



MEMORANDUM

FC 14 (01-02-07)

TO: CEO Beau Goldie

FROM: DOO Frank Maitiski

SUBJECT: Dam Safety Program Update

DATE: 3/21/2011

Staff committed to inform the Board on critical Dam Safety Program issues. This is the 1st Dam Safety Program Update for 2011.

See Attachment for table summarizing status of 3 seismic stability evaluation projects.

Dam Safety Program – Board Work Study Session

A Board Work Study Session on the Dam Safety Program was held on January 18, 2011. The agenda included briefing and discussion of the Dam Safety Program elements, past dam work and upgrades, the evolution of dam seismic stability, an update on Anderson Dam seismic stability findings and the associated Anderson/Coyote Dam operating restrictions, an update on the Calero Dam seismic stability findings, and an update on issues for each District dam.

Anderson Dam Seismic Stability Evaluation

The major tasks in this project include field and laboratory investigations, seismic stability analyses, and the writing of the final report. The field investigation is complete except for the fault rupture study which is discussed below. The seismic stability analyses are nearly complete. A draft seismic stability evaluation report will be provided to DSOD and FERC for comment in April 2011, with the final report completed in May 2011.

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 upon the probable deformation, and potential cracking from a major earthquake, the consultant recommended an operating restriction of between 20 to 25 feet below the spillway crest to provide an adequate level of safety to the downstream public. After a peer review by a second consultant, and review by our Technical Review Board, this analysis was presented to DSOD and FERC on February 9, 2011. Based upon this refined analysis, staff proposed a revision of the operating restriction to 25 feet below the spillway crest. Staff submitted this proposal to DSOD and FERC for review in parallel with their review of the refined analysis. The regulatory agencies are still reviewing our revised operating restriction proposal.

The initial fault trench for evaluating fault activity was completed on December 14, 2010. This initial fault trench did not produce clear evidence that the fault is inactive, which is required to eliminate the issue of fault rupture of the outlet. This work and the next steps were presented to our Technical Review Board on January 7, 2011 for review. Although the consultant completed the work required by the scope of the contract, staff requested a proposal on further fault trenching to definitively establish that the fault is inactive.

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.

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Early work focused on developing the overall project delivery strategy and refining project scope. A meeting was held on March 4, 2011 regarding the project delivery. The key decisions were to separate planning and design work into separate consultant agreements. The planning consultant will not be eligible for further project work. The other key decision is that a Program Management firm will be retained to lead the execution of the project. These key decisions will be reflected in the Project Plan.

The major outstanding scope issues include the existing adequacy of the outlet and spillway. The District has requested input from both DSOD and FERC on these adequacy issues.

Dam Maintenance EIR

After completion of review by Counsel, the draft Dam Maintenance EIR should be issued for public review in March 2011. Although the nature and extent of comments may impact the schedule, the Dam Maintenance EIR is currently scheduled for certification by June, 2011.

Almaden, Calero and Guadalupe Dam Seismic Stability Evaluations

The major tasks in this project include field and laboratory investigations, seismic stability analyses, and the writing 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 on December 7 and 8, 2010. DSOD agreed in general with the adequacy of the field investigation and the proposed engineering material properties. DSOD provided written comments on February 7, 2011. The consultant successfully addressed the comments allowing them to begin the seismic stability analyses.

The field investigation identified the presence of alluvial materials in portions of the foundations at all three dams, with probable liquefaction under Calero Main Dam. This new information resulted in the District proposing a revision to the operating restriction 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. 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 will be found to have inadequate seismic stability but for different reasons. The Almaden Dam analysis is continuing. Preliminary results are expected this fall. 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 under the current agreement with Terra/GeoPentech (TGP) includes the seismic stability evaluation for Lenihan and Stevens Creek Dams (SSE2A), with Chesbro and Uvas Dams (SSE2B) to be evaluated after the agreement is amended as originally planned. The major tasks in the SSE2A project include field and laboratory investigations, seismic stability analyses, and the writing of the final report. The planned field investigation at Stevens Creek is complete and the work plan for the Lenihan Dam field investigation is under review. The seismic stability analyses will begin after DSOD accepts results of the field and laboratory investigations, with the final report to follow.

The current schedule shows study completion for Lenihan and Stevens Creek dams by January 2012 and Uvas and Chesbro dams by December 2013, subject to DSOD acceptance. DSOD has indicated they will need additional time to review project deliverables. An updated schedule is being negotiated with DSOD and it will be provided to the Board of Directors once it has been negotiated.

The field and lab investigation at Stevens Creek Dam shows foundation alluvial materials that may be liquefiable. As the seismic stability analysis proceeds, staff will continue to evaluate the need for any

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reservoir operating restriction at Stevens Creek Dam. Although it is very early in the investigation, there is the possibility that some downstream retrofit may be needed.

The consultant reviewed the large amount of information available at Lenihan Dam and completed some preliminary seismic stability analyses with just the existing information. A modest proposal for the Lenihan Dam field investigation has been submitted and is under review.

Dam Inspections and Maintenance

DSOD inspections of Anderson, Stevens Creek, Coyote, Coyote Percolation, Chesbro and Uvas Dams were completed on February 15, 2011. The DSOD area engineer appeared satisfied with the status of the dams and the maintenance completed on them, although the inspections confirmed a modest number of items needing follow-up. This inspection confirmed that there is still a substantial gopher problem at many of the dams. Staff is working to ensure that we will have adequate environmental clearance to better address this issue in Dam Maintenance Program EIR.

FERC Five Year Safety Inspection and Report for Anderson Dam

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 must prepare a report on this process, which is due to FERC by August 2011. The kickoff meeting for this project was held on January 26, 2011 and 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 is scheduled for March 22 through 24.



Frank Maitski
Deputy Administrative Officer
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, 82.6% expended**Conditional Task Budget Authorized:** \$328,527 authorized (72%) of \$457,000 budgeted, for downstream shell Becker Hammer testing, support for fault rupture field investigation MND, fault rupture investigation, for sensitivity analysis, for reservoir restrictions, and for conceptual remedial alternatives.**Completion:** 86% 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. Work to date has not shown the fault to be inactive; scope to finish this evaluation is under review and the final report on the fault rupture issue will occur on a separate track after May 2011.**Issues:** seismic stability of embankment confirmed to be deficient, fault rupture of outlet pipe still under investigation**SSE1B (Almaden, Calero, Guadalupe)****Consultant:** URS**Consultant Budget:** \$3.3 million, 71% expended**Conditional Task Budget Authorized:** \$246,628 authorized (30%) of \$810,000 budgeted, for Calero Dam Becker Hammer Testing and for Calero Fault investigations.**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:** Planned schedule calls for completion of Lenihan & Stevens Creek Dams by January 2012 and Chesbro & Uvas Dams by December 2013, subject to negotiation with DSOD.**Issues:** Seismic stability of embankments – potentially liquefiable alluvium found at Stevens Creek Dam, consultant will be performing analyses to determine whether the dam is deficient or not; too early to tell at Lenihan Dam.