

Newsbulletin June 25, 1982

New evidence in carbonized logs . . .

Unprecedented blasts formed Jemez caldera

They are the deadliest of volcanoes, so awesome that the French coined a descriptive phrase: *nuée ardente*—glowing cloud. They are ash eruptions such as Vesuvius poured forth in A. D. 79 to suffocate the citizens of Pompeii and Mount Pelee produced in 1902 when 30,000 people died on the island of Martinique.

Now, new evidence has been found for the age and destructive force of an "ash volcano" in New Mexico that erupted so violently 1.4 million years ago that it collapsed upon itself, forming the Jemez caldera (depression), one of

the largest in the world.

"It was an unprecedented series of blasts," Don Potter, visiting scientist at the Laboratory says, "much more voluminous than the recent Mount St. Helens eruptions."

Potter is chairman of the geology department at Hamilton College, N.Y., on a sabbatical at the Laboratory to study the Bandelier tuff, an enormous apron of volcanic ash and pumice spewed from the volcano that created the caldera, 35 miles northwest of Los Alamos.

Potter has painstakingly plotted the directional flow of pumice in the ash-flow tuff,

which was forced from the earth and carried for miles down the volcano's flanks, and plans to return to the Laboratory to finish mapping the phenomenon. During his investigation, he stumbled across a pumice quarry in Guaje Canyon, near Los Alamos, where quarry operator Eloy Baros told him about finding "pumice with oil in it." His curiosity piqued, Potter scouted the area and found a dozen sites where trees, toppled and moved for miles by the force of the volcanic eruption, were carbonized.

Potter believes the carbonized logs are the first

such objects reported from the ancient eruption. Their condition and age confirm the time and explosive effect of the volcano.

"These friable charcoal logs, when wet, oozed a black substance very much like crude oil," Potter said. Significantly, the trees had the same directional flow as the pumice—both were moved by the same force at the same time.

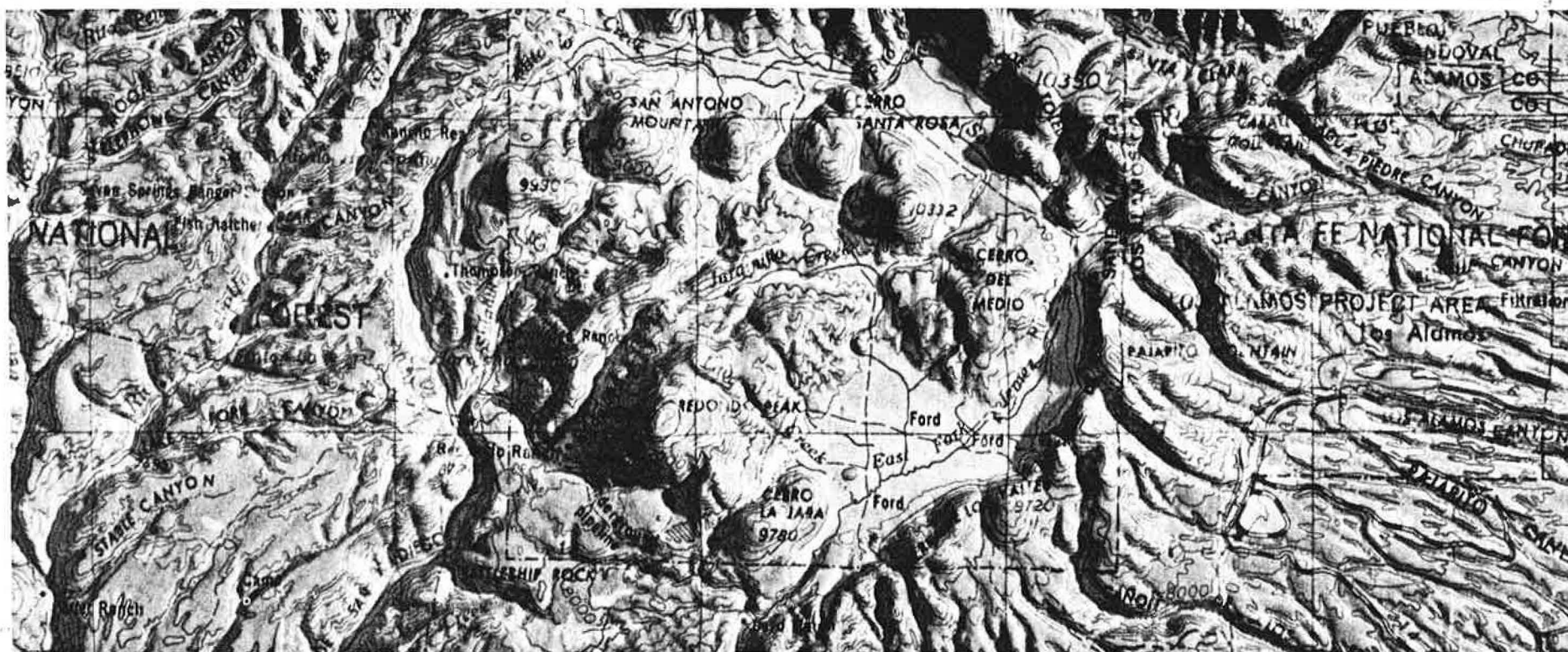
"We will do some work to see what kind of trees these were, when they were alive," Potter said. "We know that they were growing on the flanks of a 12,000-foot moun-

tain before it erupted, and we also know that they were carried downslope by a glowing avalanche almost one and a half million years ago. The trees are too old for carbon dating."

(Carbon-14 dating is a method of determining the approximate age of an object based on the radioactive decay of an isotope of carbon. This charcoal no longer has measurable amounts of carbon-14 isotopes.)

Potter describes the distinctive geology of northern New Mexico, shaped by the ancient volcanic action and by

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Violent eruption of an "ash volcano" created the vast Jemez caldera shown on this three-dimensional map. Los Alamos is on the Pajarito Plateau at the lower right corner.

Unprecedented blasts formed caldera . . .

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subsequent eruptions, as "fascinating." The caldera created by the major eruption is about 16 miles across and dotted with domes and extrusions from later events.

"What you are seeing, as you travel in these mountains, is a layer of white pumice rock laid down by the force of the explosion, then the pinkish, clindery rock (compressed

ash) that flowed for miles down the slopes, like a glowing, tormented river," Potter said. "The volcano erupted after 10 million years of underground activity and outpourings."

Smaller particles of ash from the volcano traveled for hundreds of miles on easterly winds and have been identified as far away as Kansas and Oklahoma. The heavier

ejecta, a tide of gaseous, incandescent materials, snuffed out all life and vegetation before solidifying into "tuff," the distinctive volcanic rock that blankets this region.

In May, 1981, another visiting scientist at Los Alamos, this one from West Germany, reported on a year-long experiment that appeared to have mapped the magma

chamber beneath the Jemez caldera. Gerhard Suhr said the chamber had a radius of up to 12.5 miles and was still probably in a partial melt, with the magma contained in a matrix of fissures and fractures of in dike-like sheets.

Potter believes the most recent activity in the caldera was about 40,000 years ago and that there still could be activity

within its 16-mile span, but "not anything that approximates the flows that carried these trees such distances."

During his sabbatical, Potter has been attached to the Geology group (ESS-1), sponsored and supported by the Associated Western Universities, as a visiting Los Alamos staff member.

—Public Affairs Office

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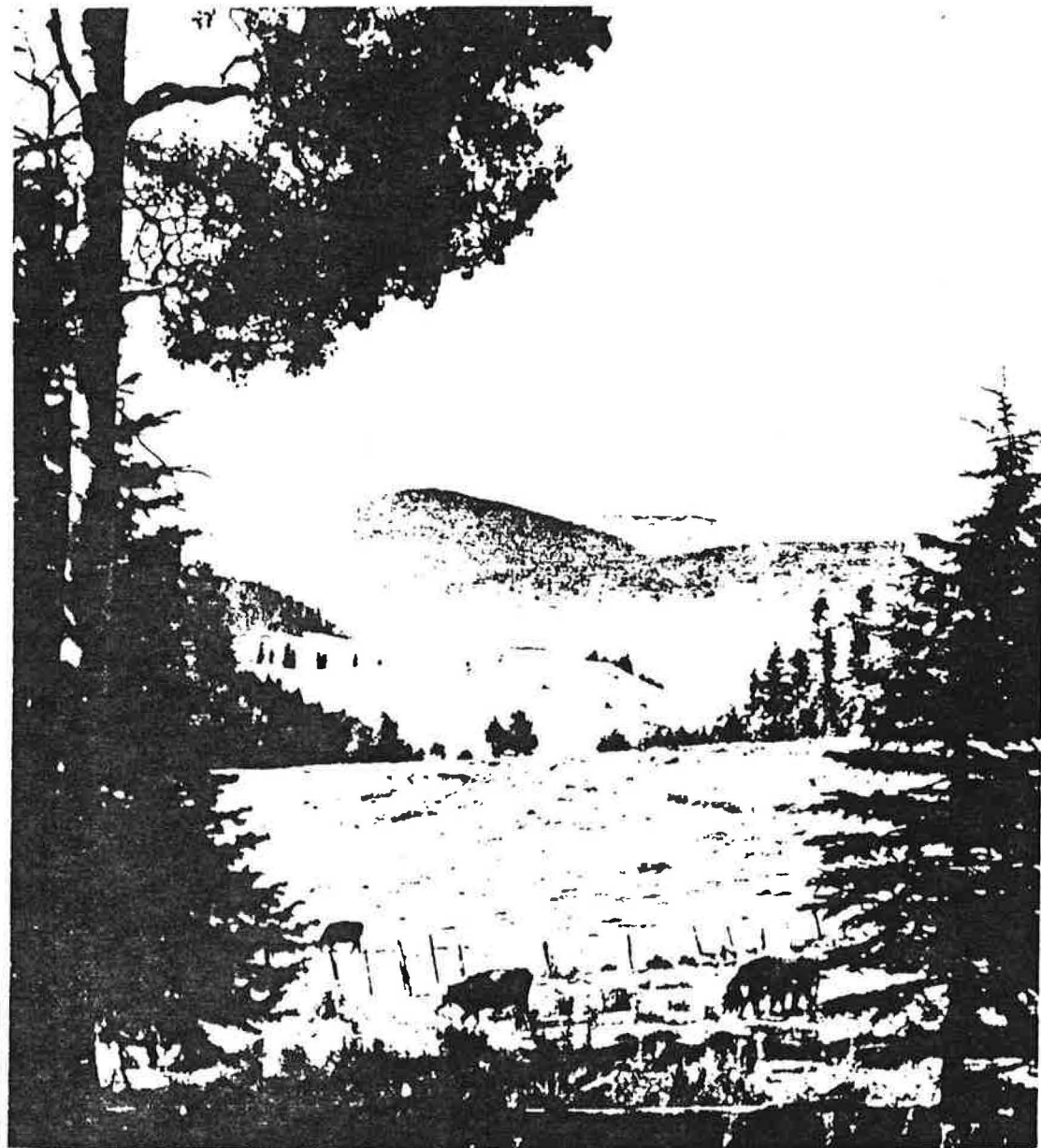
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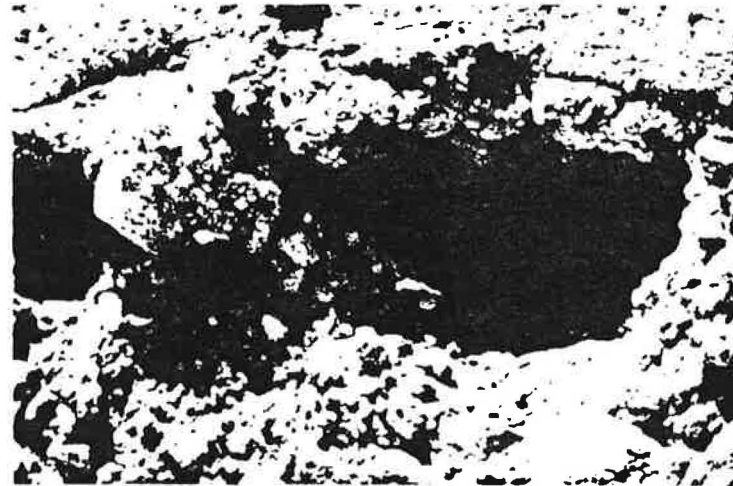
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The Valle Grande occupies the southeastern portion of the Jemez caldera. This view looks into the Valle's vast expanse from the southwestern crater rim near the entrance to Del Norte pass.



A tree, toppled and carried for miles by a volcanic ash flow 1.4 million years ago, is now charcoal in this hole near a pumice quarry in Guaje Canyon. About a dozen such trees have been located by a Laboratory visiting staff member, Don Potter, who believes the logs are the first carbonized objects reported from the ancient eruption.



Much of the distinctive beauty of northern New Mexico is drawn from formations such as this. Pumice, laid down by the violent eruption of an ash volcano in the Jemez Mountains 1.4 million years ago, is sandwiched between massive layers of ash-flow tuff. Weathering and erosion carves the material into scenic displays.