Little Damage, 12 Hurt

Oroville-Centered

McClatchy Newspapers Service

OROVILLE — A rolling series of earthquakes punched Northern California yesterday, tumbling bricks and mortar from homes here, shattering windows, starting fires and leaving 12 persons injured.

The quakes, occurring between 8:45 a.m. and 1:20 p.m., were centered only a few miles south of Oroville Dam — the nation’s tallest earth-filled dam at 770 feet — but the shocks caused no apparent damage.

Most of the destruction — ranging from the partial collapse of the Butte County courthouse which is under construction to the tumbling of food from supermarket shelves — was centered here.

However, the largest of the temblors, occurring at 1:20 p.m. and registering from 5.7 to 6.1 on various Richter scales, was felt the length of the Central Valley, from Fresno to Redding. It also was felt in the San Francisco Bay area and as far east as Lake Tahoe and Reno.

In Sacramento, the bigger quake visibly shook the century-old Capitol, sloshed water out of the College Greens swimming pool and swayed high-rise buildings. However, no damage was reported.

The nursing supervisor at Oroville Medical Center, the only hospital in Oroville, last night said 12 persons were treated for earthquake-related injuries — mostly minor cuts from flying glass.

She said one woman suffered a fractured leg when she fell while running out of her house during the quake and a sawmill worker suffered a severe cut when a saw shook loose and landed on his arm. She also said a couple of persons were treated for hysteria.

The quake toppled some power lines outside Oroville, setting off 10 brush and grass fires, but damage was not serious. At least two residential fires also were reported.

Chimneys toppled from several older homes and bricks and plaster fell from others.

Chuck Kuhlmann, owner of the Town & Country Liquor Store, said $20,000 worth of liquor spilled onto the floor when a whole wall of bottles tumbled during the quake.

“In the 25 years I’ve lived here, I’ve never seen anything like it,” said Oroville Mayor Robert A. Winston.

In addition to the damage to the new courthouse, authorities said the old courthouse sustained severe damage. The structure, built in 1855, was evacuated and its chimney pulled down as a precaution.

The downtown Montgomery Ward...
store sustained a cobweb-like series of cracks in its foundation and part of the ceiling fell down. There were no injuries.

"It felt like the earthquake started right here," said Ward's employee Charlie Yokley.

Broken glass and other debris littered the streets of the city's main business district and store owners worked into the night boarding up windows.

The epicenter of the quakes was pinpointed four miles southwest of Oroville. There were three shocks before the big one, which in turn was followed by several aftershocks.

The State Department of Water Resources sent crews out to check levee systems and dams in the Central Valley. They reported no damage.

An employee walking across Oroville Dam when the big quake began said it caused a ripple on the lake surface but no damage was reported to the embankment, although there was a brief power outage.

The dam, which impounds more than 3 million acre-feet of water, is the keystone of the California Water Project.

A seismograph within the dam itself, which is monitored in Reno, recorded the major shock at a magnitude of 6 on the Richter scale, according to Dr. Alan Ryall of the University of Nevada. Ryall and other scientists said the temblors might be attributed to the filling of Oroville Reservoir. "It is not uncommon that the filling of large reservoirs is followed by considerable earthquake activity within a few years," he said.

Authorities in dozens of north state cities, including Woodland, Susanville, Williams, Auburn, Placerville and Pollock Pines, said they received calls, indicating the quake had been felt there. However, there were no reports of major damage.

A woman in Fresno told deputies the larger shock knocked a lamp off a table in her home.

A restaurant owner in Chico said several dishes broke when they tumbled off a table and several windows were reported shattered in Yuba City.

In Biggs, Assistant Police Chief Terry Pooler said a truss on the city water tower broke, windows shattered and canned goods spilled off their shelves in stores.
Charlie Yokley, an employee at the Montgomery Ward store in Oroville, inspects damage inflicted by yesterday's quakes and, right, a passerby downtown stops to wonder at a vertical fracture of a street light.
Lake Pressure May Have Set Off Shake

By Nancy Skelton

The pressure of Lake Oroville on the rocks deep beneath its bed may have triggered yesterday's earthquake, according to several experts now studying the jolt.

The lake, now about a decade old, filled faster than ever during this spring's rains, according to the State Department of Water Resources.

Strong quakes have been occurring in the area since mid-June, with yesterday's 6.1 tremor the most severe.

Seismologists and geologists around the state and in Nevada say that because of the ground's geology, there always is a strong earthquake possibility around Oroville — a strong quake shook the area in 1940.

Pressure from the huge lake might have affected a deep fault, setting off the latest series of quakes, the scientists say.

If it turns out Lake Oroville was the trigger — if, indeed, an exact cause ever is determined — it won't be the first time heavy earth tremors have been linked to a "new" man-made lake.

According to Dr. Alan Ryall, director of the University of Nevada's Reno seismology laboratory, the 5.7 shock that jarred Reno in 1966 was centered near Prosser Lake — a new body of water which filled only two years before.

Quakes followed the filling of Lake Mead behind Hoover Dam, as well as the completion of lakes in Italy, India, Greece and other parts of the world.

Ryall says what "probably happened" at Oroville was the pressure of the lake water caused some pre-existing fault — "some five to six miles beneath the lake" — to shift.

"We know as water pressure increases, the strength of rock decreases. When you take [water] pressure from a rock, it becomes less strong," Dr. David Stewart of the National Center for Earthquake Research in Menlo Park, says the lake is only one possibility. "The strain in the earth — the energy — already has to be there, ready to be released," Stewart says, adding most quakes associated with such lakes occur within a couple of years after they are filled.

Oroville, he pointed out, is nearly 10 years old.

Oroville filled between 1964 and 1966 and no strong earthquake activity was recorded for nine years, according to the state water resources department.

"This spring, however, the water level went down during the winter months — "rose more rapidly than ever before," according to John Keyser, deputy engineer for the State Division of Safety of Dams.

But Keyser totally discounts the theory that lake pressure caused yesterday's quake. "There is no relationship whatever," he says. "You can just call it a random activity of our mother earth. California, after all, has earthquakes all the time."

Yet, according to Heywood G. Dewey, head of operations and maintenance for the water resources department, there was something "unusual" following the end of this spring's rainy season — a series of strong earthquakes at Oroville Dam. In mid-June, a jolt measuring between 3 and 4 on the Richter Scale was followed by lesser tremors leading up in a fairly strong reading on June 27. Again, minor quakes shook the area as a prelude to yesterday's jolt.

Lane Johnson of the U.S. Seismological Station at UC Berkeley says the Oroville quake "may never be pin-pointed," but "there is some very well documented earthquake activity occurring after the building of dams."

"He says what is important to remember is an earthquake in the Oroville area — with or without a dam "is not an unexpected event" given its geology.

He also points out the dam could well have been built over some deep — and hitherto unknown — fault. "It's not unusual that we have non-recongnizable signs of faults," Johnson says. "Not every one is the San Andreas."

Dr. James Whitcomb of Caltech indicated there is enough documentation of quake activity after new lakes to consider it one factor in the growing efforts to predict quakes.

Saturday, August 2, 1975
Sacramento Bee
Scientists at the California Institute of Technology in Pasadena first registered the big temblor at 6.4 on the Richter scale, but later revised it down to 6.1. At the University of California, Berkeley, it had a magnitude of 5.7.

Scientists said the different readings were because of the varying locations of the measuring equipment and that they would later determine a specific figure.

The last powerful quake recorded in California was the San Fernando Valley temblor Feb. 9, 1971. That shock registered 6.5 on the Richter scale. Sixty-five persons were killed and damage was in the millions of dollars.

The Richter scale is a measure of ground motion as recorded on seismographs. Every increase of one number means a tenfold increase in magnitude. Thus, a reading of 7.5 reflects an earthquake 10 times stronger than one of 6.5. The San Francisco earthquake of 1906 registered 8.25.

A team of state architects inspected the 106-year-old Capitol and found a few cracks. However, they said they would have to check their records to determine if they were new or old. Meanwhile, tourists continued to flock through the old building, which has been determined to be unsafe in the event of an earthquake.

Kathryn King, an employee at the California State University, Sacramento, library, said she was in the stacks on the fourth floor when the quake hit.

"There was a crackling and rippling sound among the books and I got out fast into the aisles," she said. "Our building is one of the most modern earthquake-safe structures in Sacramento, but it swayed a bit."

Meanwhile, a temblor measuring 4.9 on the Richter scale rumbled through portions of five Southern California counties late yesterday, but there were no reports of damage.

**She Was Shook Out Of State**

CHICO — Police dispatcher Walt Richards said one woman was so upset after yesterday's series of earthquakes she jumped in her car and headed out of state.

Richards said he was on duty when the woman telephoned the police department to say she had just left her home in Oroville, about 20 miles to the south, and was making a brief stop here before driving on to Washington.

Richards said the woman asked him to telephone her husband at his job in Oroville and tell him she wasn't coming back.
Sacramento History Shows City Free Of Earthquakes—Almost

Sacramentans long have considered their city rather immune from the ravages of major earthquakes that have struck other California cities.

And while history and geology lend some support to that confidence, the city has felt the effects of shocks centered elsewhere. And indeed, scientists say they cannot be sure the city is as immune as some believe.

The most memorable quakes in Sacramento came in 1872 and 1892. But not even the great San Francisco Earthquake of 1906 stirred much more than curbside conversation.

Little damage occurred in Sacramento even though Bay Area cities were leveled by the quake and subsequent fire.

"Windows rattled and chandeliers swayed to and fro," The Bee said of the 1906 quake's effect on Sacramento. "Even the soundest slumberers were awakened by the shock."

Geologists say Sacramento sits on a cushion of silt thousands of feet deep over bedrock that has no known faults running through it. South of Sacramento, in the delta region, the silt is up to 25,000 feet deep.

But this, according to some scientists, may not act as a shock absorber. Instead, they say, loose soil contributes to earthquake damage, acting much like a bowl of gelatine when it is shaken.

Sacramento's apparent favored position stems more from its location — on flat ground far from known major faults. Considering those factors, Sacramento is less vulnerable to earthquake damage than any other major California city.

In fact, the city never has had a major quake. In March 1872 the city was struck with a shockwave emanating from a quake centered in the Owens Valley in the southern Sierra Nevada.

According to The Bee, the only injury was suffered by a newspaper reporter who jumped from the third story of the Orleans Hotel which still stands in Old Sacramento.

The man hit the top of a small outhouse, leaped onto a wagon shed, crashed through that roof to the top of a covered wagon and from there bounced to the ground.

In April 1892 a quake centered near Vacaville gave Sacramento its most severe shock, one that sent residents into the streets, shook loose some plaster, broke windows and dishes and "disturbed the population."

Most recently, a quake registering 6.5 on the Richter scale, sent shockwaves out from its epicenter near Verdi, Nev., on Sept. 12, 1966.

Damage was extensive in the Sierra, but in Sacramento it was negligible. Some residents of the Capital City said it was the worst quake they had ever felt.

Others said they did not feel a thing.

Coverage of the Oroville earthquake was provided by Bee staff writers Don Thornton, Ken Pavy, Walt Wiley, Jeff Raimundo and Nancy Skelton, and Bee correspondents Arlene Hetherington and Ann Fleischer. Photos are by Frank Stork and Owen Brewer.
Needle on seismic monitor at State Water Resources Building went wild when morning quake hit.
Residents Survey Damage From 'Hard, Sharp' Jolt

By Kenneth G. Payton and Walt Wiley

OROVILLE — Everyone seemed to be saying the same thing: yesterday's earthquake simply wasn't supposed to happen here.

Long-time residents like Mayor Robert A. Winston, Cork Marr, an auto dealer for 20 years who lost five $100 windows, and Fire Chief Eugene Ludwig said they had never seen anything like it.

"I was talking to a customer when I felt it coming," said Montgomery Ward's employee Charlie Yokley. "I said, 'hit the deck, this is going to be a big one.'"

"But they just stood there petrified."

Wards suffered some of the worst damage of any of the more modern commercial buildings here. Ceiling tile and lighting fixtures fell. Water pipes burst in an upstairs storage area and a spiderweb of cracks spread over the solid concrete slab foundation.

"There were no injuries," said Yokley. "We were very fortunate. It was a hard sharp jolt, the one this afternoon, not the rolling kind."

At 1:30 p.m.—10 minutes after the biggest quake yesterday—Chuck Kuhlmann, owner of Town & Country Lumber, started clearing out the carpet of broken glass that lay strewn across a small room in his store after whiskey bottles tumbled from their shelves.

His wife, Carol, estimated the loss at $20,000.

She said, "The kids who work here called their friends and they all brought snow shovels. At least we were able to open up and get back in business."

But the store still reeked of whiskey last night as business resumed.

"I'll tell you one thing," Ann Bills, 43-year Oroville resident, said, "I'm not going to stay in the house tonight."

Miss Bills lives in a 102-year-old house which has been in her family since 1598. The afternoon jolt cracked plaster walls and destroyed a chimney.

Down the block Fred Huntington watched a priceless collection of antique pottery smash to pieces.

Oroville's mayor said he was balancing himself changing trousers when the most severe jolt hit at 1:20 p.m.

"I was just like this, on one foot changing my pants," he said. "I went out and looked at my pool and there was this great tidal wave."

"It was the damndest thing, a whole tidal wave curling up over the edge."

An earlier quake—believed to be the second temblor to hit here yesterday—knocked a 20-foot section of ceiling in the room where Judge R.M. Watt had been sworn in as Butte County's third Superior Court judge an hour before.

The first tremor, a much lighter one at about 8:45 a.m., had prompted Judge Jean Morony to quip: "I knew swearing in a third judge here for the first time would be an earthquaking event."

Books also flew from the shelves in the modern courthouse and metal shelves were bent sideways.

Downtown at the old courthouse Butte County Director of Public Works Clay Casteberry said, "It (the courthouse) doesn't appear to be safe for use.

Large cracks showed on the outside of the 150-year-old structure.

Mayor Winston actually was impatient with all the excitement. "Our biggest problem is the influx of news media coming into the airport. We haven't had this many since Elizabeth Taylor and Richard Burton were here to make a movie."

At the Farmers' Supermarket on Oro Dam Boulevard, Manager Mike McIntosh was opening up after having been closed for five hours to clear up a mess that filled four 30-gallon garbage cans.

"We won't know what our loss is," he said. "We'll have to wait until our quarterly inventory."

He said when the quake hit he was talking to a 70-year-old woman and his only thought was how to protect her.

"I had her crouch down behind the cash register. I figured that was the safest place to get."

At a glass shop, a repairman racing away with a new supply of plywood yelled, "I can't talk to you now. I've got 40 plate glass windows I've got to deal with. It takes a half hour just to put wood over a big window."

"I'm not even fixing the glass now—just putting up wood and giving them an estimate."

At a television shop where one of the plate glass windows was shattered, the owner took the opportunity to use the new clean wood that had been hastily stored to advertise: "Earthquake Sale! Earth shaking values!"

California Highway Patrol Lt. W.T. Sanders said he was interviewing a man for a job at the time the big temblor hit.

"He was from Modesto and when the building started to shake a light fixture fell out of the ceiling right onto the desk. That guy ran right out of the door and I guess he headed to Modesto. I didn't see him at all after that."

Oroville lawyer Norris Goodwin, whose home is near the center of the quake south of Oroville, was in town buying film to photograph the damage at his house.

"I guess it might have been $3,000..."
One Expected Quake

hants 'closed for the day' as this resident discovered after the earthquake

to $7,000 damage and I can't get a nickle's worth of insurance coverage. At least I'll be able to take it off my income tax," he said.

"My daughter grabbed my collection of antique statues and mugs from the shelf and laid everything in the middle of the living room floor, so at least all that was saved. But my fireplace and chimney are wrecked and my garage was wrenched away from the house."

Oroville Insuranceman Ed Dahlmeier guessed less than one per cent of Oroville's property was insured against earthquake damage.

The Sacramento Bee

Metropolitan News

Saturday, August 2, 1975 • Page B4

48
Shock Felt In Bay Area

By William Moore
Chronicle Correspondent

Oroville, Butte county

A strong earthquake jolted this little town on the Feather river early yesterday, extensively damaging many buildings and sending shock waves throughout the state's midsection.

- Variously measured at from 5.7 to 6.4 on the Richter scale, the quake inspired immediate fears for the huge Oroville earth-fill dam nearby, but initial checks by the state Department of Water Resources found no damage.

- One injury, a minor one, was reported. A young girl fell when running from a store, however, glass littered the streets, many stores closed and falling wires and short circuits started several small fires, all quickly put out.

- Sidewalks buckled and some roads were closed by rockslides.

- The shock waves were felt throughout the Central Valley to Fresno and as far east as Lake Tahoe and as far west as the Bay Area. But all damage was confined to Oroville and its suburb of Palermo.

Strong Quake Rattles Oroville—No Damage Found at Dam

San Francisco Police reported about 50 calls after the earthquake, but no reports of damage. Chico and Sacramento swayed noticeably, however.

- Employees in downtown Sacramento buildings crowded into stairwells for safety after the quake was felt, and in Merced residents reported flower pots swaying. One woman in Fresno, 200 miles south of Oroville, said a lamp fell off a table.

- The 90-year-old Butte County Courthouse was evacuated and closed, its walls cracked.

- A city worker who was in the courthouse, Virginia Elam, said, "The walls buckled, and then cracks went right up them. The plaster and lights fell. I was like scared to death."

- Supervisor Bernie Richter said, "It looks to me as though the building is done for and will have to be torn down."

- One of this Gold Rush town's venerable saloons, the Black Bart Restaurant, also closed. The cook, John Bantrup, said, "Things started shaking, a bottle fell off the shelf and almost hit a customer on the head; and everybody got out."

- Bantrup's seven-year-old son, Tim, said simply, "I was holler ing."

- The big temblor, at 1:20 p.m.

Back Page Cot. 2
followed two earlier, smaller jolts, one measuring 3.3 at 8:45 a.m. and another at 5.0 at 9:27 a.m.

A resident of the town said, everybody's scared. There was damn near hysteria in the Bank of America after the third quake.

Bob Winston, mayor of this town of 7500, said however that "disaster stories" about the earthquake were not true.

"There have been many wild rumors going around. I personally walked around the downtown. There was much glass damage, but no serious injuries or collapsing buildings."

As residents and city workers began cleaning up fallen debris, an almost continuous series of aftershocks kept the ground rumbling.

On one block, all seven houses lost their chimneys. The Safe-way was closed after the ceiling began to sag. A rest home, the Magnolia Manor Resident Care Home, was evacuated after part of the ceiling fell in.

Most of the buildings in town were reported damaged to some degree.

"It's like nothing that ever bit here before," said Don Shaffer, editor of the Oroville Mercury-Register. "Part of a bluff fell into the Feather river where it goes through town."

Telephone communication with the town was snarled for hours as incoming calls swamped circuits.

A few minor fires were also reported in the area by the state Office of Emergency Services in Sacramento, which closely monitored the situation but as not requested for help by local authorities.

Everett Blizard, chief of planning operations for that office, said falling wires and short circuits caused the fires, all quickly put out.

Thomas McEvilly, assistant director of the Berkeley Seismographic Station, said the epicenter was about five miles southwest of Oroville, or about ten miles downstream from the big dam.

The Berkeley instruments measured it at 5.7 on the Richter scale, but California Institute of Technology in Pasadena judged it at 6.4.

McEvilly claimed the Berkeley results are probably more accurate since its station is closer to Oroville, and because earthquakes in the Central Valley often have their shock waves channeled south toward Los Angeles, making them appear larger at Caltech than they actually are.

The National Earthquake Information Service in Boulder, Colo., put the figure at 6.0.

On the Richter scale, an increase by one full point—from 5.0 to 6.0, for example—represents a tenfold increase in strength.

An earthquake of 3.5 can cause slight local damage; a 4 can cause moderate damage; 5 considerable damage; 6 severe damage. A 7 reading is considered a major earthquake causing widespread damage, and an 8 is a great earthquake potentially capable of tremendous damage.

The 1906 San Francisco earthquake measured 8.25.
Aennis Palmer leaned up the garden shop of Montgomery Ward in Oroville; inset shows location of Oroville dam
Oroville Dam Holds Firm in Quake

Oroville

The mammoth walls of the Oroville Dam held "perfectly" during the earthquake that rolled through here yesterday, officials said after initial inspections of the 82-story dam.

Attention turned immediately to the great earthen walls that dam the waters of the Feather river in a reservoir almost as large as Lake Shasta.

"Our reports are that there was no damage—Oroville Dam stability is perfect," said William Dunn, a spokesman for the state Department of Water Resources in Sacramento.

Throughout the weekend, experts will double-check gauges that monitor pressure along the dam, which is twice length of the Golden Gate Bridge.

Dunn said the dam's earthquake safety is bolstered by its earth-filled construction. Less stable concrete-arch construction was considered, but vetoed when the dam was built in the 1960s, Dunn said.

The dam could withstand a quake measuring 7.5 on the Richter scale, a magnitude many times that of yesterday's quake, in the "offhand estimate" of Gordon Dukleth, division engineer with the state Water Resources department.

Yet, some critics have questioned safety of the state's dams in earthquakes and Dukleth said latest engineering techniques were being used in an investigation of the dam that began before yesterday's quake.

The Oroville Dam was authorized in 1951, built in the 1960s and dedicated in 1968. The cost topped $300 million. The dam, one of the world's largest, is only part of the $3 billion state water project to dam water of Northern California and channel it throughout the state.
Shake And Bake Weather In

Heat Blasts North State — More Due

Whew! That was a hot day. Not a record, but close.

The National Weather Service says there's more of the same for today, but with one note of relief: The days are getting shorter so the heat won't last quite so long.

It was 104 in downtown Sacramento and 106 at Executive Airport. The record is 107, set in 1969.

Cooler marine air should seep into the Sacramento Valley and the foothills tomorrow. And it may be even cooler Tuesday.

Truckee had the distinction of being one of the coolest spots in the nation with a low reading of 34.

Meantime, the Northeast boiled in a heat wave with New England temperatures shooting over the 100 mark.

In Boston, fire officials said water pressure was "dangerously low" in parts of the city because persons were turning on fire hydrants to splash in the water.

A Connecticut mosquito control official reported some good news. Mosquitoes that bred during a recent rainy spell, he said, most likely will die of heat prostration and dehydration. They just can't take it.

Aftershocks Rock Area, Fray Nerves

Central Valley

McClatchy Newspapers Service

OROVILLE — Several strong aftershocks jolted Northern California yesterday, rattling buildings and unnerving residents who have withstood two days of shaking without serious injury.

The tremors' epicenters were scattered over a five-mile area in the southern outskirts of Oroville, near the spot where Friday's sharper earthquake struck.

About 10 stores closed again yesterday afternoon as newly restacked bottles and food containers tumbled once more from shelves. The county library in Oroville was closed because of book spillage.

The two strongest aftershocks, occurring at 1:22 and 1:59 p.m., swayed office buildings in Sacramento and San Francisco. They measured 5.4 and 5.2 on the Richter scale, respectively.

Following the pattern of a typical earthquake, the aftershocks were of decreasing magnitude. The last major

See Back Page, A16, Col.
Quake Fever Heats Up...

By Ken Payton

Oroville — "How ya doin' today, Barney?" said the mayor.

"Oh, I'm doin' just fine, Mr. Mayor. The Old Man's got his arms around me."

Barney Gabriel of Montgomery Street, owner of a bar on a street in downtown Oroville where buildings suffered damage enough in the weekend's earthquakes to warrant condemnation, might have expressed how a lot of other people felt here yesterday.

Barney was not the only one who looked to the heavens for help. A local church on a radio station broadcast a sermon on 'The Scriptures talking about a 'great many earthquakes will accompany judgment on earth."

"There will be a great many more things happening," the pastor said, "but earthquakes are what we are talking about today, and there have been a lot of them recently."

Except for a few bars, every commercial establishment in downtown Oroville was closed as sightseers drove slowly by buildings roped off to protect pedestrians, and Mayor Robert A. Winston followed grimly as engineers assessed the damage.

Three quakes hit Friday, several more on Saturday, and after-shocks continued to rock the area yesterday.

Dan Trotter, general maintenance superintendent of Oroville Dam, said major Saturday shocks registered 5.2 to 5.5 on the Richter scale at 6:04 p.m.

Oroville Residents Wait Patiently And Pray

and 4.5 at 7:47. None was as strong yesterday.

Trotter went to work at 9:30 a.m. yesterday after being up until about midnight.

"We're about ready to shut it down now and get back to normal hours," he said yesterday. "The dam came through in great shape. We had some minor damage to the buildings here and some sloughing off in one of the channels, but that was about all."

"I'd rather be behind this than upper Dam or Bullards Bar," he said. "They're concrete arches."

Police officer Jack Lee said people are "getting uptight waiting for the next shock to come. It's like stepping on a sly and slipping on the floor uppersides. We can't help wonder when he's going to do the next one."

As for people leaving Oroville because of the shocks, "I hope not," said Lee. "See Page 18, Col. 1."
Oroville Awaits Rumbles

Continued from page A1

Mayor Winston. "I haven't seen mass hysteria or people packing up and getting out. The people seem amazed that the structural damage isn't more than it is.

"I went to the grocery store with my wife Saturday for one of the few times I have," Winston said. "This jolt hit and knocked groceries off of all the shelves.

"People were calm though. There was no rushing for the entrance. One mother picked up her child and hugged it, but that's normal."

Down on Montgomery Street, young Tony Klein and his wife were loading furniture from their restaurant onto a pickup truck.

Black Bart's, housed in an ancient building built in 1830 and reportedly the site of poker games by the real Black Bart, will be no more. After an investment of $10,000 18 months ago, Klein watched helplessly as city officials condemned the building.

"I've been broke before," said Klein. "They say we might get some federal help. I just have to start again."

An older man sat in the shade of trees in front of the county administration building still rapped off. "We ought to start tearing away these old, old," he said. "It's their town and they're going to have it.

"I've got a job in the cannery starting Tuesday. They're going to start up and I'm going to be there." But a service station attendant said people indeed are leaving. "If they aren't, they should. If this keeps up, the whole town's going to go.

"The pressure is building up again. We've had two shocks already this morning.

People worried about the dam? "Some are, some aren't," said a man in a liquor store. "As for me, I don't think any earthquake could ever break that dam. If it did, it would wipe out Oroville and I wouldn't have to worry about anything anyway."

Other "shocks" might come in the weeks ahead.

"It's going to be tough telling people they can't use their buildings," the mayor said.

These shocks will come beginning next week, he said, after engineers complete damage assessments.

Entire blocks may have to be demolished, particularly downtown where buildings date back to the late 1800s.

Minor Damage To Capitol Believed Caused By Quake

An inspection of the State Capitol has revealed minor damage which officials think probably was caused by Friday's earthquake.

Officials of the State Office of Architecture and Construction say the damage does not increase the danger of the Capitol collapsing. It already had been labeled structurally unsafe and a major rebuilding project is planned.

The damage discovered on an inspection tour immediately after the tour was limited to two areas in the dome structure and to part of the south wall of the Assembly chamber.

"We noticed some diagonal cracking in the pillars between the windows in the barrel of the dome," said William Vick, deputy state architect. He said a decorative cast-iron ring around the outside of the upper dome had pulled about a half an inch from the structure.
Aftershocks
Rock Valley,
Fray Nerves

Continued from page A1

Atmter struck at 6:03 p.m. and was
measured at 4.8.

Several Oroville families, fearing
that another damaging earthquake
might occur, fled to motels in Chico.
One desk clerk said a young couple
remarked that they left their home
because they were "scared to death
and couldn't stay any longer."

Don Shaffer, editor of the Oroville
Mercury-Register, said residents
"generally are pretty nervous because
of these continuing shakes. Many of them
fear they are building up to something."

But Clarence Allen, geology profes-
sor at the California Institute of Tech-
nology, said, "Based on past experi-
ence the chance of anything equal to
or larger than Friday is exceedingly
small."

"Aftershocks will doubtless con-
tinue to occur for many days within the
area," said a spokesman for the Uni-
versity of California's seismological
station in Berkeley.

Oroville's two glass stores reported
receiving $80,000 in orders and ex-
pected more. Several roadway cracks
were reported.

Friday's tremor, registering 6.1 on
the Richter scale, was the strongest
California has experienced since the
1971 San Fernando Valley quake that
killed 65 persons.

Oroville Police Sgt. Gary Staves
said light aftershocks "went on all
night long. Ones that you can feel are
going about every hour."

The latest series of quakes did no
damage to the huge Oroville Dam but
local officials were preparing emer-
gency evacuation plans anyway.

In Yuba and Sutter Counties down-
stream, the continuing quakes also
affected nerves.

"We're most worried about the pos-
sible effects of a break or crack in the
dam. We're probably overreacting," said
Larry Ciley, a Sutter County ad-
ministrator.

The Yuba-Sutter Fair Committee
held an executive session to consider
closing the fair but voted against it.

About 50 Butte County employees
will be without offices as the result of
the earthquake activity. Public Works
Director Clay Castleberry said he will
not permit anybody to enter the coun-
y administrative center because of
its rickety condition.

Aftershocks
Of Oroville
Earthquake

Tiny, felt earthquakes in
the Oroville area continued to
register at the rate of several
each hour yesterday at the Uni-
versity of California Seismograph-
ic Station in Berkeley.

"They may have been every
five minutes or so this morning,
but they're coming about every
ten minutes now," said seismolog-
ist W.T. McEvilly last night.

"That's the way these after-
shocks work—the rate of occur-
rence slowly dies out."

These, miniscule tremo-
ors—and three "strong events" on
Saturday—were aftershocks to the
big quake, measuring 6.1 on the
Richter scale, that jolted Oroville
Friday.

Two of the three quakes Sat-
urday were recorded between 1
p.m. and 2 p.m., and the third
came a few minutes after 6 p.m.
They measured, respectively, 5.4,
5.2 and 4.8 on the Richter scale.

According to McEvilly, peo-
ple start noticing earthquakes
that get a Richter reading of
about 3.

Oroville residents who had
fled out of fear that the "the
might break began trudging back
home.

Engineers and homeowners
alike tried to assess the damage
and geologists made calculations
and notes and guesses.

One theory they considered
was the possibility that the
quakes were caused by the pres-
sure of the 3.4 million acre-foot-

lake behind the dam.

"There are several places
where the loading of deep reser-
voirs has apparently caused
quakes," said McEvilly.

"This was known when Oro-
ville was designed and built, and
seismographic stations were put
in the area by the Department of
Water Resources to monitor the

McEvilly said that no in-
crease was noted so far as he
knew.

The question of whether the

dam contributed to the quake
cannot be answered right now, he
said: "You're going to see five
years of debate on this."
Continued from First Page.

Earthquakes apparently unseathed. It did not lose a drop of the 3.5 million acre-feet of water behind it.

The temblors, however, cracked plaster in buildings at the dam and caused boulders to roll down hillsides. In Oroville, six miles away, a big bluff toppled into the Feather River.

The two major northern temblors were accompanied by a swarm of smaller shocks. All were centered in the same area southwest of Oroville.

The first of the two quakes occurred at 9:26 a.m. and registered 5.3 on the Richter scale.

The bigger temblor came nearly four hours later and was felt as far away as Redding, 76 miles to the north; in San Francisco, 126 miles to the southwest; in Reno and Carson City, Nev., 100 miles to the east, and in Fresno, 210 miles to the southeast.

It was not until 5:14 p.m. that the Palm Springs earthquake shook the Southland. It measured 4.9 on the Richter scale.

When the biggest of the Orovile quakes came, people poured out of buildings in the business section and ran into the street to avoid being hit by plaster and masonry.

A nursing home was evacuated by 13 elderly persons after a falling tile. The wall of a Montgomery Ward store collapsed. Several small fires broke out when electrical wiring was shaken loose.

Canned goods and other merchandise tumbled onto the floors at markets.

"A couple of liquor stores here will never be the same again," a California Highway Patrol officer said. "Everything went on the floor."

Telephone and power lines fell, leaving several thousand residents without electricity or telephone service.

A sign on the door of the Bank of America branch late Friday read, "Closed 2:30 Because of Earthquake."

Mrs. Bonnie Huntington, assistant manager of the bank, said about 60 persons inside the building "screamed and ran to the front door" when the largest of the temblors came.

She said the rolling felt moved the safe deposit box vault about 2 inches.

Isaac Chetham, who is retired, said he was sitting at a poker table in a Montgomery Ward playing lowball when the building began shaking.

"We didn't even remember what I had in my hand," he said. "I headed outside fast."

The main concern of everyone, though, was the dam and whether it would hold. The dam is the key unit of California's 22.8 billion dollar water project.

The dam is wide enough to span downtown Los Angeles from 1st St. to Pico Blvd.

Palm Springs police Sgt. Ed Brucks said the department switchboard was flooded with calls after the temblor hit near there late Friday afternoon.

"It shook the heck out of the police building," he said. "I've got three walls of glass around me and I had to leave the room. But the glass didn't break."

Two rangers of the U.S. Forest Service abandoned their 45-foot-high observation tower 10 miles southeast of Hemet, fearing it might topple.

They radioed to headquarters: "We are experiencing a heavy earthquake and the tower is shaking quite badly." Then there was silence. But they came on the air again three minutes later to say that the tower was all right.

County firemen in Beaumont and Cherry Valley moved their trucks out of station houses in case the roofs collapsed. But the buildings weathered the shakes.

A small grass fire was started at Tri-Palm Estates, a trailer park in Thousand Palms, when a power line was shaken down. Firemen quickly controlled the blaze.

Bill Lorin of radio station KPSI in Palm Springs had just finished reading a story on the Orovile temblors when his studio, he said, "started swaying back and forth."

In Sacramento, the 105-year-old Capitol building went through the ordeal with only some minor damage to the 219-foot-high dome. It was declared an earthquake hazard three years ago.

The Legislature's Joint Rules Committee ordered the 60-member staff of state Treasurer Jesse Unruh to vacate the office in the west wing of the building after the biggest of the northern quakes struck.

The 6.1 Orovile temblor was the strongest to hit California since the 6.5 shock in San Fernando on Feb. 9, 1971, which killed more than 60 persons and caused an estimated $850 million in damage.

The 1906 San Francisco earthquake, registered 8.25 on the Richter scale, Dr. Clarence Allen, a seismologist at Caltech in Pasadena, pointed out that in the past there have been at least four instances of water in big dams "lubricating" faults and causing earthquakes.

The phenomenon has occurred, he said, in China, Greece, South Africa and Lake Mead, Nev.

But he added that he doubted such a condition caused the Orovile temblor because the dam was too far away from the epicenter of the shocks.

"But I'm sure that this is something we are going to have to look into quite carefully," said Allen, Caltech professor of geology and geophysics.

"The idea is not farfetched. All large reservoirs now being designed have this possibility in mind and the assumption is that it could happen."

Allen said the tremendous weight of the water behind the dams probably also has something to do with the triggering of earthquakes.
Earth Cracks Point to Dam as Cause

By FRED GAREETSON
Tribune Staff Writer

The U.S. Geological Survey has discovered evidence that the Aug. 1 earthquake ruptured the ground surface for more than a mile along a previously unknown fault line which appears to pass through Oroville Reservoir a mile east of Oroville Dam.

The discovery adds new evidence that the construction of Oroville Dam may have triggered the damaging quake which registered 6.1 on the Richter Scale.

Dr. Barry Raleigh, chief of the U.S. Geological Survey Branch of Earthquake Tectonics at Menlo Park, said the surface rupture was found in relatively flat land at about the 600 foot level in the Sierra Nevada foothills seven miles south of the reservoir.

The spot where the earth cracked open is about 1½ miles southeast of the village of Wyandotte, generally in the Cleveland Hill area east of Fine Gold Gulch in Butte County.

Raleigh said, "No geologic map that I have examined showed a fault at that location" although, he said, it was logical to assume that some kind of inactive fault might exist there because it is along the line of contact between the Sierra Nevada granite rock formations to the east and the metamorphic rocks (such as California greenstone) to the west.

He said examination of satellite photos of the Oroville region show a number of topographic features sitting in a straight line across the country-side near Oroville. Nature abhors straight lines and in California such alignments usually are suspected of being earthquake faults.

"This one appears to be a fault," Raleigh said.

The surface ruptures occurred along this alignment, north to the reservoir.

He said the aftershocks of the Aug. 1 quake have been mapped to show a fault extending down to the west from the line of surface ruptures to a spot located six miles under the community of Palermo. Palermo, located on the southern outskirts of the city of Oroville, was the epicenter of the Aug. 1 quake.

In general, the speculation about Oroville Dam goes this way:

Prior to the construction of the 770-foot-tall Oroville Dam in the mid-1960s the Feather River poured out of the mountains across the ancient and apparently inactive fault line. Water leaking into the underground along the fault would have had little effect.

But construction of the dam impounded water so that the deepest spot in the reservoir was almost directly over the newly discovered fault. Water squeezing into the underground was now being injected into the fault under great pressure.

USGS scientists previously found at Denver and in the Rangely Oil Field in Colorado that they could create earthquakes by injecting water under pressure into certain kinds of deeply buried fractured rock formations. The quakes stopped when the pressure was reduced. They could turn earthquakes on and off with a faucet.

If Oroville Reservoir is acting like a faucet for earthquakes, then this year it was turned on full. State officials said the reservoir filled up more rapidly this Spring that at any time in previous years.

Raleigh declines to speculate until all the evidence is in, but says there is evidence to support the idea of a dam-caused quake, but there also is strong evidence this was a normal quake which happened to occur in an area with no previous recorded earthquake history.

The Aug. 1 quake is peculiar in that there have been more large aftershocks—in the 4.0 to 6.1 range—than for any other known quake of this size in California history, Raleigh said.

On the other hand, the rate of decay of the seismic action appears to be completely normal. Also, all of the aftershocks have been located south of the reservoir and none has been recorded under the dam itself, he said.

One piece of evidence still to be gathered is a special survey that would show whether the weight of the water impounded by the dam has caused the land surface to subside around the reservoir. Oroville Reservoir contains four million acre feet of water when full.

State Department of Water Resources officials say there are 25 known cases where reservoir construction appears to be connected with increased seismic activity, although none has previously been proven in California, DWR officials said.

Oakland Tribune

Sun., Aug. 17, 1975
GEOLOGIST EXAMINES TECTONIC FRACTURE RUPTURE FROM AUG. 1 EARTHQUAKE

Surface rupture of newly found fault seven miles south of Oroville Reservoir
Oroville Study

No Proof of Link Between Dam, Quake

By Charles Petit

A panel of earthquake experts who advise the State Department of Water Resources could find no link between the huge Oroville dam and the earthquake that shook nearby areas August 1, a member said yesterday.

Such a connection would be "very difficult if not impossible" to demonstrate, said Bruce Bolt, director of the University of California at Berkeley Seismographic Station and a member of the five-person Seismic Advisory Board to the water department.

The board met Friday to study the data on the earthquake and send its findings to the water department, operator of the 700-foot-tall hydroelectric dam, the world's largest earth-fill structure.

Other members of the permanent advisory panel are San Francisco consulting engineer John A. Blume, Berkeley professor of engineering H. Bolton Seed, and California Institute of Technology seismologists George Housner and Clarence Allen.

Part of the difficulty in reaching firm conclusions, Bolt said yesterday, is that earthquakes near Oroville, while usually smaller than the August 1 quake and its attendant aftershocks, are not uncommon.

"I went back through the records," Bolt said, "and found there have been about 30 earthquakes within 50 miles of Oroville since 1850, including one in 1940 and one in 1950."

He said it is "doubtful" that the weight of the water behind the Oroville dam could have triggered the quake, "but not impossible."

All that is known is that a zone of rock about five miles long, and about five miles underground, slipped to cause the earthquake, Bolt said.

Whether the fault that moved is connected to known faults, visible at the surface, is impossible to guess, he said.

But if it is, that could be news. The only well-mapped surface fault system in the region is the Melones Fault complex, an ancient structure most scientists feel has not moved in two million years.

Bolt said the Oroville quake was probably due to local stress caused by the general sliding motion of the North American and Pacific crustal plates.

But the report suggested several measures aimed at learning more about the origin and precise location of the August 1 quake, which caused extensive damage in the town of Oroville and was measured variously at from 5.7 to 6.3 on the Richter scale.

These include precise surveys to reveal any surface ground displacement, plus detonation of small surface explosions to calibrate instruments at the dam and make possible precise maps of the earthquake's location.
Oroville Shaken Down by 6 Inches

OROVILLE (AP) — Earthquakes have sunk the Oroville area about six inches in relation to the Sierras, and another quake in the area is a "reasonable probability," a federal report said Saturday.

The U.S. Geological Survey study reported the depression from the series of earthquakes that began Aug. 1 in the Northern California community.

"People shouldn't be surprised" if a 6-magnitude earthquake occurs in the area," said Tousson Topozada of the California Department of Conservation.

Other scientists have said a quake of that size might be expected anywhere along the Sierra foothills, which had been considered relatively earthquake-safe until now.

The largest of the Aug. 1 quakes was measured at 6.1 on the Richter scale, which each full point represents a shock 10 times stronger than the preceding point. By comparison, the San Francisco earthquake of 1906 measured 8.3.

The Oroville quakes caused widespread damage to older buildings in the city but no serious injuries. Topozada and fellow seismologist Don Rodgers issued a memorandum in the Department of Conservation linking the Oroville quakes to the nearby Oroville dam, at 779 feet high the nation's tallest earthfilled dam.

"The proximity of the earthquake to Lake Oroville suggests a relationship between the two," they said, adding that earthquakes of similar magnitude "have been triggered by man-made lakes in India, Rhodesia and Greece."

$150 Million Claim Filed in Oroville Quake

A $150 million class-action claim contends that water from Oroville Dam seeped down, created slippage along an underground fault and ultimately caused the Aug. 1 Oroville earthquake and aftershocks. The claim was filed by Maxim N. Bach, an Oroville attorney, against Butte County and the state Department of Water Resources. Bach could bring a lawsuit if the county and state refuse the claim. Bach's action contends government officials acted negligently in allowing the dam to be built.
Expert Says Downtown Buildings Are Not Safe

By JAN HELD

In the event of another major earthquake, the majority of the old buildings in downtown Oroville would be "death traps" according to Karl V. Steinbrugge, chairman of the California Seismic Safety Commission.

Steinbrugge, a leading expert in the field of structural engineering and design, was one of many persons on hand last night to supply the Oroville City Council with input to aid in determining what level of repair will be mandated for downtown buildings damaged by earthquake activity.

During the almost three hours of discussion in city hall last night, one businessman heatedly accused the council "you don't give a damn about what happens to the businessmen."

Mayor Robert Winston, who attempted to explain that the council was seeking input for the very reason of helping the businessmen, became irate when the man continued shouting accusations. The mayor, slamming the gavel on the table, told the man he was out of order and told him to sit down if "you can't conduct yourself like a gentleman." The businessman left the meeting.

While no determination was made last night as to what level of acceptable risk will be approved, some indication of what should be required is expected in approximately two weeks. At that time, it is hoped a select committee appointed by the mayor today will have reached some conclusions to resolve the problem in the downtown area.

Appointment of the committee was suggested last night by Dair Tandy, a local con-

tractor, the mayor's office reported today that a committee is being appointed, and that the committee will be comprised of persons representing the construction industry, structural engineers, building owners, the real estate and insurance industries and citizens-at-large. City representatives also will serve on the committee, but in an ex-officio capacity. The committee will report back to the council on Sept. 16.

One of the reasons for appointing the committee was because of the importance of the decision that will be made. Also, the audience last night was comprised mostly of engineers, building owners and businessmen. The engineers — viewing the situation in black and white — see a serious problem, and, while they realize the complexity of the suggestion, the majority of the engineers suggest a need for stringent code enforcement and drastic repairs.

The businessmen and building owners, on the other hand, feel they can't afford extensive repairs, nor do they want to start repairs until they know if the money will be well spent. The businessmen don't want to put money into the buildings if the repairs would be outmoded by the codes to be adopted.

Some of the businessmen at the meeting suggested that the buildings were "risk" before the earthquakes, and expressed the attitude that the council should not mandate extensive repairs.

"There are risks in everyday life," one man said. That same man, however, said that in all fairness the council should poll the general public to determine their opinions on the situation. He said those present mostly comprised downtown merchants and building owners who were concerned about how much money they are going to have to expend. "Like you said," referring to an earlier comment made by the mayor, "there are 20,000 people out there." He said that, in all fairness, those persons should...
Councilmen Discuss Damaged Buildings

(Continued from Page 1)

be solicited to determine just how much risk they are willing to take when shopping in downtown stores.

The attitude of several present was that the repair requirements should not be too stringent. Several commented that “after all, the buildings are still standing.”

Mayor Winston said he wished the meeting could have been held during the week immediately after the earthquakes. Stating “time heals all wounds,” the mayor said it is his opinion the attitude then would have been somewhat different than the attitudes expressed during last night’s meeting.

He referred back to an earlier comment stating that the loss of one life in a building that tumbled during an earthquake would be tragedy. He admitted that the council could not demand strict codes because, if it did, some 75 percent of the buildings in the downtown area would come down. On the other hand, he said, the council could not condone only a minimum amount of repair.

Steinbrugge had agreed to that comment earlier by stating “you must make certain you’re not asking for too much or too little.”

However, while stating he did not envy the council for having to “bite the bullet” by arriving at a determination as to what level of acceptable risk will be adopted, he said what the council must decide is “how many people are you willing to let die in an earthquake?”

Steinbrugge said Oroville’s problem is not unique. He said the City of Los Angeles has some 20,000 to 30,000 brick buildings that have the same type of sand and lime mortar construction such as that found in most of Oroville’s downtown buildings.

He said that “brick buildings with sand and lime mortar do collapse in earthquakes.”

Steinbrugge said it is “easy to make a building earthquake ‘resistant’ — not earthquake proof.” He said this can be accomplished “through the building code already adopted by this city.”

He said that “a redevelopment program is important, and long range planning is vital.”

He suggested that the city begin a redevelopment program and that it “start eliminating the buildings that are death traps.”

“There is a definite hazard here,” he told the council, “and you are blinding yourself if you are saying ‘let’s neglect it.’”

The action to be taken by the council, he said, will have to be “a gut level decision.”
More Earthquake Rumors

THERE WILL ALWAYS be those among us that want to believe the worst. Call them pessimists, cynics, doom-sayers or whatever; these are the persons who seem to get sort of a macabre kick out of being the bearer of bad news. Often, in their quest for the more unpleasant bits of information, they are careless with the facts, stretching a point here and there to give more substance to their story. Sometimes, they just lie.

Oroville, like any other community, has its share of this type of person. And, since the Aug. 1 earthquake and its subsequent aftershocks, they have been having a field day making up or passing on rumors that have little or no basis in fact, and serve no purpose other than to frighten those gullible enough to believe them.

Shortly after our earthquakes began, the rumors started. The first ones concerned the dam and most of us heard the one that claimed that a worker at the dam had discovered a crack in the dam that was leaking. The inference, of course, was that the collapse of the dam was imminent. This was, or course, proved to be completely false. Most of those, who had watched the dam being built, though, didn’t believe it in the first place. The magnitude of a quake large enough to even damage the dam is almost impossible to imagine.

THEM CAME THE REPORT that there was an underground volcano in the Palermo area. Some persons believed this one. Some also believed the story about steam coming from the top of Table Mountain.

Because there are those persons who want to believe the worst, these stories were passed on until debunked by the experts. The Mercury took the lead in checking out these rumors and passing on the truth to its readers.

But rumors flow freely in times of stress and they still continue. The latest one is so ludicrous that it shouldn’t even be acknowledged, but because it impugns the integrity of both the Mercury and the local radio station, we have to stop it right now.

THE CLAIM GOES — and it has already been offered over the air by the radio listener — that both the Mercury and the station have been informed of when the next big quake will hit Oroville, but have been sworn to secrecy to avoid panic in the city.

It is more than a little disturbing to think that anyone would believe such tripe, but human nature being what it is, we know that there are probably some who would give it credence, regardless of its monstrous absurdity.

We would like to say that if we had such information, we wouldn’t believe it. No one has yet predicted a major earthquake — or even a minor one as far as we know. Secondly, if we did have such information, we would pass it on to our readers reporting it as just another rumor. The story undoubtedly got started, because we refused to print the “scare” story carried by a Sacramento newspaper that pondered the possibility of another large quake in our area. That story was debunked in Tuesday’s editorial.

We have said it before and we will say it again, the Mercury will not be a party to printing rumor or guesses as fact. We will seek out and expose these stories for what they are — pure fabrications.