Quake jolts north state

By Nancy Dooley

A powerful, rolling earthquake, believed to be centered 10 miles northwest of Livermore, shook San Francisco and parts of Northern California this morning, swaying highrise buildings and sending frightened residents into the streets. Preliminary estimates put the magnitude of the quake, which occurred just after 11 a.m., at 5.6 on the Richter scale.

University of California officials said the epicenter was so close to Berkeley that it knocked indicators right off their measuring devices in the campus seismographic station.

Police throughout the Bay Area were swamped with telephone calls. Most of the damage reports came from the East Bay.

Livermore police reported two persons had suffered heart attacks and 11 others were injured, not seriously. Six of them apparently were cut by broken glass at the Intel Electronics firm, and the other five were residents of the Sunset Mobile Home Park, where several large trailers were knocked off their foundations.

The California Highway Patrol closed Interstate 580 at the Altamont Pass, and 300 persons were evacuated from the Lawrence Livermore Laboratory.

The quake lasted between 10 and 20 seconds. It was felt as far away as Carson City, Nev., to the east and Hollister to the south.

In Pasadena, Caltech spokesman Dennis Meredith said, "It rang all the alarms on our instruments and it kept ringing them, so that means you're getting lots of earthquakes."

Contra Costa County director of emergency services Will Perry said the quake was "either so big or so close that it knocked the Berkeley seismograph right off the scale."

The quake was the second major quake since Aug. 6, when a jolt registering 5.9 on the Richter scale shook the northern state.

Most of today's damages were centered in the Livermore area.

Windows were broken in the Lawrence Laboratory, but the plutonium used for nuclear research was secured, according to officials of the lab.

Several filing cabinets toppled over, and there was one reported heart attack. About 300 persons were removed from the seven-story building.

"It was very very strong here," said public information officer Jeff Garberson. "We've had damage to the building I'm in and I'm not supposed to be in it."

Pacific Gas and Electric reported power outages in Livermore and Califurnia reported damage to a bridge that carries eastbound Interstate 580 traffic over the north Greenville Road in Livermore.

Caltrans spokesman Bob Halligan said the western end of the bridge dropped about 8 inches. The bridge was not closed but traffic was restricted to one lane.

Alpha Beta stores in Livermore and Dublin reported extensive damage, with broken windows and merchandise scattered all over the floor.

In San Francisco, Richard Evans, assistant to public works director Jeffrey Lee, said plaster fell in three places in City Hall, but most of it was decorative.

Many city workers ran into doorways for protection. Perry said there were unconfirmed reports of power lines down in Alameda County, ruptured gas mains in the Livermore Valley and broken plate glass windows in the Montclair area of Oakland.

BART stopped all trains for a short time and then resumed service.

The telephone company reported disruptions in service due to heavy usage, but said it had received no reports of heavy damages.

The earthquake of 1906, which occurred before the Richter scale was devised, has been estimated at 7.9 on the Richter scale.

Only four quakes greater than that of Aug. 6 have struck the San Francisco Bay area in this century. Other such strong tremors were a 1911 quake estimated at 6.6, which was centered near Hollister on the Calaveras Fault, and two tremors of a 6.1 magnitude centered off the coast of Monterey in 1929.

Quake Disaster Area Declared

SAN FRANCISCO (AP) - Five counties have been declared a disaster area by the federal Small Business Administration as a result of the Livermore earthquake on Jan. 31.

It makes homeowners and businesses eligible for low-interest loans to repair damage.

The SBA said the declaration covers Alameda, Contra Costa, San Joaquin, Stanislaus and Santa Clara counties.

Los Angeles Times (Sat., Feb. 16, 1980)
A Long Quake Jolts Big Area

5.5 Shock Centered In East Bay

By David Perlman
Science Editor

A rolling earthquake swept through much of Northern California yesterday, causing minor injuries and damage near its epicenter and forcing 7100 workers to evacuate the huge Livermore nuclear weapons laboratory.

The "moderate" quake struck in a remote, hilly section of southeastern Contra Costa County at ten seconds past 11 a.m., with a Richter magnitude of 5.5. It was followed within the next three minutes by two aftershocks — one with a magnitude of 5.2 and the other measuring 4.8.

Residents reported feeling the ground roll beneath them as far away as Reno, nearly 200 miles east of San Francisco; Monterey, 150 miles south, and Santa Rosa, 50 miles north.

The BART system halted all its trains for five minutes after the quake, but trains in the tunnel beneath San Francisco Bay were allowed to go to the nearest stations before the shutdown. No damage was reported anywhere on the line.

Country roads and some larger highways near the epicenter buckled and cracked, and an overpass along Interstate 880 at Greenville Road became impassable when earthworks and paving on the east side of the structure slumped three to eight inches.

The overpass did not break, but eastbound traffic had to be diverted off 880, and cars soon backed up several miles. Highway crews began clearing away chunks of tar and concrete, and two of the blocked lanes were reopened later in the day.

Throughout the Bay Area, shattered windows, swaying highrises and groceries piled in the aisles of markets provided typical marks of the kind of quake Northern California experiences.

But yesterday's quake was unusual because it struck along a fault strand that apparently has no name and has experienced few if any temblors in the recent past.

Its epicenter seemed to be within the Morgan Territory Regional Preserve, a hilly, brush-covered park tract 12 miles north of Livermore and two miles south-east of the Contra Costa County community of Byron.

According to Robert Sharp, a geologist with the U.S. Geological Survey's earthquake research center at Menlo Park, the quake may have centered close to the Mount Diablo Fault, a northern branch of the Greenville Fault that runs roughly north-south and passes near the Lawrence Livermore Laboratory.

When that laboratory was vacated yesterday as machines and equipment toppled, lab officials launched a swift and thorough radiation check of the buildings where plutonium and other nuclear weapons material are used.

There was no release of radioactivity at all, officials said, and full operations are expected today.

C. Barry Raleigh, a Geological Survey seismologist, was asked whether the seismic fault in yesterday's quake might be coupled to any of the small faults that run near the Livermore laboratory and the nearby Vallecito nuclear reactor owned by General Electric.

"That's a good question," Raleigh replied, "and we'll find out later."

Two teams of earthquake experts were sent to the epicenter area by the Geological Survey yesterday, and Bruce Bolt, chief of the University of California's seismographic station at Berkeley, dispatched a third group of specialists from his laboratory.

According to Bolt, who first announced the precise magnitude of the initial quake and its two aftershocks, the temblor struck when two locked segments of the fault slipped past each other at a depth of about 20 kilometers — approximately 12.6 miles — below the earth's surface.

But because the region of the quake has never been intensively instrumented — nor noted for anything other than very minor temblors — there was some doubt yesterday as to just which fault system was most closely involved.

Faults in the region reveal almost no surface evidence, Bolt said, because the alluvial soil is...
The quake's epicenter and the distances the jolt radiated

But in those few seconds there were scant consequences.

About a dozen persons were treated for minor injuries at the Livermore laboratory yesterday, and nearly 20 suffered cuts, bruises and sprains in the city of Livermore.

All 10 schools were closed in Livermore while authorities checked for structural damage, and other schools closed in small communities throughout the Contra Costa and Alameda counties' quake areas.

Pacific Gas and Electric Co. reported the quake cut power for 10,000 customers in Livermore and Pleasanton from 11 a.m. to 12:30 p.m., and gas leaks interrupted supplies in a few areas. Phone service was also briefly curtailed in the same neighborhoods.

At the Sunrise Mobile Home Park in Livermore, 133 of the box-like residences were jolted from their concrete block foundations — but no one was seriously injured. That kind of earthquake-triggered event has long worried disaster planners, who fear that many lives will be lost if ever a big quake hits loosely anchored mobile homes while residents are asleep.

In Stockton, about 40 miles east of the quake's epicenter, 275 persons fled an old hotel and debris fell from the structure to the sidewalk. Windows cracked and other buildings shook strongly.

The California Department of Water Resources briefly shut down its big Tracy pumping plant, which sends Sacramento Valley water south into the fertile San Joaquin Valley, but pumping resumed when tests showed the machinery was undamaged.

National Guard helicopters flew over the water-ravaged delta area to check canals and levees for quake damage, but they were hampered by heavy ground fog around mid-day. Later surveys showed that the levees held and the canals seemed undamaged except for a few cracks here and there.

At the Ord ranch near Byron, closest community to the epicenter of the quake, brick walls toppled and the town lost its electricity when a power line snapped.

In San Francisco, the earthquake's only real effect was excitement and conversation. The city's single report of damage was a bushel of plaster that fell from the ceiling of City Hall, just outside the ornate chambers of the Board of Supervisors.
Bay Area continues to rattle from aftershocks

By Nancy Dooley
and Malcolm Glover

Four earthquake aftershocks rattled the Bay Area last night and today as residents of the East Bay mopped up the damage from yesterday's rolling quake.

Scientists at the UC Berkeley Seismographic Station reported two aftershocks, centered near Livermore, shook the earth this morning at 5:36 and 6:30 a.m., registering 3.8 and 3.6 respectively on the Richter scale.

They followed two shocks last night at 9:12 and 9:24 p.m., which measured 4.4 and 4.6 respectively.

Dr. Robert Uhrhammer, a research scientist at the seismographic station, said he expects small aftershocks to continue throughout the day and possibly longer.

Livermore Police Lt. Larry Morris said police received no more reports of damage or injuries during the night and this morning's aftershocks didn't bring a single police call.

Livermore is just 10 miles from the epicenter of yesterday's temblor, which struck just after 11 a.m. and measured 5.5 on the Richter. It was followed immediately by two strong aftershocks, measuring 5.2 and 4.9.

A Pacific Telephone Company spokesman today urged customers to restrict telephone calls to Livermore to emergencies only.

Although no equipment was damaged and overall telephone service was good, the spokesman said, heavy calling in the Livermore-Pleasanton area forced the company to reroute many calls to ease congestion.

By limiting calls to the area today, he said, residents could be assured of enough circuits.

More than 100 Livermore residents whose homes were damaged were given assistance by the Oakland Chapter of the American Red Cross, augmented by disaster personnel from the Peninsula and San Francisco.

Eighty-two people were temporarily housed in a motel in the recreation center of the Springtown Mobile Home Park and another 30 were put up at the nearby Holiday Inn.

City officials said 78 homes suffered major damage and are unlivable. 44 others incurred minor damage. Most of the heavily damaged dwellings were in several mobile home parks where they were knocked off their foundations.

At least 17 people were injured, none seriously, and treated at Valley Memorial Hospital.

Officials of the Lawrence Livermore Laboratory monitored a slow leak in a 49,000-gallon storage tank holding a solution of water and tritium, a low-level radioactive isotope. They said the leak posed no danger.

Some 40,000 gallons of water at the Wente Winery was destroyed. Nicholas Wente said the water was not bottled, canned and waiting on pallets for shipment when the temblor struck. He wasn't immediately able to put a value on the loss.

Minor damage was reported to several buildings in the valley town and electric power for 16,000 customers was off for more than 90 minutes.

Outside Livermore, The Greenville Road overpass on Highway 580 dropped six to ten inches and was closed until repairs were completed.

The Greenville Road was closed for several hours until repairs were completed.

These other damages were reported elsewhere in the Bay Area:

- DUBLIN: A suspended ceiling of a K-Mart fell causing an estimated $50,000 in damage and causing the store to be evacuated.

- LEANDRO: A school on Bancroft Avenue was evacuated when a gas meter sprang a leak.

- HAYWARD: Electricity was lost for about half an hour in an area serving 1,000 customers.

- CONTRA COSTA COUNTY:

  Will Perry, head of the Office of Emergency Services, termed the damage "light and rather spotty." A building used by the Signode Corp. in Pittsburg was evacuated for fear that a cracked beam would give way in an aftershock, bringing the roof down. A window in a Safeway store at Concord cracked; a chimney collapsed on Tassajara Road in the San Ramon area; a pool in Danville overflowed; and minor rock slides fell upon several roads.

- MARIN and SONOMA: Although the quake was widely felt in Marin and lower counties, no damage was reported.

- SAN FRANCISCO:

  Ornamental plaster fell in a number of areas and some new cracks were found in the marline floor of City Hall. Several U.S. District Court judges dismissed trials and hearings that were being held on the upper floors of the Federal Building after the building began rolling and rocking.

- SANTA MATEO COUNTY: The civil defense and disaster office received no damage reports.

- SANTA CLARA COUNTY: The Office of Emergency Services received only one damage report, a cracked wall in downtown San Jose.

(Examiner staff writers Alan Clune, Maura Dolan, Tom Hall, Jon Kawamoto, Mike Lasitter, Don Lattin, Norman Melnick, Paul Shainoff and John Todd contributed to this report.)

Table not visible in text.
Leak in laboratory not serious, according to Livermore brass

(From Page 58)

Though its half-life is 12 years, tritium leaves the body quickly because of the turnover of water.

Thus a person who drank two liters a little over two quarts of the material leaking at Livermore — and did so repeatedly for a year’s time — would not exceed the maximum recommended dose of 1,000 microcuries for an individual, said Peterson.

The spill at the Livermore Lab, which is operated by the University of California for the U.S. Department of Energy, is being classified as an "unusual occurrence," said a DOE spokesman.

This indicates it is not considered a major incident, he said. A report will be made to DOE headquarters in Washington, D.C., but only because "there has been so much attention and because it occurred during an earthquake," said the spokesman.

Jeff Garberson, spokesman for the Livermore lab, said last night that the tank had been emptying at the rate of several gallons an hour since about noon yesterday.

He said the leaking solution was not a threat.

"We could dump it down the sewer without telling a soul," said Garberson, "and not even come close to breaking the rules."

The seismic vulnerability of the Lawrence Livermore facility has been a long-running controversy, particularly the risk of accidental release of plutonium, used to make nuclear warheads, which is one of the most deadly radioactive substances known.

The debate has focused on the existence of numerous faults in the Livermore vicinity and uncertainties relating to their activity. Laboratory officials have maintained that the critical structures can withstand the maximum quake thought possible in the area.

Yesterday’s quake apparently occurred on a little-known fault. Last May, seismic concerns helped bring about an order to shut down the Vallecitos plutonium laboratory, operated less than 10 miles away in Pleasanton by General Electric and the DOE.

Garberson said the discovery of the leak by laboratory crews was not revealed to reporters who gathered at the facility yesterday afternoon because "this isn’t hazardous."

Garberson said his office probably was not told because inspection crews believed it was "not important to bother us with it."

The spokesman said that "I don’t think there was any decision" to not reveal the leak.

Instead, he said, foremost on the inspectors’ minds were building damage, loose electrical wires and natural gas leaks, as well as making certain no one inside the buildings had been injured by falling cabinets and bookcases.

The laboratory’s water supply also was temporarily cut off, he said.

Earlier yesterday, lab spokeswoman Linda Currey had said all structures and labs containing radioactive materials had been checked, "and no radioactivity was released." She said the buildings checked included those containing plutonium, tritium and a small research nuclear reactor. As a precaution, however, all 7200 workers at the facility were sent home for the day.

They were to return today.

An inspection by representatives of the state Office of Emergency Services, the state Health Department, and the federal Department of Energy did not include the plutonium or reactor facilities.

"We didn’t have the clearance for that," said Orrin Orr, of emergency services following yesterday afternoon’s inspection. He said that after a drive through the one-square mile facility there "was no visible damage. Everything looks perfectly normal."

Following the later disclosures, Orr could not be reached last night. But Max Veal, reached at the Office of Emergency Services in Sacramento, termed the leakage "very insignificant. You get more radiation from the sun than you would from this leak."

He said he did not know whether Orr was aware of the leak when Orr gave the facility a "clean bill of health."

Veal also could not say definitely who had found the leak, but said, "They found it, didn’t they?"

Garberson said the material in the leaking tank was used mainly in biological research. He noted, however, that most of the radioactive substances used at the lab are "defense related." Lawrence Livermore is the nation’s developer of nuclear weapons systems.

The tank area, Garberson said, is like a "coffee cup over a saucer," and that the spill would remain in a bowl-like depression surrounding the leaking vessel.

Such tanks are used at the lab, he said, to evaporate the water, using artificial heat, in order to leave a solid residue that could be packaged for transport to established nuclear waste storage facilities.

Garberson said that now "good old Mother Nature" would provide the heat for evaporation.

The lab could have patched up the tank, he said, but officials decided the "radioactive level was so low that it wasn’t important."

Examiner staff writer Malcolm Glover also contributed to this report.
Examiner earthquake report

Earthquakes of Richter scale magnitude 3.2 or greater in the last two months. They are listed by date and time, magnitude and location.

1. Dec. 5, 11:14 p.m. / 3.1 / Coyote Lake
2. Dec. 16, 10:54 p.m. / 3.0 / Coyote Lake
3. Dec. 24, 6:00 a.m. / 4.0 / 12 miles west of Santa Cruz
4. Jan. 24, 11 a.m. / 5.5 / 15 miles north of Livermore

The map covers an area of 14,000 square miles. In this area, an average of 20 earthquakes of magnitude 3.0 or greater, but up to eight quakes of that size could be recorded in a month without being regarded as statistically unusual.

Major known earthquake faults are shown on the map. A solid line indicates ground rupture or direct geological evidence of a fault; a dotted line represents inferred extension of a fault based on indirect evidence.

The Richter scale is an index for classifying earthquakes according to the amount of ground motion as measured by a seismograph. A 10-fold increase in ground motion causes a seismic jump on the Richter scale; thus magnitude 9 indicates a quake 10 times stronger ground shaking than a magnitude 4, 100 times stronger than magnitude 3 and 400 times stronger than magnitude 2 or less.

Most quakes of magnitude 2.0 or less are not felt. The 1906 San Francisco quake measured 8.3 on the open-scale.

Data courtesy of the University of California at Berkeley Seismological Station.
Livermore Atomic Lab is a Mess

By George Williamson and Paul Liberatore

Furniture, equipment and windows broke or crashed to the floor around the Lawrence Livermore Laboratory complex yesterday—but crucial structures housing radioactive materials resisted the shock from an earthquake whose epicenter was only 12 miles away.

"We have checked all critical buildings and no radioactive material was released. We expect to be in full operation tomorrow," said lab spokeswoman Linda Currey.

Twenty-five to 30 people suffered minor injuries, none of which required a trip to a hospital. The injuries were said to be mostly bumps, bruises and scrapes caused by falling objects.

Small quantities of acid were spilled in some labs, but officials said these were being cleaned up and were no danger.

As a precaution, and to steady employees nerves, most of the one-square mile facility's 7100 workers were told to go home shortly after the 11 a.m. quake.

Otherwise the quake did little serious harm at a nuclear research plant some critics have called intolerably vulnerable to earthquakes.

Lab spokespersons said the evacuation was not because of any danger presented by four buildings containing radioactive materials. These buildings, they said, approach the highest earthquake-resistant standards in the world.

They said the concern that produced the precautionary removal of workers related to the other buildings on the complex which do not house dangerous materials and therefore are built only to normal community earthquake standards.

However relatively light the final damage, workers remained shaky well after the quake and its aftershock were over.

"It was terrible. TV monitors fell all over the floor. I saw a lot of areas that were shambles. It's amazing that people weren't hurt more," said James Carlson, a technician in the Computer Graphics facility.

Sarah Bly, who works in the same building, said "I talked to a lot of computer programmers, and when the place started to shake, they thought they were going to die."

Critics' biggest concern has been with the gray Plutonium Metallurgy Laboratory (Building 322) whose foot-thick reinforced concrete walls store up to 500 pounds of plutonium further sealed within steel walls and in individual boxes bolted to the floor.

The vaults held firm yesterday, but reporters were not told whether offices in the same building suffered the furniture rattling that occurred elsewhere.

A quick tour of the plant's Equal Opportunity Building found the place empty of people and physically in a shambles. Lamps, bookcases, planters, and blackboards had been toppled to the floor and in many cases broken.

Windows were broken there and at the seven-story administration building, where the scene of breakage and debris was pretty much the same.

Overhead light fixtures and false ceilings were reported to have fallen here and there.

No serious damage was reported at the adjacent Sandia Laboratories—where unlike Lawrence the weapons research does not involve plutonium. Sandia's 1000 employees were also sent home for the afternoon.

Don DuBose, 47, a tool designer at Sandia, was asked what it was like to experience a powerful earthquake while working next door to one of the major plutonium storage sites in the world.

"The thought passed my mind that it could be the Russians," he said. But he added that he considers it "practically impossible" for nuclear materials to escape.

"The facilities where that stuff is stored are designed to take 100 times what we experienced today," he said. "I was just worried about something falling on me."

The Livermore Valley is crisscrossed with small earthquake faults, none of which were respon-
Low-level radioactive leak at lab
Quake aftershocks continue in area

By Barbara Buell
Times Tribune Staff

LIVERMORE — A small amount of radioactive water leaked from a storage tank at the Lawrence Livermore Laboratory Thursday night and today as aftershocks of Thursday’s powerful earthquake sent new shivers through Northern California.

Laboratory officials said the leak is coming from a 30,000-gallon tank containing tritium, a radioactive form of hydrogen. But the level of radiation is “many, many times lower” than drinking water standards because it is being diluted as it trickles. Hatti Carwell, a health physicist for the state Department of Energy, said this morning.

The Bay Area was hit by an aftershock measuring 3.8 on the Richter at 5:39 a.m. today and again at 6:03 a.m. by an earthquake of 3.6 magnitude. An aftershock of 4.6 was recorded at 9:12 p.m. Thursday, and 12 minutes later another of magnitude 4.4 hit.

Two other shocks were recorded within minutes of the main earthquake Thursday, which was measured at 5.5 at 11 a.m. The aftershocks all originated along the Antioch Fault system near the epicenter of the first quake, 12 miles north of Livermore. The Antioch Fault is not connected to the major San Andreas and Calaveras faults.

Reporters were not permitted Thursday inside the 640-acre Lawrence Livermore Laboratory, one of two nuclear weapons research centers in the country. At first Thursday, officials denied there was any radioactive leak, but laboratory spokesman Michael Ross later confirmed that radioactive water began leaking at the rate of 15 gallons an hour. The water, coming from a cracked pipe joint in a tank sitting on three-foot-high stilts, is being collected in an impermeable asphalt catch basin.

Ross said he anticipated the leak may continue for several days. A scaper poured into the tank is expected to stop the leak.

Nearly all of the 7,100 employees at the laboratory were evacuated Thursday. Only security, fire and inspection personnel stayed behind.

Jim Davis, branch chief for the State Department of Energy in San Francisco, said today that there was no damage to the reactor at the plant or to the reactor’s water system, nor was there damage to a building where plutonium is used. He said all auxiliary systems operated properly during the general power outage in Livermore after the quake.

There apparently remains some question as to whether the Livermore Laboratory could withstand a shock more severe than Thursday’s quake. Davis said the nuclear facilities were built to withstand an earthquake of 5.5 magnitude. He said the buildings will be reviewed to examine their strength in the face of a more severe shock.

Office buildings not reinforced to the degree of the nuclear buildings did receive some structural damage. At least a dozen employees were treated for bruises after file cabinets and office furniture fell on them, Linda Currey, public information officer, said.

Near the Livermore Laboratory, the eastbound lanes of Interstate 580 were closed at Altamont Pass until 4 p.m. Thursday after the ground settled six inches beneath the roadway where it joins the Greenville Road overpass.

Erv Smitten, a State Department of Transportation superintendent, said there was no structural damage to the overpass.

The six-inch drop in the road was smoothed over with asphalt.

Elsewhere in Livermore, the Sunrise Mobile Home Park was severely damaged when trailers were bounced from their concrete block foundations. Ninety of 133 homes experienced moderate to serious damage; 30 more had minor damage, Bob Springer of the Livermore police said.

Springer was coordinating efforts at a command post in the mobile home park’s recreation building, a brick structure taken over by the Red Cross. There was only one injury.

A Red Cross volunteer estimated 100 residents would be accommodated at the shelter Thursday night. By midday today, two dozen residents gathered to drink the 10 gallons of coffee provided by the Red Cross while they watched canvas cots arrive. A few persons also snatched shots of whiskey apparently rescued from the tensile interior of a damaged home. Residents said they would not return to their homes in case of aftershocks.

Don DuBose, whose home shifted four feet away from a stairway alongside it, said he estimated damage at $5,000. His was not the worst case.

Maxine Kalisher, sitting at a desk in one of the trailers, suffered neck injuries in the quake and was treated at a local hospital.

“I felt a bump and all of a sudden a rumble came and threw me from the wall to the desk to wall,” Kalisher said. “Then it stopped. My home was badly damaged,” she said, lowering a cigarette as she began sobbing.

Charlene Loucks didn’t want to return to her house to see the broken glass and dishes. “I was in the family room,” she said. “I was going to crochet. The power went off instantly. The whole coach seemed like it was rocking around.

“Nearly everybody got outside and started crying.”

“Luckily, we just raised our insurance on it and have an earthquake waiver.”

Telephone lines were jammed Thursday and this morning as people jumped to call friends and relatives. Electricity was on and off all day in the Livermore area as utility crews made repairs.

40,000 gallons of wine destroyed

LIVERMORE, Calif. (UPI) — In addition to property damage and injuries, the earthquake that shook the San Francisco Bay Area Thursday caused the destruction of 40,000 gallons of wine at the Wente Bros. Livermore winery.

Philip Wente said most of the wine was bottled, cased and waiting on pallets for shipment when the temblor struck. It shook the cases off their pallets, smashing the bottles.

Wente said he was unable to put a dollar value on the ruined stock since it was in several varieties with different price ranges.

Peninsula Times Tribune
Palo Alto, California
January 25, 1980
Los Angeles Times
Fri., Jan. 25, 1960

The quake, however, was not as severe as one which struck in two sharp, rocking jolts last Aug. 6 and registered 5.9 on the Richter scale, the strongest quake to hit Northern California in 53 years.

The epicenter of the August quake was in a lightly populated area of rugged ranchland and hill country along the Calaveras Fault near Hollister in San Benito County.

A spokesman at the state Office of Emergency Services in Sacramento said Thursday he was "reluctant" to say the Lawrence lab had been evacuated but conceded that "nonessential people were sent home." He also said minor water and gas leaks were reported throughout the city, which has a population of about 50,000, and telephone and electrical services were temporarily interrupted.

One of the hardest hit areas was a mobile home park, where 135 homes were shaken from their foundations and their owners evacuated.

In San Francisco, plaster fell from the ornate moldings between the ceilings and walls on the second floor of City Hall but there was no significant damage reported and no injuries. Buildings also swayed in Sacramento and Oakland, and 100 tenants of an aging downtown hotel in Stockton were evacuated when the walls began to crack.

"Everything with legs fell over," Andrew Arrate said from his home in Walnut Creek, about 25 miles north of Livermore.

The Bay Area Rapid Transit District (BAR) shut down service for about 40 minutes to check for structural damage to its tracks and tunnels, including the transbay tube connecting San Francisco and Oakland. Trains resumed running shortly before noon, however.

Dr. Bruce Bolt, director of the seismographic station at UC Berkeley, said the quake "doesn't change our prediction that there's a better than 50-50 chance that there will be a major quake in the next 10 years. This (Thursday's quake) has nothing to do with the big one."

Bolt and Stanford University seismologist Richard Jahns predicted in an article last month that California would be struck within the next 10 years by a quake with a magnitude on the Richter scale of 7.5.

Every increase of a number of the Richter scale, a measure of ground motion as recorded on seismographs, means a tenfold increase in magnitude. The 1971 San Fernando earthquake in Southern California, by way of comparison, was a 6.6. The great San Francisco earthquake of 1906, before the advent of sophisticated measuring devices, has been estimated at 7.9.

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WHERE IT WAS FELT—Shaded area shows extent of the quake.

Strong Quake Rolls Across North California; 24 Hurt

By WILLIAM ENDICOTT
Times Staff Writer

SAN FRANCISCO—A powerful earthquake shook a large area of Northern California Thursday, toppling high-rise buildings in downtown San Francisco and causing at least 24 minor injuries at the Lawrence Livermore Laboratory 40 miles east of here, near the epicenter.

Extensive damage probably was averted because the quake produced more of a rolling motion than a sharp jolt.

Hundreds of persons were evacuated from schools and office buildings when cracks appeared in the buildings or when gas lines broke. Interstate 580, a main link between San Francisco and the San Joaquin Valley, was closed for a time when an overpass between Livermore and Tracy sank several inches. But it apparently sustained no structural damage.

Seismologists at UC Berkeley put the magnitude of the quake, which occurred at 11 a.m., at 5.5 on the Richter scale. The epicenter was about 12 miles northwest of Livermore at the southern end of the Antioch Fault, the seismologists said.

The quake lasted about 30 seconds and was felt as far away as Reno, 250 miles to the east. It also was felt in Monterey to the south, Santa Rosa to the north and Fresno in the San Joaquin Valley.

Two aftershocks closely followed the initial quake, measuring 4.2 and 4.3 respectively. In addition, there were at least 40 other aftershocks ranging from 2 to 3 in magnitude.

Most workers at the Lawrence lab at Livermore, which employs 7000 persons, were sent home when gas began leaking from damaged pipes but officials said there was no damage to the lab's nuclear research reactor.

But Thursday night, officials said a special storage tank at the laboratory containing 50,000 gallons of radioactive water had sprung a small leak as a result of the quake. They said the leak posed no health hazards.

"It was very, very strong here," Jeff Gariberson, the lab's public information officer, said. "We've had damage to the building I'm in and I'm not supposed to be in it."

Most of the injuries at the lab involved sprains or bruises and occurred when people fell or were tossed about in trailers that are used as temporary offices. One employee was admitted to a Livermore hospital complaining of chest pains. Elsewhere in the city, a roofer suffered burns to his hands when hot tar spilled over them and several other minor injuries were reported.
A Startled Deputy Was Directly Over the Quake

By Scott Blakey and Peter Kuehl

It was moments after the radio announced the time as 11 a.m. yesterday that Contra Costa County sheriff's deputy Troy Treat noticed "cows running" in the green fields along Vasco Road.

Then Treat saw "boulders bouncing down the hill" just ahead to the left. And, strangely, "The car started to shimmie."

The lawman figured it was just another mud slide caused by last week's heavy rains until, a second or two later, "I saw the road crack."

"It actually buckled about 30 yards in front of me. Have you ever seen a mole burrow? — it was like that: like a mole tunneling under the road only faster, much faster," Treat said.

The deputy said he slammed down the brake pedal as the car twisted halfway around to the right and bumped over the road's new hump.

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"It dawned on me that I was right in the darn epicenter of that earthquake," Treat declared as he told his tale for fellow deputies at the farm. "I mean, that was the main crack in the earth coming at me down that hill."

"Weird," said the deputy, who drives the same way five days a week from his home in Santa Clara.

"It was right at the (Alameda-Contra Costa county line where it hit. Every time I drive by that spot from now on, I guess I'll think about it."

Treat was passing the Ordway Ranch leased by Jack Ladd when the jolt struck.

Horse and cattle ran wildly in circles, and some hunkered together as if threatened by a predator when the quake hit at 11:03:10. Ladd said, "like a freight train was just running over me."

The 42-year-old Ladd, an ex-rodeo rider, said the "sumbitch hit when I was in my pickup truck. Jesus, it just scared the hell out of me."

The rafters of a corrugated steel shed into which he just had driven flexed, and the building shook. The rumbling roar of the 5.5 (on the Richter scale) quake subsided in 30 seconds, he said.

Meanwhile, Ladd's wife, Clay, endured the frightening earth shift as she walked out of an aquarium shop in Brentwood, six miles away. Fish tanks danced but remained upright.

The Ladds' house, a solid ranch-style dwelling, suffered fairly severe structural damage, the couple said:

- A 12-by-eight-foot fireplace of brown stone and brick cracked and parted from the wall, as did a smaller fireplace in another room.
- Power to the telephone and utility lines was cut.
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- Tiles fell from the bathroom wall.
- Stereo speakers were knocked off the living room wall and were tossed four feet.
- Bottles of liquor and expensive glassware were hurled into splinters and puddles from a bar in the dining room.

That was the last straw, thought Ladd as he perused the damage. And into Brentwood he sped in the car. He stalked into the nearest local bar, the Wild Idol Inn, and demanded, "Give me a drink, and does your phone work?"

Everywhere, fright and helplessness

By Peter H. King
and Dennis J. Opatrny
Examiner Staff Writers

LIVERMORE — A tic quivers on a tiny patch of the planet's massive face, and tens of thousands of human beings know chaos. Their buildings fall, their legs give out, their roads crack and, most of all, their illusions of earthly dominance crumble a bit.

This is what happened at 11 a.m. yesterday to the 50,000 humans who inhabit this town.

"It makes you feel so helpless. It was true terror, pure fear," said Sandy Lamharen, expressing a sentiment ricocheting throughout Livermore yesterday afternoon in the wake of the earthquake that registered 5.5 on the Richter scale.

The epicenter of the earth's move-
mighty feats. A bulldozer was jerked sideways six feet by the jolt. A toilet was entirely emptied of its water. Bookshelves were cleared, sidewalks cracked, mobile homes "danced off their foundations. And as they recovered their land legs and swept up their shops, many of the townsfolk were searching for the words to describe the vague, unsettling feeling they shared.

"You just got to ride her out, I guess. There's nothing you can do," said Don Redding, who was working behind the window of the Adult Book Store on Main Street when the quake struck.

"You can't do anything. You are just at the mercy of whatever is going on. It's terrifying," said Cherrie Dyer, who was across the street when it happened, selling Bibles at the Good News Book Store.

"It's a dizzying sensation, just a feeling of helplessness," said Les Spence, a 70-year-old retired printer, who was sitting in his car when it started to shake. "I figured a couple of husky guys were playing a prank on me."

"When you are driving a car and it starts to go off the road," said The Rev. Donald Keefer, pastor of Valley United Methodist Church, "well, you can steer it back on track. But in this thing, you can't steer, you aren't in control."

* * *

It has been more than two hours since the first shake, and the emergency room at the Valley Memorial Hospital is doing heavy business. Space is at a premium and things are moving fast, and yet the flow seems to be fluid, unheeded.

"We had a disaster drill recently and fortunately it was an earthquake drill," Margy Odell, public information officer, tells a knot of reporters. "We had about 13, 16 kids from the high school as volunteer victims. We learn a lot from the drills."

On a clean white wall of the emergency room is a rectangle of butcher paper. There are 26 names scrawled across it; beside each name, an age, a sex, an injury description. It is a hospital worker's, says "our quake count."

A burly man in blue jeans, his shirt only half on, hobbling past the sign and down the hallway. A fresh cast holds his left arm in an L-shape, and he has been told it is best - if uncomfortable — to prop up the arm behind his head, exposing his armpit.

Lyle Elwood, 41, explains he was working in a metal shed in Dublin, kneeling on a small platform and hammering nails when the building started moving. I went to step off the platform but when I put my foot down, the ground wasn't there. It had moved. "I had a carpenter's apron on, behind me. With nails in it. I landed on my butt...got nails in my butt and it hurt like hell. Then I looked at my arm. It was bent back and I said, 'Oh, Christ, I broke my arm..."

Just as he is about to leave for home, Elwood overhears that in the police station they are discussing the chronicling of such matters. His injuries, he thinks, are almost all of those suffered yesterday, are classified as only "minor."

"Minor," he hollers. "Try to tell me this is minor. It will be six weeks before I can go back to work. Minor. Christ...And it hurts."

Now an ambulance wheels up quickly, and as the back doors swing open, hospital officials begin to hustle the reporters out of the emergency room.

Looking back, they see a middle-aged man being carried out of the ambulance on a stretcher. He does not appear to be conscious. His shirt has been stripped off, and several tubes are attached to his torso.

"That's 27," one of the hospital workers says, pushing on a reporter's elbow as she walks him through the orange double door. "That was No. 27. However, we think one of the earlier ones may have been a quake victim."

* * *

It is sunset, and at the corner of Sundance and Sandal streets in the Springfield Sunrise Mobile Home Park, it almost seems like a warm summer night.

The streets are crowded with kids and parents and strangers, and everyone is hollering to one another. But it is a surreal scene, for also present are the bit players of disaster.

A small boy carries a sack of groceries out of his grandmother's home, which like most of the others has been knocked off its foundation.

Two teen-agers walk toward their car, cameras in hand, scouring the ruins for car parts.

An old lady walks up Sundance Street with a flower in her hand; she is limping.

A Red Cross worker goes door to door, legal pad in hand.

A television news crew sits idly in a van parked on the corner, waiting to "go on live" in a few minutes.

A car loaded with children and boxes pulls by slowly, the kids' heads turned back as they try to see if they recognize what television reporter is in the van.

Dorothy Erickson, 59, sat in front of her damaged mobile home. She could have used a drink.

"I lost five or six bottles of liquor," she said. "I fell off the shelf and broke it."

Charline Loucks, 63, who lives down a block, was asked if the mobile home knocked off its supports was hers.

"What's left of it," Loucks said, forcing a smile on her face.

"I just sat down to crochet and watch 'Family Feud' on the television, when all hell broke loose," she recalled. "I panicked when I couldn't get a door open."

Loucks said all the doors of her mobile home were jammed, so she tried the windows.

"This window over here jammed, but I opened it and kicked out the screen and crawled out," she said. "I'll tell you, it was really frightening, real good day, say."

Loucks said she has lived through quakes in Long Beach and San Francisco, but none stuns her as much as yesterday's.

"Lucrily," she added, "we just upped our insurance and added earthquake coverage."

The mobile park has 133 trailer home tenants, just about all of whom suffered some property damage, if not the scare of their lives.

"I would say most of them have some structural damage," said Lt. Dick Burress of the Livermore Police Department, who was with the first rescue crews to arrive at the park.

Mr. and Mrs. Donald Heim had just moved into the park three months ago after buying a $42,000 mobile home.

Loucks said he was knocked off its foundation.

"We're lucky we're alive. We both dove under the table. Everything just flew all over everywhere. It seemed like it lasted 10 hours."

The Heims moved to Livermore from San Leandro and intend to stay put, earthquake or not.

"We'll stay here," Heim said. "We like it. It doesn't matter where you go in California, earthquakes are there."

Richard McNeill, 52, sat at a table, wheeling and breathing with the help of his oxygen machine. He has emphysema.

"I'll tell you," he said, "this is the first one I've been in that bounced me around. I felt I was sitting on top of the quake. I just sat there and the whole bed jumped up and down."

* * *

It would seem Dick Cagley's of Dick's Glass and Mirror should have been having a real good day, as windows were broken in dozens of cars and buildings. He was not.

He was, in fact, having the worst day he could remember.

"We lost four cases of glass and about 20 windshields," moaned the 69-year-old glass man. I'd say we lost about $8,000 worth, and we don't have earthquake insurance. Can't afford it."

As he spoke, two workers scooped broken glass into a trash can. Cagley winked every time another shameful piece crashed into the can. "I don't like to hear that," he said softly.

Cagley had been in the office when the quake struck. He and his employees rushed outside and then listened in horror, helplessly, as case after case of plate glass crashed onto the floor.

"I just got all the glass, paid for last week, too."

"Everyone thinks we're making money off this thing. We're hurting, just like the rest of them."

65
Earthquake damaged major laser facility at the Lawrence Livermore Laboratory

By Steve Taylor
Times Tribune Staff

A $25 million experimental laser facility is now out of operation at the Lawrence Livermore Laboratory after being dislodged by Thursday's powerful earthquake, a laboratory spokesman said this morning.

The Shiva laser complex, the world's largest, will be out of commission for at least a few weeks until it can be resecured and inspected for further damage, spokesman Jeff Garberdson said.

Damage to the laser is the most serious effect of the earthquake at the laboratory, Garberdson said. It was more serious than the leak in a 30,000-gallon radioactive storage tank.

The laser facility, which has 20 "arms" and is as long as a football field, has been used in experiments to produce a "21st century energy source" as an alternative to conventional fuels, he said.

All of the one-inch bolts securing the 132-foot laser 60-foot target and other apparatus to the ground were sheared off and must be replaced. Additionally, the complex is full of "a lot of pieces of glass" which must be inspected for cracks, Garberdson said.

At the very least, the laser's technical adjustments must be checked before the physics experiments can resume, he said. He said officials could not accurately estimate the cost of this work, but it could total up to $1 million.

With this equipment, scientists are hoping to develop a laser which can generate more power than it uses in exploding targets like a hydrogen bomb within a contained environment, he said.

Meanwhile, a five-story theoretical-physicals office has been closed down at the laboratory facility because of possible structural damage, Garberdson said.

The leaking storage tank of water and tritium, a radioactive form of hydrogen, is apparently going to seal itself, he said.

Radioactive measurements of the leaking water Friday show the danger earlier reported to be "a joke," he said.

Throughout the laboratory, work will resume Monday on the widespread problem of knocked-down file cabinets and clocks which fell off walls," Garberdson said.

"According to David P. Hill, chief of the U.S. Geological Survey's seismology branch, Thursday's earthquake probably is a precursor of a larger quake to come.

Hill was asked the significance of the recent series of significant California earthquakes: in August near Gilroy, in October near El Centro, and the most recent one.

"It's very interesting to us. We don't understand it," Hill replied, "...there's a regional process going on."

The Mt. Diablo quake, as Thursday's has been dubbed, struck just after 11 a.m. It measured 5.5 on the Richter scale and its epicenter was 10 miles north of Livermore, in a sparsely-populated area.

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Insurance firms expect few claims from earthquake

Times Tribune News Services

SAN FRANCISCO — Insured losses in Northern California are expected to be light, following Thursday's earthquake and after shocks centered near Livermore, but insurance people are in the area assisting victims with their claims, said the Insurance Information Institute.

Agents and brokers who live in the area were on the scene immediately helping their insureds, said Robert Bellerose, chairman of the Insurance Information Institute Committee for Northern California.

Many companies have dispatched specialists from other parts of the state to survey the damage and handle claims.

Most of the insured losses are expected to arise from damage to mobile homes in the Sunrise Mobile Home Park in Livermore. The tremor knocked most of the park's 180 mobile homes off their piers, breaking windows and damaging the skirts.

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Quake-Hit Lab Makes Changes

SACRAMENTO (UPI)—Lawrence Livermore Laboratory officials reported Thursday that they quickly installed ground motion detectors after the Jan. 24 earthquake that caused $10 million in damage.

Gene Broadman, who is in charge of plant engineering, told the state Seismic Safety Commission that nearly four dozen people at the nuclear laboratory received minor injuries from falling ceiling panels, books and other equipment. Broadman said that to bring the laboratory to its pre-earthquake conditions would cost more than $3.5 million.

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It Was Suddenly Weird
At the Quake's Center

By Scott Blakey and Peter Kuehl

It was moments after the radio announced the
time as 11 a.m. yesterday that Contra Costa County
sheriff's deputy Troy Treat noticed “cows running” in
the green fields along Vasco Road.

Then Treat saw “boulders bouncing down the hill” just ahead to the left. And, strangely, “The car
started to shimmy.”

The lawman figured it was just another mud slide
caused by last week's heavy rains until, a second or
two later, “I saw the road crack.

“It actually buckled about 30 yards in front of me.
Have you ever seen a mole burrow? — it was like
that: like a mole tunneling under the road only faster,
much faster,” Treat said.

The deputy said he slammed down the brake
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When it shook

Yesterday

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67
**Skyscraper People**

**Swaying Above the Excitement**

**By Carl Note**

The calmest people in San Francisco during yesterday's earthquake were those in the tallest buildings in the city.

Working in a highrise is an act of faith, like riding in a jet plane. People simply believe they will be safe, no matter what.

Harold Criswell was sitting in Janet Matz's office at Matrix Leasing Company on the 51st floor of the Bank of America building when the quake struck at 11 o'clock. "I felt it," he said, "it was like being on a boat, like a wave. I was just relaxed. Until the windows started falling out I don't get too excited."

On the 62nd floor, the top of the Bank of America, more than 700 feet above the street, Catherine Stone, a receptionist at the Carnelian Room, was getting ready for lunch. The chandeliers moved slightly, she said, and the clipboards swayed on the wall.

"Everyone survived it OK," she said. "This one felt stronger than the one in August. But I know the building's so safe, my heart beats, but that's about it."

Jack McMinn, a vice president with the bond consulting firm of Searson Loeb Rhoades, was on the 47th floor of the Transamerica Building. His office is the highest in the pyramid. He was rather phlegmatic about the whole thing. "This building's shape naturally resists earthquakes," he said. "The ones that fall down are pendulum-shaped structures, like water towers and airport control towers — narrow at the bottom and wide at the top." None of those fell down yesterday, either.

In the same office, Geoff Klingenstein, who has lived there nine months, looked at it this way:

"I was here for two fives — five on the Richter Scale — they really shook me up. But this one, well, it was interesting. What can you worry about? What can you do? If something happens, it will happen. But my knees were shaking when it was all over."

Merri Twiggs, one of his colleagues, looked out the window at the magnificent view of the bay. It was a little hazy, with wispy fog, but on a clear day you can see a long, long way. "It's not such a good view today," she said.

"Be thankful the view is still there," he shot back.

There is always a lot of brave talk after it is all over, but there is still that heart-stopping moment when the quake hits. Andrew Easton was on the ninth floor of the One Market Plaza complex when the earthquake began.

"I was not really scared. A little nervous, maybe. I've lived here all my life, and I've felt them before. But you always have that fear. You think, 'What's coming next? Is the building going to fall down? Is the world coming to an end?'"

"It's an uneasy feeling."

In the suite of offices next door, Grace Arano, who works for the Lurie Corp., was sitting at her desk when the building started to move. "I thought I was dizzy, or sick or something. I wasn't frightened. I didn't think it was an earthquake. I thought it was me."

Back in the Matrix Leasing office, Kristi King was more surprised than anything else. "I saw the windows moving in and out, kind of waving. I thought it was a high wind. I felt a minor rolling, just a minor rolling, nothing more."

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**A handy guide to Kwanzaa**

**By Jan Woodruff**

In the East Bay, the earthquake apparently was pretty terrible, but in San Francisco it was the kind of unsettling natural occurrence that makes you think.

"It's a reminder that we're not immune to disasters," said one resident. "We need to be prepared." Another said, "It makes you think about the future.""
Dikes weather earthquake, but trouble could develop

By Fred Garretson
Tribune Regional Affairs Writer

The soft, flood-weakened dikes around the below-sea-level islands of the Sacramento-San Joaquin Delta were shaken by the most violent earthquake they've ever experienced. Thursday. Apparently the dikes survived, but fatal quake-caused damage to the dikes may show up in a few days.

Bill Ward, state civil defense chief for 10 coastal counties, said the quake hit at low tide and there were no immediate reports of levee failures.

However, Ward warned, the shaking might have caused large settlements or slumps in some dikes that won't become evident for a few days. Until high tides suddenly send water over the tops of the dikes to flood islands whose ground surface stands 20 feet below sea level.

Most of the dike didn't exist, or were only a few feet high, at the time of the 1906 San Francisco quake. Thursday's quake was an epicenter close to the Delta since 1906.

Contra Costa County officials said "hundreds of people will be out on the Delta levees" to watch for signs of flooding at high tides predicted for Thursday night and this afternoon. Even higher tides are forecast in the next three days, but the inflow of water from last week's storms is diminishing.

The dikes on two major islands - Webb Tract and Holland Tract - and several minor islands were breached by flood waters last Friday. About 11,000 acres of valuable farmland was inundated, and a few homes were washed away.

The flooding radically altered the topography and hydrology of the region, created a brand-new 9-mile-long lake in the center of the Delta. Many experts fear wind-whipped storm waves rolling across the newly formed lake will batter apart the dikes on adjacent islands, unleashing a "domino effect" of levee collapses across the Delta.

Moments after Thursday's quake, Ward said he sent two National Guard helicopters out to survey more than 1,000 miles of Delta levees but they were stymied by heavy fog.

The new lake threatens to become a conduit that would bring the saltwater tide of San Francisco Bay into the southern Delta next summer to contaminate the California Aqueduct, which supplies water to Los Angeles, the Delta-Mendota Canal, which supplies irrigation water to the San Joaquin Valley, and the Contra Costa Canal, which supplies water to 256,000 people in Contra Costa County.

Spread of the flooding also could undermine the foundations of the East Bay Municipal Utility District aqueduct, which supplies 1.1 million people in Oakland and adjacent cities.

EBMUD said Thursday's quake sent a pressure surge of 40 to 50 pounds per square inch rolling like a "water hammer" through the aqueduct. Water surged through filter plants and other facilities but there was no damage, said spokesman Jim Lattie.

San Francisco officials say it may take several days to determine whether the earthquake might have cracked or offset the Hetch Hetchy Aqueduct, which delivers water to 1.8 million people through a tunnel that runs through the Coast Range Mountains near Livermore.

A fail-safe device triggered by the quake temporarily shut down the California Aqueduct plant, which pumps water out of the Delta.

While many people in the Bay Area didn't feel the quake, it startled engineers and farmers and triggered alarms at Kettleman City, where the California Aqueduct surged with waves more than 12 inches high.

This phenomenon is called a "schiebe." Weak earthquake waves sometimes cause water in distant lakes, swimming pools and rivers to slosh out of their banks, such as during the 1964 earthquake, which hurled water out of bayou channels thousands of miles away in Louisiana.

"Dashing Outside Is Wrong"

Many persons did the wrong thing, during the earthquakes Thursday and Saturday - bolted for the outdoors - San Francisco's director of emergency services said yesterday.

"Running outside is the worst thing you can possibly do," said Philip Day.

"You don't run outside," he said. "We've said this a million times, but people still seem to do it. What you should do is get under a table or a desk, or in a corner away from light fixtures, or in an interior doorway.

During a quake the time that things are most likely to come down, and therefore no time to be moving around, Day said.

This advice goes no matter where you are when an earthquake hits, he said, but is especially important in downtown areas or anywhere near tall buildings. "The big problem is falling powerlines, plate glass, or ornamentation on buildings," Day said. "The sidewalk is just no place to be in an earthquake. Duck into a doorway, away from glass if possible."

He conceded that crawling under a desk or table isn't always the natural thing to do, "and besides, you feel ridiculous," but do it anyway, Day said.

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Jan 29 1980
Yesterday's quake wasn't really that big when compared with the past

SAN FRANCISCO (AP) — Although to some it felt like a minute's ride on a roller coaster, Thursday's earthquake was no match for several that have shaken Californians this century.

Only last August, a quake that was logged between 5.7 and 5.9 on the Richter scale—the fifth strongest in the central coastal area during this century—rocked Hollister, a small town 100 miles south of San Francisco that sits atop the Calaveras Fault.

And San Francisco's famed 1906 earthquake that triggered deadly fires would have scored a 7.9 if seismographs were operating then.

The latest quake—and at least two whopping aftershocks that struck along the Antioch Fault, and its epicenter was centered at 12 miles north of Livermore. The Seismographic Station at the University of California at Berkeley measured it as 5.5 on the Richter scale.

Hollister, so used to quakes that schoolchildren have earthquake drills as often as fire drills, was smacked by a 6.6 quake in 1911.

The Richter scale, devised in the 1930s, measures ground motion of earthquakes. Every jump by a whole number means a tenfold increase in magnitude. A quake of 6.0 is considered major.

Two tremors measuring 6.1 were centered off the Monterey coast in 1928. Truckee, a Sierra foothill town near the Nevada border, felt a 6.0 quake in 1966. A 5.9 quake in 1968 hit the area off the Mendocino County coast—about 150 miles north of San Francisco—and a 6.2 temblor did the same in 1966.

The San Fernando Valley quake of 1971, earning a 6.5 mark, was the strongest one to wallop the state in recent years.

Southern Californians were rattled by several major quakes this century. A 7.7 shook Tehachapi in 1952; a 6.5 hit the desert area outside San Diego in 1968.

One of the shakiest quakes for San Francisco Bay area residents was a 5.5 temblor in 1957 that radiated from Daly City, a suburb just south of San Francisco.

Earthquake disaster drill, complete with mock patients, only six weeks ago.

"The only difference today is we have to contend with the news media," Vern Brown, a hospital administrative assistant, said.

The hospital itself suffered only minor damage, officials said. Small piles of plaster chips and dust were visible in some hallway corners. The building lost electricity for more than an hour. Auxiliary generators kept the building lighted until shortly after noon when main power was restored.

Construction worker Gary Greening, 30, was tarring a roof when the ground shook beneath him. Hot tar spilled onto his hands, sending him to the hospital.

"It looked like the whole building was going to hit the ground," Greening said. "Seven guys on the roof with me were scrambling to get down."

After the quake, it took hours for people to calm down.

At 2 p.m., Pat Seibold, the assistant manager at Mel's Discount Liquors in Dublin, sat on the curb outside her store and smoked cigarette. Store employees inside continued to shovel broken glass into cardboard boxes and mop up alcohol from the floor.

"I'm still shaking," Seibold said. "I'm from Pekin, Illinois, and I wasn't prepared for this at all."

She took a long drink from her soft drink and several long drags from her cigarette before continuing.

"I won't leave because of my husband's job," she said. "But given half a chance I'd go back. Hell, I'd run the distance."

Her first earthquake will also be her last

By Dave Farrell
Times Tribune Staff

LIVERMORE — Mary Gibson experienced her first earthquake Thursday, and, she says, it was also her last.

She said she and her family are packing up and going back to Phoenix.

"The lights flickered and somebody yelled, 'Earthquake!' And I panicked. The lights went out and it got black—I mean pitch black," she said. "The blackness lasted only three seconds, but it seemed like an eternity."

The 11 a.m. temblor Thursday measured 5.5 on the Richter scale and the Livermore area felt every last digit.

Gibson, 33, was at her job at the Intel Corporation manufacturing plant in Livermore when the quake rolled through the valley.

She hurt her shoulder when a fellow employee shoved her under a cart to ride out the shock waves.

Two hours later, she sat in a wheelchair in the emergency room of Livermore's Valley Memorial Hospital and vowed she would never experience another quake.

Her family had moved to Livermore four months ago from Phoenix. They will be packing their belongings soon and heading back soon, she said.

"I'm not going to stay," she said, rubbing her shoulder. "I've already talked it over with my husband. We're leaving."

The quake left a mobile home park looking like someone had pulled the rug out from under it. House trailers landed on crazy angles after being tossed off their foundations and porches were demolished.

In nearby Dublin, a K-Mart store's ceiling gave way, raining fluorescent lights and ceiling panels throughout the interior. Cracks cut through blue graffiti spray painted on the building's back exterior wall.

A clock in the store's entrance dangled from a piece of conduit pipe, frozen at exactly 12:13 p.m., the moment all power was finally shut off.

Please see REACTION, A-1.

No one was reported hurt in the store, but damage was estimated at $100,000.

A liquor store next door lost thousands of dollars worth of merchandise when hundreds of bottles were shaken from their shelves.

Gibson was one of two dozen persons hospitalized at the modern multi-storied hospital. She was one of seven Intel employees injured in the quake.

Like most of the other quake victims, she was treated and released later in the afternoon.

The first patients arrived by ambulance 35 minutes after the quake. The rest followed on foot and in private cars.

They suffered from back and head injuries and burns. Most of the injuries resulted from falling furniture or from people falling down, according to Margy Odell, the hospital's press officer.

None of the injuries was serious.

The emergency room scene was one of chaotic efficiency. Patients were met in the parking lot by doctors who made preliminary evaluations. The injured were then whisked past newsmen and television cameras and into the hospital.

On their way in, their names and injuries were logged in on a large sheet of paper taped to a hallway wall.

The scene created a certain sense of deja vu among the hospital staff.

They had completed an earthquake disaster drill, complete with mock patients, only six weeks ago.

"The only difference today is we have to contend with the news media," Vern Brown, a hospital administrative assistant, said.

The hospital itself suffered only minor damage, officials said. Small piles of plaster chips and dust were visible in some hallway corners. The building lost electricity for more than an hour. Auxiliary generators kept the building lighted until shortly after noon when main power was restored.

Construction worker Gary Greening, 30, was tarring a roof when the ground shook beneath him. Hot tar spilled onto his hands, sending him to the hospital.

"It looked like the whole building was going to hit the ground," Greening said. "Seven guys on the roof with me were scrambling to get down."

After the quake, it took hours for people to calm down.

At 2 p.m., Pat Seibold, the assistant manager at Mel's Discount Liquors in Dublin, sat on the curb outside her store and smoked cigarette. Store employees inside continued to shovel broken glass into cardboard boxes and mop up alcohol from the floor.

"I'm still shaking," Seibold said. "I'm from Pekin, Illinois, and I wasn't prepared for this at all."

She took a long drink from her soft drink and several long drags from her cigarette before continuing.

"I won't leave because of my husband's job," she said. "But given half a chance I'd go back. Hell, I'd run the distance."
How It Felt When The Temblor Struck

By Jerry Carroll

Rock buckled under enormous pressure, miles beneath the surface yesterday and micro-seconds later the eerie dance of things and people that always occurs when the earth moves.

Buildings creaked and swayed, windows rattled, things fell on the floor, sidewalks cracked, gas lines snapped, people grabbed hold of something to hang onto, dogs barked and crying cattle raised their heads and galloped wild-eyed across pastures.

As is usually the case here in Earthquake Country, depending on where you were the quake yesterday was either a gentle rise and fall of the ground or a violent and terrifying shaking of the earth that destroyed a lifetime's possessions.

The worst damage was inflicted on Livermore, the biggest city closest to the epicenter, where the power was knocked out for more than an hour, an elementary school was closed because of a leaking gas line, plate glass windows shattered in sprays of silver and piles of merchandise lay heaped in shop aisles.

There, scores of trailers at the Sunrise Mobile Home Park were knocked from their foundations, sewer lines and water mains burst open and some trailers were split apart as if someone had used a giant can opener on them.

"It sounded like a loud clap of thunder at first," said Violet MeCord, who was catapulted from her rocking chair onto the floor of her trailer. "The furniture jumped up and down."

"It fell like all hell was breaking loose," said a neighbor, Emmet Mbook."It seemed like it lasted forever," said Alvena Whilhame, who manages the trailer park with her husband. "We hit the floor.

The assistant manager, Maxine Kidder, was typing a letter inside the recreation building when the tremor struck. "First I felt this little bump, then I was rocking back and forth between the wall and desk. Everything was falling down around me. I got scared the roof was caving in," she said.

When Kidder got up and tried to make her way outside, a leg gave way beneath her. She, along with 18 other persons, was treated for minor injuries at Valley Memorial Hospital.

Virginia DuBose, also a resident of the trailer park, was in a third-floor ladies room at Lawrence Livermore Laboratory when the quake hit. "It was terrible. It wasn't a sway. It was more like a banging back and forth. I was in the bathroom holding on to both walls."

When DuBose got home, she found that the three-bedroom trailer she shares with her husband had a three-foot gap between the front steps and entrance, and a two-foot-high bump in the den where the floor had buckled.

The Red Cross set up an emergency shelter at the trailer park's recreation building, but many of the residents were planning to spend the night at the nearby 24-hour Holiday Inn, where workers spent much of the day sweeping up broken dishes in the kitchen and broken bottles in the liquor storeroom.

Big Quake Loss At Wente Winery

Wente said he was unable to put a dollar value on the ruined wine, since it was in several varieties with different price ranges.

The quake also split the bottom of a redwood cask, spilling 4000 gallons. Wente said, and pushed in the bottoms of stainless steel tanks, which have a capacity of up to 50,000 gallons, making them inoperable until repaired.

How It Compared With Past Quakes

While it certainly provided Northern Californians with sufficient luncheon conversation, the earthquake yesterday was relatively mild in comparison to others that have struck the area in the past.

The quake registered 5.5 on the Richter scale, well below the 7.7 to 9.0 registred just last August by a shock whose epicenter was in Hollister.

That was the fifth strongest earthquake in the central coast area in this century.

"You can get drunk on the smell," said Rusty Oliver, the hotel's assistant manager.

Lucky Stores reported it was forced to close briefly the five supermarkets it has in the Livermore area to clean up the mess left by the temblor.

In the little hamlet of Byron, which was even closer to the epicenter, nine men and three women gathered afterward in the Wild Idle Inn to compare notes.

"If they hadn't been in San Francisco we wouldn't have just tumbled down," said tavern owner Mike Rooney.

A bushel basket's worth of plaster dropped from a City Hall ceiling in San Francisco, where Chief Administrative Officer Roger Boas was conversing with Health Department Director Merwyn Silverman at 11 a.m. "I thought the goddam building was going to fall down," Boas said.

Fri., Jan. 25, 1980
San Francisco Chronicle
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Aftershocks Rumble in Livermore Area; Further Damage Found at Nuclear Lab

From Times Wire Services

LIVERMORE—Rolling aftershocks from a strong earthquake that left hundreds of northern Californians homeless shook the Livermore area Friday, and scientists discovered further damage to a major nuclear weapons research facility.

A spokesman for the nuclear facility—the Lawrence Livermore Laboratory about 40 miles southeast of San Francisco—said a radiation leak blamed on the quake posed no danger.

A 30,000-gallon tank containing water and tritium, a low-level radioactive isotope, was leaking several gallons an hour, the spokesman said.

Scientists also reported damage to the laboratory’s huge Shiva laser system—the largest of its kind in the world—but the extent was unknown.

The Shiva system is a delicate arrangement of lenses and mirrors that focus laser beams at radioactive material to create high energy and thermonuclear weapons research.

No leakage of radioactivity was reported from buildings at the facility containing deadly plutonium and a small nuclear reactor.

Those critical facilities are housed in some of the world’s most quake-resistant structures, but they have been a target of local protesters who want the plutonium removed.

Amid shattered windows, upended furniture and broken chemical bottles, workers returned to the laboratory on Friday.

Thousands of them reported to the 640-acre nuclear weapons laboratory complex to begin the cleanup after Thursday morning’s quake, which registered 5.5 on the Richter scale.

A lab spokesman said damage included 29 trailer-offices that were knocked off their jacks, possible structural damage to a four-story office building and extensive debris from falling light fixtures and tiles.

About 30 people were treated at the laboratory for cuts and bruises after the quake, the spokesman said, and one man suffered a heart attack later in the day. Most of the 7,200 workers were evacuated briefly Thursday.

The temblor unleashed most of its force on the Livermore area, about 65 miles east of San Francisco. It was felt from Monterey, about 150 miles south of San Francisco, to Santa Rosa, 50 miles north, and up to 260 miles to the east in Reno.

Six aftershocks of between 5.2 and 3.0 on the Richter scale shook the area Thursday and Friday, but did no damage, officials said.

At least two dozen people were hospitalized in Livermore after the main quake, which crippled electric and telephone service and caused major damage, cracking roads and buildings throughout the city. Eighty-two people spent the night on cots furnished by the Red Cross after their homes were damaged.

The earthquake might have been considerably worse had it occurred along one of the state’s major fault lines, said Will Perry, director of Emergency Services in Contra Costa County.

“Not the fault, the higher the energy release when it slips,” said Perry, a member of the state Seismic Safety Commission.

Perry said the faults in the area around the quake’s epicenter just north of Livermore are short, unlike the San Andreas Fault, which runs virtually the length of the state.

Officials said the quake occurred on the Antioch Fault, a relatively short fault which is not linked to major faults in the area.

The Richter scale is a measure of ground motion as recorded on seismographs, with each increase of one number indicating a tenfold increase in magnitude. A quake of 6 can cause severe damage.

Two hundred residents of the Sunrise Mobile Home Park in Livermore remained homeless Friday as a result of the earthquake.

At least 100 out of 333 mobile homes were knocked off their pedestals. The rest suffered other damage.

The park was evacuated because of leaks in gas lines, and Alvena Wilkund, the manager, said it would be 48 hours, and maybe a week, before the park will be reopened to its residents.

In the meantime many of them will spend their nights downtown on Red Cross cots or in hotels. Others will stay with friends.

Livermore Hit by Another Quake

4.0 Temblor Causes Only Minor Damage

By JOHN KENDALL
Times Staff Writer

Another in a series of earthquakes shook the Livermore Valley in Northern California Sunday, rattling a wide area and causing minor damage but no serious injuries.

The most recent major temblor occurred at 2:58 a.m. Sunday and registered 4.0 on the Richter scale.

Quake-conscious residents were told Sunday that they can expect more temblors in the next few days or weeks.

“Earthquake sequences of this type are relatively common,” said Dr. Robert Uhrhammer, a researcher at the University of California Seismographic Laboratory in Berkeley. “We think the sequence will continue for several days or possibly weeks. The others will probably be smaller and further apart in time. We have no way of telling for certain, but it is likely that the worst is over.”

UC Berkeley scientists also recorded a Richter magnitude 5.6 earthquake at 6:33 p.m. Saturday.

Since the Livermore Valley, about 30 miles southeast of San Francisco, was struck by a 5.5 quake at 11 a.m. Thursday, the area has been rattled by eight other temblors of 4.0 or more and scores between 1.7 and 3.0.

According to Uhrhammer, all the recent earthquakes were scattered at distances of eight to 10 miles along the Greenville Fault zone, which includes the Antioch Fault, where Thursday’s quake occurred.

Mike Browne, a spokesman for the State Office of Emergency Services in Sacramento, said Sunday that the two temblors have caused “widespread, but minor, damage.”

Windows were broken in the Livermore area, where four persons were treated for minor quake-related injuries and released from Valley Memorial Hospital.

The quake pitched canned goods from supermarket shelves, dislodged acoustical ceiling panels and cracked the Greenville overpass on Interstate 580, a major eastern route from the San Joaquin Valley to the Bay Area, but the highway was not closed.

The Lawrence Livermore Laboratory estimated Sunday that the damage to the defense and energy-related research facility might run up to $1 million.

Mike Ross, a public information spokesman, said Tuesday that research facilities and an office building were the most heavily hit.

“Most of the damage in terms of disruption was of interior office nature: lighting fixtures, acoustical tiles, items in sprinkler systems, file cabinets and bookcases falling on people,” Ross said.

He minimized the seriousness of a leak in a 30,000-gallon waste water storage tank that he said contained a very small amount of radioactive hydrogen.

Ross said sludge in the tank created by Thursday’s quake had slowed the leak to a mere trickle, which posed no danger while the tank is being replaced.

Scientific study suggests quake may be indication of bigger jolts

By Ned MacKay
Times Tribune Staff

The earthquake that hit Northern California Thursday was a perfect example of the type of quakes that one scientific study claims are followed by major earthquakes within three years.

That study, conducted by Dr. Leon Knopoff of the University of California at Los Angeles and two Soviet scientists, shows that mid-sized earthquakes accompanied by a series of aftershocks seem to be followed by the major earthquakes. Thursday's quake, measuring 5.5 on the Richter scale, was followed by at least four aftershocks.

Knopoff and the Soviet scientists said they could "retrospectively predict" 78% of the major earthquakes in California, Japan and New Zealand in the past few decades, using this method.

The method can identify a region where a major shock is likely, Knopoff said, although it is not yet very precise.

Although the shaking probably seemed major to the people of Livermore, it wasn't the major temblor expected by several seismologists.

"This has nothing to do with the big one," was the evaluation of Bruce Bolt, a University of California geology professor and director of the university's seismographic station.

"And it doesn't change our prediction that there's a better than 50-50 chance that there will be a major quake in the next 10 years."

Last month Bolt and Prof. Richard Jahns of Stanford published an article predicting that California would be struck by a major earthquake within the next 10 years with a magnitude on the Richter scale of 7 or more.

The earthquake Thursday, centered about 10 miles north of Livermore, registered 5.5 on the Richter. And the one which flattened San Francisco in 1906, although it occurred before the Richter scale was devised, has been estimated at 7.9.

Bolt said it would take a "thousand quakes like this one (Thursday) to equal the energy to be released in the big quake."

The earthquake near Livermore was predictable, according to James Berkland, Santa Clara County geologist who has devised a controversial theory that earthquakes are related to the alignment of the earth, moon and sun.

Berkland mailed a list of five quake predictions a week ago to the U.S. Geological Survey, but a quake near Livermore was not included.

Rick Lester, a geologist at the Survey office of earthquake studies in Menlo Park, said today that aftershocks of the Livermore quake are continuing to be recorded every few minutes. The largest was 5.2 on the Richter, about a minute after the main shock occurred just after 11 a.m.

The ones since then have mostly been too small for people to feel.

Dozens of Survey scientists and technicians have gone to the area since the quake to set out additional instruments.

Few of the children at Woodside Elementary School were frightened by the earthquake, Principal George Sellman said.

"The rest were interested. It seems to excite kids," he said. In the classes he knew of, all the children took the teacher's cue and got under their desks "without any struggle."

Peninsula Times Tribune
January 25, 1980
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Earthquake was early for Peninsula schools

By John Raess
Times Tribune Staff

For many in Peninsula schools, Thursday's earthquake came a day too soon, but it was good practice anyway.

Disaster sirens in San Mateo and Santa Clara Counties were scheduled to sound today at 11 a.m., 24 hours after Thursday's temblor rocked the Bay Area.

In general, principals of elementary schools on the Peninsula said children reacted well, when they did react.

As part of disaster drills, students are taught the basic lesson in earthquake survival — get under cover.

Michelle Hensill-Sanders, principal of Belmont's Ralston School, said reaction was mixed.

In one class, kids received the word from a teacher to "drop and cover," she said, and immediately dived under their desks.

Then in another class, children "just looked at him," when their teacher told them to do the same, she said.

The earthquake was good practice anyway, she said. The children will do the same today when the sirens go off.

It is practice that may come in handy. The San Andreas fault, one of California's largest, runs under Crystal Springs Lake a few miles away from the hilltop school.

Principal John Brand of Hoover Elementary School in Redwood City said the school's children reacted very well. They practiced the "duck and cover" technique without panic, he said, then filed into the playing field.

In one way, he agreed, the quake was good practice because the children realize the drill has practical application.

"After it happened the kids had something to talk about," he said, "they learned why they drop and cover."

Principal Tricia Bubenik of Lakewood School in Sunnyvale said students reacted "quickly and calmly."

In one class, she said, a nod from the teacher was sufficient to send the pupils under their desks.

Principal Daniel Haley of Egan Intermediate School in Los Altos said the school was "due for a disaster drill anyway."

Haley was standing by the intercom when the first shock hit, so he told teachers to send the students under their desks.

"A couple of the teachers thought I was kidding, but they went along with the program anyway," he said.

Physical education teachers in the gym sent students to stand against a wall when they saw the baskets swaying, he said.

As a drill, he said, the timing was a little off, but at least it "fulfilled the requirement."
Quake Raises Fears About Mobile Homes

By Bill Soffier

Residents of mobile homes are living in "a disaster waiting to happen," a state earthquake expert said yesterday. But a spokesman or owners of mobile homes said that officialdom was "overreacting" in the wake of Thursday's temblor that damaged the Sunrise Mobile Home Park in Livermore.

"A mobile home is one of the worst places to be in an earthquake," said John MacLeod, a staff member of the state Seismic Safety Commission. "They come off their flimsy foundation and crash to the ground even in a moderate quake."

Citing mobile home damage in four of the last five major California earthquakes, MacLeod said the Seismic Safety Commission will soon contract with a private engineering firm to recommend building standards for anchoring mobile homes to the ground.

The commission, whose job is to advise other government agencies about earthquake dangers, has repeatedly asked the state Department of Housing and Community Development to develop mobile home tie-down standards. But the well organized owners of mobile homes vigorously object, saying the decision about the $200 to $400 cost per trailer should be up to the owner, not the government.

"The state is overreacting," said Dennis Kavanaugh, a lobbyist for the Golden State Mobile Homeowners League, which represents California's half million owners of mobile homes. "There were no personal injuries at Livermore, and it was close to the epicenter."

Ninety-five of the 133 mobile homes at Livermore's Sunrise Mobile Home Park were thrown off their foundations last Thursday. Water and sewer mains also burst.

Kavanaugh said he supports a resolution introduced in the State Legislature January 14 that calls for the state Department of Housing and Community Development to study earthquake damage on mobile homes.

Owners of mobile homes oppose any kind of state regulation. "I'll take my chances here rather than in downtown San Francisco," said Leonard Bauerle, 40, a resident for eight years of the Meadowbrook Mobile Home Park in Colma.

"It's even better to be here than a conventional home," Bauerle contended, "because the roof is light and no heavy timbers will fall on you and it's easy to escape by kicking a window right out."

But after last week's quakes, Bauerle said he is going to reinforce his home, which is two feet off the ground on concrete piers, with cinderblocks as a precaution.

Ironically, mobile homes are on light foundations because of a tax break. Such home owners don't pay property taxes because the homes are registered as motor vehicles and owners must maintain a chassis underneath the home.

Bauerle doesn't think anchoring mobile homes is the answer. "The anchors are under tension and will be the first thing to snap when the 'Big One' comes," he said.

But the nuclear weapons research facility at Lawrence Livermore Laboratory has been anchoring down all new office trailers as a precaution. A lab spokeswoman said yesterday that 100 of the facility's 900 trailers slid off their foundations last Thursday, and officials are considering tying down all the trailers.

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Lab Quake Damage of $100,000 Reported

LIVERMORE (UPI)—The earthquake that shook Lawrence Livermore Laboratory last Thursday caused about $100,000 damage to office buildings and also left a new crack in the concrete structure that surrounds a research nuclear reactor, a spokesman said Wednesday.

There had been a few small cracks in the structure surrounding the three megawatt reactor for the last 15 years and the 5.5-magnitude quake expanded some of these and added a new one, the spokesman said.

"These cracks pose no structural or radiation hazard, nor is the radiation around the reactor changed because of them," he said.

The reactor core is contained in an aluminum tank filled with water that acts as the primary neutron radiation shield. The tank also is shielded by a 6-foot thick reinforced concrete wall.

At the 11-foot high section of the wall, its thickness narrows to three feet and the cracks were in that transition area, the spokesman said.

The thinner section, he said, is not needed for shielding but rather to support a balcony used for reactor work and maintenance.

There were no critical facilities damaged by the quake or aftershocks at the laboratory, which does nuclear weapons and energy fusion research, the spokesman said.

Some shifting of concrete blocks destined for use as shielding for magnetic fusion experiments was discovered in one building and about 30 construction workers at that facility were sent home and told to report back Feb. 4.

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Quake’s Postmortem Under Way

By David Perlman
Science Editor

Scientists pored over measurements of radioactive gas in the soil of the region around Thursday’s earthquake yesterday as they placed new instruments near the epicenter to record continuing small aftershocks.

The quake rolled across a wide area of Northern California and damaged the nuclear weapons laboratory at Livermore, but earthquake specialists were more interested yesterday in what new information they could glean from the temblor.

One intriguing possibility lay in measurements of the gas called radon, a natural constituent of all soil, that some seismologists believe may offer clues to earthquake prediction.

As the scientists studied the continuing aftershocks from the quake, they also gave it an official name, an official magnitude and an official location.

Henceforth, the main shock that struck at 11 o’clock Thursday will be known as the Mt. Diablo earthquake, its official magnitude — a measure of the energy released — will be 5.5 on the Richter scale, and its location will be on the Mt. Diablo-Greenville Fault, one of a complex network of small faults collectively known as the Diablo Range.

The epicenter was located 7½ miles east of Mt. Diablo and ten miles north of Livermore.

During a day of intense exploration through the hilly brush-covered region of the epicenter and environs, scientists discovered two long cracks where the earth had ruptured when the quake struck.

One surface rupture, about a mile long, was located just south of the epicenter. There, the opposite sides of the fault slipped sideways past each other by a full six inches in a ground displacement known as a right lateral strike slip. That means the west side of the fault appeared to shift northward and the right side southward.

The second rupture, marked by a displacement of only an inch or so, occurred along a stretch of Vasco Road about three miles north of Interstate 580.

The most interesting feature of yesterday’s discussions by earthquake scientists was the disclosure that radon — a radioactive gas contained naturally in all soil — had been observed seeping upward in the ground miles away from the epicenter during a period of weeks before the quake, and then virtually disappeared in early January.

Changes in radon levels are a controversial topic in efforts at earthquake prediction, and no scientist is yet prepared to say that the phenomenon clearly portends a quake.

But Chi-Yu King, a U.S. Geological Survey scientist who has been measuring radon in the soil around California seismic areas for years, told The Chronicle yesterday he has indeed detected significant changes in Bay Area radon levels.

Four of his observing stations in the East Bay, ten to 15 miles from the epicenter of Thursday’s quake, showed as much as tenfold increases in the earth’s radon emanations last November and December, followed by abrupt decreases almost to zero within a few weeks before Thursday’s temblor.

He observed a similar phenomenon, he said, before a 1977 earthquake near Berkeley, and both Soviet and Chinese seismologists have long contended that radon changes are a major precursor of earthquakes.

King measures radon emanations in the soil by burying small plastic cups upside down in the ground about two feet deep. Tiny squares of photographic film pick up the tracks of nuclear particles emitted by the radioactive gas, and King can then measure the intensity of the radiation when he develops the exposed film. He believes the emanations increase when seismic strain builds up in the earth’s crust and squeezes the radon gas from deep-lying rocks.

When the rocks stop emitting radon, scientists theorize, it is a sign of an impending earthquake.

But King agreed with Geological Survey scientist Robert Wallace, who said yesterday, “This radon business is worth taking seriously as we try to predict quakes, but the picture is still far too complex and unclear to be certain.”

According to Robert Cockerham of the Geological Survey, Thursday’s 11 a.m. quake was preceded two minutes earlier by a small “foreshock” with a Richter magnitude of 2.5. Since then there have been thousands of tiny aftershocks and at least four with magnitudes of 3.6 and 4.5 — the last one at 6:00 a.m. yesterday.

Although past earthquake activity in the Diablo region has been meager, according to William Ellsworth of the Geological Survey, there was one temblor with a magnitude of 4.6 in June 1977, four miles southeast of Livermore.

Three others with magnitudes of up to 4.7 in the Danville area west of Mt. Diablo struck in June, 1970, and August, 1977.

According to Roger Borchardt of the Geological Survey, one of the scientifically disappointing aspects of the Diablo quake was the absence of permanent stations designed to measure ground motion in the region. These stations can give seismologists accurate readings on the behavior of the moving earth.

At the time of the Coyote Lake quake last August, the Geological Survey had six of those instruments right near the epicenter, and they were able to measure precisely how strongly the earth was jolted. An even larger array of those instruments was already in place throughout the Imperial Valley when the last big quake struck that region on Oct. 13, 1979.

But because there has been such a limited record of significant quakes in the Mt. Diablo region, the closest strong-motion instrument was 7½ miles away from the epicenter on Thursday.

Immediately after the quake, however, scientists moved in with four strong-motion devices designed to measure the acceleration of the aftershocks. They were all in place in the epicenter area before morning, and now there are dozens more, including many portable seismographs whose job it is to locate the exact positions of the continuing aftershocks along the fault.

San Francisco Chronicle **

Sat., Jan. 26 1980
Lab's Massive Laser Complex

Heavily Damaged by Quake

It's the World's Biggest

By Michael Harris

The Livermore earthquake, only a whisper compared with some of the major shakes that have struck California this century, was strong enough to knock a $25 million laser facility off its pins at the Lawrence Livermore Laboratory.

The bolts holding the metal frame of the 122-foot-long Shiva laser complex — the world’s largest — and its 60-foot-high target were sheared off when the quake struck at 11 a.m. Thursday, registering 5.5 on the Richter scale.

In the wake of Thursday night’s four major aftershocks, there were two more substantial aftershocks centered near Livermore early yesterday and more than 100 minor ones.

One aftershock yesterday struck at 5:39 a.m. and registered 4.2 on the Richter scale. Another, measuring 4.1, hit at 6:03 a.m.

The metal frames of the laser array, looking like huge construction sets, broke loose from their foundations, spewing a shower of dust onto delicate lenses and mirrors.

There was, however, good news yesterday at the massive scientific laboratory, where leakage from a 30,000-gallon tank holding a mixture of water and radioactive tritium was reduced to a trickle in the afternoon.

A total of 50 gallons dripped into an asphalt basin from a hairline fracture in the tank bottom, but geiger counters showed that the 18-inch pool of liquid at the base of the tank was far less radioactive than the dial of a luminous wristwatch.

Although the leak captured public attention first, the problems with Shiva will take longer to solve.

The laser facility will be out of operation for a month, officials at the laboratory estimated, and the costs of repairing and cleaning the powerful instrument, which is used in fusion and thermonuclear weapons research, will be heavy.

“Just how much it will cost we don’t know,” a laboratory official said.

But if the job can be done for less than a million dollars, some of those involved in the massive cleanup and reconstruction task will be surprised and relieved.

The laser facility, which occupies a 4½-story building that takes up more space than a football field, was one of two major structures that suffered heavy damage at the laboratory.

The five-story theoretical-physics office building was placed off limits because of fears that it suffered severe structural damage. The architects and engineers who designed the building were summoned from Los Angeles to see how it could be made usable again.

The physicists and their aides were told to stay away yesterday. They may be assigned to temporary quarters next week.

Most of the 7200 employees at the laboratory, sent home after the earthquake Thursday, returned to work yesterday to clean up the mess, but about 1000 of them reportedly went home again at midday.

Severe damage was inflicted on trailers, both in and out of the laboratory. Twenty-nine trailers at the laboratory were knocked off their cement-block foundations.

More than 100 of the 130 homes in the Sunrise Mobile Home Park, three miles from downtown Livermore, were severely damaged in the quake, some of them having moved three feet or more. The residents had to stay in temporary shelter while awaiting repairs.

Officials put the number of injuries in the earthquake area at 28.

But there were fresh reports yesterday of near-misses. A secretary at the laboratory ducked under her desk when she felt the quake — a moment before a heavy filing cabinet crashed onto the area where she had been sitting.

Officials at the laboratory hope that the gas supply, cut off immediately after the quake as a precautionary measure, will be turned on by Monday. With no heat or ventilation available in the buildings yesterday, many employees bundled up in sweaters to guard against the mild winter weather.

The Nuclear Regulatory Commission reported yesterday that one of its inspectors at the Rancho Seco nuclear plant, which is operated by the Sacramento Municipal Utility District, felt the quake but said there was no damage. The plant itself is closed down for refueling and is not expected to resume operations for at least six weeks.

The quake was not felt at the Diablo plant constructed by Pacific Gas & Electric Co. in San Luis Obispo County, about 150 miles south of the epicenter. The quake, centered 10 miles north of Livermore, was felt as far south as Monterey and as far north as Santa Rosa.

On the day the quake struck, Philip Day, San Francisco’s director of emergency services, was at Fire Department headquarters arguing the case for new communications equipment to cope with municipal disasters.

“The point has been made four times recently in California,” Day commented yesterday, referring to a series of quakes that the state has endured. “We should be getting the message pretty quick.”

Day said he will meet with Mayor Dianne Feinstein Tuesday or Wednesday to propose the immediate expenditure of $119,000 for emergency communication and information materials.
High and outside isn’t the place to be when earthquake hits

“I was just hanging on saying, ‘What the hell is going on?’”
— Travis Cooper, iron worker

By Mireya Navarro
At more than 135 feet high, with one foot on an edge of an eight-story building and the other foot on an outside elevator, Travis Cooper, 37, was not in the place to be when the earthquake jolted Northern California.

An employee with a San Francisco rigging company, Cooper was jerked back and forth by the 50-second earthquake yesterday that read 5.5 on the Richter scale while hanging onto a 177-year-old brick building undergoing renovation in Oakland.

One of his legs was resting on a man-lift elevator stopped at the top of a 135-foot tower.

“Before the elevator stopped, they said I was hanging onto the building,” Cooper said. “I couldn’t get to either one because it was shaking but the tower was shaking more than the building.”

Workers at two construction sites in Oakland swayed, wiggled, rocked, rolled and shook when hit by the earthquake.

“I almost tossed me out of the building,” said Don Lasarte, a dry wall installer who was working on the second floor of the newly completed Barclays Plaza on Madison and 12th streets.

Lasarte, who was standing on top of a bunch sitting on an edge, said he had to grab a metal stud to avoid falling off the building.

“I thought I was sick. I couldn’t keep my balance,” Lasarte said. “I could have very well killed myself.”

Mike Tirri, a welder, was standing on a scaffold 55 feet above ground when it started “wiggling back and forth.” By the time the aftershocks came he was already on the second floor of the threesory building.

“I thought it was a small one and a bigger one would come after that. So I went downstairs,” he said.

The 179-foot long, 97-foot wide structure suffered no damage, according to job superintendent Martin Olson, and minutes later everything was back to normal.

“Nobody panicked,” said Olson, who unlike most of the 18 workers in the building did not feel the quake.

However, one block away, on 13th and Alice streets, most of the about 100 workers working on the renovation of the former Hotel Oakland went out on the street as soon as the earth started moving.

There were no injuries and the only reported damage was a cracked window that fell out on the ground floor. However, for Cooper, who had been dismantling the man lift used to transport construction material and workers onto the roof of the building, getting hit by the earthquake while being in the tower he had worked with for more than 10 years was the “most dangerous experience I’ve ever had.”

“It looked real bad,” said Barney Hulhbee, who was operating a crane hooked onto the elevator tower. “I thought something was wrong with the crane or with the platform.”

“He (Cooper) looked down at me because he thought I was doing something wrong. He yelled asking what was wrong and I yelled back, ‘It’s an earthquake!’

The quake’s ‘funny’ effects on winery

By Alan Cline
Cecil Aguirre is a wine man, not an earthquake specialist. But this he knows: “Earthquakes do funny things.”

And indeed they do, especially Thursday’s shake that rocked the Wente Bros. winery, a few miles southeast of Livermore.

Thirty thousand gallons of chablis, rieslings and other whites went down the drain as huge tanks buckled. A few tipped over and cracked their valves.

Few bottles, however, were broken.

Although more than 100 tanks were damaged, cases stacked 15 high in the warehouse just sort of leaned on each other. Only a few fell. Bottle damage was minimal.

Aguirre, the superintendent of the 97-year-old plant, gazed yesterday at a 20,000 gallon water tank 100 feet high, shook his head and commented yesterday. “A little more and it would have come down.”

One steel leg had a most discernible bend, another less so.

“The quake seemed to go right through here,” Aguirre said. “The shake was north and south, up and down.”

Anyway you look at it, 31,000 gallons is a lot of wine, but to the winery super, compared to the plant’s several million gallon capacity, it wasn’t a great amount.

But after the shaking, one of company’s first moves was to call the federal tax man. Aguirre explained that 31,000 gallons would have to be accounted for, and the sooner the better.

He was much more concerned with the damage to the tanks, most of them stainless steel, some of 15,000-gallon size. It was the full ones that suffered the most, mainly buckling at the bottom where the steel meets the cement foundation.

The damaged sections will have to be replaced and the work won’t come cheap. But Aguirre suggested most would be usable, that the repairs could be made on a sort of “space available” basis.

In the “funny” or strange category, he notes that while the tanks toppled or buckled, there was no structural damage to any of the buildings in the complex.

None of the 20 Wente employees was even scratched, but the quake threw a scare into plant engineer Bob Detjens.

He lives near the winery. He figured his house would be a mess and he was pessimistic about his own wine cellar, about 500 bottles.

When he got home, he found that indeed, his house was a mess. A 19 inch television had been knocked off a table, books, pictures and knickknacks were strewn about.

In the basement, he saw that at least 30 jars of fruit put up by his wife were shattered. But earthquakes do funny things. Only one bottle of wine was broken.
Mobile home park severely shaken

By JAYNE GARRISON and CATALINA ORTIZ

LIVERMORE — "My home's sitting on its stubs. I don't have nothing left. It's all screwed up," mumbled F. J. Mitchell, one of about 300 Sunrise Mobile Home Park residents who saw their trailers jolted and jerked off their foundations by the earthquake that rocked the Livermore-Amador Valley yesterday.

Around him, a blaring warning to evacuate emanated from patrol cars cruising the 133-home park in North Livermore.

Nearby, the Red Cross set up an emergency center with food and cots at the Springtown Recreation Center. People forced out of their homes by the temblor were being booked into rooms at the Holiday Inn and other local motels.

But Mitchell, stunned by the day's disaster, didn't care about threats of aftershocks and wasn't about to leave his collapsed trailer.

"Hell no. I'm not going anywhere. I got a 44-magnum and I'm gonna stay here and protect my trailer."

Last evening, inside the dark Sunrise recreation center, a group of elderly residents argued around a table full of half empty beer bottles — their own relief center that was set up within an hour after the quake struck at 11 a.m.

They represented the average Sunrise owner: retired and on fixed incomes.

"I'm not gonna accept any charity. I don't want none," bellowed one elderly man, resisting his friends' request to leave for the Red Cross shelter.

Fearing looters, another resident, Robert Loucks, said he planned to patrol the park throughout the evening, then sleep in his small camper that night.

"You gotta understand," Robert Pilkey, president of the homeowners association, explained to a reporter, "a lot of the people here are elderly. Most don't have earthquake insurance. They think they've lost almost everything."

The earthquake severely damaged 95 of the mobile homes, 40 others suffered minor damages. No one could put a price tag on the damage, but most of the mobile homes are worth between $20,000 and $40,000.

Many trailers simply danced off their foundations, the fronts collapsing on the ground. Porches crumpled like match-stick structures and water gushed into the streets from broken pipes.

One unidentified woman was thrown against the wall of her trailer and taken to Valley Memorial Hospital, according to Livermore police Lt. Rick Burrows.

"I thought somebody hit my trailer. It threw me flying through the door," said a shaken Phil Tolakos.

"It seemed like everything, even the cars were jumping around," said Julie McNeil.

Bertha Jones compared the quake to a being on a roller coaster, then sharply added, "I don't like roller coasters."

Throughout the day police, firefighters and Red Cross volunteers swarmed the small complex, checking each trailer for any trapped residents, serving food to confused, displaced trailer owners and turning off all the gas, electricity and water mains.

That night, reserve police officers were called in to patrol the park.

The complex, cut off from any power or modern conveniences, was eerily quiet and dark. Dim yellow light shone through cutouts from lanterns or flashlights in the few trailers still occupied by determined owners.

But the vast majority of residents had long since packed their cars and left for relatives or Red Cross help.
Animal owners got hint of quake

By Carol Brydolf
Tribune Staff Writer

Betty Eagan, who runs the School Jungle Safari project in La Honda, said her collection of exotic jungle beasts acted so withdrawn and depressed after Thursday morning's earthquake that she was almost expecting another jolt.

"I feel strange because they feel strange; they're all just lying around, depressed," said Eagan of her assortment of lions, leopards, pumas, and wolves.

"I'm almost waiting for another one, they're acting so withdrawn and scared."

Another shake — two, in fact — did come later Thursday night in the form of two jolts that shook the hills.

Oakland Zoo foreman Val De Leon had a different worry after the morning quake — he noticed nothing.

"I'd like to believe they can tell there's going to be a quake, as so many people claim, but I've been around animals all my life and I have never noticed a thing," he said ruefully. "If animals can really tell, why didn't anyone with animals predict this one?"

De Leon and Eagan, like many Bay Area animal fanciers, were trying to monitor their animals' behavior in the wake of Thursday's sizable jolt, to see whether these beasts have some mysterious seismic sense that could help their keepers anticipate the next jolt.

Margy Sparrow, who keeps leopards and golden cats at her San Leandro home, said her animals "got all kinds of flighty, they paced and flew about in their cages. I couldn't figure out what the matter, but I had never noticed anything like that before."

After the morning quake, Sparrow said, the animals congregated in quiet groups for about a half-hour before things around the menagerie got back to normal.

Betty and Lou Eagan said their wolves began howling before and during last August's big quake, but were silent for Thurs-

day morning.

"This time the only one who reacted during the shaking was the chimp, who got up, screamed, grabbed his blanket and began hitting the wall once the shaking stopped, as if to say, 'Don't do this to me again!'"

"Lou says that when he came out to see the animals after the shaking stopped, they seemed to be, really happy to see me; they all had a great deal to say."

Most animals watchers had less dramatic observations.

A San Juan Bautista couple, who asked not to be named, said they were delighted that the morning earthquake hit while they were out with their mountain lions, bobcats, and African lions.

"We're practically on a fault," the woman laughed, "and everyone always asks us whether the animals can warn us about a quake. We're out there with them for this one, and they didn't do a damn thing. I'm glad to finally know."

Julie Fiedler of Marine World on the Peninsula said animal trainers noticed very little unusual activity just before the morning quake. "A dolphin trainer said his animals weren't responding in the usual way, that they seemed preoccupied, but that's only mildly unusual," she said.

"The cats — lions and leopards — all sort of froze in their tracks, but to me that seems a human reaction."

But Fiedler, who monitors animal behavior for Stanford Research Institute's Earthquake Watch, which logs calls from volunteer observers 24-hours-a-day, says she believes there is some correlation between seismic activity and unusual animal activity. "The trouble is it's sporadic."

John Wood, press representative for S.R.I. in Palo Alto, said a review of the computer tape that 'logged' all calls during the last two weeks revealed "no strong animal excitement before the Thursday morning quake."

A note to EERI from Roberta Carter, 8375 N. Fowler, Clovis, CA 93612, was received in the Berkeley office January 28, 1980:

I live on a small farm near Clovis, Calif. I notice on the 23rd that there was an awful lot of activity among the birds around the house (others also commented). Hundreds of birds — ducks, geese, crows, etc. — were on the move. They did not stay still very long and they were very noisy. We also have chickens & average 7 eggs a day. This day we had 1. My husband commented that evening that he thought because of this activity we were going to have an earthquake — we did. This seemed very interesting to me and I thought that maybe this type of thing would be of some help to you also.

It's not very long range forecasting but it might help.
A String Of Little Quakes

By Charles Pettit
Science Correspondent

Scores of earthquakes, many of them too small to be felt — but measurable on seismographs — continued to roll along Bay Area fault lines yesterday in the wake of last Thursday's 5.5 temblor in the East Bay.

Despite disparities in magnitude measurements, the "little" quakes have been less powerful than the original, a fact readily disputed by any number of persons, however, in the immediate vicinity of the recent aftershocks.

Such aftershocks may continue for weeks; some of them may have magnitudes as large as those of the quakes and shocks that have already occurred.

The latest reported aftershock, measured at 3.25 magnitude by the U. S. Geological Survey, occurred yesterday at 5:46 p.m. in the Pleasanton area. There were no reports of damage or injuries.

As the lesser quakes rumbled on, some officials were beginning to question some of the damage reportedly caused by the initial earthquake Thursday near Livermore.

Officials at the sprawling nuclear weapons and energy research laboratory in Livermore began to wonder yesterday whether a reported leak in a container of very low level radioactive waste — not reported to the public until nine hours after it occurred — happened at all.

The doubts came as scientists sifted mountains of data from the series of earthquakes that has jolted the Bay Area since Thursday.

The leak, in a 30,000-gallon tank of water containing radioactive tritium, was reported after about 50 gallons of water were found in an asphalt holding basin around the tank. However, Lawrence Livermore Laboratory spokesman Mike Ross said, measurements have not found any sign of radiation in the water, leading to some theories that it may have been accumulated rainwater splashed from the top of the tank.

The level of waste in the tank is so low that the lab could have flushed it directly into sewers, he said, without violating water quality standards.

The possible leak was found by the laboratory environmental health and safety personnel within an hour of the quake Thursday, but no public notice was given until 9 p.m.

The facility's chief of public information, Jeff Garberson, said the possible leak was not reported immediately to the public "because, in the confusion, I didn't see a note that was handed to me telling me about it."

No other radioactive hazards were reported by lab officials; there was no sign of damage to containment structures in the highly reinforced Building 332, which holds plutonium that is used in experiments.

Elsewhere in the laboratory, site of extensive classified work in nuclear weapons design as well as research ranging from fusion to geothermal energy, a five-story theoretical physics building remained roped off yesterday.

"There are cracks on the fifth floor," said Ross. "We don't know if they are superficial or of a structural nature."

The 150 persons who work in the building, mostly physicists and computer programmers, are working in temporary quarters elsewhere, he said.

Main damage at the lab was to the big laser fusion program, where the $25-million, 20-laser "Shiva" machine had its mounting bolts sheared off and its components showered in dust. The smaller "Argus" laser suffered damage from falling ceiling sections and lights.

The machines are expected to be repaired in a month, but at a cost of $1 million.

Scientists who study earthquakes began to piece together how the Crockettville earthquake fault near Mt. Diablo ruptured, and found that they had a lot of data to work with.

Researchers from the University of California at Berkeley Seismological Station and the U. S. Geological Survey's Office of Earthquake Research in Menlo Park invaded the rolling hill country north of Livermore following the quakes Thursday.

(Continued on page 81)
Earthquake brings injuries, damage

A powerful earthquake centered in the Sacramento Delta midway between Livermore and Stockton struck the Bay Area at 10 seconds after 11 a.m. today, causing damage and injuries.

Seventeen persons were hospitalized in Livermore with injuries suffered in the earthquake, which was centered near the city. Livermore is located on the Calaveras fault.

The Lawrence Livermore Laboratory reported some damage to buildings but no damage to the nuclear research reactor. The laboratory had to be evacuated because of leaking gas.

Two schools in Livermore were evacuated when gas began leaking from damaged pipes, officials said.

The Bay Area Rapid Transit system immediately halted all service, and trains remained stationary for about 45 minutes. Service resumed after it was determined that the system had suffered no damage.

The quake, which hit at 11 a.m. PST and appeared to have lasted for 20 seconds to a minute or more, also was felt in Carson City, Nev., some 300 miles to the east. Buildings swayed from Santa Rosa to Monterey.

In Modesto, driveways and sidewalks cracked, and water sloshed from swimming pools, but there were no reports of injuries.

Tile fell from ceilings at Hayward State University 20 miles east, but no one was injured.

Sidewalks and buildings were reported cracked in Stockton, and one old hotel was being evacuated because of structural damage. Officials at the University of California at Berkeley reported the location of the earthquake and said it measured 5.8 to 6.4 on the Richter scale.

According to the California Highway Patrol, Interstate Highway 580 was closed at Altamont Pass due to structural damage to an overpass.

Other reports of damage included the knocking out of telephone lines in the East Bay and accidents involving vehicles.

The quake was described as a "gentle, rolling motion," by many of those who felt it.

Most of the damage reports originated from this East Bay area.

The quake was estimated to have lasted 20 seconds and was felt as far east as Carson City, Nev.

Seismographic officials in Berkeley said the earthquake knocked out their sensitive measurement equipment "right off the scale."

A String of Little Quakes... (Continued from page 80)

For seismologists who put out an array of portable instruments to measure aftershocks, Saturday night's jolt was a bonus.

At the USGS yesterday, researchers eagerly gathered magnetic recording tape from a dozen "strong motion" seismographs and 90 smaller seismographs that were hastily arrayed in the region of the quake epicenter Thursday, and were installed in time for the big Saturday shake.

"I'm quite confident we got some great recordings," said USGS geophysicist Roger Borchert.

"We're looking for as good a location as we can get of the zone in the earth's crust that actually broke."

Yesterday, the director of the Berkeley seismographic station, Bruce Bolt, released a summary of the shocks that were big enough to be felt at the surface, listing 11 greater than 4.0 on the Richter scale. The largest came in rapid-fire sequence about 11 a.m. on the day, running from 4.2 to 5.5 magnitude, followed by Saturday's 5.8 quake at 6:38 p.m.

There was some argument about exact magnitudes. Seismologists at the U.S. Geological Survey put Saturday's quake at 5.2. "This isn't unusual, really," said USGS seismologist William Kinoshita.

"Different instruments, in different places, don't usually get the exact same result."

Bolt guessed about the sequence of events deep underground that caused the quakes, none of more than "moderate" size, and offered a possible explanation as to why many persons thought that the quake Thursday felt much different from the one Saturday.

Thursday, a series of shocks starting at about 10:59 and continuing for nearly three minutes created at one stretch "a strongly felt shaking that lasted over a minute," Bolt said. By contrast, on Saturday there was a single shock, shorter but more intense.

Bolt also said the flurry of quakes on Thursday apparently started about 12 miles north of Livermore, with the zone of fracture racing along underground in a generally southeastern direction for eight miles, at a rate of two miles per second.

"The southward movement on the fault rupture probably added somewhat to the intensity of the earthquake to the south," Bolt said. Then, he hypothesized, the underground fault readjusted to the new stress pattern and, on Saturday, suffered another break as big as that on Thursday, but with the direction of rupture moving north.

"This may explain," Bolt said, "why the Saturday quake felt stronger in the Danville area."

Earthquake II: Bigger and scarier, but kinder

By Lynn Ludlow and Dennis J. Opatrny

Earthquake II was perhaps as powerful, considerably less damaging but unquestionably more scary when the Bay Area trembled at suppertime last night with the second major tremor in three days.

University of California seismologists stuck to a reading of 5.5 on the Richter Scale while their colleagues elsewhere put the quake's power at anywhere from 4.4 to 5.2.

The epicenter was spotted about eight miles north of Livermore, near the bulisey of Thursday morning's 5.5 shake, in arid canons populated chiefly by nervous cows near Vasco Road and Kellogg Creek.

At the California Institute of Technology, the shake was rated at 5.2 or 5.1. The National Earthquake Information Service seismograph at the Idaho Washington border gave the quake a 4.75, and the Alaska Warning Service put it at a mere 4.4.

To the twice-shaken public, the measurements didn't matter.

"Once again we were lucky again," said Bill Ward, regional manager for the state Office of Emergency Services in Concord.

"It was a good sharp jolt."

At Valley Memorial Hospital in Livermore, where nearly 40 persons were taken after Thursday's quake, a spokesman reported six earthquake-related injuries were counted last night. Mary Odell said that the injuries were minor — mostly back sprain or bruises from bumpy encounters with shaking tables — and that no one was admitted for treatment.

Felt from Stockton to Lake Tahoe to Santa Rosa, the shudder's duration measured at between 5 and 10 seconds — caused some structural damage to the Highway 37 bridge over the Napa River and at least three new cracks in the Greenville Overpass that was damaged in the Thursday morning earthquake.

At the University of California at Berkeley Seismological Station, seismologists called it a "strong quake" — not an aftershock of Thursday's earthquake.

They said the epicenter was in the Greenville Earthquake Sequence, the same area where Thursday's quake originated.

The federal seismologists, however, described the quake as an aftershock. On the Richter Scale, a tremor of 5 is regarded as moderate. With each jump of one point, ground motion is 10 times greater. Thus a quake of 8 would be 1,000 times more powerful than a quake of 5.

A powerful earthquake last Aug. 6 registered 5.9 on the Richter, and the devastating 1906 earthquake registered 8.3.

PG&E said only 50 customers reported outages in Walnut Creek, but Alameda County deputy sheriffs said the lights went out at the county jail at Santa Rita. No problems were reported.

Rockslides were reported in the Brentwood area. In Pleasanton, a crack appeared in First Street. At the San Francisco International Airport's new north terminal, a false ceiling gave way near United Airlines Gate 81 and 27 tiles fell out.

Scientists said that within 60 seconds of the quake at 6:35 p.m., the first of several aftershocks offered additional psychic trauma to the 5 million people within the nine-county area.

But other scientists said there were no aftershocks. There was no immediate explanation for the discrepancy.

Windows rattled, buildings swayed and brick walls moved ominously back and forth in San Francisco. In Brentwood, near the epicenter, a double-wide mobile home split like an amoeba while dishes and knickknacks were dumped from cupboards and shelves.

But in Livermore, where most of the BART trains, according to procedure, went to the next stop and were being held up while the aftershocks rolled through the Bay Area.

A Lafayette homeowner said his ranch-style home "swayed and groaned... It was the sharpest quake we've ever felt."

One Palo Alto resident described the quake as "a rolling, swaying feeling that lasted for many seconds. It felt about the same as the one on Thursday."

A Mill Valley resident said the "glass was shaking, the lights and furniture were moving — it was really strong."

A Stockton resident said the quake "lasted for about eight or 10 seconds."

San Francisco police said there were no immediate reports of damage.

The quake was felt in San Jose, 50 miles south of San Francisco, and in Santa Rosa, 80 miles to the north.

And a resident of Lake Tahoe called to say the quake was felt there, also.

At the state Flood Forecast Center in Sacramento, spokesman Bill Helms said work crews from state Department of Water Resources were out on the flood-weakened levees of the Delta.

But he said no major damage was found initially in the 500-mile system of private dikes and levees an observation to be double checked during daylight today.

Saturday-night shoppers found themselves dodging cans of peas when the quake gave supermarket shelves a good series of jolts. At a K-Mart in Dublin, a customer said the lights flickered and shoppers screamed.

"I dove under the counter," she said. "I figured that was the safest place to be."

A salesclerk was in shock, she said, when her hair was wet. She was soaked with milk. "She was really in hysterics."

In San Ramon, a customer said his wife dove under the counter while peaches and cracker boxes spilled into the aisles.

Fifteen gallons of jug wine smashed on the floor, he said.

Initial reports said most public utilities survived the quake.

BART service was restored completely at 6:55 p.m. Stations at Walnut Creek and Pleasant Hill were closed for 20 minutes while rails were checked for possible damage, and passengers on the Concord line were delayed for up to an hour, a BART spokesman said.

"We've done a preliminary survey and things look good out here," said a spokesman for the Lawrence Livermore Laboratory.

"This one was quite a bit milder."

On the other hand, Livermore police dispatcher Jackie Robertson said the quake opened file drawers and blew out a transformer.

"I just hope this is it," she said. "I can't take much more."


When it shook

**Thursday**

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**Yesterday**

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Thursday's major damage took place, last night's quake was considerably more gentle. "We've done a preliminary survey and things look good out here," said a spokesman for the Lawrence Livermore Laboratory.

"This one was quite a bit milder."

On the other hand, Livermore police dispatcher Jackie Robertson said the quake opened file drawers and blew out a transformer.

"I just hope this is it," she said. "I can't take much more."
Continued from First Page

or along the nearby Greenville Fault, located south-southeast of Livermore.

At the Lawrence Livermore Laboratory, which sustained a leak in a 30,000-gallon tank of radioactive water after Thursday's quake, a duty officer Saturday reported "a few minor water leaks, but nothing serious."

The new temblor followed a swarm of smaller aftershocks, and a spokesman at the Berkeley seismological lab said even though the latest quake may outrank previous ones in magnitude, it is "a normal part of a sequence of quakes."

"When it ends, nobody knows. When it ends, it ends," the spokesman said.

Don Maestretti of the state's Office of Emergency Services reported that new cracks were found in Interstate 580, where an overpass sank after Thursday's quake. But he added that traffic was not interrupted on the highway, a main link between San Francisco and the San Joaquin Valley.

Livermore police reported that two power transformers blew out as a result of the Saturday night quake, leaving several hundred homes without power for several hours.

An auto dealer's showroom window was cracked, and new ceiling cracks showed up in Livermore homes, police reported.

Four people were treated and released at Valley Memorial Hospital for minor quake-related injuries, including one man who banged his head on a table when the quake struck while he was beneath the piece of furniture, a hospital spokeswoman said.

About 100 acoustic panels tumbled from the ceiling of a Dublin K-Mart store, which had sustained damage Thursday. "We'll just have the inconvenience of closing down again to clean up the merchandise," said an employee.

At United Airlines Gate 51 at San Francisco International Airport, airport police said that 27 foot-square acoustic ceiling tiles tumbled to the floor during the quake, but no injuries were reported.

In Antioch, north of Livermore, the quake "felt as strong as the first one" Thursday, a police officer said. But no problems were reported in the city.

"One woman was out rollerskating and she didn't even feel it. When she got home, she saw all her dishes and books had fallen off the shelves," the Antioch officer said.

The temblor was felt in Sacramento, in urban San Francisco, and as far away as Lake Tahoe on the California-Nevada border.

Operations of the Bay Area Rapid Transit System were suspended for only a few minutes while damage inspections were made.

Thursday's 30-second quake rumbled through a mobile home park and in the detergent company at Lawrence Livermore Lab officials were sent to send workers home when gas began leaking from damaged pipes.

The lab's laser facility occupies a 4½-story building that takes up more space than a football field. It is used in fusion and thermonuclear weapons research.

Laboratory officials also were dealing with what they called a harmless leak in a 30,000-gallon tank of radioactive water containing tritium. They reported the contaminated water was trickling into a concrete catch basin.

David Myers, a radiation safety supervisor at the laboratory, said about 50 gallons of the fluid leaked into the catch basin within 24 hours of the quake.

Tritium is a radioactive isotope of hydrogen used as a target in laser fusion. Myers said.

The officials said the radioactive content of the water was about half the concentration permitted to be discharged into public sewers under federal regulations, and the escaping tritium posed no health hazard.

In another development, a prominent seismologist said the earthquake, which shook a 200-mile-wide area, did not release enough energy to prevent "the big one" that scientists predict will bring massive destruction and death to California in this decade.

Bruce Boldt, chief seismologist at the University of California, said Saturday the chance of a major earthquake in the state within 10 years is still at least 50-50.

"Time is running out, and with every passing year these odds will steadily increase," he said.

Such a major temblor, registering over 7 on the Richter scale, probably would strike a heavily populated area. The only urban concentrations in the state not sitting on earthquake faults are Sacramento and San Diego.

"It would take 1,000 of these 5.5 earthquakes to relieve the energy of the big one," Boldt said.

On the Richter scale, a temblor of 5 is called moderate. With each one-point jump the ground motion is 10 times greater. Thus, the ground motion in a quake of 8 would be 1,000 times stronger than in one of 5.
FOR THEM, THE 'AFTERSHOCK' IS TERROR

Quake-victims comforted at seminars

PELEASTON (UPI) — For many Livermore Valley residents, the terror of the recent earthquake and aftershocks continued long after the ground stopped trembling.

Two weeks after the first temblor of Jan. 24, women were still unable to sleep soundly, they suffered crying spells, headaches and weight loss, had bad dreams and were continually fearful and anxious.

Children suffered nightmares and had to sleep with their parents. Some were still too afraid, two weeks later, to go to school.

The men, whatever they felt, kept silent.

Responding to a barrage of telephone calls after the first Thursday quake and a weekend of two strong aftershocks, the Alameda County Mental Health Services clinic in Pleasanton quickly organized two-hour seminars in which distraught citizens could express their fears and anxieties. The first session Jan. 31 drew 38 people.

Late last week, a UPI reporter was invited to sit in on a session attended by nine women, some of them young housewives, some of them older, all still badly upset by the quake and the much-publicized promise by seismologists of "The Big One" — the major earthquake expected to hit California in this decade.

"TV and the newspapers scared the pants off me," said one older woman, who was seconded by every member of the group. That woman slept on a mattress in her hallway after the quake because she thought it was the safest place.

One young woman recounted how she got through the initial earthquake all right but that evening, on television, watched a simulation of what a major earthquake could do to a city. She didn't sleep that night.

Two days later, on a Saturday evening, an aftershock actually larger than the original quake struck again.

"The next morning I woke up and there it was all over the Sunday paper," said the young woman. "The big one, the big one. I couldn't take it."

She left town for a week at a Sierra cabin.

"But I became afraid again as soon as I came back," she said.

Several of the women said they had been unable to take showers for fear of being caught naked. One woman with two small children said she now carries a flashlight at all times after dark, in case the lights go out.

"The common theme that emerges in the sessions is that an earthquake is unpredictable. You are out of control. There is a fear of the unknown," says Diane Hall, a county psychiatrist who organized the seminars.

"It brings up feelings of the past, difficult, stressful situations. And also for many of these women who are housewives, the home symbolizes a safe place, one of security. Now, they don't even feel their home is a safe place."

Several of the women said their husbands had mocked them for seeking help in alleviating their fears. The only men who have attended the seminars have been those accompanying their wives or mothers.

"Are there no men afraid?"

"There are some men out there who are afraid, who have nightmares, who get nervous every time a truck rolls by and the house shakes a little," said Ms. Doyle. "But in our society, they aren't even allowed to express their fears so they keep it to themselves."

Mobile home earthquake safety standards in limbo

By Virgil Holbert
Tribune Sacramento Bureau

Proposed earthquake safety standards for California mobile homes have been battled back and forth between two state bureaucracies without result for more than a year, despite widespread damage to such dwellings in three of the past four major earthquakes.

"We requested the Department of Housing and Community Development to do something about it more than a year ago but they've shown very little interest," says Robert Olson, executive director of the Seismic Safety Commission.

An RCD spokesman replies that mobile homes represent the only low cost housing available to many citizens. Strict new earthquake safety regulations might be too costly for many to comply with.

"We're not going to be able to force new regulations through our commission that nobody is On support of," said Jack Kerin, chief of the Division of Codes and standards at RCD.

Most mobile homes sit on a series of piers, stubby steel or concrete supports placed five or six feet apart and camouflaged by a metal skirt draped around the base.

The piers are designed to withstand vertical weight from above but not the horizontal movements of an earthquake. As a result, mobile homes are quickly shaken off their mountings by even a slight tremor.

On occasion, flexible natural gas line hookups have snapped, causing fires to break out.

The Seismic Safety Commission requested development of new safety codes for mobile homes a year ago after finding that such dwellings suffered five times the damage of single family homes in the 1971 San Fernando and 1978 Santa Barbara earthquakes.

Some 2,000 mobile homes were shaken off their piers. Another 103 were similarly damaged in last October's El Centro tremor.

"We asked for help from RCD but it soon became clear they weren't going to do anything," Olson said.

As a result, he said, the Seismic Safety Commission is negotiating with a private engineering firm to develop its own mobile home earthquake safety standards.

Olson said mobile homes can be anchored to resist earthquakes with a set of special tie-down cables or triangular metal braces.
Richters and rosaries: Some afterthoughts on the quake

Bob Lyhne
California

We Californians like our earthquakes — at least if they keep their place. And I think we’re proud of our — really Charles Richter’s — scale. We like to quote Richter numbers at cocktail parties and other important gatherings.

After yesterday’s little (here) jiggle, you heard comments up and down that selfsame scale. Ranging from about 5.3 to roughly 1.2, all concerning a moderate 5.5 or maybe 5.8 event that was centered a whole lot closer to Livermore than to us. Livermore is where things broke and people were hurt.

I got the Richter 5.3 reading from a Peninsula newcomer out of the East. “I was scared,” was what he said. “I’ve been through hurricanes and tornadoes, and this was worse — nothing you could see.”

And the disappointed comment from a California old-timer rated around 1.2. “A FIVE? Is THAT all?” And these fatalistic words, from a Contra Costa lady who has lived through decades of California quakes, 5.8. “The place rattled, and I was scared, but as soon as I realized what it was, I waited for it to stop. Nothing fell off the shelves.”

The fact is that the way you feel an earthquake has a lot to do with how close you are, how your house is built, and whether it’s built on bedrock or marshland. Effects, differing from place to place, are measured on Giuseppe Mercalli’s scale, not Richter’s.

For people close to the action, anyway, yesterday’s quake was a zinger. “It’s the worst I’ve ever felt,” Jean Sevrens told me from Bethel Island in the flood-ravaged Delta. “You wonder if it’s ever going to quit. The house felt as if it were going to collapse, and we could see the trees and telephone poles moving. It was spooky.”

It was a comfortable earthquake for at least most of us on the Peninsula. Here at news central, the gentle, rocking sensation was similar to what you would get in a rowboat on a mild day — not quite enough to drive anybody under his desk. And certainly less exciting than the time the press caught fire.

There were stories about water sloshing out of fish tanks and swimming pools, and one lady of my acquaintance, who had just finished her bath, watched with great interest as the water rocked in the tub.

Yet stories like these tend to foster a dangerous complacency. We glibly quote our Richter numbers as if we were telling a rosary. (We’d quote Mercalli as well, but you have to know what the scale is in order to do that.) And there! It’s categorized. It’s pigeonholed. We survived it, and it wasn’t really all that bad after all, so turn on the tally.

But earthquakes deserve more respect than that, because earthquakes shake harder than that. Yesterday’s quake was several orders of magnitude short of the one that ripped through here in 1986, and ’86 is our real benchmark for what can happen here.

Earth scientists have made some progress in their efforts to predict earthquakes, but they have a long way to go — at least as to precise timing. They have no trouble at all predicting that we will be struck by another quake comparable with ’86 (around Richter 8), quite possibly by the end of the century. That’s inevitable as sunrise.

It’s an important prediction. Deaths and injuries in earthquakes typically result from the failure of man-made structures — or the soil they stand on. Property damage, the same. Build them right, in the right place, and they should stand. Fixing up what we have would help. If you knew the big one was coming tomorrow, all you could do would be get up early, get out, and wait to see if your house fell down. We have time to do more. Yet it’s a buyer’s market for earthquake insurance, and if you know one person who has done such a simple thing as bolting his water heater to the floor or an older house to its foundation, you both must be geologists.

There was yet another news story a few weeks ago, wherein two of the most knowledgeable earth scientists in the Bay Area, Professors Bruce Bolt of UC-Berkeley and Richard Johns of Stanford, said it once again — there could be a major earthquake in the 1980s, and California’s response to the danger has been less than adequate. “Time is running out in anticipating the next big California earthquake of magnitude 7 or higher,” is what they said in a published report. Metropolitan areas in both Northern and Southern California are “certain to be hit by major earthquakes in the future. With a combination of adverse circumstances such as unfavorable timing or heavy rains just before an earthquake, damage could be twice the total of all earthquake damage recorded in the U.S. so far.” Emphasis not added; it’s unnecessary. Now, what’s on the tube?

"Mobile home standards" (Continued from previous page)

However, Karin said such devices cost anywhere from $400 to $800 to install.

"The average damage to a mobile home in an earthquake if it does fall is just $85," Karin said. "There is no incentive to accept the additional costs.

"There have been no serious injuries that we've been able to document and no fatalities. Our commission is not going to adopt a set of regulations to protect somebody who doesn't want to be protected."

Oakland Tribune January 25, 1980
Laser program is still on the beam — ‘minimal’ damage

By Alan Cleve and Malcolm Glover
Examiner Staff Writers

A visit to Shiva, the $25 million laser that resembles the world’s largest erector set, before last night’s earthquake re-run showed the force of Thursday’s tremor better than any measurement on any tremor-measuring scale.

The tops of 20 bolts anchoring a 200-ton metallic framework in a Lawrence Livermore Laboratory cement building were bitten off by the shock of a quake that officials consider moderate, despite damage certain to be in excess of $3 million, area wide.

Although the bolt heads were sheared off, the framework, reaching up 60 feet, remained in place.

In an adjoining room, 12 bolts holding the framework for the 20 arms of the world’s largest laser facility were loosened, but not broken.

Dr. John Emmett, director of the lab’s laser research department, said mirrors and lenses in the target chamber must be checked for alignment, but, aside from the need to replace the broken bolts, damage to complex equipment appeared “minimal.”

An inspection after Earthquake II last night failed to turn up any new damage, a laboratory spokesman said.

None of the 350 employees working in the 1 square-mile complex were sent home.

Although the epicenter of the latest shock apparently was closer to the city of Livermore, no new damage was reported from there.

Emmett said the work of shooting laser beams onto bits of radioactive material to produce tiny explosions, part of the research into nuclear fusion, may be delayed for as long as a month.

Damage to an older laser, Argus, onethenth the 30 trillion watts of optical or white power, was much greater.

In its housing, two large amplifiers were knocked of their tracks; a big metal oscillator fell two feet to the floor, and ceiling fixtures and panels were twisted and torn loose.

Still, Emmett said that overall the damage to the lasers was “pretty negligible.”

While workers at the laboratory continued their assessment of the effects of the quake yesterday, about 200 residents of trailer parks at the southeast of Livermore, about 50 miles from San Francisco, were forced to stay with relatives and friends or in hotels, since the temblor knocked their homes from the foundations.

Lawrence Laboratory spokesman Jeff Garberson said $1 million in damage already has been toted up in the giant facility, and costs could go as high as $3 million after inspections are made this week of a damaged five-story theoretical physics building and the Argus building.

Other quake damage estimates collected yesterday:

- Damage to buildings in the city of Livermore including some 100 mobile homes at the Sunrise Mobile Park, $1.6 million.

- Mayor Marshall Kamens said his computation did not include personal or business merchandise losses.

- Building damages in the unincorporated areas of Alameda County, $100,000, including partial collapse of a department store roof in Dublin but not the damage at the Wente Bros. winery near the Lawrence facility.

- Some 50,000 gallons of white wine went down the drain, and more than 100 stainless steel tanks either bent or buckled.

- One company official put the damage at well in excess of $200,000.

- PG&E put a $17,000 estimate on its earthquake costs, mainly for labor and materials.

- PG&E representative likened the effects of the quake on his company facilities to those of a severe storm — power cut off in places, but damage to facilities practically nil.

- The cost of repairing an approach to a U.S. 580 overpass east of Livermore was set at a maximum $50,000 by a state highway maintenance official.

- Pacific Telephone reported no damage to its system, but phone traffic into the Livermore area for the third day overloaded circuits.

- Alex Cunningham, the state director of emergency services, said a decision would be made early this week on seeking disaster status for the area, a necessary preliminary to obtaining federal help. He said he doubted that type of action would be forthcoming.

Report on Quake Damage at Nuclear Lab Stirs Row

OAKLAND — A report to Alameda County supervisors on earthquake damage at the Lawrence Livermore nuclear weapons laboratory is the focus of a dispute between lab representatives and anti-nuclear activists.

Two main quakes, both with epicenters near Livermore, rumbled through Northern California on Jan. 24 and Jan. 28, registering 5.5 and 5.6 respectively on the Richter scale. They caused scores of injuries and shook buildings for hundreds of miles.

The report, submitted by Dr. Richard L. Wagner, the lab’s executive director, to the Alameda County supervisors showed Wednesday that estimated damage to the laboratory was “up to $10 million,” including damage to sensitive laser research equipment and minor structural damage.

Officials initially estimated damage to a complex containing carefully aligned laser and optical systems at $500,000 and said it would take a month to repair.

None of the lab’s critical structures — such as a room in which 500 pounds of plutonium are stored — were harmed by the two main tremors, the report showed.

Wagner said the effect of the quakes on the laboratory fit predictions of the damage that could be expected from quakes of that magnitude. “What we learned from the earthquakes is that our figures were correct,” he said.

But Will Riggen of the anti-nuclear UC Weapons Labs Conversion Project said the Livermore Valley faults are active and are capable of producing quakes 10 times stronger than those of last month. He said the “nature of the work” at the laboratory causes scientists there to downplay the risks.

“They believe the risks to us (are) outweighed by this maintenance of security of the world by development of nuclear weapons of mass destruction,” Riggen said.
Another quake? So who cares?

By Larry D. Hatfield
and Don Lattin
Examiner Staff Writers

It would be too much to say that Bay Area residents are becoming blasé about earthquakes, particularly since they've been rattled with two big ones in the past three days. But there was a real sense of deja vu last night and, as singer Peggy Lee once put it, "Is that all there is?"

There were, to be sure, some semi-panicked reactions, like the Martinez motel phone operator who shrieked an ordinarily obscene word into the phone to a double-starstruck guest. And the "three sheets to the wind" customer in a Concord bar who gave himself a nosebleed as he dived to catch a bottle of Vodka. "It wasn't Stolichnaya or I think even he would have let it fall," said bartender Al Craft.

And there were, of course, the usual reports of strange animal behavior before the quake. In Fairfax, a young man working on his sister's ranch said that a half hour before the quake, the horses started acting restless. And others said birds were shrieking and flying about wildly.

But others carried on apace. The Walnut Creek version of low-riders or American Graffiti-like kids are the kids who cruise Main on Saturday nights stayed away for a little while but swaggered back later in the evening.

The pizza business at Sparkey's in Antioch was as green as ever. Toad Hall customers in Antioch remarked on the frequency of the earth's shakings and returned to their drinks. Some people said they didn't like all this, that they were afraid of the coming Big One, but nobody said he was moving away to more solid earth.

Bay Area residents, you see, are veterans and don't get too excited about earthquakes. Typical in that sense but not in a couple of other ways was Bruce Carder, owner of Toad Hall. "It was a nice little shake," he said.

That's about what a lot of other people said, but Carder is also the son of the late Dean Carder, a longtime seismologist with the U.S. Coast and Geodetic Center who was the first person ever to get an advanced degree in seismology from the University of California at Berkeley in 1938.

The younger Carder also is a physicist at the Lawrence Radiation Laboratory at Livermore, the nuclear center that has been close to the epicenters of both Thursday's and last night's quake. He wasn't there during Thursday's quake and only yesterday returned from Texas.

Eric Phipps, a 16-year-old counterman at Sparkey's Pizza and a junior at Antioch High, also was not too impressed, saying, "Most of the people kind of enjoyed it."

Al Viscuso, owner of the Cellar Bar in Pittsburg, sounded rather bored by the whole thing. "It was just one big hit," he said. "I threw me off balance and then the lights moved for five seconds or so. It was just one big boom, like somebody pushed in and then stopped."

Business picked up temporarily after the shake he said. "People came over here because they didn't want to be alone."

Gloria Sparman, the motel clerk who said the obscene word but wouldn't repeat it later, said the motel's swimming pool had waves in it during the quake.

She didn't feel the quake Thursday, she said. "I was acting as a maid on the second floor and I heard some windows rattling real bad and I though, gee, some of our customers might be having some problems in there. I was real surprised to find out later it was an earthquake. It wasn't anything like tonight."

Beth Fontana, an intensive care unit nurse at Contra Costa's Delta Memorial Hospital, said it was a strong quake but nothing like the last one.
Quake Slightly Off Schedule

By Rick Carroll

Jim Berland, the chief geologist and earthquake predictor of Santa Clara County, missed calling the Livermore quake last Thursday by a mere 24 hours.

But he won't take any credit for the prediction because, he says, it was the wrong kind of quake.

The Bay Area's next big quake, he thinks, will be after Valentine's Day (February 14) and before George Washington's birthday (February 22). And during the same period he believes there will be a huge jolt elsewhere.

The 49-year-old engineer, who uses an almanac, a tide table and his "seismic window" theory to predict quakes, claims he's 70 percent accurate.

"When it hit last Thursday! I was upset because it happened one day after it should have," Berland admitted yesterday.

But when the earth kept shaking, Berland said he began to smile because his theory didn't fall flat.

Berkland believes a quake probably will occur every time the moon draws near the earth at the same time it aligns with the sun where in the world during that same time," he said.

That period of time, usually eight days, he calls the "seismic window."

It opened January 14 and closed last Wednesday, the day before the first Livermore quake.

"But," said Berland, "that wasn't just a strong earthquake followed by lesser aftershocks. That was a swarm."

A swarm, he said, is a group of quakes of about the same magnitude in the same area which occur about the same time.

"We had nine in the last week. And swarms do not occur when the seismic windows are open. They come between the windows," he said.

At least that's his theory.

Here are his latest quake predictions:

"I expect a 3.5 to 5.5 magnitude quake between February 15 and February 22, within a 70-mile radius of San Jose."

"And I expect — with 70 percent confidence — a 7 magnitude quake some-where in the world during that same time," he said.

What makes him so sure is that a total eclipse of the sun will occur at 12:08 a.m. on February 16 in Africa and last more than four minutes, the longest in recent history.

An eclipse, he said, is the precise alignment (or syzygy) of the sun, earth and moon.

When that happens, the moon exerts maximum tension on the earth's oceans and crusts and the force may be just enough to trigger a fault, he said.

"Last year's solar eclipse lasted only 2½ minutes and two days later there was a 7.9 quake in southeast Alaska," Berkland said.

"And in 1973," he said, "the big killer quake in Iran (it killed 25,000 people) occurred while a lunar eclipse was under way." Berkland's predictions are gaining credibility, but many scientists still don't know what to make of them. That doesn't bother Berkland, who claims he has predicted 16 out of 22 quakes since he developed his theory in 1974.

State Ill-Prepared for Big Quake, Study Says

Sacramento

Californians are poorly prepared for a major earthquake and other natural disasters because the Brown administration has failed to do its job, a legislative report charged yesterday.

The one-year study by the Assembly subcommittee on emergency planning and disaster relief cited an "alarmingly low level of emergency preparedness."

"California, as a state, is ill-prepared to respond to a major disaster striking a metropolitan area and could incur unacceptably high levels of casualties and damages."

The report noted a federal prediction that up to 20,000 deaths might result should a major earthquake the size of the 1906 San Francisco temblor strike either the Bay Area or Los Angeles and Orange County. As many as 180,000 Californians could be left homeless.

Alex Cunningham, director of the state Office of Emergency Services, said he was willing to work to correct problems.

But he added that much of the criticism was "incomplete and contained half-truths."

Cunningham said the OES has set an earthquake exercise April 19-19 at Travis Air Force Base.

Aqueduct Closed To Repair Cracks Caused by Quakes

Sacramento

The California Department of Water Resources closed part of the South Bay Aqueduct yesterday to repair leaks caused by last week's earthquakes.

The aqueduct was closed between Patterson Reservoir and the city of Livermore, engineers said, but customers in the affected areas of Alameda and Santa Clara counties will continue to get their daily quota of 135 million gallons of water via alternative canals.

Inspection and repair of the canal, scheduled to begin today, is expected to take a week.

"It's basically a plumbing problem," a spokesman said.

United Press

Our Correspondent

JAN 30 1980
Quake Safety Hearing

Lab’s Views Are Unshaken

By George Williamson

A sometimes emotional hearing demonstrated graphically yesterday that last month’s big shakes did not alter the sharply differing views on earthquake safety at Lawrence Livermore Laboratory.

“What we learned from the earthquakes is that our figures were correct,” Dr. Richard L. Wagner, the lab’s executive associate director, told the Alameda County Board of Supervisors.

“Some damage” — now estimated at up to $10 million — to non-critical buildings and “none” to critical buildings such as Building 332, where up to 500 pounds of plutonium are stored, “were exactly what we had expected,” Wagner claimed.

But Will Riggan of the anti-nuclear UC Nuclear Weapons Lab Conversion Group argued that the main lessons from the quakes are that the Livermore Valley faults definitely are active and are capable of producing temblors ten times stronger than those of last month.

Riggan contended that the “nature of the work” done at Lawrence on nuclear weapons research causes lab scientists and administrators to downplay the risks.

“They operate on a different cost-benefit analysis than we do...They believe the risks to us...are outweighed by this maintenance of security of the world by development of nuclear weapons of mass destruction,” he said.

Wagner said that however much more powerful a future quake might register on the Richter scale, it would produce at most only three times more actual shaking force on buildings as measured in percentages of G (a horizontal acceleration equal to the force of gravity).

Studies indicate critical buildings at the lab would survive the maximum shake without important damage, he said.

Wagner conceded that “no scientist can say he is 100 percent certain of everything. The world is complex.”

The risk is “not zero,” he said before quickly adding that the danger is “not far” above zero.

Wagner said the results from last month’s earthquakes added “another decimal point” in lab officials’ confidence.

The hearing’s hottest moments came when the board ruled that testimony from Friends of the Earth, another anti-nuclear group, would have to be limited because Riggan’s presentation had taken too much time.

Andrew Baldwin, legal adviser to Friends of the Earth, declared himself “outraged” at this, and wondered aloud whether board chairman Valerie Raymond wasn’t trying to quash criticism of the lab because her husband works there.

Raymond angrily responded that the fact that her husband works at the lab and that they live with their children only two miles from it caused her, if anything, to cast a sharper eye on safety factors at Lawrence.

Raymond said that her independent review of the lab has made her “personally quite satisfied that the level of risk is small.”

Baldwin told the press that Friends of the Earth had intended to have two independent licensed structural engineers testify that their analysis of Building 332 found it less earthquake proof than a typical elementary school.

He also pointed out that the lab’s engineering studies of the building were conducted by “in-house” personnel, none a licensed structural engineer.

Lawrence engineer F. J. Tokarz, who coauthored a just released 65-page report on “Seismic Safety of the L L L Plutonium Facility,” called the elementary school parallel “nonsense.” He said Building 332 is “safer than all schools.”

Tokarz also contended that civil engineers are generally as capable as structural engineers in evaluating a building’s earthquake resistance. He noted that five Lawrence engineers had spent years studying the matter.

The anti-Lawrence groups were trying to persuade the board, which has no direct power over the federal lab, to go on record as recommending, as Riggan put it, closure of the lab and “moving nuclear material out of earthquake country and forever.”

Last year Supervisor John George proposed a similar resolution to the board, but it died for lack of a second after the board held a similar public hearing last June.

The board yesterday again took no action, and scheduled no further hearings on the matter.