



Field visit with Division of Safety of Dams and Federal Energy Regulatory Commission.



Inspection of Almaden Reservoir spillway.

The water district recognizes the catastrophic nature of potential dam failure and has implemented a comprehensive dam safety program to protect the public.

The Dam Safety Program includes four main components:

- A** Periodic special engineering studies
- B** Surveillance and monitoring program
- C** Routine inspections and maintenance activities
- D** Maintaining emergency response and preparedness plans

Through the water district's dam safety program, it ensures the continued operation of its 10 major dams. The water district also works closely with state and federal regulators, and downstream emergency response partners to meet these goals.

A Periodic special engineering studies

As geotechnical and geological professionals study catastrophic events worldwide and gain new understandings of earthquakes and their associated impacts on dams, the water district periodically undertakes special engineering studies to ensure that its dams are compliant with the latest design guidelines and regulations. Like building codes, the methods and

analysis used in the 1970s and 1980s are now outdated and require modification to keep pace with the growing body of knowledge surrounding earthquakes. In addition to seismic studies, the water district periodically conducts other special engineering studies to minimize the risks to its dams.

Water district engineers and consultants continue to study earthquakes and seismic risks as it relates to dam safety. Engineers are currently undertaking extensive seismic stability studies at Anderson, Almaden, Calero, Guadalupe, Stevens Creek and Lenihan Dams. Studies for Uvas and Chesbro Dams begin in 2012.

Seismic stability evaluations typically study the ability of the dam to withstand the effects of strong shaking in a major earthquake and if any faults beneath a dam could move and cause damage.

Of particular concern are loose layers of sandy or gravelly soils found under many of our dams, which could experience



Analysis of a soil sample extracted from a dam.

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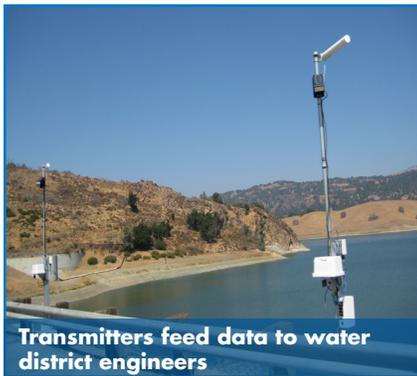
a reduction in strength (known as liquefaction) during a major earthquake. If the intensity of the earthquake is large enough, the sides of the dam could deform and potentially cause significant damage. If a dam is found deficient in these studies, the water district will lower the water to a safe level while it fixes the dam with a construction project.

Every five years, the Federal Energy Regulatory Commission (FERC) requires the water district to bring in a team of independent experts to inspect Anderson Dam, evaluate all conceivable potential risks to the dam and develop strategies to minimize these risks. Though not required by the regulatory agencies, the water district has proactively expanded this potential failure mode analysis approach to the remainder of our dams. By the end of 2012, it will have completed potential failure mode analyses for Anderson, Almaden, Calero, and Guadalupe Dams.

B Surveillance and monitoring

Instrumentation placed in and on the dam furnishes data for water district engineers to determine if the structure is functioning as intended.

The water district has automated instrumentation at five dams. The equipment is capable of collecting, checking, recording and archiving the collected data and alerting staff when parameters exceed set threshold limits.



Transmitters feed data to water district engineers

The water district continuously monitors the conditions of its dams. Two basic parameters are monitored: water seepage through the dam and physical

movement of the structure. Piezometers measure water pressure in the dam and at five dams, feed daily readings to transmitters located at the dam crest to water district offices via satellite. Inclometers in the dam and surface monuments measure dam movements.

C Dam inspections and maintenance

A good maintenance program will protect a dam against deterioration and prolong its life. Dams can deteriorate if not properly maintained. The water district's inspection and maintenance program carefully maintains all of its dams to ensure public safety.

The water district routinely inspects and monitors the condition of each dam and provides an annual surveillance report to the Division of Safety of Dams (DSOD), under the California Department of Water Resources. We work with DSOD and FERC at Anderson Dam to ensure that our dams continue to operate safely. Each year, in addition to our regular internal inspections, the water district jointly inspects each dam with DSOD.

D Emergency response and preparedness



Emergency operations staff participating in a training exercise.

At the core of the Dam Safety Program's emergency response and preparedness is its post earthquake dam evaluation program team. After significant earthquakes, trained personnel inspect the dams for any signs of damage or potential for failure.

The water district works with various agencies on emergency action planning and training exercises each year. Under the Dam Safety Program, the water district is developing updated maps which estimate what areas could flood in the highly unlikely event of a dam failure. The inundation maps for Anderson Dam were updated in 2009 and shared with the appropriate downstream emergency response partners.

Contact us

For more information, contact **Emmanuel Aryee** at **(408) 630-3074**, or earyee@valleywater.org.