REVIEW PLAN

Red Rock Hydroelectric Project
Federal Energy Regulatory Commission (FERC) #12576
Hydropower Construction

Red Rock Dam
Des Moines River
Marion County, Iowa

Rock Island District

P2 Number 332224

July 11, 2012

Revision Date	Description of Change	Page/ Para Number	Approved By
07/31/12	Revised Project Schedule; Figure 2	Page 14	Zukowski
12/19/12	Address RMC comments and Update ATR	Entire RP	Zukowski
07/2/13	Updated Project Schedule at Sec 408	Table 3	Zukowski

US Army Corps of Engineers ®

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TABLE OF CONTENTS

PHOTOGRAPH, TABLES, AND FIGURES

ATTACHMENTS

REVIEW PLAN

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1. PURPOSE AND REQUIREMENTS

A. Purpose. This Review Plan (RP) defines the scope and level of the US Army Corps of Engineers (Corps), Rock Island District's (District) Agency Technical Review (ATR) and the Corps Section 408 process reviews for the *Red Rock Hydroelectric Project Federal Energy Regulatory Commission (FERC) #12576 Hydropower Construction* (Project). The Independent External Peer Review (IEPR) Type II Safety Assurance Review (SAR) Plan that has been prepared and executed by the Red Rock Hydropower Licensee is also included in the RP discussion. The Licensee's SAR Plan is contained in Attachment 6. All appropriate levels of review (ATR, IEPR Section 408, and Policy and Legal Review) are included in this RP. The RP identifies the skill sets needed by the reviewers and the objective of the review and the specific advice sought, thus setting the appropriate scale and scope of review for the Project.

B. References

1. Engineering Circular (EC) 1165-2-209, Civil Works Review Policy , 31 Jan 2010
2. Engineering Regulation (ER) 1105-2-100, Planning Guidance Notebook
3. CECW-PB Memorandum, Policy and Procedural Guidance for the Approval of Modifications and Alterations of Corps of Engineers Projects [33 USC 408], 23 Oct 2006
4. CECW-PB Memorandum for See Distribution. Subject: Clarification Guidance on the Policy and Procedural Guidance for the Approval of Modifications and Alterations of Corps of Engineers Projects, 17 Nov 2008
5. EC 1105-2-407, Planning Models Improvement Program: Model Certification, 31 May 2005
6. ER 1110-2-12, Quality Management, 30 Sep 2006
7. Memorandum of Understanding Between the Corps and the FERC on Non-Federal Hydropower Projects, 30 March 2011
8. Memorandum, Risk Management Center Endorsement – Red Rock Dam Hydroelectric Project Review Plan , 10 December 2012 (Attachment 1)

C. Requirements. This RP was developed in accordance with EC 1165-2-209, which establishes the procedures for ensuring the quality and credibility of the Corps' reviews including independent reviews. The EC outlines two levels of review, ATR and IEPR.

2. PROJECT INFORMATION

A. Project Authorization. The Red Rock Reservoir and appurtenant works on the Des Moines River, Marion County Iowa were approved for construction under authority of the Flood Control Act, approved June 28, 1938. Dam construction was completed in 1969. The dam is operated by the Corps. An aerial view of the dam is shown in Photograph 1.

Photograph 1. Red Rock Dam

The Federal Power Act (FPA) 16 U.S.C. Part I authorizes the FERC to issue preliminary permits and licenses for non-Federal hydropower projects, including those utilizing Corps facilities. The preliminary permit gives a developer exclusive permission to study the feasibility of hydropower projects and gives a permittee priority of application for a license. A preliminary permit was issued to CRD Hydroelectric LLC on March 9, 2006. On February 24, 2009, CRD Hydroelectric LLC , pursuant to Part I of the U.S. Federal Power Act (FPA) (16 U.S.C. §§ 791a-825r (2006), filed an application with the FERC for an original license to construct, operate, and maintain a non-Federal hydroelectric facility at the Corps' Red Rock Lake Dam Project on the Des Moines River, near the City of Pella, in Marion County, Iowa. Because the Red Rock Lake Dam Hydropower Project would use surplus water from a Federal dam, it was required to be licensed [Section 23(b)(1) of the FPA, 16 U.S.C. § 817(1) (2006)]. On December 23, 2010, the FERC issued an Environmental Assessment; on April 18, 2011, the FERC issued its Order (FERC Order) and License designated as FERC Project No. 12576. Subsequent to the issuance of the FERC Order and License, the License was transferred from CRD to the Licensee, Western Minnesota Municipal Power Agency (WMMPA). Pursuant to Article 312 of the License and 33 USC 408, the Licensee must obtain approval from the Corps before construction can begin.

B. Project Description. The Corps' primary function in this Hydroelectric Project is to review and comment upon implementation documents prepared by the FERC License and generated by the Licensee and its design engineer, Montgomery Watson Harza (MWH). While the Licensee is tasked with completing its own SAR/IEPR, the District is tasked with reviewing the proposed Hydroelectric Project to ensure it will not adversely affect the operational or structural integrity of the Red Rock Dam Project. The District will review all products with regards to the FERC License for compliance with the District's ability to maintain its missions and authorized purposes, including life and dam safety, operational requirements, and environmental concerns. In addition, the District will review the technical soundness and environmental acceptability of the proposed Project. The SAR/IEPR is covered by the SAR Plan prepared by MWH on behalf of the Licensee dated May 2012.

The Licensee proposes the following facilities for construction and operation at Red Rock Dam generating capacity of 36.39 megawatts:

1. a stand-alone intake structure founded on bedrock.;
2. two 20.5 feet wide by 18.25 feet high modified horseshoe reinforced concrete penstocks founded on a 3-foot diameter jet grouted piers;
3. a new 184 feet long by 114 feet wide powerhouse, founded on bedrock, downstream from the concrete gravity section of the dam, with two 18.2 megawatts vertical Kaplan-type generating units;
4. a new connection to the existing utility with a 4.5 mile long 69 KV transmission line;
5. a new access road, approximately 450 feet long; and
6. appurtenant facilities.

The Project boundary includes 8.3 acres of Federal land managed by the Corps, including the land encompassing the intake, penstock, powerhouse, tailrace, and the first 3,200 feet of primary transmission line adjacent to and downstream of the north side of the existing spillway of the existing Red Rock Dam. The general configuration of the power plant and ancillary improvements are shown in Figure 1.

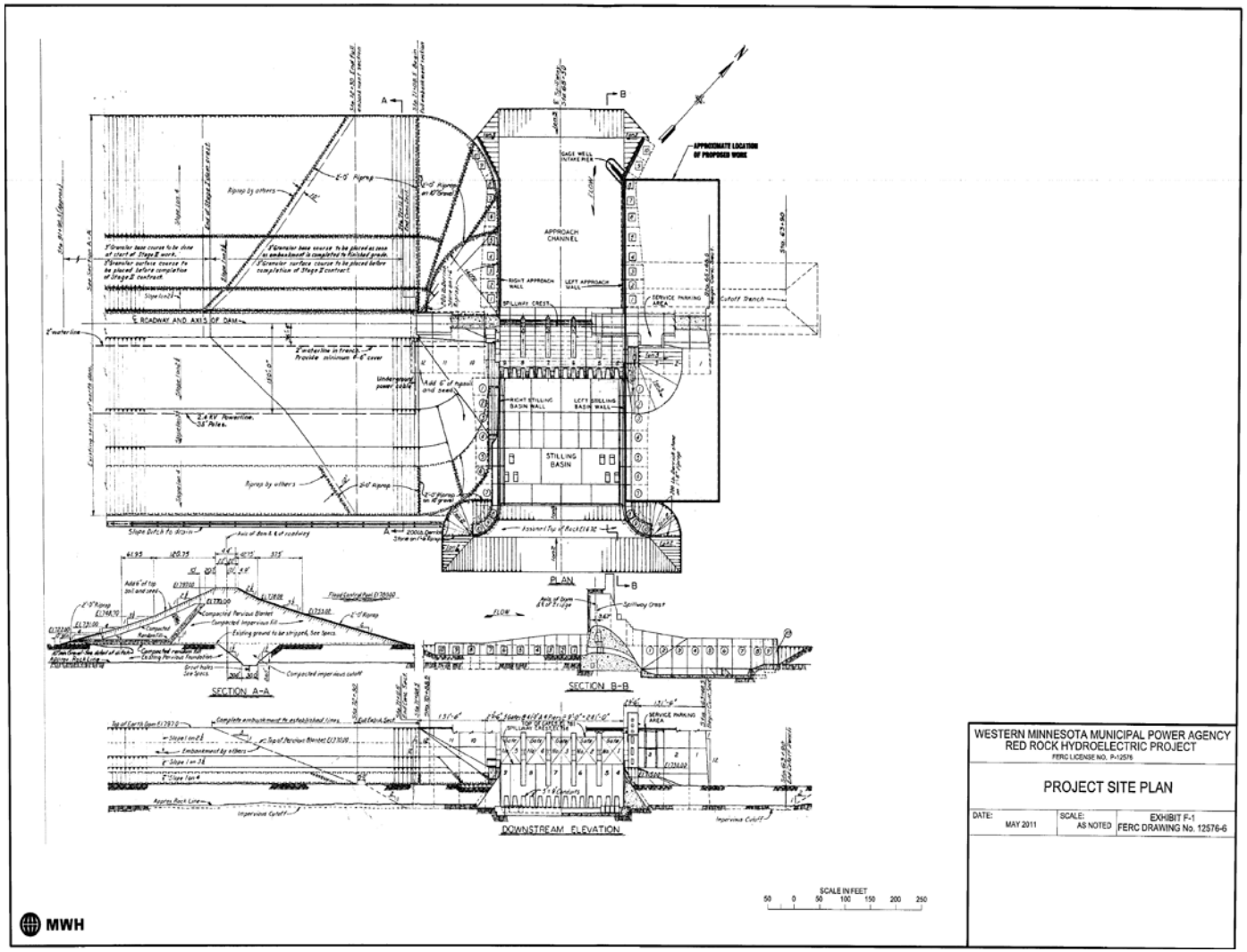


Figure 1. Project Site Plan

C. Life Safety. The Dam is currently classified as a DSAC IV dam; the hydropower Project will not improve this rating nor, with proper design, construction, operation and maintenance, negatively affect this rating. While the existing dam has a high-hazard classification and thus inherently has a life safety risk involved with it, the addition of hydropower to the dam is not seen as creating any significant increase in this risk. As part of the FERC process, a Potential Failure Modes Analysis (PMFA) has been performed to ensure that the design features, construction methods and final product do not cause any harm to government facilities or create any new significant dam safety risks or credible failure modes within the system.

Downstream from Red Rock Dam are approximately 46,495 acres of land subject to periodic inundation. Portions of the communities of Ottumwa, Eldon, Bonaparte, and Keosauqua, IA, as well as railroads, highways, utilities, farmsteads, and numerous secondary roads lie in the floodplain. With the exception of urban areas, the floodplain of the Des Moines River is essentially agriculture. The principal crops are corn, soybeans, oats and small grains.

Detailed land use analysis and property inventories in the downstream floodplain have not been compiled since Project formulation was completed in the early 1960s. The July 2003 Water Control Manual updates stage damage information to 2002 price levels and the April 1995 Emergency Action Plan (EAP) provides 1990 population estimates of communities below Red Rock.

A Population at Risk (PAR) estimate for a Probable Maximum Flood (PMF) fail event was obtained from the 1990 population estimates indexed to 2004 with census data and inundation mapping from the EAP. Table 1 shows the PAR PMF fail estimate of 9,221.

A no-fail PAR estimate for the PMF events was extrapolated from outflow data obtained, measured in cubic feet per second (cfs), from the District. Fail mode PAR estimates for the other hydrologic and seismic load conditions and the no-fail PAR for the unusual event were extrapolated from storage (acre-ft). There is no PAR in the normal and seismic no fail conditions because of normal releases occur. Table 1 shows PAR estimates used in the Screening Portfolio Risk Assessment model.

Table 1. Population at Risk Estimate

			Outflow (cfs)		PAR		
Load	**Pool Elevation**	**Storage (Acre-ft)**	No Fail	Fail	No Fail	Fail	Increment
Normal	768.0	964,699	32,000	-	-	3,570	3,570
Seismic	742.0	189,021	<30,000	-	-	699	699
Unusual	781.7	1,738,495	115,000	-	2,577	6,433	3,856
Extreme	791.5	2,491,930	379,000	946,000	3,694	9,221	5,527

The floodplain downstream of Red Rock Dam is wide and the land use is predominantly agricultural For a PMF failure event, the travel time to the nearest community downstream of the dam is less than 1 hour. The Project has an EAP in place. Loss of life estimates used Bayesian Model Averaging default values of .0002 for normal, seismic and unusual loads and .0004 for the PMFA.

D. Factors Affecting the Scope and Level of Review. The majority of the proposed changes and additions of the hydropower facility at Red Rock Dam have dam and life safety concerns, and warrant a high level of review. Reviews will be focused on the potential impacts of the proposed construction on

the integrity of the existing structure to include, slope stability, impacts to reservoir operations, impacts to adjacent spillway walls and gate structures and impacts to internal drainage elements within the embankment. Operational and environmental issues may have large impacts on design which could increase the number or length of the review periods. Timeliness of submittals is not within the control of the Federal Government. The Licensee proposes an aggressive schedule for submittals and review of documents. Maintaining the proposed schedule is dependent on the Licensee's ability to submit in a timely fashion complete packages, respond in a timely manner and provide satisfactory responses to all comments; and the Corps' ability to process associated reviews and Section 408 documents.

3. ROLES AND RESPONSIBILITIES

The following describes the roles and responsibilities for those entities required to review Project documents:

A. Western Minnesota Municipal Power Agency

1. Prepare and submit an SAR plan. Coordinate comments and resolutions.
2. Coordinate Section 408 application requirements in addition to FERC license requirements.
3. Submit a full 408 application package, with resolution of all SAR/ATR comments included.

B. Rock Island District

1. Review and comment upon the SAR plan as prepared by the WMMPA and submit to the Risk Management Center (RMC) and the Mississippi Valley Division (MVD) for review. Coordinate comments from the RMC, MVD, and the District reviews with the WMMPA.
2. Prepare, submit and execute a District RP for the District's role and responsibilities involved with the Project technical reviews including ATR and 408 application package reviews. Since this is not a Corps project, District Quality Control is limited to ensuring the RP documents are complete and approved.

C. Risk Management Center

1. Review, comment upon, and endorse the District's RP when submitted to MVD for approval.
2. Serve as the Review Management Organization. This role shall include reviewing, commenting upon and approving the WMMPA's SAR plan including ensuring IEPR SAR panel members' qualifications and independence from the Project.

D. Mississippi Valley Division

1. Review, comment upon, and approve the District's RP.
2. Coordinate the WMMPA's Section 408 application package when formally submitted via the District. The complete package will include the approved District RP, the WMMPA's SAR plan, and the full Section 408 application/proposal materials.
3. MVD shall deny application package, return for revision, or endorse and forward to the Corps, HQ for action.

4. MODEL CERTIFICATION AND APPROVAL

Due to the Corps "review only" role in this Project, no models are required to verify the effects of this Project.

5. POLICY COMPLIANCE AND LEGAL REVIEW

The District's Office of Counsel is responsible for legal review of decision and implementation documents and will sign a Statements of Legal Review prior to Project construction.

6. POSTING OF REVIEW PLAN AND PUBLIC COMMENT

To ensure that the peer review approach is responsive to the widest array of stakeholders and customers, both within and outside the Federal Government, this RP will be published on the District's public internet site following approval by MVD.

7. DISTRICT AGENCY TECHNICAL REVIEW (ATR)

A. General. ATR is an in-depth review undertaken to ensure the quality and credibility of the Project's scientific information, managed within the Corps, and conducted by a qualified team . ATR is mandatory for all decision and implementation documents. The purpose of ATR is to ensure proper application of clearly established criteria, regulations, laws, codes, principles and professional practices. The ATR team reviews the various work products and assures that all the parts fit together in a coherent whole. The ATR team is comprised of senior Corps personnel and may be supplemented by outside experts as appropriate.

ATR for implementation documents covered by EC 1165-2-209 is managed by the home District. All products and deliverables, prepared by the licensee or MWH will be reviewed within the District as they are developed to ensure they meet Project objectives, comply with regulatory and engineering guidance, and meet expectations of quality. The ATR for this Project will assess whether the analyses presented are technically correct and comply with published Corps guidance, and that the design document report explains the analyses and the results in a reasonably clear manner for the reviewers. Products will be reviewed against published guidance, including ERs, ECs, manuals, engineering technical letters, and bulletins. The ATR will focus on dam safety, operations, and environmental concerns and responsibilities.

B. Products for Review. The Licensee has proposed to submit the Project design documents in two phases. Phase I will be the upstream intake works. Phase II will be the downstream works to include the powerhouse and tailrace. All work products and reports, evaluations, and assessments shall undergo necessary and appropriate ATR. Additionally, the ATR team is responsible for a complete reading of the design documentation report and technical appendices to assure the overall integrity of the report and the recommendations before approval by the District Commander. Products requiring ATR include but are not limited to:

- Section 408 submittal including 60 percent, 90 percent, and 100 percent design plans and specifications, including a Quality Control and Inspection Plan (QCIP)

- the design document report
- construction sequencing and plan
- QA/QC methods operation plans
- operations and maintenance manual

The review will focus on dam safety and Corps project operability. These documents are created by MWH on behalf of the WMMPA. Since the products were developed outside of the District, it is appropriate to have the District, serving as the home District, review and comment.

C. Documentation of Agency Technical Review. DrChecks[sm] review software will be used to document all ATR comments, responses, and associated resolutions accomplished throughout the review process. Comments will be limited to those that are required to ensure adequacy of the product. If appropriate, relevant ATR records will be reviewed during each ATR event and the ATR team will provide comments as to the adequacy of the ATR effort for the associated product. The ATR will be certified when all ATR concerns have been resolved. At the end of ATR, the WMMPA will include all comments, responses and the final closeout as part of the Section 408 package. The ATR Certification form is presented in Attachment 2.

D. Comments and Issue Resolution. Comments and issue resolution will be managed at the District level. Any comments that cannot be resolved at this level will be elevated to the FERC for resolution.

E. Required Agency Technical Review Team Expertise. An ATR for 60 percent, 90 percent, and 100 percent design and specifications for this Project is to be completed. As part of the ATR, the following disciplines are required to review the draft and final design plans and specifications:

- Programs, Planning and Project Management Division
  - Planning and Project Management
  - Environmental
  - Cultural
- Engineering Construction Division
  - Electrical/Mechanical Engineering
  - Civil/Soils Engineering
  - Architecture/Structural Engineering
  - Hydrology & Hydraulics (H&H)
  - Geology/Geotechnical
  - Construction Engineering
  - Dam Safety
- Operations Division
- Real Estate
- Office of Counsel
- Security

The ATR Reviewers must possess a minimum level of expertise in their respective technical disciplines which is defined in Table 2.

Table 2. Agency Technical Review Disciplines

ATR Team Members/Disciplines	Expertise Required
ATR Lead	The ATR lead should be a senior professional with experience in Dam Engineering, Hydropower Section 408 reviews and conducting ATR.
Engineering Construction	The ATR reviewer should be a senior engineer with experience in construction engineering to include: dams, modifications to dams, cofferdams, construction scheduling & sequencing, quality control and safety.
Operations Manager	The ATR reviewer should be a senior operations manager with experience in dam operations.
Electrical/Mechanical Engineer	The ATR reviewer should be a senior engineer with experience in electrical and mechanical engineering on dam equipment including assessment and maintenance of control gates.
Civil/Engineer	The ATR reviewer should be a senior civil engineer with experience in dam design and construction.
Architecture/Structural Engineer	The ATR reviewer should be a senior structural engineer with experience in dam construction and with design and construction of concrete hydraulic structures, especially spillways and outlet works.
Hydraulic Engineer	The ATR reviewer should be a senior hydraulics engineer with experience in hydraulic modeling as it relates to dams and dam construction; and reservoir regulation.
Environmental Engineer	The ATR Reviewer should be a senior biologist experienced in ecosystem restoration, fish passage, and compliance with and documentation for NEPA, the Clean Water Act, and the Endangered Species Act
Geology/Geotechnical	The ATR reviewer should be a senior geologist with experience in dam design, performance monitoring, foundation improvement (jet grouting, dewatering, cofferdam design) in addition to dam construction, and familiarity with dam foundations with similar site conditions.
Construction Quality Assurance	The ATR reviewer should be a senior construction representative with experience in construction management and quality assurance of large civil works projects.
Dam Safety	The ATR reviewer should be a senior engineer with experience in dam construction and dam safety and should have prior experience with risk assessment.
Office of Counsel	The ATR reviewer should be a senior attorney
Real Estate	The ATR Reviewer should be a senior real estate representative

8. AGENCY TECHNICAL REVIEW CHARGE

The ATR Team will address the following charge issues:

1. Review the proposed Project to ensure it will not adversely affect the operational or structural integrity of the Corps' Red Rock Dam Project, including life and dam safety, operational requirements, and environmental concerns.

2. Determine the technical soundness and environmental acceptability of the proposed Project.

3. Ensure the Project is designed in accordance with published guidance, including ERs, ECs, manuals, engineering technical letters, and bulletins, focusing specifically on dam safety, operations, and environmental concerns.

4. Ensure appropriate construction QA/QC processes are being used or proposed by the WMMPA to ensure compliance with the approved Project construction documents.

5. Ensure the construction risks related to dam safety, especially related to a fluctuating flood control pool are adequately addressed.

6. Ensure that a dam safety emergency action plan has been prepared and integrates with the existing Corps EAP for Red Rock Dam. This document should include a dam safety contingency plan that addresses credible potential failure modes in conjunction with the construction of the hydropower Project. The plan should illustrate specific actions the contractor will take to ensure the safety of the dam throughout construction.

7. Apply SAR Plan Charge questions to the ATR as applicable and pertinent to ensure that the Corps interest in the Project's operation and dam safety are maintained.

9. INDEPENDENT EXTERNAL PEER REVIEW

The 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 the Corps is warranted. Any work product, report, evaluation, or assessment that undergoes District Quality Control and ATR also may be required to undergo IEPR under certain circumstances. A risk-informed decision will be made as to whether IEPR is appropriate for each product.

Both the WMMPA and Rock Island District are in agreement that an IEPR Type I is not required for this Project. As such, a formal request to waive this review from the requirements has been made by the WMMPA. The reasoning behind this request includes; no increased threat to human life; an SAR will be performed to ensure this; Federal funds being spent are not in excess of $45 million; no requests for review by any governor; no request for review by the head of a Federal agency; no public dispute; no novel practices; and no determination by the Chief of Engineers that this type of review is required. Additionally, the FERC non-Federal hydropower process serves as the decision process for licensing the Project. The FERC process has public disclosure and public agency review requirements.

The District and the WMMPA are also in agreement that a Type II IEPR, SAR is required. the WMMPA has prepared an SAR Plan which is attached as Attachment 5. The SAR shall include participation by independent experts selected from among individuals who are distinguished experts in civil/structural engineering, geotechnical engineering, and hydraulic engineering. In this instance, "independent" means that the persons selected to review the design are not involved in the original design, and have no conflict of interest. The independent panel of experts shall evaluate whether the interpretations of analysis and conclusions based on analysis are reasonable and inform the design team on the adequacy, appropriateness, and acceptability of the design and construction activities for the purpose of assuring public health, safety, and welfare. The panel will consider how Project features adequately address redundancy, robustness, and resiliency and how the findings during construction reflect the assumptions made during design. In addition to the SAR meetings identified, the IEPR team will be available throughout the design phase and construction to advise the WMMPA and MWH.

The IEPR experts from Red Rock Hydropower are considered the IEPR and do not include a member from the Federal Government. The IEPR will provide comments and recommendations to the WMMPA/MWH and does not advise or make recommendations to the Federal Government regarding Red Rock Hydropower. Since the IEPR does not meet the criteria required for consideration by the Federal Advisory Committee, it is compliant with Federal Advisory Council Act.

10. CONSTRUCTION MANAGEMENT SUB-AGREEMENT/Corps REVIEWS DURING CONSTRUCTION

The Corps will provide quality assurance for all joint use and Corps owned areas where construction may affect operations, dam safety and/or public safety. The Corps will review submittals as well as perform on-site inspections. The Corps will take and hold clearances on equipment as the contractor needs access to joint use areas as agreed in the plans and specifications.

The Licensee is responsible for providing all aspects of construction management and establishing an effective quality control and inspection program for the purpose of insuring that the Project is constructed in accordance with the approved plans and specifications and that all requirements of the License, the contract specifications, and requirements of various permits are met. A QCIP will be executed and shall conform to FERC guidelines dated January 1993, Chapter VII, Category 1A. In accordance with Article 302, 306, 308, and 312 of the License, the Licensee is required to prepare a QCIP plan as part of the contract plans and specifications submittal. Section 312 requires written approval of the construction plans and specifications by the Corps, which includes approval of the QCIP prior to authorizing construction to begin. The approved QCIP is incorporated as a sub-agreement into the Memorandum of Agreement for Access and Construction by reference and the Licensee is required to follow the approved QCIP. Any changes in the QCIP requires re-submittal and approval by the Corps.

11. SECTION 408 REVIEW

A. Description. The Licensee is solely responsible for the technical design and environmental compliance of the Project. FERC authorization to construct the Project requires Corps approval of the design and construction of permanent and temporary facilities that would be an integral part of or that could affect the structural integrity or operation of Red Rock Dam. Under the terms of 33 USC 408, any proposed modification to a Federal project requires a determination that such proposed modification and permanent occupation or use of a Federal project is not injurious to the public interest and will not impair the usefulness of such work. The authority to make this determination and to approve modifications to Federal projects under 33 USC 408 has been delegated to the Chief of Engineers. A Section 408 package will be developed and submitted by the Licensee and will be used as the basis that will support the Chief of Engineers determination of the adequacy of the modification to Red Rock Dam. The Hydroelectric Project will be evaluated and presented at a level of detail sufficient to ensure it will not impair the structural integrity, dam safety aspects or negatively impact the authorized purposes of Red Rock Dam.

The Section 408 review encompasses a wide range of topics, not just a purely technical review. The following functional areas are part of the 408 review process:

- Hydrologic and Hydraulic (H&H) Features
- Geotechnical Features
- Structural Features
- Real Estate
- Construction Phasing
- Operation and Maintenance
- Environmental

B. Products. The Section 408 Report will contain a combination of District- and Licensee-prepared materials. The Licensee is required to prepare a technical analysis and adequacy of design, including geotechnical analysis; structural components; hydraulics and hydrology; operational and maintenance requirements; real estate analysis; discussion of residual risk; discussion on Executive Order 11988 (floodplains); and environmental compliance, including a discussion on the National Environmental Policy Act; Endangered Species Act; Fish and Wildlife Coordination Act; Marine Protection; Research; and Sanctuaries Act; Wild and Scenic Rivers Act; Coastal Zone Management Act; Clean Air Act; Hazardous Toxic and Radioactive Waste; National Historic Preservation Act; and Noise Control Act. The District will prepare its determination of technical soundness and environmental acceptability to include a policy and legal analysis. As with the ATR, the Licensee proposes to submit the Section 408 Documents in two phases.

C. Oversight Team Members. To ensure the adequacy of the 408 report, the District Oversight Team will consist of senior technical experts and senior District management from the following functional areas:

- Hydraulics and Hydrology
- Operations
- Environmental
- Planning
- Real Estate
- Construction
- Safety & Occupational Health Office
- Security
- Office of Counsel
- Programs, Planning & Project Management

12. PROJECT SCHEDULE AND COST

The initial Project schedule showed the timing and sequence of all required reviews and activities, along with those tasks where coordination or interaction with the WMMPA's activities would be required. As of this revision to the RP, design of the hydropower installation is 100 percent complete and the Section 408 permit review process is under way. Table 3 lists the remaining major Project milestones.

Table 3. Project Milestones

Activity/Milestone	Completion Date
WMMPA Submits 100% design package & 408 Submittal	24 Jun 2013
MVR Submits Section 408 Package to MVD	19 Jul 2013
Prebid meeting at Lake Red Rock	18 Jul 2013
Construction Innovation Meeting at Lake Red Rock	14-15 Aug 2013
408 Approval by HQUSACE	20 Sep 2013
Contract Negotiations and Award	Oct – Nov 2013

The estimated total cost of the review process is $575,000.00; the remaining cost is $125,000. Costs associated with the IEPR are the developer's responsibility.

ATTACHMENT 1

RISK MANAGEMENT CENTER'S ENDORSEMENT

DEPARTMENT OF THE ARMY
RISK MANAGEMENT CENTER, CORPS OF ENGINEERS
13952 DENVER WEST PARKWAY SUITE 200
GOLDEN, CO 80401

REPLY TO
ATTENTION OF
CEIWR-RMC-WD

CEIWR-RMC

10 December 2012

MEMORANDUM FOR: Commander, Rock Island District, ATTN: CEMVR-EC

SUBJECT: Risk Management Center Endorsement - Red Rock Dam Hydroelectric Project Review Plan

1. The Risk Management Center (RMC) has reviewed the Review Plan (RP) for the *Red Rock Hydroelectric Project (Section 408), Federal Energy Regulatory Commission Hydro Power Construction (FERC #12576)* dated 16 August 2012, and concurs that this RP provides for an adequate level of peer review and complies with the current peer review policy requirements outlined in EC 1165-2-209 "Civil Works Review Policy", dated 31 January, 2010.

2. This RP was prepared by Rock Island District, reviewed by Mississippi Valley Division and the RMC, and all review comments have been satisfactorily resolved.

This RP defines the scope and level of the Rock Island District's Agency Technical Review) and the Corps Section 408 process reviews; and includes the Red Rock Hydropower Licensee's AE-prepared Safety Assurance Review plan. The RP identifies the most important skill sets needed in the reviews and the objective of the review and the specific advice sought, thus setting the appropriate scale and scope of review for the Project.

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 Tom Bishop, RMC Senior Review Manager (tom.w.bishop@usace.army.mil).

4. Thank you for the opportunity to assist in the preparation of this RP. Please coordinate all future changes to this review plan, all aspects of the Agency Technical Review efforts or RMO-related activities defined in the RP with Tom Bishop at (303) 0963-4556.

Sincerely,

COLIN W. KRUMDIECK, P.E.
Senior Review Manager
Risk Management Center

CF:
CEIWR-RMC-ZA (Mr. Snorteland)
CEMVD-CE (Division Quality Manager)

ATTACHMENT 2

AGENCY TECHNICAL REVIEW CERTIFICATION

RED ROCK HYDROELECTRIC PROJECT

FERC No. 12576

The Agency Technical Review (ATR) has been completed for the Section 408 Major Modification for the *Red Rock Hydroelectric Project Federal Energy Regulatory Commission (FERC) #12576 Hydropower Construction*. 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. All comments resulting from the ATR have been resolved and the comments have been closed in DrChecks[sm].

Michael P. Zukowski, P.E.
ATR Coordinator - Project Manager
CEMVR-PM-M

Date

James Bartek, P.E.
ATR Lead - Hydropower Coordinator
ECMVT-EC-DG

Date

Nate Snorteland, P.E.
Director, Review Management Office
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.

Denny Lundberg, P.E.
Chief, Engineering and Construction Division

Date

ATTACHMENT 3

WESTERN MINNESOTA MUNICIPAL POWER AGENCY
SAFETY ASSURANCE REVIEW PLAN

RED ROCK HYDROELECTRIC PROJECT

FERC License No. 12576

US Army Corps of Engineers

Safety Assurance Review Plan

May 2012

PREPARED FOR:

Western Minnesota
Municipal Power Agency

PREPARED BY:

MWH

Red Rock Hydroelectric Project
Safety Assurance Review Plan

Revision Log

0	**Original Issue**	**May 5, 2012**
1	**Final Issue Responding to USACE Comments**	**July 3, 2012**

TABLE OF CONTENTS

1.0 FORWARD

The intent of this document is to satisfy the Safety Assurance Review (SAR) requirements for the Red Rock Hydroelectric Project, FERC License No. 12576, as required by Sections 2034 and 2035 in the Water Resource Development Act (WRDA) of 2007 as described in the U.S. Army Corps Engineer's EC: 1165-2-209, Civil Works Review Policy.

Type I IEPR's are conducted on project studies whereas Type II IEPR's are conducted on design and construction activities for projects where potential hazards pose a significant threat to human life. The Red Rock Hydroelectric Project is in the final design stage with construction scheduled to begin in 2013. As a result, we are requesting a waiver of the Type I Independent External Peer Review and will perform a Type II IEPR. We are requesting a waiver of the Type I IEPR due to the fact that this is a FERC licensed project and therefore contains mandatory license articles that were created based upon an Environmental Assessment and Biological Opinion. These can be considered decisions articles thereby fulfilling the purposes of a Type I IEPR. In addition, the following discussion of the trigger factors for a Type I IEPR found in Appendix D of EC 1165-2-209 further warrants a waiver of the Type I IEPR.

1. Significant threat to human life: The existing Red Rock Dam is a high hazard project. The adequacy of the design of the proposed hydroelectric project will be achieved through the Type II SAR which will include reviews by the USACE, the IEPR and the FERC during design as well as during construction.

2. Total project cost >$45M: The total project cost is well over $45 million. No Federal funds are being used for the design and construction of the project.

3. Request by State Governor: No affected State Governors have requested a Type I SAR. The proposed project will not alter the current operation of the Red Rock Flood Control Project.

4. Request by head of a Federal agency that determines the project will have a significant adverse impact: No such request has been made.

5. Significant public dispute: No significant public dispute has occurred as to size, nature or effects of the project nor as to the economic or environmental cost or benefit of the project.

6. Cases where novel issues are likely to change prevailing practices: The design and construction of the project will incorporate accepted design principles and construction practices.

7. Any determination by the Chief of Engineers – While WMMPA is not currently aware of a determination by the Chief of Engineers for warranting a Type I SAR, WMMPA believes that the studies completed in the FERC license application process as well as the review procedures that will occur during the Type II SAR will adequately satisfy the intent of a Type I SAR.

Western Minnesota Municipal Power Agency (WMMPA) is in the process of designing a hydroelectric powerplant at the existing USACE Red Rock Lake and Dam in Marion County near Pella, Iowa. MWH Americas, Inc. has been selected by Missouri River Energy Services (MRES), the Owner's representative, to serve as the Owner's Engineer for the design of the new Red Rock Hydroelectric Project. These designs are collectively called the Red Rock

Hydroelectric Project (RRHP) under 33 USC 408 (Section 408). Safety Assurance Reviews ensure that good science, sound engineering, and public health, safety, and welfare are the most important factors in guiding the engineering design and implementation of the RRHP. WMMPA plans to initiate construction of the RRHP in 2013.

WMMPA is proactively working to ensure an independent review of its RRHP design and implementation and the proposed action in this Safety Assurance Plan should satisfy Sections 2034 and 2035 in WRDA 2007. This document outlines how the SAR will be performed and identifies the independent panel of experts who are charged with executing an adequate SAR for the RRHP.

2.0 PROJECT BACKGROUND

On April 18, 2011, FERC issued an original license to construct, operate, and maintain the 36.4 MW RRHP (project). The proposed project is located at the USACE Red Rock Dam on the Des Moines River, near the city of Pella, in Marion County, Iowa. The project facilities will be located on the left side of the existing spillway.

2.1 Proposed Project Facilities

The project will include the following general components (see Appendix A for plan and profile of project):

- Approach Channel
- Intake Structure with trashrack, stoplog and gate provisions for two penstock tunnels
- Two 18-ft. wide x 21-ft. high penstock tunnels connecting the intake structure with the powerhouse
- Penetrations through the existing gravity monolith structures for each penstock tunnel
- Powerhouse with two vertical Kaplan turbines and draft tube stoplogs
- Tailrace
- Switchyard
- 4.5 miles of transmission line (buried and overhead)
- Connection to an existing substation in Pella, Iowa

The construction work for the Project was divided into several contract packages to:

- comply with the FERC license articles;
- limit exposure to claims;
- receive responsive bids;
- encourage bid competition between qualified contractors; and
- bring power on-line as quickly as possible.

The Project will be developed using three contract packages, which are identified below along with the type of contract delivery for each package.

- Turbine/Generator Procurement – Design-Build
- General Construction – Design-Bid-Build

- Transmission Line – Design-Bid-Build

The work includes, but is not limited to:

- construction of the cast-in-place reinforced-concrete powerhouse;
- construction of the cast-in-place reinforced-concrete intake and penstock tunnels;
- construction of the approach and tailrace channels;
- construction of the dam penetrations;
- design, construction and operation of cofferdam and dewatering system;
- removal of cofferdam and dewatering system;
- installation, testing, and start-up of Owner-furnished equipment, which includes the turbine generator units;
- supply and installation of balance of plant mechanical and electrical equipment, which includes the gate equipment, trashracks, trashrake, stoplogs, powerhouse crane, and transformers;
- construction of site facilities;
- construction of recreation facilities; and
- miscellaneous other site work including finish grading, roads, parking areas, lighting, final restoration, etc.

3.0 OBJECTIVES AND SCOPE

The purpose of a SAR is to ensure that good science, sound engineering, and public health, safety, and welfare are the most important factors that determine a project's success and is achieved by independent and impartial review. The SARs are used to inform the USACE Chief of Engineers on the adequacy, appropriateness, and acceptability of the design and construction activities for the purpose of assuring public health, safety, and welfare.

SARs are required by the USACE for all projects affecting existing USACE structures. The SAR is a strategic level review and every effort should be made to avoid having the SAR duplicate the Agency Technical Review (ATR).

Safety Assurance Reviews will address the questions in Section 5.0 as they pertain to the submitted design and construction products. These products include the construction drawings, specifications, Geotechnical Interpretive Report, Detailed Design Report, Quality Control & Inspection Plan, and Operations & Maintenance Manual. The Detailed Design Report will include a discussion on the design and construction assumptions, methodologies, and procedures as well as the supporting analyses and design computations for each of the project components.

The following scope of work will be utilized in the SAR:

1) Obtain Project Documentation, including evaluating existing conditions

2) Evaluate Overall Consistency of Project

3) Review Design and Design Requirements

4) Review Hydraulics

5) Review Construction Approach

6) Review Proposed Commercial Operation

a) Operations and Maintenance (O&M) Manual

7) Geological and construction risks and their mitigation by the proposed construction arrangements

8) Prepare Independent Engineer's Reports and letters at the following intervals:

a) 60% Design Review Report

b) 100% Design Review Report

c) Critical Milestones during Construction - Letter summarizing any changes in their evaluation resulting in alterations during construction

d) End of Construction - Full report will be prepared summarizing the construction and changes in their evaluation from alterations in the construction phase

4.0 INDEPENDENT EXTERNAL PEER REVIEW

The SAR shall include participation by independent experts selected from among individuals who are distinguished experts in civil/structural engineering, geotechnical engineering, hydraulic engineering, dam safety engineering and construction risk. The independent, in this instance, means that the persons selected to review the design are not involved in the original design, and have no conflict of interest. The independent panel of experts shall evaluate whether the interpretations of analysis and conclusions based on analysis are reasonable and inform the design team on the adequacy, appropriateness, and acceptability of the design and construction activities for the purpose of assuring public health, safety, and welfare. The panel will consider how project features adequately address redundancy, robustness, and resiliency and how the findings during construction reflect the assumptions made during design. In addition to the SAR meetings identified in Section 7.0 herein, the IEPR will be available throughout the design phase and construction to advise WMMPA and MWH.

The RRHP independent external peer review experts are called the IEPR and do not include a member from the Federal Government. The IEPR will provide comments and recommendations to WMMPA/MWH and does not advise or make recommendations to the Federal Government regarding the RRHP. The IEPR does not meet the criteria of a Federal Advisory Committee and is therefore compliant with Federal Advisory Council Act (FACA).

The IEPR includes:

- Mr. Joseph Ehasz, P.E. – Panel Lead
- Dr. Robert Hall, P.E.

- Mr. Eugene Gemperline, P.E.
- Mr. Arthur Stukey, P.G.

These individuals are all recognized experts in hydroelectric powerhouse projects, dam safety engineering, construction risk, geotechnical engineering (Mr. Joseph Ehasz), geology (Mr. Arthur Stukey), hydraulic engineering (Mr. Eugene Gemperline), and civil/structural design (Dr. Robert Hall). The panel members' qualifications are clearly indicated in the Conflict of Interest disclosure forms and their resumes included in Appendix C and D and summarized below. The members of the panel have no conflicts of interest with respect to the RRHP. Each of the members can readily attest that they have had no involvement or interaction with any aspect of the existing Red Rock Dam and Reservoir nor with the proposed hydroelectric project at Red Rock Dam. They do not own land in the vicinity of the project footprint nor do they own land in the City or County. Their fields of expertise and practice are in geotechnical adequacy of designs and construction, hydraulic engineering, and civil/structural design.

Mr. Joseph Ehasz's experience is exemplified by over 40 years of design and construction of dams and associated reservoirs as well as hydroelectric projects; most of the dams for these projects can also be considered storage and/or flood control structures. He has designed all types of earth and embankment dams such as homogeneous earth dams, zoned embankment dams as well as central core rockfill dams as well as several concrete dams, such as concrete gravity dams and arch dams. He has also performed constructability reviews as well as evaluated the construction risks on several large dam and reservoir projects. In particular, he was the design director and construction manager for the Diamond Valley Reservoir Project in Southern California, which involved three large rockfill dams totaling over 100 million cubic yards of materials and an 800,000 AF reservoir. He was also design lead and one of a three person technical review board during construction for the San Roque Multipurpose Project in the Philippines, which included a 670 foot high rockfill dam, spillway, tunnels and powerhouse. He has also spent three years, 2000 to 2003, as the construction manager for the Olivenhain Dam in Southern California; a 320 foot high Roller Compacted Concrete (RCC) Dam; which also entailed constructability evaluations as well as definition of construction risk. Mr. Ehasz is a FERC Approved Part 12 Safety Inspector and has participated in over 50 FERC Part 12 dam inspections.

Dr. Robert Hall is currently a Principal with Engineering Innovations, LLC. Previously, he has served as the Division Chief, Geosciences and Structures Division, Engineering and Research Center, U.S. Army Corps of Engineers (USACE), retired in 2009 from USACE after 38 years of service. He led the Corps' research programs in the area of analysis of hydraulic structures and has supported the Corps in the seismic design/analysis/retrofit of the flood control dams, intake towers and navigation locks including: Richard B. Russell Dam, Prado Dam, Wappapello Intake Tower, Olmsted Locks, Seven Oaks Intake, Sardis Dam, and Folsom Dam (flood control and power generation). He led the USACE's research programs in the design and analysis of concrete hydraulic flood control structures and supported the writing of engineering manuals and engineering technical letters. He served as technical advisor for B.C. Hydro, Canada, in seismic evaluation of Seven Mile, Keenleyside and Strathcona Dams (power generation and flood control). He has served as the chair of US/ Japan Panel's committee on the Seismic Design of Dams. He is currently serving as an advisory board member for B.C. Hydro, Canada, in the design and constructability/construction for upgrading Ruskin, Stave Fall-Blind Slough, and La

Joie Dams. In 2007, he was invited by the Director of the "Autoridad del Canal de Panamá" (ACP) to Chair a Structural Advisory Board to formally provide technical advice on a wide spectrum of issues related to the analysis/design, evaluation, and dam safety risk assessment of the performance of the Canal's concrete hydraulic structures. He is currently supporting MWH Global in the development of design procedures for the 3rd set of Panama Canal Locks. He is also currently supporting a Department of Homeland Security research project funding the Lawrence Livermore National Laboratory and the USACE in the development of numerical tools to predict the crack growth between the interfaces of concrete gravity dams with zoned embankment dams.

As a hydraulic engineer, Mr. Eugene Gemperline, frequently prepares or uses hydrologic analyses in the planning and design of dams and appurtenant features. He has been involved in the hydrology and hydraulic design and planning for flood control, water supply, navigation, hydroelectric and irrigation dams and other features at existing dams for 38 years. Almost all of these projects are multi-purpose. All of the projects require consideration of flood impacts, planning for and design of features to store and release floods. He was involved in the hydrology and hydraulic planning and design for the proposed Burlington Dam flood control project for the St Paul District of the USACE including spillways, diversion and intake studies and design. He was also the lead hydrology and hydraulic engineer for the design of the Baldhill Dam spillway modifications for the St. Paul District. He was the project manager and lead hydrology/hydraulic engineer for the Kentucky River water supply planning project which included evaluation of using existing USACE flood control dams for water supply. A few of the water resource projects that he has been involved with include spillway design for the Yacyreta project in Paraguay/Argentina; spillway, diversion tunnel, intake, outlet design for the proposed Susitna project in Alaska; determination of flood-related impacts for hydro projects at 5 Ohio River navigation projects and determination of flood control storage and spillway requirements for the proposed Orange County water supply project in New York state. Additionally, he has participated in numerous flood control planning projects not involving dams and has prepared flood profiles and floodway determinations. With respect to dam safety risk assessment, Mr. Gemperline's experience includes the planning and design of hydraulic facilities to pass flows and floods without negatively impacting the stability of dam features. These include provision of adequate spillway and outlet works capacity, control of energy dissipation, prevention and control of erosion in stilling basins, canals and outlet works, and evaluation of potential sedimentation. He is currently on the board of consultants for the provision of dam safety improvements (spillway expansions) at two dams, Norway and Oakdale, on the Tippecanoe River in Indiana. The Baldhill project discussed above included additional spillway capacity to meet then current design flood determinations. Mr. Gemperline's hydro-mechanical experience includes consideration of the mechanical equipment's impacts on hydraulic performance including capacity, water surface profiles, pressures, cavitation potential, hydraulic uplift, eddies and vortex formation.

Mr. Arthur Stukey's main expertise is in geologic evaluation and siting of dams, almost all of which are involved primarily in power production. The majority of these structures are gated (some with emergency spillways and/or fuse plugs) and hence have a component of flood-control and high-discharge release and control. In his experience, the geologic aspects of dams and their operations (whether it be for power-, flood-control, or water-supply) are always considered together in the early design stage; this guides exploration so that designs can assure

safe and long-term operations within the given geologic and hydrologic parameters of the site, and available foundations and materials. For Red Rock Hydroelectric Project, Mr. Stukey anticipates that there is probably a large body of original exploratory data,"as-built construction records", and foundation monitoring, as well as the design drilling- and testing-data for the current project. All this information will bear on the question of adequacy of exploration for the addition of the new hydroelectric project... it should help lead to a comprehensive interpretation of structure and stratigraphy, and help in identifying geologic risk elements for the final civil design and the critical construction period.

5.0 SAR CHARGE

The Charge provides guidance to the IEPR on the objective of the SAR and specific advice sought. The Charge for this project is described in the below paragraphs.

The SAR should be constructed to identify, examine, and comment upon assumptions that underlie analysis as well as evaluate the soundness of design and analytical methods. The IEPR should bring important issues to the attention of WMMPA and the USACE. The IEPR should evaluate whether the interpretations of analysis and the conclusions based on analysis are reasonable. However, the IEPR does not present a final judgment on whether a project should be constructed or whether a particular operations plan should be implemented, as the Chief of Engineers is ultimately responsible for this final decision.

The SAR should not be expected to resolve fundamental disagreements and controversies. The IEPR should aim to draw distinctions between criticisms of the regulations and guidelines and criticisms of how well WMMPA conformed to the guidance. Reviews should focus on assumptions, data, design methods, and models.

The SAR will assist WMMPA/MWH in making decisions, but the IEPR is not being asked to make decisions. The IEPR shall avoid findings that become "directives" in that they call for modifications or additional studies or suggest new conclusions and recommendations. In such circumstances the IEPR may have assumed the role of advisors as well as reviewers, thus introducing bias and potential conflict in their ability to provide objective review later in the project.

Frequent communication will help the IEPR understand the technical and practical implications of its recommendations. The IEPR should highlight areas of disagreement and controversies that may need resolution.

The following Charge Questions will be used in the evaluation and final report. These questions are based on the guidance provided in the reference documents in Section 11.0, specifically by the USACE in EC 1165-2-209, Appendix E, by the specific site conditions at the Red Rock Flood Control Project and by the proposed project design and construction.

General

1. Are the design methodologies used to assess the hazards appropriate?

2. Are the assumptions made for the hazards appropriate?

3. Is the quality and quantity of the surveys, investigations, and engineering for the design sufficient to support the models and assumptions made for determining the hazards?

4. Does the design analysis adequately address the uncertainties given the consequences associated with the potential for loss of life for this type of project?

5. Do the project features adequately address redundancy, robustness, and resiliency with an emphasis on interfaces between structures, materials, members, and project phases?

6. From a public safety perspective, is the proposed design reasonably appropriate or are there other alternatives that should be considered?

7. During construction, do the assumptions made during design remain valid through construction?

8. To what extent has it been shown that the project is technically sound and operationally functional?

9. Are the assumptions underlying the engineering analyses sound and complete?

10. Has it been demonstrated quantitatively that the assumptions underlying engineering analyses are reasonable, sound and complete? Have the assumptions been confirmed based on experience with similar projects?

11. Are the engineering methods, models, and analyses used adequate and acceptable for the complexity of the project?

12. Are the interpretations of analysis and conclusions based on the analysis reasonable, sound and complete?

13. Has the overall Dam safety concerns changed with the addition of the proposed design? (See Dam Safety section below)

14. Has the overall operational functionality and flexibility of the Dam changed with the addition of the proposed new project features?

15. Have all load cases and assumptions been clearly identified and adequate for the proposed designs. Does the Detailed Design Report or Design Memoranda reflect this?

16. Do the remote controls and operations plan meet the Army Corps of Engineers EC 1130-2-6071, Remote Control and Operation of Water Control Systems?

17. For O&M manuals, do the requirements adequately maintain the conditions assumed during design and validated during construction; and will the project monitoring adequately reveal any deviations from assumptions made for performance and is sufficient to evaluate the change in project effectiveness?

18. Do the existing project features and/or the proposed new hydropower components effectively

work as a system? This includes (but is not limited to) aspects such as the hydraulic and hydrologic effects throughout a watershed, potential future flood fighting efforts, or the impacts on resources used by transiting migratory species.

19. Has anything significant been overlooked in the development of the design?

STRUCTURAL

1. Comment on the evaluation of engineering features. Is the scope, function and analysis of the engineering features clearly described?

2. Has the analysis been adequately performed and documented to support the proposed changes to the dam structure, associated structures and appurtenances? Has stability as well as strength of materials been considered?

3. Has the analysis been adequately performed and documented to support the new approach channel and intake structure?

4. Has the analysis been adequately performed and documented to support all load cases associated with unit load rejection or water hammer?

5. Has the analysis been adequately performed and documented to support all load cases associated with varying reservoir levels?

6. Has the system been fully designed and provided sufficient redundancy to prevent release of uncontrolled flow?

7. Has the analysis been adequately performed and documented to support the penstock tunnel design and size?

8. Has the analysis been adequately performed and documented to support and/or demonstrate the construction load cases and the projects ability to maintain flow and flood pool requirements during the construction work?

9. Has the review noted that alternatives were considered and that the project is constructable in a straight-forward fashion?

HYDRUALIC

1. Has the analysis been adequately performed and documented for the change in hydraulic conditions in regards to erosion and operational considerations?

2. Has all the inlet works been adequately evaluated and documented for all flow conditions and compared to base line conditions prior to new project futures?

3. Has the analysis been adequately performed and documented to support the penstocks tunnels and all the forces, both static and transient, associated with their configuration?

4. Has all the outlet works been adequately evaluated and documented to avoid vibration,

cavitation, abrasion and excessive O&M?

5. Has all the outlet works been adequately evaluated and documented for all flow conditions and the impact to structures and embankments?

6. Has the overall hydraulic erosion/scour potential increased with any part of the proposed design?

GEOTECHNICAL

1. Is there sufficient subsurface information to adequately develop a reasonable model of subsurface conditions?

2. Has the analysis been adequately performed and documented for the change in load condition of the dam structures and embankments attributable to the hydroelectric project?

3. Are drainage facilities functioning and adequate?

4. Have all construction load cases been adequately preformed and documented?

5. Is overall safety and stability of the dam structure compromised with the new proposed features? i.e. slope stability, foundation liquefaction, piping, settlement?

6. Has the overall seepage control been compromised by the addition of the new proposed features?

7. Does the excavation design adequately address stability, seepage, and dewatering concerns?

MECHANICAL

1. Has the analysis been adequately performed and documented for the gate control systems? And is it adequately redundant to prevent misoperation and able to meet flow requirement and ramp rates? Is the alarming system adequate?

2. Are the assumptions and engineering analyses sound and complete for the intake structure and operating equipment?

DAM SAFETY

1. Has the analysis properly considered project safety and dam safety? Have the proposed changes not caused any increased level of risk to structures or people?

2. Has recent seismic information and codes been incorporated into analysis?

3. Have the latest geotechnical information and drill logs been included?

4. Have Interim Risk Reduction considerations been included in the review?

5. Have all characteristics, conditions, and scenarios leading to potential failure, along with the

potential impacts and consequences, been clearly identified and described? Have all pertinent factors, including but not necessarily limited to population-at-risk been considered?

PROJECT OPERATIONS & RESERVIOR REGULATION

1. Has the input from the USACE Operations Manual been incorporated into drawings, specifications, operation manuals and other documents?

2. Have the USACE Operations been consulted to insure proposed changes have not or will not impact their ability to run and maintain the dam facilities?

3. Has the review considered insuring the original project function remains intact and is not compromised?

6.0 PANEL RESPONSIBILITIES

The IEPR shall:

a. Conduct the review for the subject project in a timely manner in accordance with the SAR Plan Milestones and Schedule;

b. Follow the Charge, but when deemed appropriate by the IEPR lead, request other products relevant to the project and the purpose of the review;

c. Receive from USACE any public written and oral comments provided on the project;

d. Provide timely written and oral comments throughout the development of the project, as requested;

e. Assure the review focuses on questions included in the Charge. The Panel may recommend additional questions for consideration;

f. Offer any lessons learned to improve the review process;

g. Submit reports in accordance with the review plan schedule; and

h. The panel lead shall be responsible for ensuring that comments represent the group, be non-attributable to individuals, and where there is lack of consensus, note the nonconcurrence and why.

7.0 MILESTONES AND SCHEDULE

The SAR will be conducted on an as needed basis but, at a minimum, will occur at 60 percent design, 100 percent design, during critical construction milestones and at the end of construction. The 60% SAR will address the charge of the SAR. The 100% SAR will focus on whether the design documents address the IEPR concerns raised during the 60% SAR. The SAR's during the construction phase will focus on whether the assumptions made during design remain valid during construction. The IEPR has the option to request additional or alternate milestones where warranted and reasonable.

The intermediate design submittals are divided into two parts: the u/s works and the powerhouse works. The u/s works consist of the approach channel, intake structure, penstock tunnels, dam penetration, and intake structure access road. The powerhouse works consist of the powerhouse, tailrace, access road and yards.

The following is the proposed schedule for these milestones:

60% Design

- U/S Works Submittal
- U/S Works Review Meeting with IEPR, USACE, FERC, WMMPA and MWH
- U/S Works IEPR Report
- Powerhouse and D/S Works Submittal
- Powerhouse and D/S Works Review Meeting with IEPR, USACE, FERC, WMMPA and MWH
- Powerhouse and D/S Works IEPR Report

100% Design

- U/S Works Submittal
- U/S Works Review Meeting with IEPR, USACE, FERC, WMMPA and MWH
- U/S Works IEPR Report
- Powerhouse and D/S Works Submittal
- Powerhouse and D/S Works Review Meeting with IEPR, USACE, FERC, WMMPA and MWH
- Powerhouse and D/S Works IEPR Report

Critical Milestones During Construction

- Milestones to be determined by the IEPR, USACE and FERC (i.e., cofferdam installation, intake structure excavation, and gravity dam penetration)
- Meeting and site visit with affected members of the IEPR, USACE, FERC, WMMPA and MWH for each milestone
- IEPR Findings Report/Letter

Completion of Construction

- Meeting and site visit with IEPR, USACE, FERC, WMMPA and MWH
- IEPR Final Report

In advance of each SAR meeting, MWH will prepare an agenda containing important topics, questions for the IEPR, etc., as well as provide supporting reports and meeting materials. In addition to the IEPR, representatives of WMMPA, MWH, and USACE will be invited to participate in the IEPR SAR meeting. At the conclusion of each SAR meeting, the IEPR will prepare a formal report or letter. The SAR may result in the need to obtain additional investigation, perform additional analysis, and/or potentially modify the design.

Bid documents for the general construction contract are scheduled to be issued in January 2013 and Bids are expected in May 2013. Following bid evaluation and negotiations, the contractor will be issued a notice-to-proceed for the work, and construction will start upon approval of the design by the USACE and FERC. Based upon our current estimates, construction and plant commissioning should take approximately three years yielding a commercial operation date of 2016. A copy of the detailed schedule is included in Appendix B.

8.0 PROJECT ORGANIZATION AND COMMUNICATION

The points of contact are:

- Licensee: MRES – Ray Wahle, PE, (email: rwahle@mrenergy.com)
- IEPR: Joe Ehasz, PE (email: jehasz@att.net)
- USACE: Anthony Heddleston, EIT (email: Anthony.D.Heddlesten@usace.army.mil)
- FERC: John Fornek, PE (email: john.fornek@ferc.gov)

Communication will be directly between the Licensee and USACE. The IEPR will communicate directly with the Licensee. The Licensee will forward the IEPR reports to the USACE with a copy to FERC.

9.0 REPORTING AND DOCUMENTATION

The USACE's DrChecks will be the official system for the continuity of the review record. DrChecks will be used to document all ATR comments, responses and associated resolutions accomplished throughout the review process. The IEPR will input their comments and MWH will input responses to comments. These comments and responses will be included in the SAR reports as discussed below.

IEPR reports will be prepared following each SAR. IEPR reports will contain the panel's evaluation, including the panel's assessment of the adequacy and acceptability of the methods, models, and analyses used. Regardless of whether or not the views expressed in the IEPR report are adopted, MWH shall prepare a written proposed response detailing any action undertaken or to be undertaken in response to the comments and the reasons those actions are believed to satisfy the key concerns raised (if applicable). Comments that lack consensus should be clarified to explain the non-concurrence. All comments must be addressed.

10.0 ADEQUACY OF THE SAR

The information provided in this document demonstrates MWH's effort to ensure good science, sound engineering, and public welfare are the most important considerations during the development of the RRHP. MWH is confident the plan presented in this document meets the intent of Sections 2034 and 2035 of WRDA 2007 and is adequate to allow the USACE to approve the Section 408 submittal. The SAR Plan is a living document and as presented can be modified in the future, as needed.

11.0 REFERENCES

1. Office of Management and Budget (OMB) (2004). Final Information Quality Bulletin for Peer

Review. Executive Office of the President, Office of Management and Budget, Washington, DC. Memorandum M-05-03 dated December 16.

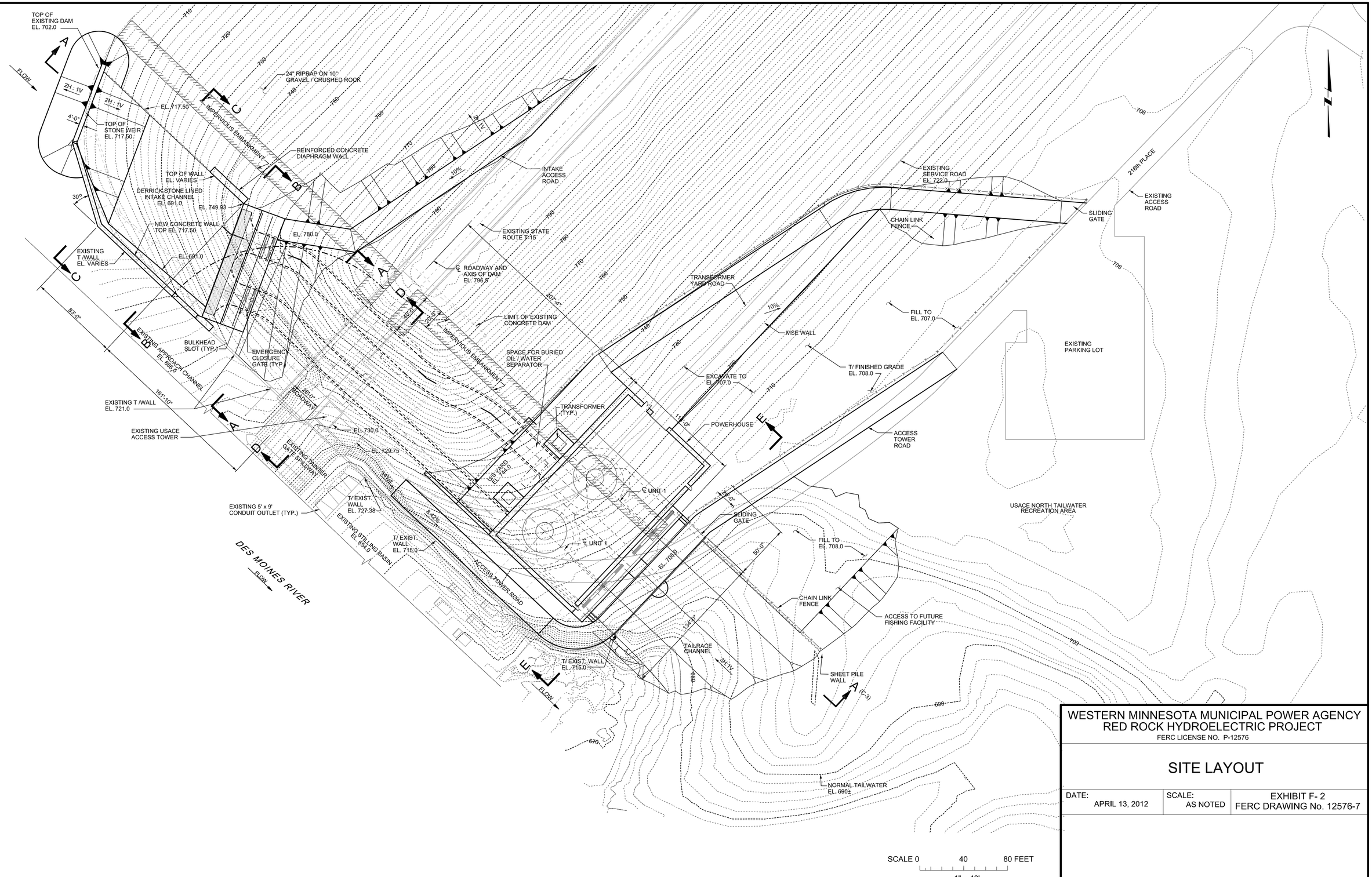
2. USACE (2007). Peer Review Process. U.S. Army Corps of Engineers, Washington, DC. CECW-CP Memorandum dated March 30. Assessment of IEPR Final Panel Comments 30 Enclosure 3, November 5, 2010.

3. USACE (2008). Review of Decision Documents. U.S. Army Corps of Engineers, Washington, DC. CCEW-CP Circular Number. EC 1105-2-410, August 22.

4. USACE (2010). Civil Works Review Policy U.S. Army Corps of Engineers, Washington, DC. Engineering Circular Number. EC 1165-2-209, January 31.

Appendix A

Site Plan and Profile

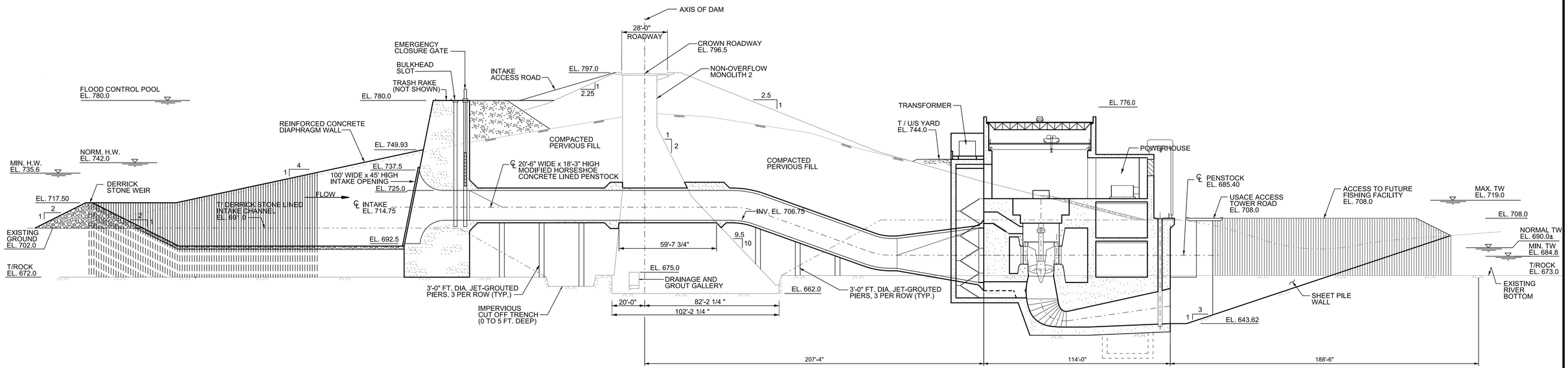


MWH

WESTERN MINNESOTA MUNICIPAL POWER AGENCY
RED ROCK HYDROELECTRIC PROJECT
FERC LICENSE NO. P-12576

SITE LAYOUT

DATE:	SCALE:	
APRIL 13, 2012	AS NOTED	EXHIBIT F- 2 FERC DRAWING No. 12576-7



PROFILE

SCALE 0 30 60 FEET

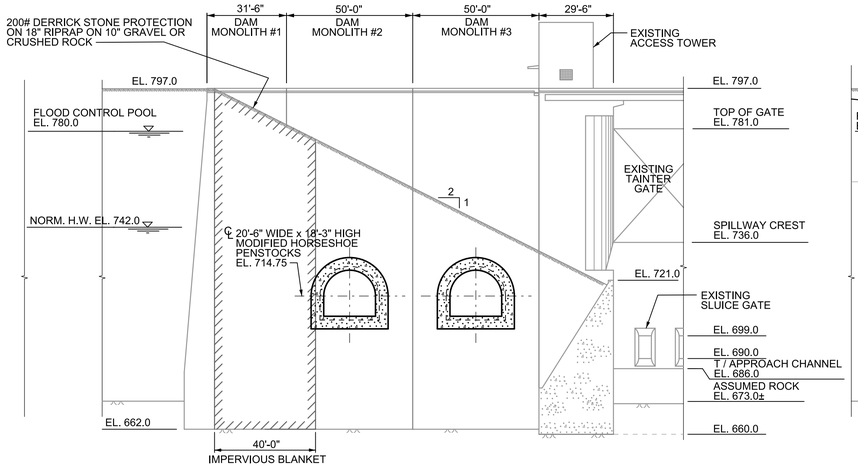
1" = 30'

MWH

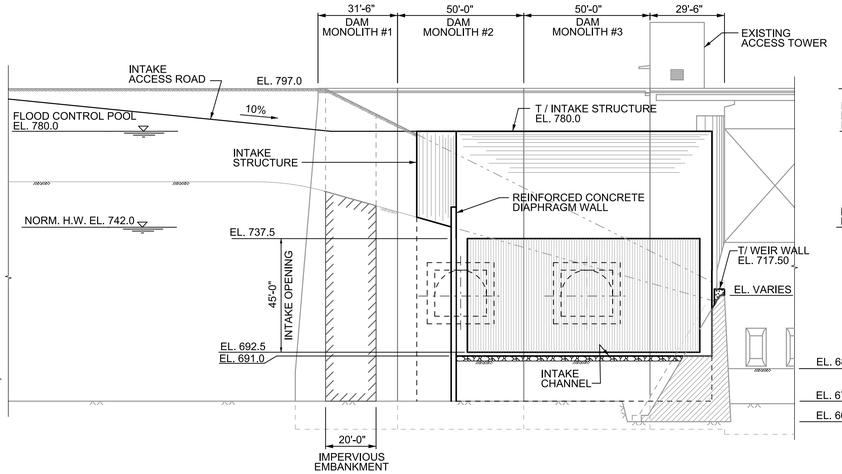
WESTERN MINNESOTA MUNICIPAL POWER AGENCY
RED ROCK HYDROELECTRIC PROJECT
FERC LICENSE NO. P-12576

PROJECT PROFILE

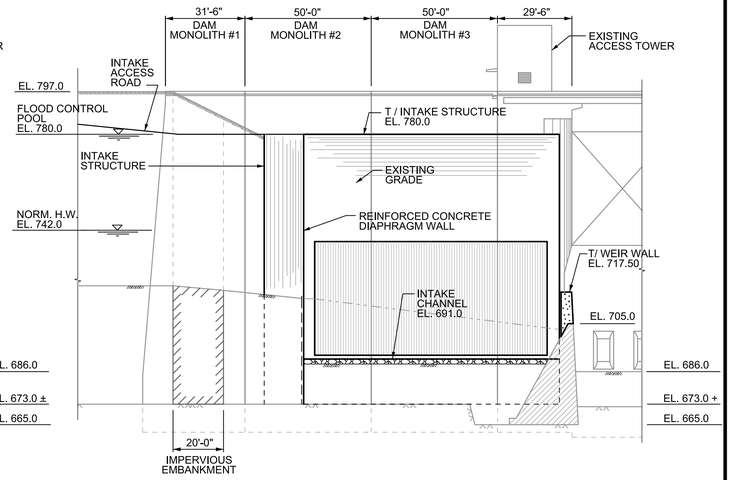
DATE:	SCALE:	
APRIL 13, 2012	AS NOTED	EXHIBIT F-3 FERC DRAWING No. 12576-8



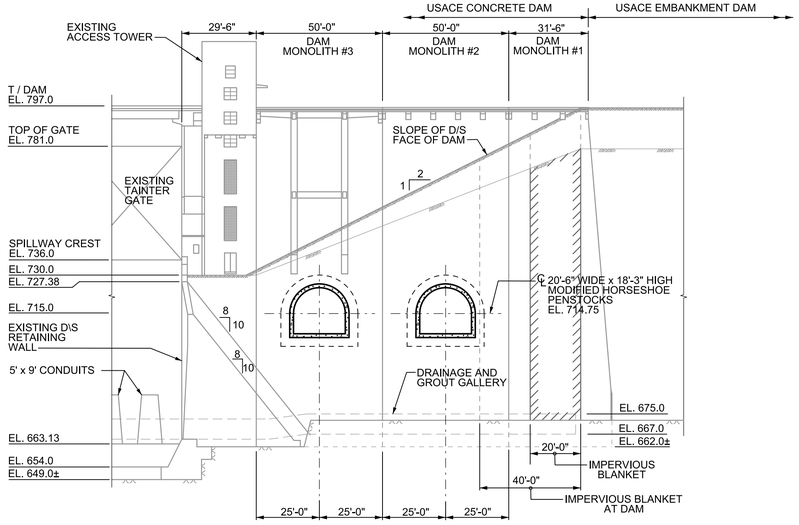
A - A



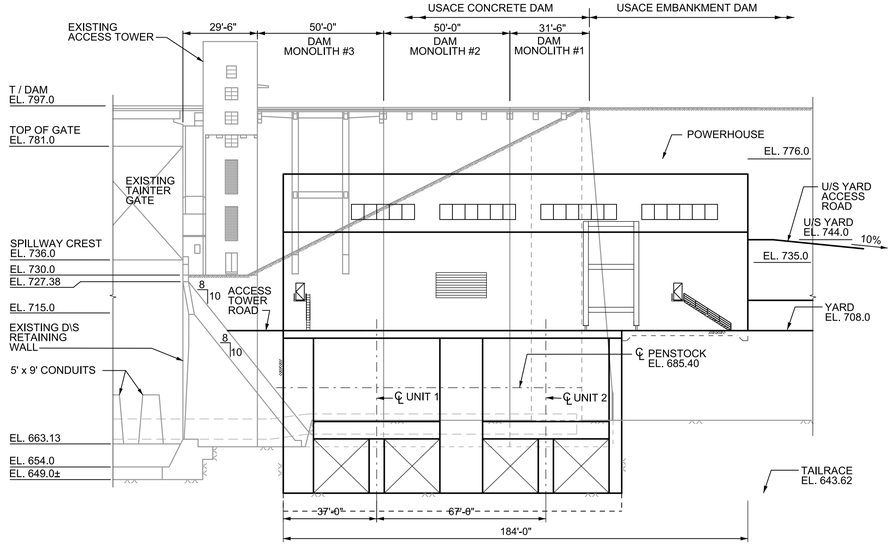
B - B



C - C



D - D



E - E

SCALE 0 30 60 FEET
1" = 30'

MWH

WESTERN MINNESOTA MUNICIPAL POWER AGENCY
RED ROCK HYDROELECTRIC PROJECT
FERC LICENSE NO. P-12576

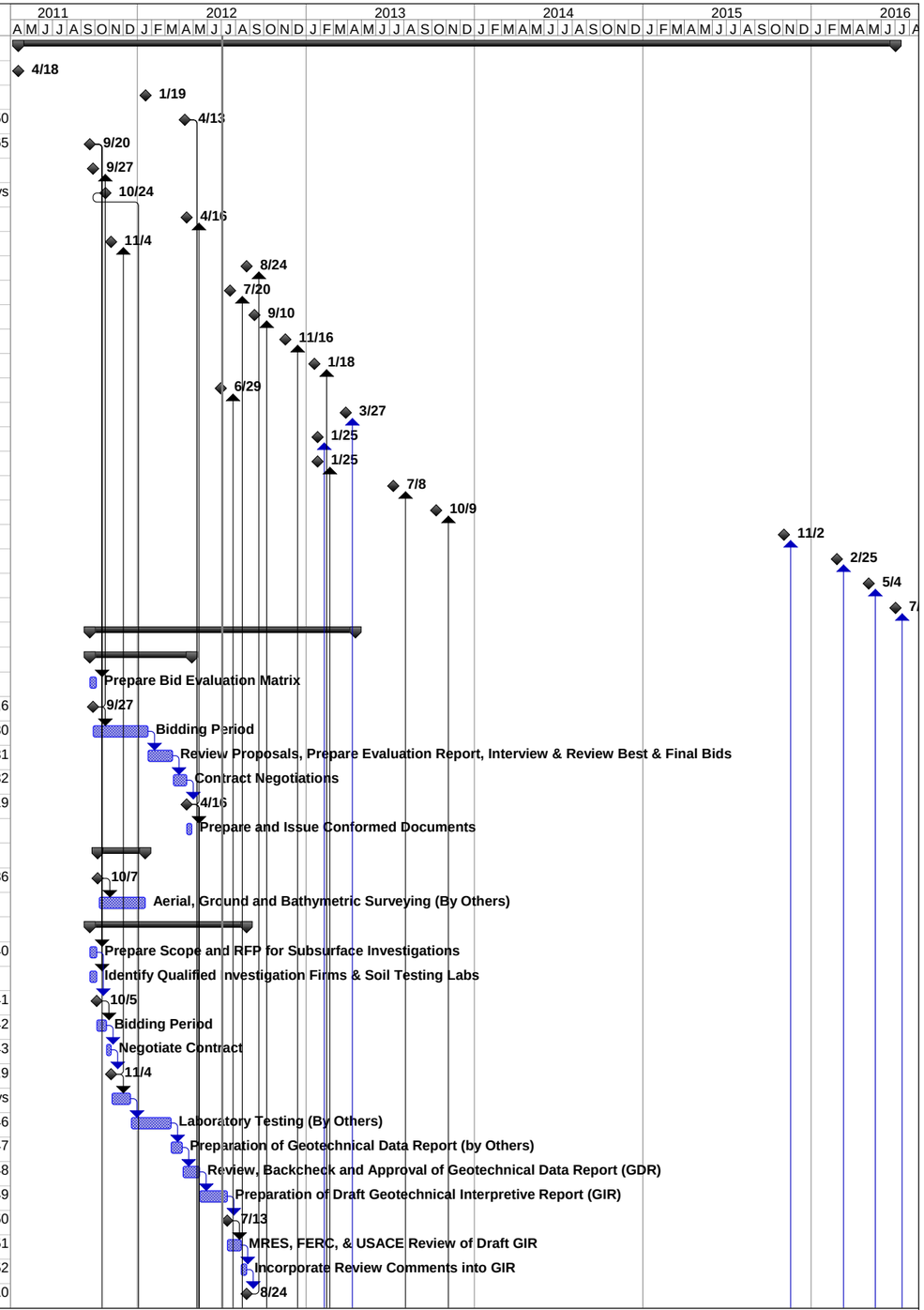
SECTIONS

DATE:	SCALE:	
APRIL 13, 2012	AS NOTED	EXHIBIT F- 4 FERC DRAWING No. 12576-9

Appendix B

Project Schedule

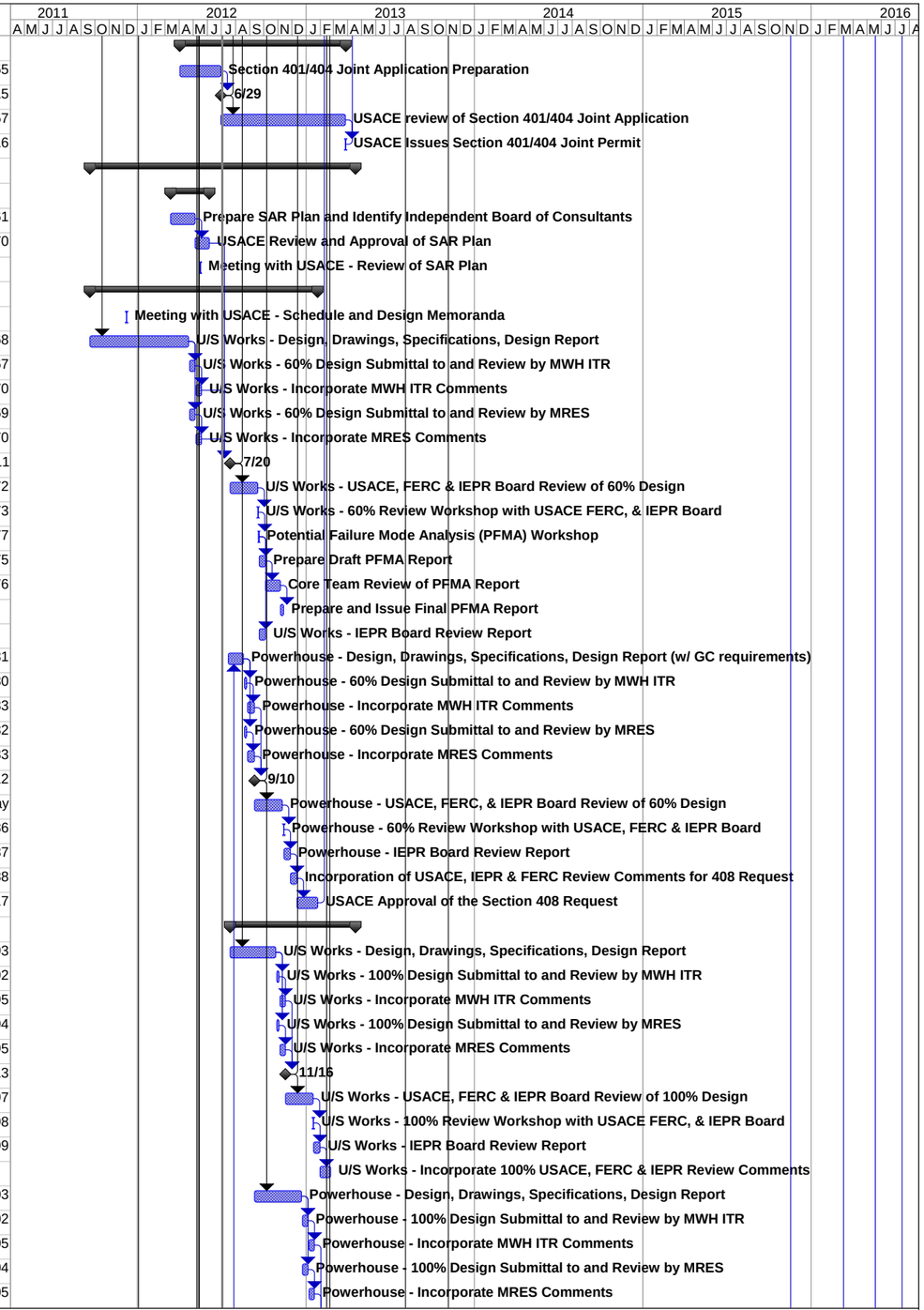
ID	WBS	Task Name	Duration	Start	Finish	Predecessors	Successors
1	**0**	**KEY MILESTONES**	**1902 days**	**Mon 4/18/11**	**Fri 7/1/16**		
2	0.1	FERC License is Issued	0 days	Mon 4/18/11	Mon 4/18/11		
3	0.2	FERC Amendment No. 1 Issued	0 days	Thu 1/19/12	Thu 1/19/12		
4	0.3	FERC Amendment No. 2 Issued	0 days	Fri 4/13/12	Fri 4/13/12		149,150
5	0.4	MWH Notice to proceed	0 days	Tue 9/20/11	Tue 9/20/11		27,38,39,65
6	0.5	Issue of RFP for T/G Equipment Procurement	0 days	Tue 9/27/11	Tue 9/27/11	28	
7	0.6	ART. 308 MOA for Design and Construction is Signed	0 days	Mon 10/24/11	Mon 10/24/11		151SF+23 days
8	0.7	Award of T/G Equipment Procurement Contract	0 days	Mon 4/16/12	Mon 4/16/12	32	
9	0.8	Contract Award for Subsurface Investigations	0 days	Fri 11/4/11	Fri 11/4/11	43	
10	0.9	Submission of GIR (Final) to MRES	0 days	Fri 8/24/12	Fri 8/24/12	52	
11	0.10	60% Design Submittal - U/S Works (Section 408)	0 days	Fri 7/20/12	Fri 7/20/12	70	
12	0.11	60% Design Submittal - Powerhouse (Section 408)	0 days	Mon 9/10/12	Mon 9/10/12	83	
13	0.12	100% Design Submittal - U/S Works	0 days	Fri 11/16/12	Fri 11/16/12	95	
14	0.13	100% Design Submittal - Powerhouse	0 days	Fri 1/18/13	Fri 1/18/13	105	
15	0.14	404 Permit Application Submittal	0 days	Fri 6/29/12	Fri 6/29/12	55	
16	0.15	404 Permit Approval	0 days	Wed 3/27/13	Wed 3/27/13	57	
17	0.16	408 Approval	0 days	Fri 1/25/13	Fri 1/25/13	88	
18	0.17	Issue of RFP for General Construction Contract	0 days	Fri 1/25/13	Fri 1/25/13	128	
19	0.18	Award of General Construction Contract	0 days	Mon 7/8/13	Mon 7/8/13	135	
20	0.19	FERC Authorization to Start Construction (Article 312)	0 days	Wed 10/9/13	Wed 10/9/13	215	
21	0.20	Completion of Intake Structure	0 days	Mon 11/2/15	Mon 11/2/15	235	
22	0.21	Completion of Penstocks	0 days	Thu 2/25/16	Thu 2/25/16	237	
23	0.22	Commissioning of Unit 1	0 days	Wed 5/4/16	Wed 5/4/16	254	
24	0.23	Commissioning of Unit 2	0 days	Fri 7/1/16	Fri 7/1/16	255	
25	**1**	**TASK 1 - FINAL DESIGN**	**576 days**	**Tue 9/20/11**	**Wed 4/17/13**		
26	**1.1**	**1.1Major Powerhouse Equipment Contract Bid & Award**	**221 days**	**Tue 9/20/11**	**Fri 4/27/12**		
27	1.1.1	Prepare Bid Evaluation Matrix	10 days	Tue 9/20/11	Mon 10/3/11	5	
28	1.1.2	Issue RFP	0 days	Tue 9/27/11	Tue 9/27/11		29,6
29	1.1.3	Bidding Period	119 days	Tue 9/27/11	Mon 1/23/12	28	30
30	1.1.4	Review Proposals, Prepare Evaluation Report, Interview & Review Best & Final Bids	39 days	Tue 1/24/12	Fri 3/16/12	29	31
31	1.1.5	Contract Negotiations	21 days	Mon 3/19/12	Mon 4/16/12	30	32
32	1.1.6	Award Major Powerhouse Equipment Contract	0 days	Mon 4/16/12	Mon 4/16/12	31	33,8,217,218,219
33	1.1.7	Prepare and Issue Conformed Documents	9 days	Tue 4/17/12	Fri 4/27/12	32	
34	**1.2**	**1.2 Site Survey**	**103 days**	**Fri 10/7/11**	**Tue 1/17/12**		
35	1.2.1	Award Contract	0 days	Fri 10/7/11	Fri 10/7/11		36
36	1.2.2	Aerial, Ground and Bathymetric Surveying (By Others)	100 days	Mon 10/10/11	Tue 1/17/12	35	
37	**1.3**	**1.3 Subsurface Investigation Program**	**340 days**	**Tue 9/20/11**	**Fri 8/24/12**		
38	1.3.1	Prepare Scope and RFP for Subsurface Investigations	11 days	Tue 9/20/11	Tue 10/4/11	5	40
39	1.3.2	Identify Qualified Investigation Firms & Soil Testing Labs	11 days	Tue 9/20/11	Tue 10/4/11	5	
40	1.3.3	Issue RFP for Subsurface Investigation	0 days	Wed 10/5/11	Wed 10/5/11	38	41
41	1.3.4	Bidding Period	15 days	Wed 10/5/11	Tue 10/25/11	40	42
42	1.3.5	Negotiate Contract	8 days	Wed 10/26/11	Fri 11/4/11	41	43
43	1.3.6	Award Contract	0 days	Fri 11/4/11	Fri 11/4/11	42	44,9
44	1.3.7	Field Subsurface Investigations (By Others)	30 days	Mon 11/7/11	Fri 12/16/11	43	45FS+2 days
45	1.3.8	Laboratory Testing (By Others)	86 days	Mon 12/19/11	Tue 3/13/12	44FS+2 days	46
46	1.3.9	Preparation of Geotechnical Data Report (by Others)	24 days	Wed 3/14/12	Fri 4/6/12	45	47
47	1.3.10	Review, Backcheck and Approval of Geotechnical Data Report (GDR)	26 days	Mon 4/9/12	Mon 5/14/12	46	48
48	1.3.11	Preparation of Draft Geotechnical Interpretive Report (GIR)	60 days	Tue 5/15/12	Fri 7/13/12	47	49
49	1.3.12	Issue Draft GIR to MRES, FERC, & USACE	0 days	Fri 7/13/12	Fri 7/13/12	48	50
50	1.3.13	MRES, FERC, & USACE Review of Draft GIR	30 days	Sat 7/14/12	Sun 8/12/12	49	51
51	1.3.14	Incorporate Review Comments into GIR	10 days	Mon 8/13/12	Fri 8/24/12	50	52
52	1.3.15	Issue Final GIR	0 days	Fri 8/24/12	Fri 8/24/12	51	10



Red Rock Hydroelectric Project
Date: Tue 7/3/12

Task	Summary	External Milestone	Inactive Summary	Manual Summary Rollup	Finish-only
Split	Project Summary	Inactive Task	Manual Task	Manual Summary	Progress
Milestone	External Tasks	Inactive Milestone	Duration-only	Start-only	Deadline

ID	WBS	Task Name	Duration	Start	Finish	Predecessors	Successors
53	**1.4**	**1.4 Section 401/404 Joint Permit**	**360 days**	**Mon 4/2/12**	**Wed 3/27/13**		
54	1.4.1	Section 401/404 Joint Application Preparation	89 days	Mon 4/2/12	Fri 6/29/12		55
55	1.4.2	Submit Section 401/404 Joint Application	0 days	Fri 6/29/12	Fri 6/29/12	54	56,15
56	1.4.3	USACE review of Section 401/404 Joint Application	270 days	Sat 6/30/12	Tue 3/26/13	55	57
57	1.4.4	USACE Issues Section 401/404 Joint Permit	1 day	Wed 3/27/13	Wed 3/27/13	56	16
58	**1.5**	**1.5 Detailed Design of Hydroelectric Plant - Section 408 Approval**	**576 days**	**Tue 9/20/11**	**Wed 4/17/13**		
59	**1.5.1**	**SAR Plan**	**60 days**	**Tue 3/13/12**	**Mon 6/4/12**		
60	1.5.1.1	Prepare SAR Plan and Identify Independent Board of Consultants	53 days	Tue 3/13/12	Fri 5/4/12		61
61	1.5.1.2	USACE Review and Approval of SAR Plan	31 days	Sat 5/5/12	Mon 6/4/12	60	70
62	1.5.1.3	Meeting with USACE - Review of SAR Plan	1 day	Wed 5/16/12	Wed 5/16/12		
63	**1.5.2**	**60% Detailed Design**	**494 days**	**Tue 9/20/11**	**Fri 1/25/13**		
64	1.5.2.1	Meeting with USACE - Schedule and Design Memoranda	1 day	Thu 12/8/11	Thu 12/8/11		
65	1.5.2.2	U/S Works - Design, Drawings, Specifications, Design Report	214 days	Tue 9/20/11	Fri 4/20/12	5	66,68
66	1.5.2.3	U/S Works - 60% Design Submittal to and Review by MWH ITR	10 days	Mon 4/23/12	Fri 5/4/12	65	67
67	1.5.2.4	U/S Works - Incorporate MWH ITR Comments	10 days	Mon 5/7/12	Fri 5/18/12	66	70
68	1.5.2.5	U/S Works - 60% Design Submittal to and Review by MRES	10 days	Mon 4/23/12	Fri 5/4/12	65	69
69	1.5.2.6	U/S Works - Incorporate MRES Comments	10 days	Mon 5/7/12	Fri 5/18/12	68	70
70	1.5.2.7	U/S Works - Submit 60% Review to USACE, FERC, and IEPR Board	0 days	Fri 7/20/12	Fri 7/20/12	69,67,61	71,90,11
71	1.5.2.8	U/S Works - USACE, FERC & IEPR Board Review of 60% Design	60 days	Fri 7/20/12	Mon 9/17/12	70	72
72	1.5.2.9	U/S Works - 60% Review Workshop with USACE FERC, & IEPR Board	1 day	Tue 9/18/12	Tue 9/18/12	71	73
73	1.5.2.10	Potential Failure Mode Analysis (PFMA) Workshop	2 days	Wed 9/19/12	Thu 9/20/12	72	74,77
74	1.5.2.11	Prepare Draft PFMA Report	10 days	Fri 9/21/12	Thu 10/4/12	73	75
75	1.5.2.12	Core Team Review of PFMA Report	32 days	Fri 10/5/12	Mon 11/5/12	74	76
76	1.5.2.13	Prepare and Issue Final PFMA Report	5 days	Tue 11/6/12	Mon 11/12/12	75	
77	1.5.2.14	U/S Works - IEPR Board Review Report	10 days	Fri 9/21/12	Thu 10/4/12	73	
78	1.5.2.15	Powerhouse - Design, Drawings, Specifications, Design Report (w/ GC requirements)	33 days	Mon 7/16/12	Fri 8/17/12	217FS+2 days	79,81
79	1.5.2.16	Powerhouse - 60% Design Submittal to and Review by MWH ITR	5 days	Mon 8/20/12	Fri 8/24/12	78	80
80	1.5.2.17	Powerhouse - Incorporate MWH ITR Comments	11 days	Mon 8/27/12	Mon 9/10/12	79	83
81	1.5.2.18	Powerhouse - 60% Design Submittal to and Review by MRES	5 days	Mon 8/20/12	Fri 8/24/12	78	82
82	1.5.2.19	Powerhouse - Incorporate MRES Comments	11 days	Mon 8/27/12	Mon 9/10/12	81	83
83	1.5.2.20	Powerhouse - Submit 60% Review to USACE, FERC & IEPR Board	0 days	Mon 9/10/12	Mon 9/10/12	82,80	84,100,12
84	1.5.2.21	Powerhouse - USACE, FERC, & IEPR Board Review of 60% Design	60 days	Tue 9/11/12	Fri 11/9/12	83	85FS+1 day
85	1.5.2.22	Powerhouse - 60% Review Workshop with USACE, FERC & IEPR Board	1 day	Tue 11/13/12	Tue 11/13/12	84FS+1 day	86
86	1.5.2.23	Powerhouse - IEPR Board Review Report	10 days	Wed 11/14/12	Tue 11/27/12	85	87
87	1.5.2.24	Incorporation of USACE, IEPR & FERC Review Comments for 408 Request	10 days	Wed 11/28/12	Tue 12/11/12	86	88
88	1.5.2.25	USACE Approval of the Section 408 Request	45 days	Wed 12/12/12	Fri 1/25/13	87	17
89	**1.5.3**	**100% Detailed Design**	**272 days**	**Fri 7/20/12**	**Wed 4/17/13**		
90	1.5.3.1	U/S Works - Design, Drawings, Specifications, Design Report	99 days	Fri 7/20/12	Fri 10/26/12	70	91,93
91	1.5.3.2	U/S Works - 100% Design Submittal to and Review by MWH ITR	5 days	Mon 10/29/12	Fri 11/2/12	90	92
92	1.5.3.3	U/S Works - Incorporate MWH ITR Comments	10 days	Mon 11/5/12	Fri 11/16/12	91	95
93	1.5.3.4	U/S Works - 100% Design Submittal to and Review by MRES	5 days	Mon 10/29/12	Fri 11/2/12	90	94
94	1.5.3.5	U/S Works - Incorporate MRES Comments	10 days	Mon 11/5/12	Fri 11/16/12	93	95
95	1.5.3.6	U/S Works - Submit 100% Review to USACE, FERC, and IEPR Board	0 days	Fri 11/16/12	Fri 11/16/12	94,92	96,13
96	1.5.3.7	U/S Works - USACE, FERC & IEPR Board Review of 100% Design	60 days	Sat 11/17/12	Tue 1/15/13	95	97
97	1.5.3.8	U/S Works - 100% Review Workshop with USACE FERC, & IEPR Board	1 day	Wed 1/16/13	Wed 1/16/13	96	98
98	1.5.3.9	U/S Works - IEPR Board Review Report	10 days	Thu 1/17/13	Wed 1/30/13	97	99
99	1.5.3.10	U/S Works - Incorporate 100% USACE, FERC & IEPR Review Comments	17 days	Thu 1/31/13	Fri 2/22/13	98	
100	1.5.3.11	Powerhouse - Design, Drawings, Specifications, Design Report	102 days	Tue 9/11/12	Fri 12/21/12	83	101,103
101	1.5.3.12	Powerhouse - 100% Design Submittal to and Review by MWH ITR	10 days	Mon 12/24/12	Fri 1/4/13	100	102
102	1.5.3.13	Powerhouse - Incorporate MWH ITR Comments	10 days	Mon 1/7/13	Fri 1/18/13	101	105
103	1.5.3.14	Powerhouse - 100% Design Submittal to and Review by MRES	10 days	Mon 12/24/12	Fri 1/4/13	100	104
104	1.5.3.15	Powerhouse - Incorporate MRES Comments	10 days	Mon 1/7/13	Fri 1/18/13	103	105



Red Rock Hydroelectric Project
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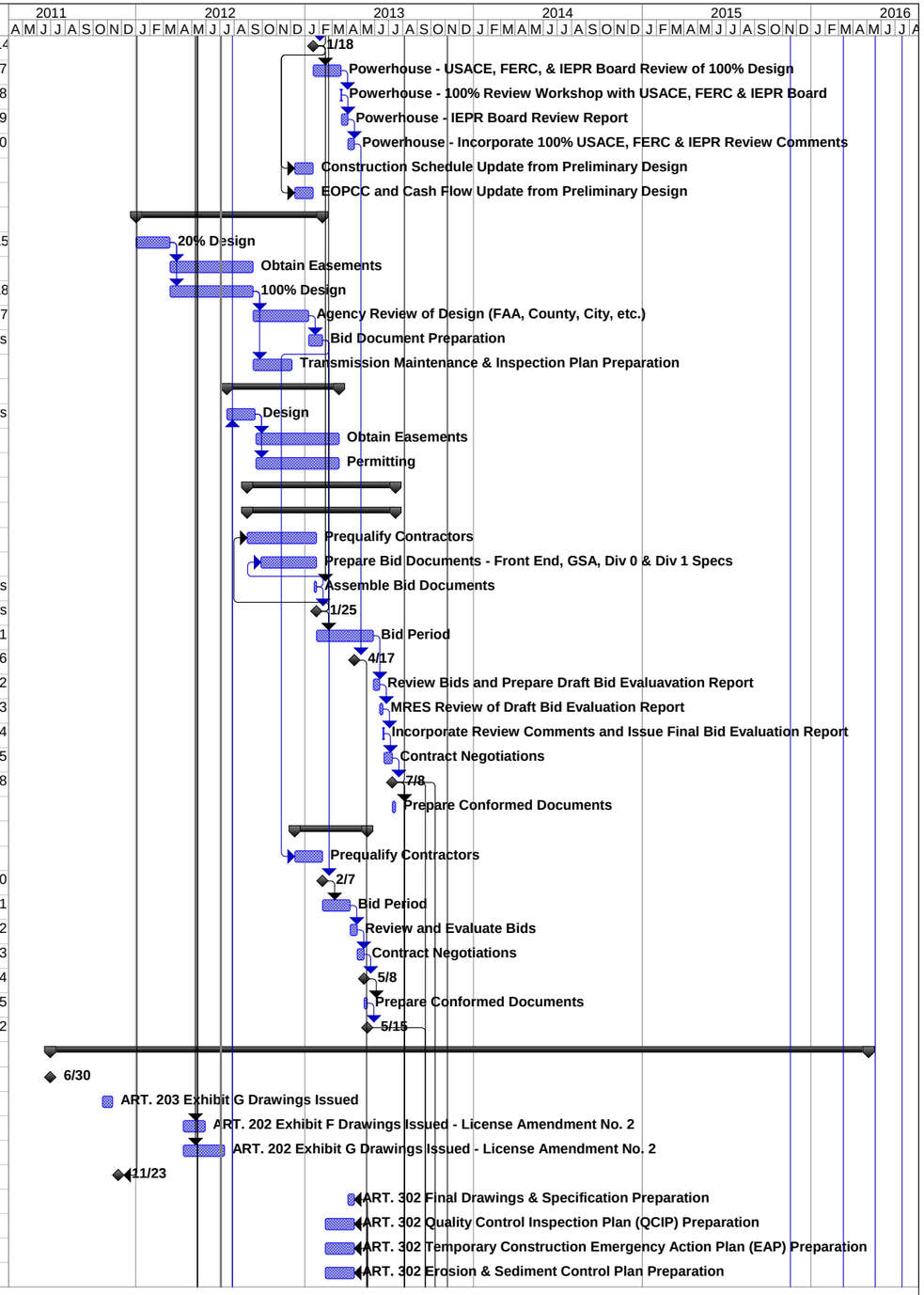
Task	Summary	External Milestone	Inactive Summary	Manual Summary Rollup	Finish-only
Split	Project Summary	Inactive Task	Manual Task	Manual Summary	Progress
Milestone	External Tasks	Inactive Milestone	Duration-only	Start-only	Deadline

ID	WBS	Task Name	Duration	Start	Finish	Predecessors	Successors
105	1.5.3.16	Powerhouse - Submit 100% Review to USACE, FERC & IEPR Board	0 days	Fri 1/18/13	Fri 1/18/13	104,102	30 days,111FS-30 days,14
106	1.5.3.17	Powerhouse - USACE, FERC, & IEPR Board Review of 100% Design	60 days	Sat 1/19/13	Tue 3/19/13	105	107
107	1.5.3.18	Powerhouse - 100% Review Workshop with USACE, FERC & IEPR Board	1 day	Wed 3/20/13	Wed 3/20/13	106	108
108	1.5.3.19	Powerhouse - IEPR Board Review Report	10 days	Thu 3/21/13	Wed 4/3/13	107	109
109	1.5.3.20	Powerhouse - Incorporate 100% USACE, FERC & IEPR Review Comments	10 days	Thu 4/4/13	Wed 4/17/13	108	130
110	1.5.3.21	Construction Schedule Update from Preliminary Design	30 days	Mon 12/10/12	Fri 1/18/13	105FS-30 days	
111	1.5.3.22	EOPCC and Cash Flow Update from Preliminary Design	30 days	Mon 12/10/12	Fri 1/18/13	105FS-30 days	
112	**1.6**	**1.6 Detailed Design of Transmission Line**	**403 days**	**Mon 1/2/12**	**Thu 2/7/13**		
113	1.6.1	20% Design	73 days	Mon 1/2/12	Wed 3/14/12		114,115
114	1.6.2	Obtain Easements	180 days	Thu 3/15/12	Mon 9/10/12	113	
115	1.6.3	100% Design	180 days	Thu 3/15/12	Mon 9/10/12	113	116,118
116	1.6.4	Agency Review of Design (FAA, County, City, etc.)	120 days	Tue 9/11/12	Tue 1/8/13	115	117
117	1.6.5	Bid Document Preparation	30 days	Wed 1/9/13	Thu 2/7/13	116	139,138FS-60 days
118	1.6.6	Transmission Maintenance & Inspection Plan Preparation	60 days	Tue 9/11/12	Mon 12/3/12	115	
119	**1.7**	**1.7 Detailed Design of Utilities**	**243 days**	**Mon 7/16/12**	**Fri 3/15/13**		
120	1.7.1	Design	61 days	Mon 7/16/12	Fri 9/14/12	217FS+2 days	FS+2 days,122FS+2 days
121	1.7.2	Obtain Easements	180 days	Mon 9/17/12	Fri 3/15/13	120FS+2 days	
122	1.7.3	Permitting	180 days	Mon 9/17/12	Fri 3/15/13	120FS+2 days	
123	**2**	**TASK 2 - GENERAL CONSTRUCTION & TRANSMISSION LINE CONTRACT BIDDING**	**321 days**	**Wed 8/29/12**	**Mon 7/15/13**		
124	**2.1**	**2.1 General Construction Contract Bidding**	**321 days**	**Wed 8/29/12**	**Mon 7/15/13**		
125	2.1.1	Prequalify Contractors	150 days	Wed 8/29/12	Fri 1/25/13	128FS-150 days	
126	2.1.2	Prepare Bid Documents - Front End, GSA, Div 0 & Div 1 Specs	120 days	Fri 9/28/12	Fri 1/25/13	127FS-120 days	
127	2.1.3	Assemble Bid Documents	5 days	Mon 1/21/13	Fri 1/25/13	105	128,126FS-120 days
128	2.1.4	Issue RFP for General Construction Contract	0 days	Fri 1/25/13	Fri 1/25/13	127	129,18,125FS-150 days
129	2.1.5	Bid Period	123 days	Sat 1/26/13	Tue 5/28/13	128	131
130	2.1.6	Issue Addenda Based on USACE, FERC & IEPR 100% Review	0 days	Wed 4/17/13	Wed 4/17/13	109	156
131	2.1.7	Review Bids and Prepare Draft Bid Evaluavation Report	10 days	Wed 5/29/13	Tue 6/11/13	129	132
132	2.1.8	MRES Review of Draft Bid Evaluation Report	5 days	Wed 6/12/13	Tue 6/18/13	131	133
133	2.1.9	Incorporate Review Comments and Issue Final Bid Evaluation Report	2 days	Wed 6/19/13	Thu 6/20/13	132	134
134	2.1.10	Contract Negotiations	12 days	Fri 6/21/13	Mon 7/8/13	133	135
135	2.1.11	Award and NTP General Construction Contract	0 days	Mon 7/8/13	Mon 7/8/13	134	229,230,160,199,207,208
136	2.1.12	Prepare Conformed Documents	5 days	Tue 7/9/13	Mon 7/15/13	135	
137	**2.2**	**2.2 Transmission Line Contract Bidding**	**157 days**	**Mon 12/10/12**	**Wed 5/15/13**		
138	2.2.1	Prequalify Contractors	60 days	Mon 12/10/12	Thu 2/7/13	117FS-60 days	
139	2.2.2	Issue RFP for Transmission Line Contract	0 days	Thu 2/7/13	Thu 2/7/13	117	140
140	2.2.3	Bid Period	60 days	Fri 2/8/13	Mon 4/8/13	139	141
141	2.2.4	Review and Evaluate Bids	15 days	Tue 4/9/13	Tue 4/23/13	140	142
142	2.2.5	Contract Negotiations	15 days	Wed 4/24/13	Wed 5/8/13	141	143
143	2.2.6	Award Transmission Line Contract	0 days	Wed 5/8/13	Wed 5/8/13	142	144
144	2.2.7	Prepare Conformed Documents	7 days	Thu 5/9/13	Wed 5/15/13	143	145
145	2.2.8	NTP for Transmission Line Contract	0 days	Wed 5/15/13	Wed 5/15/13	144	252
146	**3**	**TASK 3 - PERMITTING**	**1771 days**	**Thu 6/30/11**	**Wed 5/4/16**		
147	3.1	ART. 202 Exhibit F Drawings Issued	0 days	Thu 6/30/11	Thu 6/30/11		
148	3.2	ART. 203 Exhibit G Drawings Issued	16 days	Fri 10/21/11	Fri 11/11/11		
149	3.3	ART. 202 Exhibit F Drawings Issued - License Amendment No. 2	47 days	Fri 4/13/12	Tue 5/29/12	4	
150	3.4	ART. 202 Exhibit G Drawings Issued - License Amendment No. 2	89 days	Fri 4/13/12	Tue 7/10/12	4	
151	3.5	ART. 301 Design and Construction Schedule Submittal to USACE	0 days	Wed 11/23/11	Wed 11/23/11	7SF+23 days	
152	3.6	ART. 302 Final Drawings & Specification Preparation	14 days	Thu 4/4/13	Wed 4/17/13	156SF	
153	3.7	ART. 302 Quality Control Inspection Plan (QCIP) Preparation	45 days	Thu 2/14/13	Wed 4/17/13	156SF	
154	3.8	ART. 302 Temporary Construction Emergency Action Plan (EAP) Preparation	45 days	Thu 2/14/13	Wed 4/17/13	156SF	
155	3.9	ART. 302 Erosion & Sediment Control Plan Preparation	45 days	Thu 2/14/13	Wed 4/17/13	156SF	



Red Rock Hydroelectric Project
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Task	Summary	External Milestone	Inactive Summary	Manual Summary Rollup	Finish-only
Split	Project Summary	Inactive Task	Manual Task	Manual Summary	Progress
Milestone	External Tasks	Inactive Milestone	Duration-only	Start-only	Deadline

ID	WBS	Task Name	Duration	Start	Finish	Predecessors	Successors
156	3.10	ART. 302 Final Dwgs/Specs, QCIP, Temp. Const. EAP, Erosion & Sediment CP Submittal to USACE/FERC	0 days	Wed 4/17/13	Wed 4/17/13	130	52SF,153SF,154SF,155SF
157	3.11	ART. 302 Final Dwgs/Specs, QCIP, Temp. Const. EAP, Erosion & Sediment CP Review by USACE/FERC	47 days	Thu 4/18/13	Mon 6/3/13	156	158
158	3.12	ART. 302 Final Dwgs/Specs, QCIP, Temp. Const. EAP, Erosion & Sediment CP Comment Incorporation	7 days	Tue 6/4/13	Mon 6/10/13	157	159
159	3.13	ART. 302 Final Dwgs/Specs, QCIP, Temp. Const. EAP, Erosion & Sediment CP Final Submittal	17 days	Tue 6/11/13	Thu 6/27/13	158	229,215
160	3.14	ART. 303 & 307 Cofferdam/Deep Excavation Drawing Preparation	63 days	Tue 7/9/13	Mon 9/9/13	135	161
161	3.15	ART. 303 & 307 Cofferdam/Deep Excavation Submittal to USACE & FERC	0 days	Mon 9/9/13	Mon 9/9/13	160	162
162	3.16	ART. 303 & 307 Cofferdam/Deep Excavation Review and Approval by USACE & FERC	30 days	Tue 9/10/13	Wed 10/9/13	161	229,215
163	3.17	ART. 305 Project Financing Plan Preparation (MRES)	62 days	Fri 5/10/13	Thu 7/11/13	164SF	
164	3.18	ART. 305 Project Financing Plan Submittal to FERC	0 days	Thu 7/11/13	Thu 7/11/13	229SF-91 days	165,163SF
165	3.19	ART. 305 Project Financing Plan Review and Approval by FERC	90 days	Thu 7/11/13	Tue 10/8/13	164	
166	3.20	Meet with USACE, USFWS, IDNR, NRCS & FERC to review Art. 310, 402, 404, 405, 406, 407	2 days	Thu 6/6/13	Mon 6/10/13	F,183SF,188SF,193SI	
167	3.21	ART. 310 Regulating (or Operating) Plan for Construction & Operation Preparation (MRES)	60 days	Mon 6/10/13	Fri 8/9/13	168SF	166SF
168	3.22	ART. 310 Regulating (or Operating) Plan Submittal to FERC and USACE	0 days	Fri 8/9/13	Fri 8/9/13	229SF-62 days	167SF,169
169	3.23	ART. 310 Regulating (or Operating) Plan Review by FERC and USACE	32 days	Fri 8/9/13	Mon 9/9/13	168	170
170	3.24	ART. 310 Regulating (or Operating) Plan Incorporation of Comments	7 days	Tue 9/10/13	Mon 9/16/13	169	171
171	3.25	ART. 310 Regulating (or Operating) Plan Approval by FERC	14 days	Tue 9/17/13	Mon 9/30/13	170	
172	3.26	ART. 310 Operating MOA	365 days	Wed 5/6/15	Wed 5/4/16	254FF	
173	3.27	ART. 402 Water Quality Protection & Monitoring Plan Preparation	32 days	Fri 4/26/13	Tue 5/28/13	174SF	166SF
174	3.28	ART. 402 Water Quality Protection & Monitoring Plan Review by USACE, USFWS, IDNR	30 days	Tue 5/28/13	Thu 6/27/13	175SF	173SF
175	3.29	ART. 402 Water Quality Protection & Monitoring Plan Incorporation of Agency Comments	10 days	Thu 6/27/13	Thu 7/11/13	176SF	174SF
176	3.30	ART. 402 Water Quality Protection & Monitoring Plan Submittal to FERC	0 days	Thu 7/11/13	Thu 7/11/13	229SF-91 days	177,175SF
177	3.31	ART. 402 Water Quality Protection & Monitoring Plan Review and Approval by FERC	30 days	Thu 7/11/13	Fri 8/9/13	176	
178	3.32	ART. 404 Operation Compliance Monitoring Plan Preparation (MRES)	60 days	Wed 10/21/15	Sun 12/20/15	179SF	
179	3.33	ART. 404 Operation Compliance Monitoring Plan Review by USACE, USFWS, IDNR	31 days	Sun 12/20/15	Wed 1/20/16	180SF	178SF
180	3.34	ART. 404 Operation Compliance Monitoring Plan Incorporation of Agency Comments	10 days	Wed 1/20/16	Wed 2/3/16	181SF	179SF
181	3.35	ART. 404 Operation Compliance Monitoring Plan Submittal to FERC	0 days	Wed 2/3/16	Wed 2/3/16	254FS-92 days	182,180SF
182	3.36	ART. 404 Operation Compliance Monitoring Plan Review and Approval by FERC	32 days	Wed 2/3/16	Sat 3/5/16	181	
183	3.37	ART. 405 Fishing Access Design & Management Plan Preparation	33 days	Thu 4/25/13	Tue 5/28/13	184SF	166SF
184	3.38	ART. 405 Fishing Access Design & Management Plan Review by USACE & IDNR	30 days	Tue 5/28/13	Thu 6/27/13	185SF	183SF
185	3.39	ART. 405 Fishing Access Design & Management Plan Incorporation of Agency Comments	10 days	Thu 6/27/13	Thu 7/11/13	186SF	184SF
186	3.40	ART. 405 Fishing Access Design & Management Plan Submittal to FERC	0 days	Thu 7/11/13	Thu 7/11/13	229SF-91 days	187,185SF
187	3.41	ART. 405 Fishing Access Design & Management Plan Review and Approval by FERC	30 days	Thu 7/11/13	Fri 8/9/13	186	
188	3.42	ART. 406 Avian Protection Plan Preparation	32 days	Fri 4/26/13	Tue 5/28/13	189SF	166SF
189	3.43	ART. 406 Avian Protection Plan Review by USACE, USFWS, IDNR	30 days	Tue 5/28/13	Thu 6/27/13	190SF	188SF
190	3.44	ART. 406 Avian Protection Plan Incorporation of Agency Comments	10 days	Thu 6/27/13	Thu 7/11/13	191SF	189SF
191	3.45	ART. 406 Avian Protection Plan Submittal to FERC	0 days	Thu 7/11/13	Thu 7/11/13	229SF-91 days	192,190SF
192	3.46	ART. 406 Avian Protection Plan Review and Approval by FERC	30 days	Thu 7/11/13	Fri 8/9/13	191	
193	3.47	ART. 407 Indiana Bat Protection Report Preparation	32 days	Fri 4/26/13	Tue 5/28/13	194SF	166SF
194	3.48	ART. 407 Indiana Bat Protection Report Review by USACE, USFWS, NRCS, IDNR	30 days	Tue 5/28/13	Thu 6/27/13	195SF	193SF
195	3.49	ART. 407 Indiana Bat Protection Report Incorporation of Agency Comments	10 days	Thu 6/27/13	Thu 7/11/13	196SF	194SF
196	3.50	ART. 407 Indiana Bat Protection Report Submittal to FERC	0 days	Thu 7/11/13	Thu 7/11/13	229SF-91 days	197,195SF
197	3.51	ART. 407 Indiana Bat Protection Report Review and Approval by FERC	30 days	Thu 7/11/13	Fri 8/9/13	196	
198	3.52	ART. 408 Cultural Resources Protection Consultation w/ ISHPO and USACE	32 days	Thu 8/8/13	Mon 9/9/13	229SF-31 days	
199	3.53	Hazardous Materials Spill EAP Preparation & Submittal to USACE	30 days	Tue 7/9/13	Wed 8/7/13	135	200
200	3.54	Hazardous Materials Spill EAP USACE Review	30 days	Thu 8/8/13	Wed 9/18/13	199	228
201	3.55	System Safety Management Plan Preparation (MWH)	91 days	Fri 5/10/13	Fri 8/9/13	202SF	
202	3.56	System Safety Management Plan Submittal to USACE	0 days	Fri 8/9/13	Fri 8/9/13	229SF-62 days	203,201SF
203	3.57	System Safety Management Plan Review by USACE	32 days	Fri 8/9/13	Mon 9/9/13	202	204
204	3.58	System Safety Management Plan Incorporation of Comments	7 days	Tue 9/10/13	Mon 9/16/13	203	205

Red Rock Hydroelectric Project
Date: Tue 7/3/12

Task	Summary	External Milestone	Inactive Summary	Manual Summary Rollup	Finish-only
Split	Project Summary	Inactive Task	Manual Task	Manual Summary	Progress
Milestone	External Tasks	Inactive Milestone	Duration-only	Start-only	Deadline

ID	WBS	Task Name	Duration	Start	Finish	Predecessors	Successors
205	3.59	System Safety Management Plan Approval by USACE	15 days	Tue 9/17/13	Tue 10/1/13	204	
206	3.60	Obtain Commercial & Government Entity Code (CAGE)	32 days	Fri 6/7/13	Tue 7/9/13	207SF	
207	3.61	Conduct PSIs/Security Background Checks & Obtain NACI	30 days	Tue 7/9/13	Wed 8/7/13	135	206SF
208	3.62	Prepare Current Security Assessment, Plan for Site Protection & Access Control List	30 days	Tue 7/9/13	Wed 8/7/13	135	209
209	3.63	Submit Security Access Submittal & Background Checks to USACE	0 days	Wed 8/7/13	Wed 8/7/13	208	210
210	3.64	USACE Review of Access & Security Submittal	30 days	Thu 8/8/13	Fri 9/6/13	209	229,215
211	3.65	Prepare Plan for Accessing the Corps Recreation & Operation Facilities during Construction	31 days	Tue 7/9/13	Fri 8/9/13	212SF	
212	3.66	Submit Corps Facility Access Plan and Construction Schedule to USACE	0 days	Fri 8/9/13	Fri 8/9/13	229SF-62 days	211SF
213	3.67	Operation Emergency Plan Preparation	30 days	Mon 12/21/15	Tue 1/19/16	254SS-71 days	214
214	3.68	Operation Emergency Plan Review & Approval	45 days	Wed 1/20/16	Fri 3/4/16	213	
215	3.69	Art. 312 - Authorization to Start Construction	0 days	Wed 10/9/13	Wed 10/9/13	159,162,210	20
216	**4**	**TASK 4 - MAJOR POWERHOUSE EQUIPMENT FABRICATION**	**1039 days**	**Tue 4/17/12**	**Thu 2/19/15**		
217	4.1	Group 1 Drawings	88 days	Tue 4/17/12	Fri 7/13/12	32	FS+2 days,120FS+2 days
218	4.2	Group 2 Drawings	148 days	Tue 4/17/12	Tue 9/11/12	32	
219	4.3	Detailed Installation Instructions and Checklist for Installation Contractor	148 days	Tue 4/17/12	Tue 9/11/12	32	,222,223,224,225,226,227
220	4.4	Unit 1 - Embedded Parts Fabrication and Delivery	456 days	Wed 9/12/12	Wed 12/11/13	219	
221	4.5	Unit 1 - Turbine Removable Parts Fabrication and Delivery	707 days	Wed 9/12/12	Tue 8/19/14	219	
222	4.6	Unit 1 - Generator Removable Parts Fabrication and Delivery	724 days	Wed 9/12/12	Fri 9/5/14	219	
223	4.7	Unit 1 - All Remaining Parts Fabrication and Delivery	815 days	Wed 9/12/12	Fri 12/5/14	219	
224	4.8	Unit 2 - Embedded Parts Fabrication and Delivery	525 days	Wed 9/12/12	Tue 2/18/14	219	
225	4.9	Unit 2 - Turbine Removable Parts Fabrication and Delivery	771 days	Wed 9/12/12	Wed 10/22/14	219	
226	4.10	Unit 2 - Generator Removable Parts Fabrication and Delivery	787 days	Wed 9/12/12	Fri 11/7/14	219	
227	4.11	Unit 2 - All Remaining Parts Fabrication and Delivery	891 days	Wed 9/12/12	Thu 2/19/15	219	
228	**5**	**TASK 5 - GENERAL CONSTRUCTION & TRANSMISSION LINE CONTRACT**	**1219 days**	**Thu 9/19/13**	**Thu 1/19/17**	**200**	
229	5.1	U/S Mobilization and Temporary Facilities	167 days	Thu 10/10/13	Tue 3/25/14	135,159,162,210	F-62 days,168SF-62 days
230	5.2	D/S Mobilization and Temporary Facilities	78 days	Thu 9/19/13	Thu 12/5/13	135	232FS-14 days
231	5.3	U/S Cofferdam Installation	415 days	Tue 2/4/14	Wed 3/25/15	229FS-50 days	235FS-199 days
232	5.4	D/S Cofferdam Installation	146 days	Fri 11/22/13	Wed 4/16/14	230FS-14 days	240FS-76 days,251
233	5.5	IEPR Board Meeting - Midpoint of Construction	2 days	Mon 9/8/14	Tue 9/9/14	235SS	234
234	5.6	IEPR Report	15 days	Wed 9/10/14	Wed 9/24/14	233	
235	5.7	Intake Structure	421 days	Mon 9/8/14	Mon 11/2/15	231FS-199 days	233SS,21,239FS-32 days
236	5.8	Penstock Excavation and Foundation	120 days	Wed 7/1/15	Wed 10/28/15	235FS-125 days	237
237	5.9	Penstock Lining	120 days	Thu 10/29/15	Thu 2/25/16	236	22
238	5.10	Approach Channel	150 days	Mon 8/3/15	Wed 12/30/15	235FS-92 days	
239	5.11	U/S Cofferdam Removal	43 days	Fri 10/2/15	Fri 11/13/15	235FS-32 days	
240	5.12	Powerhouse Excavation and Foundation Treatment	145 days	Fri 1/31/14	Tue 6/24/14	232FS-76 days	241
241	5.13	Powerhouse Substructure	351 days	Wed 6/25/14	Wed 6/10/15	240	s,244FS-59 days,245,247
242	5.14	D/S Cofferdam Removal	56 days	Thu 7/30/15	Wed 9/23/15	241FS+49 days	
243	5.15	Powerhouse Superstructure	344 days	Tue 5/12/15	Tue 4/19/16	241FS-30 days	246FS-28 days
244	5.16	Unit 1 Installation	323 days	Mon 4/13/15	Mon 2/29/16	241FS-59 days	254
245	5.17	Unit 2 Installation	323 days	Thu 6/11/15	Thu 4/28/16	241	255
246	5.18	BOP Installation	303 days	Wed 3/23/16	Thu 1/19/17	243FS-28 days	
247	5.19	Powerhouse Yard, Roadways and Utilities	180 days	Thu 6/11/15	Mon 12/7/15	241	250
248	5.20	Order GSU's	0 days	Fri 4/25/14	Fri 4/25/14	249FS-308 days	
249	5.21	Delivery of GSU's	0 days	Wed 7/1/15	Wed 7/1/15		248FS-308 days
250	5.22	Transformer Installation & Switchyard Construction	60 days	Tue 12/8/15	Fri 2/5/16	247	
251	5.23	Tailrace Channel	152 days	Thu 4/17/14	Mon 9/15/14	232	
252	5.24	Transmission Line Construction	160 days	Thu 9/19/13	Tue 2/25/14	145	
253	5.25	Pella Substation Interconnection	120 days	Mon 11/2/15	Mon 2/29/16	254SS-120 days	
254	5.26	Unit No. 1 Commissioning and Operation	65 days	Tue 3/1/16	Wed 5/4/16	244	2 days,253SS-120 days,23
255	5.27	Unit No. 2 Commissioning and Operation	64 days	Fri 4/29/16	Fri 7/1/16	245	257,259FS+6 days,24
256	**6**	**TASK 6 - POST CONSTRUCTION**	**792 days**	**Wed 5/4/16**	**Wed 7/4/18**		

Red Rock Hydroelectric Project
Date: Tue 7/3/12

Task	Summary	External Milestone	Inactive Summary	Manual Summary Rollup	Finish-only
Split	Project Summary	Inactive Task	Manual Task	Manual Summary	Progress
Milestone	External Tasks	Inactive Milestone	Duration-only	Start-only	Deadline

ID	WBS	Task Name	Duration	Start	Finish	Predecessors	Successors
257	6.1	ART. 304 As-Built Drawings	90 days	Sat 7/2/16	Thu 9/29/16	255	
258	6.2	T/G Warranty Period	792 days	Wed 5/4/16	Wed 7/4/18	254FS-1 day	
259	6.3	IEPR Board Meeting - Post Construction	2 days	Tue 7/12/16	Wed 7/13/16	255FS+6 days	260
260	6.4	IEPR Final Report	15 days	Thu 7/14/16	Thu 7/28/16	259	

Red Rock Hydroelectric Project
Date: Tue 7/3/12

Task	Summary	External Milestone	Inactive Summary	Manual Summary Rollup	Finish-only
Split	Project Summary	Inactive Task	Manual Task	Manual Summary	Progress
Milestone	External Tasks	Inactive Milestone	Duration-only	Start-only	Deadline

Appendix C

Conflict of Interest Disclosure Forms

BI/COI FORM 1

THE NATIONAL ACADEMIES
Advisers to the Nation on Science, Engineering, and Medicine

National Academy of Sciences
National Academy of Engineering
Institute of Medicine
National Research Council

BACKGROUND INFORMATION AND CONFIDENTIAL CONFLICT OF INTEREST DISCLOSURE

For Studies Related to Government Regulation

NAME: Joseph L. Ehasz TELEPHONE: 916-835-5200

ADDRESS: 1632 San Pablo Drive
San Marcos, CA 92078

EMAIL ADDRESS: jehasz@att.net

CURRENT EMPLOYER: URS Energy and Construction

NAS/NAE/IOM/NRC COMMITTEE: _____

There are two parts to this form, Part I Background Information, and Part II Confidential Conflict of Interest Disclosure. Complete both parts, **sign** and **date** this form on the last page, and return the form to the responsible staff officer for *The National Academies* project and committee activity to which this form applies. **Retain a copy for your records**.

PART I **BACKGROUND INFORMATION**

INSTRUCTIONS

Please provide the information requested below regarding **relevant** organizational affiliations, government service, public statements and positions, research support, and additional information (if any). Information is "relevant" if it is related to -- and might

reasonably be of interest to others concerning -- your knowledge, experience, and personal perspectives regarding the subject matter and issues to be addressed by the committee activity for which this form is being prepared. If some or all of the requested information is contained in your curriculum vitae, you may if you prefer simply attach your CV to this form, supplemented by additional responses or comments below as necessary.

I. ORGANIZATIONAL AFFILIATIONS. Report your relevant business relationships (as an employee, owner, officer, director, consultant, etc.) and your relevant remunerated or volunteer non-business relationships (e.g., professional organizations, trade associations, public interest or civic groups, etc.).

Employee of URS Energy and Construction, Inc
V.P. of Water Resources

ASCE Fellow
United States Society on Dams, Member and Chairman of Seismic Design Committee
Member of The Beavers and the Moles

II. GOVERNMENT SERVICE. Report your relevant service (full-time or part-time) with federal, state, or local government in the United States (including elected or appointed positions, employment, advisory board memberships, military service, etc.).

III. RESEARCH SUPPORT. Report relevant information regarding both public and private sources of research support (other than your present employer), including sources of funding, equipment, facilities, etc.

IV. PUBLIC STATEMENTS AND POSITIONS. List your relevant articles, testimony, speeches, etc., by date, title, and publication (if any) in which they appeared, or provide relevant representative examples if numerous. Provide a brief description of relevant positions of any organizations or groups with which you are closely identified or associated.

Fellow in American Society of Engineers
Member of US Society on Dams
Member of The Beavers and The Moles

V. ADDITIONAL INFORMATION. If there are relevant aspects of your background or present circumstances not addressed above that might reasonably be construed by others as affecting your judgment in matters within the assigned task of the committee or panel on which you have been invited to serve, and therefore might constitute an actual or potential source of bias, please describe them briefly.

PART II **CONFIDENTIAL CONFLICT OF INTEREST DISCLOSURE**

INSTRUCTIONS

It is essential that the work of committees of the institution used in the development of reports not be compromised by any significant conflict of interest. For this purpose, **the term "conflict of interest" means any financial or other interest which conflicts with the service of the individual because it (1) could significantly impair the individual's objectivity or (2) could create an unfair competitive advantage for any person or organization.** Except for those situations in which the institution determines that a conflict of interest is unavoidable and promptly and publicly discloses the conflict of interest, no individual can be appointed to serve (or continue to serve) on a committee of the institution used in the development of reports if the individual has a conflict of interest that is relevant to the functions to be performed.

The term "conflict of interest" means something more than individual bias. There must be an *interest,* ordinarily financial, that could be directly affected by the work of the committee.

Conflict of interest requirements are *objective* and *prophylactic.* They are not an assessment of one's actual behavior or character, one's ability to act objectively despite the conflicting interest, or one's relative insensitivity to particular dollar amounts of specific assets because of one's personal wealth. Conflict of interest requirements are objective standards designed to eliminate certain specific, potentially compromising situations from arising, and thereby to protect the individual, the other members of the committee, the institution, and the public interest. The individual, the committee, and the institution should not be placed in a situation where others could reasonably question, and perhaps discount or dismiss, the work of the committee simply because of the existence of conflicting interests.

The term "conflict of interest" applies only to *current interests.* It does not apply to past interests that have expired, no longer exist, and cannot reasonably affect current behavior. Nor does it apply to possible interests that may arise in the future but do not currently exist, because such future interests are inherently speculative and uncertain. For example, a pending formal or informal application for a particular job is a current interest, but the mere possibility that one might apply for such a job in the future is <u>not</u> a current interest.

The term "conflict of interest" applies not only to the personal interests of the individual but also to the *interests of others* with whom the individual has substantial common financial interests if these interests are relevant to the functions to be performed. Thus, in assessing an individual's potential conflicts of interest, consideration must be given not only to the interests of the individual but also to the interests of the individual's spouse and minor children, the individual's employer, the individual's business partners, and others with whom the individual has substantial common financial interests. Consideration must also be given to the interests of those for whom one is acting in a

fiduciary or similar capacity (e.g., being an officer or director of a corporation, whether profit or nonprofit, or serving as a trustee).

This disclosure form is used for any committee that will be used by the institution in the development of one or more reports to be provided by the institution to a sponsoring agency for use in a government regulatory process. For such projects, *the focus of the conflict of interest inquiry is on the identification and assessment of any interests that may be directly affected by the use of such reports in the regulatory process.*

For example, if this institution were conducting a study of proposed modifications in the government regulation of a particular application of biotechnology, the focus of the conflict of interest inquiry would be on the identification and assessment of any interests that would be directly affected by that regulatory process if the institution's report were to provide the basis for regulatory action or inaction. The concern is that if an individual (or others with whom the individual has substantial common financial interests) has specific interests that could be directly affected by the regulatory process, the individual's objectivity could be impaired.

Such interests could include an individual's stock holdings in excess of $10,000 in a potentially affected biotechnology company or being an officer, director, or employee of the company. Serving as a consultant to the company could constitute such an interest if the consulting relationship with the company could be directly affected or is directly related to the subject matter of the regulatory process.

An individual's other possible interests might include, for example, relevant patents and other forms of intellectual property, serving as an expert witness in litigation directly related to the subject matter of the regulatory process, or receiving research funding from a party that would be directly affected by the regulatory process if the research funding could be directly affected or is directly related to the subject matter of the regulatory process and the right to independently conduct and publish the results of this research is limited by the sponsor. Consideration would also need to be given to the interests of others with whom the individual has substantial common financial interests -- particularly spouses, employers, clients, and business or research partners.

The following questions are designed to elicit information from you concerning possible conflicts of interest that are relevant to the functions to be performed by the particular committee on which you have been invited to serve.

1. EMPLOYMENT. (a) If the reports resulting from this committee activity were to provide the basis for government regulatory action or inaction with respect to the matters addressed in the reports --

(i) If you are employed or self-employed, could your current employment or self-employment (or your spouse's current employment or self-employment) be directly affected?

(ii) To the best of your knowledge, could any financial interests of your (or your spouse's) employer or, if self-employed, your (or your spouse's) clients and/or business partners be directly affected?

(iii) If you are an officer, director or trustee of any corporation or other legal entity, could the financial interests of that corporation or legal entity be directly affected?

(iv) If you are a consultant (whether full-time or part-time), could there be a direct effect on any of your current consulting relationships?

(v) Regardless of the potential effect on the consulting relationship, do you have any current or continuing consulting relationships (including, for example, commercial and professional consulting and service arrangements, scientific and technical advisory board memberships, serving as an expert witness in litigation, or providing services in exchange for honorariums and travel expense reimbursements) that are directly related to the subject matter of the possible government regulatory action or inaction?

(b) If you are or have ever been a U.S. Government employee (either civilian or military), to the best of your knowledge are there any federal conflict of interest restrictions that may be applicable to your service in connection with this committee activity?

(c) If you are a U.S. Government employee, are you currently employed by a federal agency that is sponsoring this project? If you are not a U.S. Government employee, are you an employee of any other sponsor (e.g., a private foundation) of this project?

If the answer to all of the above questions under EMPLOYMENT is either "no" or "not applicable," check here X (NO).

If the answer to any of the above questions under EMPLOYMENT is "yes," check here ____ (YES), and briefly describe the circumstances on the last page of this form.

2. INVESTMENT INTERESTS. Taking into account stocks, bonds, and other financial instruments and investments including partnerships (but excluding broadly diversified mutual funds and any investment or financial interest valued at less than $10,000), if the reports resulting from this committee activity were to provide the basis for government regulatory action or inaction with respect to the matters addressed in the reports --

(a) Do you or your spouse or minor children own directly or indirectly (e.g., through a trust or an individual account in a pension or profit-sharing plan) any stocks, bonds or other financial instruments or investments that could be affected, either directly or by a direct effect on the business enterprise or activities underlying the investments?

(b) Do you have any other significant financial investments or interests such as commercial business interests (e.g., sole proprietorships), investment interests (e.g., stock options), or personal investment relationships (e.g., involving parents or grandchildren) that could be affected, either directly or by a direct effect on the business enterprise or activities underlying the investments?

If the answer to all of the above questions under INVESTMENT INTERESTS is either "no" or "not applicable," check here X (NO).

If the answer to any of the above questions under INVESTMENT INTERESTS is "yes," check here ____ (YES), and briefly describe the circumstances on the last page of this form.

3. PROPERTY INTERESTS. Taking into account real estate and other tangible property interests, as well as intellectual property (patents, copyrights, etc.) interests, if the reports resulting from this committee activity were to provide the basis for government regulatory action or inaction with respect to the matters addressed in the reports --

(a) Do you or your spouse or minor children own directly or indirectly any such property interests that could be directly affected?

(b) To the best of your knowledge, do any others with whom you have substantial common financial interests (e.g., employer, business partners, etc.) own directly or indirectly any such property interests that could be directly affected?

If the answer to all of the above questions under PROPERTY INTERESTS is either "no" or "not applicable," check here X (NO).

If the answer to any of the above questions under PROPERTY INTERESTS is "yes," check here ____ (YES), and briefly describe the circumstances on the last page of this form.

4. RESEARCH FUNDING AND OTHER INTERESTS. (a) Taking into account your research funding and other research support (e.g., equipment, facilities, industry partnerships, research assistants and other research personnel, etc.), if the reports resulting from this committee activity were to provide the basis for government regulatory action or inaction with respect to the matters addressed in the reports --

(i) Could the research funding and support for you or your close research colleagues and collaborators be directly affected, or

(ii) If you have any research agreements for current or continuing research funding or support from any party whose financial interests could be directly affected, and such funding or support is directly related to the subject matter of the regulatory process, do such agreements significantly limit your ability to independently conduct and publish the results of your research (other than for reasonable delays in publication in order to file patent applications)?

(b) Is the central purpose of the project for which this disclosure form is being prepared a critical review and evaluation of your own work or that of your employer?

(c) Do you have any existing professional obligations (e.g., as an officer of a scientific or engineering society) that effectively require you to publicly defend a previously established position on an issue that is relevant to the functions to be performed in this committee activity?

(d) To the best of your knowledge, will your participation in this committee activity enable you to obtain access to a competitor's or potential competitor's confidential proprietary information?

(e) Could your service on the committee on which you have been invited to serve create a specific financial or commercial competitive advantage for you or others with whom you have substantial common financial interests?

(f) If the committee activity for which this form is being prepared involves reviews of specific applications and proposals for contract, grant, fellowship, etc. awards to be made by sponsors, do you or others with whom you have substantial common financial interests, or a familial or substantial professional relationship, have an interest in receiving or being considered for awards that are currently the subject of the review being conducted by this committee?

(g) If the committee activity for which this form is being prepared involves developing requests for proposals, work statements, and/or specifications, etc., are you interested in seeking an award under the program for which the committee on which you have been invited to serve is developing the request for proposals, work statement, and/or specifications -- or, are you employed in any capacity by, or do you have a financial interest in or other economic relationship with, any person or organization that to the best of your knowledge is interested in seeking an award under this program?

If the answer to all of the above questions under RESEARCH FUNDING OR OTHER INTERESTS is either "no" or "not applicable," check here _X_ (NO).

If the answer to any of the above questions under RESEARCH FUNDING OR OTHER INTERESTS is "yes," check here ____ (YES), and briefly describe the circumstances below.

EXPLANATION OF "YES" RESPONSES:

During your period of service in connection with the activity for which this form is being completed, any changes in the information reported, or any new information, which needs to be reported, should be reported promptly by written or electronic communication to the responsible staff officer.

J. L Ehaz
YOUR SIGNATURE

5/1/12
DATE

Reviewed by: _____
Executive Director

_____
Date

BI/COI FORM 1

THE NATIONAL ACADEMIES
Advisers to the Nation on Science, Engineering, and Medicine

National Academy of Sciences
National Academy of Engineering
Institute of Medicine
National Research Council

BACKGROUND INFORMATION AND CONFIDENTIAL CONFLICT OF INTEREST DISCLOSURE

For Studies Related to Government Regulation

NAME: Robert L. Hall TELEPHONE: 601-529-0937

ADDRESS: P. O. Box 820267 Vicksburg, MS, 39182-0267

EMAIL ADDRESS: Robert.L.Hall.phd@gmail.com

CURRENT EMPLOYER: Engineering Innovations, LLC.

NAS/NAE/IOM/NRC COMMITTEE: Independent Engineer Peer Review panel

There are two parts to this form, Part I Background Information, and Part II Confidential Conflict of Interest Disclosure. Complete both parts, **sign** and **date** this form on the last page, and return the form to the responsible staff officer for *The National Academies* project and committee activity to which this form applies. **Retain a copy for your records.**

PART I **BACKGROUND INFORMATION**

INSTRUCTIONS

Please provide the information requested below regarding **relevant** organizational affiliations, government service, public statements and positions, research support, and additional information (if any). Information is "relevant" if it is related to -- and might reasonably be of interest to others concerning -- your knowledge, experience, and

personal perspectives regarding the subject matter and issues to be addressed by the committee activity for which this form is being prepared. If some or all of the requested information is contained in your curriculum vitae, you may if you prefer simply attach your CV to this form, supplemented by additional responses or comments below as necessary.

I. ORGANIZATIONAL AFFILIATIONS. Report your relevant business relationships (as an employee, owner, officer, director, consultant, etc.) and your relevant remunerated or volunteer non-business relationships (e.g., professional organizations, trade associations, public interest or civic groups, etc.).

Consultant to Consultores Internationales (CICP)
Consultant to BCHydro, Canada
Consultant to Panama Canal Authority
Consultant to Battelle, Inc
Consultant to Bowhead, Inc
Consultant to ES3, Inc
Member ASCE
Board Member Vicksburg Habitat for Humanity

II. GOVERNMENT SERVICE. Report your relevant service (full-time or part-time) with federal, state, or local government in the United States (including elected or appointed positions, employment, advisory board memberships, military service, etc.).

Employed by the U.S. Army Corps of Engineers, August 1971 to September 2009

III. RESEARCH SUPPORT. Report relevant information regarding both public and private sources of research support (other than your present employer), including sources of funding, equipment, facilities, etc.

Support from Drexel University on a National Science project, "Seismic Response of Concrete Gravity Dams Subjected to Spatially Variable Excitations."

IV. PUBLIC STATEMENTS AND POSITIONS. List your relevant articles, testimony, speeches, etc., by date, title, and publication (if any) in which they appeared, or provide relevant representative examples if numerous. Provide a brief description of relevant positions of any organizations or groups with which you are closely identified or associated.

Project Related Publications:

- Matheu, E. E., **Hall, R.L.**, and Ebeling, R. M. 1999. "Nonlinear Seismic Response of Concrete Gravity Dams," , *2nd US-Japan Workshop on Advanced Research on Earthquake Engineering for Dams*, 7-8 May 1999, Tokyo, Japan.
- **Hall, R.L.** 1999. "Status of Construction and Safety of Dams in the United States." *2nd US-Japan Workshop on Advanced Research on Earthquake Engineering for Dams,* 7-8 May 1999, Tokyo, Japan.
- **Hall, R.L.** 1997. "Importance of Reservoir Bottom Absorption," *Fifth Pan American Congress of Applied Mechanics*, 2-4 January 1997, San Juan, Puerto Rico.
- Yamaguchi, Y., **Hall, R. L.**, Sasaki, T., Matheu, E., Kanenawa, K., Chudgar, A., and Yule, D.. 2004. "Seismic Performance Evaluation of Concrete Gravity Dams," Proceedings of the 13th World Conference on Earthquake Engineering, Vancouver, B.C., Canada, 1-6 August, 2004.
- Ghanaat, Y., **Hall, R.L.**, and Redpath, B.B. "Measurement and Computation of Dynamic Response of Arch Dams Including Interaction Effects," *Journal of Seismology and Earthquake Engineering*, International Institute of Earthquake Engineering and Seismology, Summer 2000, vol 2, no. 3, Teheran, I.R. Iran.
- Ghanaat, Y., **Hall, R.L.**, and Redpath, B.B. 2000. "Measurement of Dynamic Response of Arch Dams Including Interaction Effects," , *12th World Conference on Earthquake Engineering*, 24-27 January 2000, New Zealand.
- Ghanaat, Y., Redpath, B. R. and **Hall, R.L.** 1999. "Field Measurements of Dynamic Interactions at Longyangxia Dam." Report to National Science Foundation, Quest Structures.

Other Significant Publications:.

- **Hall, R.L.**, de Bejar, L. A., Sjostrom, K. J., and Matheu, E. E. 1998. "Effect of Reservoir Sub-bottom Energy Absorption on Hydrodynamic Forces on Dams," *Proceedings, 30th Joint Panel Meeting on Wind and Seismic Effects*, N. Raufaste (ed.), National Institute of Standards and Technology, Gaithersburg, MD, May 12-15, 1998.
- **Hall, R. L.**, and Roper, W. E. 1993. "Corps of Engineers Research Program on Concrete Dams," *Proceedings, 25th Joint Meeting on Wind and Seismic Effects*, US Department of Commerce, National Institute of Standards and Technology. May 17-20, 1993, Tsukuba, Japan.
- **Hall, R. L.** 1991. "Importance of Nonlinear Response to Seismic Analysis of Concrete Gravity Dams," *Proceedings of the Corps of Engineers Structures Conference*, Jacksonville, Florida.
- **Hall, R. L.**, and Nickell, J. S. 1990 (April). "Seismic Evaluation of Folsom Concrete Gravity Dam," *Eighth Structural Congress, ASCE*, 262-264, Baltimore, Maryland.
- **Hall, R. L.** 1990. "Importance of Nonlinear Seismic Response of Concrete Gravity Dams," *Eighth Structural Congress, ASCE*, 256-258, Baltimore, Maryland.
- Bevins, T., **Hall, R. L.**, and Wright, R. S. 1989. "Vibration Studies of Richard B. Russell Concrete Gravity Dam," *Proceedings, 20th Joint Meeting of US-Japan Cooperative Program on Wind and Seismic Effects*, National Institute of Standards, May 17-20,1989, Gaithersburg, Maryland.
- USACE, Engineer Manual 1110-2-6051, "Time-History Dynamic Analysis of Concrete Hydraulic Structures," 31 August 2000.

(d) Synergistic Activities:

- Briefed the Assistant Secretary of the Army for Civil Works, The Honorable John P. Woodley, on the necessity of the US conducting a risk assessment to determine the risk the Panama Canal could have to the US economy, 12 February 2008, Washington, D.C.
- Organized and chaired International Workshop at the Corps Workshop on Reservoir Bottom Absorption, 8-9 May 8-9 1997, San Francisco, California.
- Presented keynote paper at the UJNR/JSDE Workshop on Earthquake Engineering for Dams, 14-16 May 2007, Tsukuba, Japan.
- Invited as keynote panel member at the 68th Shock and Vibration Symposium on Verification and Validation of Nonlinear Structural Dynamics Codes, 18-22 November 1996 Monterey, California.
- Chair, Structural Advisory Board, Panel Canal Authority
- Advisory Board, Ruskin Dam, BCHydro, 2001- present
- Advisory Board, For 3 other dams for BCHydro, 1991-2000

V. ADDITIONAL INFORMATION. If there are relevant aspects of your background or present circumstances not addressed above that might reasonably be construed by others as affecting your judgment in matters within the assigned task of the committee or panel on which you have been invited to serve, and therefore might constitute an actual or potential source of bias, please describe them briefly.

None.

PART II **CONFIDENTIAL CONFLICT OF INTEREST DISCLOSURE**

INSTRUCTIONS

It is essential that the work of committees of the institution used in the development of reports not be compromised by any significant conflict of interest. For this purpose, **the term "conflict of interest" means any financial or other interest which conflicts with the service of the individual because it (1) could significantly impair the individual's objectivity or (2) could create an unfair competitive advantage for any person or organization.** Except for those situations in which the institution determines that a conflict of interest is unavoidable and promptly and publicly discloses the conflict of interest, no individual can be appointed to serve (or continue to serve) on a committee of the institution used in the development of reports if the individual has a conflict of interest that is relevant to the functions to be performed.

The term "conflict of interest" means something more than individual bias. There must be an *interest,* ordinarily financial, that could be directly affected by the work of the committee.

Conflict of interest requirements are *objective* and *prophylactic.* They are not an assessment of one's actual behavior or character, one's ability to act objectively despite the conflicting interest, or one's relative insensitivity to particular dollar amounts of specific assets because of one's personal wealth. Conflict of interest requirements are objective standards designed to eliminate certain specific, potentially compromising situations from arising, and thereby to protect the individual, the other members of the committee, the institution, and the public interest. The individual, the committee, and the institution should not be placed in a situation where others could reasonably question, and perhaps discount or dismiss, the work of the committee simply because of the existence of conflicting interests.

The term "conflict of interest" applies only to *current interests.* It does not apply to past interests that have expired, no longer exist, and cannot reasonably affect current behavior. Nor does it apply to possible interests that may arise in the future but do not currently exist, because such future interests are inherently speculative and uncertain. For example, a pending formal or informal application for a particular job is a current interest, but the mere possibility that one might apply for such a job in the future is <u>not</u> a current interest.

The term "conflict of interest" applies not only to the personal interests of the individual but also to the *interests of others* with whom the individual has substantial common financial interests if these interests are relevant to the functions to be performed. Thus, in assessing an individual's potential conflicts of interest, consideration must be given not only to the interests of the individual but also to the interests of the individual's spouse and minor children, the individual's employer, the individual's business partners, and others with whom the individual has substantial common financial interests. Consideration must also be given to the interests of those for whom one is acting in a

fiduciary or similar capacity (e.g., being an officer or director of a corporation, whether profit or nonprofit, or serving as a trustee).

This disclosure form is used for any committee that will be used by the institution in the development of one or more reports to be provided by the institution to a sponsoring agency for use in a government regulatory process. For such projects, *the focus of the conflict of interest inquiry is on the identification and assessment of any interests that may be directly affected by the use of such reports in the regulatory process.*

For example, if this institution were conducting a study of proposed modifications in the government regulation of a particular application of biotechnology, the focus of the conflict of interest inquiry would be on the identification and assessment of any interests that would be directly affected by that regulatory process if the institution's report were to provide the basis for regulatory action or inaction. The concern is that if an individual (or others with whom the individual has substantial common financial interests) has specific interests that could be directly affected by the regulatory process, the individual's objectivity could be impaired.

Such interests could include an individual's stock holdings in excess of $10,000 in a potentially affected biotechnology company or being an officer, director, or employee of the company. Serving as a consultant to the company could constitute such an interest if the consulting relationship with the company could be directly affected or is directly related to the subject matter of the regulatory process.

An individual's other possible interests might include, for example, relevant patents and other forms of intellectual property, serving as an expert witness in litigation directly related to the subject matter of the regulatory process, or receiving research funding from a party that would be directly affected by the regulatory process if the research funding could be directly affected or is directly related to the subject matter of the regulatory process and the right to independently conduct and publish the results of this research is limited by the sponsor. Consideration would also need to be given to the interests of others with whom the individual has substantial common financial interests -- particularly spouses, employers, clients, and business or research partners.

The following questions are designed to elicit information from you concerning possible conflicts of interest that are relevant to the functions to be performed by the particular committee on which you have been invited to serve.

1. EMPLOYMENT. (a) If the reports resulting from this committee activity were to provide the basis for government regulatory action or inaction with respect to the matters addressed in the reports --

(i) If you are employed or self-employed, could your current employment or self-employment (or your spouse's current employment or self-employment) be directly affected?

(ii) To the best of your knowledge, could any financial interests of your (or your spouse's) employer or, if self-employed, your (or your spouse's) clients and/or business partners be directly affected?

(iii) If you are an officer, director or trustee of any corporation or other legal entity, could the financial interests of that corporation or legal entity be directly affected?

(iv) If you are a consultant (whether full-time or part-time), could there be a direct effect on any of your current consulting relationships?

(v) Regardless of the potential effect on the consulting relationship, do you have any current or continuing consulting relationships (including, for example, commercial and professional consulting and service arrangements, scientific and technical advisory board memberships, serving as an expert witness in litigation, or providing services in exchange for honorariums and travel expense reimbursements) that are directly related to the subject matter of the possible government regulatory action or inaction?

(b) If you are or have ever been a U.S. Government employee (either civilian or military), to the best of your knowledge are there any federal conflict of interest restrictions that may be applicable to your service in connection with this committee activity?

(c) If you are a U.S. Government employee, are you currently employed by a federal agency that is sponsoring this project? If you are not a U.S. Government employee, are you an employee of any other sponsor (e.g., a private foundation) of this project?

If the answer to all of the above questions under EMPLOYMENT is either "no" or "not applicable," check here __✓__ (NO).

If the answer to any of the above questions under EMPLOYMENT is "yes," check here ____ (YES), and briefly describe the circumstances on the last page of this form.

2. INVESTMENT INTERESTS. Taking into account stocks, bonds, and other financial instruments and investments including partnerships (but excluding broadly diversified mutual funds and any investment or financial interest valued at less than $10,000), if the reports resulting from this committee activity were to provide the basis for government regulatory action or inaction with respect to the matters addressed in the reports --

(a) Do you or your spouse or minor children own directly or indirectly (e.g., through a trust or an individual account in a pension or profit-sharing plan) any stocks, bonds or other financial instruments or investments that could be affected, either directly or by a direct effect on the business enterprise or activities underlying the investments?

(b) Do you have any other significant financial investments or interests such as commercial business interests (e.g., sole proprietorships), investment interests (e.g., stock options), or personal investment relationships (e.g., involving parents or grandchildren) that could be affected, either directly or by a direct effect on the business enterprise or activities underlying the investments?

If the answer to all of the above questions under INVESTMENT INTERESTS is either "no" or "not applicable," check here __✓__ (NO).

If the answer to any of the above questions under INVESTMENT INTERESTS is "yes," check here ____ (YES), and briefly describe the circumstances on the last page of this form.

3. PROPERTY INTERESTS. Taking into account real estate and other tangible property interests, as well as intellectual property (patents, copyrights, etc.) interests, if the reports resulting from this committee activity were to provide the basis for government regulatory action or inaction with respect to the matters addressed in the reports --

(a) Do you or your spouse or minor children own directly or indirectly any such property interests that could be directly affected?

(b) To the best of your knowledge, do any others with whom you have substantial common financial interests (e.g., employer, business partners, etc.) own directly or indirectly any such property interests that could be directly affected?

If the answer to all of the above questions under PROPERTY INTERESTS is either "no" or "not applicable," check here __✓__ (NO).

If the answer to any of the above questions under PROPERTY INTERESTS is "yes," check here ____ (YES), and briefly describe the circumstances on the last page of this form.

4. RESEARCH FUNDING AND OTHER INTERESTS. (a) Taking into account your research funding and other research support (e.g., equipment, facilities, industry partnerships, research assistants and other research personnel, etc.), if the reports resulting from this committee activity were to provide the basis for government regulatory action or inaction with respect to the matters addressed in the reports --

(i) Could the research funding and support for you or your close research colleagues and collaborators be directly affected, or

(ii) If you have any research agreements for current or continuing research funding or support from any party whose financial interests could be directly affected, and such funding or support is directly related to the subject matter of the regulatory process, do such agreements significantly limit your ability to independently conduct and publish the results of your research (other than for reasonable delays in publication in order to file patent applications)?

(b) Is the central purpose of the project for which this disclosure form is being prepared a critical review and evaluation of your own work or that of your employer?

(c) Do you have any existing professional obligations (e.g., as an officer of a scientific or engineering society) that effectively require you to publicly defend a previously established position on an issue that is relevant to the functions to be performed in this committee activity?

(d) To the best of your knowledge, will your participation in this committee activity enable you to obtain access to a competitor's or potential competitor's confidential proprietary information?

(e) Could your service on the committee on which you have been invited to serve create a specific financial or commercial competitive advantage for you or others with whom you have substantial common financial interests?

(f) If the committee activity for which this form is being prepared involves reviews of specific applications and proposals for contract, grant, fellowship, etc. awards to be made by sponsors, do you or others with whom you have substantial common financial interests, or a familial or substantial professional relationship, have an interest in receiving or being considered for awards that are currently the subject of the review being conducted by this committee?

(g) If the committee activity for which this form is being prepared involves developing requests for proposals, work statements, and/or specifications, etc., are you interested in seeking an award under the program for which the committee on which you have been invited to serve is developing the request for proposals, work statement, and/or specifications -- or, are you employed in any capacity by, or do you have a financial interest in or other economic relationship with, any person or organization that to the best of your knowledge is interested in seeking an award under this program?

If the answer to all of the above questions under RESEARCH FUNDING OR OTHER INTERESTS is either "no" or "not applicable," check here ✓ (NO).

If the answer to any of the above questions under RESEARCH FUNDING OR OTHER INTERESTS is "yes," check here ____ (YES), and briefly describe the circumstances below.

EXPLANATION OF "YES" RESPONSES:

During your period of service in connection with the activity for which this form is being completed, any changes in the information reported, or any new information, which needs to be reported, should be reported promptly by written or electronic communication to the responsible staff officer.

[signature] May 9, 2012

YOUR SIGNATURE DATE

Reviewed by: _____ _____

Executive Director Date

BI/COI FORM 1

THE NATIONAL ACADEMIES
Advisers to the Nation on Science, Engineering, and Medicine

National Academy of Sciences
National Academy of Engineering
Institute of Medicine
National Research Council

BACKGROUND INFORMATION AND CONFIDENTIAL CONFLICT OF INTEREST DISCLOSURE

For Studies Related to Government Regulation

NAME: Eugene Joseph Gemperline, Jr TELEPHONE: (760) 798-2932

ADDRESS: 812 Luminara Way, San Marcos, CA 92078

EMAIL ADDRESS: gene@ejgemperline.com

CURRENT EMPLOYER: Eugene J. Gemperline, Inc

NAS/NAE/IOM/NRC COMMITTEE:

There are two parts to this form, Part I Background Information, and Part II Confidential Conflict of Interest Disclosure. Complete both parts, **sign** and **date** this form on the last page, and return the form to the responsible staff officer for *The National Academies* project and committee activity to which this form applies. **Retain a copy for your records.**

PART I **BACKGROUND INFORMATION**

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reasonably be of interest to others concerning -- your knowledge, experience, and personal perspectives regarding the subject matter and issues to be addressed by the committee activity for which this form is being prepared. If some or all of the requested information is contained in your curriculum vitae, you may if you prefer simply attach your CV to this form, supplemented by additional responses or comments below as necessary.

I. ORGANIZATIONAL AFFILIATIONS. Report your relevant business relationships (as an employee, owner, officer, director, consultant, etc.) and your relevant remunerated or volunteer non-business relationships (e.g., professional organizations, trade associations, public interest or civic groups, etc.).

President and sole owner/employee – Eugene J. Gemperline, Inc., consulting engineering services, July 2011 to current
Consulting engineer, Franklin G. DeFazio, Inc., San Diego, CA January 2007 to December 2011.
Consulting engineer, employee and stock owner, non-officer, MWH Americas Inc., Chicago, IL, 2002 – January 2007
Consulting engineer, Harza Engineering Company, employee, stock owner, partner and associate, non-officer, Chicago IL, September 1974 to 2002
Consulting engineer, Harza Engineering Company International, employee, share holder, non-officer, Chicago IL, 1990 to 2002

Current professional society memberships
Member – American Society of Civil Engineers, non-officer, non-remunerated
Member – American Water Works Association, non-officer, non-remunerated
Member – U. S. Society on Dams, non-officer, non-remunerated

Previous professional society memberships
Member – Western Society of Engineers, non-officer, non-remunerated
Member – American Water Resources Association, non-officer, non-remunerated

II. GOVERNMENT SERVICE. Report your relevant service (full-time or part-time) with federal, state, or local government in the United States (including elected or appointed positions, employment, advisory board memberships, military service, etc.).

U. S. Environmental Protection Agency, Robert Taft Center, Cincinnati, Ohio, summer employee, June-August, 1973.
Ohio Department of Transportation, Cincinnati, Ohio, summer employee, June-September, 1972.
Ohio Department of Transportation, Cincinnati, Ohio, summer employee, June-September, 1971.

III. RESEARCH SUPPORT. Report relevant information regarding both public and private sources of research support (other than your present employer), including sources of funding, equipment, facilities, etc.

None

IV. PUBLIC STATEMENTS AND POSITIONS. List your relevant articles, testimony, speeches, etc., by date, title, and publication (if any) in which they appeared, or provide relevant representative examples if numerous. Provide a brief description of relevant positions of any organizations or groups with which you are closely identified or associated.

"How U.S. Lock and Dam Hydropower Developers Are Meeting Army Corps Navigation and Sediment Transport Requirements", Alden Research Laboratory White Paper, 2011 (Timothy Sassaman, Dan Gessler co-authors)

"Retrofitting Hydropower at Existing Dams, Modeling Needs", presentation at Alden Research Laboratory, 2010.

"The Approach Channel Control Structure at Arrow Lakes Generating Station", Canadian Society of Dams, 2010 (Amy Stevenson, Kenneth Christison, Vincent Zipparro, co-authors)

"Optimization of the Approach Channel to the Smithland Powerhouse Using a Combination of CFD and Physical Modeling", in *Proceedings of Waterpower '09,* Spokane, WA. (T. Sassaman, R. Lagumbay, C. Konstantellos, P. Meier co-authors).

"2D Sediment Transport Modeling at Smithland Locks and Dam", in *Proceedings of Waterpower '09,* Spokane, WA, (D. Gessler, C. Konstantellos, P. Meier co-authors)

"Physical Modeling of the Smithland Locks and Dam Navigation Structure to Evaluate the Impact of the Addition of a Powerhouse", in *Proceedings of Waterpower '09,* Spokane, WA (S. Cain, D. White, C. Konstantellos, P. Meier, co-authors)

"The Approach Channel Control Structure at Hugh Keenleyside Dam", in *Proceedings of Waterpower '09,* Spokane, WA (A. Stevenson, K. Christison, V. Zipparro, co-authors)

"Hydropower Developments at Existing Lock and Dam Projects", in *Proceedings of Waterpower '09,* Spokane, WA (B. Hughes, N. Sims, C. Konstantellos, P. Meier, co-authors)

"Impacts of Hydraulic Transients in Complex Systems for San Vicente Dam Raise Project" in *Proceedings of Hydrovision '08",* Sacramento, CA (R. Stampbach, D. Thompson, J. Zhou co-authors.

"Failure and Replacement of the Safe Harbor Skimmer Wall," in *Ice in Surface Waters. Proceedings of the 14th International Symposium on Ice,* Potsdam, NY, 1998 (Z.R. Matus, O.L. O'Donel co-authors).

"Hydraulic and Hydrologic Studies for a Proposed Water Supply Intake" in *Rivertech '96 - Proceedings of the 1st International Conference on New/Emerging Concepts for Rivers,* IWRA, Chicago, 1996 (N.L. Schickedanz, K. Smedley co-authors).

"The Belleville Hydroelectric Project - An Overview" in *Waterpower '95,* ASCE, San Francisco, 1995 (C. Konstantellos co-author).

"The Belleville Hydroelectric Project - A Model Project," in *Waterpower '95,* ASCE, San Francisco, 1995, (B. Hughes, co-author).

"Determination of the Friction Factor for a Turn of the Century Aqueduct," *Proceedings of the ASCE Water Resources Engineering Conference,* ASCE, San Antonio, 1995 (J. Marold, R. Sabri, J, Iannuzzi, co-authors).

Chapter 8, "Ice," of *ASCE Guidelines for Design of Intakes for Hydroelectric Projects* 1995.

Chapter 3, "Hydraulic Design," of *ASCE Guidelines for Design of Intakes for Hydroelectric Projects"* 1995.

"Frazil Ice Problems and Solutions at Hydropower Intakes," *Waterpower '91,* American Society of Civil Engineers, Denver, CO, 1991.

"The Rehabilitation of Baldhill Dam, North Dakota, Twice the Spillway at Half the Price," Association of State Dam Safety Officials, *Proceedings of the 7th Annual Conference,* New Orleans, LA, 1990.

"Considerations in the Design and Operation of Hydro Power Intakes," *Cold Regions Hydrology and Hydraulics Monograph,* Technical Council on Cold Regions Engineering, American Society of Civil Engineers, 1990.

"Licensing of the Moose River Hydroelectric Project," *Waterpower '89,* American Society of Civil Engineers, Niagara Falls, NY, 1989.

"Prediction of Riparian Vegetation Changes Downstream of a Large Hydroelectric Development," *Streamside Management Symposium,* College of Forest Resources, University of Washington, 1987.

"Design and Analyses of an Annular Aeration Device on a Morning Glory Spillway," *Symposium of Applied Mechanics,* American Society of Civil Engineers, Buffalo, NY, 1986. (co-authors J.E. Lindell, C.Y. Wei).

"Hydrology and Hydraulic Studies for Licensing of the Susitna Hydroelectric Project," *Cold Regions Hydrology Symposium,* American Water Resources Association, Fairbanks, AK, 1986.

"The Susitna Hydroelectric Project: Simulation of Reservoir Operation," *Cold Regions Hydrology Symposium,* American Water Resources Association, Fairbanks, AK, 1986.

"Survey of Experience in Operating Hydroelectric Projects in Cold Regions," *Cold Regions Hydrology Symposium,* American Water Resources Association, Fairbanks, AK, 1986.

"Simulation of Steady, Non-Uniform, Rapidly-Varied Flow Profiles in Tunnels, Conduits and Open Channels," *Proceedings of the Hydraulics Division Specialty Conference,* American Society of Civil Engineers, MIT, 1983.

"Development of the Hedging Horizon for Use in the Allocation of Stream Resources for Water Supply," Master's thesis, 1974.

V. ADDITIONAL INFORMATION. If there are relevant aspects of your background or present circumstances not addressed above that might reasonably be construed by others as affecting your judgment in matters within the assigned task of the committee or panel on which you have been invited to serve, and therefore might constitute an actual or potential source of bias, please describe them briefly.

None

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The term "conflict of interest" applies not only to the personal interests of the individual but also to the *interests of others* with whom the individual has substantial common financial interests if these interests are relevant to the functions to be performed. Thus, in assessing an individual's potential conflicts of interest, consideration must be given not only to the interests of the individual but also to the interests of the individual's spouse and minor children, the individual's employer, the individual's business partners, and others with whom the individual has substantial common financial interests. Consideration must also be given to the interests of those for whom one is acting in a

fiduciary or similar capacity (e.g., being an officer or director of a corporation, whether profit or nonprofit, or serving as a trustee).

This disclosure form is used for any committee that will be used by the institution in the development of one or more reports to be provided by the institution to a sponsoring agency for use in a government regulatory process. For such projects, *the focus of the conflict of interest inquiry is on the identification and assessment of any interests that may be directly affected by the use of such reports in the regulatory process.*

For example, if this institution were conducting a study of proposed modifications in the government regulation of a particular application of biotechnology, the focus of the conflict of interest inquiry would be on the identification and assessment of any interests that would be directly affected by that regulatory process if the institution's report were to provide the basis for regulatory action or inaction. The concern is that if an individual (or others with whom the individual has substantial common financial interests) has specific interests that could be directly affected by the regulatory process, the individual's objectivity could be impaired.

Such interests could include an individual's stock holdings in excess of $10,000 in a potentially affected biotechnology company or being an officer, director, or employee of the company. Serving as a consultant to the company could constitute such an interest if the consulting relationship with the company could be directly affected or is directly related to the subject matter of the regulatory process.

An individual's other possible interests might include, for example, relevant patents and other forms of intellectual property, serving as an expert witness in litigation directly related to the subject matter of the regulatory process, or receiving research funding from a party that would be directly affected by the regulatory process if the research funding could be directly affected or is directly related to the subject matter of the regulatory process and the right to independently conduct and publish the results of this research is limited by the sponsor. Consideration would also need to be given to the interests of others with whom the individual has substantial common financial interests -- particularly spouses, employers, clients, and business or research partners.

The following questions are designed to elicit information from you concerning possible conflicts of interest that are relevant to the functions to be performed by the particular committee on which you have been invited to serve.

1. EMPLOYMENT. (a) If the reports resulting from this committee activity were to provide the basis for government regulatory action or inaction with respect to the matters addressed in the reports --

(i) If you are employed or self-employed, could your current employment or self-employment (or your spouse's current employment or self-employment) be directly affected? No

(ii) To the best of your knowledge, could any financial interests of your (or your spouse's) employer or, if self-employed, your (or your spouse's) clients and/or business partners be directly affected? No

(iii) If you are an officer, director or trustee of any corporation or other legal entity, could the financial interests of that corporation or legal entity be directly affected? No

(iv) If you are a consultant (whether full-time or part-time), could there be a direct effect on any of your current consulting relationships? No

(v) Regardless of the potential effect on the consulting relationship, do you have any current or continuing consulting relationships (including, for example, commercial and professional consulting and service arrangements, scientific and technical advisory board memberships, serving as an expert witness in litigation, or providing services in exchange for honorariums and travel expense reimbursements) that are directly related to the subject matter of the possible government regulatory action or inaction? No

(b) If you are or have ever been a U.S. Government employee (either civilian or military), to the best of your knowledge are there any federal conflict of interest restrictions that may be applicable to your service in connection with this committee activity? No

(c) If you are a U.S. Government employee, are you currently employed by a federal agency that is sponsoring this project? If you are not a U.S. Government employee, are you an employee of any other sponsor (e.g., a private foundation) of this project? No

If the answer to all of the above questions under EMPLOYMENT is either "no" or "not applicable," check here __X__ (NO).

If the answer to any of the above questions under EMPLOYMENT is "yes," check here ____ (YES), and briefly describe the circumstances on the last page of this form.

2. INVESTMENT INTERESTS. Taking into account stocks, bonds, and other financial instruments and investments including partnerships (but excluding broadly diversified mutual funds and any investment or financial interest valued at less than $10,000), if the reports resulting from this committee activity were to provide the basis for government regulatory action or inaction with respect to the matters addressed in the reports --

(a) Do you or your spouse or minor children own directly or indirectly (e.g., through a trust or an individual account in a pension or profit-sharing plan) any stocks, bonds or other financial instruments or investments that could be affected, either directly or by a direct effect on the business enterprise or activities underlying the investments? No

(b) Do you have any other significant financial investments or interests such as commercial business interests (e.g., sole proprietorships), investment interests (e.g., stock options), or personal investment relationships (e.g., involving parents or grandchildren) that could be affected, either directly or by a direct effect on the business enterprise or activities underlying the investments? No

If the answer to all of the above questions under INVESTMENT INTERESTS is either "no" or "not applicable," check here __X__ (NO).

If the answer to any of the above questions under INVESTMENT INTERESTS is "yes," check here ____ (YES), and briefly describe the circumstances on the last page of this form.

3. PROPERTY INTERESTS. Taking into account real estate and other tangible property interests, as well as intellectual property (patents, copyrights, etc.) interests, if the reports resulting from this committee activity were to provide the basis for government regulatory action or inaction with respect to the matters addressed in the reports --

(a) Do you or your spouse or minor children own directly or indirectly any such property interests that could be directly affected? No

(b) To the best of your knowledge, do any others with whom you have substantial common financial interests (e.g., employer, business partners, etc.) own directly or indirectly any such property interests that could be directly affected? No

If the answer to all of the above questions under PROPERTY INTERESTS is either "no" or "not applicable," check here __X__ (NO).

If the answer to any of the above questions under PROPERTY INTERESTS is "yes," check here ____ (YES), and briefly describe the circumstances on the last page of this form.

4. RESEARCH FUNDING AND OTHER INTERESTS. (a) Taking into account your research funding and other research support (e.g., equipment, facilities, industry partnerships, research assistants and other research personnel, etc.), if the reports resulting from this committee activity were to provide the basis for government regulatory action or inaction with respect to the matters addressed in the reports --

(i) Could the research funding and support for you or your close research colleagues and collaborators be directly affected, or

(ii) If you have any research agreements for current or continuing research funding or support from any party whose financial interests could be directly affected, and such funding or support is directly related to the subject matter of the regulatory process, do such agreements significantly limit your ability to independently conduct and publish the results of your research (other than for reasonable delays in publication in order to file patent applications)? No

(b) Is the central purpose of the project for which this disclosure form is being prepared a critical review and evaluation of your own work or that of your employer? No

(c) Do you have any existing professional obligations (e.g., as an officer of a scientific or engineering society) that effectively require you to publicly defend a previously established position on an issue that is relevant to the functions to be performed in this committee activity? No

(d) To the best of your knowledge, will your participation in this committee activity enable you to obtain access to a competitor's or potential competitor's confidential proprietary information? No

(e) Could your service on the committee on which you have been invited to serve create a specific financial or commercial competitive advantage for you or others with whom you have substantial common financial interests? No

(f) If the committee activity for which this form is being prepared involves reviews of specific applications and proposals for contract, grant, fellowship, etc. awards to be made by sponsors, do you or others with whom you have substantial common financial interests, or a familial or substantial professional relationship, have an interest in receiving or being considered for awards that are currently the subject of the review being conducted by this committee? No

(g) If the committee activity for which this form is being prepared involves developing requests for proposals, work statements, and/or specifications, etc., are you interested in seeking an award under the program for which the committee on which you have been invited to serve is developing the request for proposals, work statement, and/or specifications -- or, are you employed in any capacity by, or do you have a financial interest in or other economic relationship with, any person or organization that to the best of your knowledge is interested in seeking an award under this program? No

If the answer to all of the above questions under RESEARCH FUNDING OR OTHER INTERESTS is either "no" or "not applicable," check here __X__ (NO).

If the answer to any of the above questions under RESEARCH FUNDING OR OTHER INTERESTS is "yes," check here ____ (YES), and briefly describe the circumstances below.

EXPLANATION OF "YES" RESPONSES:

During your period of service in connection with the activity for which this form is being completed, any changes in the information reported, or any new information, which needs to be reported, should be reported promptly by written or electronic communication to the responsible staff officer.

YOUR SIGNATURE

May 3, 2012
DATE

Reviewed by: _____
Executive Director

_____
Date

BI/COI FORM 2

THE NATIONAL ACADEMIES
Advisers to the Nation on Science, Engineering, and Medicine

National Academy of Sciences
National Academy of Engineering
Institute of Medicine
National Research Council

BACKGROUND INFORMATION AND CONFIDENTIAL CONFLICT OF INTEREST DISCLOSURE

For Studies Involving Program Reviews and Evaluations

NAME: Arthur H. (Art) Stukey TELEPHONE: 802-223-4189

ADDRESS: 120 College Street

Montpelier, VT, 05602

EMAIL ADDRESS: artstukey@comcast.net

CURRENT EMPLOYER: Self- Employed, LLC

NAS/NAE/IOM/NRC COMMITTEE: _____

There are two parts to this form, Part I Background Information, and Part II Confidential Conflict of Interest Disclosure. Complete both parts, **sign** and **date** this form on the last page, and return the form to the responsible staff officer for *The National Academies* project and committee activity to which this form applies. **Retain a copy for your records**.

PART I **BACKGROUND INFORMATION**

INSTRUCTIONS

Please provide the information requested below regarding **relevant** organizational affiliations, government service, public statements and positions, research support, and additional information (if any). Information is "relevant" if it is related to -- and might

reasonably be of interest to others concerning -- your knowledge, experience, and personal perspectives regarding the subject matter and issues to be addressed by the committee activity for which this form is being prepared. If some or all of the requested information is contained in your curriculum vitae, you may if you prefer simply attach your CV to this form, supplemented by additional responses or comments below as necessary.

I. ORGANIZATIONAL AFFILIATIONS. Report your relevant business relationships (as an employee, owner, officer, director, consultant, etc.) and your relevant remunerated or volunteer non-business relationships (e.g., professional organizations, trade associations, public interest or civic groups, etc.).

Art Stukey is currently consulting as Engineering Geologist on two projects for the World Bank (Nam Theun 2 Hydroelectric Project in Laos, and Upper Cisokan Pumped Storage Project in Indonesia).

He is also listed as Chief Consulting Geologist for Aqua-Energie, LLC, based in Syracuse, NY.

II. GOVERNMENT SERVICE. Report your relevant service (full-time or part-time) with federal, state, or local government in the United States (including elected or appointed positions, employment, advisory board memberships, military service, etc.).

No direct service as an individual with US government, state or local agencies, only service as an employee of Harza Engineering and or MWH on occasional projects listed in resume.

III. RESEARCH SUPPORT. Report relevant information regarding both public and private sources of research support (other than your present employer), including sources of funding, equipment, facilities, etc.

None.

IV. PUBLIC STATEMENTS AND POSITIONS. List your relevant articles, testimony, speeches, etc., by date, title, and publication (if any) in which they appeared, or provide relevant representative examples if numerous. Provide a brief description of relevant positions of any organizations or groups with which you are closely identified or associated.

In the years 2000-2001, Mr. Stukey served as president of the Association of Engineering Geologists, a professional geologic organization, based in Denver, CO.

V. ADDITIONAL INFORMATION. If there are relevant aspects of your background or present circumstances not addressed above that might reasonably be construed by others as affecting your judgment in matters within the assigned task of the committee or panel on which you have been invited to serve, and therefore might constitute an actual or potential source of bias, please describe them briefly.

There is no such information to my knowledge.

PART II **CONFIDENTIAL CONFLICT OF INTEREST DISCLOSURE**

INSTRUCTIONS

It is essential that the work of committees of the institution used in the development of reports not be compromised by any significant conflict of interest. For this purpose, **the term "conflict of interest" means any financial or other interest which conflicts with the service of the individual because it (1) could significantly impair the individual's objectivity or (2) could create an unfair competitive advantage for any person or organization.** Except for those situations in which the institution determines that a conflict of interest is unavoidable and promptly and publicly discloses the conflict of interest, no individual can be appointed to serve (or continue to serve) on a committee of the institution used in the development of reports if the individual has a conflict of interest that is relevant to the functions to be performed.

The term "conflict of interest" means something more than individual bias. There must be an *interest,* ordinarily financial, that could be directly affected by the work of the committee.

Conflict of interest requirements are *objective* and *prophylactic.* They are not an assessment of one's actual behavior or character, one's ability to act objectively despite the conflicting interest, or one's relative insensitivity to particular dollar amounts of specific assets because of one's personal wealth. Conflict of interest requirements are objective standards designed to eliminate certain specific, potentially compromising situations from arising, and thereby to protect the individual, the other members of the committee, the institution, and the public interest. The individual, the committee, and the institution should not be placed in a situation where others could reasonably question, and perhaps discount or dismiss, the work of the committee simply because of the existence of conflicting interests.

The term "conflict of interest" applies only to *current interests*. It does not apply to past interests that have expired, no longer exist, and cannot reasonably affect current behavior. Nor does it apply to possible interests that may arise in the future but do not currently exist, because such future interests are inherently speculative and uncertain. For example, a pending formal or informal application for a particular job is a current interest, but the mere possibility that one might apply for such a job in the future is <u>not</u> a current interest.

The term "conflict of interest" applies not only to the personal interests of the individual but also to the *interests of others* with whom the individual has substantial common financial interests if these interests are relevant to the functions to be performed. Thus, in assessing an individual's potential conflicts of interest, consideration must be given not only to the interests of the individual but also to the interests of the individual's spouse and minor children, the individual's employer, the individual's business partners, and others with whom the individual has substantial common financial interests. Consideration must also be given to the interests of those for whom one is acting in a

fiduciary or similar capacity (e.g., being an officer or director of a corporation, whether profit or nonprofit, or serving as a trustee).

The institution is frequently called upon by sponsors to provide an independent review and evaluation of a particular program or programs of the sponsor. For any committee that will be used by the institution in the development of one or more reports to be provided by the institution to a sponsoring agency for use as an independent review and evaluation of one or more programs of the sponsor, *the focus of the conflict of interest inquiry is on the identification and assessment of relationships to the program or programs to be reviewed and evaluated, as well as on other interests that might be directly affected by the review and evaluation.*

For example, if the institution were conducting an independent review and evaluation of a particular research program of a sponsor, the focus of the conflict of interest inquiry would be on the identification and assessment of existing interests in that program that could be directly affected if the institution's report were to provide the basis for action or inaction with respect to changes in the program. The concern is that if an individual (or others with whom the individual has substantial common financial interests) has interests that could be directly affected by the review and evaluation process, the individual's objectivity while participating in the review and evaluation process could be impaired.

Such interests could include existing research grants or contracts under the program being reviewed and evaluated held by the individual (or others with whom the individual has substantial common financial interests) if, for example, the grants or contracts might be modified or terminated, or if there is a reasonable expectation of continuing research funding that could be lost. Other interests that might be directly affected might include, for example, one's employment and the interests of one's employer, one's self-employment and the interests of one's clients, interests in partnerships and commercial ventures arising out of or related to the research, interests in relevant patents and other forms of intellectual property related to the research, and interests in various forms of substantial non-financial research support.

Certain relationships to the sponsor may also raise issues of conflict of interest. For example, serving as a consultant to the sponsor could constitute the basis for a conflict of interest if the consulting relationship could be directly affected or is directly related to the subject matter of the review and evaluation.

The questions set forth below are designed to elicit information from you concerning possible conflicts of interest that are relevant to the functions to be performed by the particular committee on which you have been invited to serve.

1. <u>RELATIONSHIPS TO THE PROGRAM (S) BEING EVALUATED</u>. Taking into account your interests and the interests of other individuals with whom you share substantial common financial interests (e.g., spouse, close research colleagues and collaborators, business partners, etc.) --

(a) Do you or such others receive current *financial support* (e.g., research and/or development grants or contracts, procurement contracts, consulting contracts, other grant support, etc.) from the program(s) being evaluated that could be directly affected by the committee's report (e.g., possible termination of current agreements or loss of reasonably anticipated future funding)?

(b) Do you or such others receive substantial current *non-financial support* (e.g., equipment, facilities, industry partnerships, research assistants and other research personnel, etc.), from the program(s) being evaluated that could be directly affected by the committee's report?

(c) Do you or such others have *any other current financial interest* (e.g., patent rights, interests in partnerships and commercial ventures, etc.) obtained from or through the program(s) being evaluated that could be directly affected by the committee's report?

If the answer to all of the above questions under RELATIONSHIPS TO THE PROGRAM(S) BEING EVALUATED is either "no" or "not applicable," check here __X___ (NO).

If the answer to any of the above questions under RELATIONSHIPS TO THE PROGRAM(S) BEING EVALUATED is "yes," check here ____ (YES), and briefly describe the circumstances on the last page of this form.

2. INVESTMENT INTERESTS. Taking into account stocks, bonds, and other financial instruments and investments including partnerships (but excluding broadly diversified mutual funds and any investment or financial interest valued at less than $10,000), if the reports resulting from this committee activity were to provide the basis for action or inaction with respect to changes in the program(s) being reviewed and evaluated --

(a) Do you or your spouse or minor children own directly or indirectly (e.g., through a trust or an individual account in a pension or profit-sharing plan) any stocks, bonds or other financial instruments or investments that could be affected, either directly or by a direct effect on the business enterprise or activities underlying the investments?

(b) Do you have any other financial investments or interests such as commercial business interests (e.g., sole proprietorships), investment interests (e.g., stock options), or investment relationships (e.g., involving parents or grandchildren) that could be affected, either directly or by a direct effect on the business enterprise or activities underlying the investments?

If the answer to all of the above questions under INVESTMENT INTERESTS is either "no" or "not applicable," check here __X___ (NO).

If the answer to any of the above questions under INVESTMENT INTERESTS is "yes," check here ____ (YES), and briefly describe the circumstances on the last page of this form.

3. PROPERTY INTERESTS. Taking into account real estate and other tangible property interests, as well as intellectual property (patents, copyrights, etc.) interests, if the reports resulting from this committee activity were to provide the basis for action or inaction with respect to changes in the program(s) being reviewed and evaluated --

(a) Do you or your spouse or minor children own directly or indirectly any such property interests that could be directly affected?

(b) To the best of your knowledge, do any others with whom you have substantial common financial interests (e.g., employer, business partners, relatives) own directly or indirectly any such property interests that could be directly affected?

If the answer to all of the above questions under PROPERTY INTERESTS is either "no" or "not applicable," check here __X___ (NO).

If the answer to any of the above questions under PROPERTY INTERESTS is "yes," check here ____ (YES), and briefly describe the circumstances on the last page of this form.

4. OTHER INTERESTS. (a) If the reports resulting from this committee activity were to recommend changes in the program(s) being evaluated --

(i) If you are employed or self-employed (or your spouse is employed or self-employed), could your current employment or self-employment (or your spouse's current employment or self-employment) be directly affected?

(ii) To the best of your knowledge, could any significant financial interests of your (or your spouse's) employer or, if self-employed, your (or your spouse's) significant clients and/or business partners be directly affected?

(iii) If you are an officer, director or trustee of any corporation or other legal entity, could the financial interests of that corporation or legal entity be directly affected?

(iv) If you are a consultant (whether full-time or part-time), could there be a direct effect on any of your current consulting relationships?

(b) Do you have a consulting relationship with a sponsor, grantee, or contractor of the program being reviewed and evaluated that is directly related to the subject matter of the program review and evaluation for which this disclosure form is being prepared (e.g., a

consulting relationship to provide assistance to the sponsor, grantee, or contractor with respect to the program review and evaluation)?

(c) Is a central purpose of the program review and evaluation a critical review and evaluation of your own work or that of your employer?

(d) Are you an official or employee of an agency or organization, which is a sponsor of the program that is being reviewed and evaluated and/or a sponsor of this program review and evaluation committee activity?

(e) Do you have any existing professional obligations (e.g., as an officer of a scientific or engineering society) that effectively require you to publicly defend a previously established position on an issue that is relevant to the functions to be performed in this committee activity?

(f) To the best of your knowledge, will your participation in this committee activity enable you to obtain access to a competitor's or potential competitor's confidential proprietary information?

(g) If you are or have ever been a U.S. Government employee (either civilian or military), to the best of your knowledge are there any federal conflict of interest restrictions that may be applicable to your service in connection with this committee activity?

(h) Could your service on the committee on which you have been invited to serve create a specific financial or commercial competitive advantage for you or others with whom you have substantial common financial interests?

(i) If the committee activity for which this form is being prepared involves reviews of specific applications and proposals for contract, grant, fellowship, etc. awards to be made by sponsors, do you or others with whom you have substantial common financial interests, or a familial or substantial professional relationship, have an interest in receiving or being considered for awards that are currently the subject of the review being conducted by this committee?

(j) If the committee activity for which this form is being prepared involves developing requests for proposals, work statements, and/or specifications, etc., are you interested in seeking an award under the program for which the committee on which you have been invited to serve is developing the request for proposals, work statement, and/or specifications -- or, are you employed in any capacity by, or do you have a financial interest in or other economic relationship with, any person or organization that to the best of your knowledge is interested in seeking an award under this program?

If the answer to all of the above questions under OTHER INTERESTS is either "no" or "not applicable," check here __X___ (NO).

If the answer to any of the above questions under OTHER INTERESTS is "yes," check here ____ (YES), and briefly describe the circumstances below.

EXPLANATION OF "YES" RESPONSES:

During your period of service in connection with the activity for which this form *is being completed, any changes in the information reported, or any new information, which needs to be reported, should be reported promptly by written or electronic communication to the responsible staff officer.*

4 June 2012

YOUR SIGNATURE — DATE

Reviewed by: _____ _____

Executive Director — Date

Appendix D

IEPR Member Resumes

Joseph L. Ehasz, P.E.

Consultant

Areas of Expertise

Water Resources
Dams and Reservoirs
Dam safety/FERC consultant
Hydroelectric consultant
Heavy civil construction

Years of Experience

With URS: 44 Years
With Other Firms: 1 Year

Education

MS/Civil Engineering/Rutgers University/1965

BS/Civil Engineering/Rutgers University/1963

Registration/Certification

Professional Engineer, CA

and 27 other states

Overview

Mr. Ehasz has more than 40 years of experience in water resources and dams. He has extensive experience in planning, engineering, design, and construction aspects of reservoirs, dams, levees and water conveyance facilities. His major field of interest is civil related aspects of water resources and power plant structures; in particular, the planning, analysis, design and construction of dams, reservoirs, pumping plants and pipelines.

He was Design Director for URS on the Metropolitan Water District's $2 - billion Diamond Valley Lake Project, as well as the Owner's Construction Manager for dams on one of the largest water reservoir and pump station projects in the country involving three large dams totaling 113-million cubic yards of earth and rock materials. He was Project Construction Manager for the Olivenhain RCC Dam and Pump Station for the San Diego County Water Authority.

Additional experience and responsibilities have included management and direction of the civil and geotechnical engineering groups working on design features of dams, levees and reservoirs for hydroelectric power stations as well as supervision of engineers and constructors working on various types of heavy civil structures. Mr. Ehasz has several years of experience with the California Division on Safety of Dams (DSOD) while managing reservoirs and dams in California. He is also a FERC-certified dam safety consultant and has had direct involvement in, and responsibility for, over fifty FERC Part 12 Safety Inspections. Mr. Ehasz is a member of the U.S. Society on Dams and serves as the Chairman of the Committee on Earthquake Design. In addition, Mr. Ehasz is presently serving on the American Society of Civil Engineer's Construction Institute.

He participates on various review boards evaluating engineering and design of reservoirs, dams, spillways pumping plants and hydraulic structures. Recently he has served on a review committee reviewing the design and constructability of various options for dikes and dams for separation of the Salton Sea. He is a member of the FERC's Independent Panel for the review of the redesign and construction of the Taum Sauk Pumped Storage Project in Missouri. He also participates on Consulting Boards for Duke Power in North Carolina, American Municipal Power, Inc. on two Ohio River projects, the USACE on a large spillway at Folsom Dam in Sacramento, CA and Success Dam in Central California, the USBR in Utah, B. C. Hydro in Vancouver, British Columbia and Ontario Power in Ontario, Canada. Mr. Ehasz has been on the Board of Consultants at the San Roque Power Project in the Philippines that involved over seven miles of tunnels and adits as well as 200-meter-high embankment dam, and large spillway.

Project Specific Experience

Olivenhain Dam Project, San Diego County Water Authority, Escondido, California. Project Construction Manager for the Construction Management Team for 310-foot-high RCC dam, 26,000 AF reservoir and pump station.

Diamond Valley Lake (Eastside Reservoir) Project, Metropolitan Water District of Southern California, Riverside County, California. He was the Owner's Design Director and Construction Manager for Dams that included over 120 million cubic yards of materials for the three dams. He managed 80 field engineering and inspection staff and two large contracts totaling over $700 million. In that capacity, he was also the primary contact with the California DSOD and coordinated all site activities.

Ludington Pumped Storage Project, Consumers Power Company, Michigan. 1,872 MW project. Design responsibility of one 5-mile long embankment dam, maximum 160-foot high, involving 37 million yards of earth embankment and clay lined reservoir.

Swift No. 2 Rehabilitation Project, Cowlitz County Public Utility District, Cougar, Washington. Project Manager for the rehabilitation of the Swift No 2 Powerhouse, 6 miles of canals, inlet-outlet structures and a forebay dam involving $70 million dollars of design and construction.

Sydney A. Murray Hydroelectric Project, Catalyst Energy Development Corporation. 192 MW project in Lousiana. Design responsibility for concrete buttress dams, canals and powerhouse.

Long Lake and Nine Mile Dams, Avista Corporation. Analysis and design of stabilizing system of tendons for both concrete gravity dams as well as repair of a concrete spillway.

Southwestern Pumped Storage Survey, Sempra Energy, San Diego, California. Technical and quality reviewer of various sites and locations as well as guidance with respect to cost evaluations and comparisons.

Phantom Canyon Pumped Storage Project, Confidential Client, Colorado. Technical and quality reviewer of various reservoir sites and locations as well as guidance with respect to geotechnical evaluation of various dam types as well as cost evaluations and comparisons.

Keban Hydroelectric Project, Devlet Su Isleri, Turkey. 640 MW project. Design and analysis for 680-foot high rockfill dam, 440-foot high concrete gravity dam and associated power tunnels.

FERC Part 12 Safety Inspections. Reviewed and inspected over 50 dams and tunnels of all types as well as embankment, concrete gravity, buttress and arch dams.

Roxboro Afterbay Dam, Carolina Power & Light. Project Manager and designer for a concrete gravity dam, inlet-outlet structure and associated embankment dam and gated concrete spillway.

Shearon Harris Project, Carolina Power Light Company, North Carolina. Design responsibility for two earth/rockfill dams.

South Fork American River (SOFAR) Project, SOFAR Management Authority, California. Chief Engineer responsible for design of four dams and reservoirs, and 18 miles of tunnels, involving two concrete-faced rockfill dams and two low concrete gravity dams in northern California.

Gokcekaya Hydroelectric Project, Turkey, Devlet Su Isleri. 300 MW Project. Design of concrete and stability analysis of double curvature thin arch dam 550-foot high and spillway and associated diversion and power tunnels.

Davis Pumped Storage Project, Allegheny Power Service Corporation, West Virginia. Design responsibility for three large embankment dams, and large diameter high-pressure tunnels and penstocks.

Susitna Hydroelectric Project, Alaska Power Authority, Alaska. 1,200 MW. Design review of an 880-foot-high embankment dam, 400-foot-high concrete arch dam and associated power tunnels.

Montour Power Project, Montoursville, PA, Pennsylvania Power & Light Co. Project Manager for planning and design of a make-up water intake and pump station along the West Branch of the Susquehanna River, and 12 miles of 48 in. water line, as well as a 5,000 AF water makeup reservoir, embankment dam and 2.5 mile 36 in. RCC pipeline.

Bi-County Tunnel Project, Bi-County Water Authority, Laurel, Maryland. Mr. Ehasz was Project Manager for the design and construction management of six miles of 10-foot-diameter tunnel involving steel lining of an existing tunnel.

Professional Societies/Affiliates

ASCE - Fellow
ASCE Construction Institute
National Society of Professional Engineers
Rutgers Engineering Society
United States Society on Dams
Assoc. of State Dam Safety Officials
Comm. on EQ Design of Dams – Chairman
The Beavers and The Moles

Selected Publications

"Value Engineering at Olivenhain RCC Dam, USA", J. L. Ehasz, M. R. H. Dunstan, Ken Steele, Chuck Nylund. International Commission on Large Dams, Barcelona, Spain 2006.

"Providing Emergency Storage for San Diego" J.L. Ehasz , G. Reed, M. Rogers, Civil Engineering Magazine, April 2003.

"Design and Construction of the San Roque Multipurpose Project" J.L. Ehasz, E. O'Connor, Published in USSD Bulletin, March 2003.

"Partnering for Success at the Olivenhain Dam" J.L. Ehasz Presented at the USSD Annual Meeting, San Diego, June 2002.

"Move that Mountain – The Growth of the Eastside Reservoir Project Dams." J.L. Ehasz, S.D. Summy, P.R. Zaman. Presented at WaterPower '99, Las Vegas, Nevada, July 1999.

"Embankment Design for the San Roque Multipurpose Project." J.L. Ehasz, M. Pavone, D.W. Osmun. Presented at Hydrovision 2000, Charlotte, North Carolina, August 2000.

"Modular Construction Brings Hydropower to the Lower Mississippi." J.L. Ehasz. Presented at 10th Annual Meeting in New Orleans of USCOLD. March 1990.

"Modular Construction Brings Hydropower up the Mississippi." Co-authored with J.M. Brooks. EPRI Conference in Cincinnati, Ohio. August 1989.

"Reinforced Rockfill Rehabilitates Old Arch Dam." Co-authored with L.E. Morlan. 1986.

"Foundation Movements - Prediction and Performance." Co-authored with M. Pavone. 10th International Conference on Soil Mechanics and Foundation Engineering, Stockholm, Sweden. 1981.

"Dynamic Properties of Weathered Rock." Co-authored with I.H. Wong and K.H. Liu. 7th World Conference on Earthquake Engineering, Istanbul, Turkey. September 1980.

"Probability of Liquefaction due to Earthquakes." Co-authored with I.H. Chon, 7th World Conference on Earthquake Engineering, Istanbul, Turkey. September 1980.

Robert L. Hall

Position: Principal
Engineering Innovations, LLC
Vicksburg, MS

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1405 Sweetgum Lane, Vicksburg, MS 39180
Ph: (601) 529-0937 Fax :(601) 638-2779
E-mail: Robert.L.Hall.PhD@gmail.com

(a) Professional Preparation:

Auburn University	Civil Engineering	BS,	1971
Mississippi State University	Civil Engineering	MS,	1978
Oklahoma State University	Civil Engineering	Ph.D.,	1985

(b) Appointments:

- Division Chief, Geosciences and Structures, Engineering and Research Center, U.S. Army Corps of Engineer (USACE), 2001-2009,(Retired from USACE after 38 years of service)
- Adjunct Professor, Department of Civil Engineering, University of Puerto Rico, 1991-1993
- Adjunct Professor, Department of Engineering, Mississippi State University, !986-present
- Adjunct Professor, Department of Mathematics, Jackson State University, 1986
- Adjunct Professor, Department of Civil Engineering, University of Missouri, 2004

(c) Publications

Project Related Publications:

- Matheu, E. E., **Hall, R.L.**, and Ebeling, R. M. 1999. "Nonlinear Seismic Response of Concrete Gravity Dams," *, 2nd US-Japan Workshop on Advanced Research on Earthquake Engineering for Dams*, 7-8 May 1999, Tokyo, Japan.
- **Hall, R.L.** 1999. "Status of Construction and Safety of Dams in the United States." *2nd US-Japan Workshop on Advanced Research on Earthquake Engineering for Dams*, 7-8 May 1999, Tokyo, Japan.
- **Hall, R.L.** 1997. "Importance of Reservoir Bottom Absorption," *Fifth Pan American Congress of Applied Mechanics*, 2-4 January 1997, San Juan, Puerto Rico.
- Yamaguchi, Y., **Hall, R. L.,** Sasaki, T., Matheu, E., Kanenawa, K., Chudgar, A., and Yule, D.. 2004. "Seismic Performance Evaluation of Concrete Gravity Dams," Proceedings of the 13th World Conference on Earthquake Engineering, Vancouver, B.C., Canada, 1-6 August, 2004.

- Ghanaat, Y., **Hall, R.L.**, and Redpath, B.B. "Measurement and Computation of Dynamic Response of Arch Dams Including Interaction Effects," *Journal of Seismology and Earthquake Engineering*, International Institute of Earthquake Engineering and Seismology, Summer 2000, vol 2, no. 3, Teheran, I.R. Iran.
- Ghanaat, Y., **Hall, R.L.**, and Redpath, B.B. 2000. "Measurement of Dynamic Response of Arch Dams Including Interaction Effects," *, 12th World Conference on Earthquake Engineering*, 24-27 January 2000, New Zealand.
- Ghanaat, Y., Redpath, B. R. and **Hall, R.L.** 1999. "Field Measurements of Dynamic Interactions at Longyangxia Dam." Report to National Science Foundation, Quest Structures.

Other Significant Publications:.

- **Hall, R.L.**, de Bejar, L. A., Sjostrom, K. J., and Matheu, E. E. 1998. "Effect of Reservoir Sub-bottom Energy Absorption on Hydrodynamic Forces on Dams," *Proceedings, 30th Joint Panel Meeting on Wind and Seismic Effects*, N. Raufaste (ed.), National Institute of Standards and Technology, Gaithersburg, MD, May 12-15, 1998.
- **Hall, R. L.**, and Roper, W. E. 1993. "Corps of Engineers Research Program on Concrete Dams," *Proceedings, 25th Joint Meeting on Wind and Seismic Effects*, US Department of Commerce, National Institute of Standards and Technology. May 17-20, 1993, Tsukuba, Japan.
- **Hall, R. L.** 1991. "Importance of Nonlinear Response to Seismic Analysis of Concrete Gravity Dams," *Proceedings of the Corps of Engineers Structures Conference*, Jacksonville, Florida.
- **Hall, R. L.**, and Nickell, J. S. 1990 (April). "Seismic Evaluation of Folsom Concrete Gravity Dam," *Eighth Structural Congress, ASCE*, 262-264, Baltimore, Maryland.
- **Hall, R. L.** 1990. "Importance of Nonlinear Seismic Response of Concrete Gravity Dams," *Eighth Structural Congress, ASCE*, 256-258, Baltimore, Maryland.
- Bevins, T., **Hall, R. L.**, and Wright, R. S. 1989. "Vibration Studies of Richard B. Russell Concrete Gravity Dam," *Proceedings, 20th Joint Meeting of US-Japan Cooperative Program on Wind and Seismic Effects*, National Institute of Standards, May 17-20,1989, Gaithersburg, Maryland.
- USACE, Engineer Manual 1110-2-6051, "Time-History Dynamic Analysis of Concrete Hydraulic Structures," 31 August 2000.

(d) Synergistic Activities:

- Briefed the Assistant Secretary of the Army for Civil Works, The Honorable John P. Woodley, on the necessity of the US conducting a risk assessment to determine the risk the Panama Canal could have to the US economy, 12 February 2008, Washington, D.C.
- Organized and chaired International Workshop at the Corps Workshop on Reservoir Bottom Absorption, 8-9 May 8-9 1997, San Francisco, California.
- Presented keynote paper at the UJNR/JSDE Workshop on Earthquake Engineering for Dams, 14-16 May 2007, Tsukuba, Japan.
- Invited as keynote panel member at the 68th Shock and Vibration Symposium on Verification and Validation of Nonlinear Structural Dynamics Codes, 18-22 November 1996 Monterey, California.
- Chair, Structural Advisory Board, Panel Canal Authority
- Advisory Board, Ruskin Dam, BCHydro, 2001- present
- Advisory Board, For 3 other dams for BCHydro, 1991-2000

(e) Collaborators & Other Affiliations:

- **Collaborators over the past 48 months**

Sam Yao, Ben C. Gerwick, Inc., San Francisco, CA
Dan Russell, INCA, Portland, Or
Dan Duque, MHW, Chicago, IL
Zee Duron, Harvey Mudd College, Clermont, Ca
Louis Alfaro, Panama Canal Authority, Panama
Ted Krauthammer, University of Florida
Larry Nuss, Bureau of Reclamation
Ken Lum, BCHydro, Canada

- **Graduate Advisors:**

Ms. Yazmin Seda-Sanabria, University of Puerto Rico at Mayaguez, 1994
Mr. Hank McDevitt, Mississippi State University, 1995
Maj. Frank Akins, Mississippi State University, 1999

- **Ph.D. Thesis Advisor:**

Robert Dinan, University of Missouri, 2003
MAJ Richard Evely, Mississippi State University, 2001

Eugene J. Gemperline, Jr
Consulting Engineer
812 Luminara Way
San Marcos, CA 92078, (760) 798-2932

EMPLOYMENT EXPERIENCE:

Current: President of Eugene J. Gemperline, Inc., consulting engineer providing hydraulic engineering services in the planning, design, and operation of water and water resource development projects.

2007 – 2011: Franklin G. DeFazio, Inc. Consulting Engineer providing hydraulic engineering services in the planning, design, and operation of water and water resource development projects.

2001 - 2006: Principal Hydraulic Engineer and Supervising Project Manager, MWH Americas, Inc.

1993 – 2001: Senior Hydraulic Engineer and Project Manager, Partner and Associate, Harza Engineering Company (now MWH Americas).

1979 – 1993: Hydraulic Design Engineer, Project Manager, Water Supply Program Manager, Harza Engineering Company (now MWH Americas).

1974 - 1979: Planning Engineer, Harza Engineering Company (now MWH Americas).

PROJECT EXPERIENCE:

Eugene J. Gemperline is a Consulting Hydraulic Engineer and Project Manager. His current services include hydraulic engineering for hydroelectric and water supply projects to private and public clients. Current projects include hydraulic design of several hydro projects on the Ohio River for MWH Americas and American Municipal Power, a hydro project in Washington State for Black & Veatch and Puget Sound Energy and water supply projects in California for the San Diego County Water Authority and Olivenhain Municipal Water District. He is currently serving on the Board of Consultants for a FERC licensed hydroelectric facility in Indiana (MWH design) and is a member of the CICP review board for the Panama Canal expansion project.

Mr. Gemperline has more than 37 years of experience in the planning, design, and construction oversight of water resource projects in North, Central and South America, Asia and Africa. He has been responsible for all phases of project development, from planning and permitting through final design and start-up. His responsibilities have included management of planning and design phase services as well as responsibility for the hydraulic design of all features of hydroelectric, water supply, flood control, and other water resource projects. Mr. Gemperline's expertise includes cold regions engineering, environmental, permitting and

licensing of hydroelectric and other water resources projects. He has recently served as lead hydraulic engineer for the design of four hydroelectric projects at U. S. Army Corps of Engineers (USACE) locks and dams on the Ohio River and for the design of the Arrow Lakes Hydro Project at an existing dam in British Columbia. Mr. Gemperline is the author of the chapters on Hydraulic Design and Ice of the American Society of Civil Engineers publication *Guidelines for the Design of Intakes for Hydroelectric Projects* and has written 25 professional publications.

Hydroelectric Power Projects

Mr. Gemperline prepared and/or supervised the hydraulic analyses and design for more than 25 hydroelectric and pumped storage facilities with generation capacities between 10 MW and 10,000 MW. He was the project manager and lead hydraulic engineer for the preparation of the bid and contract documents for the Belleville Hydro Project at the U. S. Army Corps of Engineers Belleville Locks and Dam on the Ohio. He was lead hydraulic engineer for the design of four other hydroelectric projects at existing USACE Ohio River Locks and Dams (Cannelton, Smithland, Willow Island and Meldahl) and for design of the Arrow Lakes Hydropower Project at the Hugh Keenleyside Dam on the Columbia River in British Columbia. His services included all phases of new or existing projects including expansion and operation of existing facilities. Facilities designed included intakes, power conduits, penstocks, tailraces, surge control works, ice control works, river diversion works, trashracks, and gates. Example projects include the Susitna Hydroelectric Project, Alaska (spillways, intakes, diversion tunnels, power tunnels, licensing studies); Guri (Simon Bolivar) Project, Venezuela (spillway); Yacyreta Project, Argentina/Paraguay (spillways, channels, river diversion, fish facilities); Maheshwar Project, India (intake); Bujugali Project, Uganda (hydrology, economics); Ohio River Projects, United States (intakes, channels, navigation impacts); Rocky Mountain pumped storage, US (hydraulic transients); Arrow Lakes Hydropower, British Columbia (intake, channels, slope protection, drainage).

Dams and Spillways

Mr. Gemperline prepared or supervised the planning, design and operation of more than 15 spillways that have ranged in capacity from 100 ft^3/sec (3 m^3/sec) to 3.400,000 ft^3/sec (95,000 m^3/sec) and dams with heights from 50 feet (17 m) to 800 feet (240 m). The dams include earth, rock fill, concrete, rubber, and roller compacted concrete type structures. These spillways include designs with overflow and siphon crests, open channel chute, baffled chute and tunnel spillways, flip buckets, stilling basins and baffle type energy dissipation in a wide variety of geologic formations and materials. Example projects include the Al Wahda Dam, Jordan (110 m high, tunnels, intakes, spillway, transients); Baldhill Dam, North Dakota (20 m high, spillway); Yacyreta, Argentina/Paraguay (spillways, channels, river diversion, fish facilities); Watana Dam, Alaska (240 m high, spillway, channels, diversion, intake).

Physical Hydraulic Models

Mr. Gemperline has been involved with the preparation, execution and interpretation of hydraulic models since 1979. He has prepared the specifications for, supervised the construction and operation and been responsible for interpretation of the results of thirteen physical models for facilities in the U.S. and Canada. He has served as lead hydraulic engineer reviewing the results of four other physical hydraulic models. Mr. Gemperline's experience has also involved the review and use of physical hydraulic model studies for more than 50 other projects including spillways, hydroelectric projects, tunnels, drop shafts, diversion facilities, intakes, pipelines, chutes, navigation and other hydraulic facilities. His experience covers a wide range of models for river works and spillways, including sectional, comprehensive, movable bed, fixed bed, hydraulic machinery, valves, gates, aeration, cavitation and hydraulic vibration models. Example projects include comprehensive navigation and sectional intake channel models for five Ohio River hydro projects, a model of the ice skimmer wall at the Safe Harbor hydro project, models of the intake channel at the Arrow Lakes hydro project, intake models for cooling water facilities for cogeneration projects, spillway models for Baldhill, Yacyreta and Guri hydro projects.

Boards of Consultants and Review Boards

Mr. Gemperline is currently serving on the Board of Consultants for the spillway expansions for Norway and Oakdale Hydroelectric Projects (FERC Project 12514) for the Northern Indiana Public Service Corporation. He is a also a member of the CICP internal review board for the Panama Canal Expansion Project responsible for reviewing hydraulic design of the navigation locks. He has previously served on review boards for the expansion of the O'Hare airport and cooling water facilities for new cogeneration facilities for Duke Energy in California.

Mathematical Modeling and Computational Fluid Dynamics

Mr. Gemperline has written and used mathematical modeling software throughout his career. He authored one of the earliest water surface profile programs to consider both supercritical and subcritical flow and used it in the design and analyses of numerous spillways, tunnels and channels. He adapted it to the transport of ice. He wrote a program to simulate the diversion and closure of rivers and applied it to the analyses of river diversion schemes for several major hydroelectric projects. He developed a fluid dispersion model and applied it to the location of water supply intakes to avoid sediment intake. He managed and prepared the mathematical modeling for the licensing of the Susitna Hydroelectric Project (1983 – 1986) including reservoir and river thermal, sediment and ice studies. He has supervised the use of CFD modeling in the design of hydroelectric project intakes and in the design of hydro project exit

channels to minimize impacts on river sedimentation. Example projects include design of spillways for Al Wahda Dam, Jordan; Baldhill Dam, North Dakota; analyses of river diversion schemes for Yacyreta hydro project, Argentina/Paraguay; Rio Caroni projects, Venezuela; water supply intake studies for Fairfax County, Virginia and Montgomery County, Maryland; and evaluation of ice transport on the Niagara River, New York. CFD modeling was used to assist physical modeling in the design of hydro intake and exit channels for hydro projects on the Ohio River.

Erosion/Sedimentation/Sediment Transport

Mr. Gemperline prepared hydrologic studies of sediment transport/sedimentation for 3 reservoirs and 3 water supply intakes and potential impacts of hydro projects on bed erosion at existing locks and dams. River studies have involved development of sediment dispersion models and determination of sediment and water quality parameters with distance offshore for the location of alternative water supply intakes. Studies of potential impacts on bed erosion at hydro projects at existing locks and dams are undertaken as part of physical model studies of the projects and also with mathematical modeling. As an example, Mr. Gemperline supervised CFD and physical model studies to evaluate the impacts of project operation on channel stability, erosion and sedimentation to mitigate potential impacts on the navigation channel at the Smithland hydro project at the USACE Smithland Locks and Dam on the Ohio River. Studies have involved determination of expected sediment concentration in raw water to determine treatment plant solids loadings. Example projects include the new offshore water supply intake for Fairfax County, Virginia and the feasibility study for the proposed offshore water supply intake for Montgomery County, Maryland.

Hydraulic Transient Analyses

Mr. Gemperline has extensive experience in the analyses of hydraulic transients in pressurized conduits and open channels for the design of hydroelectric and water supply projects. He has prepared hydraulic transient analyses of a reservoir water supply and transmission system including two reservoirs, multiple reservoir outlet works including multiple port system, emergency release valves, two pumping stations, surge control facilities, flow bypass facilities, a water treatment plant and 193 interconnected pipes with A/V valves, pressure reducing valves, vents and overflow structures. He developed the study plan for design requirements including system components and geometry, surge and vent facilities. He determined key design parameters including maximum and minimum pressures, cavitation potential, and operating guidelines.

Mr. Gemperline supervised and prepared unsteady flow modeling for analysis and design of 1.2 km, 1100 m^3/s approach channel for a 175 MW hydroelectric project. He developed and analyzed control logic, mechanical and structural methods to optimize energy production and

control effects of transient operations on hydraulic conditions and unit operations. He developed structural and mechanical design parameters based on unsteady flow conditions.

He prepared hydraulic transient analyses for features of several other water supply, hydroelectric and pumped-storage projects including transmission mains, penstocks, valves, tailraces and surge tanks including use development of transient models using full 4-quadrant unit characteristics. Example projects include the Al Wahda project, Jordan; Rocky Mountain pumped storage project, Georgia (US); Smith Mountain pumped storage project, Virginia; Arrow Lakes hydro project, British Columbia; and San Vicente pump station, California.

River Control Works/Restoration

Mr. Gemperline prepared planning studies, design and operation of 8 river control and diversion projects. These projects were for control of ice, water supply and hydraulic structure construction and erosion control on rivers with average discharges up to 500,000 ft^3/sec (14,000m^3/sec). This work included development of alternative configurations, operational policies, water supply capacity improvements, diversion facility design, cofferdam heights and risk analysis for project owners and contractors to determine economical project construction and operation. Example projects include the river diversion works for the Yacyreta hydro project, Argentina/Paraguay and Rio Caroni hydro projects, Venezuela; the ice skimmer wall at the Safe Harbor hydro project, Pennsylvania; and cofferdams at the Ohio River hydro projects.

Tunnels/Penstock/Canals/Intakes

Mr. Gemperline prepared conceptual design, final design and operation studies on more than 30 projects that involved tunnels, penstocks, and canals for conveyance of water. He performed conceptual design, final design, operation studies and rehabilitation studies for these facilities, which have ranged in capacity from 100 ft^3/sec (3 m^3/sec) to 39,000 ft^3/sec (1115 m^3/sec). Example projects include the Ohio River hydro projects; the Arrow Lakes hydro project, British Columbia; Mae-Mho project, Thailand; the Tunnel and Reservoir Plan, Chicago.

Fish Facilities

Mr. Gemperline designed two fish facilities for the migration of anadromous and fresh water species. This work has involved fish diversion screens, ladders, elevators and counting stations. Example projects include the Yacyreta hydro project, Argentina/Paraguay and the Lower Saranac hydro project, New York.

Cold Regions and Ice

Mr. Gemperline has directed or performed six studies for the analysis and management of ice flows and/or jams on rivers. This work involved the analysis and prediction of ice movement in rivers with and without man-made structures. Studies included the development and use of a mathematical model to simulate the development and break-up of a river ice cover in Alaska for the licensing of the Susitna hydro project, the determination of expected forces on a "ice skimmer wall" at the Safe Harbor hydro project, Pennsylvania, estimation of frequency and magnitude of ice-related flooding and damages for the Rock River in Illinois, development of remedial measures in a reservoir to mitigate for upstream ice-related flooding at the Safe Harbor project, development of ice-related forces for a "river walk" type development on a project in Michigan and expert witness services related to ice-related flooding on the Niagara River in New York.

Navigation

Mr. Gemperline is currently on the review board for the design of the navigation locks for the Panama Canal expansion project. He has served as the lead hydraulic engineer for the design of five projects involving navigation locks on the Ohio River. He supervised the comprehensive physical model studies for five hydroelectric projects at existing locks and dams and used the model studies to design project features including the approach channel and tailrace to minimize impacts on commercial navigation entering and leaving the locks. These studies were coordinated with the U.S. Army Corps of Engineers and included physical simulation of lock operations. He also supervised CFD and physical model studies to evaluate the impacts of project operation on channel stability, erosion and sedimentation to mitigate potential impacts on the navigation channel. For the Yacyreta Hydroelectric Project in Argentina/Paraguay he developed a mathematical model to compute the wind/wave forces on a proposed floating guide wall for the navigation lock.

Pumping Stations

Mr. Gemperline prepared and/or supervised analyses and design of hydraulic features including intake and discharge conduits, valves, and surge control facilities for more than 10 pumping stations with capacities up to 1100 ft^3/sec (30 m^3/sec) and heads up to 330 ft. (100 m).

Water Supply

Mr. Gemperline prepared and/or supervised planning studies and design of more than 15 water supply projects with capacities up to 1500 ft^3/sec (40 m^3/sec). This work has involved

cooling water facilities for power plants, brick and mortar lined aqueducts up to 26 miles long (42 km), raw water supply tunnels with lengths up to 10 miles (16 km) and diameters up to 30 ft. (9 m), canal/pipeline systems up to 30 miles long (48 km), rehabilitation of damaged large diameter PCCP and conversion from pressure to gravity flow, spillways and outlet works for reservoirs and open channel chutes. Work has also included planning studies for storage facilities including raising of dams and control works to improve safe yield for a water supply agency. Example projects include hydraulic transient analyses for several elements of the San Diego County Water Authority's aqueduct system; analysis and design of improvements of New York City's New Croton Aqueduct; planning studies for the communities withdrawing water from the Kentucky River and planning studies for a new Lake Michigan intake for the City of Chicago.

DEGREES:

Master of Science in Environmental Engineering, University of North Carolina at Chapel Hill, 1974

Bachelor of Science in Civil Engineering, University of Notre Dame, 1973

PROFESSIONAL REGISTRATIONS:

Illinois (PE, 1980, 62-037848), Ohio (PE, 1982, E46613), Alaska (PE, Civil, 1984, CE6214 retired/inactive), New York (PE, 1986, 063020 retired/inactive), Kentucky (PE, 1993, 17655 retired/inactive), Virginia (PE, 1997, 031445 retired/inactive), Maryland (PE, 1998, 023460 retired/inactive), Nevada (PE, Civil, 2008, 19140), California (PE, Civil, 2008, 72706).

PROFESSIONAL SOCIETIES:

American Society of Civil Engineers
American Water Works Association
United States Society for Dams
Tau Beta Pi
Chi Epsilon

PROFESSIONAL PUBLICATIONS:

Twenty-five technical articles and chapters in various publications of the American Society of Civil Engineers, Western Society of Engineers, Canadian Society of Dams, Waterpower and Hydro Review.

ARTHUR H. STUKEY
Consulting Geologist, LLC

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KEY QUALIFICATIONS:

Mr. Stukey has concentrated his career in geologic siting and foundation work for dams, reservoirs, and water conveyance tunnels. Work includes site evaluations, project layouts, construction surveillance, performance monitoring, rehabilitation, and site re-development.

Mr. Stukey is currently reviewing field investigations, preliminary through design-level planning and documentation, geologic design criteria, and reporting directly to private and governmental owners and lending institutions.

He currently is an independent consultant, and serves as Chief Geologist for Aqua-Energie, LLC.

TOTAL YEARS OF EXPERIENCE: 40

EDUCATION:

Master of Science in Geology, University of New Mexico, 1968

Bachelor of Science in Geology, Tufts University, 1964

Professional Societies: Past-President-Association of Engineering Geologists (AEG) 2000; Member International Association of Engineering Geologists, and U.S. Society on Dams (USSD).

Continuing Education: Field Instrumentation of Soil and Rock, University of Missouri, 1978; Ph.D. candidate in Engineering Geology, Rutgers University, 1970-1974

Professional Registrations: Oregon: Professional and Engineering Geologist, No. E146 (1978 to date).

EXPERIENCE RECORD:

Upper Cisokan Pumped Storage Project., Indonesia

Client: World Bank for PT PLN (Persero (Utility), Bandung, Indonesia
Geologic Consultant on World Bank Project Review Panel (PRP), reviewing feasibility, design contracting and construction for 300-m head, 1040 MW pumped storage project, to be the first pumped storage project in Indonesia. Project elements include two RCC dams (75meters and 98 meters high); two headrace tunnels with inclined power shafts and four-unit underground power station. First PRP meeting with local technical counterparts was held in Indonesia, October 2010.

Nam Theun 2 Hydroelectric Project, Laos
Client: World Bank for Lao Ministry of Energy, Vientiane, Laos.
Geologic Consultant on three-man World Bank Dam Safety Review Panel (DSRP), reviewing feasibility and design of 250-m head, 1000 MW hydroelectric station on tributary of the Mekong River. Project elements include a 45-m RCC dam and embankment saddle dikes; 2.5-km long, 8.0-m-dia. tunnel/shaft/tunnel and penstock system, and surface power station. The downstream release involves a re-regulation pond and 27-km of channel and diversion works. Work consists of field reviews of project, report preparation, and on-going coordination with Owner and the Design Engineer (Electricité de France). Bedrock includes redbed clastics, karst limestone, and locally severe faulting.

Nam Theun 2 Multi Purpose Project went into commercial operation in April 2010 and is now visited regularly by DSRP for monitoring reviews during the first six years of commercial operation, to 2016. (2000-present).

Chaparral Hydroelectric Project
Italian Construction Group, San Salvador
Field review and evaluation of landslide at abutment excavation for a 90 m dam in construction in El Salvador. Rio Torola**,** July 2010, with Aqua-Energie.

Tumarin Hydroelectric Project
Italian Construction Group, Managua, Nicaragua
Geologic Consultant conducting field and office review of four alternative sites for 70-MW power station and 40-meter concrete gravity dam and spillway. Coordinated with local geologists, surveyors, drilling firm and planning and environmental/social engineers to develop feasibility investigations in remote area of Eastern Nicaragua. Participated in preparation of geologic interpretations and evaluation of Feasibility Report, December 2007 to 2010, with Aqua-Energie.

Singoli-Bhatwari
Larsen and Toubro, New Delhi, India
Lead Geologist for MWH, field and office review and planning for hydro development in the Siwalik range foothills of the Himalayas. Feasibility-level coordination with other discipline leads stressing geologic risk assessment for 12-km tunnel and location selection for associated barrage, desander, and surface power station. Nov 2007.

Thornton Composite Reservoir
Metropolitan Water Reclamation District of Greater Chicago
Internal Review Board member for MWH – Geologic advisor and QC reviewer for evaluation and design of closure dam and storage of combined storm water/sewage at the Thornton Rock Quarry, Chicago (part of the overall Deep Tunnel and Reservoir Plan for the Chicagoland). Project involves a 100 ft high RCC closure dam in a 2000-foot long rock wall separating an active limestone quarry from a soon to be abandoned quarry. (April 2007 to September 2009)

Tornillito Hydroelectric Project
Elcosa, San Pedro Sula, Honduras
Geologic Consultant on private power development with Aqua-Energie in limestone terrane of northern Honduras. Project involves a 70-meter high integral gravity dam, spillways and power station. Principal tasks are evaluation of potential for karstic leakage, design and review of drilling and geophysical exploration, evaluation, and participation in design and review of GIN grouting program (with Aqua-Energie 2005 to 2010).

Lake Mead Intake No. 3
Southern Nevada Water Authority, Las Vegas, Nevada
Senior Advisor to MWH - Geologic consulting and contract preparation for new municipal water tunnel beneath Lake Mead. Work involves onshore and offshore geophysical surveys, drilling programs and evaluations for proposed tunnel, intake, and underground pump station (2005 to 2007).

Tongbai Hydroelectric Pumped Storage Project, Hangzhou, China
Client: World Bank for Zhejiang Provincial Electric Power Company, Hangzhou, PRC
Geologic Consultant on "Special Board of Consultants" (SBC) reviewing feasibility and design of 255-m-head, 1,200-MW pumped storage project. Main elements include modification of existing (upper) reservoir, and construction of a new intake, twin 9-m-dia., and 1.1-km conduit system, including inclined shafts, bifurcations, underground power cavern, and tail tunnels. Bedrock is primarily jointed granite with local faulting, redbeds, and basaltic dikes (2000-2005).

Yi Xing Pumped Storage Project, Jiangsu Province, China
Client: World Bank for Jiangsu Provincial Electric Power Company, Nanjing, PRC.
Geologic Consultant on "Special Board of Consultants" (SBC) reviewing feasibility and design of ±200-m-head, 1000-MW pumped storage project. Main elements include a lined and excavated upper reservoir, a concrete buttress wall for the upper reservoir embankment dam, and underground power cavern sited between two major faults. Bedrock is primarily siliceous sedimentary rock with local granitic intrusions (2001-2006).

Karahnjukar Neo-Seismic Review
Landsvirkjun, The National Power Company, Reykjavik, Iceland
Geologic reviewer of foundation and site conditions at the 195-meter high CFRD dam, currently in construction in northeastern Iceland. Review includes evaluation of newly discovered, Recent-age faulting within 10 km of the project. The review centers on mechanisms of fault re-activation and will attempt to develop criteria with local specialists to differentiate between tectonically generated movements, and those driven by isostatic rebound, a process that is strongly suggested by site geomorphology.

A second phase of the review was to evaluate the GIN grouting methods being used in the consolidation, and curtain work, and to evaluate the need for a deep shaft extension of the foundation concrete to treat a fault zone encountered in the excavation works (2004 to 2006).

Parsa Pumped-Storage Project, Israel
Client: Israel Electric Company, Ltd.
Lead Geologist for development of an 800-MW pumped-storage project at the Dead Sea. Work consists of review of existing documents, site visits, mapping review, layout of exploration drilling and exploratory adits, working with local geotechnical firm to develop technical specifications for exploration, advising design team on geologic conditions for reservoirs and underground station, preparation of geologic reports for the carbonate and karstic terrane, and presentations to client and project Consulting Board. Site is located at the faulted margin of the Dead Sea Graben, with approximately 400 m of vertical relief (1992-2008).

San Bartolo Dike Failure
City of Lima, Peru
Principal geologist reviewing site conditions leading to failure of sewage treatment lagoon upon first filling. Situation involved interaction of the reservoir, concrete-lined treatment lagoons, and water stop performance at a site constructed on a large alluvial fan complex with very pervious, interbedded debris flows. Recent age, poorly cemented sand and gravel rapidly piped to form a failure conduit that measured 30 meters long, 2 meters high and 3 meters wide. Report to Owner is to be part of design basis for remedial treatment of the lagoons that cover an area 2.6 km long x 300 meters wide (2005).

Borman Park Water Supply Tunnel
City of Gary Indiana
Lead Geologist for layout and construction inspection of 3-mile long TBM tunnel beneath the southern end of Lake Michigan. Tunnel was a 13-ft internal diameter drive in Silurian and Devonian limestone and dolomite. 2002-2005.

Markland Generating Station, Potential Failure Mode Analysis (PFMA)
Cinergy Corp., Cincinnati, Ohio
Core team geologist for evaluation of three-unit (87 MW) generating station, integral with the USACOE's Markland Lock and Dam at river mile 531.5 on the Ohio River. The PFMA is a multidisciplinary review and appraisal of potential failure modes, conducted prior to and as part of the 5-year FERC Part 12 Inspection and Safety Report program (2004).

Ohio Falls Power Station, Potential Failure Mode Analysis (PFMA)
Louisville Gas and Electric Company, Louisville, Kentucky
Geologist in FERC evaluation of 8-unit (10 MW) generating station built in 1926-28. Power station is integral with the USACOE's McAlpine Lock and Dam at river mile 605.5 on the Ohio River. The PFMA is a multidisciplinary review and appraisal of potential failure modes, and review of original construction photos, conducted prior to and as part of the 5-year FERC Part 12 Inspection and Safety Report program (2004).

Falcon Dam Drilling Risk Assessment, Starr County, South Texas
International Boundary & Water Commission
Principal Geologist evaluating risk to an existing two mile long embankment dam on the Mexco:USA border, from a proposed deep gas well field development (drilling, fracture completion, and operations) beneath the dam and reservoir. Engineering geologic as well as petroleum geology input to quantitative risk assessment (2004).

Glade Reservoir Evaluation, Fort Collins, CO
Northern Colorado Water Conservancy District, Berthoud, Colorado.
Principal Investigator to evaluate potential reservoir losses from proposed water storage reservoir in gypsum- and limestone-karst terrane. Project involves stratigraphic and structural evaluation of seepage at several dam axes, remedial treatment, and prediction of downstream impacts. Site is in inclined Permo-Triassic strata in the hogback/foothills belt of the eastern Colorado Rockies (2003 to 2004).

Elm Road Power Station Expansion, Milwaukee, WI.
Client: Wisconsin Electric (WE Power, LLC), Milwaukee, Wisconsin.
Geologic consultant for cooling water supply tunnel in Lake Michigan. Tasks involve contracting and supervising offshore geophysical surveys; contract preparation and award for deep offshore drilling program, geotechnical evaluations of limestone and dolomite stratigraphy, and assistance to Owner during license application. Project goal is to provide 2.5 mgd cooling water for expansion of existing coal-fired generating plant on western shore of Lake Michigan, via 32-ft diameter bedrock tunnel with drilled shafts and bottom intakes (2002 to 2004).

City of Chicago/Water Supply Intake Tunnel, Illinois, U.S.A.
Client: City of Chicago
Lead Geologist on siting study for new, fresh-water intake tunnel in limestone and dolomite for the City of Chicago. Main option is for a bedrock TBM tunnel, 30-ft dia., 8 to 10 mi in length, connecting to the existing Jardine Water Purification Plant. Investigations include archive review of existing tunnel data, coordination and interpretation of offshore geophysical surveys, diver inspections, underwater video; selection of alignment; and designing /contracting /supervising offshore drilling activities. Most recent activities have included authoring Design Data Report, and geological portions of the Design Geotechnical Memorandum (1998-2002).

Jinping Hydroelectric Project, Sichuan Province, China
Client: Ertan Hydroelectric Development Corporation (EHDC), Chengdu, Sichuan Province, China
Special Consultant to review twelve years of geologic explorations for proposed 305-meter double curvature arch dam on the Yalong River. On-site, field review of adits, drawings and plans covering project, geology, deep-seated abutment fractures, foundation excavations and concrete materials. This was a joint consultation with MWH's Chief Consultant in Structural Engineering (Dr. C.H.Yeh) who was reviewing the arch dam design (2002).

Glen Park Canal Failure Review, USA, 2003 to 2003
Client: Chubb Insurance Company
Geologic and Geotechnical Reviewer. Review of site inspection reports on a bedrock canal wall failure in karstic limestone in upstate New York. Review dealt with explanation of geologic influences in the failure of a power canal sidewall, which led to loss of generation and required reconstruction. The report involved careful description of geologic processes and providing opinions relative to the industry definition of terms; work done in conjunction with MWH's director of Global Hydropower. (2002)

Bhote Koshi Hydroelectric Project, Nepal
Client: Bhote Koshi Power Company Private Limited
Geologic Consultant for first year field performance review of 50-MW power station designed by Harza Engineering Company in mid-90's. Field review of the 7 km 5-meter dam power tunnel, dam, stilling basin and slope protection works for remote power station in Northern Nepal. Mr. Stukey was the supervising geologist for the design exploration of this project prior to construction (April 2002).

Elkhart Generating Station, IL
Client: Cornbelt Energy, Elkhart IL
Consulting Geologist evaluating subsidence potential for Low Emission Boiler System (LEBS) development above an underground coal mine in central Illinois. Assignments included overall geologic review and evaluation, design of exploration program and coordinated report with academic mine specialist from Southern Illinois University (2001 to 2002).

Wyandotte Gas Turbine Risk Assessment, Wyandotte, Michigan
Client: Southern Energy International
Principal Investigator for risk assessment related to suitability of property for development as gas turbine station. Property is located in suburb of Detroit, Michigan, and is underlain by former solution-mined salt caverns. Risk question related to evaluating the potential for development of surface sinkholes on property, similar to large sinks that had developed within a mile of the site in 1971. Project involved field interviews and evaluation of infrastructure, review of literature, and final report advising client to purchase (2000).

US Army Corps of Engineers Stone Committee
Client: City of Chicago Department of Environment
Engineering Geologist representing the City of Chicago on Joint Committee addressing stone quality, specifications, and inspection issues related to Chicago Shoreline protection and marine construction projects. Committee consisted of district geologists from the Chicago, Detroit and Buffalo Districts of the Corps of Engineers, plus designers, contractors, field supervisors, and project management personnel. Work involved field review of quarries, defining acceptable and non-acceptable stone for above-water and submerged placement, and developing realistic QC criteria for inspection (2000-2002).

South Water Purification Plant - Breakwater Reconstruction, Illinois, U.S.A.
Client: City of Chicago, IL
Principal Geologist responsible for assuring stone quality for reconstruction work on 2600-ft breakwater in Lake Michigan. Stone ranges to maximum size of 20 tons, and involves field and office coordination with US Army Corps of Engineers, City of Chicago Departments of Water and the Environment, review of quarry operations, and coordination with resident construction staff (1997-1999).

Hongjiadu Hydroelectric Project, Guizhou Province, People's Republic of China
Client: Asian Development Bank
Panel of Experts Member, Foundation Specialist, engaged for initial review of Project Design (Guiyang Hydroelectric Investigation, Design and Research Institute) with continuing role in Contract Document review and consultation during construction of 182-m-high Concrete Face Rockfill Dam (CFRD). Project is in classical Karst Terrane of south-central China, near the capital city of Guiyang (1996).

Boyabat Dam and Hydroelectric Project, Turkey
Client: Dogus Construction Consortium
Lead Geologist for foundation treatment program of 195-m-high, concrete gravity dam on the Kizilirmak River in northern Turkey. Advising design-build contractor on major project in limestone terrain with karst solution features. Preparation of contract document drawings and text for anticipated treatment (1999).

Kalungwishe River Feasibility Studies, Zambia
Client: Zambia Electric Service Company
Lead Geologist for design and evaluation of field geophysical and drilling programs at two sites on the Kalungwishe River, in remote Northern Zambia (Kundabwika and Kalungwishe). Coordinated work of Zimbabwean contractors and Romanian field personnel (1998-1999).

Itezhi-Tezhi Project, Zambia
Client: Zambia Electric Service Company
Senior Geologist on multi-disciplinary team reviewing construction and performance history of 20-year-old embankment dam in western Zambia for possible expansion to produce power. Reviewed existing construction and artesian uplift records on site, developed program and specifications for investigation, and authored summary report for management on geologic and geotechnical factors affecting the expansion (1996-1998).

Rouge River Combined Sewage Overflow Control Tunnel, Michigan, U.S.A.
Client: Wade Trim Associates, Inc., and Detroit Water and Sewerage Department
Peer Review Specialist evaluating Feasibility Report for CSOP program in suburban Detroit. Key concerns involve construction of 7.5-mi tunnel system in glacial soils and bedrock with H_2S, methane and artesian groundwater pressures. Coordinated draft report and presentation to client and peer organization (1998).

LaFortuna Project, David, Panama
Client: ENRON
Geologic evaluation of existing hydroelectric power station for privatization offer. Elements include underground power station cavern, 8-km long tail tunnel, and 100-m-high concrete faced rock fill dam (1998).

Bhote Koshi Hydroelectric Project, Nepal
Client: Bhote Koshi Power Company Private Limited
Lead Geologist for private power development in west central Nepal. Reviewed field conditions for diversion weir, desanding basin, 7-km transfer tunnel, 1500-m surface penstock and 32-MW surface power station. Set up exploration drilling and mapping program for foundation and materials investigations, and wrote investigation contract specifications on site in Nepal for Nepali contractors. Advised MWH design engineering team, and wrote geotechnical evaluation for client and funding agencies (1993-1997).

La Fortuna Tunnel Inspection, Panama
Client: IRHE (Instituto de Recursos Hidraulico y Electrification)
Geologic review of 8-km tail tunnel. The 5.5-m x 5.5-m tunnel have served the major power station of western Panama for 15 years. The inspection was conducted to determine the degree of deterioration of the tunnel and lining, relating to future rehabilitation and planning work (1996).

Rouge River Outfall, Michigan, U.S.A.
Client: C.C. Johnson & Maholtra, Environmental Engineers and Scientists
Lead Geologist for geologic and geotechnical review of tunnel alignment and profile for proposed 20-ft-dia., 5700-ft-long bedrock tunnel. Work included review of permeability testing, core logging, and evaluation of tunnel alignments in a limestone/dolomite sequence with highly pervious stratigraphic intervals. Large-scale, surface sinkholes resulting from collapse of deep, abandoned solution salt mines were also a concern. Field visits, consulting with client's geotechnical contractor and other specialists, and presentation to the City of Detroit were initiated in July 1995 and are on-going (1995-1996).

Sacaba and Nueovos Apportes Projects, Cochabamba, Bolivia
Client: La Empresa Corani, S.A.
Lead Geologist for technical review and input to construction cost estimate for power and water supply projects involving 19 km of sidehill canal, 16 km of 2.6-m-dia. bedrock tunnel, 2-km surface penstock, 8-MW power station and 20-km water distribution pipeline. Work included field review with Client engineers and geologists, layout of design exploration program, and refining tunnel and penstock alignment. Project is located in high desert terrane (1995-1996).

5 de Noviembre Hydroelectric Project, El Salvador
Client: Comisión Ejecutiva Hidroeléctrica del Río Lempa (CEL)
Lead Geologist for final design exploration and contract documents. Project comprises a 250-m canal; two 6-m-dia., 120-m-long penstocks; and a 120-MW powerstation as an expansion to a currently operating project. Construction will be in alluvial terraces, residual soil and a layered basalt sequence. Primary concerns are to establish construction grades, materials and layouts that will not adversely affect the existing station. Work involved field visits, core review, client presentations, and review of objectives with local contractors and site geologist, and designing layout of geologic drawings for contract documents (1994-1995).

Monk's Hollow Project (100-m thin-arch dam), Utah, U.S.A.
Client: Central Utah Water Conservancy
Consulting Geologist to review past studies and determine a program to evaluate the technical feasibility of siting a 100-m thin arch dam adjacent to a fault zone with more than 100 ft of vertical displacement. The project is located west of the Wasatch front in central Utah and is one element of a large water storage/irrigation system. Work also included interviews with USBR technical staff, coordinating with a local geotechnical firm in Salt Lake City, advising MWH's planning and design engineers, and discussions to appraise client (1994-1995)

Summit Underground Pumped-Storage Project, Ohio, U.S.A.
Client: Ohio Edison Company. Consulting Geologist reviewing geologic conditions related to adapting deep (2,200-ft) underground limestone mine to a proposed pumped-storage project. Work involved site inspection of mine; review of drilling program results related to the mine as a lower reservoir, the underground powerstation, and high-pressure brine zones in rock units immediately beneath the mine. Work was performed as part of a small group of MWH technical specialists advising the client of risk associated with financial investment in the project development (1992-1994).

Rocky Mountain Pumped-Storage Project, Georgia, U.S.A.
Client: Oglethorpe Power Corporation
Senior Geologist for team of specialists advising client prior to their commitment to take over partially completed project and Lead Geologist throughout final design investigations, preparation of contract documents, and construction. Main geotechnical elements involved determining extent of upper reservoir blanket, geologic criteria for 400-ft-deep cutoff wall for the main (lower) dam, and foundation treatment for seven related, lower reservoir saddle dams. Project is located in karst limestone and clastic rock units of the southern, folded Appalachian Mountains (1989-1994).

Hidronor Privatization, Argentina
Client: Southern Electric International
Consulting Geologist on review team advising client of risk and costs prior to bidding on five existing hydroelectric projects being privatized by the government of Argentina. Work included site and document reviews, interviews with current operators and local consultants, and reporting to client. The Alicura Project was successfully bid and technical review of drainage for the 100-m embankment dam and intake canal continued was added to original work scope (1993).

Twin Buttes Dam, Texas, U.S.A.
Client: U.S. Bureau of Reclamation
Consulting Geologist on two-person specialist team reviewing seepage at 20,000-ft-long, 85-ft-high embankment dam in Big Spring, Texas. Reviewed geologic and construction drawings, interviewed client staff, reviewed existing investigation data, existing remedial grouting and drainage well treatment, monitoring records, and advised on additional cutoff and grouting programs (1993).

Warragamba Dam, Sydney, Australia
Client: New South Wales Public Works
As Consulting Geologist on three-person specialist team, reviewed possibility of raising a 140-m-high concrete dam impounding the principal water supply for Sydney, Australia. The work involved a site visit to inspect the dam and review geologic, construction and monitoring records for the 30-year-old structure. The foundation conditions included evaluation of stress-relief uplift during construction, differential modulus values on opposite abutments, abutment creep during construction and early operation, and crack development in the dam during early operation. Report to the client was an onsite evaluation of the feasibility of raising the dam for additional storage (1993).

South Holston Dam, Tennessee, U.S.A.
Client: Tennessee Valley Authority
As Consulting Geologist, established, monitored, and interpreted drilling program (dam and barge drilling) to determine feasibility of providing shaft and tunnel outlet to existing reservoir. Supervised subcontractor's site geologist, correlated new drill data with construction records and photos from 1940s. Reported internally to MWH design team on geologic/geotechnical criteria (1992).

Chien-Min Reservoir Feasibility Planning Project, Taiwan
Client: Taiwan Provincial Water Conservancy Bureau
As Consulting Geologist, advised Taiwanese design firm and client on dam type, axis location, construction materials and design exploration for the 110-m-high embankment dam and 7.3-km trans-basin diversion tunnel. Work involved field review, core review, coordination with design engineers to layout geotechnical drawings, and written and verbal presentations to client (1991-1992).

Moose River Hydroelectric Project, New York, U.S.A.
Client: Long Lake Energy Corporation
As Lead Geologist, set up and supervised field investigations for a 4,500-ft, 15-ft-dia. unlined bedrock power tunnel and surface power station. Work also included monitoring construction activities and initial start up of project, including review of first filling and remedial treatment of project leakage from the TBM tunnel (1985-1987).

Kangneung Hydroelectric Project, South Korea
Client: Korean Electric Power Corporation
Lead Geologist during site selection, investigation, design, and construction of project involving an 85-m-high embankment dam, 15-km power tunnel, 500-m-deep dropshaft, and an 80-MW power station. Work consisted of advising Korean design firm during multiple trips to Korea, field and office review, and client reports (1985-1987).

Ertan Hydroelectric Project (240-m arch dam), Sichuan Province, China
Client: Ertan Hydroelectric Development Corporation
Consulting Geologist for design review of 240-m-high concrete arch dam and 2,000-MW underground power station in metasedimentary rock sequence on the Yalong River. Participated in two-week site review with other specialists to resolve questions of rock design parameters, abutment stability, excavation depths, and foundation treatment tests. Also led presentations on site regarding impact of geology on excavation depth, slope stability, consolidation and curtain grouting, and drainage (1986).

Long Lake Energy Corporation Projects
Client: Long Lake Energy Corporation
Lead Geologist for field investigation of six abandoned dams in the Adirondack Mountains of upstate New York to obtain basic design information for upgrading to operating plants. Of those studied, Philadelphia, Alice Falls, and Christine Falls have since been rehabilitated to serve as functioning small-hydro power plants (1985-1986).

Bath County Pumped-Storage Project, Virginia, U.S.A.
Client: Virginia Power and Electric Company
Lead Geologist during pre-start-up, remedial foundation work for this 2,100-MW pumped-storage project. Compiled construction mapping to determine areas for remedial grouting, drainage, and monitoring in a system comprised of three power tunnels, each 28.5 ft in dia., approximately 6,400-ft long with intermediate 980-ft-high shafts, and six steel penstock sections. Work involved map construction, coordinating field and design staff, and Board presentations. At project close out, Stukey was principal author and supervised assembly of completion reports for foundation treatment of the entire project and the 1.5-year remedial program (1984-1986).

Susitna Hydroelectric Project, Alaska, U.S.A.
Client: Alaska Power Authority
As Lead Geologist, supervised exploration program, trained site geologists, monitored and analyzed field results, and prepared final geologic report for FERC License Application for 800-ft-high embankment dam and 1,000-MW underground power station (1983-1985).

Twin Falls Hydroelectric Project, Idaho, U.S.A.
Client: Idaho Power Corporation
As Lead Geologist, developed foundation investigations for surface and underground expansion of existing project for FERC relicensing (1982-1983).

Upper Han Basin Hydroelectric Project, South Korea
Client: Korea Electric Power Corporation
Lead Geologist responsible for advising Korean consulting firm on geotechnical investigations for three interbasin transfer tunnels, dams, and powerhouses (1982-1983).

South Columbia Basis Irrigation Project-Power Plant Program
Client: South Columbia Basin Irrigation District
Lead Geologist for three power sites in the South Columbia Basin Irrigation district. Directed field investigations of Summer Falls, Main Canal, and PEC Headworks projects; prepared project reports; and participated in developing design/contract documents (1981-1983).

Uribante-Caparo Project, Venezuela
Client: C.A. de Administración de Fomento Eléctrico
Field review of test grouting and consolidation grouting program for 160-m-high (525-ft) embankment dam, on granular limestone (1980-1981).

Electric Lake Dam, Utah, U.S.A.
Client: Utah Power and Light Company
As Field Supervisor of remedial grouting program, stopped reservoir leakage from abutment rock at 200-ft-high embankment dam. The six-month field program involved drilling in core of embankment dam, with cement and chemical grout injection to control leakage (1980-1981).

Water Resources Development Study, Wyoming and Montana, U.S.A.
Client: Mobil Oil Corporation
Site selection studies for water supply reservoirs for synfuel projects near Glendive, Montana; and Buffalo, Wyoming. Field reconnaissance of dam sites with swelling clay and loess deposits (1980).

Tavera-Bao Dam, Dominican Republic
Client: Corporación Dominicana de Electricidad
Lead Geologist for field mapping of foundations and drainage galleries at 100-m-high (328-ft) embankment dam and dike complex. Coordinated with Chief Foundation Engineer on grouting of dam and dike foundations. (1979-1980).

15 de Septiembre (formerly San Lorenzo) Hydroelectric Project, El Salvador
Client: Comisión Ejecutiva Hidroeléctrica del Río Lempa (CEL)
Temporarily supervised sleeve grouting program in alluvial foundation for a 45-m-high (148-ft) embankment dam (1979).

Boundary Dam, Washington, U.S.A.
Client: Seattle City Light

Conducted geologic field review for the 1.5-mi-long Sullivan Creek power tunnel (1979).

Summersville Project, West Virginia, U.S.A.
Client: U.S. Army Corps of Engineers - Huntington District
Conducted geologic investigations for siting a power shaft, tunnel, and powerhouse at the existing dam (1979).

Karun River Dam (200-m thin arch dam), Iran
Client: Khuzestan Water and Power Authority
Resident Geologist for the 200-m-high (656-ft) arch dam and 1,000-MW powerhouse. Maintained all geologic records, mapped 140-m-high (460-ft) underground cutoff wall excavation in limestone foundation, and coordinated grouting programs, drainage, slope stabilization, and foundation treatment with chief foundation engineer. Wrote project completion report for geology, foundation treatment, and groundwater monitoring (1975-1978).

Cornell Hydroelectric Plant Modernization Project, Wisconsin, U.S.A.
Client: Northern States Power Company
Responsible for foundation mapping at expansion site adjacent to existing dam and paper mill (1975).

Nuclear Power Plant Siting Studies, East Coast US
Client: Dames and Moore, Consulting Engineers
Field and office studies for nuclear plant siting in New Jersey, Maryland and Pennsylvania. Work included field supervision of drilling and trenching to detect neo-seismic fault activity, and regional structural geologic evaluation of earthquake and fault risk. (Part-time and full-time work during graduate studies at Rutgers University (1971-1974).

Stony Creek Pumped-Storage Project, Pennsylvania, U.S.A.
Client: Pennsylvania Power and Light Company and Metropolitan Edison Company
Lead Geologist conducting site geologic investigations, including drilling supervision, core logging, pressure testing, and stratigraphic correlations (1970).

Petroleum Exploration, Permian Basin, West Texas and New Mexico, USA
Client: Texaco Inc
Exploration Geologist in Permian Basin. Developed subsurface interpretations and drilling objectives, coordinated with seismic reflection specialists, conducted well site inspection. Oil and gas drilling targets were in the depth range of 12,000 to 18,000 ft in limestone/dolomite reservoirs. (1966-1970)

Additional Experience:

- Adjunct Professor, Illinois Institute of Technology; 3-credit hour lecture series, titled "Engineering Geology, CE-321" (1994, 1996-1998).

- Principal geologist and administrative head for group of 15 geologists and hydrogeologists engaged in RI/FS (Remedial Investigation/Feasibility Study) activities for United States Environmental Protection Agency (USEPA) Superfund sites. Responsible for technical reports and personnel scheduling in Envirosphere's Lyndhurst, New Jersey, and Illinois offices. Projects involved soil and groundwater contamination sites, field assessments, investigation design, and interaction with EPA and other Engineering Subcontractors (1988).

- Consulting during Graduate Work for the following clients: Halecrest Aggregate, Edison, New Jersey (1974); Madison Township Environmental Commission, New Jersey (1973); Rutgers Institute for

Environmental Studies (1973-1974), U.S.A.; Dames & Moore (Nuclear plant / neo-seismic siting studies, East Coast, U.S.A.) (1971-1974).

OVERSEAS ASSIGNMENTS:
Argentina, Australia, Bolivia, China, Dominican Republic, El Salvador, Honduras, Iceland, Indonesia, Iran, Israel, Laos, Nepal, Nicaragua, Nigeria, Peru, South Korea, Venezuela, Zambia.

LANGUAGES:
English, Limited Spanish

TECHNICAL PAPERS:

"Geologic and Hydrogeologic Setting of the Chicago Area," North-Central Section AEG, 1995, compiled and edited by A.H. Stukey, M.P. Bruen, and D.L. Kelleher.

"Rocky Mountain Project - Seepage Cutoff in Solutioned Limestone," ASCE Waterpower 91 (A.H. Stukey, K.L. Wong, and G. Taylor, co-authors).

"Geology and Hydrofracture, Moose River Power Tunnel, New York," ASCE Waterpower 89, 1989 (A.H. Stukey and V.J. Zipparro, co-authors).

"Geologic Influences on Design, Summer Falls, Washington," First International Symposium on Hydraulic Structures, Colorado State University, 1987.

"Geohydrologic Monitoring, Karun Dam, Iran," Proceedings of 10th International Conference of Soil Mechanics and Foundation Engineers, 1981 (A.H. Stukey, J.A. Scoville, and M. Saines, co-authors).

"Site Characterization for Underground Construction" 2004, Invited speaker at Association of Engineering Geologists Symposium on Site Characterizations, Annual Meeting, Detroit Michigan, USA.

PROFESSIONAL HISTORY:

2010 to present, AH Stukey, Consulting Geologist, LLC

2005 to present – Chief Geologist, Aqua-Energie, LLC.

1996 to 2010 - Independent Consultant; and Chief-Consultant-Geology (Senior Advisor) for MWH

1975 to present Harza Engineering / MWH Global, Chicago, Illinois, U.S.A.

2001 to present	Chief Consultant - Geology
1995	Principal Engineering Geologist and Partner
1990	Senior Associate
1986	Associate
1986	Geology Section Head
1979	Senior Engineering Geologist
1975 to 1979	Engineering Geologist

1970 to 1975 Consultant/Ph.D. Graduate Student, New Jersey, U.S.A.

1971 **Harza Engineering Company, Chicago, Illinois, U.S.A.**

1966 to 1970 Field Geologist **Texaco, Inc., Texas, U.S.A.**
Exploration Geologist