

A Catalogue of Drill Core Recovered
From Kilauea Iki Lava Lake
From 1967 to 1979

by

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This report is preliminary and has
not been edited or reviewed for
conformity with Geological Survey
standards or nomenclature

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This open file report is a modified version of open file report 80-504, which it supersedes. In the course of using report 80-504, the principal author found that pages 3, 8, 16, 59, 65, 68, and 70, were incomplete (pp. 16, 59, 68) or contained inaccuracies that would not be obvious to most users of the report. These pages have been corrected in the present version.

Anyone having a copy of the older report need replace only those pages, to have the updated version.

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Introduction

The purpose of this report is to serve as a descriptive catalogue for drill core recovered from Kilauea Iki lava lake, from 1967 to 1979.

Kilauea Iki lava lake was formed when lavas of the 1959 summit eruption were ponded in Kilauea Iki pit crater, a large pit crater at the extreme upper end of Kilauea's east rift zone (Fig. 1). This eruption is one of the best documented of Kilauean eruptions: Murata and Richter (1966) and Richter and Murata (1966) presented data on the chemistry and petrography of the lavas, respectively, and Richter et al. (1970) described the complex filling of the pit crater in considerable detail.

Investigation of the lava lake began a few months after the crust stabilized, with the establishment of two perpendicular lines of levelling stations on the surface of the lake. In 1960-62, four holes were drilled through the upper crust in the center of the lake; the crust was 22-44 feet (6.7-13.4 m) thick at that time. Richter and Moore (1966) presented petrographic, modal, and chemical data on the core recovered from this early drilling.

The upper crust of Kilauea Iki was drilled again in 1967 by staff members of the Hawaiian Volcano Observatory, and core was recovered from three holes. In 1975, U.S. Geological Survey workers drilled three more holes, each a few feet away from one of the 1967 holes. A summary of all work done on Kilauea Iki and other Hawaiian lava lakes through 1975 has been given by Wright et al. (1976).

The lake has been redrilled twice since 1975, by workers from Sandia Laboratories, as part of their Magma Energy Research program, in cooperation with the U.S. Geological Survey. In 1976, they drilled two holes near the center of the lake. In 1978-79, they drilled a total of six holes; one, commissioned by the U.S. Geological Survey, went completely through the lava lake near its north edge, into the pre-1959 lavas below.

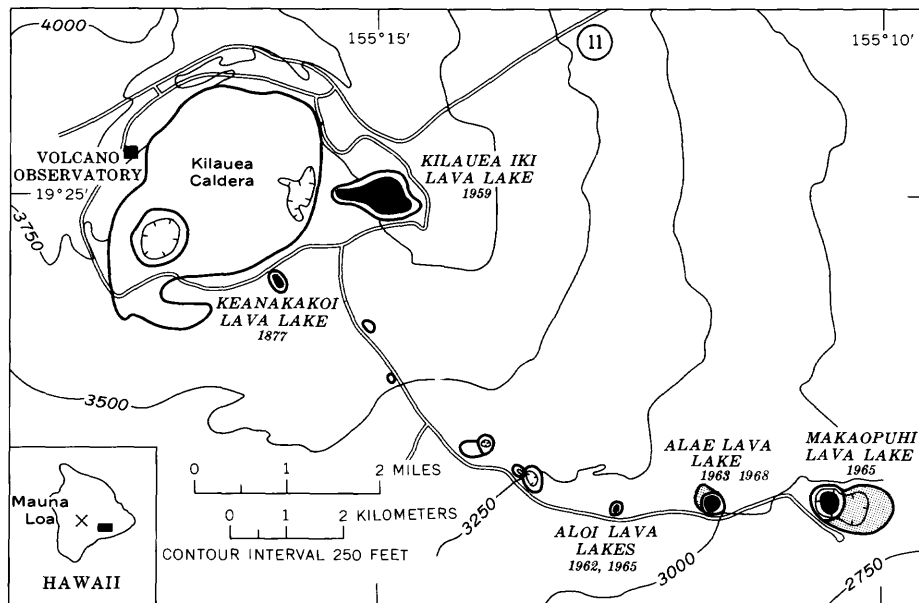


Figure 1. Index map of the summit area of Kilauea Volcano. All historic lava lakes formed prior to 1968, with their dates of filling, are shown. Of these, only the 1959 Kilauea Iki lava lake is both still in a partly molten state and still available for study. The lava lakes farther down on the east rift (Aloi, Alae, Makaopuhi) are now covered by lavas from Mauna Ulu. (This figure is reproduced from Wright et al., 1976.)

Basic data on the results of the four drilling programs (1967, 1975, 1976 and 1978-79) are summarized in Table 1. Fourteen deep holes have been drilled to date; from these a total of 2140 feet (652 m) of core has been recovered. The 1967 and 1975 coring used tungsten carbide bits with NX core barrels, which produced core 5 cm in diameter. The 1976 and 1978-79 corings used a larger drill rig, diamond bits, and larger core barrels, producing core 6+ cm in diameter. The diamond bits were far superior to the tungsten carbide bits: the drilling went much faster and the core recovery rate was much higher in 1976 and 1978-79.

Figs. 2 and 3 show the location of the 14 drill holes. Users of this catalogue should not that certain holes were drilled only a few (2-9) feet away from older holes in order to sample the same section of crust in different stages of development. Clusters of closely spaced holes are:

KI67-3, KI75-1, KI79-3, KI79-4

KI76-1, KI76-2, KI79-2

KI67-1, KI75-2

KI67-2, KI75-3, KI79-5

Hole #	Location	Date coring completed	Maximum depth of hole (feet)	Core diameter (cm)	Percent recovery	Nature and depth of lowest piece of coherent core	Comments
KI67-1	1795N717	4/21/67	89.2	5	88	Crust from ~86.9'	
KI67-2	1816N941	7/19/67	98.0	5	82	Crust from 97.8'	
KI67-3	1804N102	10/27/67	87.0	5	98	Crust from ~84.6'	
KI75-1	1803N92	2/27/75	145.1	5	80	Crust/glass in contact at 145.1'	
KI75-2	1796N717	3/ 6/75	139.5	5	74	Crust from 132.9'	
KI75-3	1806N939	3/14/75	145.7	5	71	Crust from 145.7'	Hole stopped short of melt.
KI76-1	1697N183	8/24/76	151+ <u> </u>	6	99	Crust/glass in contact at 149.3'	
KI76-2	1697N181	9/ 3/76	151+ <u> </u>	6	99	Crust from 150.5'+ <u> </u>	No core taken 0.0-10.5'
KI75-1R	1803N92	12/12/78	>173.1	6.35	99+	Crust from 173.1'	
KI79-1	1790N286	12/21/78	204.0	6.35	99+	Crust from 204'	Drilling stopped at 204'. Drilled through temperature maximum?
KI79-2	1698N181	1/ 5/79	>165.6	6.35	99+	Crust/glass in contact at 165.6'	
KI79-3	1794N89	1/10/79	>172.8	6.35	99+	Crust/glass in contact at 172.8'	
KI79-4	1797N90	1/13/79 ?	172.1	6.35	99+	Crust from 172.1'	Coring stopped short of melt.
KI79-5	1813N941	2/ 9/79	330.8	6.35	99+	Pre-1959 lava	No core taken 0.0-8.0'. Contact between 1959 lava lake and pre-1959 basement hit at 313.7'
KI79-6	1729N545	2/15/79	>190.4	6.35	99+	Crust/glass in contact at 190.4'	No core taken 0.0-12.8'.

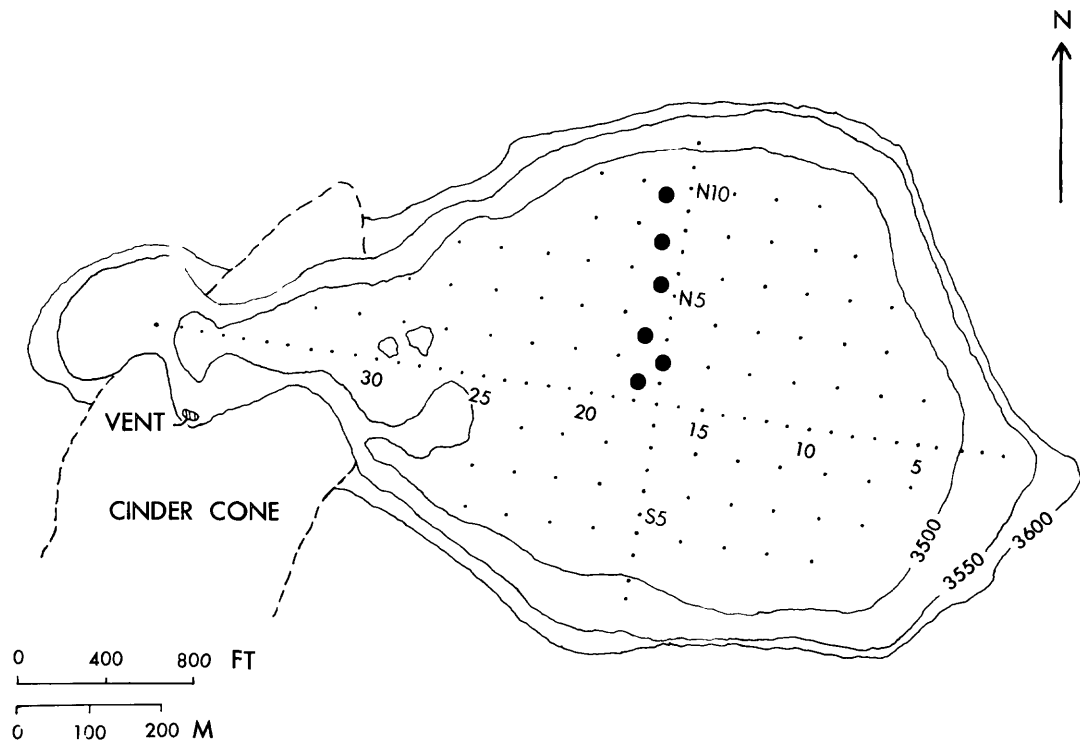


Figure 2. Plan view of the post-1959 surface of Kilauea Iki. The network of levelling stations is shown by the small dots. Their labelling is read as follows: the point labelled "N5" is levelling station 17N5, that is, it is 1700 feet west of the easternmost station on the principal east-west line, and 500 feet north of that line. The locations of drill holes are given in table 1 in terms of this network of levelling nails. The large filled circles indicate the location of drilling sites occupied from 1967 to 1979.

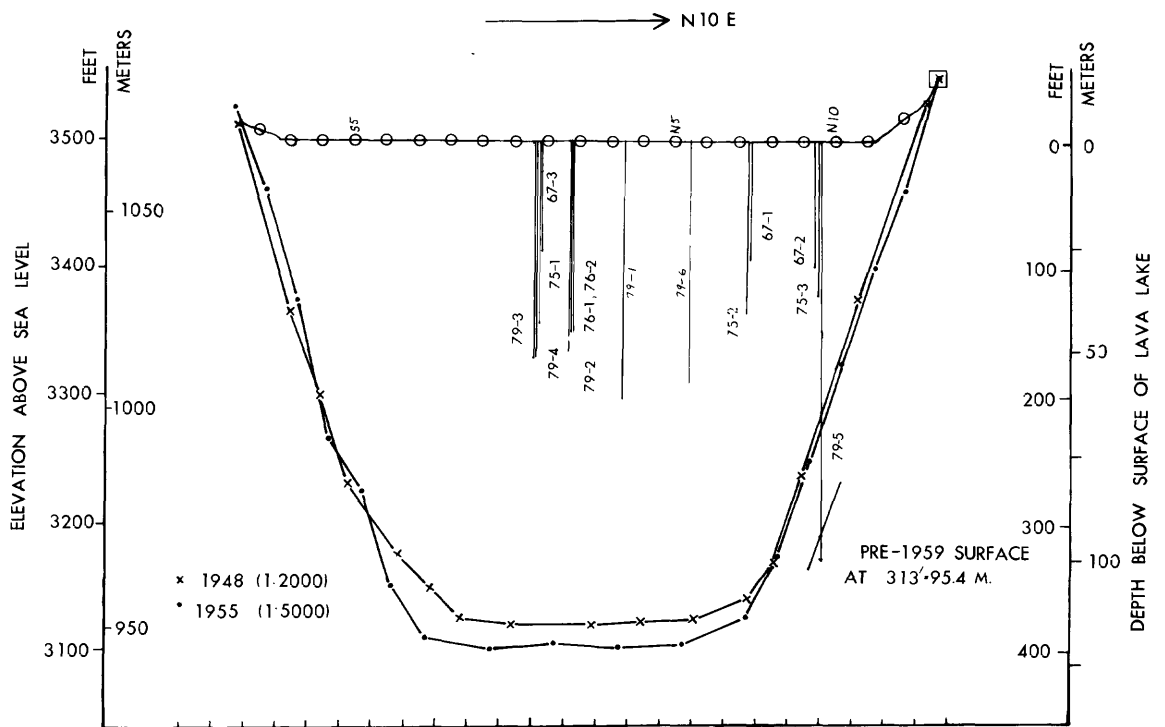


Figure 3. Cross-section of Kilauea Iki lava lake, taken along the N-S line of closely-spaced levelling stations shown in Fig. 2. The present surface of the lava lake and two pre-eruption profiles are shown. The pre-eruption profiles are taken from two different topographic maps: one (at 1:2000) is based on air photos taken in 1948; the other (at 1:5000) is based on air photos taken in 1955 (both prepared by R. Jordan, U.S.G.S., Flagstaff). The actual location of the lake bottom below hole KI79-5 is significantly different from either, as indicated. Vertical exaggeration is 4:1.

The drill holes, which mostly lie along a parallel line 100 feet to the west of this section, are shown projected onto this cross section. Several of the drill hole locations, indicated approximately in Fig. 2, have been occupied 2-3 times, in order to sample the same section of crust in several stages of development. These clusters of closely spaced drill holes are shown schematically this figure; the spacing between holes within clusters is not to scale.

Description of the catalogue

The logs for the various holes are arranged in chronological order, that is, as listed in Table 1. The logs for the 1967 holes were made by R.S. Fiske (now at the National Museum of Natural History); they have been edited slightly by R.T. Helz for this compilation. Helz is solely responsible for the logs for the 1975 and 1976 holes. During the 1978-79 drilling, the core was measured, boxed, and labelled, and preliminary recovery and petrographic notes made by N.G. Banks, R.B. Moore, and T.J. Casadevall of the Hawaiian Volcano Observatory. The final logs as presented here were made by R.T. Helz.

For each hole, there are two logs. The first is a recovery log, which gives the dates on which particular depth intervals were drilled and the amount of core recovered. In the 1967 and 1975 logs, where recovery was less than 100% and the missing core could be assigned to particular intervals, these gaps are specified. In some of the 1975 holes (KI75-2, KI75-3), the recovery rate was well below 100%, but the core was so pervasively abraded that it was not possible to assign the loss to specific intervals. This occurred chiefly in sections that were extensively oxidized or altered. The recovery rate in 1976 and 1979 was nearly 100%.

Some recovery logs show more than one sample of core recovered from a given depth interval in a particular hole. The usual reason for this is that the lowermost part of holes, which came near the crust/melt interface, filled up with a crystal-poor black glass within minutes to hours after the drillstring was withdrawn. This glass, recovered in partly devitrified condition when drilling was resumed, is designated "ooze". Most apparently duplicate samples consist only of ooze, but occasionally the drill veered off the original hole and some new wallrock core was recovered from the same depth as earlier core (e.g., at 147 ft in KI76-2). The earliest sample at a given depth should be the

most pristine. In some holes (KI67-2, KI75-1) minor oozing occurred before the maximum depth of the hole was reached. In such instances, the core recovered below the ooze appears to be perfectly normal. In all cases, the presence of ooze and the depth at which it was encountered are noted in the recovery log. However, the depth at which the ooze was recovered is not necessarily the depth at which the ooze originated.

For one hole (KI79-4), the drilling notes were too sketchy to construct a recovery log. The available information on the time of drilling, recovery rates, etc. for that hole is summarized on p. 59.

The second table for each hole is a brief petrographic log of the core. The lake consists mostly of olivine basalt, with 5-10% coarser grained, diabasic segregation veins (Helz, 1979), so the logs describe variations within a fairly narrow range of rock types. Features noted include:

- (1) Freshness. Presence of oxidation. More rarely, presence of possible secondary reduction (the "black olivine" rock seen in holes 67-1 and 75-2).
- (2) Vesicularity. Shape of vesicles. (Foundered crust frequently has vesicles preserved but distorted or partly filled with segregation-vein type material). Presence of denser layers, even if very thin. (Those in the uppermost part of the lake may mark contacts between slabs of very shallow foundered crust.)
- (3) Presence and relative abundance of olivine phenocrysts. The quantity terms used carry the following approximate significance:

olivine-rich	>25% olivine by volume
olivine common	10-25% " " "
olivine present	5-10% " " "
olivine sparse	<5% " " "

- (4) Presence of glass. Glass first appears in the core as black, vitreous specks. The matrix of the rock darkens through dark gray to black as the percentage of glass increases. The hottest recovered samples of crust contain ~45% by volume glass. Samples designated "glass" or "glass in bit" are >90% glass.
- (5) Presence of vesicle fillings (anhydrite/gypsum; cristobalite). Presence of whitish bloom on core collected just above steam-water interface. (This is Na₂SO₄, thenardite.)
- (6) Presence, thickness, and orientation of diabasic segregation veins.

As the core was logged from top to bottom, comparative terms (e.g., "less oxidized," "more olivine-rich," etc.) refer to the immediately preceding interval of core unless otherwise specified.

Most petrographic terminology is standard. A few peculiar field terms were retained. The "black olivines" are olivine phenocrysts which appear black in handspecimen. In thin section, they consist of fresh colorless olivine riddled with tiny opaques, probably magnetite. "Spotted rock" refers to core that consists of foundered crust, the vesicles of which have been completely filled by segregation material. "Spotted rock" grades up (or down) into rock with partly filled vesicles, to rock with completely open vesicles. The "leopard rock" of R.S. Fiske (hole KI67-2) appears to be the same, except that it was cored while partly molten, whereas the "spotted rock" was cored at subsolidus temperatures.

In addition, there are a variety of terms used to describe the fractures which form when hot core is quenched by the water used to cool the bit during drilling. These include a set of radial fractures with occasional hackly horizontal breaks in core collected at high subsolidus temperatures,

and closely spaced concentric ("onionskin") fractures in core that was partly molten just prior to being quenched by the drilling water.

In one hole (KI75-2), two boxes of core (from 15.8 to 44.0 feet) were spilled after a preliminary descriptive log was made. Some unique pieces of core can be placed at their exact depths within that interval. For other pieces, the depths are only approximate, as indicated on p. 31.

Location, availability, labelling of core

The core has been divided between the Hawaiian Volcano Observatory and the National Museum of Natural History, as follows. Core for most holes has been cut in half lengthwise, one half being at HVO and the other half at the Museum. In two cores, where there were closely spaced duplicate holes, one whole core is at HVO (KI76-2, KI79-4) and the other whole core is at the Museum (KI76-1, KI79-3). The only other core which has not been sectioned lengthwise is the ooze from the 1978-79 drilling, which is all at HVO.

Samples should be taken from the half which is at the Museum, unless the relevant section of core is no longer available. Requests should be made to R.T. Helz (U.S.G.S., Reston).

The core is labelled in feet, rather than meters, as the core barrels used were 2, 5, or 10 feet long. All depth and length measurements in this catalogue are in feet, to make it easier to work with the core as labelled.

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Core Recovery Log for KI67-1

Date	Interval drilled (feet)	Core recovered (feet)	Intervals of core	Gaps
1/17/67	0-0.9	0.7	0.0-0.7	0.7-0.9
	0.9-2.0	0.9	1.1-2.0	
	2.0-2.2	0.2	2.0-2.2	2.4-2.5
	2.2-3.0	0.7	2.2-2.4	
			2.5-3.0	
	3.0-5.3	2.3	3.0-5.3	13.5-13.6 14.3-14.4
	5.3-9.9	4.6	5.3-9.9	
	9.9-15.0	4.9	9.9-13.5	
			13.6-14.3	
			14.4-15.0	18.0-18.3
15.0-20.0	4.7	15.0-18.0		
		18.3-20.0		
	20.0-25.2	5.2	20.0-25.2	
1/18/67	25.2-27.2	2.0	25.2-27.2	
	27.2-30.2	3.0	27.2-30.2	
	30.2-31.3	1.1	30.2-31.3	
	31.3-34.9	3.6	31.3-34.9	
	34.9-39.9	5.0	34.9-39.9	
	39.9-45.0	5.0	40.0-45.0	39.9-40.0
	45.0-50.0	5.0	45.0-50.0	
1/19/67	50.0-55.0	4.2	50.0-53.8	53.8-54.5
			54.5-55.0	
	55.0-60.0	5.0	55.0-60.0	
	60.0-65.0	4.0	60.0-61.4	61.4-61.8
			61.8-62.1	62.1-62.5
			62.5-63.6	63.3-63.8
	65.0-70.0	2.9	63.8-65.0	
		65.0-65.7	65.7-68.7	
		68.7-70.0		
2/8/67	70.0-71.8	0.4	uncertain	uncertain
	71.8-75.0	3.2	71.8-75.0	
	75.0-80.0	5.0	75.0-80.0	
	80.0-84.8	4.0	80.0-83.8	83.8-84.6
		84.6-84.8		
3/9/67	79.6-85.0 (ooze)	1.6	uncertain	uncertain
	85.0-88.5	1.2	uncertain	uncertain
	Plus fragmental glass from 88.5-89.2			
4/21/67	81.0-89.0 (ooze)	~2	uncertain	uncertain

Petrographic Log for KI67-1

Depth (in feet)	Description of core
0-0.9	Highly vesicular; cavity 0.65-0.85
0.9-2.0	Highly vesicular; top of core ground, so assume missing 0.2 between 0.9 and 1.1
2.0-2.2	Highly vesicular; some loss due to blockage
2.2-3.0	Highly vesicular, medium gray, very soft drilling, assume core loss between 2.4 and 2.5
3.0-7.0	Highly vesicular, medium to light gray
7.0-7.3	Band of somewhat more dense material, moderately vesicular
7.3-9.7	Highly vesicular
9.7-10.0	Band of fairly dense, finely vesicular material; contacts flat
10.0-13.0	Highly vesicular
13.0-13.1	Fairly dense material, as 9.7-10.0
13.1-13.3	Moderately vesicular; contacts above and below gradational
13.3-13.7	Fairly dense, as 9.7-10.0
13.7-14.7	Somewhat more vesicular, but not as in typical crust
14.7-17.4	Fairly to highly vesicular; the olivines in the interval 16.2-17.4 are altered
17.4-18.0	Less vesicular, somewhat fresher
18.0-18.3	Gap
18.3-23.4	Highly vesicular, some parts more vesicular than others
23.4-31.3	Alternately highly vesicular and moderately vesicular; contacts gradational between these bands. Vesicular bands are: 24.3-25.2, 25.2-25.8, 26.1-26.3, 26.6-26.9, 27.2-27.8, 28.2-28.4, 28.7-28.9, 29.2-29.4, 29.7-31.3. Steeply dipping gash or string of vesicles at 29.2-29.4 is lined with segregation vein material
31.3-31.8	Very dense, densest material encountered thus far in this hole. 1/8" seam of segregation vein material follows string of dipping vesicles in upper part of interval

Depth (in feet)	Description of core (KI67-1)
31.8-44.5	<p>Alternatively highly vesicular and dense to moderately vesicular, contacts gradational. Vesicular zones are as follows: 31.8-32.4, 33.4-33.9, 34.6-35.0, 35.5-36.7, 36.9-37.3, 38.1-39.2, 41.0-42.5, 43.2-43.3, 43.7-44.0.</p> <p>Segregation vein material scattered, especially in the more vesicular intervals -- e.g., 32.1, 1/8" thick, 15° dip; 33.7, 1/8-1/4" thick, steeply dipping, irregular; 34.8, 1/4" thick, flat; 38.4, 1/4-1/2" thick, 45° dip. Other patches of segregation vein material line some vesicles</p>
44.5-50.0	<p>Gradational downward into uniformly vesicular rock containing reddened, altered olivines. Tabular patch of segregation vein material at 48.6 (1/4" thick, flat); plagioclase and opaques growing on rim of many vesicles</p>
50.0-53.4	<p>Gradational downward into similar vesicular, altered rock, but flat or gently dipping bands of segregation vein material 1/8" to 5/8" thick are common. These form about 15% of the interval</p>
53.4-55.6	<p>Abruptly more dense; olivines fresh or nearly so</p>
55.6-70.4	<p>Moderately to highly vesicular. A few bands of somewhat less vesicular material, such as at 57.4-57.6, but otherwise fairly homogeneous. Olivines blackened, some zones cavernous or crumbly</p>
70.4-71.8	<p>Gap</p>
71.8-76.6	<p>Finely to moderately vesicular; much of interval has mottled, blotchy appearance. Olivine in interval 71.8-72.5 is moderately darkened, but most below is fresh. Scattered patches of segregation vein material, as at 74.2 (1/2" thick) and at 75.8 (1/2" thick), (both flat)</p>
76.6-88.5	<p>Considerably more dense, scattered patches of small, round vesicles. Partly molten segregation vein 0.2' thick at 79.2 (dipping 20°). Percent of glassy patches increases downward</p>
88.5-89.0	<p>Crystal-poor glass, probably from molten segregation vein(?)</p>

Core Recovery Log for KI67-2

Date	Interval drilled (feet)	Core recovered (feet)	Intervals of core	Gaps
5/9/67	0-0.3	0.2	0.0-0.2	0.2-0.3
	0.3-1.5	1.0	0.3-0.8	0.8-1.0
			1.0-1.5	
	1.5-2.2	0.5	1.7-2.2	1.5-1.7
	2.2-3.4	1.0	2.3-3.0	2.2-2.3
			3.1-3.4	3.0-3.1
	3.4-8.7	4.6	3.5-4.5	3.4-3.5
			4.7-7.7	4.5-4.7
			8.1-8.7	7.7-8.1
	8.7-10.0	1.3	8.7-10.0	
	10.0-15.0	4.2	10.0-10.4	10.4-11.0
			11.0-12.4	12.4-12.6
			12.6-15.0	
15.0-20.0	4.7	15.0-17.3	17.3-17.6	
		17.6-20.0		
20.0-25.0	4.1	20.9-25.0	20.0-20.9	
5/12/67	25.0-30.0	4.1	25.0-28.4	28.4-28.6
			28.6-29.1	29.1-29.8
			29.8-30.0	
	30.0-35.0	4.6	30.0-30.6	30.6-30.8
			30.8-33.3	33.3-33.5
			33.5-35.0	
	35.0-40.0	4.5	35.0-38.0	38.0-38.5
			38.5-40.0	
	40.0-45.0	4.3	40.0-41.5	41.5-41.9
			41.9-42.8	42.8-43.1
			43.1-45.0	
	45.0-47.0	2.0	45.0-47.0	
	5/17/67	47.0-50.0	1.9	47.0-47.5
			48.0-49.4	49.4-50.0
6/14/67	50.0-55.0	3.1	50.0-50.3	50.3-50.8
			50.8-52.1	52.1-52.5
			52.5-53.8	53.8-54.0
			54.0-54.2	54.2-55.0
	55.0-60.0	3.7	55.0-55.2	55.2-55.7
			55.7-57.0	57.0-57.4
			57.4-59.0	59.0-59.4
			59.4-60.0	
	60.0-65.0	3.9	60.0-61.7	61.7-62.2
			62.2-64.4	64.4-65.0
	65.0-70.0	3.1	65.0-65.5	65.5-66.0
			66.0-66.7	66.7-67.2
			67.2-67.9	67.9-68.6
		68.6-69.1	69.1-69.3	
		69.3-70.0		

Date	Interval drilled (feet)	Core recovered (feet)	Intervals of core	Gaps		
6/14/67	70.0-75.0	3.9	70.0-70.4	70.4-70.9		
			70.9-71.4	71.4-72.0		
			72.0-75.0			
	75.0-80.0	4.9	75.1-80.0	75.0-75.1		
	80.0-85.0	4.6	80.0-84.1	84.1-84.5		
7/6/67	85.0-87.5	2.4	84.5-85.0			
			85.0-87.1	87.1-87.2		
			87.2-87.5			
			80.1-81.0 (ooze)	0		
			81.0-82.0 (ooze)	0		
7/19/67	82.0-85.0 (ooze)	2.5	? -85.0	?		
	85.0-87.0 (ooze)	2.0	85.0-87.0			
	87.0-89.0	1.8	87.0-87.5 (ooze)			
			87.5-88.4	88.4-88.6		
			88.6-89.0			
	89.0-92.0	1.1	89.0-90.1	90.1-92.0		
	92.0-94.0	1.8	92.0-94.0			
	83.4-90.0 (ooze)	0.5	86.0-90.0	83.4-86.0		
	90.0-95.2	1.0	90.0-90.2	90.2-94.0		
			94.0-94.4	94.4-94.8		
7/27/67	95.2-97.8	2.1	94.8-95.2			
			95.2-96.5	96.5-97.2		
			97.2-97.8			
			Plus glass in bit to 98.0			
7/27/67	65.0-70.0 (ooze)	0	---	65.0-70.0		
	70.0-75.4 (ooze)	1.7	?	?		
	75.4-80.0 (ooze)	0.3	?	?		
	80.0-84.0	0.6	?	?		
	84.0-87.5	2.1	84.0-85.8	85.8-87.2		
			87.2-87.5			
	87.5-91.0	3.0	87.5-88.4	88.4-88.6		
			88.6-89.8	89.8-90.1		
			90.1-91.0			
	91.0-95.0	4.0	91.0-95.0			
95.0-97.0	1.8	95.0-96.5	96.5-96.7			
		96.7-97.0				

Petrographic Log for KI67-2

Depth (in feet)	Description of core
0.0-4.3	Highly vesicular, some near-horizontal banding defined by zones of less-vesicular material
4.3-4.4	Less porous rock with small (less than 1 mm) vesicles. Seems to be just as olivine-rich as overlying and underlying rocks
4.4-8.1	As 0.0-4.3
8.1-8.7	Less porous rock as 4.3-4.4
8.7-21.5	Vesicular rock, vesicle content somewhat variable; some strings of vesicles dip up to 45°, much olivine altered
21.5-22.3	Somewhat less vesicular; larger(?) less altered olivines
22.3-22.35	Coarse segregation vein
22.35-23.0	As in 21.5-22.3 interval
23.0-25.5	Highly vesicular, moderate olivine alteration
25.5-26.4	Coarse segregation vein, large vesicles
26.4-26.8	Vesicular, dipping vesicles
26.8-27.0	Segregation vein material, patchy distribution
27.0-32.0	Generally coarsely vesicular, some less vesicular zones; most olivine fairly fresh
32.0-33.3	Largely segregation vein material; in lower 0.5' the edge of vein is nearly vertical, irregular on small scale; host rock as above
33.3-34.8	As 27.0-32.0
34.8-35.2	Some segregation vein material, dipping about 45° in places
35.2-35.4	More and less vesicular rock, contact between the two is steeply dipping
35.4-40.4	Vesicular, somewhat altered; locally olivine rock
40.4-52.1	Generally altered (reddened), moderately vesicular. Much of core split along near-vertical fracture
52.1-61.0	Altered and moderately altered above 58'; less altered and less vesicular below that

Depth (in feet)	Description of core (KI67-2)
61.0-62.3	Segregation vein, nearly flat lying. Gap 61.7-62.3 probably was also segregation vein
62.3-72.0	More compact and fresher rock; homogeneous
72.0-74.0	Fairly abruptly more vesicular, scattered patches of segregation vein material; largely segregation vein at bottom of interval
74.0-78.6	Abruptly more dense, fresher. From 75.2-76.0 the rock is more vesicular and is riddled with segregation vein material
78.6-79.1	Segregation vein, vesicular
79.1-85.0	Variably vesicular rock, patchy distribution of segregation veins, edges of these veins generally not sharp, centers of some veins glassy, especially in lower part of interval. Some bands of vesicular rock in lower part of interval dip up to 30°
85.0-86.2	Mostly glassy segregation vein; some nonvesicular wall rock with irregular, steeply dipping contact
86.2-97.8	Nonvesicular or sparsely vesicular rock with many irregular patches of glassy segregation vein material. "Leopard rock" 89.2-89.6; other patches of "leopard rock" at 87.5-87.9, 89.9-90.0. Rock appears to be more olivine rich and more glassy in lower 3' of interval
97.8-98.0	Glassy segregation vein material(?)

Core Recovery Log for KI67-3

Date	Interval drilled (feet)	Core recovered (feet)	Intervals of core	Gaps
8/16/67	0.0-1.0	0.9	0.0-0.8	0.8-0.9
			0.9-1.0	
	1.0-2.0	0.8	1.0-1.4	1.4-1.6
			1.6-2.0	
	2.0-3.0	1.0	2.0-3.0	---
	3.0-4.0	1.0	3.0-4.0	---
	4.0-5.0	0.8	4.0-4.8	4.8-5.0
	5.0-10.0	4.5	5.0-9.5	9.5-10.0
	10.0-15.0	5.0	10.0-15.0	---
	15.0-20.0	5.0	15.0-20.0	---
	20.0-25.0	5.0	20.0-25.0	
	25.0-30.0	5.0	25.0-30.0	---
	30.0-32.2	1.2	30.0-31.2	31.2-32.2
	32.2-35.5	3.3	32.2-35.5	---
	35.5-39.5	4.0	35.5-39.5	---
8/23/67	39.5-44.5	5.0	39.5-44.5	---
	44.5-49.6	5.1	44.5-49.6	---
	49.6-55.0	5.1	49.6-54.7	54.7-55.0
	55.0-60.0	4.7	55.0-56.7	56.7-57.0
			57.0-60.0	
	60.0-65.1	5.1	60.0-65.1	
	65.1-70.0	4.9	65.1-70.0	
	70.0-74.0	3.9	70.0-73.2	73.2-73.3
			73.3-74.0	
	74.0-79.0	4.8	74.0-74.8	74.8-75.0
			75.0-79.0	
10/27/67	78.0-83.0	2.5	80.5-83.0(?)	78.0-80.5(?)
	83.0-87.0	1.5	83.0-84.5(?)	84.5-87.0(?)

Petrographic Log for KI67-3

Depth (in feet)	Description of core
0.0-1.4	Highly vesicular, vesicles large, rock dark gray, most olivine fresh. Gap from 0.8-0.9
1.4-1.6	Gap.
1.6-7.3	Highly vesicular, vesicles large to medium, rock becomes brownish and olivines become more altered lower in interval. Gap 4.8-5.0.
7.3-7.8	Somewhat less vesicular, vesicles same size but just more sparsely distributed.
7.8-8.9	Coarsely vesicular as above, some altered olivine.
8.9-9.2	Dense, less vesicular band, orientation uncertain.
9.2-16.5	Highly vesicular, generally uniform, but 12.5 to 14.0 contains somewhat larger vesicles; much olivine altered. At about 15.6 first small patch of segregation vein material appears -- is parallel to string of dipping vesicles. Rock becomes less vesicular gradually at 16.2-16.5; in this interval vesicles dip almost 45°.
16.5-17.2	Less vesicular, along steeply dipping contact. Part of rock dense, rest is moderately vesicular.
17.2-18.3	Variably vesicular; upper 0.4' moderately vesicular and contains near horizontal segregation vein 0.05' thick. This grades downward to 0.5' of more finely vesicular rock (appears olivine rich). Grades to 0.3' of more coarsely vesicular rock.
18.3-18.6	Abruptly denser at top of interval, gradational at bottom. 0.05' segregation vein (horiz.) at top of interval.
18.6-30.0	Variably vesicular, moderate to very coarse vesicles; segregation veins as follows: 21.0 - 0.1' thick, horizontal 22.0 - 0.03' thick, horizontal Lower 0.5' gradationally less vesicular to moderately vesicular typical of rock below.
30.0-41.0	Moderately to coarsely vesicular, but considerably more homogeneous than above rock. Many vesicles stretched and dipping; some minor segregation vein material along stretched vesicles.

Depth (in feet)	Description of core (KI67-3)
41.0-51.0	<p>Moderately vesicular, even more homogeneous than interval above; most vesicles fairly equant.</p> <p>Segregation veins:</p> <p style="margin-left: 40px;">45.4-45.6 irreg., steeply dipping, perhaps 0.1' thick</p> <p style="margin-left: 40px;">46.7-46.9 more or less flat, 0.2' thick</p>
51.0-78.7	<p>Moderately to sparsely vesicular, massive, fairly homogeneous, occasional clustering of large vesicles.</p> <p>Segregation veins:</p> <p style="margin-left: 40px;">51.5-51.7 dipping, 0.1'thick</p> <p style="margin-left: 40px;">61.1-61.4 nearly flat, more vesicular than host</p> <p style="margin-left: 40px;">65.8-66.2 nearly vertical, at least 0.1' thick</p> <p style="margin-left: 40px;">70.0-70.4 nearly flat</p> <p style="margin-left: 40px;">72.1-72.3 30° dip</p> <p style="margin-left: 40px;">75.6-76.8 in part steep</p>
78.7-87.0	<p>Zone of partial crystallization, generally less vesicular than anything above.</p> <p>Segregation veins:</p> <p style="margin-left: 40px;">79.0-79.1 small, dip uncertain</p> <p style="margin-left: 40px;">79.9-80.4 top horiz., bottom steep; partly molten</p> <p style="margin-left: 40px;">80.8-82.1 glassy</p> <p>Glass (black, nonvesicular) in bit from 86.8-87.0(?)</p>

Core Recovery Log for KI75-1

Date	Interval drilled (feet)	Core Recovered (feet)	Percent recovery*	Gaps
2/19/75	0.0- 1.0	0.6	60	1.0-1.5
	1.0- 1.5	none	0	
	1.5- 2.5	0.6	60	
	2.5- 3.3	1.8	100	
	3.3- 6.4	3.0	95	
	6.4- 10.0	3.6	100	
2/20/75	10.0- 20.0	6.3	63	
	20.0- 29.0	9.0	100	
	29.0- 39.0	7.9	79	
	39.0- 49.0	10.0	100	
2/21/75	49.0- 59.0	10.0	100	
	59.0- 69.0	9.7	97	
	69.0- 75.0	6.0	100	
2/24/75	75.0- 85.0	9.0	90	81.7- 82.3 91.7- 94.3 95.0-102.0
	85.0- 95.0	8.2	82	
	95.0-102.0	none	0	
	102.0-105.0	3.0	100	
2/25/75	105.0-115.0	7.3	73	107.0-109±
	115.0-125.0	4.7	47	
	125.0-135.0	6.7	67	
	135.0-140.8	4.0	70	
2/26/75	138.0-140.8 (ooze)	0.1-0.2	~5	
	140.8-145.1	4.3	100	
2/27/75	134.7-138.2 (ooze)	2.2	~60	

* not counting gaps

Petrographic Log for KI75-1

Drilling interval (feet)	Assigned depth (feet)	Description of core
0.0-1.0	0.0-1.0	Highly vesicular, olivine-rich; with secondary minerals in vesicles.
1.0-1.5	1.0-1.5	No core.
1.5-2.5	1.5-1.9	No core.
	1.9-2.1	Oxidized, highly vesicular, with secondary minerals in vesicles.
	2.1-2.2	Denser layer (small vesicles).
	2.2-2.5	Vesicular, olivine-rich, with fresh olivine.
2.5-3.3	2.5-3.3	Abundant fresh olivine. Medium-coarse vesicles throughout.
3.3-6.4	3.3-6.4	Vesicular, olivine-rich rock. Olivines oxidized.
6.4-10.0	6.4-10.0	Olivine-rich; mostly very vesicular. Sheet vesicles containing segregation vein material between 9.5 and 10.0.
10.0-20.0	10.0-16.2	Highly vesicular, olivine-rich, with fresh olivines. Recovery poor.
	16.2-18.0	Denser layer with less olivine.
	18.0-18.9	Vesicular, olivine-rich rock.
	18.9-19.5	Small flat-lying segregation veins. Largest is 1.5" thick.
	19.5-20.0	Vesicular, olivine-rich rock.
20.0-29.0	20.0-20.9	Topmost is vesicular, olivine-rich, followed by denser material with flattened vesicles.
	20.9-25.6	Olivine-rich rock with minor segregation veins. Olivine fresh at top, becoming more altered with depth.
	25.6-26.6	Very coarse vesicles. Less olivine, slightly oxidized.
	26.6-29.0	Irregularly vesicular rock with oxidized olivine.

Drilling interval (feet)	Assigned depth (feet)	Description of core (KI75-1)
29.0-39.0	29.0-31.2	Oxidized zone, continued from above interval.
	31.2-39.0	Olivine-rich rock with flattened vesicles. Olivine fresh. Segregations in the larger flat-lying vesicles.
39.0-49.0	39.0-49.0	Most vesicles smaller, with a few isolated larger ones. Olivine still common. Very uniform rock, all fresh.
	41.8-42.0	Largest segregation vein in this interval.
49.0-59.0	49.0-59.0	Abundant small vesicles throughout. Olivine is fresh, common.
	56.2-56.4	Largest segregation vein.
59.0-69.0	59.0-69.0	Very uniform rock; finely vesicular, olivine common.
	60.4-60.6	Segregation
	65.0-65.5	Largest segregation vein in interval.
	67.5-67.7	Vuggy segregation with platelets of plag, cpx, ilmenite.
69.0-75.0	69.0-75.0	Finely vesicular to diktytaxitic, with small fresh olivines.
	70.5-71.3	Segregation along side of core.
	73.5-75.0	Massive vesicular segregation vein. Contains olivine.
75.0-85.0	75.0-77.0	Segregation vein continued from above. Total thickness is ~3.5 feet. Contains elongate olivine crystals.
	77.0-85.0	Dense fresh rock. Finely vesicular to diktytaxitic. Olivine present.
	81.8-82.4	Gap, with minor segregation recovered.
85.0-95.0	85.0-95.0	Dense, fresh rock. Gray, diktytaxitic, with fresh olivine. This was "melt" in 1967.
	91.0-92.0 92.0-94.0	Segregation vein material, highly vesicular. Recovery poor in this range.
95.0-102.0	95.0-102.0	No core.

Drilling interval (feet)	Assigned depth (feet)	Description of core (KI75-1)
102.0-105.0	102.0-105.0	Dense fresh rock. Light gray, diktytaxitic. Fresh olivine present.
	103.1-103.8	Minor vuggy areas of segregation material with little beads of cristobalite(?) in large vertical vesicles.
105.0-115.0	105.0-113.7	Dense, gray, diktytaxitic rock. Locally oxidized near cracks. Locally contains whitish salts. Segregation at 106.0-106.2.
	113.7-115.0	Massive segregation vein, relatively few vesicles.
115.0-125.0	115 -118	Dense fresh rock. Gray, diktytaxitic. Olivine present.
	118 -119	Segregation vein 0.5' thick.
	119 -122	Dense rock. Small olivines present.
	122 -123	Segregation vein 0.4' thick.
	123 -125	Dense rock, as in 119-122' interval.
	125.0	Segregation vein.
125.0-135.0	125.0-129.0	Segregation veins present: 125-127, 127.5-128.0. Lowest one glassy.
	129.0-135.0	Dense, gray, diktytaxitic olivine-rich rock. Glassy segregation at 131.2-131.4.
	132 -135	Rocks characteristically break with knobby fracture. Glassy?
135.0-140.8	135 -137	Dense, darker gray olivine-rich rock. Contains interstitial glass.
	137 -138	Glassy segregation, ~0.2' thick.
	138 -140.8	Olivine-rich rock with dark gray to black matrix as glass content increases.
140.8-145.1	140.8-145.1	All very dark, glassy with conspicuous olivine-rich areas. Crust and melt in sharp contact at 145.1 ft. Glass non vesicular.

Core Recovery Log for KI75-2

Date	Interval drilled (feet)	Core recovered (feet)	Percent recovery*	Gaps
3/3/75	0.0- 1.25	0.6	47	
	1.25- 2.1	0.4	45	
	2.1- 2.5	none	-	2.1- 2.5
	2.5- 3.7	1.2	100	
	3.7- 9.0	4.8	90	
	9.0- 14.0	5.0	100	
	14.0- 24.0	9.3	93	
	24.0- 34.0	9.3	93	
	34.0- 44.0	9.8	98	
3/4/75	44.0- 54.0	9.8	98	
	54.0- 63.4	3.6	100	54.0- 59.8
	63.4- 71.4	5.7	71	
	71.4- 79.4	6.4	80	
3/5/75	79.4- 90.0	4.4	94	79.4- 84.3 89.0- 90.0
	90.0-100.0	6.1	61	
	100.0-110.0	8.0	99	102.2-104.1
	110.0-120.0	5.8	85	110.6-113.8
3/6/75	120.0-130.0	5.3	90	124.5-128.6
	130.0-139.5			132.9-139.5

Bit became stuck in glass at 139.5 ; most of core was lost in pulling the bit out of the melt. Upon re-entry, 1.3 feet of black glass + crystals was recovered between 137.5 and 138.8 feet.

* not counting gaps

Petrographic Log for KI75-2

Drilling interval (feet)	Assigned depth (feet)	Description of core
0.0-1.2	0.0-1.2	Coarsely vesicular, olivine-bearing rock with secondary minerals in vesicles. Oxidized.
1.2-2.1	1.2-2.1	Vesicular, oxidized, with secondary minerals in vesicles.
2.1-2.5	2.1-2.5	No core.
2.5-3.7	2.5-3.7	Coarse vesicles. Olivines oxidized. Still some secondary vesicle fillings.
3.7-9.0	3.7-5.8	Coarsely vesicular; olivines oxidized. Recovery poor.
	5.8-8.8	Vesicles smaller, but still abundant. Olivines oxidized.
	8.8-9.0	Highly altered, oxidized, punky rock.
9.0-14.0	9.0-13.0	Vesicular, oxidized rock.
	13.0-14.0	Denser, relatively fresh rock. Some fresh olivine.
14.0-24.0	14.0-15.0	Denser, fairly fresh rock, as above.
	15.0-15.8	Vesicular, patchily oxidized rock.
	15.8-23.5	Rock all oxidized. Highly vesicular near top of interval, getting slightly denser near bottom.
	at 16.2-16.8	Very oxidized rock next to crack.
	at 17.6	Inclusion or olivine clot, now completely oxidized.
24.0-34.0	at 18.5 and 22.5	Thin segregation veins 0.1-0.2 inches thick.
	23.5-24.0	Fresher, relatively dense rock.
	24.0-24.5	Fresh, olivine-rich rock with a large irregular patch of segregation material at 24.2-24.3.
	24.5-26.0	Olivine-rich rock, mostly vesicular but with thin dense layers.
	26.0-28.0	Segregation vein, at least 2.0' thick. Top pieces include vein-wallrock contact; lower pieces in vein only.

Drilling interval (feet)	Assigned depth (feet)	Description of core (KI75-2)
	28.0-30.0	Olivine-rich vesicular rock, mostly fresh.
	30.0-33.8	Much denser olivine-bearing rock. Fresh.
	33.8-34.0	"Spotted rock". Olivine-rich, apparently formerly vesicular rock with segregation material filling most of the vesicles. Some vesicles are still vuggy.
34.0-44.0	34.0-38.3	Olivine-rich vesicular rock. Locally oxidized.
	38.3-41.0	Denser, fresher olivine-bearing rock.
	41.0-43.0	Olivine-rich vesicular rock with minor segregation material in veins and vesicles.
	43.0-44.0	Strongly oxidized rock with variable vesicle content.
44.0-54.0	44.0-44.6	"Spotted rock", as at 34.0'. Very dense.
	44.6-45.8	Fresh, olivine-rich, vesicular rock.
	45.8-48.3	"Red-and-green" rock. Altered, olivine-rich, vesicular.
	48.3-49.1	Slightly denser, fresher rock. Olivines still oxidized.
	49.1-52.0	Severely oxidized vesicular olivine-rich rock.
	52.0-52.4	Series of small segregation veins.
	52.4-54.0	Olivine-rich, vesicular rock. Relatively fresh.
54.0-63.4	54.0-59.8	Very dense olivine-bearing rock, with oxidized joint filling on one side. Recovery poor.
	59.8-61.7	Vesicular, variably altered olivine-rich rock.
	61.7-61.8	Thin, very dense layer.
	61.8-63.4	Vesicular rock. Altered (olivines are blackish) but not oxidized (?).
63.4-71.4	63.4-71.4	Rock fairly uniform but pervasively altered. Matrix green to black. Olivines mostly black, but some are red. Red and black olivines may occur within inches of each other.

Drilling interval (feet)	Assigned depth (feet)	Description of core (KI75-2)
71.4-79.7	71.4-72.7	Greenish rock with black olivines, as above.
	72.7-78 ±	Reddish oxidized vesicular rock with scattered minor segregation veins.
	78 ±-79.7	Dense gray rock, olivine-bearing. Almost fresh.
79.7-90.0	79.7-90.0	Dense, olivine-bearing gray rock. Few vesicles. Riddled with small patches of segregation vein material. This was "melt" in 1967.
90.0-100.0	90.0-100.0	Uniform rock. Dense gray, sparsely vesicular to diktytaxitic. Olivine-bearing. Minor segregation material scattered throughout.
	98.0-100.0	Slightly altered. Rest of 90.0-100.0 interval is very fresh.
100.0-110.0	100.0-110.0	Dense gray diktytaxitic rock, olivine-bearing. Little segregation material. Top oxidized (probably continued from 98.0-100.0). Rock gets fresher with depth.
110.0-120.0	110.0-120.0	Dense fresh rock. Gray, diktytaxitic, olivine-bearing.
120.0-130.0	120.0-120.3	Olivine-bearing, gray, diktytaxitic rock.
	120.3-120.8	Segregation vein, nonvesicular to sparsely vesicular, with diabasic texture.
	120.8-121.8	Highly vesicular, vuggy segregation vein.
	121.8-122.2	Slightly altered dense rock. Has small feathery ocelli of pyroxene(?).
	122.2-129.5	Dense gray diktytaxitic olivine-bearing rock with minor segregation veins. All fresh.
	at 128.9	Isolated blebs of fresh greenish-gray glass.
	129.5-130.0	Olivine-bearing rock with interstitial glass, glassy segregation veins.
130.0-132.9	130.0-132.9	Dense, olivine-rich rock with increasingly dark glassy matrix. Reddish on surface.
132.9-139.5		No core. (Bit stuck and core was lost in pulling out.)

Drilling interval (feet)	Assigned depth (feet)	Description of core (KI75-2)
137.5-138.8	137.5-138.8	Black nonvesicular glass; some slightly crystallized from contact with cooling water.

Supplementary notes on spilled core (KI75-2)
(15.8-44.0 feet)

Interval	
15.8-18.1	In place except perhaps bottom piece (of 6). Bottom piece fits on length and vesicularity.
18.1-20.0	Top 3 pieces in place. Bottom piece (of 4) fits on basis of degree of alteration and vesicularity. It is also too long to fit in any other row.
20.0-21.8	These 5 pieces fit together in order given. Their absolute position may be off if any core in the 15.8-20.0' interval is misplaced.
21.8-24.0	First and third pieces interchangeable. Second piece (with segregation vein) in place. Bottom foot of core (fresh rock) is in place.
24.0-26.0	Top 3 pieces in place. Next 2 pieces placed on the basis of (1) core size, (2) freshness of olivine and (3) presence of thin dense layers. Piece #6 (of 7) is arbitrary. Bottom piece is the top of the segregation vein which runs from 26.0-28.0', and is in place.
26.0-28.0	All segregation vein material. Pieces near top have wallrock contact on one side; pieces near bottom are all vein. Placement arbitrary within these two categories. Bottom piece is the bottom contact (in place).
28.0-30.0	Pieces of vesicular olivine-rich rock selected for being (1) full size core and (2) fresh. All placement arbitrary. Nine pieces.
30.0-32.2	Selected for being fresh, dense, full-sized core. Placement arbitrary. Ten pieces.
32.2-34.0	All dense fresh core. Pieces arranged to taper down gradually toward 34.0'. Last two pieces (of 12) are the "spotted rock". These are in place.
34.0-41.0	All undersized pieces of core, arranged roughly by vesicularity. Placement very arbitrary.
43.0-44.0	Oxidized zone at base. Bottom three pieces are in place.

Core Recovery Log for KI75-3

Date	Interval drilled (feet)	Core recovered (feet)	Percent recovery*	Gaps
3/10/75	0.0- 1.9	0.8	43	
	1.9- 3.0	0.9	82	
	3.0- 8.0	5.0	100	
	8.0- 10.8	2.1	75	
	10.8- 12.8	none	--	10.8- 12.8
	12.8- 20.0	7.0	97	
	20.0- 25.0	5.0	100	
	25.0- 35.0	5.6	100	29.2- 33.6
3/11/75	35.0- 45.0	10.3	100	
	45.0- 50.0	4.3	86	
	50.0- 60.0	8.4	100	50.2- 51.8
	60.0- 65.0	3.6	72	
3/12/75	65.0- 75.0	3.0	100	65.2- 67.2
	75.0- 80.0	3.5	70	
	80.0- 86.1	1.5	100	80.0- 84.6
3/13/75	86.1- 91.0	4.4	90	
	91.0- 96.0	4.8	96	
	96.0-100.8	3.6	100	96.4- 97.6
	100.8-106.0	5.0	97	
	106.0-111.0	2.0	100	108.0-111.0
	111.0-116.0	3.8	100	112.7-113.9
	116.0-119.0	2.7	90	
3/14/75	119.0-123.6	2.6	57	
	123.6-129.0	0.6	11	
	129.0-134.0	2.0	40	
	134.0-139.0	4.3	86	
	139.0-144.0	4.6	92	
	144.0-145.7	1.7	100	

Hole KI75-3 was terminated at 145.7 ft, without reaching melt.

*not counting gaps

Petrographic Log for KI75-3

Drilling interval (feet)	Assigned depth (feet)	Description of core
0.0-1.9	0.0-1.9	Highly vesicular, olivine-rich rock. Top oxidized; in the lower piece, the olivines are still fairly fresh.
1.9-3.0	1.9-3.0	Highly vesicular olivine-rich rock, somewhat oxidized, especially along joint surfaces. Minor coatings of whitish secondary mineral.
3.0-8.0	3.0-7.5	Coarsely vesicular, olivine-bearing rock. Variably oxidized; altered most along joint surfaces.
	7.5-8.0	More finely vesicular, denser olivine-bearing rock. Oxidized.
8.0-10.8	8.0-8.2	Denser olivine-bearing rock, as above. Oxidized.
	8.2-10.8	Highly vesicular olivine-bearing rock. Variable alteration.
10.8-12.8	10.8-12.8	No core.
12.8-20.0	12.8-20.0	Highly vesicular olivine-rich rock, all fresh. Many small segregation veins present; at 13.0, 13.3, 13.6, 15.6, 16.2, 18.6, 19.2 and 19.5. All 1/4-1/2" wide, and all flat-lying except the one at 19.2.
20.0-25.0	20.0-25.0	Fresh, variably vesicular olivine-rich rock with small segregation veins at 20.1, 20.9, 21.6, 21.9, and 25.0, all flat-lying.
25.0-35.0	25.0-27.2	Massive segregation vein, highly vesicular.
	27.2-35.0	Denser, olivine-rich rock with flattened vesicles. Fresh. Recovery poor.
35.0-45.0	35.0-35.7	Olivine-rich vesicular rock; olivines fresh.
	35.7-35.8	Segregation vein.
	35.8-38.3	Dense olivine-bearing rock.
	38.3-38.6	Minor segregations (0.3', 0.1').
	38.6-39.7	Vesicular olivine-rich rock.
	39.7-42.0	Denser olivine-bearing rock.

Drilling interval (feet)	Assigned depth (feet)	Description of core (KI75-3)
	42.0-42.2	Segregation.
	42.2-45.0	Variably vesicular, olivine-rich rock. All of this interval (35.0-45.0) very fresh.
45.0-50.0	45.0-50.0	Olivine-rich vesicular rock. Progressively more altered as depth increases.
50.0-60.0	50.0-52.0	Oxidized olivine-rich core. Recovery poor.
	52.0-54.5	Dense fresh core, variable olivine content.
	54.5-55.1	Segregation vein.
	55.1-56.1	Contact below vein fresh for 0.2', followed by very dense oxidized olivine-rich rock (pinkish matrix).
	56.1-57.3	Fresh dense olivine-rich rock.
	57.3-60.0	Dense to moderately vesicular rock; variable olivine content.
60.0-65.0	60.0-65.0	Dense, oxidized, olivine-rich rock, continuous from above.
65.0-75.0	65.0-74.8	Dense, oxidized, olivine-bearing rock.
	74.8-75.0	Vesicular, olivine-rich rock. Oxidized.
75.0-80.0	75.0-80.0	Vesicular, oxidized, olivine-rich rock, continued from above.
80.0-86.1	80.0-84 ±	Oxidized, vesicular, olivine-rich rock.
	84 ±86.0	Denser, fresher rock with less olivine than above, but olivine still abundant.
86.1-91.0	86.1-86.9	Dense olivine-bearing rock. Altered.
	86.9-87.4	Slightly fresher(?) olivine-bearing rock (black olivines).
	87.4-89.0	Oxidized, nonvesicular segregation vein.
	89.0-89.5	Dense olivine-bearing rock, slightly oxidized.
	89.5-90.2	Oxidized, vesicular segregation vein.
	90.2-91.0	Oxidized, vesicular, olivine-rich rock.

Drilling interval (feet)	Assigned depth (feet)	Description of core (KI75-3)
91.0-96.0	91.0-92.3	Oxidized, olivine-rich vesicular rock, as above.
	92.3-96.0	Dense (not diktytaxitic) olivine-bearing oxidized rock. Black and red olivines both present.
96.0-100.8	96.0-100.8	Extremely dense oxidized rock with olivine content decreasing with depth. This was melt in 1967.
100.8-106.0	100.8-106.0	Extremely dense, slightly oxidized rock. Olivine sparse.
106.0-111.0	106.0-111.0	Very dense, slightly oxidized rock (except bottom two pieces, which are fresh). Olivine sparse.
111.0-116.0	111.0-116.0	Very dense olivine-bearing gray rock. Olivine slightly more abundant than in above two intervals. Whitish bloom on rock surface as it dries -- Na-sulfate mineral(s)?
116.0-119.0	116.0-116.5	Vesicular segregation, with cross-cutting vein(?) of dense olivine-bearing rock.
	116.5-118.0	Dense fresh olivine-bearing rock.
	118.0-119.0	Slightly vesicular segregation vein.
119.0-123.6	119.0-120.5	Dense gray olivine-bearing rock.
	120.5-121.5	Segregation vein. Recovery poor.
	121.5-123.6	Dense gray olivine-bearing rock. Olivine content variable. Glassy segregation at bottom.
123.6-129.0	123.6-129.0	Recovery poor. Fragments of dense gray olivine-rich rock with interstitial glass.
129.0-134.0	129.0-134.0	Olivine-rich rock with dark gray matrix (interstitial glass).
134.0-139.0	134.0-137.9	Olivine-rich rock with dark glassy matrix.
	at 135 ±	Vesicle lined with glass.
	137.9-138.5	Black olivine-rich core.
	138.5-139.0	More crystalline olivine-rich rock than above(?).

Drilling interval (feet)	Assigned depth (feet)	Description of core (KI75-3)
139.0-144.0	139.0-144.0	Olivine-rich rock with black glass matrix. Olivine in well-defined bands between 140.4-141.0'.
144.0-145.7	144.0-145.7	Extremely glassy black olivine-rich rock. Olivines 3-5 mm long common.

Core Recovery Log for KI76-1

Date	Interval drilled (feet)	Core recovered (feet)	Percent recovery
8/18/76	0.0- 1.2	1.2	100
	1.2- 2.3	0.8	70
	2.3- 3.5	1.2	100
	3.5- 8.5	4.9	98
	8.5- 10.0	1.5	100
8/19/76	10.0- 15.0	4.8	96
	15.0- 19.0	4.0	100
	19.0- 25.0	6.0	100
	25.0- 35.0	9.7	97
8/20/76	35.0- 45.0	10.0	100
	45.0- 55.0	10.0	100
	55.0- 65.0	10.0	100
	65.0- 75.0	10.0	100
	75.0- 85.0	9.5	95
8/23/76	85.0- 95.0	10.0	100
	95.0-105.0	10.0	100
8/24/76	105.0-115.0	10.0	100
	115.0-125.0	10.0	100
	125.0-135.0	10.0	100
	135.0-140.3	5.3	100
	140.3-145.3	5.0	100
	145.3-149.3	4.0	100

Below this depth the drilling string dropped 1.5 feet to a depth of 150.8 feet, where it was stopped by another layer of rigid crust. Only 0.8 feet of glass from below the crust-melt interface was recovered.

Petrographic Log for KI76-1

Drilling interval (feet)	Assigned depth (feet)	Description of core
0.0-1.2 1.2-2.3 2.3-3.5	0.0-3.5	Highly vesicular, slightly oxidized rock with secondary minerals (probably gypsum and cristobalite) in the vesicles.
3.5-8.5	3.5-4.5	As above.
	4.5-8.5	Highly vesicular, slightly oxidized rock. Olivine-rich.
8.5-10.0	8.5-10.0	As above, but more oxidized.
10.0-15.0	10.0-13.1	Very oxidized, vesicular, olivine-rich rock. Oxidized xenolith(?) at 12.5-12.6 feet.
	13.1-15.0	Fairly dense, fresh rock. Olivine content variable, but mostly lower than rock in 10.0-13.1 interval.
15.0-19.0	15.0-15.2	Continuous with above, but slightly oxidized.
	15.2-18.9	Vesicular, olivine-rich rock. Oxidized between 15.8 and 17.0.
	18.9-19.0	Denser, fresh rock with small segregation at top.
19.0-25.0	19.0-20.9	Fresh rock, mostly olivine rich. Variable vesicularity. Segregation 0.5" thick at top.
	20.9-23.2	Dense, fresh, olivine-rich rock.
	23.2-24.7	Vesicular, olivine-rich rock, locally oxidized. Segregation between 22.7-22.9 ft.
	24.7-24.6	Less vesicular, olivine-rich rock. Slightly oxidized.
	24.6-25.0	Denser fresh rock with small segregation at top.
25.0-35.0	25.0-35.0	All fresh rock. Olivine content and vesicularity variable. Larger vesicles are subhorizontal and partly lined with segregation material. These are scattered throughout this interval.
35.0-45.0-	35.0-41.9	Fresh, olivine-rich rock. Vesicularity variable. Subhorizontal vesicles partly lined with segregation material from 40-41.5 ft.

Drilling interval (feet)	Assigned depth (feet)	Description of core (KI76-1)
	41.9-45.0	Dense fresh rock, with one vesicular zone in center. Olivine less abundant than in 35.0-41.9 interval.
45.0-55.0	45.0-55.0	Fresh gray diktytaxitic rock. Coarse olivine moderately abundant. Many small pipe vesicles, pods of segregation material. Segregation at 54.0-54.2.
55.0-65.0	55.0-65.0	Fresh, gray diktytaxitic rock. Sparse larger vesicles. Coarse olivine phenocrysts moderately abundant. Minor pods of segregation material locally.
65.0-75.0	65.0-70.7	Gray, diktytaxitic rock as above. Olivines moderately abundant.
	70.7-71.3	Segregation vein, 0.5' thick.
	71.3-73.5	Gray diktytaxitic rock, with olivines slightly altered. Coarse olivines sparse.
	73.5-74.0	Segregation vein, very vuggy, with cristobalite in vesicles.
	74.0-75.0	Gray diktytaxitic rock. Olivines slightly altered.
75.0-85.0	75.0-81.9	Fresh diktytaxitic rock. Olivine present but small.
	76.0-77.0	Segregation vein.
	81.9-84.2	Massive segregation vein, very vuggy near top. No olivine.
	84.2-85.0	Fresh gray diktytaxitic rock. Olivine sparse.
85.0-95.0	85.0-95.0	Matrix rock as in 84.2-85.0 interval. Segregations at 86.4-87.3 ft. and 94.3-95.0 ft. Lower one contains olivine, upper does not.
95.0-105.0	95.0-99.7	Gray diktytaxitic rock. Sparse olivines. Several minor segregation veins in this interval.
	99.7-102.3	Massive segregation, vuggy at top. Contains olivine.
	102.3-105.0	Matrix rock as in 95.0-99.7 interval.
105.0-115.0	105.0-115.0	Dense gray rock with very sparse olivine. Large olivine-bearing segregation from 105.2-106.3 ft. Coating of Na ₂ SO ₄ at 109.5-110.5 ft.
115.0-125.0	115.0-116.6	Dense gray diktytaxitic rock. Small (<3 mm) olivine phenocrysts only.

Drilling interval (feet)	Assigned depth (feet)	Description of core (KI76-1)
	116.6-116.8	Segregation vein.
	116.8-119.0	Dense gray diktytaxitic rock. Olivine phenocrysts sparse, small.
	119.0-120.4	Segregation veins with olivine.
	120.4-123.0	Dense matrix rock, as above.
	123.0-125.0	Massive segregation, with olivine.
125.0-135.0	125.0-126.4	Continuation of segregation. Total thickness = 3.4 feet.
	126.4-127.6	Rock shattered to small pieces. Some chips are dense, gray and almost aphyric, but with olivine abundant in groundmass. Some chips have fine-grained segregation material.
	127.6-130.6	Massive segregation, 3.0' thick. Contain olivine.
	130.6-131.0	Dense olivine-bearing matrix rock.
	131.0-131.2	Segregation vein, probably glassy.
	131.2-135.0	Dense gray diktytaxitic rock with flecks of black glass. Olivine phenocrysts sparse.
135.0-140.3	135.0-140.3	Rock as above, except glass more abundant. Olivine phenocrysts commoner, including some large crystals (~6 mm).
140.3-145.3	140.3-141.0	Dense gray rock with glassy matrix. Olivine common.
	141.0-143.3	Massive segregation. Large pools of fresh black glass, surrounded by coarse radiating plagioclase crystals.
	143.3-145.3	Olivine-rich rock with dark gray matrix containing abundant glass. Minor cross-cutting veinlets of glass.
145.3-150.0	145.3-149.3	Olivine-rich rock with gray to black matrix. Conspicuous vertical segregations of coarse olivine. Black glass in contact with crust at 149.3 ft.
	149.3-150.0	Black glass, containing scattered olivine, plagioclase crystals.

Core Recovery Log for KI76-2

Date	Interval drilled (feet)	Core recovered (feet)	Percent recovery
8/30/76	0.0- 10.5	none	0
	10.5- 14.0	3.5	100
	14.0- 24.0	10.0	100
	24.0- 34.3	10.3	100
8/31/76	34.3- 44.0	9.3	96
	44.0- 54.0	9.8	98
	54.0- 64.3	10.3	100
	64.3- 74.1	9.8	100
	74.1- 84.1	10.0	100
9/1/76	84.1- 94.3	10.2	100
	94.3-102.5	8.2	100
	102.5-110.0	7.9	?
	110.0-115.5	5.5	100
	115.5-125.8	10.3	99
	125.8-135.8	9.9	99
	135.8-145.8	10.0	100
9/2/76	145.8-150.5±	4.7+ plus 0.5 feet of glass, down to approximately 151 feet	100
9/3/76	138.5-147.1 (ooze+)	0.9	10

Petrographic Log for KI76-2

Drilling interval (feet)	Assigned depth (feet)	Description of core
0.0-10.5		No core recovered.
10.5-14.0	10.5-14.0	Olivine-rich, highly vesicular rock. Oxidized.
14.0-24.0	14.0-14.2	Oxidized, vesicular rock continuous with above.
	14.2-15.7	Relatively dense fresh rock.
	15.7-19.7	Oxidized, vesicular rock. Olivine-rich.
	19.7-22.7	Denser, fresh rock. Coarse olivine clots at 20.5 ft.
	22.7-24.0	More oxidized, vesicular rock.
24.0-34.3	24.0-24.5	Oxidized olivine-rich rock, continuous with above.
	24.5-30.0	Fairly dense rock, which locally has a few large vesicles flattened. Olivine content variable.
	30.0-34.3	Finely vesicular rock, with variable olivine content. Locally more coarsely vesicular, with largest vesicles flattened. These sometimes contain vuggy ilmenite (31.3 ft.).
34.3-44.0	34.3-35.0	Reground core. Vesicular, olivine-rich, slightly altered.
	35.0-41.8	Vesicular rock, olivine content variable. All slightly altered, especially along joint surface.
	41.8-43.1	Dense fresh rock.
	43.1-44.0	More vesicular, olivine-rich rock. Slightly altered.
44.0-54.0	44.0-47.8	Mostly fairly dense rock, slightly altered, with whitish bloom at 47.0-47.8 ft.
	47.8-49.5	More strongly oxidized rock. Finely vesicular from 48.5-49.5 ft.
	49.5-54.0	Fairly dense, fresh gray rock. Moderate olivine content. Whitish bloom locally.
54.0-64.3	54.0-64.3	Gray, finely vesicular to diktytaxitic rock. Olivines slightly altered. Small (<0.1') segregation at 55.3 ft. dipping ~45°.

Drilling interval (feet)	Assigned depth (feet)	Description of core (KI76-2)
64.3-74.1	64.3-71.4	As above (54.0-64.3 interval). Whitish coating on joint surfaces.
	71.4-71.8	Segregation vein.
	71.8-74.1	Fresh gray diktytaxitic rock with scattered small segregations crosscutting at low angles.
74.1-84.1	74.1-77.1	Gray diktytaxitic rock with small blebs and stringers of segregation material.
	77.1-77.9	Vuggy segregation vein.
	77.9-83.1	As in 74.1-77.1 ft. interval.
	83.1-84.1	Segregation vein. No olivine seen.
84.1-94.3	84.1-84.3	Continuation of segregation vein, 1.2' thick.
	84.3-93.7	Gray diktytaxitic rock. Coarse olivine rare, smaller olivines common. Many joint surfaces, with whitish coatings of gypsum(?). Segregation at 86.0-86.5.
	93.7-94.3	Vuggy segregation vein. Appears somewhat altered.
94.3-102.5	94.3-94.6	Continuation of above segregation vein, 0.9' thick.
	94.6-99.1	Gray diktytaxitic rock, with minor segregation material locally.
	99.1-102.3	Massive segregation with olivine. Vuggy in center, less vesicular near top and bottom contacts.
	102.3-102.5	Matrix rock as in 94.6-99.1 interval.
102.5-110.0	102.5-105.1	Gray, diktytaxitic rock, with scattered pods of segregation material. Small olivine phenocrysts common.
	105.1-106.1	Segregation vein. Cristobalite beads common in vugs.
	106.1-110.0	Matrix rock as in 102.5-105.1 interval.
110.0-115.5	110.0-115.5	Gray diktytaxitic rock. Olivine phenocrysts common locally. Large vesicle(?) at 115.2-115.3. Whitish Na ₂ SO ₄ bloom between 110.5 and 113.5.

Drilling interval (feet)	Assigned depth (feet)	Description of core (KI76-2)
115.5-125.8	115.5-123.5	Gray diktytaxitic rock with small olivine phenocrysts. Segregations at 118.4-118.6 (flat-lying), 118.7-119.0 (steeply dipping, very olivine-rich) and at 121.0-121.5 (steeply dipping, olivine-bearing).
	123.5-125.8	Massive segregation vein with olivine.
125.8-138.8	125.8-127.0	Continuation of segregation vein. Total thickness 3.5 feet.
	127.0-128.6	Dense gray rock, shattered to small pieces. Olivine sparse.
	128.6-131.4	Massive segregation, with olivine, 2.8 ft. thick.
	131.4-135.8	Dense gray rock, much broken up. Slightly vuggy around minor segregations. Radial fractures present at 132 ft., plus minor black glass. Glass content increases downward.
135.8-145.8	135.8-141.6	Partly glassy rock with gray to dark gray matrix. Olivine abundant though mostly <5 mm.
	141.6-144.0	Massive segregation, still partly molten.
	144.0-145.8	Dark gray rock with glassy matrix. Olivine abundant.
145.8-152±	145.8-151±	Dark gray to black rock with onion skin fractures. Very glassy, with conspicuous coarse olivine.
	151± 152±	Black glass, highly fragmented, with scattered olivine crystals, etc. Glass in bit had vesiculated, probably from cooling water.
138.5-147.1	?	Core half wallrock, half ooze.

Core Recovery Log for KI75-1R
(Re-entry of hole KI75-1)

Date	Interval (in feet)	Recovered (in feet)	Percent Recovery
12/8/78	131.7-133.9 (ooze)	2.2	100
	133.9-136.9 (ooze)	3.0	100
	136.9-143.6 (ooze)	6.7	100
12/9/78	143.6-155.7	9.1	100
	155.7-166.7	10.0	100
	166.7-172.5	6.8	100
12/11/78	172.5-173.1	0.6 Plus 5 feet of black glass	
12/12/78	164.7-170.5 (ooze)	~6.0	

Petrographic Log for KI75-1R

Depth (in feet)	Description of core
132# -140.0	Crystallized ooze, becoming less vesicular downward.
140.0-143.6	Dense, flinty, crystallized ooze, becoming coarser-grained downward.
143.6-145.3	Crystallized ooze, with grain size gradually approaching that of a segregation vein by 145.3.
145.3-146.1	Transition zone of dense segregation material and dense gray olivine-bearing matrix rock. First coarse olivines at 146.1.
146.1-155.8	Dense gray olivine-rich rock. Core mostly in small pieces, but olivine distribution appears to be fairly uniform. Fracture pattern in lower half of interval is from cooling water.
155.8-155.9	Glassy segregation. First obvious glass.
155.9-169.2	Glassy, olivine-rich core. Glass content increases downward. Coarse olivines abundant, but their distribution is fairly uniform. Segregations at: 156.0-156.1, 159.4-159.6, 160.4, 166.1.
169.2-173.0	Black olivine-rich glassy core. Olivine distribution uniform.
173.0+	Black glass, in fragments, recovered from core barrel and bit.

Core Recovery Log for KI79-1

Date	Interval (in feet)	Recovered (in feet)	Percent recovery
12/13/78	0 - 1.3	0.9	70
	1.5- 2.4	1.1	100
	2.4- 4.2	1.8	100
	4.2- 5.1	0.9	100
	5.1- 6.3	1.2	100
	6.3- 8.7	2.4	100
	8.7- 14.0	5.3	100
	14.0- 21.4	7.4	100
	21.4- 23.8	2.4	100
12/14/78	23.8- 34.0	10.2	100
	34.0- 44.0	9.9	99
	44.0- 54.0	10.0	100
12/15/78	54.0- 64.0	10.0	100
	64.0- 74.0	10.0	100
	74.0- 84.0	10.0	100
12/18/78	84.0- 94.2	10.2	100
	94.2-104.2	10.2	100+
	104.2-114.2	10.0	100
12/19/78	114.2-124.0	9.8	100
	124.0-128.2	4.2	100
12/20/78	128.2-134.2	6.0	100
	134.2-144.2	10.0	100
	144.2-154.1	9.9	100
	154.1-164.2	10.1	100
	164.2-174.2	10.0	100
	174.2-184.4	10.2	100
12/21/78	184.4-194.3	9.9	100
	194.3-204.0	9.7	100
	203.2-204.0	0.7	100

Upon reaching 204 ft, the entire drill string was withdrawn from the hole to check the condition of the bit. Upon re-entry the driller put bottom at 203.2'. Last 0.7' of core recovered upon lowering entire string again is undersized. Hole appears to have collapsed during the time the string was up.

1/25/79	166.8-176.8	10.2	100+
	172.9-178.0	6.4	100+
	172.9-177.9	6.7	100+

Petrographic Log for KI79-1

Depth (in feet)	Description of core
0.0- 5.1	Highly vesicular olivine-rich core. Some vesicles coated with secondary anhydrite/gypsum.
5.1-14.0	Vesicles generally somewhat smaller than above, but core still very vesicular. Much olivine. One dense layer at 10.8' to 10.9'. All rock slightly oxidized.
14.0-14.7	Highly vesicular, somewhat oxidized rock.
14.7-15.0	Denser, fresher rock. Many vesicles filled with segregation material (spotted rock), especially in lower half of interval.
15.0-26.3	Highly vesicular olivine-rich rock, mostly somewhat oxidized. (Olivine, vesicles, oxidation increase together.) Denser layers at 15.5-15.6, 18.0-18.5, 18.7-20.1, 20.7-21.5 Segregations at: 17.9-18.0, 19.2, 20.0, 23.6-23.7. In addition to these, there are smaller stringers of segregation material, plus many of dense layers are "spotted rock" i.e. the vesicles are completely filled with segregation material.
26.3-39.4	Highly vesicular, olivine-rich rock. All quite fresh. Vesicles flattened locally. Segregation veins at 29.3-29.9, 35.5, plus segregation material lining large cavities from 37.4-37.6.
39.4-47.0	Highly vesicular, olivine-rich core. Fresh. Minor segregation material in largest vesicles.
47.0-53.2	Denser rock. Olivine common, fresh. Larger vesicles all flattened, now dipping irregularly in various directions.
53.2-67.0	Vesicular rock. Most vesicles small, not deformed at all. Olivine phenocrysts common, mostly fresh. Segregations at: 57.6-57.7, 58.7-58.9, 60.2-60.3, 63.9, 65.7-65.8, 65.9-66.1.

Depth (feet)	Description of core (KI79-1)
67.0-80.9	Finely vesicular rock. Olivine content moderate to sparse, decreasing downward. All fresh. Segregations at: 70.0-71.2, 74.9-75.2, 78.6-78.8, 79.3.
80.9-93.8	Finely vesicular rock. Olivine phenocrysts small. Rock very uniform in appearance in this interval. Segregation at 82.2-84.2 (with olivine), 86.6-86.8 (dipping ~60°), 88.7-89.1, 91.7-91.8.
93.8-108.2	Finely vesicular to diktytaxitic rock. Olivine phenocrysts small, though fairly common when rock is examined closely. Segregations at: 96.8-97.2, 104.6, 106.4-106.9.
108.2-121.9	Fresh gray diktytaxitic rock. Olivine scarce. Heavy Na ₂ SO ₄ bloom from 120-121-8. Segregations at: 112.0, 114.4-115.4 (irregular contact -- might be feathered edge of 2 veins).
121.9-135.6	Fresh gray, mostly diktytaxitic rock. Olivine content somewhat higher than in above interval, but crystals still small (<5mm). Dense core which shatters with conchoidal fracture at 124-128. Na ₂ SO ₄ bloom at 123.3-123.7. Segregations at: 126.4-126.6, 129.1-129.8, 130.0-131.9 (with olivine). None of these are vuggy. Also present: two large, empty vesicles at 122.6.
135.6-149.3	Dense gray rock. Olivine content increases steadily in this interval. From 141' to 149', olivine is concentrated in slightly vuggy vertical bands. Segregations at: 138.8-140.6, 148.6-149.3.
149.3-162.2	Dense fresh rock with light-gray matrix. Olivine content generally higher than in above interval. Vuggy, olivine rich bands occur at 5-6 places through interval. Their contacts dip 70-90°. Core from 159-162.2' has hackly radial cracking from cooling water. Segregation at 157.6-158.2.
162.2-164.1	Dense rock with dark-gray matrix. Pools of black glass in matrix at 163.4. Olivine content very high throughout.

Depth (feet)	Description of core (KI79-1)
164.2-175.9	<p>Glass content increases downward. Lowest piece has black matrix with abundant olivine phenocrysts. Vertical concentrations of olivine + glass conspicuous in 172-175.9' interval. Above that, olivine-rich layers are subhorizontal.</p> <p>Segregation at 167.1-167.5.</p> <p>Thinner segregations/glassy partings at: 168.2, 169.5-169.8 (steeply dipping), 169.8 (horizontal) 173.5-173.7 (dipping 45°, complex upper contact) 175.3 (dipping 45°).</p>
175.9-184.3	<p>Core has black glassy matrix throughout. Olivine content very high. Olivine-glass concentration present at 178.5', 182-184'.</p> <p>Small glassy parting at 176.0-176.2 (dipping 45°).</p>
184.3-185.0	<p>Rubbly, vesicular zone. Very olivine-rich. Temperature maximum? Scoriaceous surfaces coated (?) with black glass.</p>
185.0-194.4	<p>Very black olivine-rich core. Olivines uniformly distributed. Exterior of core becoming variable in diameter, increasingly corrugated. Suggests it was still plastic while rising through bit and core catcher (i.e., cooling water not circulating well. Like core from bottom of 75-1, only more so.)</p> <p>Glass parting at 187.9'.</p> <p>Very glassy vesicular areas at 195.0-196.0'.</p>
194.4-204.0	<p>Very black olivine-rich core, with corrugated surface down to 202.0'. Very glassy, olivine-rich pocket at 202.2.</p>
203.2-204.0	<p>Core not corrugated, distinctly less glassy than above. Core recovered in this interval is undersized.</p> <p>Plus 23.3' of olivine-rich black glassy core recovered during the attempted re-entry of KI79-1 on 1/26/79. The hole had collapsed completely, and collapsed twice during the re-drilling.</p>

Core Recovery Log for KI79-2

Date	Interval (in feet)	Recovered (in feet)	Percent recovery
12/28/78	0.0- 1.8	1.8	100
	1.8- 4.2	2.1	88
	4.2- 5.7	1.5	100
	5.7- 7.3	1.6	100
	7.3- 8.2	0.9	100
	8.2- 18.2	10.0	100
12/29/78	18.2- 28.0	9.8	100
	28.0- 38.0	10.0	100
1/2/79	38.0- 44.1	6.1	100
	44.1- 54.0	9.9	100
1/3/79	54.0- 64.0	10.0	100
	64.0- 74.0	10.0	100
	74.0- 84.0	10.0	100
	84.0- 94.0	10.0	100
	94.0-104.0	10.0	100
	104.0-114.0	10.0	100
1/4/79	114.0-124.0	10.0	100
	124.0-133.0	10.0	100
1/5/79	133.0-143.7	10.7(?)	100
	143.7-153.8	10.1	100
	153.8-163.8	10.0	100
	163.8-165.6	1.8	100

Plus about 0.4' of black glass collected in bit.

1/5/79	154.9-165.1 (ooze)	10.2
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Petrographic Log for KI79-2

Depth (in feet)	Description of core
0.0- 4.1	Highly vesicular rock. Olivine common. Secondary minerals (anhydrite, gypsum) line vesicles through much of this interval.
4.1-11.6	Vesicular core, somewhat less vesicular than above. All fresh.
11.7-13.2	Oxidized vesicular core.
13.2-13.5	Dense layer directly under above oxidized, vesicular zone.
13.4-24.6	Vesicular core, mostly oxidized, olivine-rich, with occasional fresher, denser layers. These are locally "spotted rock". Dense layers at: 15.1-15.8 (partly spotted rock) 17.0-17.2 19.6-20.1 21.5-22.3 (spotted-rock) 23.8-24.6 These are all olivine-rich. Segregation veins at: 19.6-19.7 21.2 23.0-23.3
24.6-38.3	Core still vesicular, but less so. Zones of flattened vesicles at 24.8-25.2, 28.0-29.5, 31.3-31.6, 33.6-33.8, 35.7-35.9, 38.0-38.4. Some of these bands are quite dense, others not. Core somewhat oxidized from 34.3-38.4. Upper part (24.6-34.3) is mostly quite fresh. Segregations at 29.9, 33.6, 35.8, 36.4.
38.3-50.9	Vesicularity decreases markedly in this interval. Olivine common; some very coarse olivines present. Zones of flattened, deformed vesicles present at 40.7-41.8, 43.3-44.1. Central part (42-46) fresh; rest is slightly oxidized.

Depth (feet)	Description of core (KI79-2)
50.9- 63.0	<p>Finely vesicular to diktytaxitic rock, mostly fresh. Olivine common.</p> <p>Segregation at 52.6, 52.8-52.9, 54.9, 59.0.</p>
63.0- 75.1	<p>Finely vesicular to diktytaxitic fresh gray rock. Olivine common.</p> <p>Segregations at 66.2-66.4 (dipping 60°) 70.3-70.5 (dipping 30°), 74.6-75.1.</p>
75.1- 86.3	<p>Fresh gray diktytaxitic rock. Olivines smaller, less abundant than above.</p> <p>Segregations at: 76.1-76.7, 77.7-77.9 (complex web of veins), 82.9-84.0, 85.7-86.3.</p>
86.3-97.3	<p>Fresh gray diktytaxitic rock. Small olivine phenocrysts fairly common, very uniformly distributed.</p> <p>Segregations at: 89.5-90.0 (steeply dipping, only 1" wide), 93.4-94.7.</p>
97.3-110.4	<p>Fresh gray diktytaxitic rock. Small olivine phenocrysts still fairly common.</p> <p>Segregations at 100.0-102.8, 105.3-106.0, 110.0-110.4. All contain olivine.</p>
110.4-122.4	<p>Fresh diktytaxitic rock, very uniform. Olivine sparse, small.</p> <p>Segregations at: 111.6 (very vuggy), 117.6-118.0 (top half very vuggy), 120.7-121.3. Lower two both have olivine.</p>
122.4-133.3	<p>Matrix rock is fresh, olivine-poor to 123.0. Olivine content increases noticeably within this interval. From 131.8-133.3 olivine is common, though crystals are mostly small. This interval is mostly segregation veins as follows:</p> <p style="padding-left: 40px;">123.0-125.5 (olivine-bearing) 128.8-131.8 (olivine-bearing)</p>
	<p>Both segregations are distinctly more vesicular in the top half than in the bottom part.</p>
133.3-146.6	<p>Olivine-rich rock with a gray, diktytaxitic matrix from 133.3-135.5 and a dense black matrix from 135.5-146.6. Quenched by 1976 drilling.</p> <p>Segregation at 140.9-143.6.</p>

Depth (feet)	Description of core (KI79-2)
146.6-149.0	Dense olivine-rich rock. Matrix not as strongly quenched as in above interval.
149.4-150.6	Massive segregation vein. This was melt in 1976.
150.6-159.7	Olivine-rich rock. Hackly radial fractures from being quenched by cooling water. First pools of black glass at 154.8, in small segregation. Glass increases rapidly below that depth, so that 156-159.7 is black-matrix rock.
159.7-165.6'	Black glassy rock with abundant coarse olivine crystals. Occasional olivine-glass concentrations, which are slightly vuggy. Crust-melt interface (?) at 165.6'.
165.6'+	About 0.4' of black glass collected in bit.

Core Recovery Log for KI79-3

Date	Interval (in feet)	Recovered (in feet)	Percent recovery
1/8/79	0.0- 1.8	1.8	100
	1.8- 3.5	1.7	100
	3.5- 4.6	1.1	100
	4.6- 6.2	1.6	100
	6.2- 9.8	2.0	55
	9.8- 14.7	4.9	100
	14.7- 24.7	10.0	100
	24.7- 34.8	10.1	100
	34.8- 45.0	10.2	100
1/9/79	45.0- 55.0	10.0	100
	55.0- 64.7	9.7	100
	64.7- 74.8	10.1	100
	74.8- 84.8	10.0	100
	84.8- 95.0	10.2	100
	95.0-105.0	9.8	98
	105.0-115.2	9.7	100
	115.2-124.8	9.6	100
	124.8-134.5	9.7	100
134.5-144.3	9.8	100	
1/10/79	144.3-154.0	9.7	100
	154.0-164.0	10.0	100
	164.0-172.8	8.8	100
Plus 0.4' of glass in core barrel and bit.			
1/10/79	155.2-165.4 (ooze)	10.2	

Petrographic Log for KI79-3

Depth (in feet)	Description of core
0.0-14.5	Highly vesicular, olivine-rich basalt. Upper 0.2 oxidized. Anhydrite/gypsum intermittently present lining vesicles in 1.0-5.0 interval. Lowest 2 feet oxidized near vertical crack.
14.5-14.7	Fairly dense rock, containing relatively little olivine.
14.7-15.0	Vesicular olivine-rich basalt. Oxidized.
15.0-15.2	Dense layer. Is dense chiefly because vesicles are filled with segregation material (spotted rock).
15.2-25.6	Variably vesicular olivine-rich rock, locally oxidized. Dense layers at 15.1-15.8, 17.1-17.2, 18.2-18.4, 18.4-18.5, 21.9-22.1. Segregation veins at: 15.6, 16.6, 18.2, 18.4, 20.0-20.2, 23.5-23.6.
25.6-27.6	Less olivine than in above interval. Vesicles larger.
27.6-29.6	Slightly oxidized vesicular basalt, as in above interval.
29.6-34.8	Fresher rock than above. Vesicles very variable in size; locally they appear to be stretched and distorted. Some partly filled with segregation material, including one very large cavity at 33.0-33.2.
34.8-41.5	Moderately olivine-rich, fresh rock, generally less vesicular than in above interval. Large cavities at 34.8, 36.4. Segregations at 38.7, 41.0. Strings of small vesicles with segregation material common from 37.5-41.5.
41.5-55.0	Fresh rock, moderately rich in olivine. Vesicularity somewhat variable, but tending to decrease downward. Minor, highly vesicular segregations at 49.0, 53.3, 54.7.
55.0-65.8	Fresh rock; olivine content moderate. Vesicles small except where associated with segregation material. Segregations at: 57.1-57.2, 61.5-61.8.

Depth (feet)	Description of core (KI79-3)												
65.8-79.8	<p>Fresh rock, finely vesicular to diktytaxitic. Coarse olivine noticeably less abundant than above; olivine phenocrysts sparse in 77-79.8 interval.</p> <p>Segregations at 67.0-67.5 (dipping 30°), 73.0-73.3 (dipping 20°), 74.8-76.9 and 77.3. All contain beads of cristobalite in vesicles. First and third contain olivine.</p>												
79.8-91.3	<p>Fresh gray diktytaxitic rock. Olivine phenocrysts sparse.</p> <p>Segregations at:</p> <table border="0" style="margin-left: 2em;"> <tr> <td>80.4</td> <td>dipping 45°</td> </tr> <tr> <td>81.6-81.9</td> <td>with cristobalite in vesicles</td> </tr> <tr> <td>84.8-84.9</td> <td>irregular: diabase mixed with fine-grained material - ??</td> </tr> <tr> <td>86.5-87.0</td> <td>with olivine</td> </tr> <tr> <td>88.5-88.7</td> <td></td> </tr> <tr> <td>90.4-90.6</td> <td>with cristobalite in vesicles</td> </tr> </table>	80.4	dipping 45°	81.6-81.9	with cristobalite in vesicles	84.8-84.9	irregular: diabase mixed with fine-grained material - ??	86.5-87.0	with olivine	88.5-88.7		90.4-90.6	with cristobalite in vesicles
80.4	dipping 45°												
81.6-81.9	with cristobalite in vesicles												
84.8-84.9	irregular: diabase mixed with fine-grained material - ??												
86.5-87.0	with olivine												
88.5-88.7													
90.4-90.6	with cristobalite in vesicles												
91.3-91.4	Vuggy segregation.												
91.4-105.5	<p>Gray diktytaxitic basalt. Olivine phenocrysts sparse. Isolated large vesicles and strings of vesicles associated with minor segregation material scattered through interval.</p> <p>Large segregation at 99.3-100.3 contains olivine. Vuggy in middle.</p>												
105.5-118.7	<p>Gray diktytaxitic rock. Noticeably denser in lower half of interval. Heavy Na₂SO₄ bloom at 116.7-117.9.</p> <p>Segregations at: 107.0-107.1 110.1-110.2 113.3-114.6</p>												
118.7-131.0	<p>Gray diktytaxitic rock. Olivine content increases markedly in this interval: olivine phenocrysts common in 127-131 interval. Three distinct intervals of very heavy Na₂SO₄ bloom in core, above segregation veins, as follows:</p> <table border="0" style="margin-left: 2em;"> <tr> <td>Segregation:</td> <td>Na₂SO₄</td> </tr> <tr> <td>121.0-121.8</td> <td>119.6-121.1</td> </tr> <tr> <td>122.9-123.2</td> <td>122.0-122.9</td> </tr> <tr> <td>124.7</td> <td>123.8-125.5</td> </tr> <tr> <td>125.5-126.1</td> <td></td> </tr> <tr> <td>126.4-126.7</td> <td></td> </tr> </table> <p>All larger segregations have olivine.</p>	Segregation:	Na ₂ SO ₄	121.0-121.8	119.6-121.1	122.9-123.2	122.0-122.9	124.7	123.8-125.5	125.5-126.1		126.4-126.7	
Segregation:	Na ₂ SO ₄												
121.0-121.8	119.6-121.1												
122.9-123.2	122.0-122.9												
124.7	123.8-125.5												
125.5-126.1													
126.4-126.7													

Depth (feet)	Description of core (KI79-3)
131.0-144.3	<p>Gray diktytaxitic rock. Olivine content moderate to high. Conspicuous vertical swirls of coarse olivines, associated near their tops with minor stringers of segregation material. Very high concentration of olivine 140-144. All this was glassy in 1975.</p> <p>Small segregations at 135.5, 140.2, 143.7, 144.1.</p>
144.3-156.7	<p>Core in this interval consists of alternating bands of dense (flinty) rock with moderate olivine content and finely vesicular rock with extremely high olivine content. There are approximately six layers of each. The contacts between these two rock types dip 60-80°. All rock very fresh. One segregation at 144.8-144.9. The crust-melt contact seen in 1975 was at 145.1.</p>
156.7-158.0	<p>Matrix rock is flinty with moderate olivine content. There are two segregations, at 156.9-157.0 and 157.5-158.0, both still vuggy. A joint surface runs vertically between these two. It formed while the segregations were still molten, as the surface of the joint is coated with glass adjacent to each vein in a band 2-4" wide.</p>
158.0-161.1	<p>Dense olivine-rich rock. Dark-gray matrix.</p>
161.1-169.6	<p>Glass present in matrix. Rock becomes increasingly glassy downward. Olivine abundant. Olivine-rich concentrations at 162.2-162.3 and 165.5-166.0, but this section lacks the conspicuous banding seen in 144-157 interval. Segregations present in this interval: 161.3, 163.5-163.7 (glassy), 163.9, 165.2-165.3 (glassy), 168.1 (glassy).</p>
169.6-172.9	<p>Black, glassy olivine-rich rock. Olivine distribution uniform.</p> <p>Glassy parting at 170.3.</p>
172.9	<p>Crust-melt interface.</p>
172.9-173.0	<p>Black glass from bit.</p>

Drilling and Recovery Data For KI79-4

Drilling for hole KI79-4 began 1/12/79. Coring was stopped at 172.1 feet, on January 16, 1979. Core recovery from 0.0-172.1 feet was nearly 100%.

Hole KI79-4 was extended to a depth of ~ 185 feet by churn-drilling, with a special high-temperature bit, on January 18. No core was recovered, however, and the hole did not stay open when the drill string was withdrawn. This information is mostly derived from Sandia in-house report SAND79-1360, by Neel, Striker and Curlee.

Petrographic Log for KI79-4

Depth (in feet)	Description of core
0.0- 5.0	Highly vesicular crust. Olivine common, fresh. Vesicles coated with secondary minerals (anhydrite/gypsum) through much of this range.
5.0-13.0	Highly vesicular crust. Olivines oxidized in this interval.
13.0-14.0	Denser layer. Olivines fresh.
14.0-27.2	Highly vesicular, olivine-rich rock. All oxidized except in two denser layers at 14.8-15.8 and 17.4-17.6. Segregations at 17.4-17.5, 19.2-19.3, 19.4-19.5, 20.8-20.9, 23.0, 23.2-23.3.
27.2-39.5	Vesicular crust. Olivine somewhat less conspicuous than in above intervals. Zones of distorted vesicles at 28-30 and 34.5-36.01. Most vesicles lined with crust of crystals minor segregation material? One segregation (0.5" thick) between 31.4 and 31.8, dipping 80°.
39.5-49.0	Vesicular crust. Vesicles stretched, flattened, or steeply dipping, throughout this interval. Olivine content moderate. Olivines oxidized. Segregations at 44.0-44.1 and 48.0-48.1, plus minor ones associated with sheet vesicles.
49.0-53.9	Vesicular crust. Vesicles undeformed. Olivine common, mostly fresh.
53.9-67.6	Vesicles decrease noticeably in size and abundance in this interval. Olivine phenocrysts common, slightly oxidized. Segregations at: 56.1-56.2, 60.1-60.4, 65.1-65.4.
67.6-74.0	Vesicular gray rock. Most vesicles small except for those associated with small strings of segregation material. Olivine common, mostly fresh. Segregations at: 69.6-69.8 (dipping 85°), 70.3-73.5. Last one contains olivine.
74.0-75.7	Massive segregation, with olivine.

Depth (feet)	Description of core (KI79-4)
75.7- 81.5	Finely vesicular to diktytaxitic rock. Olivine less abundant than in 67.6-74.0 interval. Segregation from 81.2-81.5
81.5- 93.8	Finely vesicular to diktytaxitic rock. Fresh. Olivine phenocrysts sparse. Segregations at: 84.1-84.3 (0.1 thick, dipping 30°) 85.2-85.9 87.7-87.9 88.1-88.6 (very vuggy; maybe some core lost) 91.0-91.2
93.8- 94.1	Segregation vein.
94.1-108.1	Gray diktytaxitic rock, with small, sparse olivine phenocrysts. Some vuggy cavities associated with minor segregation material. Segregations at: 96.9-98.2 (cristobalite in vesicles), and 104.0-104.1.
108.1-111.6	Fresh diktytaxitic rock with sparse olivine phenocrysts.
111.6-114.2	Massive segregation vein.
114.2-121.2	Dense fresh rock. Shattered, with conchoidal fracture, by drilling (?). Olivine phenocrysts small, rare. Segregations at: 117.9-118.2, 119.1-119.7.
121.2-122.0	Segregation vein.
122.0-134.0	Fresh gray diktytaxitic rock, with scattered small olivine phenocrysts. Olivine content noticeably higher than in 108-121 interval. Na ₂ SO ₄ bloom at 122-124. Segregation veins at: 122.7, 123.4, 123.6, 124.0, 127.0-127.8.
134.0-143.5	Dense, dark gray core. Olivine phenocrysts common to abundant. Big phenocrysts concentrated in steeply dipping (80°) bands. This was glassy in 1975.
143.5-147.9	Very olivine-rich, fresh rock. Locally vuggy, near small patches of segregation material. Segregations at: 144.9, 145.3-145.4.

Depth (feet)	Description of core (KI79-4)
147.9-161.3	Dense olivine-rich rock. Alternating bands with more/less olivine, dipping at 70-80°, as in KI79-3. Segregations at: 155.7, 159.8-160.3 (the latter a complex of small segs. interlayered with matrix rock).
161.4-172.1	Olivine-rich rock. Olivines more uniformly distributed than in above interval. Small glassy segregation at 161.5' = first glass? Glass increases downward to black-matrix, olivine-rich rock at 172.1. Glassy partings at 164.7, 167.0, 170.0-170.1.

Core Recovery Log for KI79-5

Date	Interval (in feet)	Recovered (in feet)	Percent recovery
1/30/79(?)	0.0- 8.0	0	0
	8.0- 14.0	6.1	100
	14.0- 24.0	9.8	98
	24.0- 34.0	10.1	100
	34.0- 44.0	10.1	100
	44.0- 54.0	9.5	95
	54.0- 64.0	10.0	100
1/31/79(?)	64.0- 74.0	9.4	94
	74.0- 84.0	10.0	100
	84.0- 94.0	10.0	100
	94.0-104.0	10.0	100
	104.0-114.0	10.0	100
	114.0-124.0	10.0	100
	124.0-134.0	10.0	100
	134.0-144.0	10.0	100
144.0-154.0	9.6	96	
2/1/79	154.0-164.0	10.0	100
	164.0-174.0	10.0	100
	174.0-184.0	10.0	100
	184.0-194.0	10.0	100
	194.0-204.0	10.0	100
	204.0-214.0	10.0	100
2/6/79	214.0-224.0	10.1	100+
	224.0-234.0	9.8	98
	234.0-244.0	10.0	100
	244.0-254.0	10.0	100
2/7/79	254.0-264.0	10.0	100
	264.0-274.0	10.0	100
	274.0-284.0	10.0	100
	284.0-294.0	10.0	100
	294.0-304.0	10.0	100
2/9/79	304.0-314.0	10.0	100
	314.0-324.0	8.2	82
	324.0-330.8	5.2	76

Petrographic Log for KI79-5

Depth (in feet)	Description of core
0 - 8	No core taken.
8 - 10.5	Highly vesicular basalt. Olivines somewhat oxidized.
10.5-11.0	Highly oxidized pumiceous rubble. Foundered crust that didn't go anywhere? Sharp upper contact with black vesicular basalt dips $\sim 60^\circ$. Rubble (0.2' thick) underlain by more basalt (0.3') then more rubble, irregularly enclosed in basalt.
11.0-14.0	Vesicular basalt. Less vesicular, somewhat more oxidized than 8-10.5 interval.
14.0-24.0	Vesicular olivine-rich basalt. Vesicles flattened, distorted in much of this interval. Olivine more abundant than in overlying section. Small segregations at: 14.0, 14.4, 15.3, 21.0, 21.7, 22.2, 22.4, 23.2. Lower 3 dip $\sim 45^\circ$, upper ones nearly flat-lying.
24.0-24.7	Vesicular olivine-rich basalt.
24.7-26.2	Segregation vein. Vesicles evenly distributed.
26.2-30.9	Fresh olivine-rich rock. Vesicularity variable. Many zones of distorted vesicles or vesicles partly filled with segregation material. Small segregation at 26.6-26.7.
30.9-32.4	Segregation vein. Vesicles evenly distributed.
32.4-34.0	Fresh olivine basalt. Olivine content and vesicularity variable. Zones of distorted vesicles as above.
34.0-37.0	Mostly fairly dense fresh rock with smaller olivines. Layer at 34.8-35.7 is oxidized, more vesicular, more olivine-rich.
37.0-40.2	Vesicular, very olivine-rich rock. Somewhat oxidized.
40.2-43.2	Denser, fresher rock. Olivine content moderate to high.
43.2-44.0	Vesicular, olivine-rich rock, as in 37.0-40.2 interval. Oxidized.

Depth (feet)	Description of core (KI79-5)
44.0-54.0	Vesicular olivine-rich rock. Vesicles decrease from moderate to sparse in this interval. All rock somewhat oxidized. Minor segregation material associated with bigger vesicles.
54.0-55.0	Dense rock with traces of flattened vesicles. Pinkish matrix, especially near top of interval. Olivine content moderate. Olivines slightly oxidized.
55.0-57.0	Rock somewhat more vesicular than in above interval. Olivine content somewhat higher. Small segregations at 55.7-55.8 and 56.5-56.7.
57.0-62.3	Very olivine-rich rock. Vesicles present; locally flattened and distorted, and/or lined with vuggy crystals. Large olivines (5 mm across or more) present. Rock increasingly more oxidized with depth; core at 61-62.3 strongly oxidized.
62.3-63.3	Very dense olivine poor rock; contact between this and overlying olivine-rich vesicular rock is irregular. Pink matrix, especially in upper half suggests strong oxidation.
63.3-64.0	Olivine content moderate, increasing downward in this interval. Rock is fairly fresh, with small vesicles. Some vesicles vuggy/lined with segregation material.
64.0-69.8	Fairly dense rock, with larger vesicles flattened. Olivine content moderate to high. Somewhat oxidized.
69.8-74.0	Rock more olivine-rich, more vesicular than in above interval. Highest vesicularity and olivine content at 69.5-70.0, 72.0-72.4, 72.8-73.8.
74.0-81.0	Segregation veins at: 70.0-70.1, 71.3-71.4, 72.6-72.7, 73.5-73.6. Very olivine-rich vesicular rock. Olivines fresh. Small segregations at 76.3-76.4 and 77.4. Lower one is 0.1' wide and dips 60°.
81.0-82.8	Vertical contact between massive segregation vein and vesicular olivine-rich crust. Upper and lower contacts of vein are horizontal.
82.8-83.9	Vesicular olivine-rich rock riddled with minor segregations.
83.9-84.0	Segregation vein.

Depth (feet)	Description of core (KI79-5)
84.9- 86.2	Dense fresh rock, with small segregations. Vesicles associated with segregations. Olivine content variable but generally moderate to low. There are 4 segregation veins from 84.1-85.5; each is 1-2" thick.
86.2- 87.0	Dense olivine-poor rock riddled with segregation material. Some very large cavities in segregations. Pink, oxidized matrix throughout.
87.0- 91.0	Dense rock with scattered small segregations, mostly dipping at 20-40°. Olivine content moderate. Rock fresh.
91.0- 94.0	Dense fresh rock. Olivine content moderate to high. Some very large olivine crystals (~1 cm long) present. Some round spots of segregation material at 93.0 (= filled vesicles?).
94.0- 97.5	Fairly dense rock. Olivine content moderate to high. Flattened vesicles present at 95-97.
97.5-104	Very dense oxidized olivine-poor rock. One oxidized segregation (0.1' thick) at 97.6.
104.0-104.5	Very dense rock. Pink oxidized matrix. Essentially no olivine phenocrysts. There is a single large vesicle half filled with segregation material at 104.2.
104.5-105.5	Segregation vein. Upper half very vuggy, lower half dense. Contacts dip at 30°.
105.5-109.0	Very dense rock, without phenocrystic olivine. Oxidized. Rare isolated cavities, sometimes containing minor segregations.
109.0-109.1	Segregation vein.
109.1-110.5	Very dense rock. A few small olivine phenocrysts present. Rock fresher than in above interval.
110.5-111.0	Segregation vein.
111.0-114.0	Dense rock with scattered small olivine phenocrysts. Matrix somewhat oxidized. There is a sharp contact at 113.5 between very fine and somewhat coarser grained rock, both with small olivine phenocrysts.

Depth (feet)	Description of core (KI79-5)
114.0-124.0	Gray, finely vesicular to diktytaxitic basalt with small, scattered olivine phenocrysts. Minor stringers of segregation material in 116-124 interval. Some spotty oxidation of the matrix from 121-124.
124.0-124.7	Diktytaxitic rock with small phenocrysts. Matrix slightly oxidized.
124.7-124.8	Segregation vein. This was glassy in 1975.
124.8-126.5	Diktytaxitic, olivine-poor rock. Strongly oxidized.
126.5-134.0	Oxidized rock, with moderate to high olivine content. Only cavities are vuggy areas in small segregation veins, most of which dip steeply. Larger segregation at 131.6-131.7 and 133.7-134.0. This whole interval (124.0-134.0) had a heavy Na ₂ SO ₄ bloom.
134.0-141.0	Dense oxidized olivine-rich core. Minor segregation veins, mostly with vesicles. Olivine content of some layers >50%. This was very glassy in 1975.
141.0-143.0	Dense gray rock with moderate olivine content. Minor stringers of segregation material in upper part of interval.
143.0-144.0	Very olivine-rich rock with considerably void space between olivines. This was near the bottom of the hole in 1975. Maybe void space was caused by melt moving sideways into hole?
144.0-145.2	Gray olivine-rich core, marked by vertical concentration of coarse olivine running through middle of core. This was hole bottom in 1975.
145.2-154.0	Dense gray diktytaxitic rock. Olivine content moderate; crystals very uniformly distributed.
154.0-164.0	As above, but with slightly higher olivine content. Crystals as much as 1 cm long are present. Small segregation at 163.0'. Concentric fractures in core, produced by cooling water (first seen at 150.0) more pronounced in this interval.
164.0-174.0	Dense, fresh olivine-rich rock with a dark-gray matrix. <u>Not</u> diktytaxitic. Has concentric structure with hackly fracture.

Depth (feet)	Description of core (KI79-5)
174.0-184.0	As above. Olivine distribution very uniform. Matrix varied from light gray to dark greenish-gray, and is very fine grained.
184.0-194.0	As above. Core has regular horizontal fractures in addition to concentric structure noted above.
at 194.0	Small vuggy segregation.
194.0-204.0	Fresh, dense olivine-rich rock. Light-gray matrix. Some very minor segregation at 198 feet.
204.0-214.0	Fresh, dense olivine-rich rock with gray matrix. Still has concentric structure with hackly fracture.
214.0-224.0	As in above material.
224.0-234.0	Fresh diktytaxitic olivine-rich rock with gray matrix. Occasional large irregular vesicles, but no segregation material in them. Concentric cooling structure less conspicuous than above.
234.0-244.0	Fresh diktytaxitic olivine-rich rock, with gray matrix. Minor segregation material at 240.0.
244.0-254.0	Core as in above interval.
254.0-264.0	As in above interval. Strongly oxidized next to steep joint surface (1/4" layer) at 256-258.
264.0-279.0	As in above interval
279.0-281.5	Strongly oxidized olivine-rich rock.
281.5-284.0	Olivine-rich rock, oxidized only along fractures. Fracture density noticeably higher from 274-284 than higher in section.
284.0-294.0	Very dense olivine-rich basalt. Olivines slightly blackened in lower part of interval. Distribution of olivine uniform throughout interval. One joint surface present, only slightly oxidized.
294.0-300.0	Very dense olivine-rich basalt. Olivines slightly blackened. No fractures.
300.0-304.0	Very dense olivine-rich basalt. Joint surfaces oxidized. Interior fresh.
304.0-310.5	Very dense olivine-rich basalt. Joint surfaces oxidized but interior of rock, including olivine, is mostly fresh.

Depth (feet)	Description of core (KI79-5)
310.5-313.0	Very dense oxidized basalt with moderate olivine content. Oxidized joint surface runs through this whole interval.
313.0-313.7	Lower vesicular zone in 1959 lava. Abundant large vesicles with smooth internal surfaces; no minerals deposited in them. Coarse olivine phenocrysts slightly oxidized.
at 313.7	Parting with thin baked soil/vegetation layer = contact of 1959 lava with basement.
313.7-315.0	Highly vesicular olivine-poor basalt below 1959 lava. Baked red. Vesicles all small.
315.0-324.0	Vesicular basalt. Vesicle size variable, but vesicles abundant throughout. No baking; rock mostly quite fresh. Local Na ₂ SO ₄ (?) bloom; also some vuggy deposits of brown mineral in vesicles at 322.0-322.5.
324.0-330.8	Vesicular, olivine-poor basalts, presumably pre-caldera Kilauean shield lavas.

Core Recovery Log for KI79-6

Date	Interval	Recovered	Percent recovery
2/13/79	0-12.5	0	0
	12.5-14.6	1.8	86
	14.6-24.6	9.8	98
	24.6-34.6	10.0	100
	34.6-44.6	10.0	100
	44.6-54.6	10.0	100
	54.6-64.6	10.0	100
	64.6-74.6	9.9	99
	74.6-84.6	10.0	100
	84.6-94.6	10.0	100
	94.6-104.6	10.0	100
2/14/79	104.6-114.6	10.1	100+
	114.6-124.6	10.0	100
	124.6-134.6	10.0	100
	134.6-144.6	10.0	100
	144.6-154.6	10.0	100
	154.6-164.6	10.0	100
	164.6-174.6	10.0	100
	174.6-184.4	9.8	100
	184.4-190.4	6.0	100
Plus several feet of black glass recovered from the core barrel in fragments.			
2/15/79	168.4-178.4 (ooze)	6.4	
	178.4-184.5 (ooze)	5.8	
	172± -178.4 (ooze)	1.3	
	178.4-184.4 (ooze)	6.0	
	184.4-187.5 (ooze)	3.1	

Petrographic Log for KI79-6

Depth (in feet)	Description of core
0 - 12.5	No core recovered.
12.5- 27.4	Highly vesicular olivine-rich crust, with occasional denser layers (12.5-12.8, 13.5-13.9). Oxidized zone at 14.0-18.0.
27.4- 38.2	Highly vesicular crust, with abundant olivine. Vesicles flattened locally, but only slightly. Rock fresh except at 32.0-33.0.
38.2- 41.9	Large vesicles sparse. Rock is gray, fresh, finely vesicular. Olivine common.
41.9- 51.7	Finely vesicular rock. Olivine common. Flattened vesicles with minor segregation material between 43.0 and 44.0.
51.7- 61.3	Finely vesicular gray rock. Olivine common. Segregation at 55.1-55.3.
61.3- 62.4	Segregation vein. Vuggy throughout.
62.4- 72.5	Finely vesicular to diktytaxitic (72.0-72.5) gray rock. Small olivine phenocrysts common. Segregations at: 66.4-66.5, 67.2, 67.8-67.9 (dipping 45°), 68.4 (very vuggy, with cristobalite beads).
72.5- 74.0	Diktytaxitic gray rock. Olivine common. In sharp contact with more vesicular rock below.
74.0- 87.3	Finely vesicular, fresh rock. Olivine common. One segregation at 75.9-77.5. Both contacts of vein dip steeply.
87.3-101.5	Finely vesicular to diktytaxitic gray rock. Olivine small, sparse. Occasional isolated large vesicles. Segregations at: 87.3-87.4, 91.8-92.6, 95.0-96.8.
101.5-104.7	Segregation vein. Upper 2/3 vuggy, lower 1/3 massive.
104.7-115.6	Gray diktytaxitic rock. Olivine phenocrysts small, sparse. Segregations at: 106.7-106.8, 106.9-107.0 (both very vuggy), 111.2-113.5, 114.0-114.3.

Depth (feet)	Description of core (KI79-6)
115.6-128.0	Gray diktytaxitic rock. Olivine content noticeably higher than in above interval. Core shattered with conchoidal fracture from 123.5-126.0. Na ₂ SO ₄ bloom present sporadically from 120 on down to 148. Segregations at 116.6-116.8, 124.5-124.6, 126.2-127.2.
128.0-140.5	Gray diktytaxitic rock. Olivine content, size of olivine crystals increase downward. Olivine common throughout. Segregations at: 130.0, 130.8-131.0, 133.1, 137.3-138.3 (much olivine).
140.5-141.7	Segregation vein, olivine bearing.
141.7-154.5	Gray diktytaxitic rock. Coarse olivine abundant throughout. Steeply dipping olivine-rich layers present 142-149. Na ₂ SO ₄ bloom present, especially at 144.7-148.0. Many segregations present at: 142.4-142.7, 144.1, 144.6-144.7, 149.9-150.3, 151.0-151.2, 154.4-154.5.
154.5-166.8	Gray to dark-gray diktytaxitic rock. Olivine abundant. Steeply dipping olivine-rich layers present 156-159. Core has hackly concentric fracture below 160. Segregations present at: 156.4-156.8 (contacts complex), 157.9-158.8 (contacts complex), 159.7-159.8 (dipping 70°), 164.3-164.8 (glassy segregation; olivine rich). First glass in matrix rock observed at about 166'.
166.8-169.0	Dense rock with dark-gray glassy matrix. Very olivine-rich.
169.0-177.6	Olivine-rich rock with black glassy matrix. Glass content increases downward. Small segregations or glassy partings at: 175.0, 175.5-175.7.
177.6-190.3	Very olivine-rich core with black glassy matrix. Core knobby, very friable from 185-190.3.
190.3	Contact between olivine-rich crust and black glass. Recovered several feet of black glass from core barrel, as small chips.