IEPR, Type II
35% Design Review	11 Jul – 7 Aug 2013	DQC
	11 Jul – 7 Aug 2013	ATR VE BCOES
Draft EIS/EIR Review	21 Apr – 20 May 2014	OC
	21 Apr – 23 May 2014	DQC
	26 May – 27 Jun 2014	ATR
	30 Jun – 1 Aug 2014	IEPR
65% Design Review	13 Dec – 23 Jan 2013	DQC
	24 Jan – 6 Feb 2014	BCOES
	14 Mar – 18 Apr 2014	ATR
	2 May – 5 Jun 2014	SAR
95% Design Review	4 Aug – 5 Sep 2014	DQC
	27 Oct – 28 Nov 2014	ATR
	15 Dec 2013 – 19 Jan 2014	SAR
	8 Sep – 19 Se 2014	BCOES

### 3.5' Dam Raise (Embankment & Dikes)

Review Activity	Approximate Schedule	Reviews
35% Design Review	Dec 2014	DQC
Draft EIS/EIR Review	Jul 2015	DQC ATR SAR
65% Design Review	Jul 2015	DQC BCOES ATR SAR
95% Design Review	2015	DQC ATR
100% Design Review	2016	DQC, ATR, SAR BCOES

### Temperature Control Shutters

Review Activity	Approximate Schedule	Reviews
35% Design Review	9 Jan – 24 Feb 2012	DQC, VE
65% Design Review	2014	DQC ATR SAR
95% Design Review	2014	DQC ATR
100% Design Review	2015	DQC, ATR, SAR BCOES

### Bushy Lake & Woodlake Ecosystem Restoration

Review Activity	Approximate Schedule	Reviews
35% Design Review	2018	DQC
65% Design Review		DQC BCOES ATR
95% Design Review	2019	DQC ATR
100% Design Review		DQC, ATR, BCOES

## B. Estimated Costs for Review Process

Funds have been budgeted for ATR and SAR review activities. The approximate cost breakdown per product activity is provided in Table 2 below. The costs are shared with the local sponsors.

**Table 2. Typical Estimated Costs**

<b>Review Activity</b>	<b>Cost</b>
DQC	\$85,000
VE	\$60,000
ATR	\$75,000
SAR	\$100,000
BCOES	\$25,000

## 8. Points of Contact

Questions about this Review Plan may be directed to the applicable District Project Delivery Team, Lead Engineer, Jeffrey Qunell, (916) 557-7408, or to the Project Manager, Nikole May, (916) 557-6869. The Chief, Engineering Division, is Rick Poepelman, (916) 557-7301.

## 9. Review Plan Approval

The Sacramento District requests that the South Pacific Division endorse the above recommendations and approve this Review Plan as described in Appendix B of EC 1165-2-209.

# **Appendix A**

## **Management Team**

**Appendix A – Management Team**

<b>NAME</b>	<b>AGENCY</b>	<b>PHONE</b>	<b>E-MAIL ADDRESS</b>	<b>MAILING ADDRESS</b>
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USBR - Denver	Denver Federal Center, Denver, CO 80225			
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# **Appendix B**

## **Project Delivery Team (PDT)**

**Appendix B - Project Delivery Team (PDT)**

<b>NAME</b>	<b>AGENCY</b>	<b>PHONE</b>	<b>E-MAIL ADDRESS</b>	<b>MAILING ADDRESS</b>
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	USACE/SPK	(916) 557-		USACE - Sacramento
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**Appendix B - Project Delivery Team (PDT) - Continued**

<b>NAME</b>	<b>AGENCY</b>	<b>PHONE</b>	<b>E-MAIL ADDRESS</b>	<b>MAILING ADDRESS</b>
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<b>Materials</b>				
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Ken Sondergaard	USACE/SPK	(916) 557-5347	kenneth.b.sondergard@usace.army.mil	USACE - Sacramento
<b>Facilitator / Value Engineering</b>				
Mary Diel	USACE/SPK	(916) 557-6833	mary.r.diel@usace.army.mil	USACE - Sacramento
<b>Contracting</b>				
Matthew Hanscarik	USACE/SPK	(916) 557-7480	Matthew.P.Hanscarik@usace.army.mil	USACE - Sacramento
<b>Security</b>				
Drew Lessard	USBR	Information available under Project Management.		
<b>OC</b>				
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<b>PAO</b>				
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<b>Addresses</b>				
USACE - Sacramento	1325 J Street, Sacramento, CA 95814			

# **Appendix C**

## **Agency Technical Review (ATR) Team**

**Appendix C - Agency Technical Review (ATR) Team**

<b>NAME</b>	<b>AGENCY / ORGANIZATION</b>	<b>PHONE</b>	<b>E-MAIL ADDRESS</b>
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**ATR Lead / Structural**

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**Hydraulic Design / Physical Modeling**

**Hydrology**

**Environmental & Water Quality**

**Geotechnical**

**Construction**

**Risk Assessor - to be assigned by HEC**

**Civil**

**Concrete Materials**

**Hydraulic Structures**

**Mechanical**

**Cost**

# **Appendix D**

## **Safety Assurance Review (SAR) Team**

### Appendix D - Safety Assurance Review (SAR) Team

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<b>Mechanical</b>				
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<b>Construction</b>				
<b>Materials</b>				
<b>Environmental &amp; Water Control</b>				

**NOTE: Those identified above are preliminary members proposed by the contractor. SAR contract for EDR was awarded on 25-Sep-2012**

# **Appendix E**

**Constructability Review Conference (CRC) Team**

# **Appendix G**

## **Vertical Team**

**Appendix G - Vertical Team**

<b>NAME</b>	<b>AGENCY / ORGANIZATION</b>	<b>PHONE</b>	<b>E-MAIL ADDRESS</b>	<b>MAILING ADDRESS</b>
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<b>Value Engineering</b>				
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<b>Economics</b>				
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<b>Environmental</b>				
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<b>Counsel</b>				
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USACE - DC	441 G Street, NW, Washington, DC 20314			



**ATTACHMENT 1**

**COMPLETION OF AGENCY TECHNICAL REVIEW**

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

*SIGNATURE*

\_\_\_\_\_  
Matthew Hanson  
ATR Team Leader  
CENWP-EC-DS

\_\_\_\_\_  
Date

*SIGNATURE*

\_\_\_\_\_  
Nikole May  
Project Manager (home district)  
CESPK-PM-C

\_\_\_\_\_  
Date

*SIGNATURE*

\_\_\_\_\_  
Name  
Architect Engineer Project Manager<sup>1</sup>  
Company, location

\_\_\_\_\_  
Date

*SIGNATURE*

\_\_\_\_\_  
Nathan Snorteland  
Director, Risk Management Center  
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*

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Rick L. Poepelman, P.E.  
Chief, Engineering Division  
CESPK-ED

\_\_\_\_\_  
Date