


MEMORANDUM

July 7, 2011

TO: BOARD OF DIRECTORS
ERIC KUHN, GENERAL MANAGER
DAN BIRCH, DEPUTY GENERAL MANAGER

FROM: JOHN CURRIER, P.E. 

SUBJECT: RITSCHARD DAM INVESTIGATION OF UNUSUAL EMBANKMENT DEFORMATION

There has been a great deal of activity related to the Ritschard Dam embankment deformation investigation since the April board meeting. The expert review panel has met twice with River District staff and our consultant, URS Corporation. Key findings from the panel's report are:

- *“Although the deformations of concern are continuing and require investigation and resolution, they are not accelerating and are not presently occurring at a rate that indicates or requires an emergency response. There is adequate time to investigate and resolve the problem.”¹*
- *“Follow up investigations, instrumentation and monitoring will be needed to establish the extent and specific nature of the problem and to determine, over time, whether or not remediation would be necessary.”²*

The panel's June 22, 2011 report is attached for your review.

This memorandum; 1) briefly updates the board on the expert review panel process and recommendations, 2) transmits the final report of the panel and the joint River District / URS response (Accountability Report) and, 3) **requests three funding authorizations to implement the recommendations of URS, River District staff, and the expert review panel.**

1. **Staff requests authorization to enter into a Continuing Services Agreement with URS Corporation extending through August, 2013 for engineering support related to on-going investigations of the unusual deformation of Ritschard Dam. Staff requests a total authorization through August 2013 of \$280,000.**

¹ *Expert Review Panel - Ritschard Dam Report 2 - Workshop of June 2, 2011, Evaluation of Unusual Settlement, June 22, 2011, J. Lawrence Von Thun, Steve J. Poulos, and Richard W. Kramer*

² *ibid*

Pursuant to the URS Scope of Work and fee estimate dated July 5, 2011, staff recommends a year 1 budget of \$230,000³. Based on anticipated support for the instrumentation and monitoring plan staff recommends a year 2 budget of \$50,000.

2. Staff requests authorization to enter into a contract with drilling contractor, Boart Longyear, with a budget amount of \$165,000⁴ for the purpose of installing the additional Ritschard Dam instrumentation agreed upon between the expert review panel, the River District, and URS Corporation.
3. Staff requests authorization to enter into a contract with excavation contractor, Native Excavating, Inc. with a budget amount of \$30,000 for the purpose of installing the additional Ritschard Dam deformation monuments agreed upon between the expert review panel, the River District, and URS Corporation and for constructing access roads to facilitate the installation of additional instrumentation by others.

1. Reminder of Action Taken at the January, 2011 Board Meeting

In January staff recommended entering into a new continuing services agreement (CSA) with URS with authorization for funding of \$330,000 to cover 2011 and 2012 investigations and evaluation of remediation alternatives. The existing CSA was scheduled to expire on January 31 and it had been amended 6 times and well beyond the initial scope and intent.

The Board directed that the existing CSA be extended until the end of July, 2011 rather than approving a new CSA. The expert review of settlement and the URS' investigations to date would occur within the extension period. Unallocated funding in the existing CSA (~\$130,000) was deemed sufficient to cover outstanding URS tasks and any expenditures during the expert review process.

Staff updated the board in April. No action was requested or taken by the board. At that time the expert review panel was under contract and had been reviewing documents with the first River District / Review Panel / URS workshop scheduled for the following week.

2. Expert Review Process and Resulting Work Plan

The expert review panel consisted of three nationally and internationally recognized embankment dam experts, Larry Von Thun, Steve Poulos, and Richard Kramer. Mr. Von Thun and Mr. Kramer plan on attending the July board meeting.

After initial document review by the panelists, a site visit and workshop with the River District and URS took place on April 28 and 29 at Wolford Mountain Reservoir. Following the workshop the panelists jointly prepared an initial report of their findings and recommendations.

³ \$211,000 included in July 5, 2011 Scope of Work + \$19,000 for additional year 1 tasks that may be required.

⁴ \$143,000 unit cost proposal + 15% contingency

In response to that report, URS, with River District input, prepared an “accountability report” responding to panel’s report. This was followed by a 2nd workshop on June 2nd focusing on unresolved questions. This resulted in the panel’s final report (attached), an updated accountability report (also attached), and a work plan for implementing the panel’s recommendations.

The recommended work plan consists of:

1. Installation of additional instrumentation to monitor and better understand the embankment deformation. The instrumentation includes
 - i. 4 additional inclinometers (they measure horizontal movement of a bore hole providing an understanding of where and at what rate horizontal movements are taking place).
 - ii. 7 additional piezometers (they measure the water level, or pressure, at specific locations within or beneath the embankment).
 - iii. 20 additional surface deformation monuments (monitor surface movement of the embankment)
2. Conducting a Potential Failure Modes Analysis (PFMA). The PFMA will address the full range of dam-safety-related potential failure modes.

An additional, optional, task for conducting a stability analysis of the upstream slope of the embankment has been budgeted but will only take place if deemed appropriate and necessary by the expert review panelists or in response to the additional monitoring results.

3. Conclusion

The settlement of Ritschard Dam is significant and the River District is committed to thorough investigation and appropriate remediation should the investigation conclude that it is necessary. We are confident that the additional instrumentation and monitoring recommended by the expert review panel is a step in the right direction.

Attachments:

1. Expert Review Panel - Ritschard Dam Report 2 - Workshop of June 2, 2011, Evaluation of Unusual Settlement, June 22, 2011, J. Lawrence Von Thun, Steve J. Poulos, and Richard W. Kramer
2. Accountability Report, Ritschard Dam Movement Evaluation, July 7, 2011, URS Corp. and River District staff