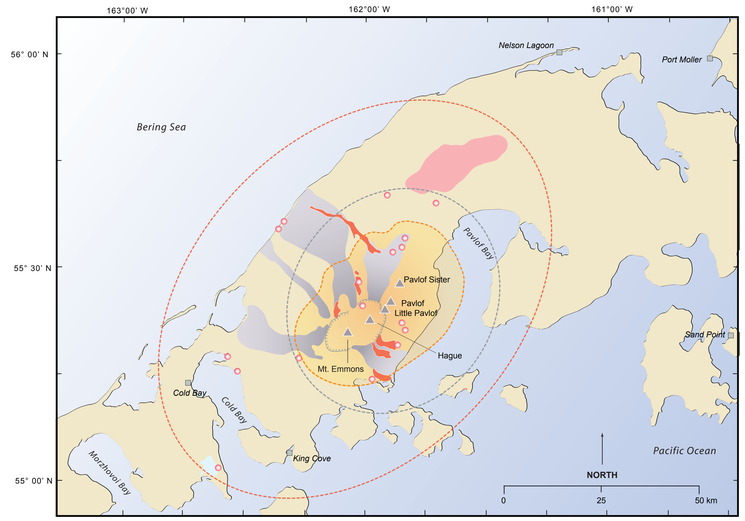
U.S. DEPARTMENT OF THE INTERIOR
U.S. GEOLOGICAL SURVEY

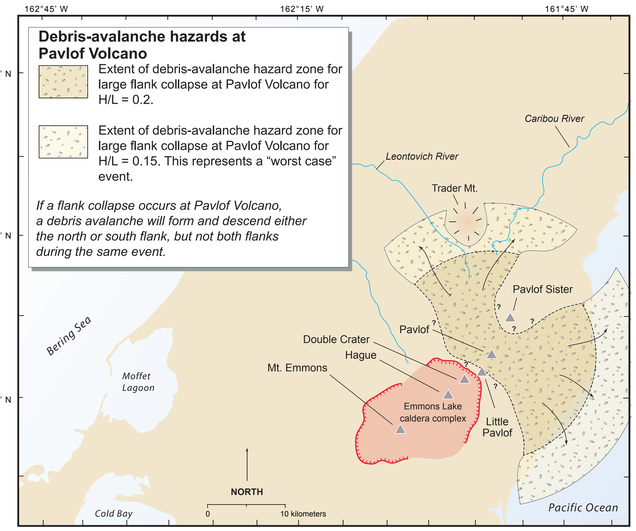
SCIENTIFIC INVESTIGATIONS REPORT 06-5248

PLATE 1



Pyroclastic flow, surge, and blast hazards

- Extent of 26 ka pumiceous pyroclastic-flow deposits forming surface mantle over glacial moraine
- Outcrops and localities where 26 ka pumiceous pyroclastic-flow deposits are present
- Extent of welded tuffs of Quaternary age
- Major river valleys and lowland areas that would be inundated by dense, ground-hugging proclastic flows erupted from Emmons caldera
- Approximate extent of severe hazard zone for large, caldera-forming eruption
- Approximate extent of hazard zone for moderate to large eruptions from stratocones within the Emmons Lake volcanic center based on H/L = 0.15
- Approximate extent of hazard zone for area that could be affected by directed blast. This hazard zone boundary represents a worst-case condition for the Emmons Lake volcanic center.



Debris-avalanche hazards at Pavlof Volcano

- Extent of debris-avalanche hazard zone for large flank collapse at Pavlof Volcano for H/L = 0.2.
- Extent of debris-avalanche hazard zone for large flank collapse at Pavlof Volcano for H/L = 0.15. This represents a "worst case" event.

If a flank collapse occurs at Pavlof Volcano, a debris avalanche will form and descend either the north or south flank, but not both flanks during the same event.

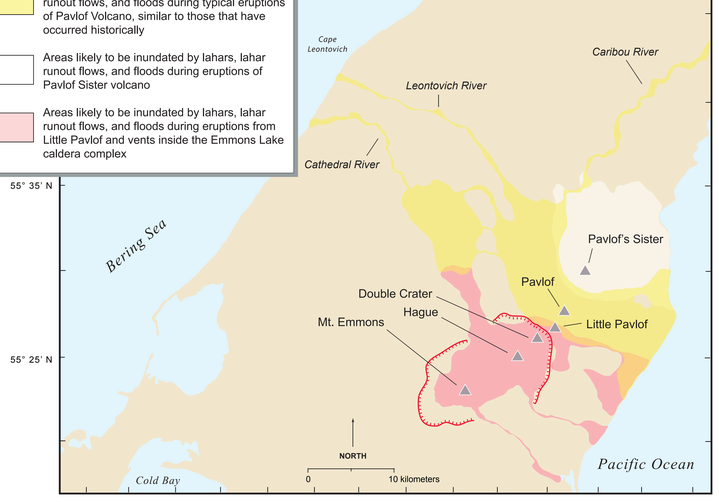
Ash Fallout Hazards

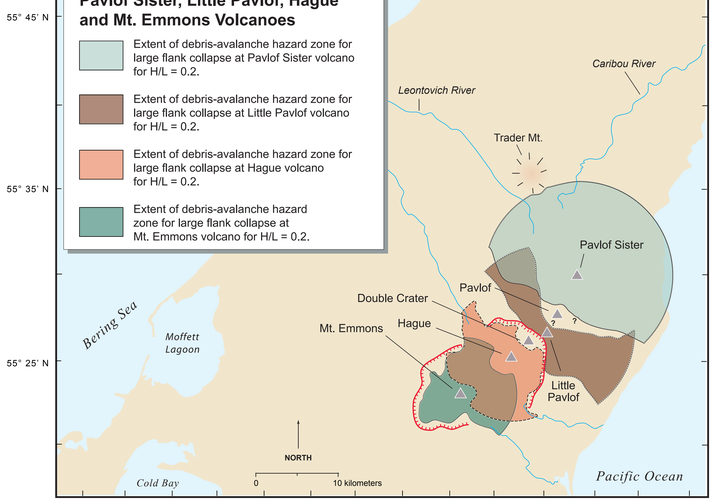
- Areas likely to receive ash fall during eruptions similar to the largest historical eruptions
- Areas that could receive ash fall during moderate sustained eruptions
- Areas that could receive ash fall during large sustained eruptions

The hazard zone for volcanic ash is likely to be similar to the extent of ash fallout of recent eruptions of Pavlof Volcano. The specific area of ash fallout depends on the prevailing winds, which are generally from the west. Ash plumes could rise to 15 km (50,000 ft) altitude or more and would drift down-wind as ash clouds for days to weeks following an eruption. Drifting clouds of volcanic ash would be hazardous to all aircraft in areas downwind from the volcano.

Lahar, lahar runout, and flood hazards

- Areas likely to be inundated by lahars, lahar runout flows, and floods during typical eruptions of Pavlof Volcano, similar to those that have occurred historically
- Areas likely to be inundated by lahars, lahar runout flows, and floods during eruptions of Pavlof Sister volcano
- Areas likely to be inundated by lahars, lahar runout flows, and floods during eruptions from Little Pavlof and vents inside the Emmons Lake caldera complex





Debris-avalanche hazards at Pavlof Sister, Little Pavlof, Hague and Mt. Emmons Volcanoes

- Extent of debris-avalanche hazard zone for large flank collapse at Pavlof Sister volcano for H/L = 0.2.
- Extent of debris-avalanche hazard zone for large flank collapse at Little Pavlof volcano for H/L = 0.2.
- Extent of debris-avalanche hazard zone for large flank collapse at Hague volcano for H/L = 0.2.
- Extent of debris-avalanche hazard zone for large flank collapse at Mt. Emmons volcano for H/L = 0.2.

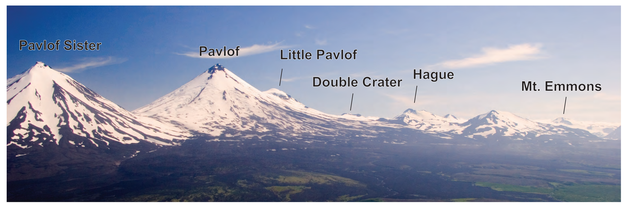
Probability of eruptive activity for main vents in the Emmons Lake volcanic center

Type of activity	Hazards	Relative Event Probability for Main Eruptive Vents: Mt. Emmons	Mt. Hague	Double Crater	Little Pavlof	Pavlof	Pavlof Sister	Cinder cones
Eruptions involving water (phreatic eruptions)	Ballistic particles, pyroclastic surges, tephra fall	Low	High	Moderate	Low	Low	Low	Low
Strombolian eruption	Tephra fall, ash clouds, pyroclastic flow and surge, lahar, lava flow	Low	Moderate	Low	Low	High	Moderate	Moderate
Plinian eruption	Tephra fall, ash clouds, pyroclastic flow and surge, lahar	Low	Low	Low	Low	Low	Low	Low
Caldera-forming eruption	Extensive pyroclastic flows, tephra fall	Low	Low	Low	Low	Low	Low	Low

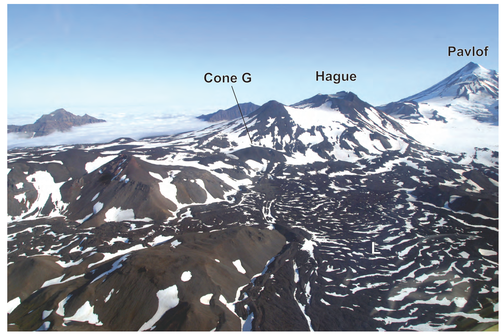
NOTE ABOUT VOLCANO HAZARD-ZONE BOUNDARIES

The preliminary hazard-zonation map indicates generalized hazardous areas associated with future eruptions of the Emmons Lake volcanic center. Also indicated are areas at risk from various volcano-related events such as debris avalanche and lahar that may not be related to an actual eruption. Pyroclastic eruptions are likely to initiate lahars and floods and will probably result in variable amounts of ashfall. Debris avalanches are uncommon at this volcanic center and are unlikely to be significant hazards. A large flank collapse from Pavlof Volcano could enter the Pacific Ocean, but it is unlikey to initiate a tsunami.

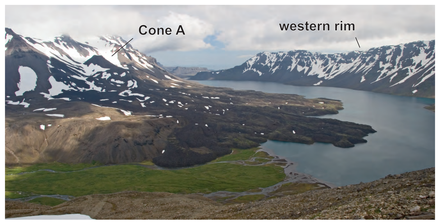
The hazard-zone boundaries do not indicate a major change in the degree of hazard, but are generalized approximations based on known deposits and eruptive characteristics of similar volcanoes. The degree of hazard generally decreases in a downvalley direction and as height above the valley floor increases.



Major volcanoes of the Emmons Lake volcanic center. View is to the southwest. Photograph by C.F. Waythomas, August, 2005.



Vents within the Emmons Lake volcanic center most likely to erupt in the near future are Pavlof Volcano, the most historically active volcano in Alaska, Mt. Hague, and Cone G. The fresh-appearing morphology and active hydrothermal system on Mt. Hague indicates that the volcano has been active somewhat recently, although it has had no known eruptions in about the past 300 years. Cone G has produced at least five lava flows (L) of Holocene age. Photograph by C.F. Waythomas, August 2001. View is to the northeast.



Young lava flows erupted from Cone A terminating in Emmons Lake. During the past 5-10,000 years, eruptions within the Emmons Lake caldera have been primarily effusive, lava producing events. The lavas are basaltic to basaltic andesite in composition and move relatively slowly when they are emplaced and are generally not hazardous. However, some explosive activity may occur during cone construction and tephra fallout and ballistic particles could be produced. The ridge in the upper right is the western rim of the Emmons caldera complex.

PRELIMINARY VOLCANO-HAZARD ASSESSMENT FOR THE EMMONS LAKE VOLCANIC CENTER, ALASKA

by
Christopher F. Waythomas, Thomas P. Miller, and Margaret T. Mangan