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# THE VOLCANO LETTER

A Weekly news leaflet of the Hawaiian Volcano Research Association

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## KILAUEA REPORT No. 738

WEEK ENDING MARCH 3, 1926

Issued by the Observatory, U. S. Geological Survey:

T. A. Jaggar, Official in charge

The only volcanic event of note during the week was an earthquake that appears to have centered under Mauna Loa. At Halemaumau February 25, at 5 p. m., there was some rock sliding at the west. On March 1 at 3 p. m. there was an avalanche from the SW wall and the steam vents at the base of the south wall appeared to be yellowing with sulphur increasingly.

Ten local earthquakes were registered. One at 8:20 p. m. February 24 was accompanied by a deep booming noise and felt here, origin very near station. At 6:41 a. m. February 28 an earthquake generally felt on the island dismantled seismographs at Observatory and Kona and was perceptible more than 10 seconds at Kilauea. The shaking dislodged rock at Kapapala ranch which broke a water-pipe there and was the strongest felt there in two years.

Tilting of the ground at the Observatory was slight to the SSE.

J. C. Beam, topographic engineer at the station, has started surveys for a net of bore-hole locations on Kilauea floor, wherewith to determine the isothermal lines of surface temperature of the rock in the crater region by means of shallow drilling, and thermometer measurements.

## THE GAS VENTS OF THE KATMAI ERUPTION

In 1919 Allen and Zies of the Geophysical Laboratory studied the fumaroles at Katmai Volcano, Alaskan peninsula. (See Volcano Letter, No. 5; Technical Papers, National Geographic Society, No. 2, 1923, A chemical study of the fumaroles of the Katmai region by E. T. Allen and E. G. Zies). These gas craters at very high temperatures were mostly in the "sand-flow" of the eruption of 1912, and the following conclusions were reached:—

The vents are along deep fissures, with secondary characteristics, and temperature-pressure features partly unaccountable.

Temperatures range up to 650°C. The borders of the area are cooler.

Fumarolic activity is declining. Steam is about 99 per cent by volume of the gases, the remainder are hydrochloric acid, carbon dioxide, hydrogen sulphide, nitrogen, hydrofluoric acid and methane, with minor amounts of oxygen, carbon monoxide, argon and ammonia. Hydrogen was not determined apart from the sulphide. Sulphur dioxide was not detected. Fluorine as hydrofluoric acid occurs in amounts comparable with hydrogen sulphide and nitrogen, a quantity unheard of elsewhere.

The argon and nitrogen are largely atmospheric and the water largely from surface sources, as the fumaroles below the surface appear to be accessible to surface air and steam.

The water appears to have been vaporized and heated before it entered the fumaroles.

The heat is not from oxidation by atmospheric oxygen.

No combustible gases burn at the surface, and decrease of temperature downward in some places is due to hot lateral gas vents higher up.

Except for the soluble gases, no relation between temperature and gas composition was observed, and the Deville-Fouque' generalizations of a world-wide order of gas change with declining eruptivity, do not hold. T.A.J.

## THE GEYSERS, CALIFORNIA

Steam for power is being drilled for at "the Geysers" in Sonoma County. The hot areas extend along the side of a narrow canyon, repeated at intervals for six miles. No lava or igneous products are visible, and like the Larderello power area in Italy (Volcano Letter No. 32) serpentines are present, along with sandstones, schists and shales. At the Geysers drilling reaches sandstone at less than 100 feet depth. Close to the surface the temperature is 100 degrees Centigrade. "As cracks are cut by the drill the steam flow increases and the temperature rises rapidly 25° C. or more per 100 feet in the upper strata, and measurements show that water could not penetrate to any considerable depth without being vaporized." (E. T. Allen, Jour. Wash. Acad. Sci. p. 74, Feb. 4, 1926. Further evidence of the nature of Hot Springs.)

Small hot springs are frequent, often of high mineral concentration. Their maximum temperature reaches the boiling point for the elevation 98° C. The acid springs contain sulphates of amonium and magnesium, the alkaline ones carbonate, bicarbonate and sulphate. "The evidence shows that the volatile matter is derived from volcanic gases which are escaping from springs and fumaroles," the non-volatile matter coming from serpentine and other metamorphic rocks. Oxidation is shallow as shown by fresh pyrite in the drillings; the surface water cannot penetrate deeply.

Allen accounts for the phenomena "on the assumption that superheated steam and other volcanic gases are ascending from a hot batholith" or body of intrusive magma "through a deep crack in the overlying strata; that the steam is heating surface water by condensation, and the gases hydrogen sulphide and carbon dioxide through logical chemical changes are decomposing the superficial rocks." T.A.J.