

UNITED STATES DEPARTMENT OF THE INTERIOR  
GEOLOGICAL SURVEY

Geologic map of Mauna Loa Volcano - Kulani quadrangle, Hawaii (preliminary)

By

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

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Kulani Quadrangle, Hawaii

PRELIMINARY MAP LEGEND

Unit	<u>Associated radiocarbon dates<sup>1</sup></u>	
	Within the Kulani quadrangle	From other areas
<hr/>		
<div>1942</div> Dense, medium-gray a'a erupted in April-May, 1942	Historic	
<div>1852</div> Dense, olivine-rich a'a erupted in February, 1852	Historic	
<div>Kkk</div> "Keamoku flow of Kipuka Kekake" <sup>3</sup> Dense, dark gray aphanitic a'a		W-3871, 230+60 W-4360, 300+60
<div>Kle</div> "Lower Keamoku flow" <sup>3</sup> - eastern unit. A'a and pahoehoe characterized by abundant fine plagioclase	W-4341, 330+60	W-3879, 830+60 <sup>2</sup> W-3880, 530+60 <sup>2</sup> W-4367, 570+70 <sup>2</sup> W-4845, 640+70 <sup>2</sup>
<div>kp</div> Olivine-rich of the Kulani Project. Mostly a'a - no megascopic plagioclase	W-3790, 420+70 W-3793, 450+60	
<div>ha</div> Olivine- and plagioclase-rich a'a of Pu'u Ha'a		
<div>bs</div> Olivine- and plagioclase-bearing a'a of the Mauna Loa Boys' School. Characterized by commonly intergrown olivine and plagioclase		W-4576, 480+60

kw

W-4338, 590+50

Olivine-bearing a'a of Keawewai  
Camp

kr

W-4345, 760+70

Olivine-rich pahoehoe of  
Keauhou Ranch

ou

W-4794, 880+60  
W-4813, 1,380+60<sup>2</sup>

Plagioclase-rich a'a of Ola'a  
Uka Forest Reserve

3.6

Unnamed, dense aphanitic a'a at  
western edge of quadrangle

ku

W-4237, 1,320+50      W-4343, 1,280+70  
W-4340, 1,400+70      W-4631, 1,110+60  
W-4357, 1,490+50

Aphanitic pahoehoe of Kulaloe Road.  
Characterized by well-sorted,  
spherical vesicles and fresh glassy  
surface where undisturbed

3.2

Unnamed, vesicular, olivine-rich a'a

3.0<sub>a</sub>

Small kipuka of plagioclase-rich pahoehoe in SW corner of quadrangle

3.0<sub>b</sub>

Highly vesicular, olivine-rich a'a and  
pahoehoe in SE corner of quadrangle

3.0<sub>c</sub>

Dense, plagioclase-rich a'a with minor  
olivine in NW corner of quadrangle

unnamed  
flows of  
similar  
age

2.6

Nearly aphanitic, dense, pink-weathering a'a in SW corner of Quadrangle

au

W-3856, 1,040+70  
W-4837, 1,480+60

Uwekahuna Ash. Weakly consolidated lithic and vitric ash, derived from Kilauea volcano

uw

W-4344, 1,690+70

Plagioclase-bearing a'a of Upper Waiakea Forest Reserve. Correlation between the several different lobes is tentative

sw

W-4356, <200<sup>2</sup>  
W-4807, 620+70<sup>2</sup>  
W-4810, 2,550+80

Aphanitic pahoehoe of Solomon's Waterhole

2.2a

Olivine-rich pahoehoe and a'a north of Keawewai Camp. Olivine 3-8 percent, minor plagioclase in sugary aggregates

2.2b

Plagioclase-rich a'a in NW corner of quadrangle. Plagioclase very fine, to 5 percent

pf

W-4174, 2,890+70

Olivine- and plagioclase-rich pahoehoe of Panaewa Forest Reserve. Characterized by common micro-gabbroic xenoliths

Unnamed  
flows of  
similar  
age

pu

Aphanitic basalt pahoehoe of Punahoa Ahupua'a. Characterized by poorly sorted, subrounded vesicles; contains many large lava tubes

W-4358, 4,070+70  
W-4995, 1,760+60<sup>2</sup>

W-3803, 4,050+50  
W-4574, 3,700+70  
W-4621, 3,140+70  
W-4624, 3,380+80  
W-4629, 3,360+80

pk

Picrite of Palakea Flat. Weathered pahoehoe characterized by 25-30 percent coarse, fresh olivine

W-4991, 7,960+110

kc

Plagioclase-rich basalt spatter of Kulani Cone, characterized by 10-12 percent coarse, subhedral plagioclase

2.0a

Dense, fine-grained a'a with abundant very fine plagioclase in SW part of quadrangle

2.0b

Mixed a'a and pahoehoe with 3-7 percent olivine and minor plagioclase north and south of Kulani Cone

2.0c

Plagioclase-rich a'a and pahoehoe at NW corner of quadrangle

2.0u

Old, poorly exposed a'a flow remnants central parts of Quadrangle. Mostly aphanitic, probably include two or more flows

Unnamed flows of similar age

1.8<sub>a</sub>

Highly vesicular pahoehoe SW of Kulani Cone. Characterized by 2-4 percent euhedral plagioclase and minor olivine

1.8<sub>b</sub>

Dense, near aphanitic a'a with sparse olivine NE of Kulani Cone

1.6

Old, deeply-weathered, nearly aphanitic pahoehoe in SW corner of quadrangle. Some fine plagioclase.

ho

W-4975, 9,020±130

Olivine-rich pahoehoe of Pu'u Hoakalei. Characterized by coarse, fresh olivine phenocrysts in deeply weathered matrix

pl

W-4995, 10,400±150

Old, ash-covered pahoehoe near Pu'u Lalaau. Contains 5-8 percent sugary olivine and minor fine plagioclase.

ap

Pahala Ash. Well-consolidated vitric ash, probably derived from numerous eruptions of both Kilauea and Mauna Kea volcanoes

Associated lava flows have <sup>14</sup>C of ages from 12,000 to 30,000 years

1.4

Very old, ash-covered, deeply-weathered pahoehoe with 30-35 percent clear olivine

1.4<sub>s</sub>

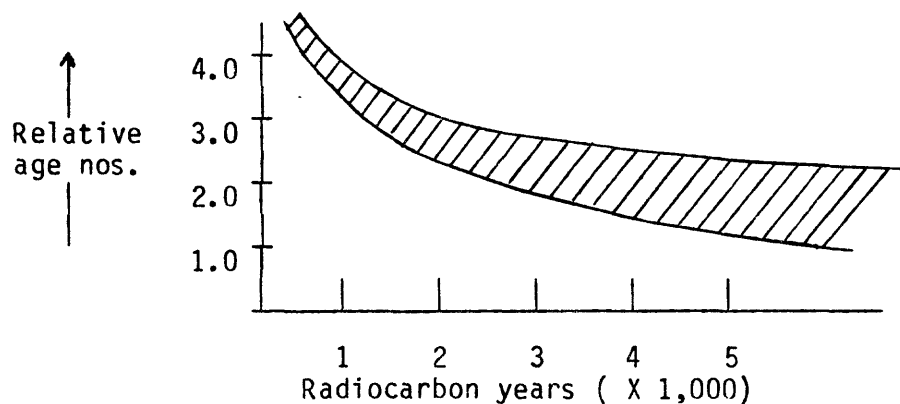
Poorly exposed, deeply weathered spatter formed by several different eruptions

Unnamed flows of similar age

Age relations not known

# UNDATED, UNNAMED FLOWS (2.0<sub>b</sub>, 1.8<sub>a</sub> etc.)

The numbers refer to relative age, based on subjective evaluation of weathering characteristics. The figure below gives an estimation of their radiocarbon age equivalence:

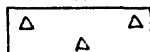


## LITHOLOGIC CHARACTERISTICS

### Average phenocryst abundances:

(Ol)	Olivine >5%
Ol	Olivine >15%
(Pc)	Plagioclase >2%
Pc	Plagioclase >5%

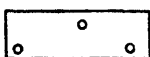
### Flow morphology:



A'a

No overprint indicates pahoehoe

### Pyroclastic characteristics:



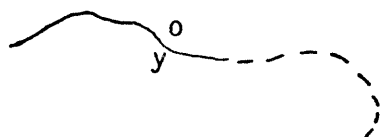
Ash and/or reticulite



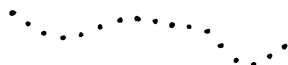
Spatter and cinder.  
Includes some  
shelly pahoehoe

## MAP SYMBOLS

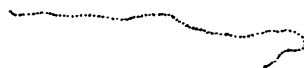
### Geologic contacts:



Contact between map units, dashed where approximate or inferred. Shorter dashes indicate greater uncertainty. Age relations shown where not obvious: y = younger, o = older

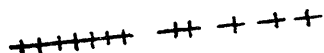


Contact, concealed.

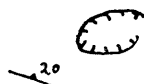


Contact between a'a and pahoehoe facies of the same unit.

### Eruptive vents:



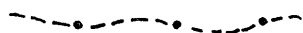
Eruptive vent, dashed where concealed or inferred.



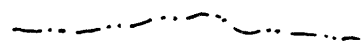
Crater rim.

Strike and dip of layering in spatter cones.

### Lava conduits:

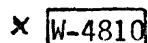


Inferred location of large lava tubes. Dark areas indicate known windows.



Large lava channel.

### Radiocarbon sample localities:



Dated radiocarbon sample locality, showing USGS Radiocarbon Laboratory Lab. No.<sup>1</sup>

<sup>1</sup> Ages by M. Rubin, in radiocarbon years b.p. (before 1950)

<sup>2</sup> Suspected erroneous ages due to sample contamination.

<sup>3</sup> Peterson, D. W., 1967, Geologic Map of the Kilauea Crater Quadrangle, Hawaii: U. S. Geol. Survey Geol. Quadrangle Map GQ-667.



# KULANI QUADRANGLE, HAWAII

## CORRELATION OF MAP UNITS

