



MEMORANDUM

FC 14 (01-02-07)

TO: CEO Beau Goldie

FROM: DOO Frank Maitski

SUBJECT: Dam Safety Program Update

DATE: 5/17/2011

Staff committed to inform the Board on critical Dam Safety Program issues. This is the 2nd Dam Safety Program Update for 2011. This update provides information on all 3 seismic stability evaluation projects, the Anderson Dam Seismic Stability Retrofit Project, the Dam Maintenance Program EIR, the FERC Five Year Safety Inspection and Report for Anderson Dam, and the Dam Safety Review of Almaden, Calero, and Guadalupe Dams.

See the attached table summarizing the status of 3 seismic stability evaluation consultant agreements.

Anderson Dam Seismic Stability Evaluation

The major tasks in this project include field and laboratory investigations, seismic stability evaluations, and preparing the final report. The seismic stability analyses are complete. A draft seismic stability evaluation report was provided to Division of Safety of Dams (DSOD) and the Federal Energy Regulatory Commission (FERC) for comment on February 1, 2011. The final report is scheduled to be completed in May 2011, pending receipt of regulatory agency comments. The field investigation is complete except for the fault rupture study which is discussed below.

Preliminary results on the seismic stability of the dam embankment were developed and shared with the Board of Directors on October 26, 2010. The dam was determined to have inadequate seismic stability and the operating restriction was increased to 37 feet below the spillway, as an interim measure, to ensure public safety.

More refined analysis on the probable deformation and recommended operating restriction was provided to the District on December 21, 2010. Based on this analysis, the District's consultant recommended an operating restriction of 20 to 25 feet below the spillway crest to provide an adequate level of safety to the downstream public. After a peer review by the District's Technical Review Board, this analysis was presented to DSOD and FERC on February 9, 2011. Based upon this refined analysis, staff requested a revision of the operating restriction to 25 feet below the spillway crest.

The regulatory agencies are still reviewing our revised operating restriction request. Staff met with both DSOD and FERC on the seismic stability evaluation study and the proposed operating restriction on May 3, 2011. We are anticipating a response from both agencies in May.

The fault rupture investigation to determine whether the fault traces located under the dam are active is ongoing. The significance of an active fault under the dam could determine whether or not the existing dam outlet structure will need to be replaced. We have not yet produced sufficient clear evidence that the faults are inactive. This work and the next steps were presented to the District's Technical Review Board on January 7, 2011 for review. Although the consultant completed the work required by the scope of the contract, staff requested recommendations on further fault trenching required to definitively establish that the fault is inactive.

Staff will incorporate consideration of further field investigation for fault rupture and fault offset into the planning consultants work for the Anderson Dam Seismic Stability Retrofit Project.

A Technical Memo on conceptual options for dam embankment retrofits has been provided to DSOD and FERC for their information. A Technical Memo on conceptual options for outlet pipe

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rehabilitation/replacement will be provided to DSOD and FERC in May 2011 for their information. These Technical Memos will serve as input to the planning process.

Anderson Dam Seismic Stability Retrofit Project

Staff initiated work to scope and execute a seismic stability retrofit project. A budget adjustment to fund this project in FY 2011 was approved by the Board on January 25, 2011.

In the past two months, staff has developed the overall project delivery strategy and is working with the Division of Safety of Dams (DSOD) and the Federal Energy Regulatory Commission (FERC) to refine the project scope.

The overall project delivery strategy has been incorporated in the Fiscal Year 2012-2016 Capital Improvement Plan and the Fiscal Year 2012 budget. The strategy involves retaining separate consulting firms to perform project management, planning, design, and construction management work. The use of consultants to undertake and prepare the key project deliverables is being proposed due to the extensive resource commitment necessary for a project of this magnitude. Future seismic retrofit projects at other District dams may be more conducive for use of in-house staff resources.

A key project delivery decision is to separate different phases of the work into separate consultant agreements. Another key decision is that a Project Management firm will be retained to lead the execution of the project. This will provide continuity and external resources to expeditiously undertake this retrofit project. The RFP for the Project Manager may include the possibility of adding other potential future dam rehabilitation projects to the agreement.

The scope of this project will include modifying or replacing the outlet works to address the potential fault rupture risk. However, funding for the outlet works has not been included in the Fiscal Year 12-16 CIP. Funding for the replacement of the outlet works is planned to be included in the Fiscal Year 13-17 CIP. We anticipate performing additional field investigation under this project to either establish fault inactivity and/or to estimate the potential fault offset to determine whether it is feasible to modify the outlet works versus a full replacement.

The other major outstanding scope issues include the adequacy of the existing spillway and the flow capacity requirements of the new or rehabilitated outlet. The District has requested input from both DSOD and FERC on these issues.

Staff plans to solicit proposals from consulting firms for the overall Program Management scope of work by May 2011 and the Planning Phase scope of work by June 2011. The award of these two contracts will occur in fall 2011.

Dam Maintenance EIR

The draft Dam Maintenance EIR will be issued for public review in May, 2011, with the public comment period closing by June 30. Although the nature and extent of comments may impact the schedule, the Dam Maintenance EIR is currently scheduled for Board certification in August, 2011. This will allow for an extended internal review to ensure effective coordination with habitat conservation plans and to optimize maintenance work practices.

Almaden, Calero and Guadalupe Dam Seismic Stability Evaluations

The major tasks in these evaluations include field and laboratory investigations, seismic stability analyses, and completion of the final report. The field and laboratory investigations are complete and analyzed. Engineering material properties for the dams were developed by the consultant and presented to DSOD in December 2010. DSOD agreed with the adequacy of the field investigation and the proposed engineering material properties.. Resolving DSOD comments on the appropriate ground

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motions (earthquake energy and wave shape) for analysis was completed on April 11, 2011, and allowed the seismic stability evaluation analysis to move forward.

The field investigation identified the presence of alluvial materials in portions of the foundations at all three dams, with potential liquefaction under Calero Main Dam in a maximum credible earthquake. This new information resulted in the District proposing a revision to the operating restriction from 5.9 feet to 14 feet below the spillway crest. DSOD accepted this revision.

The field and lab investigation also confirmed that the Guadalupe Dam embankment is weaker than desirable, which may result in excessive deformation. Although preliminary results on the seismic stability of the dam embankments will not be presented to DSOD until the fall of 2011, staff believes it is possible that both Calero Main Dam and Guadalupe Dam may be found to have inadequate seismic stability. The Almaden Dam analysis is continuing.

A draft seismic stability evaluation report will be provided to DSOD for comment in February 2012, with the final report completed in March 2012.

Chesbro, Lenihan, Stevens Creek, and Uvas Dam Seismic Stability Evaluations

The project scope for the current evaluations includes the seismic stability evaluation for Lenihan and Stevens Creek Dams (SSE2A). Chesbro and Uvas Dams (SSE2B) will be evaluated after the agreement is amended, as originally planned. The major tasks in the SSE2A project are similar to those in the other seismic stability evaluations.

The planned field investigation at Stevens Creek is complete and the work plan for the Lenihan Dam field investigation is under review by DSOD. The seismic stability analyses will begin after DSOD accepts results of the field and laboratory investigations, with the final report to follow.

The field and lab investigation at Stevens Creek Dam shows foundation alluvial materials that may be liquefiable in a maximum credible earthquake.

The consultant briefed the Technical Review Board on May 5, 2011 on the Stevens Creek Dam field and lab investigation, probable engineering material properties, and possible outcomes of the seismic stability evaluation. After review and discussion of the information presented, the Technical Review Board recommended additional field investigation at Stevens Creek Dam. Even with the potentially liquefiable alluvial material in the dam foundations, the Technical Review Board believes there is a substantial chance of establishing the seismic adequacy of Stevens Creek Dam, and that this additional field investigation is critical to making a convincing case.

Staff concurs and believes that an investment in this field investigation is key to minimizing the need for a seismic retrofit. We are working with the consultant to develop an appropriate scope, work plan, and budget for this work for approval by DSOD. If this additional field investigation cost exceeds the contract budget, staff will bring a contract amendment to the Board for approval, along with the measures to fund the work.

This additional field investigation will impact the schedule for completion. Once a new schedule has been discussed with DSOD, the Board will be updated.

The consultant reviewed the large amount of information available at Lenihan Dam and completed some preliminary seismic stability analyses with just the existing information. After review by staff and the Technical Review Board, a limited work plan for the Lenihan Dam field investigation was submitted to DSOD for review on April 11, 2011.

FERC Five Year Safety Inspection and Report for Anderson Dam

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One of the requirements of the District's license with the Federal Energy Regulatory Commission (FERC) for the operation of Anderson Dam is to have an "Independent Consultant" perform a detailed safety performance review and inspection once every five years. The Independent Consultant, Ken King, was retained by the District under the consultant contract approved by the Board on June 15, 2010. The Independent Consultant must prepare a report on this process, which is due to FERC by August 24, 2011. The Safety Inspection of Anderson Dam was held with the Independent Consultant and FERC on April 26, 2011. No major issues emerged from this inspection. The project is on schedule.

Dam Safety Review of Almaden, Calero, and Guadalupe Dams

In addition to the required inspection and report of Anderson, the District also included an independent dam safety review and potential failure mode analysis evaluation for Almaden, Calero, and Guadalupe Dams. This work will provide critical information for planning and executing the dam safety program at these three dams. The analysis will determine if the Dam Safety Program is monitoring and analyzing conditions relevant to public safety, and to gather data that may be useful should seismic retrofits be required at any of these dams.

The Potential Failure Mode Analysis workshop for Almaden, Calero, and Guadalupe Dams was held March 22 through 24. No surprising failure modes were identified, but areas needing additional evaluation, or monitoring, include seepage at Almaden and Calero Dams and whether the Almaden Dam embankment and spillway are adequate to contain and pass the Probable Maximum Flood. The project is on schedule.



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Water Utility Technical Support Division Deputy's Office

Attachment

SCVWD Dams - Seismic Stability Evaluation – Consultant Agreement Status

Anderson

Consultant: AMEC Geomatrix

Consultant Budget: \$3.126 million, 83.7% expended

Conditional Task Budget Authorized: \$362,327 authorized (79%) of \$457,000 budgeted, for downstream shell Becker Hammer testing, support for fault rupture field investigation Mitigated Negative Declaration, fault rupture investigation, for sensitivity analysis, for reservoir restrictions, and for conceptual remedial alternatives.

Completion: 86.6% complete

Completion Date: Refined results on the seismic stability of the dam embankment confirmed that the dam had inadequate seismic stability and were presented to the Board in January 2011 and DSOD and FERC in February 2011. We will complete the report by May 2011. This project's final report on the fault rupture issue will occur on a separate track after May 2011. This work will not be sufficient to establish fault inactivity, so staff will incorporate consideration of further field investigation for fault rupture and fault offset into the planning consultants work for the Anderson Dam Seismic Stability Retrofit Project.

Issues: seismic stability of embankment confirmed to be deficient, outlet pipe may need rehabilitation or replacement.

SSE1B (Almaden, Calero, Guadalupe)

Consultant: URS

Consultant Budget: \$3.3 million, 71% expended

Conditional Task Budget Authorized: \$341,057 authorized (42%) of \$810,000 budgeted, for Calero Dam Becker Hammer Testing, for Calero Fault investigations, and more refined deformation analysis.

Completion: 71% complete

Completion Date: Preliminary results on the seismic stability of the dam embankments will be presented to DSOD in summer 2011. We will update the Board thereafter, with completion of the report by March 2012

Issues: seismic stability of embankments is probably deficient at Calero Main and Guadalupe Dams, with Almaden Dam to be determined.

SSE2 (Lenihan, Stevens Creek, Chesbro & Uvas)

Consultant: Terra/GeoPentech, A Joint Venture

Consultant Budget: \$1.89 million FY 2010, 40% expended (\$2 million planned for FY 2012 budget for Chesbro and Uvas Dams)

Conditional Task Budget Authorized: \$100,776 authorized (22%) of \$449,000 budgeted, for characterization of Lenihan Fault traces and completion of Becker Penetration Tests at Stevens Creek Dam.

Completion: 39.2% complete

Completion Date: Current schedule calls for completion of Lenihan & Stevens Creek Dams by January 2012 and Chesbro & Uvas Dams by December 2013. Additional Stevens Creek Dam field investigation will require a schedule extension, subject to discussion with DSOD.

Issues: Seismic stability of embankments – potentially liquefiable alluvium found at Stevens Creek Dam, consultant will be performing additional field investigation and analyses to determine whether the dam is deficient or not.

