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TITLE: The 1986 Activity of Mt. St. Augustine: Volcanic Hazards in the Cook Inlet Basin.

ABSTRACT

Following a period of 8 months of precursory seismic activity, Mt. St. Augustine, an island volcano in the eastern Aleutian arc, burst into violent eruption shortly after midnight on March 27, 1986. The 1986 eruption can be divided into 3 phases. The explosive main phase from March 27 to April 8 produced eruption columns exceeding 10 km in height in the first 4 days, widely dispersed regional ash falls, intense pyroclastic flow activity, and lahars from melting snow. The second phase from April 23 to 28 was much less violent (plumes reached about 4 km) and was characterized by dome growth, Merapi-type pyroclastic flows and extrusion of an about 1.5 million m^3 andesitic lava flow. After a hiatus of 4 months, the third phase, from August 10 to early September, involved renewed dome growth, extrusion of a spine and more Merapi-type pyroclastic flow activity.

Historic eruptions of Augustine have followed the same general pattern. Eruptive volumes (0.1-0.3 km^3 condensed magma) and magma chemistry (SiO_2=56-63%) have been similar for all of the historic eruptions. None of the historic eruptions have lasted more than 1 year. Eruptions have all involved pyroclastic flows, extensive tephra falls, and dome emplacement. The 1883 eruption was different; it began with a major edifice collapse that triggered a tsunami which affected the lower Cook Inlet shorelines. Offshore bathymetry indicates that this type of event has repeatedly occurred during the Holocene.

The 1986 eruption of Mt. St. Augustine provided an opportunity to evaluate a volcanic hazard assessment made prior to this event (Kienle and Swanson, 1980). Studies of events during other historic eruptions of Mt. St. Augustine (1883, 1935, 1963-64, 1976) were used for our volcanic hazard assessment. Hazards experienced during the 1986 eruption were well-described by this study.

A very high risk zone covers all of Augustine Island and a wedge-shaped zone offshore to the north and northeast, which is the direction of a breach in the summit crater. Pyroclastic flows extended down the north flank of the volcano all the way to the sea. Volcanic gas emissions and heavy tephra falls created a very high hazard anywhere on the island. Fishermen working offshore from the volcano did not venture into the high risk zone at the height of the pyroclastic flow activity.

Tephra falls in the moderate risk zone were low; less than 1 cm over lower Cook Inlet. A major concern during the eruption was the potential for a landslide-related tsunami, but none developed. Aircraft generally avoided the moderate risk zone during the eruption. However, a couple of incidents involving volcanic dust pitting windshields and contaminating hydraulic fluid were reported by aircraft flying through volcanic dust clouds.

Relatively small amounts of ash in the low risk zone around Anchorage caused some concern. Airlines voluntarily stopped operations in and out of Anchorage during the initial phase of the eruption. Concern for airborne volcanic dust in the Anchorage area prompted closing of some businesses and public services, but a real hazard did not develop and dust concentrations reached only 900 $\mu g/m^3$.

Later phases of the eruption related to dome growth have produced pyroclastic flows and ash accumulation on Augustine Island, but these events were of much lower intensity than the initial phase of the eruption. Hazards developed during the 1986 eruption of Mt. St. Augustine were within those limits defined by our earlier studies and we feel comfortable using these guidelines in predicting hazards associated with future eruptions.

1987 Geologic Hazards Symposium Agenda and Abstracts