

# Timely lessons for East Bay from the 1868 Hayward Fault earthquake

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It is sobering to realize that the 1868 Hayward fault earthquake was the last major eruption on our local fault.

The United States Geological Survey states that major destructive earthquakes occur along the Hayward fault, on average, every 138 years. This means that since 2006 we have been due for another.

There is no doubt that the Hayward fault, the most densely populated earthquake fault in the United States, is going to lash out mightily sometime soon. Is "soon" in a few decades, a few years, a few minutes?

The fact is that, as a community, we have chosen to ignore what happened on Oct. 21, 1868, at 7:54 a.m., in the process ignoring what is most likely in store for us. Few know the facts of this history. What is to be seen is not pretty. It is rather ominous.

The 45-second 1868 Hayward earthquake (over 2½ times longer in duration than Loma Prieta in 1989, and equal in intensity to the 1906 San Francisco earthquake) arrived with a rumble and then increased shaking. It stopped for a second or two, then resumed with a growing and overwhelming power and clamor. It ended with an oscillating motion in many locations.

Many people were knocked down and could not stand again until the shaking stopped. Some folks grabbed onto trees or fences to try to stabilize themselves. Trees swayed like pendulums. People were propelled across their rooms and back again.

A number of residents all over the Bay Area witnessed fissures in the earth open and then close again like a hungry mouth. Some folks just sank down and waited. Many assumed this was it for them and began to prepare to meet their doom.

Panic ensued in some places, and as far away as Sacramento people charged into the streets through the dust as soon as the wild gyrations stopped. The Hayward fault had ruptured from south of Fremont to as far north as what would become Berkeley.

Many people experienced the quake and its intense horizontal shaking but had no or only minor damage to their structures. In general, it depended on what kind of ground you happened to be on and what kind of building you were in.

There were locations where destroyed buildings and unharmed ones were right next to each other.

San Francisco suffered major damage, mostly in the area of the "made-ground" where Yerba Buena Cove had been filled in (now the Financial District). This area had previously been 10 to 80 feet deep in mud.

As a rule of thumb, the further from the epicenter (Hayward) you were, the less intense your experience was, but there were notable exceptions to that rule.

Long-dry creek beds suddenly gushed with water.

Fissures opened in the ground in numerous locations all over the East Bay and as far south as Santa Cruz. Fissures opened by Lake Merritt and the bay shore in Oakland, at the base of the Hayward hills, and along the San Ramon Valley and hills in Contra Costa County.

It was almost impossible for the stage coach to traverse the road between San Leandro and Warm Springs due to the many crevices. A man herding his cattle in Summerville had to leap two or three paces to avoid falling in a fast-forming gap in the earth during the rumbling.

Some fissures spouted dust or water, one gushing as high as 50 feet in the air. Some terrain was raised up, while other nearby areas fell and became ponds. New springs were born while others dried up.

A continuous 9-mile-long fissure opened starting in Oakland around Mills College, extending south and east to San Leandro. Later studies indicate the straight fissure, ranging from six inches to six feet in width, continued for 30 miles.

The earthquake of 1868 was powerful enough -- somewhere between a 6.8 and a 7.0 -- that even after destroying much of the small towns of San Leandro and Hayward, it still had enough wallop to slither with the speed of a jet fighter to Sacramento, where it shook the ground with such violence that the Sacramento River ran momentarily backward, leaving the ship *The Globe* sitting in mud. The river returned in a matter of seconds with a two-foot wave that pounded dockside ships intensely.

People "vomited" (to quote Mark Twain) into the streets in general confusion and fear, though not panic.

Some large warehouses near San Francisco Bay sank. Others in the flatlands collapsed. One toppled into the bay near Warm Springs. Some were untouched, especially on the hills of San Francisco.

Kanaka Davis had built a two-story house along the mouth of San Leandro Creek. During the earthquake, it sank to its second story into a wide earthquake fissure. The family was still inside. They miraculously escaped unharmed. Other buildings were ripped in half, tipped, or in various stages of collapse or damage. Most chimneys were toppled or twisted. Large areas, such as all of Oakland, were almost devoid of standing chimneys. Interestingly, every downed chimney there fell in a southerly direction.

In Oakland, glass littered Broadway, some brick buildings suffered collapsing walls, and some did not. Some were destroyed, some unharmed.

Brick buildings in much of the Bay Area did not, as a whole, perform well. After the quake there was a call to limit their height and require that they be reinforced with steel. Others demanded that city hall structures be rebuilt with wood rather than masonry materials. Damage to city halls or courthouses was almost universal.

The 11 chimneys of the California School for the Deaf, in what would become Berkeley a decade later, were knocked down. The massive new stone building, which was in the process of being completed, suffered some downed gable-end walls and other repairable damage.

One workman was about 140 feet in the air, at the top of the new wooden tower, when the earthquake exploded. He held on while it swayed many feet back and forth.

The majority of the building held together well. One workman commented that if the construction had been of

The Hayward fault's western side ruptured six feet horizontally to the north, on average, that morning. The fault physically ruptured as far north as what would become Berkeley. Down at Jacob's Wharf, by the shoreline, much lumber was tossed into the Bay.

The Bay Area population of 1868 was fundamentally brave, hardy and self-reliant, and began cleaning up the mess at once. Then they began rebuilding and repairing with determination. They had no choice.

Deaths were surprisingly few, somewhere around 30. Given the magnitude and reach of the earthquake, the East Bay was amazingly lucky. But there were only about 24,000 people living near the fault in 1868, which limited casualties. Today there are more than two million.

Within a matter of days, the people of 1868 quickly thought about and published the lessons of the event. They concluded that chimneys above the roofline should be made of sheet metal and not brick.

Many believed that well-built, wood-frame houses were basically earthquake-proof if they had a proper foundation on solid land. They warned never to build with heavy cornices, overhangs, or awnings, as they could fall and kill people running out of buildings, as had just occurred.

They said good mortar must be used in building walls and chimneys. They cautioned that masonry buildings should have metal braces and ties, and that foundations and walls should be thick.

Firewalls above roofs -- mandated to help prevent fires from spreading quickly from one roof to another -- were condemned as they fell with such thunder and frightening frequency in the earthquake.

Earthquake dangers now took precedence over fire hazards, the previous number-one danger.

Most of all, people were cautioned not to run out of buildings during an earthquake and to stay calm. Some called for a commission to study the best practices for future building and for those recommendations to be enforced.

Newspapers noted that deaths from natural disasters in California were much less than back east, where 300 people had died of sunstroke in New York the previous year.

They urged strength, faith, and determination. They stated their lessons clearly. If those lessons had been followed, especially by governmental officials, hundreds of people would not have lost their lives in the subsequent 1906 earthquake.

Look around. Look around your house, your block, and your neighborhood. We have built pipelines for jet fuel on our bay shore and oil refineries in and near our communities. We have fire, toxic, and collapse hazards.

We also have bridges and gas stations and overpasses and chemical plants posing unknown potential risks. We continue to build on "made-land," and pretend that human engineering of a masonry football stadium directly on the Hayward fault will protect tens of thousands of people when a 40-mile mass of earth intends to rupture and shift.

An invisible Paul "Earthquake" Revere is riding down your block crying out, "The earthquake is coming. The earthquake is coming." But few are listening. They are talking on cell phones or texting. They are ordering from menus and busy with chores and children. They are us.