Quake rattles Livermore lab

These days it seems as if every major earthquake is remembered for some reason or another, even if it causes no fatalities. The November quake in California's Imperial Valley, for example, furnished the best records yet of how an earthquake-engineered building rides out a temblor (SN: 11/3/79, p. 310).

And the series of quakes that rumbled through northern California beginning Jan. 24 will be remembered as the ones that shook up Lawrence Livermore Laboratory. The magnitude 5.5 quake on Jan. 24 did an estimated $1 million damage to the laser fusion projects at the federally owned laboratory and forced the evacuation of about two dozen employees. But many feared it would be worse. Stored plutonium for nuclear weapons research and the small research reactor at the laboratory 40 miles northeast of San Francisco have prompted protests about the safety of the facility since nearby faults were reevaluated in the late 1970s and found to be active.

The quake is also notable seismologically. According to researchers at the U.S. Geological Survey in nearby Menlo Park and at the University of California at Berkeley, the initial shock was actually a multiple earthquake, similar to the much larger 1964 Alaska quake. Bill Bakun of the USGS explained that the record, though complicated, seems to show at least three quakes that make up the initial magnitude 5.5 event. At least 100 aftershocks followed in the hours after the main quake, and more than ten were measured above magnitude 4.0, he said. On Jan. 26, a second major quake rattled the area and was pegged at magnitude 5.6 by the researchers at Berkeley. Unlike the initial event, however, this quake was not followed by rapid aftershocks. The researchers are choosing to call the string of shocks an "earthquake sequence" because it does not follow the usual pattern of a large quake followed by smaller aftershocks. Bakun says this pattern, and the multiple initial shock in particular, is not remarkable for much stronger quakes but is unusual for magnitude 5 events.

The "earthquake sequence" occurred on the north-south lying Greenville fault, which runs parallel to and east of the San Andreas fault. According to Bakun, the quake ruptured a part of the fault that showed no previous signs of activity. Berkeley researchers found evidence for three inches of horizontal movement along an eight-mile stretch of the fault from 12 miles north of the town of Livermore to 4 miles north. Despite rumors that this might defuse "the big one", Berkeley seismologist Bruce Bolt says the series does not hasten or delay the likelihood of a magnitude 7 or greater quake within the next decade. A quake of this size is not large enough to relieve the strain on the nearby San Andreas fault, he says. "All we can say is the fact that it occurred is evidence that there is strain in California," says Bakun.

But it was the first quake since 1906 to sway buildings in San Francisco and it was felt as far away as Reno, Nev., 200 miles to the east. About two dozen persons were reported injured and a highway was closed after it sank six inches.

The damage that attracted the most attention, however, was at the Livermore laboratory. Spokesperson Linda Curry assured that the buildings that house radioactive and toxic substances and the research reactor "came through beautifully." Those buildings, she said, have been built or reinforced to withstand a magnitude 6.5 quake and ground motions of .5 to .8 g. (one g is equal to the acceleration due to gravity — 32 ft/sec^2 — so .5 g would be a horizontal acceleration equal to 50 percent of that of gravity.) The laser fusion experiments, Shiva and the smaller Argus, did not fare so well. Bolts on Shiva's support structure sheared and the optical components and the rollers that allow the structure to expand and contract with heat were damaged. Both projects will require extensive cleaning and a one-month shut-down. In addition, the quake triggered a leak in a container that holds tritium-contaminated water from laboratory experiments. The radioactivity is within limits for dumping in a sewage system, Curry said, and the leak has been stopped. □

Basic black is just as cool

Ever wonder why Bedouins wear black instead of white robes in the face of the hot Sinai sun? Amiram Shkolnik of Tel Aviv University and Richard Taylor and Virginia Finch of Harvard University did. They made measurements in the sun and found, as expected, that black robes absorb more radiation than do white robes, that the surface temperature of black robes is higher than that of white and that the inward flow of heat is greater through black than through white robes.

But the amount of heat gained by a Bedouin in the hot desert sun is the same in a black as in a white robe, the researchers report in the Jan. 24 NATURE. Why? Enhanced convection caused by warmer air beneath the black robe, they suggest, carries the heat away before it reaches the skin. Greater convection might even make a black robe feel more comfortable than a white robe. The Bedouins probably knew this all along. □

Nature

Miscarriages and 'DES daughters'

A new chapter is being added to the diethylstilbestrol (DES) story as an increasing number of daughters of women who took DES during pregnancy approach their reproductive years. The synthetic hormone DES, once thought to prevent miscarriages, was taken by as many as two million pregnant women between 1945 and 1955. Now, preliminary studies indicate that "DES daughters" may face an increased risk of miscarriage or premature delivery when they become pregnant.

Larry Cousins and co-workers at the University of California in San Diego, whose study recently was accepted for publication in OBSTETRICS AND GYNECOLOGY, compared the reproductive capability of confirmed DES daughters with that of a control group. Cousins found no significant difference between DES-exposed women and the unexposed (or control) group in the number of pregnancies terminated during the first half of gestation. However, 40 percent of the DES-exposed group with pregnancies lasting beyond the midpoint of gestation had premature babies and 25 percent of those babies died. The unexposed group had no premature births or infant deaths among the women whose pregnancies continued beyond the midpoint of gestation. So, DES exposure seemed to be associated only with late pregnancy complications, Cousins explains, a phenomenon that may be due to a weakened cervix or to the contour of the uterus in DES daughters.

Cousins collected his data from questionnaires. Recognizing the possibility of "subject selection bias," he included the number not answering the questionnaire in the total study population, without increasing the incidence of premature deliveries. The results still showed a significant difference in premature deliveries between DES-exposed and unexposed groups.

Interestingly, Cousins found no difference between the exposed and unexposed groups in family history of pregnancy loss. Apparently, many of the DES mothers had not been given the drug because of repeated miscarriages but rather because of insignificant vaginal spotting.

Cousins warns that his study has resulted in only "preliminary information." It will be at least several years, he says, before the final lines of this latest chapter to the DES story are written. □