

## **Santa Clara Valley Water District Dam Safety Program**

Valley Water owns and operates 14 regulated dam structures under licenses granted by the State of California Department of Water Resources, Division of Safety of Dams (DSOD). The regulated structures include 10 major reservoir dams, Coyote Percolation Pond Flashboard Dam, Rinconada Water Treatment Plant Reservoir, Fellows Dike, and Calero Auxiliary Dam. The sizes of Valley Water's reservoirs vary from 495 Acre-Feet (AF) to 90,323 AF. The combined storage capacity of Valley Water's 10 major reservoirs is 169,009 AF. Anderson Dam, because of its power generating capability, is also under the Federal Energy Regulatory Commission (FERC). As part of these license requirements, Valley Water must provide assurances that its dams and other water retention facilities are inspected for safety on a regular basis, and that the reservoirs are operated safely. The Dam Safety Program directly supports this goal. The major operational elements of the Program are:

1. Dam safety surveillance and monitoring;
2. Dam inspections and maintenance;
3. Emergency preparedness and response; and
4. Special engineering studies such as seismic evaluations.

The following is a description and update of these elements.

### **1. Dam Safety Surveillance and Monitoring:**

#### Background:

Valley Water performs dam safety surveillance and monitoring to ensure that the condition of dam assets is adequately monitored, analyzed for safety, and documented. Valley Water monitors the movement of the dams and the flow (and pressure) of the water moving through the dams. This is achieved by regularly monitoring an array of instruments consisting of piezometers, inclinometers and survey monuments installed within the dam. The instrument data from the dams is reviewed monthly or immediately after a significant event such as an earthquake. The Dam Safety Program also prepares and submits annual surveillance reports for each of our dams to the California Division of Safety of Dams (DSOD) (and the Federal Energy Regulatory Commission, or FERC, in the case of Anderson Dam) as required by these regulators. These reports present our interpretations of surveillance data (i.e. geotechnical monitoring instruments, seepage weirs, survey monuments, etc) gathered for the period of the report, to evaluate the performance of the dam.

#### Current Status:

The data collected from the instruments at each dam is analyzed and evaluated at least once a month. Additionally, the staff performs informal inspections of each dam bi-annually during maintenance, and formally annually with DSOD and FERC. Staff's review of the surveillance data and periodic safety inspections indicate that the dams and appurtenant structures show response to their environment, aging process, and external events as intended. Based on their review of Valley Water's surveillance and monitoring data and annual inspection, DSOD and FERC have concurred with staff's determinations.

### **2. Dam Inspections and Maintenance**

#### Background:

Dams are Valley Water's oldest assets. Dam appurtenances, such as intake structures, control valves, and outlet pipes, are reaching the end of their useful life and require regular

preventive and/or corrective maintenance. The condition assessment and plans to address marginal conditions of these appurtenant structures are presented in Attachment 2. Additionally, as responsible dam owners, Valley Water is required by DSOD and FERC to regularly maintain their dams to ensure public safety. Regular maintenance activities at the dams include servicing mechanical equipment such as valves, burrowing animal control, vegetation management, erosion control, and cleaning weep holes in the spillways. The hydraulic systems for the intake gates in the reservoirs are also maintained under this program to prevent hydraulic fluid leaks in the reservoir. Besides the regular preventative maintenance, corrective maintenance tasks are also performed on the systems to replace worn-out parts. Valley Water's FY 2022 budget includes funds for the scheduled planned and preventive maintenance tasks.

Current Status:

Valley Water inspects the dams annually with FERC and DSOD to ensure that the dams are in safe condition. Valley Water staff inspected all of its dams with DSOD in 2021. The inspections indicate the dams are performing as intended. Dam maintenance was executed as planned in staff's 2021 annual maintenance work plan.

### **3. Emergency Preparedness and Response**

Background:

Emergency Action Plans (EAPs) have been prepared for all Valley Water's dams. The EAPs are reviewed and updated annually for contact information. The EAPs for each dam contain a summary of emergency conditions that may develop, a plan for addressing them, and an inundation map. Valley Water works with various agencies on emergency action planning and training exercises each year. Copies of the EAPs for all the dams were submitted to DSOD; to the California's Office of Emergency Services (Cal OES); to Valley Water's OES; and to all downstream Emergency Management Agencies. A copy of the EAP for Anderson Dam was also submitted to FERC.

Valley Water's emergency response and preparedness also includes the Post-Earthquake Dam Evaluation Program (PEDAP) team. After significant earthquakes, trained Valley Water personnel self-deploy and immediately inspect the dams for any signs of damage or potential failure so that appropriate actions may be taken in a timely fashion.

Current Status:

The inundation maps in the EAPs estimate what areas could flood in the highly unlikely event of a dam failure. The inundation maps for all of Valley Water's dams were updated between 2014 and 2020.

As required by FERC, Valley Water performs table-top and functional exercises for Anderson Dam once every five years. The last table-top and functional exercises for Anderson Dam were performed by Valley Water in September 2021.

### **4. Special Engineering Studies - Seismic Stability Evaluation of Dams**

Background:

As part of its seismic re-evaluation program in the early 2000's, the DSOD performed independent, preliminary seismic stability evaluations of Almaden, Calero, Guadalupe, Lenihan, Stevens Creek, Chesbro and Uvas dams. Based on the results, DSOD notified Valley Water of its concerns regarding seismic stability of these dams and directed Valley Water to update the seismic stability analyses for each one. In 2003, FERC reviewed a

required safety inspection report for Anderson Dam (GEI, 2001). Based on its review, FERC also concluded that a seismic stability evaluation of Anderson Dam was required.

In 2012, during the planning study of the Anderson Dam Seismic Retrofit Project, it was determined that the Anderson Dam spillway and the Coyote Dam spillway (Coyote Dam is located upstream of Anderson Reservoir), do not meet the current Probable Maximum Flood (PMF) standards. In May 2013, DSOD requested Valley Water to perform a comprehensive evaluation of the Coyote Dam spillway. At that time, DSOD and Valley Water agreed that the Anderson Dam spillway would be modified to meet the PMF standards as part of the Anderson Dam Seismic Retrofit Project.

Current Status:

As of February 2022, Valley Water has completed seismic evaluations for Anderson, Almaden, Calero, Guadalupe, Lenihan, and Stevens Creek dams. The seismic evaluations for Chesbro, Uvas and Coyote dams are ongoing. The status and determinations of seismic stability evaluations are summarized in Table 1.

**Table 1. Current Status of Seismic Stability Evaluations and Subsequent Capital Projects for Valley Water’s Dams**

<b>Dam</b>	<b>Evaluation</b>	<b>Determination</b>	<b>Planning</b>	<b>Design</b>	<b>Construction</b>
Anderson	Completed in June 2011.	Dam embankment and spillway require seismic retrofit.	Completed in August 2013.	Underway; planned completion in June 2024.	Planned completion in December 2031.
Almaden	Completed in May 2012.	No seismic retrofit required; intake and spillway require replacement.	Completed in March 2017.	Underway; planned completion in June 2029.	Planned completion in June 2031.
Calero	Completed in May 2012.	Downstream dam embankment and spillway requires seismic retrofit.	Completed in April 2015.	Underway; planned completion in June 2032.	Planned completion in June 2034.
Guadalupe	Completed in May 2012.	Dam embankment and spillway requires seismic retrofit.	Completed in September 2015.	Underway; planned completion in March 2025.	Planned completion in October 2027.
Lenihan	Completed in December 2012.	No seismic retrofit required. Spillway evaluations ongoing; future replacement or significant repairs recommended.	To be determined (TBD)	TBD	TBD
Stevens Creek	Completed in December 2012.	No seismic retrofit required. Spillway evaluations ongoing; future replacement recommended.	TBD	TBD	TBD
Coyote Chesbro Uvas	Underway; planned completion in December 2023.	To be determined (TBD) Coyote spillway retrofit needed for updated hydraulic capacity standards (HMR 58).	TBD	TBD	TBD

Based on the seismic evaluation results, Almaden, Lenihan, and Stevens Creek dams do not require seismic retrofit work; Anderson, Calero, and Guadalupe dams were found to be seismically deficient, and capital projects are underway to retrofit these dams. Even though seismic studies indicated adequate seismic stability for the Almaden Dam embankment, its intake structure (which may fail during a large earthquake) and spillway (which does not meet current standards) have to be retrofitted.

Until the capital projects at Almaden, Anderson, Calero, and Guadalupe dams are completed, Valley Water, with the concurrence of its dam regulatory agencies, has voluntarily restricted the reservoir levels at these dams. Coyote Dam has had a reservoir operating restriction since 1992 due to concerns with the active Calaveras Fault beneath the dam. Valley Water's reservoir sizes, capacities, and current operating restrictions are summarized in Table 2.

**Table 2. District Reservoir Sizes, Capacities, and Restrictions**

Reservoir	Year Built	Dam Height (feet)	Use	Surface Area (Acres)	Reservoir Capacity (AF)	Restricted Capacity (AF)	February * 2022 Stored Volume (AF)	Reason for Restriction
Almaden	1935	105	Recharge & treated water	59	1,586	1,472	1,001	Seismic stability concerns
Anderson	1950	240	Recharge & treated water	1,245	90,373	2,881	3,418	Seismic stability concerns
Calero	1935	98	Recharge & treated water	347	9,934	4,585	3,937	Seismic stability concerns
Chesbro	1955	95	Recharge	265	7,945	7,945	4,718	N/A
Coyote	1936	138	Recharge & treated water	648	23,244	12,382	8,076	Active fault under the dam
Guadalupe	1935	129	Recharge	79	3,415	2,218	1,442	Seismic stability concerns
Lexington	1952	195	Recharge	475	19,044	19,044	10,055	N/A
Stevens Creek	1935	120	Recharge	91	3,138	3,138	1,441	N/A
Uvas	1957	118	Recharge	286	9,835	9,835	9,460	N/A
Vasona	1935	30	Recharge	57	495	495	274	N/A
				<b>Total</b>	<b>169,009</b>	<b>63,995</b>	<b>43,822</b>	

AF = acre-feet

\* Reservoir levels on February 3, 2022.