



AUTHOR M. E. Yount and T. P. Miller

AFFILIATION U.S. Geological Survey

ADDRESS 4200 University Dr., Anchorage, AK 99508

TELEPHONE (907) 561-1181

TITLE: Hazard Implications of the 1983-84 Eruption of Mount Veniaminof, Alaska

### ABSTRACT

Mount Veniaminof is a large andesitic stratocone, 765 km south of Anchorage on the Alaska Peninsula, that has an ice-filled, 8x11-km summit caldera and an historically active intracaldera cone. Previous eruptions of Veniaminof were reported in 1838, 1852, 1874, 1892, 1930, 1939, and 1956. The villages of Perryville, Ivanof, and Chignik Lake, along the Pacific coast, are within 40 km of the volcano, but only Perryville is directly downslope.

The 1983-84 eruption began in June 1983 and lasted through April 1984, with a possible hiatus from mid-August to early October. The eruption was characterized during the first two months by strombolian bursts of ash and glowing lava. Later, lava flowed down the south side of the active intracaldera cone, and ash emission decreased. Initial subglacial melting and subsequent meltback of the margin of the glacier by lava flows resulted in a meltwater lake in a steep-walled, 120-m-deep, 2x0.9-km ice pit. Lake water drained along the caldera floor through subglacial tunnels in the ice-pit wall. By October 1983, the lake had diminished to a pond, and lava flows from the cone had covered the floor of the ice pit.

Other historical eruptions have probably been from the same vent area as the 1983-84 eruption and were probably similar in character. The 1939 eruption, however, was somewhat more violent. "Flames and smoke" were visible as much as 240 km away. Two to five cm of ash reportedly fell over a 48-km radius, probably increasing turbidity and snowmelt run-off of streams. Perryville residents were evacuated by Coast Guard cutter.

One of the principal hazards from an eruption of Mount Veniaminof is a jökulhlaup (or outbreak flood) of water from melting of the intracaldera glacier. During the 1983-84 eruption, approximately  $0.15 \text{ km}^3$  of ice melted, presenting the possibility that subglacially ponded water could be catastrophically released from the caldera. A southward-directed jökulhlaup could flow toward Perryville, possibly endangering life and property. The entire south rim of the caldera is ice covered, masking any breaches of the wall that would provide the most likely paths of outbreak. Analysis of vertical air photographs and synthetic-aperture radar (SAR) imagery indicates that the south rim is unbroken except for an east-facing breach south of Slim Glacier. A jökulhlaup through this breach would go down a drainage system into the Pacific Ocean 17 km east of Perryville; thus, Perryville would not be endangered. A jökulhlaup toward Perryville could still be generated through an undetected breach of the south rim that would allow release of trapped intracaldera water southward, or by an eruption outside the caldera beneath the south flank ice field.

Principal hazards presented by future eruptions of Mount Veniaminof thus consist of airborne ash and possible jökulhlaups.

