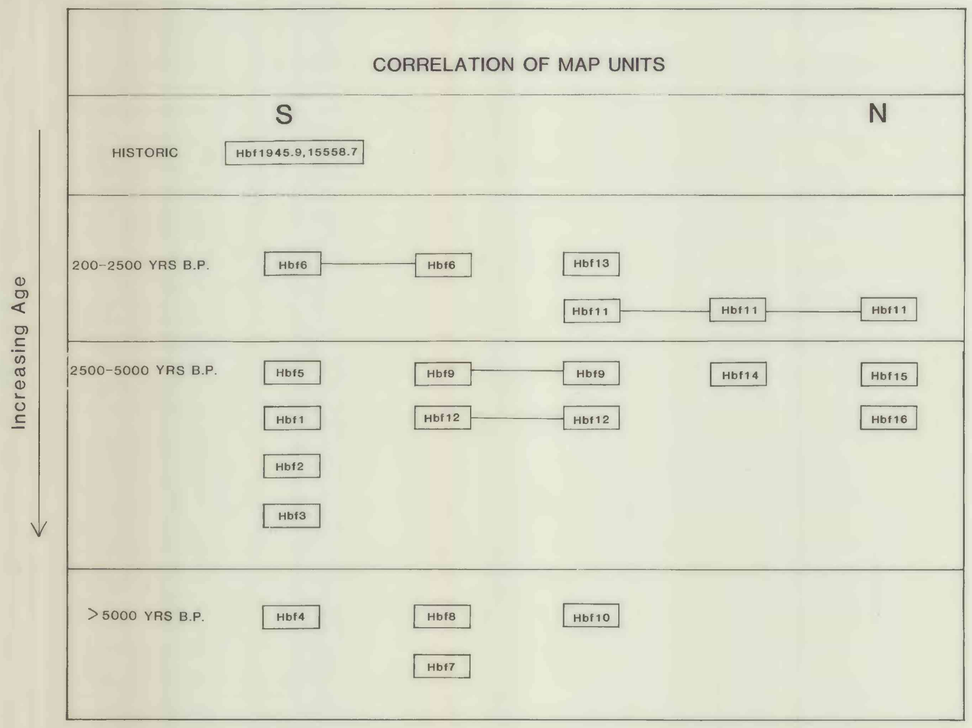
DEPARTMENT OF THE INTERIOR

U.S. GEOLOGICAL SURVEY

OPEN FILE REPORT

85-586



All known stratigraphic sequences for Keahole Point Quadrangle are presented vertically in the Correlation of Map Units. Flow ages increase as shown. Age relations among flows presented in different columns are unknown. For example, the age relation between Hbf6 and Hbf13 or Hbf6 and Hbf11 is unknown. Age relations have been inferred for flows in different age groups. Several flows are represented in more than one sequence; for emphasis, horizontal lines connect flows which are the same.

DESCRIPTION OF MAP UNITS

Map unit labels are interpreted as follows: The first entry, H, describes the Hualalai Volcanic Series of Hualalai Volcano (MacDonald,1949). The second entry describes the type of lava; b is alkalic basalt unless otherwise noted in the map unit description, and t is trachyte. The third entry is a morphologic description; f indicates a flow whereas v indicates vent deposits. The final entry is an identification number. Each flow not associated with a vent is described with a unique number. Flows associated with vents are described with the approximate latitude-longitude of the associated vent. Vent entries also include the approximate latitude-longitude of the vent. For example, Hbf1945.9,15558.7 describes a flow of alkalic basalt from Hualalai Volcano that issued from a vent at 19° 45.9' and 155° 58.7'.

Age assignments for all prehistoric map units are based upon surface morphology, presence of soil, and coastal expression. Younger flows usually form coastal deltas while erosion of older flows creates inlets. Note that map patterns distinguish age groups.

HISTORIC UNIT

Hbf1945.9,15558.7 Historic 1801 HueHue lava flow located at the northern boundary of quadrangle near Keahole Point Airport. Phenocryst mineralogy varies depending upon location. Distal flow phenocryst mineralogy is 4-6% olivine, 0-1% plagioclase, and 0-1% clinopyroxene. Vent deposits and proximal flow have 0-2% olivine phenocrysts. Flow is chiefly pahoehoe. Chemical analyses of this flow are presented in Clague et. al. (1980).

YOUNGEST PREHISTORIC UNITS (200-2500 YRS B.P.)

Hbf6 Lava flow located adjacent to and north of Hbf5. Phenocryst mineralogy is 4-7% olivine, 0-1% plagioclase, and 0-1% clinopyroxene. Chiefly aa. A distinctive paleomagnetic direction for Hbf6 suggests the flow is approximately 2300 years (per. comm. Duane Champion, 1985).

Hbf11 Lava flow located south of the historic 1801 HueHue lava flow. Phenocryst mineralogy is 1-2% olivine and 0-1% plagioclase. Small dunite and gabbro xenoliths are common. Chiefly pahoehoe. Paleomagnetic data for Hbf11 is consistent with an age of 2100-2200 years (pers. comm. Duane Champion, 1985).

Hbf13 Lava flow located adjacent to and north of Hbf9. Phenocryst mineralogy is 0-2% olivine,0-1% plagioclase, and 0-1% clinopyroxene. Small dunite and gabbro xenoliths are common. Chiefly aa. Hbf13 and Hbf11 may have been erupted from the same vent.

INTERMEDIATE PREHISTORIC UNITS (2500-5000 YRS B.P.)

Hbf1 Lava flow located in the southern portion of the quadrangle. Phenocryst mineralogy is 1-4% olivine and 0-1% plagioclase. Includes pahoehoe and aa. Paleomagnetic data for a flow with similar petrology from the adjacent Kailua quadrangle is consistent with an age of 3600 years old (pers. comm. Duane Champion, 1985).

Hbf2 Lava flow located in Hbf1. Phenocryst mineralogy is 1-3% olivine and 1-4% plagioclase. Includes pahoehoe and aa.

Hbf3 Lava flow located in Hbf1 and north of Hbf2. Phenocryst mineralogy is 2-4% olivine,0-1% plagioclase, and 0-1% clinopyroxene. Chiefly aa.

Hbf5 Lava flow located adjacent to and north of Hbf1. Phenocryst mineralogy is 1-2% olivine and 0-1% plagioclase. Chiefly pahoehoe.

Hbf9 Lava flow located north of Hbf8 and south of Keahole Point Airport. Phenocryst mineralogy is 1-3% olivine. Includes pahoehoe and aa.

Hbf12 Lava flow located adjacent to and north of Hbf9. Tumuli are common. Phenocryst mineralogy is 2-4% olivine, 0-1% plagioclase, and 0-2% clinopyroxene. Chiefly pahoehoe.

Hbf14 Kipukas located in Hbf11. Tumuli are rare. Phenocryst mineralogy is 1-2% olivine and 1-2% clinopyroxene. Chiefly pahoehoe.

Hbf15 Lava flow located at the northern boundary of quadrangle. Phenocryst mineralogy is 1-2% olivine,0-1% plagioclase, and 0-1% clinopyroxene. Olivine-plagioclase-clinopyroxene crystal clots as well as small dunite and gabbro xenoliths are common. Chiefly aa.

Hbf16 Lava flow located at the northern boundary of quadrangle. Phenocryst mineralogy is variable 3-10% olivine, 0-1% plagioclase, and 2-5% clinopyroxene. Plagioclase-clinopyroxene crystal clots are rare. Includes pahoehoe and aa. Hbf16 is older than Hbf15.

OLDEST PREHISTORIC UNITS (> 5000 YRS B.P.)

Hbf4 Lava flow located adjacent to and north of Hbf1. Tumuli are rare. Phenocryst mineralogy is 1-2% olivine. Chiefly pahoehoe.

Hbf7 Lava flow located adjacent to and north of Hbf8. Phenocryst mineralogy is 2-6% olivine, 1-3% plagioclase, and 1-4% clinopyroxene. Gabbro xenoliths are common. Chiefly spiney pahoehoe. Hbf7 is older than all surrounding flows.

Hbf8 Lava flow located north of Hbf6 and adjacent to and east of Hbf7. Phenocryst mineralogy is 2-4% olivine and 0-1% plagioclase. Chiefly aa. Hbf8 is younger than Hbf7 but older than Hbf9.

Hbf10 Kipukas located in Hbf9. Tumuli are common. Phenocryst mineralogy is 1-4% olivine. Chiefly pahoehoe. Late phase as flows of small areal extent with variable 6-15% olivine commonly issued from tumuli.

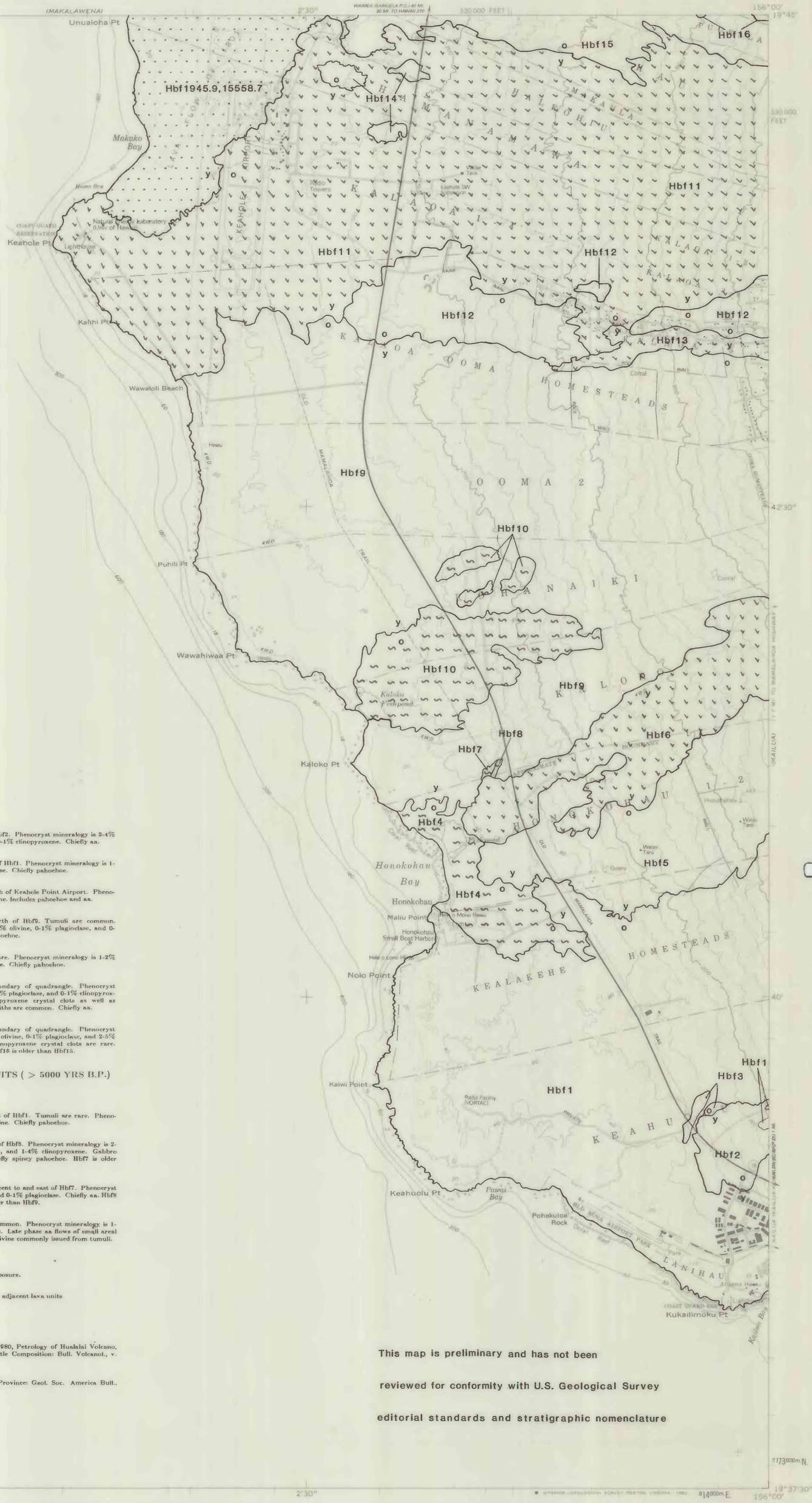
—— Contact, approximate in areas of poor exposure.

Y/O indicates young/old age relations between adjacent lava units

BIBLIOGRAPHY

Clague, D.A., Jackson, E.D., and Wright, T.L, 1980, Petrology of Hualalai Volcano, Hawaii: Implication for Mantle Composition: Bull. Volcanol., v. 43-4, p. 641-656.

Macdonald, G.A.,1949, Hawaiian Petrographic Province: Geol. Soc. America Bull., v.60, p. 1541-1596.



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SCALE 1:24 000

1 MILE

1000 0 1000 2000 3000 4000 5000 6000 7000 FEET

1 KILOMETER

CONTOUR INTERVAL 40 FEET
DOTTED LINES REPRESENT 20-FOOT CONTOURS
DATUM IS MEAN SEA LEVEL
DEPTH CURVES IN FEET—DATUM IS MEAN LOWER LOW WATER
THE RELATIONSHIP BETWEEN THE TWO DATUMS IS VARIABLE
SHORELINE SHOWN REPRESENTS THE APPROXIMATE LINE OF MEAN HIGH WATER
THE MEAN RANGE OF TIDE IS APPROXIMATELY 1 FOOT

APPROXIMATE MEAN DECLINATION 1962

QUADRANGLE LOCATION

ROAD CLASSIFICATION

Primary highway, hard surface — Light-duty road, hard or improved surface

Secondary highway, hard surface — Unimproved road

State Route

This map is preliminary and has not been reviewed for conformity with U.S. Geological Survey editorial standards and stratigraphic nomenclature

PRELIMINARY GEOLOGIC MAP OF KEAHOLE POINT QUADRANGLE, HAWAII

by

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1985