

the active subcrater was filled with lava in the early stages but finally became a shallow pit floored with loose pyroclastic material. Its earlier rim, which separated it from the main crater floor on the east, was obliterated, and the foot of the east wall was buried.

The latest activity was similar to that described by Allen in the account of the 1948 eruption, and the crater now shows a return to the earlier conditions. The active subcrater on the southwest has again been deepened, and a rim of pyroclastic material has again been built up between it and the wide floor of the main eastern half of the summit. A difference has remained, however. The 1949 eruption apparently weakened the northwest rim and permitted small fumaroles to emerge on the outer slopes. During the winters since then a large patch outside the northwest rim has been observed to remain free of snow, due to the presence of warm ground.

References

1. ALLEN, L. R. ACTIVITY AT NGAURUHOE, APRIL-MAY, 1948. *N. Z. Jour. Sci. and Technol.* 30B: 187-193, 1948.
2. BATTEY, M. H. THE RECENT ERUPTION OF NGAURUHOE. *Rec. Auck. Inst. Mus.* 3(6): 387-395, 1949.
3. CLOUD, P. E. THE 1949 ERUPTION OF NGAURUHOE. *Sci. Monthly* LXXII, 4: 241-251, 1951.

ERUPTION OF MOUNT SPURR, ALASKA

By Ray E. Wilcox

Mount Spurr is the northeasternmost of a chain of many active volcanoes comprising the Aleutian volcanic arc. The explosive outbreak of Mount Spurr which took place early on July 9, 1953, was its first strong activity during the 200 years of recorded history of that area.

The eruption took place from an old ice-filled vent at an altitude of about 7,000 feet on the south shoulder of Mount Spurr. Reports of concurrent eruptions from other points on Mount Spurr and Mount Torbert appear to have been erroneous, as also do reports of eruption in the Lake Beluga-Mount Susitna area, 30 miles east of Mount Spurr, on July 10. The eruption was observed by Werner Juhle and Henry Coulter, of the U. S. Geological Survey, from July 11 to 14, and by the writer from July 12 to 27.

The earliest observations of the eruption were made by airplane pilots at 5:05 A.M., July 9, apparently only minutes after the initial outbreak. From a distance of 60 miles they noted the eruptive cloud rising through the overcast to a height of about 15,000 feet and a width of about $\frac{1}{8}$ mile, growing rapidly. By 5:25 A.M. the cloud had risen to the 30,000-foot level and had begun to mushroom. At 5:40 A.M. the mushrooming portion extended from an altitude of 32,000 feet to 60,000 or 70,000 feet, with an estimated diameter of 30 miles. Its stalk was estimated to have a diameter of about a mile. Electrical discharges were seen at intervals of about 3 seconds throughout the mushroomed portion. By 6:00 A.M. falling ash obscured the area below the expanded portion of the cloud, and the stalk was lost from sight.

A report by a pilot at 9:00 A.M. indicated that the ash still was erupting in large quantities and that the radius of the mushroom cloud had increased to 40 to 60 miles at 27,000 feet altitude. At noon the activity was greatly diminished, but at 3:30 P.M. moderately strong eruption had resumed and, apparently, continued through the afternoon and evening. On the morning of July 10 the vent was steaming only, but at 3:30 P.M. an especially strong surge of ash-laden steam rose to 20,000 feet. From July 11 to 14 the activity consisted of the liberation of moder-

ately large quantities of steam, with little or no ash. The intensity of the steam eruption in general diminished from day to day, with the exception of one stronger surge of steam and minor ash at 2:00 P.M. on July 13. This trend of gradually diminishing intensity continued through the rest of July.

No lava flows were produced during the eruption. Immense floods and mud flows did occur on July 9 or 10, however, the water for which no doubt stemmed from the melting of the ice in the crater and, possibly, from local torrential rains associated with the strong ash eruption. Thousands of cubic yards of debris of all sizes up to several yards in diameter were carried down the south flank of the mountain to pile up in the Chakachatna River and form a dam, behind which the water backed up for a distance of about 5 miles, nearly to Chakachamna Lake.

The huge ash cloud from the first surges of the eruption moved slowly eastward, and by 11:00 A.M. its leading edge had spread over Anchorage, 80 miles east of the volcano. Street lights in Anchorage came on automatically at 11:00 A.M., due to the increasing darkness, and by noon ash was falling abundantly, accompanied by a perceptible odor of gas. Complete darkness lasted from 1:00 to 3:00 P.M. Ash continued to fall through the remainder of the afternoon and evening, but by early morning on July 10 only a haze of dust hung over the area. No significant amount of new ash appears to have reached the Anchorage area after that. At Anchorage the measured thickness of ash ranged from $\frac{1}{8}$ to $\frac{1}{4}$ inch. In the Beluga Lake area the ash deposit may have ranged from 1 inch to several inches in thickness, judging from the large number of trees and bushes bent down by the load. On the southeast slope of Mount Spurr, Juhle found only a couple of inches of coarse debris. Westward the ash deposit thinned rapidly, and little or no ash could be seen on the snow a mile or two west of the active vent.

[Sometime in the last week of August, Dr. R. Werner Juhle, who made some of the observations of activity of Mount Spurr presented above, lost his life in Knife Creek in (the Valley of Ten Thousand Smokes) Katmai National Monument, Alaska. He had gone out alone from the base camp on a traverse planned to take several days. When he failed to return at the appointed time, an exhaustive search by planes and by men on foot aided by bloodhounds (flown up from San Francisco for the search) discovered his footprints leading up to and disappearing on the bank of a narrow, deep rapids of Knife Creek. His pack and exposure meter were found on the opposite bank of the rapids but prolonged search failed to find any further trace. Dr. Juhle, one of the outstanding recent graduates in geology from Johns Hopkins University, had done his Doctor's thesis on Iliamna Volcano, Alaska, and was engaged during the 1953 field season in the study of Katmai Volcano and the Valley of Ten Thousand Smokes as part of the co-operative investigation of Katmai National Monument by the National Park Service, Geological Survey, and other organizations.—H. A. Powers.]

J. P. EATON JOINS HVO STAFF

On September 15, Dr. Jerry P. Eaton joined the staff of the Hawaiian Volcano Observatory as Seismologist. Dr. Eaton has just completed his work for the degree of Doctor of Philosophy at the University of California, with a thesis on "The Theory of the Electromagnetic Seismograph." The thesis deals in large part with the response characteristics of Sprengnether seismographs, one of which is being operated at the Observatory's Uwekahuna station. Dr. Eaton is assuming charge of the seismological work, and most other geophysical work, of the Volcano Observatory.

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