Dams and Extreme Events — Reducing Risk of Aging Infrastructure under Extreme Loading Conditions

34th Annual USSD Conference
San Francisco, California, April 7-11, 2014
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Dams and Extreme Events — Reducing Risk of Aging Infrastructure under Extreme Loading Conditions

34th Annual USSD Conference
San Francisco, California, April 7-11, 2014

Hosted by
San Francisco Public Utilities Commission
On the Cover

Aerial view of the Calaveras Dam Replacement Project taken on January 27, 2014. The San Francisco Public Utilities Commission is building a new earth and rock fill dam immediately downstream of the existing dam. The replacement Calaveras Dam will have a structural height of 220 feet. Upon completion, the Calaveras Reservoir will be restored to its historical storage capacity of 96,850 acre-feet or 31 billion gallons of water. The project is the largest project of the Water System Improvement Program to repair, replace and seismically upgrade key components of the Hetch Hetchy Regional Water System, providing water to 2.6 million customers.

U.S. Society on Dams

Vision

To be the nation's leading organization of professionals dedicated to advancing the role of dams for the benefit of society.

Mission — USSD is dedicated to:

• Advancing the knowledge of dam engineering, construction, planning, operation, performance, rehabilitation, decommissioning, maintenance, security and safety;
• Fostering dam technology for socially, environmentally and financially sustainable water resources systems;
• Providing public awareness of the role of dams in the management of the nation's water resources;
• Enhancing practices to meet current and future challenges on dams; and
• Representing the United States as an active member of the International Commission on Large Dams (ICOLD).

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FOREWORD

Included in these Proceedings are papers presented during the 34th USSD Annual Meeting and Conference, held April 7-11, 2014, in San Francisco, California. A separate book includes abstracts for each paper.

The theme of the 34th USSD Conference was Dams and Extreme Events — Reducing Risk of Aging Infrastructure under Extreme Loading Conditions. The Conference technical program was organized by several USSD Committees under the leadership of Daniel L. Wade, San Francisco Public Utilities Commission. The nation’s 80,000 dams are aging, and more than 75 percent of these facilities are more than 50 years old. However, the criticality of these facilities has increased over time as a result of the ever increasing demands for water, flood control and energy. In addition, many older low and significant hazard dams that were constructed to protect agricultural interests are now protecting people and personal property. As a result, the classifications of many of these structures have changed to high hazard, bringing new costly challenges for owners to retrofit or modify existing dams in response to the new role of the structure.

As dam owners are faced with the decision of either life extension or retirement of aging facilities, a renewed focus on dam safety risk reduction for extreme loading conditions through prudent economic investment is paramount to making wise decisions.

The theme highlights the need for continued innovation in prediction and analysis of loading conditions from extreme events, and the need to apply these advances to make prudent investments to reduce risk and economically meet the ever increasing needs for responsible water resources, flood control, energy and mining projects.

The papers in the Proceedings were selected from abstracts submitted in response to a Call for Papers, and include both oral and poster presentations. Authors are specialists with broad experience from government agencies, utilities, academia, water districts, consulting firms and private industry.

The Conference Organizing Committee extends thanks and appreciation to the San Francisco Public Utilities Commission, Hosts of the 34th Annual Meeting and Conference.

Special thanks are also extended to the Committee Members who selected the abstracts and reviewed the technical papers, and to the authors who prepared the papers included in the Proceedings.
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Update on the Calaveras Dam Replacement Project

Michael Forrest and John Roadifer, URS Corporation; and Daniel L. Wade, Susan Hou and Gilbert Tang, San Francisco Public Utilities Commission

Dam Foundations & Differing Site Conditions — Calaveras Dam Replacement Project

Jeffrey M. Bair, Terence M. King and Christopher G. Mueller, Black & Veatch Corporation; and Daniel L. Wade and Susan S. Hou, San Francisco Public Utilities Commission