



## Oroville Dam had problems right from the start in 1960s



KEN CANTRELL Special to The Bee

Water rushes down the battered Oroville Dam spillway and into the surrounding hillside, causing a muddy stream to flow into the Feather River. The spillway's troubles triggered a massive evacuation in February and the biggest crisis since the dam was completed in 1968.

### Gov. Pat Brown's zeal overrode fund shortfall, claims of flaws

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America's tallest dam was built from earth, stone and concrete – and the towering ambition of Gov. Pat Brown.

Sixty years before a crisis at Oroville Dam sent thousands fleeing for their lives in February, the late governor brought an almost evangelical zeal to erecting the structure that would hold back the Feather River to deliver water to the parched southern half of the state.

Hundreds of pages of state archives, oral history interviews and other documents reveal a portrait of a man hell-bent on building Oroville and the rest of the State Water Project. Determined to leave a personal legacy, Brown misled voters about the

State Water Project's costs, ignored recommendations to delay Oroville's construction and brushed aside allegations that substandard building materials were being used at the dam. His administration steamrolled past a land-speculation scandal, relentless labor strife and the deaths of 34 workers to get Oroville built on time.

"I didn't want anything to stop the California Water Project," Brown said years later, using an earlier name for the project.

Oroville Dam was an extraordinary achievement. It remains America's highest dam, rising 770 feet from its base and 922 feet above sea level. In 1964, when it was just half built, it prevented a monstrous flood. It came through an earthquake, measuring 5.7 on the Richter scale, in 1975 with "minor superficial damage," according to a state report. As the linchpin of the state's water delivery network, capable of holding 3.5 million acre-feet of water, Lake Oroville has played a critical role in California's meteoric economic and population growth since its completion in 1968.





California Department of Water Resources

Gov. Edmund G. “Pat” Brown Sr., left, sets off the initial dynamite blast at Oroville Dam with William Warne, director of the Department of Water Resources, and students from Las Plumas Elementary School in October 1961.

But now Pat Brown’s son, current Gov. Jerry Brown, finds himself cleaning up a mess that engineering experts believe was caused at least in part by design and construction problems from his father’s day.

In February, a gaping canyon formed in the center of Oroville Dam’s 3,000-foot-long flood-control spillway as a major storm rolled in. The lake rose to the highest level in its 48-year history and crested over the adjacent emergency spillway – a concrete lip resting on an unlined hillside. About 188,000 residents were told they had only hours to escape when much of the hillside washed away.

The state got a handle on the crisis, and residents returned home after two days. But full recovery will take two years and cost an estimated \$550 million, including the expense of replacing the battered main spillway. That’s five times what it cost to build the spillway in the first place, when adjusted for inflation.

Nothing The Sacramento Bee found in the historical records directly foreshadowed the spillway woes, and experts say the problems that plagued construction – the strikes, the land speculation, even the worker fatalities – were on par with big dam projects of that era.

But experts also say the enormity of Pat Brown’s ambitions might well have returned to haunt his son a half-century later.

“It may come back to engineering hubris, and engineering hubris inevitably comes back to bite us in the butt in California,” said Jeffrey Mount, a geologist and water expert at the Public Policy Institute of California.

Jerry Brown’s office declined to make him available for an interview for this story. Brown initially responded sarcastically when asked at a news conference Thursday whether he felt any particular responsibility to repair Oroville Dam because of its ties to his father’s governorship.

“You mean if my father hadn’t done it, I’d say, ‘What the hell?’ I’d say, ‘So what?’ ” he said. “Look, when a dam breaks and it threatens to kill 100,000 people, everybody wants to fix it. And

now you say, ‘By the way, your father was involved 40 or 50 years ago.’ That’s an interesting connection, but that doesn’t add to it, other than the fact that we’d like to make the thing work.”

Moments later, however, Brown acknowledged a greater sense of urgency to complete the repairs. He recalled, as a teenager, flying over a deadly flood on the Feather River in the mid-1950s with his father, who was then attorney general, and Democratic presidential candidate Adlai Stevenson.

“It was a very impressive sight,” Brown said. “So the fact that we have flood control and a dam up there is very important; so, yes, I do have that personal interest. I want to see it get finished.”

Oroville and the State Water Project represented an audacious undertaking – “the greatest mass movement of water ever conceived by man,” according to a flier the state printed to recruit engineers in 1963.

The state was a newcomer to a dam-building boom that blossomed in the 1930s and 1940s, when the federal government built Shasta, Hoover and the other great dams of the West.

The California Department of Water Resources was less than a decade old when work began at Oroville, and it had no experience with anything even close to Oroville’s scale. Then again, no state government did: At that point, major dam projects were exclusive property of the federal government, not the states.

“No other state ever attempted anything like this,” said J. David Rogers, an engineering expert and dam historian at the Missouri University of Science & Technology. “It was larger than any federal dam when it was built. ... It was the largest nonfederal public works project in world history. Nothing else out there was as big and as ambitious as the California Water Project.”

## ‘LETHAL ARROGANCE’

Did California get in over its head?

After conducting an independent analysis of the February spillway failure, Robert Bea, of UC Berkeley’s Center for Catastrophic Risk Management, says it did. Bea concluded that numerous corners were cut during the spillway construction. Portions of the concrete chute were too thin; it had a flawed drainage system; and the structure wasn’t properly anchored to the underlying bedrock – findings that have been echoed by preliminary studies by the U.S. Army Corps of Engineers and a team of forensics engineers hired by DWR at the insistence of the federal government.

Bea said the failings showed a “lethal arrogance” on the state’s part. “It’s only a question of time until you’ve got major problems, even failures,” he said.





Sacramento Bee file

Workmen attempt to save valuable equipment from the path of the rampaging Feather River at the Oroville Dam site in December 1964, when the half-built structure held back a potentially major flood.

Rogers said the dam’s main spillway apparently didn’t get the same level of attention as the main dam.

Top engineers and consultants were brought in from all over the world to ensure the dam met the highest standards of that era, which included rigorous studies to prove the bedrock was strong enough to support the dam and withstand the test of time.

The spillways were a different story, Rogers said. They were built on much more weathered rock that easily crumbled this winter. The main spillway, built by George Farnsworth Construction and Oro

Pacific Constructors, cost \$96 million in today’s dollars, about one-tenth the cost of the main dam.

“I think most of the emphasis and the attention was to the dam and the underground power plant, and those things,” Rogers said. “I don’t know (whether) the spillways got the same level of attention. ... There wasn’t a lot of experience in the United States on spillways of that height and that capacity.”

For California officials, building Oroville Dam was an act of redemption.

During the 1930s, California voters approved the construction of the Central Valley Project to bring

Northern California water to portions of the San Joaquin Valley. But the bond market was in such desperate condition during the Depression that the state couldn’t finance the project. So state officials asked President Franklin Roosevelt’s administration to build the CVP instead.

As the 1950s drew to a close, Pat Brown was determined to expand water deliveries. The CVP only went as far as the Fresno area; Brown wanted to bring water clear to the Mexico border. His administration refused to play second fiddle to the feds.

“There is no justification whatsoever for the people to







LARRY MATTHEWS

Four workers were killed in a 1965 head-on train collision at the Oroville Dam construction site. One engine was lifted off the tracks and pushed back until it hit the roof of a tunnel. During dam construction, 34 workers died.

expect the Great White Father in Washington to solve all their problems,” former DWR Director Harvey Banks said in an interview for an oral history project in the late 1970s at UC Berkeley’s Bancroft Library.

### ‘A MONUMENT TO ME’

Brown, who was elected governor in 1958, saw Oroville and the State Water Project as a chance to put his personal stamp on California.

“I think it’s a monument to me, and I’m very proud of it,” he told the Berkeley interviewers. The California Aqueduct, which cuts through the San Joaquin Valley to Southern California carrying Oroville’s water, was named for him.

Brown campaigned relentlessly for the project, persuading the Legislature and then the voters to go along.

He cajoled Southern California officials, who were leery about costs, into providing crucial political support. His administration sweet-talked wary Butte County residents into flooding entire towns and removing tens of thousands of acres of land from county tax rolls. In exchange, he promised to make Lake Oroville a tourism mecca, a pledge that has largely gone unfulfilled.

Brown wasn’t above fudging the numbers. To get the State Water Project built, including the aqueduct and other facilities, Brown needed voters to approve a \$1.75 billion bond measure (\$14.3 billion in today’s dollars). Brown told the Berkeley interviewers that he and his advisers realized the project’s true cost was probably about \$2.5 billion, but weren’t sure voters would swallow such a number.

“We didn’t know exactly the cost of the project. We hadn’t priced it out to any exactitude,” Brown said in the Berkeley interview.

Besides, the governor believed cost didn’t really matter given what was at stake.

“You need water. Whatever it costs, you have to have it,” he said.

The bond measure squeaked by in November 1960 with 174,000 votes, a 3 percent margin.

Yet that didn’t guarantee Oroville would get built right away. Cost became an issue almost immediately, and some advisers urged Brown to postpone Oroville for a while and concentrate on other elements of the project first.

Brown, however, wouldn’t wait. Delay would only lead to higher costs later on, he reasoned. Besides, the governor was deeply affected by historic flood along the Feather River in 1955, which killed at least 37 people. This was the flood his son recounted last week.

### DAM PROVES ITSELF

The decision proved prescient. In late December 1964, a powerful storm sent waves of water into the Feather River watershed. State officials contemplated deliberately breaching levees in rural areas to save the region’s urban areas. Barely half finished, and standing just 400 feet high, Oroville dam proved mighty enough to hold back the floodwaters.

“The dam was only half up, but it was up just enough to save Marysville and Yuba City,” Brown told the Berkeley interviewers. “So I was again vindicated in the decisions that I had to make.”

Oroville Dam’s construction took five years and

had problems almost from the start. Like many projects in those days, it also took a large death toll.

Local historians say that 34 men died building the dam and the surrounding infrastructure. There were fatal heat strokes, heart attacks, explosions, cave-ins and truck and tractor wrecks. The worst accident occurred in 1965, when two trains – one whose 40 cars were loaded with heavy dam-fill, the other empty – smashed head-on in a fiery collision at a tunnel entrance. Four men died.

In 1964, at least three state workers were fired in a land-speculation scandal.

Officials said the workers had purchased land near the dam site knowing they'd turn a hefty profit when the state bought it. It wasn't until a decade later that the full extent of the scandal emerged, when The Bee published an investigative series revealing that insider dealing by state employees inflated the state's land-acquisition costs by about \$6 million (nearly \$50 million in today's dollars).

Work at Oroville Dam also was mired in labor problems. Workers went on strike after strike seeking higher wages and to protest what they called unsafe working conditions. During one strike, as many 1,000 workers walked off the job. At one point, tensions between workers who'd just concluded a strike and those who didn't honor their picket line erupted in a rock-throwing fight.

The biggest controversy, though, came in January 1964, when the Oroville Mercury-Register stunned its readers with a blockbuster allegation: Substandard materials were being used to build the dam's earthen wall as well as one of the tunnels that was being dug to release water.

The story, based on an interview with an unnamed engineer and photos the paper took inside the construction zone, triggered a swift reaction from a local state senator who called for fact-finding committees to investigate.

Brown, however, bristled.

In an interview a day later, he called the story "irresponsible and erroneous." Although he publicly welcomed an investigation, he privately urged DWR's chief engineer, Alfred Golze, to demand a retraction from the paper, according to memos stored in the state archives.

Lawmakers were granted a hearing at a state Senate committee, which declined to act after hearing testimony from the state's engineers and the paper's publisher, who refused to divulge the name of his tipster. Golze didn't seek the retraction, but the California Water Commission – a division of the DWR – wrote in a report released three months later that there was no evidence "that Oroville Dam was designed or is being built in an unsafe manner."

While the main structure of the dam itself has held up, other portions of the Oroville complex have experienced problems.

In 2009, five workers were injured while working on a repair as water surged through a river outlet, blowing out a steel bulkhead. The state Occupational Safety and Health Administration slapped DWR with a \$141,375 fine for safety violations.

Three years later, a major fire shut down a hydroelectric power plant in nearby Thermalito for several days. It's still not fully repaired.

Neither of those incidents compared with what happened in February. Rogers, the dam expert from Missouri, said the crisis should serve as a wake-up call. The bold infrastructure projects of the past are in dire need of upgrades.

"The lesson to be learned is, 'America, your infrastructure is aging,' " he said. "You can expect more of this kind of stuff."

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**Editor's note:** This story was corrected to reflect the accurate death toll from the 1955 storms.