



Nevado del Ruiz, in the Colombian Andes, erupted Nov. 13, 1985, setting off mudflows that killed more than 22,000.

in volume than the largest blast of Mt. St. Helens in 1980. But the lahars made it the second-worst volcano disaster of the century. (The worst was the 1902 eruption of Mt. Pelée in Martinique, in which 28,000 died.) Hot ash and gravel seared about 10 percent of the mountain glacier. Melted ice flooded down, gathering dirt and rubble on its way. In three hours, the towns of Armero and Chinchiná were washed out.

Ruiz then was quiet until late April, when seismic activity began to increase. On May 4, there began a series of harmonic tremors that lasted until June 14. On June 15 and 16, the tremors were replaced by a swarm of small earthquakes. On June 17, the tremors resumed.

It's difficult to tell exactly what the latest seismicity means, because it did not occur the same way last fall. Rumbling before the September eruption lasted only a week, according to David Harlow of the U.S. Geological Survey (USGS) in Menlo Park, Calif. Between Oct. 1 and Nov. 11, there was little seismicity. Tremors began again only two days before the Nov. 13 eruption.

Recent changes in the mountain's shape are puzzling as well, because there are few comparison data. Deformation measurements were taken for only one month before the November eruption. "We should have started measuring a year and a half ago so we would know how much the magma store grew before it erupted," says Norman G. Banks of the Cascades Volcano Observatory in Vancouver, Wash., who is project chief of the USGS team studying Ruiz. "We don't know if there is a much larger amount there still to be tapped." Generally, the more magma present, the more volcanic activity expected.

Some scientists have speculated that the lahars could be worse next time because they can flow through fresh, clean pathways. On the other hand, the ash layer from November might protect the ice cap from melting as quickly next time. Ultimately, the lahars will be determined by the size of the eruption, which scientists cannot predict, Harlow says.

As scientists study signs of eruption, Colombian government and Red Cross

officials try to persuade mountain residents to move. "Some insist on staying where they are, and some wait for government promises that they will be given other homes," Meyer says. Once the people are resettled, he adds, they are likely to stay away for years, until Ruiz completes its volcanic cycle. — *M. Murray*

Blitzing to win at computer chess

It took more than speed and processing power to win the world computer chess championship this week in Cologne, West Germany. After its first two games in a five-game tournament, CRAY BLITZ, the defending champion, was in trouble. It had just lost a game to a lightly regarded opponent. But a mid-tournament correction—the removal of four lines in a 28,000-line computer program—saved the day and the title. CRAY BLITZ became the first program in the tournament's 12-year history to repeat as world champion.

In the tournament, four of the 23 competing chess computers finished at the top with identical 4-win and 1-loss records. CRAY BLITZ won the championship over Hitech, BEBE and Sun Phoenix in a tie-breaking scheme.

CRAY BLITZ's initial problems stemmed from four lines that program developer Robert Hyatt, a graduate student at the University of Alabama in Birmingham, had inserted after testing some parts of his program on a VAX minicomputer and finding an apparent weakness in the way the computer evaluated pawn movements. But when the modified program was run on a CRAY supercomputer, which is fast enough to allow a much deeper search than a VAX, the effect was not unlike "putting glue on the bottoms of all the pawns," says Hyatt. That change probably led to the losses at last year's North American computer chess championship (SN: 10/26/85, p.260) and in this tournament.

But after the offending lines were removed, CRAY BLITZ started playing like a world champion again. "The difference in its play was striking," says Hyatt. The program swept through its next two games and seemed ready for its climactic match with favored Hitech, developed by Hans Berliner and his colleagues at Carnegie-Mellon University (CMU) in Pittsburgh.

The match took more than six hours. After about 60 moves, Hitech finally resigned. "We could feel it slowly slipping away," says CMU's Murray Campbell. But, he adds, "we're looking for our revenge in Dallas." That's where the North American computer chess championship will be decided in November.

— *I. Peterson*

OSHA tightens asbestos rules

New federal regulations intended to reduce the risk of death and disease from exposure to asbestos by 90 percent have received mixed reactions from labor and industry. The regulations were announced last week by the Occupational Health and Safety Administration (OSHA) and are scheduled to go into effect next month.

According to OSHA, the reduced risk derives directly from a 90 percent reduction in the acceptable level of asbestos exposure, from 2 fibers per cubic centimeter (f/cc) of contaminated airspace to 0.2 f/cc—more than the 0.1 f/cc level wanted by labor and less than the 0.5 f/cc level wanted by industry. Covering 1.3 million U.S. workers exposed to the cancer-causing fiber, the OSHA regulations for the first time specifically protect construction workers, who encounter asbestos in the renovation and demolition of old, asbestos-ridden buildings and who therefore suffer the highest risk of exposure. Under the new regulations, all workers must receive training in working safely with asbestos and must wear protective masks in regulated areas.

But "no mask is 100 percent safe," argues Jack Keane, safety officer for the Washington, D.C.-based International Association of Heat and Frost Insulators and Asbestos Workers. According to Keane, workers frequently take off their masks in contaminated areas, inhaling dangerous quantities of asbestos. Robert Percival of the Environmental Defense Fund in Washington, D.C., agrees: "OSHA's own inspection standards show quite high rates of violations of using the respirators."

Industry representatives, however, say the construction trades already adequately regulate worker exposure to asbestos. "In the renovation business, we've been doing it for a long time," says Dennis Bradshaw of the Associated General Contractors of America, based in Washington, D.C. The real problem of the new regulations, he says, is that they fail to recognize the variety of jobs encountered in construction. "They become a waste of time and money without any real benefit to the worker who isn't exposed to asbestos," he says.

Union leaders and environmentalists argue that no level of exposure to asbestos is safe and that the stricter regulations are only a stopgap measure. "The only way to protect the public," says Percival, "is to do what the Environmental Protection Agency [SN:2/1/86,p.70] is trying to do: Phase out asbestos products completely." — *T. Kleist*

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