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Heavy rains signal end of Dam testing

Above average rainfall has raised hopes that the prolonged testing of Matilija Dam is ended, a public works official said Wednesday.

Bechtel Corp. began testing the dam last winter in response to a State Division of Dam Safety ruling that the structure was unsafe.

A final report is due by August.

Byron Eddy, the county's flood control chief, said heavy rains of last month enabled engineers to fill and lower Matilija Lake in 10-foot increments with four days static testing at each level.

Only one complete filling and lowering was completed last year raising fears that another below average rainfall year would project the tests into 1968.

The extension will probably not be necessary, Eddy said.

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WEEKLY
STAR-FREPRESS
3-19-67

ON BABYSITTING A TIRED DAM

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Story and Photos By
JAY ELLIS RANSOM

JUST OVER 20 years ago, a prediction was made during the construction of the 620-foot Matilija Dam eight miles north of Ojai that the Santa Clara River sand used in the aggregate for the cement-block construction "may result in disruption and eventual failure of the structure."

The prediction was made in The Press-Courier on Feb. 12, 1947, by Harold E. Burket, Ventura architect, appearing before the Ventura County Flood Control Board. Burket based his prediction of eventual deterioration on "a chemical reaction between the sand and low alkaline cement," supplied by the Portland Cement Company.

Today, Matilija Dam, at the east end of the heavily faulted Santa Ynez Mountains, has the shakes. Whether the dam will be retained by the Ventura River Municipal Water District which owns it, even with a gaping 300 by 30-foot slot cut in the top center to reduce its height and holding capacity by one-half, is currently being determined by a two-year-long period of tests now nearing completion.

The uncertainty surrounding the safety of the cement-block dam that rises 165 feet above the canyon bottom comes from a clearly observable deterioration in the cement comprising the upper sections and particularly noticeable along the stairway leading to the crest.

Two years ago, engineers discovered the concrete was badly deteriorated and blamed the cracking and swelling on "alkali minerals in the aggregate used during construction." According to George Gonsman, an engineering technician in the Ventura County Department of Public Works who periodically takes strain-gage readings for The Bechtel Corp. of San Francisco, in the 20 years since the dam was completed, the alkaline reaction with atmospheric oxygen and water seepage has

caused the concrete to weaken, expand and crack open.

"However, the cement blocks at the bottom of the dam below water level, and hence below the region of active oxidation, are still in good condition," Gonsman said.

Deterioration of the dam, constructed at a cost of more than \$4 million in 1947, with Ventura County still owing \$1.6 million. It was discovered two years ago when State engineers issued a blanket order to check all dams following the collapse of the Baldwin Hills earth-fill dam in southwest Los Angeles in December of 1963.

For the past two years extensive daily tests have been made by Bechtel engineers to determine how much, if any, movement there may be within the dam and between the dam itself and the canyon abutments on either side.

NORMALLY, CONCRETE expands and contracts a small amount, measurable in the hundredths of an inch, from heating and cooling by sun and shadow. Also, as the water level rises behind the dam, pressure increases; as the water level falls, the pressure drops. Both forces serve to give movement to the dam.

What engineers are hoping to find is that all movement is elastic. They do not want to discover "nonelastic" movement, that is, a continuous minute shifting of the concrete mass downstream because that is indicative of danger of eventual collapse.

Engineers have positioned strain gauges at various parts of the dam. Electronic checks are made several times a day, particularly during periods of change in water level. Cycles are carefully analyzed for every 10 feet of water level change, both up and down.

"During the empty-to-full and full-to-empty periods, we hold water at each 10-foot level for four days to obtain critical observations on the stability of the structure," Gonsman said.

Should the strain-gage measurements indicate the dam is not in any danger of collapsing, engineers say it has at least another 15 years of usefulness. It was designed originally to store 7,000 acre-feet of runoff as a flood control project but the removal of the top 30 feet of the dam has reduced the storage capacity to 3,700 acre-feet.

THE DAM is eight feet thick at the crest and about 40 feet thick at the base. To help strengthen the lower portion of the structure, the 12-ton blocks of cement from the slot were sunk along the upstream footing beneath approximately 135 feet of water. Removal of the blocks and the two-year engineering study is costing approximately \$500,000.

"If the movement proves to be cyclic and elastic," Gonsman said, "Ventura County and especially the people living below the dam have nothing to worry about."

The dam and catch basin traps storm water spilling off the steep-sided mountains behind the dam. Since, however, the crest has an elevation of 1,095 feet (1,000 feet at the bottom spillway) and the City of Ojai lies at an elevation of 750 feet, the impounded waters are used to supply city and ranch residents via a gravity pipe line.

Construction of the dam in 1947 was surrounded by enormous controversy, legal suits, objections and obstructions. Labeled both a "fiasco" and a "vital necessity," the dam has served its primary purpose of stabilizing the water situation along the Ventura River channel. During the recent winter floods, the dam held up the runoff during the three most vital hours when other area streams were cresting and going down again, before the water level of Matilija Lake reached the slot and began pouring over into the canyon. Thus flooding of downstream ranches and residences was safely prevented.

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George Gonsman, engineering technician for the Water Resources Division of the Ventura County Department of Public Works, periodically takes electronic readings of strain gauges set into Matilija Dam and canyon walls.

A chunk larger than a football field has been removed from the midsection of the 620-foot Matilija Dam because of fears the dam may be showing signs of stress. Note the comparative size of the men at the left side of the notch.

MAY LAST 15 YEARS

Decision Nears on Future of Ventura County 'Hole' Dam

BY CHARLES HILLINGER
Times Staff Writer

For two years Ventura County has been trying to determine whether to keep a dam with a hole in it the size of a football field.

The answer is expected any day now.

Matilija Dam, eight miles north of Ojai in the Santa Ynez Mountains, is believed to be the only dam in the world functioning with a big hole in it.

The 300-foot-long, 30-foot deep notch was cut to save the structure after engineers discovered concrete in upper sections had deteriorated in several spots.

If the two-year watch on the dam determines it is safe for storing water, Matilija will have at least another 15 years of useful life, engineers say.

By slicing out the notch, the dam's storage capacity has been reduced from 7,000-acre feet to 3,700-acre feet.

Weaknesses in Dam Found

Weaknesses in the dam were found when the state issued a blanket order to check all dams following the collapse of the Baldwin Hills earth fill dam in December, 1963.

A check showed that a lye-like substance got into the cement mix when Matilija was being built, causing a chemical reaction which resulted in swelling and cracking.

Matilija Dam was constructed at a cost of \$4 million in 1947. Ventura County still owes \$1.6 million for the job.

It is costing \$500,000 for the removal of the football field-size section and for two years of testing. Four times each day since March, 1965, readings have been taken on eight Carlson stress gauges in the dam.

"We're trying to learn if there is any movement in the dam," explains George Gonsman, engineer techni-

an for the Ventura County Flood Control District, who has been making the tests.

"Concrete expands in the sun, contracts in colder weather. What we're looking for is non-elastic movement."

To make certain the dam is stabilized now that it has the huge chunk removed, stress gauge readings are taken each day at 6 a.m., 10 a.m., 2 p.m. and 9 p.m.

"Movement is relative to temperatures and different elevations of water behind the dam," says flood control engineer Byron Edde.

"We're making a complete engineering analysis, including two cycles each year in the two-year study as the lake behind the dam fills then empties.

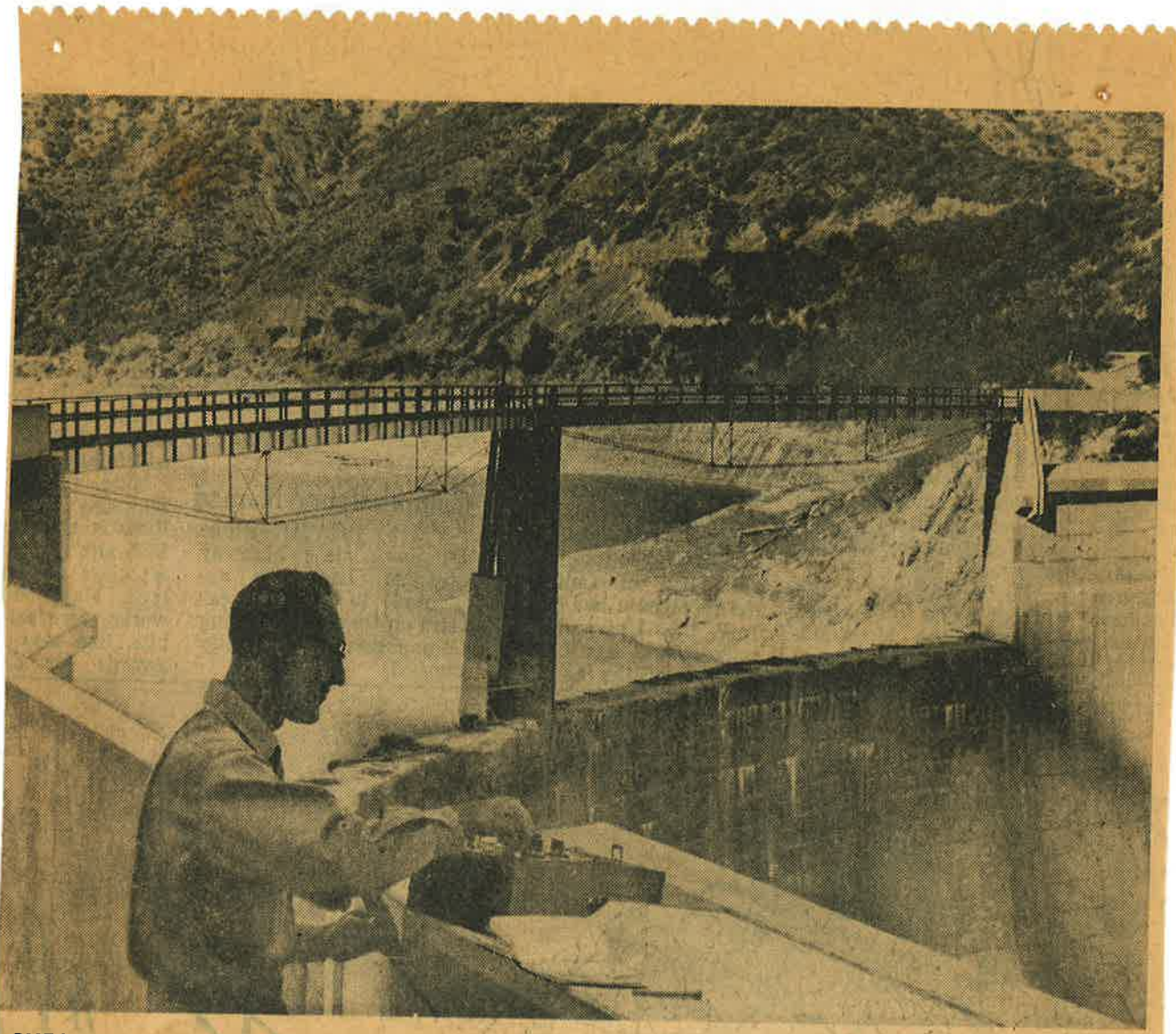
"During the empty-to-full and full-to-empty periods we hold water at each 10-foot level for four days to obtain critical observations on the stability of the structure."

To help strengthen the dam, 8-foot thick, 12-ton chunks, removed to make the hole, were buried at its footing.

The dam traps storm water spilling down the Santa Ynez Mountains. During or after storms excess water is released and carried through a conversion canal five miles south to Casitas Dam.

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CHECKING—George Gonsman checks a stress gauge to see if there has been any movement at Matilija

Dam, north of Ojai, the only dam with a hole and still operating. The hole is the size of football field.
Times photo by Art Rogers