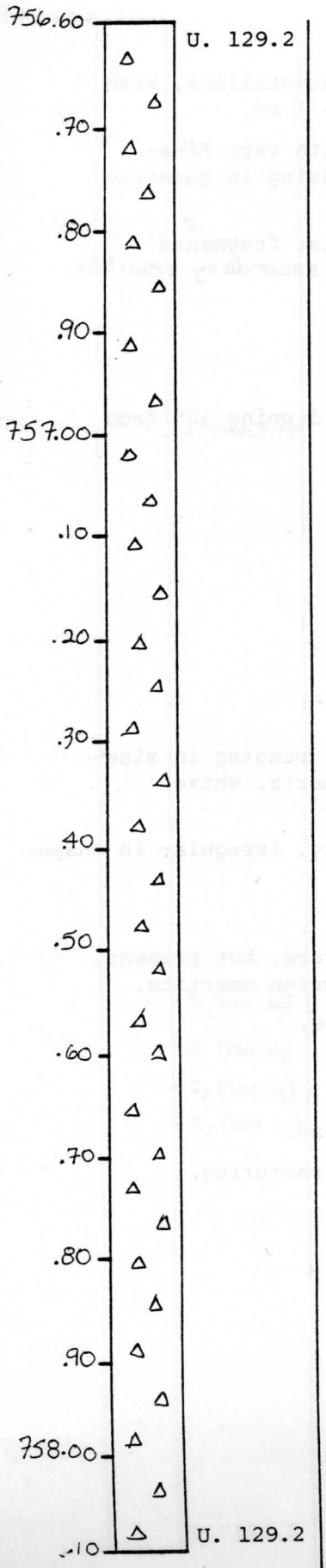
ICELAND RESEARCH DRILLING PROJECT - REYDARFJORDUR 1978

Visual Core Description Observer ...NG.....

Depth Interval 7560 cm to 7581.5 cm

Box 130, Section 1



LITHOLOGY-PETROGRAPHY

Mottled purplish-green and gray-green brecciated unit with angular to subrounded basaltic clasts that are poorly sorted, ranging in size from 3 to 4 mm to approximately 5 cm.

Unit is extremely permeable.

STRUCTURE

Brecciated

VESICLES/AMYGDALES

Tiny, irregular vesicles, < 3 mm diameter, are contained within clasts.

FRACTURES - VEINS - BRECCIA

Unit is not highly fractured. Breaks in core appear to be caused by drilling.

ROCK ALTERATION

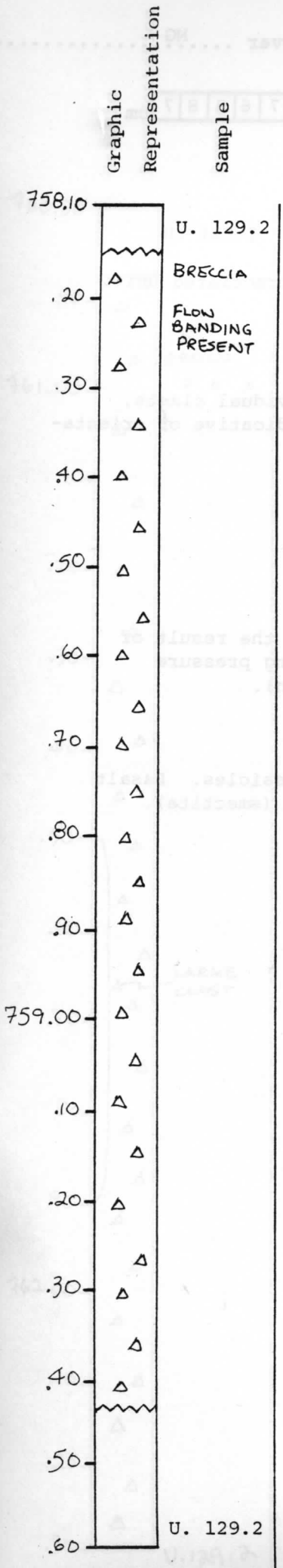
Spaces between clasts are primarily filled with zeolites. Euhedral laumontite fill some spaces between clasts. Unit also altered to green clay (smectite ?) and rusty-red clay (red smectite ?).

ICELAND RESEARCH DRILLING PROJECT - REYDARFJORDUR 1978

Visual Core Description Observer NG

Depth Interval 7581 5 cm to 7594 3 cm

Box 130, Section 2



LITHOLOGY-PETROGRAPHY

Mottled purplish-green and gray-green brecciated unit continued from above.

Unit is very permeable.

STRUCTURE

Flow banding within clasts, but angle is variable.

VESICLES/AMYGDALES

In brecciated clasts, irregular to elongate shape, < 4 mm.

ROCK ALTERATION

Alteration products are zeolites, primarily filling spaces between clasts and green and red clays.

Unit is very porous and weathered looking.

FRACTURES-VEINS - BRECCIA

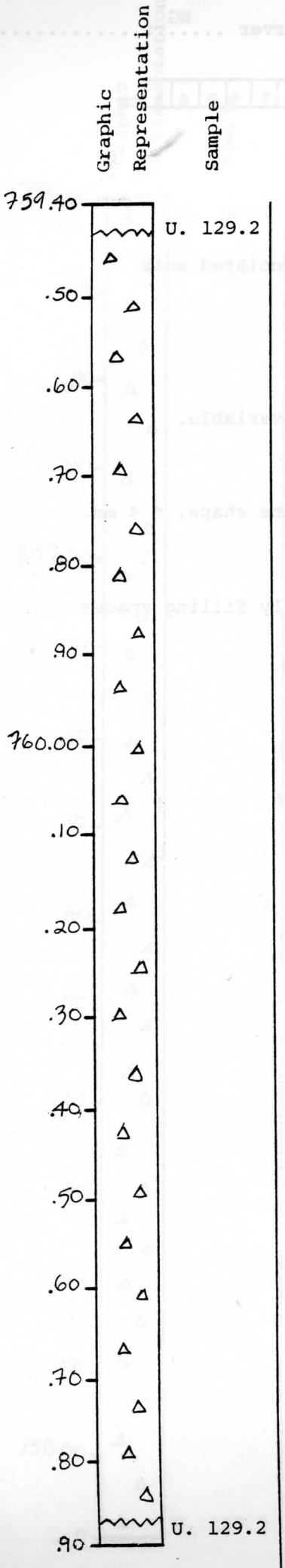
Unit not highly fractured.

ICELAND RESEARCH DRILLING PROJECT - REYDARFJORDUR 1978

Visual Core Description Observer ....NG.....

Depth Interval | | 7 | 5 | 9 | 4 | 3 | cm to | | 7 | 6 | 0 | 8 | 7 | cm

Box 130, Section 3



LITHOLOGY-PETROGRAPHY

Mottled purplish-green and greenish-gray brecciated unit. Continued from above.

STRUCTURE

Brecciated. Flow banding present in individual clasts, but angle is variable and probably not indicative of orientation.

VESICLES/AMYGDALES

< 4 mm, irregular shape to elongate

FRACTURES - VEINS - BRECCIA

Not highly fractured. Most fractures are the result of expanding clays due to release of confining pressure following drilling (this is interpretation).

ROCK ALTERATION

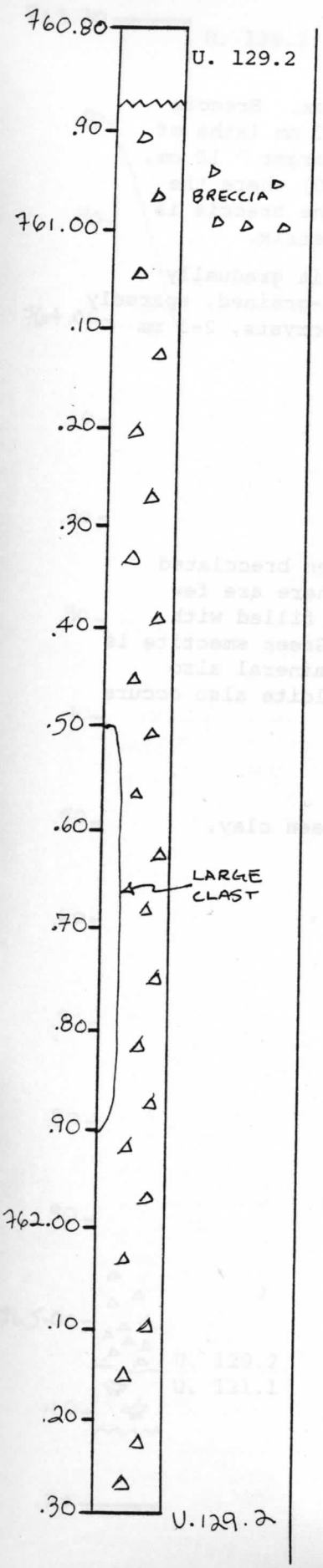
Zeolites fill spaces between clasts and vesicles. Basalt clasts are altered to red and green clays (smectite).

ICELAND RESEARCH DRILLING PROJECT - REYDARFJORDUR 1978

Visual Core Description Observer NG

Depth Interval 76087 cm to 76230 cm

Box 130, Section 4



LITHOLOGY-PETROGRAPHY

Mottled purplish-green and green-gray brecciated basalt unit (continued from above).

Upper portion (to ∿ 761.20) has very angular basalt fragments 3-4 mm long. There are 3 main types:

1) aphyric, fine-grained, green-gray basalt
2) aphyric, green basalt with < 1 mm elongate spots of green smectite? over 3% of fragment
3) gray-green sparsely phyric vesicular basalt (∿ 3 mm diameter) with fine-grained ground mass from 761.30 to 761.90, is a region of breccia which has smaller clasts, ranging from 1 mm-5 mm. The breccia is matrix supported. Matrix contains large units of zeolite (laumontite ?).

Unit highly permeable.

VESICLES/AMYGDALES

As above

FRACTURES - VEINS - BRECCIA

Not highly fractured.

As above.

ROCK ALTERATION

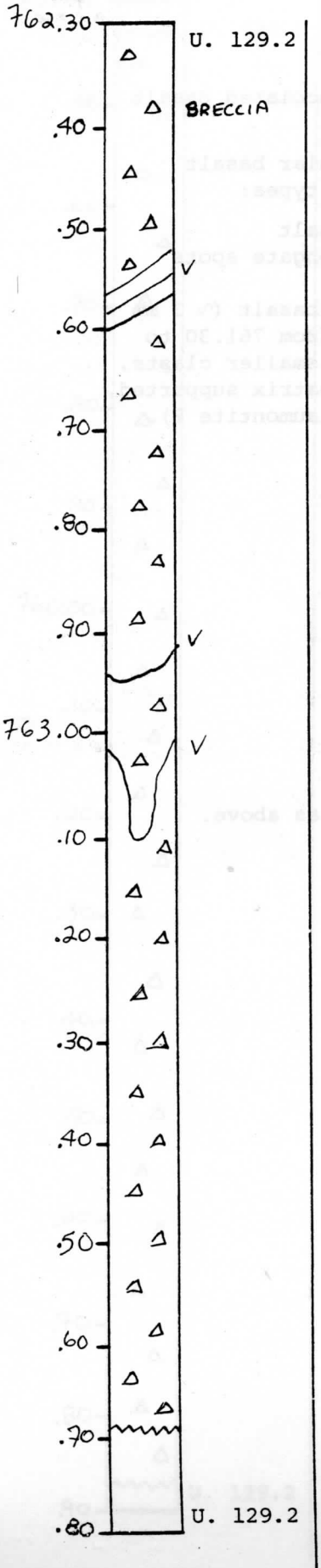
Zeolite, green smectite and red smectite as above.

ICELAND RESEARCH DRILLING PROJECT - REYDARFJORDUR 1978

Visual Core Description Observer ....NG.....

Depth Interval 7623.0 cm to 7636.9 cm

Box 131, Section 1



LITHOLOGY-PETROGRAPHY

Brecciated unit continued from previous box. Breccia clasts are sparsely phyric, containing 1-2 mm laths of plagioclase, clasts which are generally larger > 10 cm, but there are layers (around 763.30-763.40) where the clasts are angular, between 1-3 cm, and the breccia is matrix supported with 50-80% zeolite in matrix.

763.50 - 763.60 Brecciated portion of unit gradually grades into more massive gray-green, fine-grained, sparsely phyric basalt flow with plagioclase phenocrysts, 2-3 mm long and less than 1 mm wide.

STRUCTURE

Brecciated

FRACTURES - VEINS - BRECCIA

Calcite in material filling spaces between brecciated clasts from 762.65 to end of section. There are few veins. They are thin (< 4 mm) wide, and filled with green smectite?, calcite, and zeolite. Green smectite is commonly on walls of veins, but a green mineral also occurs as speckles on glassy zeolite. Calcite also occurs near vein walls.

ROCK ALTERATION

Unit is altered to green and purplish green clay.

Visual Core Description Observer ..NG.....

Depth Interval 7636 9 cm to 7651 2 cm

Box 121, Section 2

Graphic Representation Sample

763.70 U. 129.2

.80

.90

764.00

.10

.20

.30

.40

.50

.60

.70

.80

.90

765.00 U. 129.2
U. 131.1

.10

.20

LITHOLOGY-PETROGRAPHY

Fine-grained greenish-gray sparsely phyric basalt. Phenocrysts are plagioclase, less than 1 mm long.

764.40 Basal portion of unit is brecciated. Clasts are angular and 2-5 mm in size. Clasts are basaltic fragments. Each clast is rimmed with a reddish secondary deposit. Matrix is green altered basalt and zeolite.

U. 131.1 Contact between this and above unit is sharp. It is defined as the lower limit of breccia of U. 129.2 and the top of scoriaceous flow of 131.1, described on next page. Contact is irregular, but subparallel.

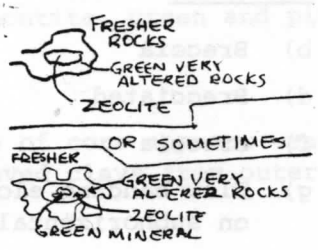
FRACTURES - VEINS - BRECCIA

Hairlike veinlets in braided pattern from 764.03 upward in section. Veins contain calcite and white zeolite. There are other hairlike veinlets in rock. These are filled with white zeolite and green smectite, with green smectite on walls of veins.

Unit is not highly fractured.

ROCK ALTERATION

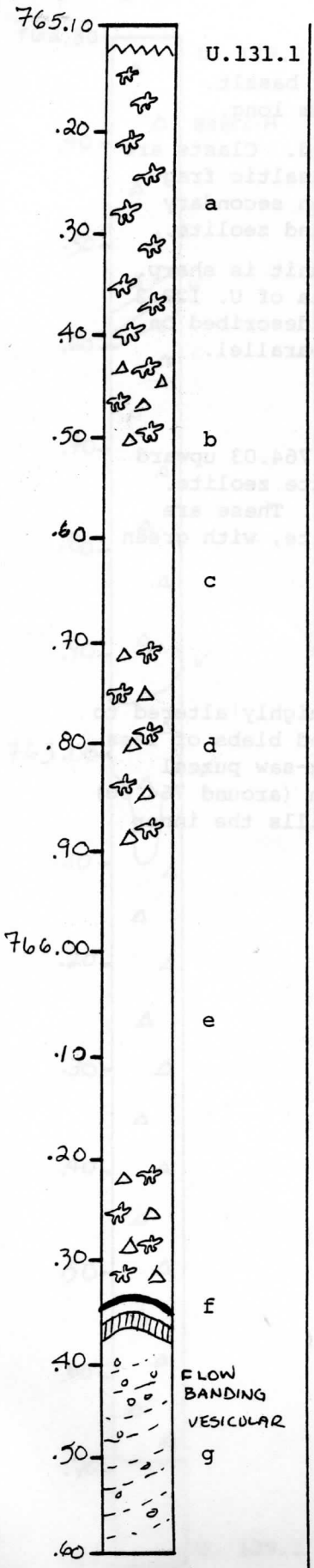
New type of alteration pattern. Rock is highly altered to purplish and greenish clays. Only isolated blebs of less altered material remain, giving rock a jig-saw puzzel appearance. Towards lower part of section (around 764.50) zeolite alteration is also abundant and fills the inner portion of chloritized? smectized? blebs.



Visual Core Description Observer NG

Depth Interval 765.12 cm to 766.64 cm

Box 134, Section 3



LITHOLOGY-PETROGRAPHY

a) Upper portion of unit (a) consists of a rubble of dark gray scoriaceous basalt, that is sparsely phyric. Phenocrysts = thin blades of plagioclase up to 1 mm long. Some of ground mass appears glassy, especially around rims of vesicles.

b) Mixed dark-gray scoriaceous basalt and breccia. Clasts are fine-grained, dark-grayish-green basalt, 3-5 cm. Breccia is commonly matrix supported. Matrix is combination of fine-grained basalt altered to green and red clay, and zeolite.

c) Sparsely phyric dark greenish gray, fine-grained basalt. Phenocrysts = altered plagioclase and pyroxene?

d) Similar to "b" above except clasts are larger, to 3 cm across, and some clasts are of vesiculated basalts similar to "c" above, and "d" below. Euhedral blades of laumontite to 6 mm long occur in spaces between clasts.

e) Similar to "c" above.

f) Brecciated unit similar to "d" containing clasts similar to "c".

g) Upper portion of unit contains 2 flow bands 1/2 and 1 cm wide of dark gray aphyric, non-vesicular basalt. Between and below these layers is dark gray, very sparsely phyric, fine-grained, vesicular basalt. Phenocrysts = < 1 mm long blades of plagioclase.

STRUCTURE

b) Breccia

d) Brecciated

f) Breccia

g) Flow banding elongated, vesicles define lineation on subhorizontal surface.

VESICLES/AMYGDALES

a) ∿ 60% of rock irregular shape 2-5 mm across long axis. Lined with crystalline zeolites and quartz? About 1/2 of vesicles are completely filled with zeolite.

b) As above in scoria.

c) ∿ 40% of rock is < 1 mm, irregularly, shaped vesicles. They are commonly rimmed with red and/or green clay, and filled with zeolite. At 765.74 there is a vug ∿ cm in diameter containing euhedral blades of laumontite.

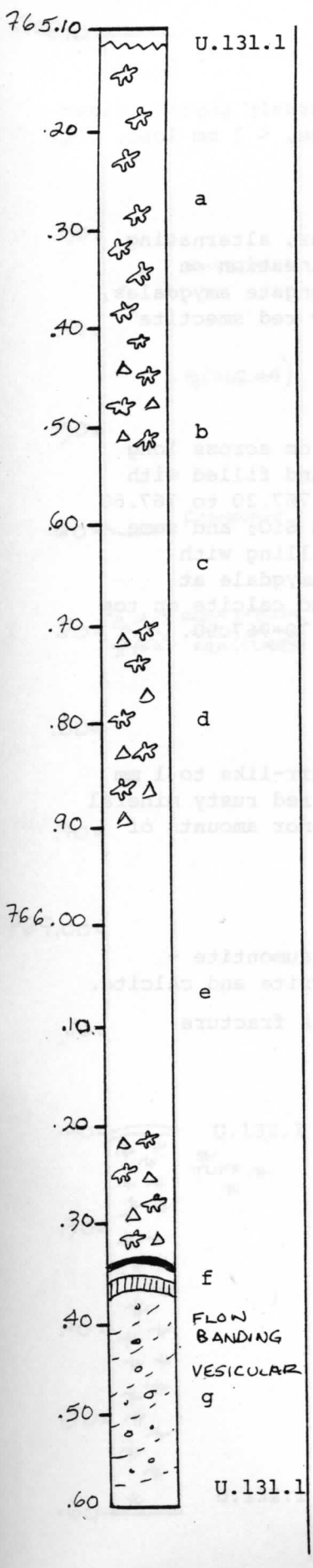
d) 1-2 mm vesicles in breccia clasts, and similar to "b" above. Unit also contains vugs of euhedral laumontite to 4 mm long.

(Continued on overleaf)

Visual Core Description Observer NG

Depth Interval 765.12 cm to 766.64 cm

Box 134, Section 3 (continued)



VESICLES/AMYGDALES (continued)

g) Elongate to spherical < 1 mm to 1 cm across. Long axis rimmed as illustrated.

FRACTURES - VEINS - BRECCIA

a) 4% of rock consists of irregular, hair-like veinlets filled with white zeolite.

b) Rare, hair-like veinlets filled with zeolites.

c) A network of hair-like veinlets filled primarily with red, but also with green clay, connects vesicles.

d) Hair-like to 1 mm width veinlets over < 1% of rock, filled with white zeolite.

g) Irregular vein 1/2 to 1 cm wide, contains bright green massive mineral, euhedral laumontite, calcite and black smectite?

ROCK ALTERATION

a) Clays and zeolites

b) As above

c) Altered to bright green and pinkish purple clay.

d) As above

g) Minor amounts of pyrite in veinlets. Calcite confined to vein. Laumontite, green and pink clay.

OTHER

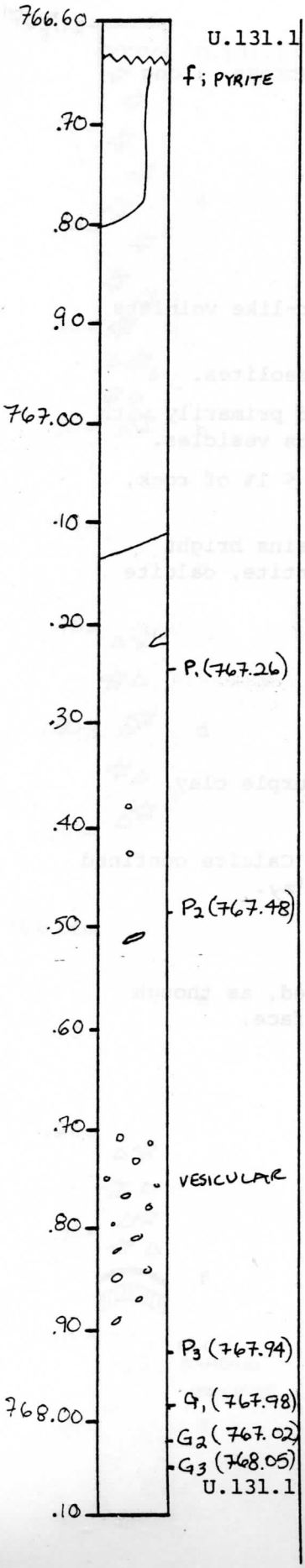
a) Outer surface of core appears weathered, as though drilling removed clays from outer surface.

d) As above.

Visual Core Description Observer NG

Depth Interval 7664 cm to 7681 4 cm

Box 131, Section 4



LITHOLOGY-PETROGRAPHY

Mottled purplish-green and gray-green sparsely phyric, fine-grained basalt. Phenocrysts = plagioclase, < 1 mm long.

STRUCTURE

Flow banding defined by elongate amygdales, alternating bands of greener and purplish basalt. Lineation on fracture surface at 766.75 defined by elongate amygdales, filled with green smectite, surrounded by red smectite filling fracture.

VESICLES/AMYGDALES

Amygdales range in size from < 1 mm to 3 cm across long axis. They are predominately elongate, and filled with zeolite or green smectite, except around 767.20 to 767.60 where vesicles have a layer of stratified SiO_2 and some calcite. Commonly vesicles have zoned filling with smectite on rim and zeolite in center. Amygdale at 767.50 has stratified silica on bottom and calcite on top especially vesicular portion between 767.70-767.90.

FRACTURES - VEINS - BRECCIA

Fracture at 766.75 contains pyrite.

Fractures over ~ 1% of rock. They are hair-like to 1 mm wide. Fractures contain green smectite, red rusty mineral (red smectite? hematite?) zeolite, and minor amounts of pyrite.

ROCK ALTERATION

All products are green and red smectite laumontite - other white zeolite? Minor amounts of pyrite and calcite.

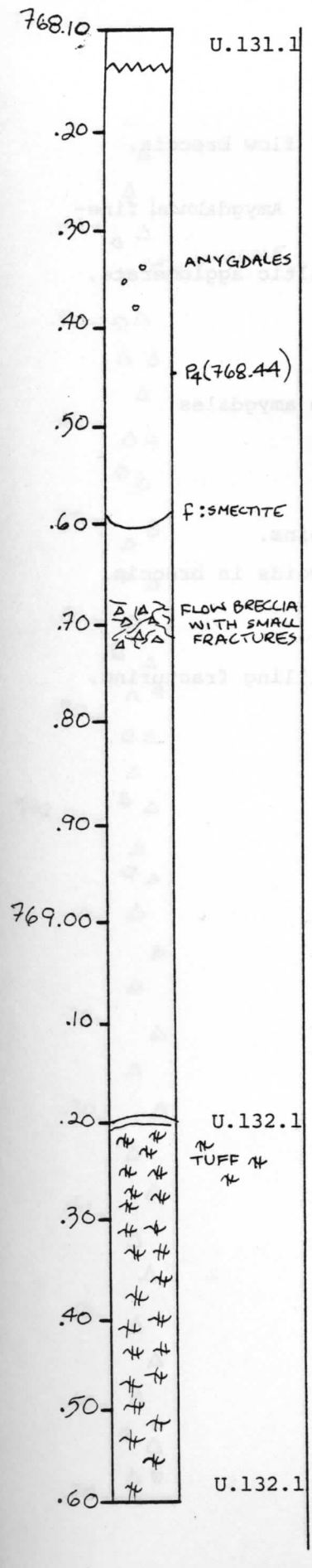
767.15 Rusty red alteration product fills fracture (looks like hematite).

ICELAND RESEARCH DRILLING PROJECT - REYDARFJORDUR 1978

Visual Core Description Observer ILG

Depth Interval 7681.4 cm to 7696.5 cm

Box 132, Section 1



LITHOLOGY-PETROGRAPHY

Fine-grained tholeiitic lava with well developed planar flow structure dips at 30°. Marked alteration along planes of platy flow structure elongate.

Rock becomes progressively more brecciated towards base of unit with presence of fragments 6 cms diameter.

769.20 Uneven lower surface of flow.

Fine grained tuff. 769.20 - 769.22 coarse tuff with fragments up to 1 cm diameter 769.22 - 769.28, green matrix. Transitional contact to fine-grained dark tuff.

769.44 Green acid tuff with lithic fragments up to 1 cm diameter.

769.52 Relatively sharp contact to dark soil or tuff horizon.

VESICLES/AMYGDALES

768.30 - 768.40 Sparse elongate amygdales, elongate along planar flow structure, filled with smectite and "zeolite".

767.78 Small green smectite filled amygdales.

769.20 - 769.60 No amygdales

FRACTURES - VEINS - BRECCIA

768.60 Smectite on fracture

768.70 Flow breccia with small fractures running through unit

769.20 - 769.60 None

ROCK ALTERATION

No pyrite?

768.80 Some of the breccia fragments are greenish with pervase green smectite.

OTHER

768.80 Flow breccia at base of unit.

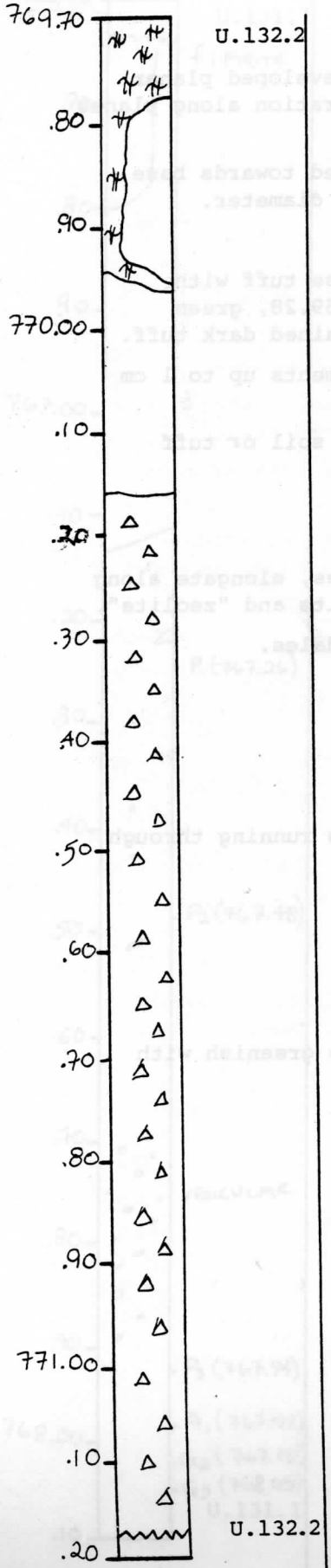
ICELAND RESEARCH DRILLING PROJECT - REYDARFJORDUR 1978

Visual Core Description Observer ILG

Depth Interval 7696 5 cm to 7711 8 cm

Box 132, Section 2

Graphic Representation Sample



LITHOLOGY-PETROGRAPHY

769.70 Dark green sediment tuff.

769.80 Large fragments at top of lava, ? flow breccia, with sediments between topmost blocks.

770.00 ? large fragments at top of flow. Amygdaloidal fine-grained tholeiite.

770.20 - 771.20 Flow breccia and/or basaltic agglomerate, fragments up to 6 cm diameter.

VESICLES/AMYGDALES

770.35 - 771.20 ? smectites removed from amygdales during drilling.

FRACTURES - VEINS - BRECCIA

769.90 Hairlike → 1 mm zeolite filled veins.

770.00 - 771.20 Zeolite filling 1-3 mm voids in breccia.

ROCK ALTERATION

770.20 Swelling clays producing post-drilling fracturing.

OTHER

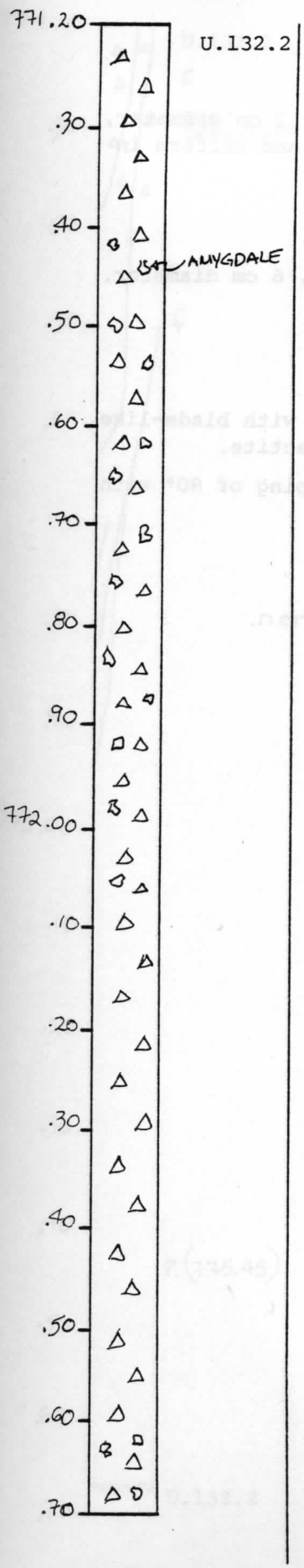
770.30 Flow top breccia.

ICELAND RESEARCH DRILLING PROJECT - REYDARFJORDUR 1978

Visual Core Description Observer ..ILG.....

Depth Interval 7711 8 cm to 7727 2 cm

Box 132, Section 3



LITHOLOGY-PETROGRAPHY

Flow breccia (?) containing large proportion of amygdaloidal fragments. Some fragments > 5 cm diameter. Main lithologic unit appears to be fine-grained tholeiite, aphyric.

772.20 Transition into part of unit containing different fragmental material.

772.60 Some amygdaloidal fragments.

FRACTURES - VEINS - BRECCIA

771.20 - 772.70 No fractures and veinlets.

ROCK ALTERATION

771.20 - 772.20 Smectites in amygdales removed during drilling.

OTHER

771.20 - 772.70 Thick flow top breccia.

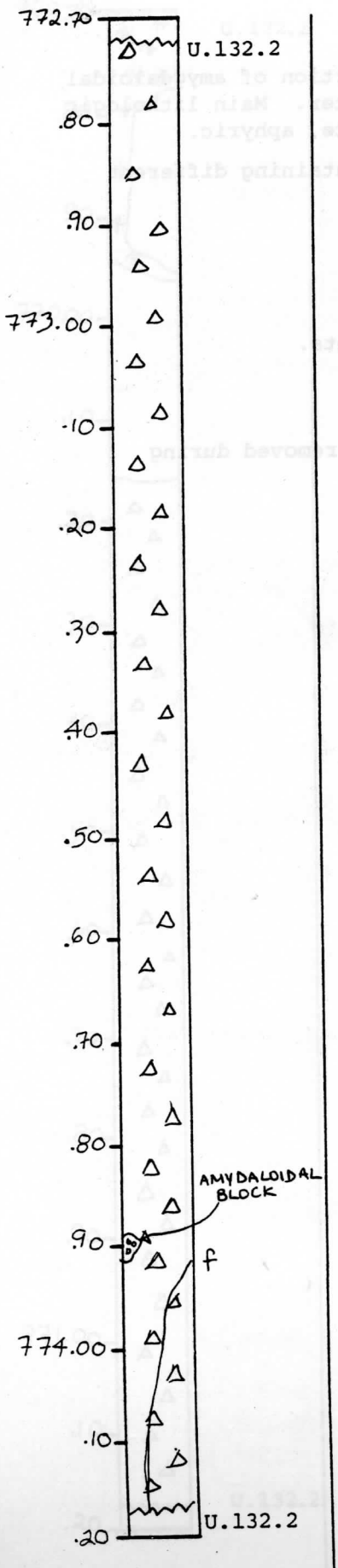
ICELAND RESEARCH DRILLING PROJECT - REYDARFJORDUR 1978

Visual Core Description Observer ILG

Depth Interval 7727.2 cm to 7741.8 cm

Box 132, Section 4

Graphic Representation Sample



LITHOLOGY-PETROGRAPHY

Flow breccia containing many fragments > 3 cm diameter, becoming progressively more homogeneous and uniform in character.

VESICLES/AMYGDALES

773.93 Amygdaloidal block ∿ brecciated, 6 cm diameter.

FRACTURES - VEINS - BRECCIA

773.60 Veins of zeolite?

773.55 Vein of white radiating zeolite with blade-like crystals. Margin of vein lined with smectite.

773.93 Mineralized planar fracture, dipping of 80° with radiating zeolite and smectite.

OTHER

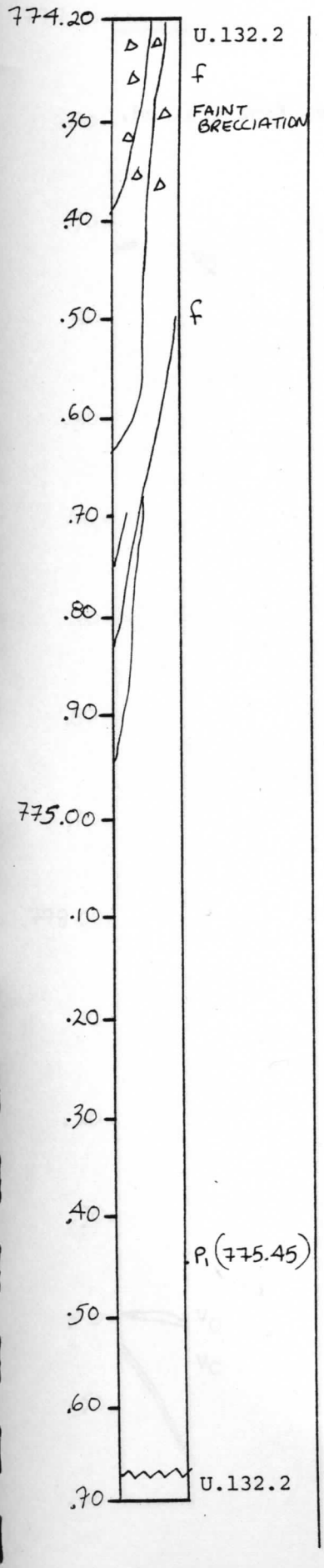
Thick flow top breccia throughout section.

ICELAND RESEARCH DRILLING PROJECT - REYDARFJORDUR 1978

Visual Core Description Observer JRD

Depth Interval 774.18 cm to 775.67 cm

Box 133, Section 1



LITHOLOGY-PETROGRAPHY

Very dense, massive, fine-grained, non vesicular, light gray, sparingly porphyritic basalt - "tholeiite".

Phenocrysts are plagioclase and pyroxene, about .3 to .4 cm long, less than 2% by vol.

774.80 - 775.45 No change

STRUCTURE

None observed.

VESICLES/AMYGDALES

Irregular amygdales constitute < 1% by vol. of the upper 1/2 of this section.

774.90 - 775.50 No vesicles

FRACTURES - VEINS - BRECCIA

Some brecciation apparent in upper portion of the section.

774.40 Several fractures with very high core angle to fracture filled with zeolite and green chlorite/smectite.

774.80 - 775.45 Fractures scarce

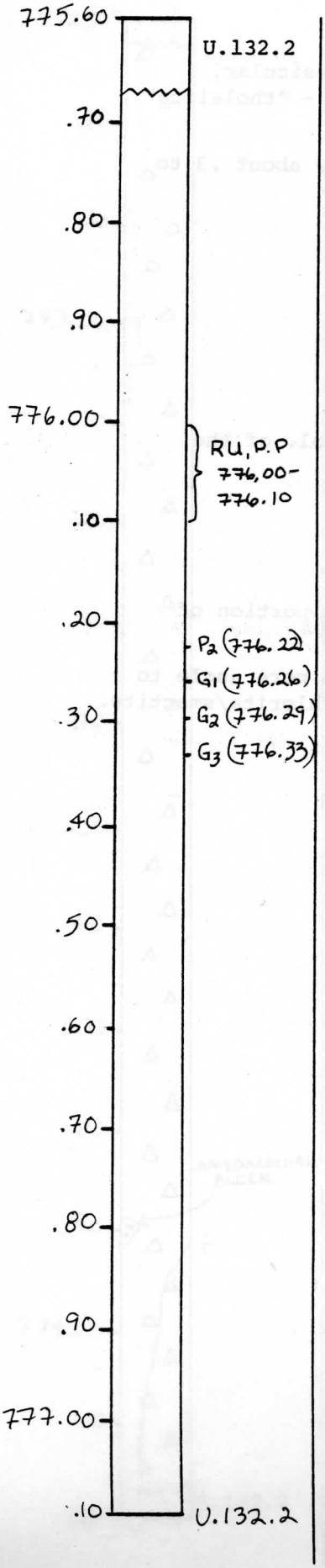
ICELAND RESEARCH DRILLING PROJECT - REYDARFJORDUR 1978

Visual Core Description Observer ....JRD.....

Depth Interval 7756 7 cm to 7771 1 cm

Box 133, Section 2

Graphic Representation Sample



LITHOLOGY-PETROGRAPHY

Light greenish gray, massive, very dense, fine-grained, aphyric, basaltic lava flow center.

Entire section homogeneous.

STRUCTURE

None observed.

VESICLES/AMYGDALES

None observed.

FRACTURES - VEINS - BRECCIA

None observed.

ROCK ALTERATION

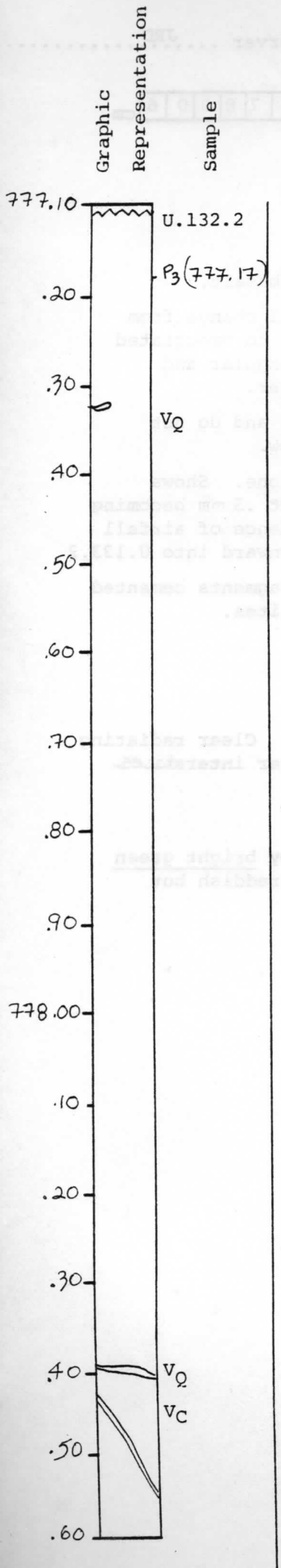
Seems to be very fresh

ICELAND RESEARCH DRILLING PROJECT - REYDARFJORDUR 1978

Visual Core Description Observer .....

Depth Interval 7711 cm to 7861 cm

Box 133, Section 3



LITHOLOGY-PETROGRAPHY

Very dense, homogeneous, fine-grained massive aphyric to sparingly porphyritic lava flow interior.

777.60 No significant change

FRACTURES - VEINS - BRECCIA

Very few hairline fractures. Those with low core angle to fracture filled with quartz. Those with high core angle to fracture filled with smectite.

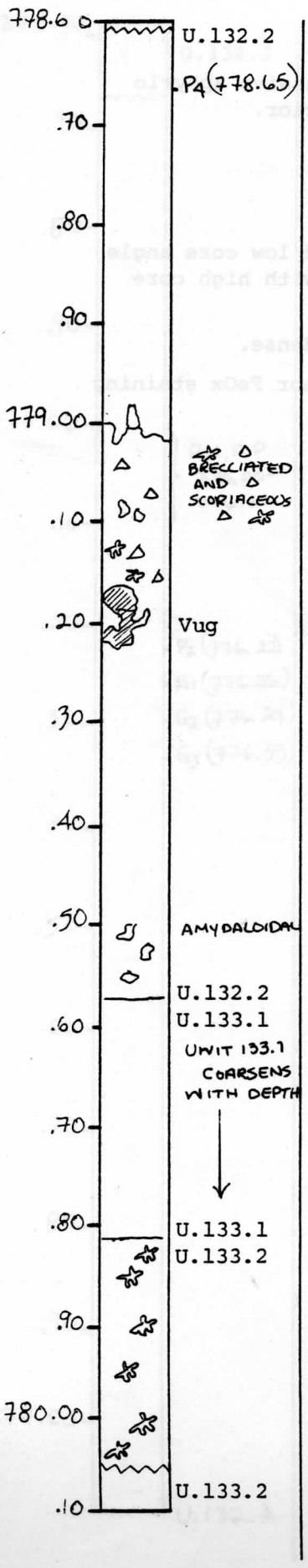
V_Q = Quartz filled veins very vitreous dense.

V_C = Chlorite/smectite veinlets with minor FeOx staining may be oxidized sulfide.

Visual Core Description Observer JRD

Depth Interval 77861 cm to 78006 cm

Box 133, Section 4



LITHOLOGY-PETROGRAPHY

Dense, massive, aphyric, non-vesicular basalt.

779.00 Flow bottom breccia--gradational change from light green gray, massive portion above to brecciated reddish rubble zone composed of mixed angular and scoriaceous fragments up to 10 cm diameter.

Several fragments are very amygdaloidal and do not resemble the massive portion of the flow.

U.133.1 Sedimentary interbedded sandstone. Shows graded bedding--average grain size about .5 mm becoming coarser toward bottom of unit. No evidence of airfall material or crystals. Transitional downward into U.133.2

U. 133.2 Scoriaceous flow top - some fragments cemented by a waxy greenish clay. Otherwise zeolites.

FRACTURES - VEINS - BRECCIA

Vug (with laumontite filling)

U.133.2 Zeolite filling of open space. Clear radiating fibrous mineral unknown in some of larger interstices.

ROCK ALTERATION

U. 132.2 Breccia is cemented in part by bright green chlorite material. Surface of core is reddish but interior is distinctly green.