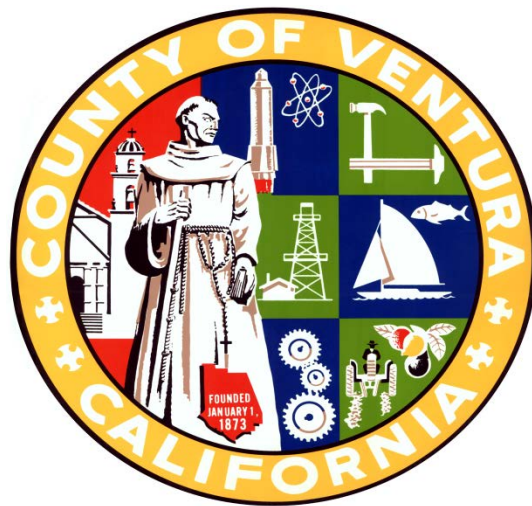


Ventura County Grand Jury 2017 - 2018



Final Report

Ventura County Dam Safety

May 10, 2018

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Ventura County Dam Safety

Summary

In light of the 2017 failure of the spillway at Oroville Dam, the 2017-2018 Ventura County Grand Jury (Grand Jury) investigated the condition of more than 20 dams in or adjoining Ventura County. The Grand Jury found that 14 of these dams could cause significant loss of life and property if they failed. Four of these dams, all under the jurisdiction of the State of California Division of Safety of Dams (DSOD), are identified as having existing or potential deficiencies. The Grand Jury investigated the reasons for the deficiencies and what efforts are being made to correct them.

The Grand Jury also reviewed how a dam failure would be handled by the County of Ventura (County). The Grand Jury concluded that dam disaster response plans follow State of California (State) guidance. However, these plans provide little or no guidance beyond the process of notifying dam management and the Ventura County Office of Emergency Services (OES). The Grand Jury concluded that there does not appear to be any effort by the dam owners or the OES to educate the public as to the potential inundation areas, evacuation routes, or what to do in the event of a dam failure.

The Grand Jury recommends that the OES consider working with dam owners and cities to develop and widely distribute dam failure inundation maps and other information to assist residents in planning for dam failures.

The Grand Jury recommends that the OES work more closely with DSOD to monitor and evaluate safety for dams in or affecting Ventura County. The Grand Jury also recommends that the OES track the progress of remedial action taken at Matilija Dam, Santa Felicia Dam, Castaic Dam, and Bouquet Canyon Dam. Reports of progress should be made to the BOS annually.

Background

Ninety years ago, the St. Francis Dam collapsed on a tributary of the Santa Clara River. Approximately 12.4 billion gallons of water [32,000 acre-feet] rose to a height of 140 feet, surging 54 miles to the Pacific Ocean. A wall of water two miles wide leveled towns in its path. Many people were alerted by frantic phone calls from phone operator Louise Gipe. Others were alerted by local law enforcement officers, including Highway Patrolman Thornton Edwards, who rode through the Santa Clara River Valley with the alert ahead of the flood waters. Despite these efforts, at least 450 people lost their lives in the disaster, many within the communities of Piru, Fillmore, and Santa Paula. Flood waters damaged property and facilities all the way to the Pacific Ocean.

Recent events, including the 2017 failure of the spillway at Oroville Dam, have pointed to the need for increased scrutiny and evaluation of structural safety based on a new understanding of dams and dam failure. There are 10 dams in Ventura County and four in Los Angeles County that could impact life and/or property of Ventura County residents if they failed. The larger dams are regulated by the

California Division of Safety of Dams (DSOD), while the smaller ones are primarily subject to self-regulation.

The OES is responsible for coordinating the response to any dam failures. The OES is not responsible for dam failure plans, which are prepared by the various dam owners. However, the OES is charged with implementing the plans in the case of a potential disaster. The emergency responses during the 2017-2018 wildfires raise concern about how well Ventura County would respond to one or more dams failing in the case of major flooding or an earthquake.

Methodology

The Grand Jury met with OES staff to review dam disaster plans and its role, procedures, and policies used to respond to a dam failure. The Grand Jury reviewed State dam safety documents. The Grand Jury contacted the owners of dams identified by DSOD as being potentially problematic. The failure of these dams could cause loss of life or significant property damage in Ventura County.

Facts

- FA-01.** The County General Plan Hazards Appendix [2013] has identified 20 dams whose failure could cause inundation, possibly leading to loss of life or property damage. (Ref-01)
- FA-02.** Sixteen dams in the County are under the jurisdiction of the DSOD, with inundation areas identified in case of failure. (Ref-02)
- FA-03.** The OES has identified 14 dams that could have a significant impact on County residents in the event of dam failure. Ten of these dams are in the County: Bard Reservoir, Casitas Dam, Lake Eleanor, Lake Sherwood, Las Lajas, Matilija Dam, Runkle Debris Basin, Santa Felicia Dam (Lake Piru), Senior Canyon, and Linaloa Lake. There are four in Los Angeles County: Bouquet Canyon Dam, Castaic Dam, Pyramid Dam and the Westlake Reservoir. (Ref-03)
- FA-04.** Both the State and the Federal Emergency Management Agency (FEMA) regulate large dams, although each uses different criteria for the oversight, inspection, and disaster planning required. (Ref-04)
- FA-05.** As a result of the failure of the Oroville Dam spillway, the State ordered new and more detailed inspections of approximately 100 dams within the state. The State rated Castaic, Bouquet Canyon, and Santa Felicia as "Fair," and Matilija as "Poor." (Ref-05)
- FA-06.** A dam with a "Fair" rating is defined by the DSOD as follows:
- "No existing dam safety deficiencies are recognized for normal loading conditions. Rare or extreme hydrologic and/or seismic events may result in a dam safety deficiency. Risk may be in the range to take further action. Additional DOSD criteria can include the following:
- Dam has a long-standing deficiency that is not being addressed in a timely manner

- Dam is not certified and its safety is under evaluation
- Dam is restricted and operation of the reservoir at the lower level does not mitigate the deficiency.”
(Ref-05, Ref-06)

Matilija Dam

FA-07. The Ventura County Watershed Protection District (VCWPD) owns and operates the Matilija Dam [capacity 3,800 acre-feet], which received a “Poor” rating by the DSOD. The DSOD rating was based on concerns as to the ability of the dam, specifically issues related to the wing walls, to withstand a 7.5 magnitude earthquake. While the analysis did not appear to indicate complete failure, it indicated a likelihood of significant weakening. VCWPD’s subsequent analysis did not indicate the same level of damage. Even so, the VCWPD, with concurrence from DSOD, agrees that removing the upper wing walls could significantly stabilize the dam. For that reason, VCWPD has applied for a \$2-million hazard mitigation grant from FEMA to remove the wing walls. The district is continuing its quarterly monitoring program of the dam and will be taking core samples later this year to ensure that it has up-to-date information as to the dam’s integrity.

FA-08. The VCWPD is working on a plan to remove Matilija Dam. The plan faces technical and environmental challenges and has yet to be finalized or approved by regulatory agencies. The VCWPD would use property tax money and is seeking additional funding to complete the demolition. Depending on the method used to dismantle the dam and dispose of the sediment, the costs could range from \$111 million to \$208 million. Funding has not been obtained, and the removal has not been environmentally cleared. (Ref-07, Ref-08)

FA-09. There are roughly 8 million cubic yards of debris behind Matilija Dam. There is a concern that a big storm will push huge amounts of mud and water over the top, overwhelming bridges, culverts and roads below. (Ref-09)

Castaic Dam

FA-10. The California Department of Water Resources (DWR) operates the Castaic Dam [capacity 323,700 acre-feet]. It has identified three areas that contribute to the “Fair” rating and potential weaknesses in the dam. All three areas are currently being analyzed, with alternatives for remediation expected to be developed in 2018 or 2019. Subsequent to that, a plan, including funding, will be developed.

Bouquet Canyon Dam

FA-11. The Los Angeles City Department of Water and Power (DWP) owns and operates the Bouquet Canyon Dam in Los Angeles County. The dam has a capacity of 36,500 acre-feet, approximately the same size as the St. Francis Dam, on the same watershed. The DWP reported that the DSOD “Fair” rating for the Bouquet Canyon Dam was based on a 2002 seismic

stability evaluation "...which did not take into account the improved dam characterization techniques and methodologies that were made after the outdated 2002 evaluation..." The DWP voluntarily lowered the level of water in the dam and undertook more seismic studies. It also improved and added to its safety monitoring systems. (Ref-10, Ref-11)

Santa Felicia Dam (Lake Piru)

- FA-12.** The United Water Conservation District (UWCD) owns and operates Santa Felicia Dam on Lake Piru [capacity 100,000 acre-feet]. The "Fair" rating is primarily due to deficiencies in the dam's outlet that could result in damage should a "Maximum Credible Earthquake occur before the UWCD completes planned upgrades..." The district is currently designing improvements to the existing outlet and spillway. Environmental clearance is scheduled for 2018, with construction to begin in 2019 at a cost of more than \$100 million.
- FA-13.** Disaster response plans for all major dams are prepared using a standardized format prepared by the DWR and the California Governor's Office of Emergency Services (CalOES). The plans are focused on inspections and notifications to the dam administration and appropriate authorities such as the County Office(s) of Emergency Services. The plans also include an inundation map prepared to State standards. (Ref-12)
- FA-14.** The dam operators and OES do not hold public drills or distribute information to residents about potential inundation areas or evacuation routes.
- FA-15.** The Casitas Water District had a system of sirens and held periodic drills, which have been discontinued. The sirens were intended to provide warnings to the population in the inundation area below Lake Casitas in the event of a dam failure.
- FA-16.** The UWCD has warning sirens in the Piru area. (Ref-13)
- FA-17.** The OES has held incident exercises within the past two years with the operators of Santa Felicia Dam (Lake Piru) and Bard Reservoir Dam (Lake Bard). It also conducted a critical infrastructure site visits and decision-making exercises for managing threats leading to dam failure.
- FA-18.** The OES uses VC Ready Alert [a reverse 911 system] as the primary tool to notify residents and businesses about potential dam failures and the need to evacuate. In the event of a dam failure or possible failure, VC Ready Alert would be supplemented by police, sheriff, and fire personnel delivering warnings in person. In the event of a major earthquake and loss of cell towers, VC Ready Alert may not work. VC Ready Alert requires voluntary registration and currently has approximately 75,000 registered users. About 250,000 users receive alerts through cell-phone carrier 911 registration. There may be significant duplication of the two lists. Alerts go out in both English and Spanish.

FA-19. The VC Ready Alert webpage is now in both English and Spanish. VC Ready Alert includes a language preference option. The OES also provides general information brochures in English and Spanish. (Ref-14, Ref-15)

Conclusions

C-01. The Grand Jury concluded that there are 14 dams, including four in Los Angeles County, that could cause significant loss of life and property damage in Ventura County if they failed. Of those, DSOD has identified four dams as having existing or potential deficiencies. (FA-01, FA-02, FA-03, FA-04)

C-02. The Grand Jury concluded that the VCWPD has identified structural issues regarding the Matilija Dam. The district is working to remove the dam. Pending obtaining funding and final approval of required environmental clearances, the dam may continue to be a threat. (FA-07, FA-08, FA-09)

C-03. The Grand Jury concluded that the DWR has identified issues causing potential deficiencies in Castaic Dam and is working on a plan of action to fix them. Once a plan has been completed, funding and environmental clearances will be obtained. (FA-10)

C-04. The Grand Jury concluded that the DWP does not concur with the DSOD rating for Bouquet Canyon Dam. However, DWP has taken some steps to improve the safety of the dam and the ability to respond to a disaster. The DSOD has not updated its biennial report on dam safety, so any modification of its rating of the Bouquet Canyon Dam is unknown at this time. (FA-11)

C-05. The Grand Jury concluded that the UWCD appears to have a clear understanding of the possible deficiencies of the Santa Felicia Dam and is currently working on the design and environmental clearances for the remedial work. While its activities should be monitored, the UWCD seems to be responding to the concerns in a timely manner. (FA-12)

C-06. The Grand Jury concluded that dam-disaster response plans reviewed follow state guidance. However, they provide little or no guidance beyond the process of notifying dam management and the OES. (FA-04, FA-13)

C-07. The Grand Jury concluded that with limited exceptions, there does not appear to be any way of notifying people in potential inundation areas of pending disasters other than the phone and cell-phone alert systems. These systems are likely to fail in a major earthquake. (FA-14, FA-15, FA-16, FA-17, FA-18)

C-08. The Grand Jury concluded there does not appear to be any effort by the dam owners or the OES to educate the public as to potential inundation areas, evacuation routes, or what to do in the event of a dam failure. (FA-14, FA-15, FA-16, FA-17, FA-18)

- C-09.** The Grand Jury concluded that the OES’s main tools to notify the public in the event of a dam failure have been upgraded to include information in both English and Spanish. (FA-18, FA-19)
- C-10.** The Grand Jury concluded that while inspections are required by the DSOD, there is no local monitoring or public awareness as to the status of the dams and the actions taken by their owners to improve their reliability and safety. (F-01, F-02, F-03, F-04, F-05, F-06)

Recommendations

- R-01.** The Grand Jury recommends that the OES track the progress of remedial action taken at Matilija Dam, Santa Felicia Dam, Castaic Dam, and Bouquet Canyon Dam. Reports of progress should be made to the BOS annually. (C-01, C-02, C-03, C-04, C-05)
- R-02.** The Grand Jury recommends that the OES consider working with dam owners and cities to develop and widely distribute dam failure inundation maps and other information to assist residents in planning for responses to dam failures. (C-06, C-07, C-08)
- R-03.** The Grand Jury recommends that the OES consider working with dam owners and cities to pursue placement of signage and sirens within the inundation areas. (C-07, C-08, C-09)
- R-04.** The Grand Jury recommends that the OES work more closely with DSOD to monitor and evaluate safety for dams in or affecting Ventura County. (C-10)
- R-05.** The Grand Jury recommends the BOS direct the Public Works Department to provide technical assistance, as appropriate, to the OES, augmenting its expertise in dam safety and operation. (C-10)

Responses

Responses Required From:

Ventura County Board of Supervisors (C-10, R-01, R-05)

Responses Requested From:

Ventura County Office of Emergency Services (C-01, C-06, C-07, C-08, C-09, C-10, R-01, R-02, R-03, R-04, R-05)

Los Angeles City Department of Water and Power (C-04, C-08, R-01)

State Department of Water Resources (C-03, C-08, R-01)

County of Ventura Watershed Protection District Board (C-02, C-08, R-01)

United Water Conservation District (C-05, C-08, R-01)

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Glossary

<u>TERM</u>	<u>DEFINITION</u>
BOS	Ventura County Board of Supervisors
CalOES	California Governor’s Office of Emergency Services
County	County of Ventura
DSOD	California Division of Safety of Dams
DWP	Los Angeles City Department of Water and Power
DWR	California Department of Water Resources
FEMA	Federal Emergency Management Agency
Grand Jury	2017-2018 Ventura County Grand Jury
NPDES	National Pollutant Discharge Elimination System
OES	Ventura County Office of Emergency Services
State	State of California
UWCD	United Water Conservation District
VCWPD	Ventura County Watershed Protection District