



## MEMORANDUM

FC 14 (01-02-07)

**TO:** Beau Goldie

**FROM:** Frank Maitiski

**SUBJECT:** Dam Safety Program Update

**DATE:** 9/7/2011

This is the 3rd 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 Dam Maintenance.

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

### Anderson Dam Seismic Stability Evaluation

The major tasks in this project included field and laboratory investigations, seismic stability evaluations, and preparing the final report. The final seismic stability evaluation report was provided to Division of Safety of Dams (DSOD) and the Federal Energy Regulatory Commission (FERC) on June 27, 2011. Based upon the seismic stability evaluation performed under this project, DSOD and FERC approved a revised operating restriction to 25 feet below the spillway crest in June 2011. With this approval, we have recovered 10,560 acre-feet of storage in the reservoir. The Board received an update on these issues in the June 30, 2011, CEO Bulletin.

The fault rupture investigation to determine whether the fault traces located under the dam are active was inconclusive. Staff will incorporate consideration of further field investigation for fault rupture and fault offset into the planning consultant's work for the Anderson Dam Seismic Stability Retrofit Project.

The consultant submitted all required deliverables and we are in the process of closing out the agreement with AMEC Geomatrix. Once the agreement has been closed, the remaining agreement funds will be unencumbered and returned to reserves. With project completion, the next Board Dam Safety Program update will be the last one to discuss the Anderson Dam Seismic Stability Evaluation. The consultant deliverables (Seismic Stability Evaluation Report and technical memoranda) are available on the District's website.

### Anderson Dam Seismic 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 4 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 to ensure timely completion of this retrofit.

The scope of this project will include modifying or replacing the outlet works to address the potential fault rupture risk. 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 to either establish fault

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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 involve assessing the adequacy of the existing spillway and the flow capacity requirements of the new or rehabilitated outlet. Staff requested input from both DSOD and FERC on these issues. The 2011 FERC Five Year Safety Inspection and Report (discussed below) recommended reevaluation of the Anderson Dam Probable Maximum Flood, which will be addressed in this project.

Staff solicited proposals from consulting firms for the overall Project Management scope of work on July 25, 2011; proposals were received. The selection process continues, with the planned contract award by December, 2011. Proposals for the Planning Phase scope of work were solicited on August 25, 2011, with the planned contract award by February 2012.

### Dam Maintenance EIR

The draft Dam Maintenance EIR was released for public review on August 1, 2011, with the public comment period closing on September 16, 2011. Although the nature and extent of comments may impact the schedule, the Dam Maintenance EIR is currently scheduled for Board certification in December, 2011. This schedule included an extended internal review to ensure effective coordination with habitat conservation plans and to optimize maintenance work practices. Since the Draft Stream Maintenance Program EIR is also out for public review at this time, several resource agencies requested extensions for their review of these two EIRs. After consideration by staff, a two week extension for the Regional Water Quality Control Board to submit comments on the Dam Maintenance Program EIR was agreed upon. This will result in a two week delay in the schedule for Board certification.

### 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 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.

Preliminary results on the seismic stability of the dam embankments was presented first to our Technical Review Board on Friday August 12 and then to DSOD on August 22, 2011. These preliminary results stated that both Calero Main Dam and Guadalupe Dam have inadequate seismic stability, whereas the Almaden Dam and the Calero Auxiliary Dam have adequate seismic stability.

The consultant's next step is to submit a technical memo with recommendations for the operating restriction on these 3 reservoirs in October. Staff will consider and take appropriate action in collaboration with DSOD at that time. It is possible that the recommendations will restrict reservoir storage in Calero and Guadalupe even further. Staff is planning to place an update on these results on the agenda for the October 25, 2011, Board meeting.

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A draft seismic stability evaluation report will be provided to DSOD for comment in January, 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. 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 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 additional field investigation is important to determine if a seismic retrofit will be required. We are working with the consultant to develop an appropriate scope, work plan, and budget for this work for approval by DSOD. After extensive coordination between the parties, a program for additional Stevens Creek field investigation has been developed and submitted to DSOD for approval. The additional field investigation cost is planned to be within the contract budget.

This additional field investigation will impact the schedule for completion. Once a new schedule has been negotiated with DSOD, the Board will be updated. DSOD has been briefed on this and believes that obtaining the information from the additional field investigation is worth the wait.

The consultant reviewed the large amount of information available at Lenihan Dam. After some preliminary seismic stability analyses with just the existing information, a modest field investigation program was approved by DSOD and completed in July, 2011. Laboratory testing of the samples is being carried out.

Staff has not yet initiated the contracting for the Seismic Stability Evaluation of Chesbro and Uvas Dams. DSOD is more focused on completion of the seismic stability evaluations on Almaden, Calero, Guadalupe, Lenihan and Stevens Creek Dams than on compliance with the original schedule.

### 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, was retained by the District under the consultant contract approved by the Board on June 15, 2010. The Independent Consultant prepared the 2011 Five Year Safety Inspection and Report and submitted it to FERC, on schedule, on August 24, 2011. The Report recommended reevaluation of the Anderson Dam Probable Maximum Flood, which will be addressed by the Anderson Dam Seismic Retrofit Project.

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### Dam Maintenance

The dam maintenance program includes cycling (opening and closing) the outlet valves each year to exercise and demonstrate operability of the valves. The September 2, 2011 CEO Bulletin updated the Board on repairs needed on the Guadalupe Dam hydraulic system.

Dam maintenance is being executed as planned in our Annual Maintenance Work Plan and as covered by our current environmental clearances. A number of additional dam maintenance tasks have emerged since the FY 2012 budget was prepared. Currently identified needs include the hydraulic system repairs at Guadalupe Dam, repairs to the Anderson Dam hydraulic system in the control building, replacement of the fixed cone valve hydraulic cylinders at Coyote Dam, and installation of a phone line to the Anderson Dam control building for use in emergencies.

A budget adjustment (currently estimated at \$300,000) for these items will be brought to the Board of Directors on October 25, 2011; it is likely that much of the required funds will be balanced by the surplus funds to be unencumbered and returned to reserves from the AMEC Geomatrix consultant contract for the recently completed Anderson Dam seismic stability evaluation.

Finally, work has begun this year on the design of staff safety improvements at our dams. This includes stairs, anchoring points for the cleaning of spillway weep holes and expansion joints, and improved railings and platforms over the Vasona Dam spillway. The FY 2012 budget included much of the labor for this work. Funds for contract services and materials were deferred until the design was completed and the costs estimated. Staff will be balancing the criticality of making these staff safety improvements in FY 2012, versus budgeting for them in FY 2013, in making a decision on any additional budget adjustment in FY 2012.



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Water Utility Technical Support Division Deputy's Office

Attachment

<p>SCVWD Dams - Seismic Stability Evaluation – Consultant Agreement Status</p> <p><b>Anderson</b>  <b>Consultant:</b> AMEC Geomatrix  <b>Consultant Budget:</b> \$3.126 million, 90.5% expended  <b>Conditional Task Budget Authorized:</b> \$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, sensitivity analysis, reservoir restrictions, and conceptual remedial alternatives.  <b>Completion:</b> 93.5% complete  <b>Completion Date:</b> Project deliverables including reports and technical memoranda were completed in June 2011. Based upon project conclusions, 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.  <b>Issues:</b> seismic stability of embankment confirmed to be deficient, outlet pipe may need rehabilitation or replacement.</p>
<p><b>SSE1B (Almaden, Calero, Guadalupe)</b>  <b>Consultant:</b> URS  <b>Consultant Budget:</b> \$3.3 million, 74% expended  <b>Conditional Task Budget Authorized:</b> \$413,301 authorized (51%), of \$810,000 budgeted, for Calero Dam Becker Hammer Testing, Calero Fault investigations, more refined deformation analysis, and reservoir restriction evaluation.  <b>Completion:</b> 74% complete  <b>Completion Date:</b> Preliminary results on the seismic stability of the dam embankments were presented to DSOD in August 2011. Calero and Guadalupe Dams have inadequate seismic stability. Recommendations for reservoir restrictions are next, with completion of the report by March 2012.  <b>Issues:</b> seismic stability of embankments are deficient at Calero Main and Guadalupe Dams.</p>
<p><b>SSE2 (Lenihan, Stevens Creek, Chesbro &amp; Uvas)</b>  <b>Consultant:</b> Terra/GeoPentech, A Joint Venture  <b>Consultant Budget:</b> \$1.89 million FY 2010, 81% expended (\$2 million planned for FY 2012 budget for Chesbro and Uvas Dams)  <b>Conditional Task Budget Authorized:</b> \$100,776 authorized (22%) of \$449,000 budgeted, for characterization of Lenihan Fault traces and completion of Becker Penetration Tests at Stevens Creek Dam.  <b>Completion:</b> 78% complete  <b>Completion Date:</b> Current schedule calls for completion of Lenihan &amp; Stevens Creek Dams by January 2012 and Chesbro &amp; Uvas Dams by December 2013. Additional Stevens Creek Dam field investigation will require a schedule extension, subject to discussion with DSOD.  <b>Issues:</b> Seismic stability of embankments – potentially liquefiable alluvium found at Stevens Creek Dam. Consultant will perform additional field investigation and analyses to determine whether the dam is seismically deficient.</p>