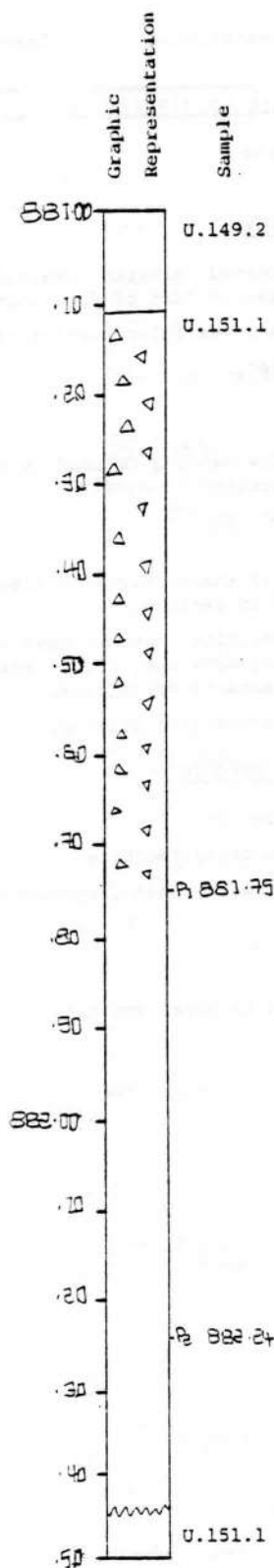


Visual Core Description

Observer N. Gruve

Depth Interval 83100 cm to 33245 cm

Box 151, Section 2

LITHOLOGY-PETROGRAPHY

U.149.2 Lower portion of fine-grained, aphyric, vesicular, green gray unit. Continued from above.

U.151.1 Upper portion of unit is mottled, green-gray to purplish green-gray breccia. Brecciated clasts are of variable size ~ 3 mm to cms across long axis. They are primarily vesicular, fine grained aphyric basalt. The breccia grades downward to green-gray, fine-grained, aphyric, vesicular basalt.

STRUCTURE

U.151.1 - upper portion. Brecciated

U.151.1 - downward - vesicular

VESICLES/AMYGDALES

U.151.1 Vesicles are tiny, 1 mm, irregular and filled with smectite and zeolite near breccia. This grades downward to subrounded to elliptical vesicles ranging from ~ 2-10 mm across long axis, filled with smectite and zeolite.

FRACTURES - VEINS - BRECCIA

U.151.1 Unit not highly fractured. Spaces between breccia clasts and irregular hairlike fracture in breccia are filled with zeolite.

Large cavity at 882.10 is filled with euhedral blades of vitreous zeolite (laumontite). Cavity is ~ 1 cm across long axis.

Other fractures are lined with pinkish-purple smectite.

ROCK ALTERATION

Pervasive smectite alteration.

Visual Core Description

Observer ... N. Gruver .....

Depth Interval 

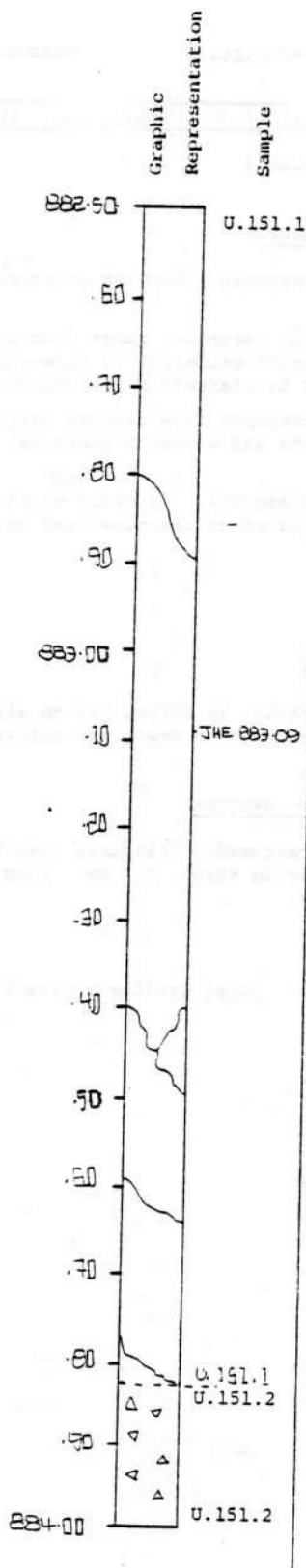
|   |   |   |   |   |
|---|---|---|---|---|
| 8 | 8 | 2 | 4 | 5 |
|---|---|---|---|---|

 cm to 

|   |   |   |   |   |
|---|---|---|---|---|
| 8 | 8 | 4 | 0 | 0 |
|---|---|---|---|---|

 cm

Box 151, Section 3

LITHOLOGY-PETROGRAPHY

U.151.1 Gray-green, fine-grained, very sparsely phyrlic basalt. Phenocrysts - plagioclase, < 1% of rock, ~ 2 mm long.

U.151.2 Mottled dark gray, light gray, and green and purplish gray breccia. Poorly sorted clasts of vesicular to non-vesicular, fine-grained basalt. Matrix is largely zeolitized.

STRUCTURE

Vesicular (U.151.1)

VESICLES/AMYGDALES

U.151.1

Vesicles = 2-5% of rock, are primarily elliptical, and range in size from 1 mm to 2 cm across long axis.

883.08 is lined with massive zeolite?, superimposed on zeolite is euhedral quartz, projecting into open space.

Most vesicles are lined with green smectite and filled with platy, vitreous, sometimes radiating zeolites and/or quartz.

FRACTURES - VEINS - BRECCIA

Unit 151.1. Not highly fractured. Core angle to fracture varies from 60°-80°. They are lined with black, green, and pink smectite. Upper fracture also contains zeolite.

ROCK ALTERATION

Pervasive smectite. Zeolite altering some of ground mass locally.

OTHER

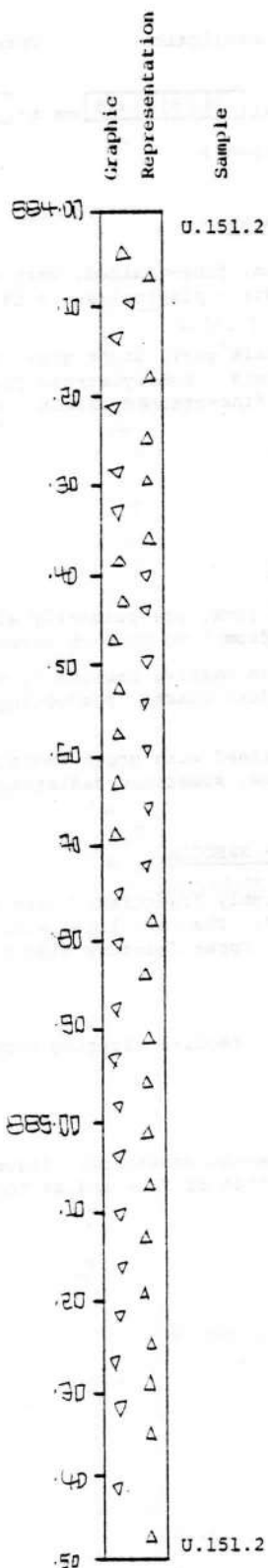
883.85 Contact somewhat arbitrary. Placed at base of more massive portion of flow and at top of breccia zone below.

Visual Core Description

Observer ... N. Gruver...

Depth Interval 88400 cm to 89560 cm

Box 151, Section 4

LITHOLOGY-PETROGRAPHY

Brecciated unit continued. Mottled greenish gray to dark gray.

Clasts are generally large but range from 1/2 to 12 cm in size. They consist primarily of fine-grained, vesicular, aphyric to sparsely phyric basalt.

There is poorly developed flow banding defined by elongation of clasts and wisps of smectite? in ground mass.

Groundmass light green-gray, sparsely phyric, vesicular basalt, largely altered to smectite? and zeolite.

STRUCTURE

Brecciated

VESICLES/AMYGDALES

5-20% of rock irregular in shape, 1-4 mm size. Filled primarily with green smectite? but some contain zeolite.

FRACTURES - VEINS - BRECCIA

Unit not highly fractured. Fractures over ~ 1% of section. Irregular in shape, < 1 mm - 2 mm wide filled with white zeolite.

ROCK ALTERATION

Pervasive smectite. Local zeolite alteration.

Visual Core Description

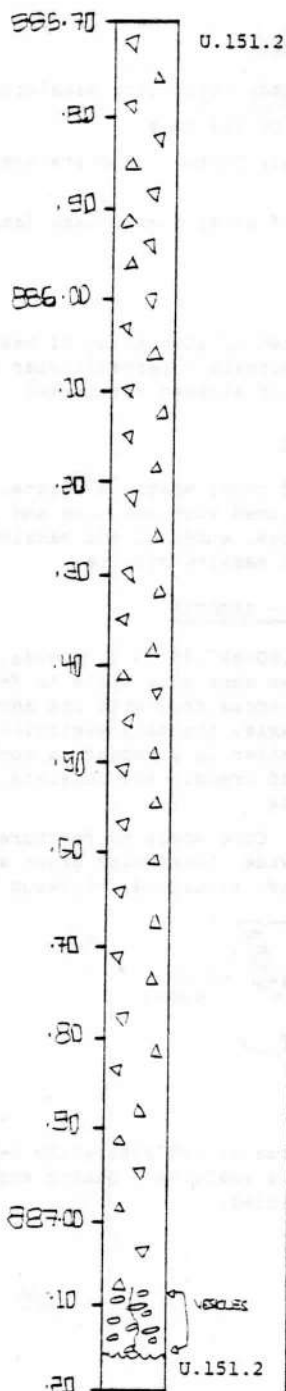
Observer N. Gruver

Depth Interval 885.55 cm to 887.16 cm

Box 152, Section 1

Graphic  
Representation

Sample

LITHOLOGY-PETROGRAPHY

Brecciated unit continued from above.

Color is more purple than above (mottled greenish and purplish gray), and clast size is smaller (2 mm to 4 cm) but otherwise similar.

This grades downward to gray-green, very sparsely phytic? vesicular basalt.

Phenocrysts =&lt;1% of rock--altered plagioclase.

STRUCTURE

Brecciated.

887.09 Vesicular, flow banding defined by elongated vesicles.

VESICLES/AMYGDALES

In lower portion vesicles ~ 10%, elongate, 2 mm - 1 mm long and flattened, filled with zeolite and/or smectite.

FRACTURES - VEINS - BRECCIA

Irregular, hairlike fractures and veinlets in brecciated portion of section filled with zeolite.

In lower portion of unit fractures &lt; 1% of rock, ~ 2 mm wide, filled with zeolite.

ROCK ALTERATION

Pervasive smectite, zeolite alteration of groundmass in breccia.



Visual Core Description

Observer N. Gruver

Depth Interval 

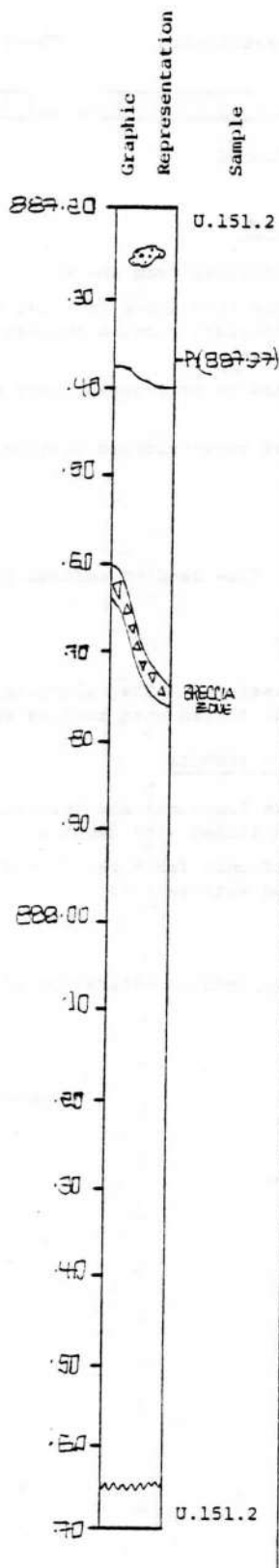
|   |   |   |   |   |
|---|---|---|---|---|
| 8 | 8 | 7 | 1 | 6 |
|---|---|---|---|---|

 cm to 

|   |   |   |   |   |
|---|---|---|---|---|
| 8 | 8 | 8 | 6 | 5 |
|---|---|---|---|---|

 cm

Box 152, Section 2

LITHOLOGY-PETROGRAPHY

887.25 Fine-grained, vesicular, basaltic, xenolith.

887.60 - 887.75 Breccia zone.

Gray-green, sparsely phyrlic, fine-grained, vesicular basalt.

Phenocrysts ~ 1% of rock, plagioclase laths ~ 1-3 mm long.

STRUCTURE

Flow banding defined by elongation of vesicles and alignment of phenocrysts ~ perpendicular to long axis of core and wisps of altered veinlets.

VESICLES/AMYGDALES

Vesicles = 2-3% of rock, mostly elongate, some spherical 1 mm - 1 cm long lined with smectite and filled with stratified silicates, euhedral and massive quartz, and white, euhedral to massive zeolite.

FRACTURES - VEINS - BRECCIA

Breccia zone (887.60-887.75) ~ 2 cm wide, sharp boundaries. Planar zone core angle to fracture breccia zone is ~ 80°. Breccia fragments are angular, 2 mm-4 cm across long axis, sparsely vesicular, sparsely phyrlic basalt, similar to surrounding rock. Green mass of breccia ~ 15% of breccia and consists of massive quartz and smectite.

Other fractures - Core angle to fracture ~ 80°.

Fractures ~ 3 mm wide, lined with green smectite. Filled with unknown, platy, radiating, vitreous zeolite.

ROCK ALTERATION

Minor amounts of rusty, red alteration near base of section. Pervasive smectite. Quartz and zeolite in fractures and vesicles.

Visual Core Description

Observer .N. Gruver .....

Depth Interval 

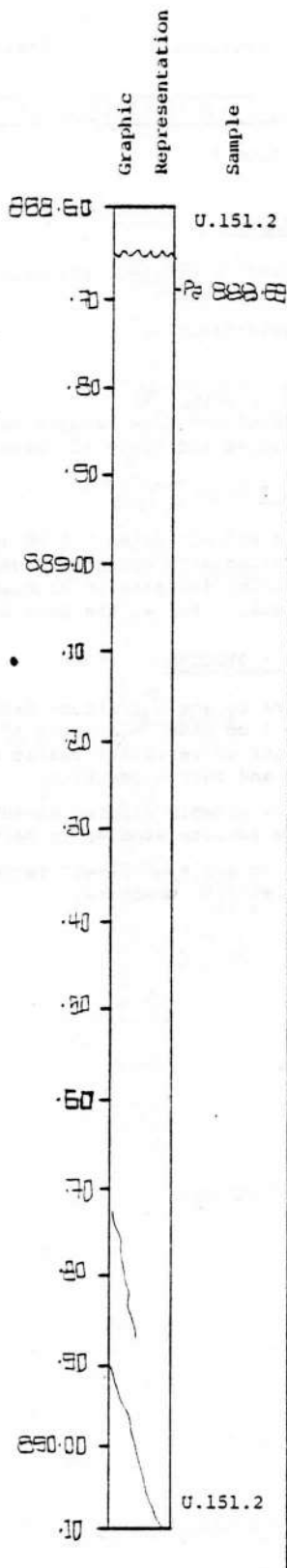
|   |   |   |   |   |
|---|---|---|---|---|
| 3 | 8 | 8 | 6 | 5 |
|---|---|---|---|---|

 cm to 

|   |   |   |   |   |
|---|---|---|---|---|
| 8 | 9 | 0 | 1 | 5 |
|---|---|---|---|---|

 cm

Box 152, Section 3

LITHOLOGY-PETROGRAPHY

Gray-green, fine - medium grained, sparsely phyrlic, vesicular basalt. More massive portion of section continued from above.

STRUCTURE

Moderately sparsely vesicular.

VESICLES/AMYGDALES

Vesicles ~ 3% of rock spherical to elongate 3-10 mm across long axis. Commonly filled with zoned arrangement of smectite - quartz - zeolite from rim to center of vesicle.

FRACTURES - VEINS - BRECCIA

Fractures < 1% of rock, at base of section are two fractures, 1 mm wide core to angle fracture ~ 80°. Fractures filled with zeolite.

ROCK ALTERATION

Pervasive smectite.

Visual Core Description

Observer ... N. Gruver

Depth Interval 

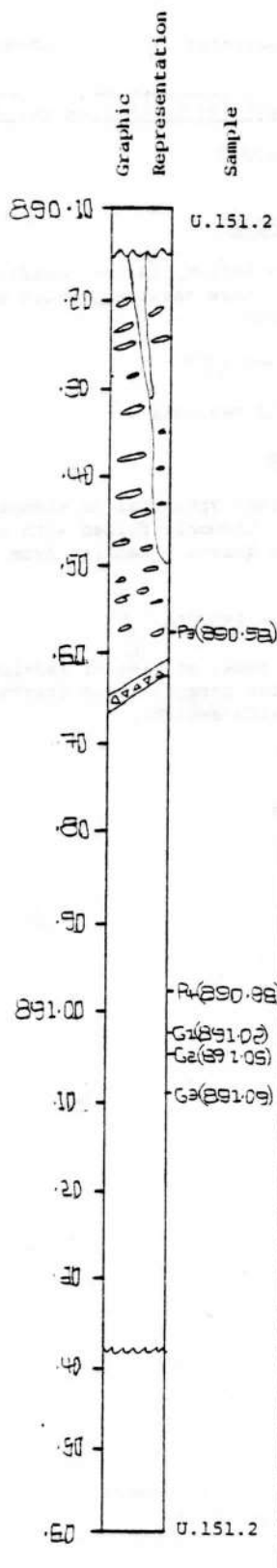
|   |   |   |   |   |
|---|---|---|---|---|
| 8 | 9 | 0 | 1 | 5 |
|---|---|---|---|---|

 cm to 

|   |   |   |   |   |
|---|---|---|---|---|
| 8 | 9 | 1 | 3 | 8 |
|---|---|---|---|---|

 cm

Box 152, Section 4

LITHOLOGY-PETROGRAPHY

Gray-green, medium-fine grained, sparsely aphyric, moderately vesicular, basalt.

890.65 Microbreccia-fault?

STRUCTURE

Moderately well developed flow banding defined by elongation of vesicles and wisps of smectite.

VESICLES/AMYGDALES

Vesicles flattened and elongated ~ 1 cm across long axis. Commonly filled with zoned arrangement of quartz and zeolite. Vesicles decrease in abundance down the hole and are extremely rare at the base of the section.

FRACTURES - VEINS - BRECCIA

Breccia zone - core to angle fracture breccia zone ~ 20°. Zone is ~ 2 cm wide. Consists of tiny brecciated fragments of vesicular basalt in ground mass altered to quartz and purple smectite.

Other fractures are steeply dipping 85-90° and lined with unknown white zeolite similar to Section 3.

Minor veinlets at an angle of 30-40° perpendicular to core axis are filled with smectite.

ROCK ALTERATION

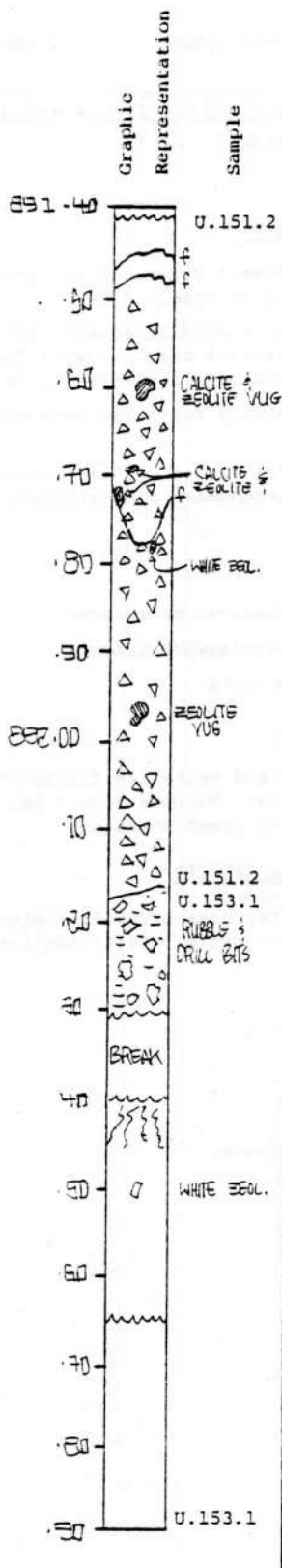
Pervasive smectite.

Visual Core Description

Observer JM

Depth Interval 891.39 cm to 892.65 cm

Box 153, Section 1



# LITHOLOGY-PETROGRAPHY

U.151.2

891.48 Transition from massive, aphyric, gray colored basalt flow to reddish brown flow bottom breccia - with fragments ranging from reddish brown vesicular fragments to black aphyric fragments. Size range 5 cm - 1 mm.

U.151.2

U.153.1

892.18 Contact between the bottom breccia and flow top breccia is a very fine-grained, black and highly weathered sediment and basalt sediment between 892.18 and 892.30. Contact dipping 40°, depositional flow contact.

U.153.1

892.40 - 892.65 Reddish-gray coarse grained flow top breccia, with grain boundaries often indistinguishable, with aphyric, fine-grained clasts and groundmass; minor vesiculation.

## STRUCTURE

891.40 - 891.48 Massive

891.48 - 892.18 Brecciated

892.18 - 892.30 Sediment and basaltic sediment

892.40 - 892.65 Brecciated

## VESICLES/AMYGDALES

891.50 - 892.18 Irregular vein like vesicles filled with white zeolite (laumontite) and coarse grained calcite.

892.40 - 892.65 Vesicles, rare vein-like vesicles filled with white zeolite. Small irregular green smectite blotches.

## FRACTURES - VEINS - BRECCIA

891.77 Fracture surface covered with zeolites, dipping 70-80°.

892.18 - 892.65 Fractures irregular

## ROCK ALTERATION

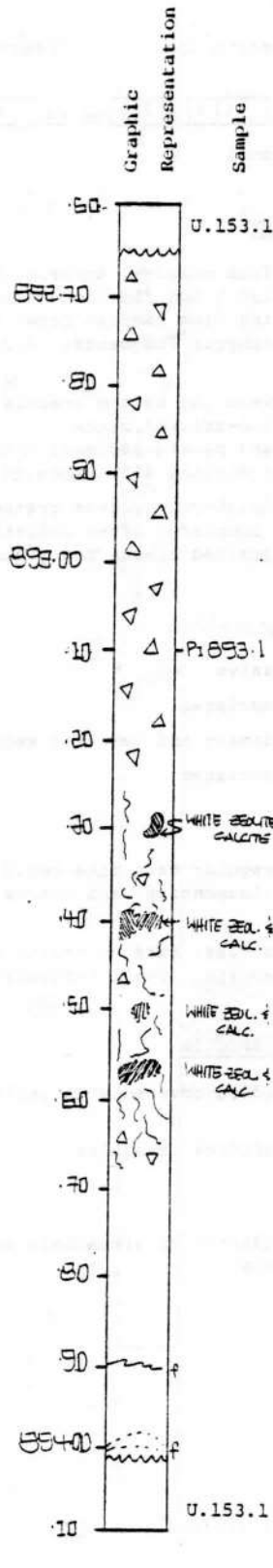
891.50 - 892.18 Oxidation of groundmass and fragments in flow bottom breccia.

Visual Core Description

Observer J.M.

Depth Interval 89265 cm to 89401 cm

Box 153, Section 2

LITHOLOGY-PETROGRAPHY

892.65 - 893.00 Basalt fragments and groundmass fine-medium grained aphyric basalt flow.

893.24 Transition to more brecciated and increased reddish gray scouraceous breccia, with fragments ranging from larger than the core diameter - 1 cm.

893.28 - 893.58 Highly fractured zone with irregular fractures

893.68 - 894.01 Transition to less brecciated basalt flow, clasts and groundmass fine-grained, aphyric basalt flow, reddish gray.

STRUCTURE

892.65 - 892.95 Massive, brecciated

893.10 - 893.58 Scouraceous breccia

893.65 - 894.01 Breccia

VESICLES/AMYGDALES

Vesicles irregular and vein-like filled with white zeolites and calcite. Maximum size 3 cm, smaller vesicles filled with green smectite.

FRACTURES - VEINS - BRECCIA

893.25 - 894.01 Fractures irregular, with little or no mineral alteration - may be due to swelling clays.

Visual Core Description

Observer ... JM .....

Depth Interval 

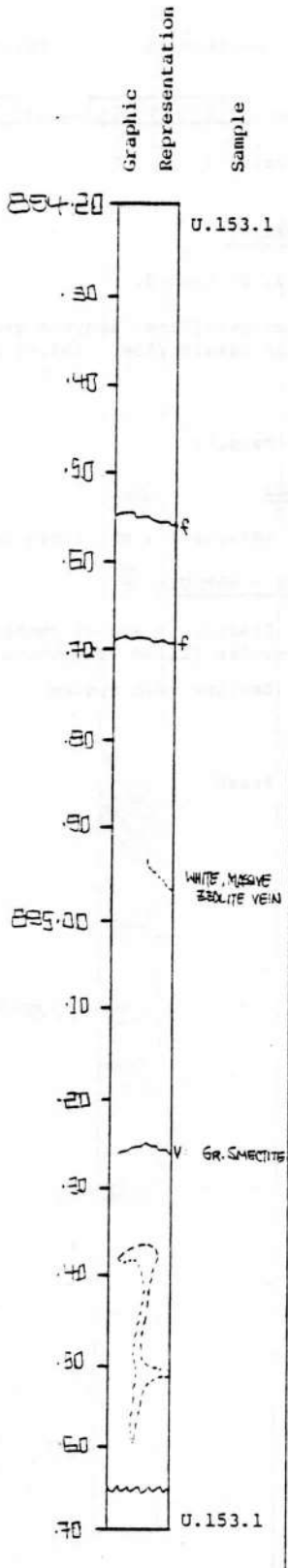
|   |   |   |   |   |
|---|---|---|---|---|
| 8 | 9 | 4 | 2 | 0 |
|---|---|---|---|---|

 cm to 

|   |   |   |   |   |
|---|---|---|---|---|
| 8 | 9 | 5 | 6 | 5 |
|---|---|---|---|---|

 cm

Box 153, Section 3

LITHOLOGY-PETROGRAPHY

Greenish-gray, fine-grained aphyric, holocrystalline basalt flow with green smectite vesicles, clasts with indistinguishable grain boundaries.

STRUCTURE

894.20 - 894.80 Massive

894.85 - 895.51 Faint flow banding

VESICLES/AMYGDALES

894.20 - 895.55 Vesicles 1 mm and less in size - sparse, filled with green smectite.

FRACTURES - VEINS - BRECCIA

895.42 Veins, 2 cm - 1 mm wide, filled with white massive zeolite

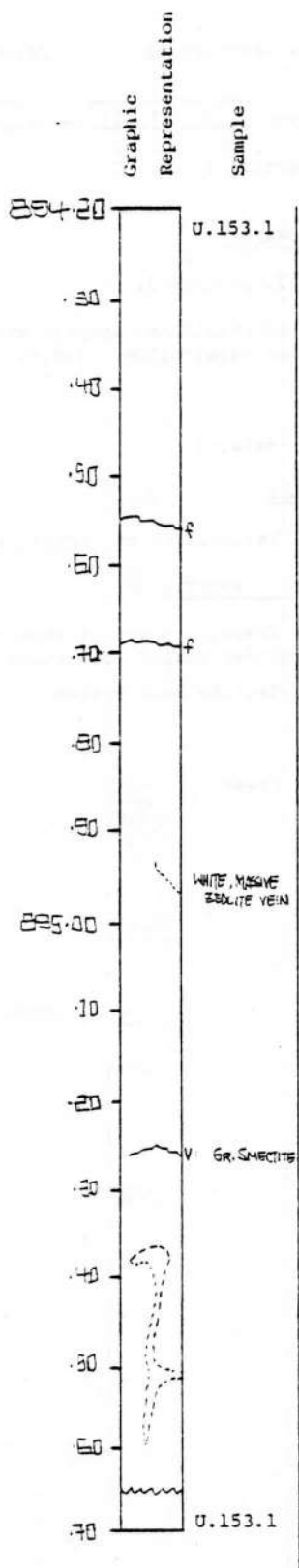
894.55 Fracture - white massive zeolite

894.69 Fracture - fracture and vein with white massive zeolite.

Visual Core Description

Observer JMDepth Interval 89420 cm to 89565 cm

Box 153, Section 3



Visual Core Description

Observer ... J.M. ....

Depth Interval 

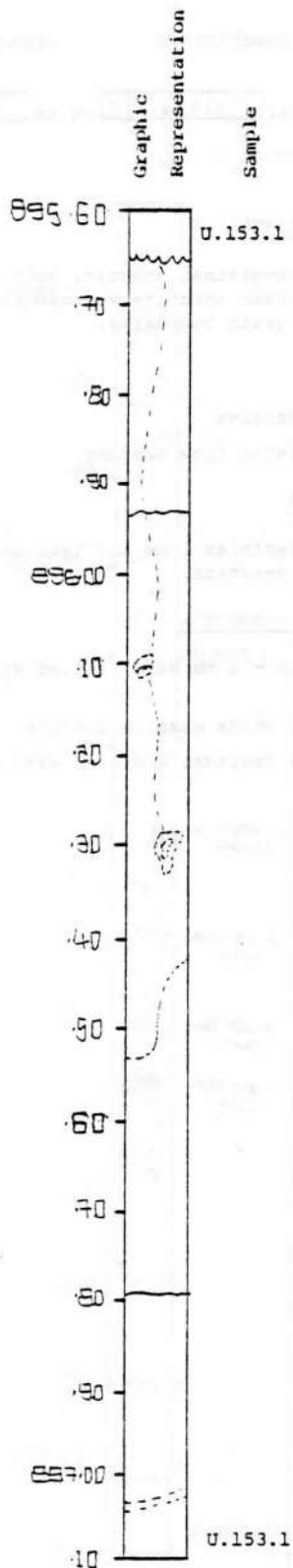
|   |   |   |   |   |
|---|---|---|---|---|
| 8 | 9 | 5 | 6 | 5 |
|---|---|---|---|---|

 cm to 

|   |   |   |   |   |
|---|---|---|---|---|
| 8 | 9 | 7 | 1 | 2 |
|---|---|---|---|---|

 cm

Box 153, Section 4

LITHOLOGY-PETROGRAPHY

Continued Box 153, Section 3.

Fine-grained holocrystalline, aphyric gray massive, sparsely vesicular basalt flow. 895.65 - 897.04

STRUCTURE

895.65 - 897.00 Massive

VESICLES/AMYGDALES

895.65 - 897.00 Vesicles; 1 mm, irregular, green smectite.

FRACTURES - VEINS - BRECCIA

895.70 - 896.98 Fracture - system running length off the section; irregular filled with white massive zeolite.

895.85 - 896.20 Zeolite vein system

ROCK ALTERATION

895.65 - 896.98 Fresh



Visual Core Description

Observer K. Hattori.....

Depth Interval 

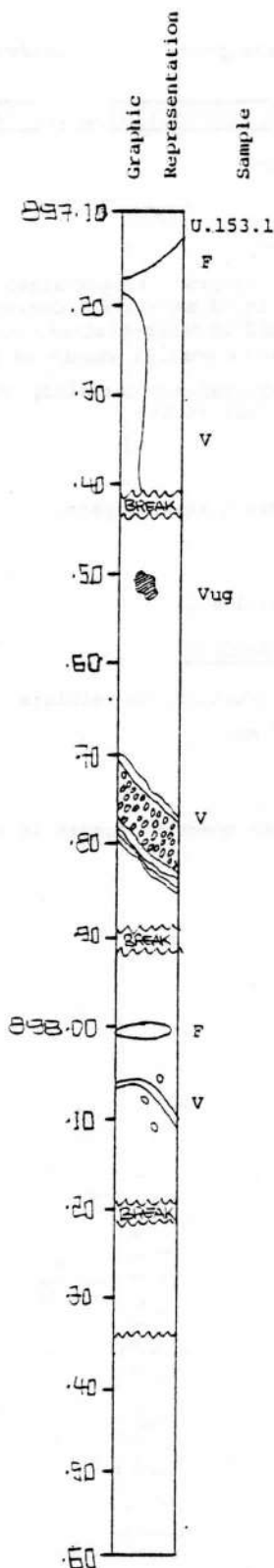
|   |   |   |   |   |
|---|---|---|---|---|
| 8 | 9 | 7 | 1 | 0 |
|---|---|---|---|---|

 cm to 

|   |   |   |   |   |
|---|---|---|---|---|
| 8 | 9 | 8 | 3 | 4 |
|---|---|---|---|---|

 cm

Box 154, Section 1

LITHOLOGY-PETROGRAPHY

897.18 - 897.43 Green coloured, aphyric plagioclase basalt.

897.45 - 897.85 Original texture has been destroyed

897.88 - 898.35 The amount of plagioclase phenocryst increase. The size of plagioclase become larger (3 mm)

STRUCTURE

897.13 - 897.30 Compact

897.45 - 897.78 Very brittle crushed zone

VESICLES/AMYGDALES

897.10 - 897.43 Vesicles - round sh. 1 ~ 3% filled with green smectite.

897.85 - 898.34 Vesicles: 1 ~ 3% filled with green smectites.

897.15 F (50°) fault plane is covered with green smectite and zeolites.

897.35 V (green smectite and zeolite), vein core to angle fracture 85° (~ 3 mm).

897.52 - Vug - euhedral laumontite (5 cm) crystal (1 cm).

897.78 - V; composite veins of Fe-hydroxides, gr-smectite, zeolite (laumontite).

898.00 F - core to angle fracture 0°, fault plane is covered with green smectite.

898.09 V - zeolite vein (~ 5 mm)

ROCK ALTERATION

897.10 - 897.43 Green smectite.

897.30 - 897.43 Stronger alteration.

897.43 - 897.85 Intensely altered clayey, zeolite is disseminated in rock, especially near veins.

897.88 - 897.95 Alteration becomes weak, but groundmass is intensely altered to clay minerals.

898.11 - 898.34 Fairly fresh.

Visual Core Description

Observer ..K..Hattori..

Depth Interval 

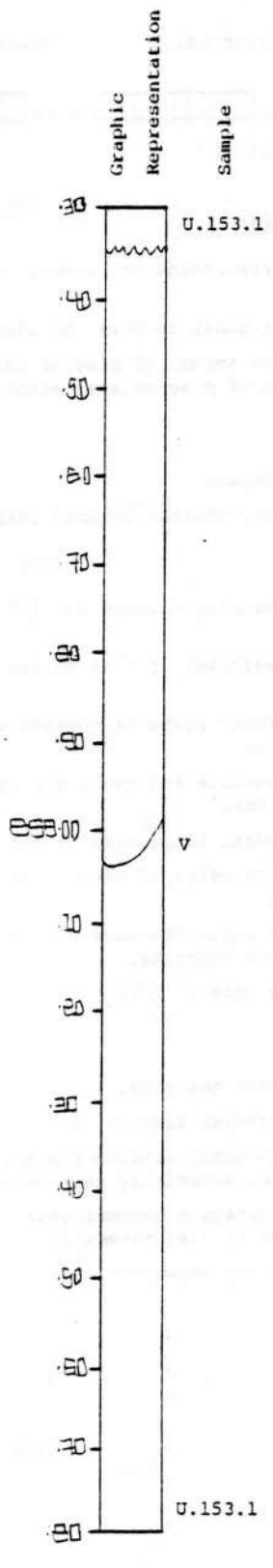
|   |   |   |   |   |
|---|---|---|---|---|
| 8 | 9 | 8 | 3 | 4 |
|---|---|---|---|---|

 cm to 

|   |   |   |   |   |
|---|---|---|---|---|
| 8 | 9 | 9 | 8 | 1 |
|---|---|---|---|---|

 cm

Box 154, Section 2



LITHOLOGY-PETROGRAPHY

Light green colored, aphyric, fine-grained basalt. Plagioclase phenocryst (3 mm ~ 3%). Compared to Section (3), Section 2 is finer-grained, with smaller phenocryst and a smaller amount of phenocrysts.

899.52 - 899.78 Very few, but certainly pyrite phenocryst appear (1 mm) (< 1%)

STRUCTURE

898.34 - 899.77 Compact, massive part.

VESICLES/AMYGDALES

898.34 - 898.64 Vesicles 1%.

FRACTURES - VEINS - BRECCIA

898.34 - 899.73 No fracture, no veinlets

899.03 V - Quartz 2 mm.

ROCK ALTERATION

898.34 - 899.73 Green smectite occurs in vesicles.

Visual Core Description

Observer ... K. Hattori .....

Depth Interval 

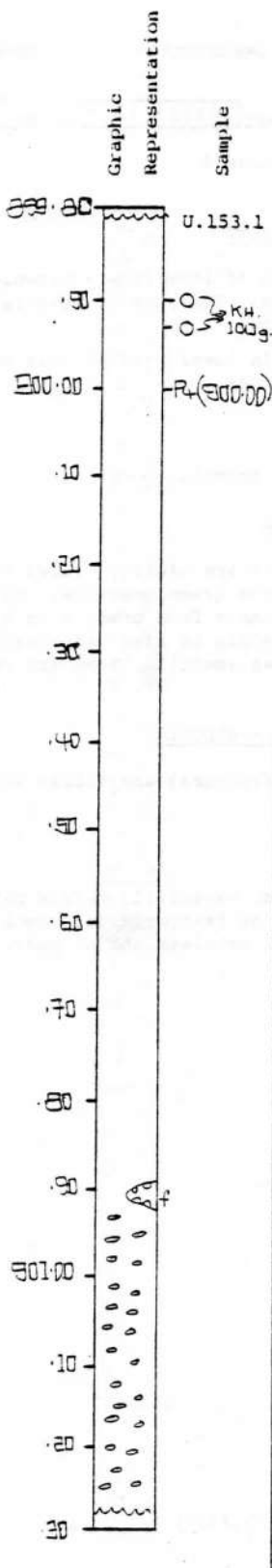
|   |   |   |   |   |
|---|---|---|---|---|
| 8 | 9 | 9 | 8 | 1 |
|---|---|---|---|---|

 cm to 

|   |   |   |   |   |
|---|---|---|---|---|
| 9 | 0 | 1 | 2 | 8 |
|---|---|---|---|---|

 cm

Box 154, Section 3



LITHOLOGY-PETROGRAPHY

899.81 - 900.88 Central part of the lava unit (153.1). Greey-green colored porphyritic basalt (plagioclase phenocryst 7 ~ 8 mm, 5%; pyroxene phenocryst ~ 2 mm, 1%).

Definitely it is more crystalline compared to Section 2. Sporadically zeolite amygdules (~ 2 cm) are present.

900.90 - 901.28 Bottom part of the lava flow unit (U.153.1) - amygdoidal, purple-green coloured, aphyric, fine-grained basalt; no phenocryst.

STRUCTURE

899.81 - 900.88 Compact

900.90 - 901.28 Brittle

VESICLES/AMYGDALES

900.74 Amygdale; ~ 1.5 cm, filled with zeolite.

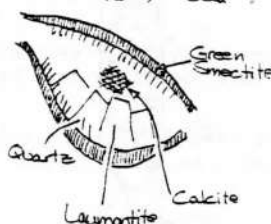
900.90 - 901.28 Amygdales; orientated flattened, up to 1 cm. Vol. %; 15% green smectite filling.

FRACTURES - VEINS - BRECCIA

899.81 - 900.75 No fractures, no veinlets.

900.90 - 901.28

FRACTURE # 3cm



ROCK ALTERATION

899.81 - 900.75 Looks fresh.

900.90 - 901.28 Clayey

Visual Core Description

Observer ...K. Hattori

Depth Interval 

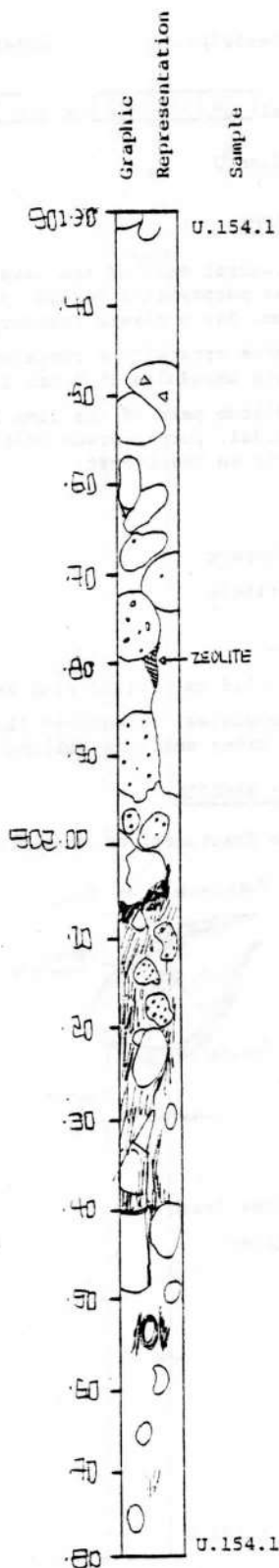
|   |   |   |   |   |
|---|---|---|---|---|
| 9 | 0 | 1 | 2 | 8 |
|---|---|---|---|---|

 cm to 

|   |   |   |   |   |
|---|---|---|---|---|
| 9 | 0 | 2 | 8 | 0 |
|---|---|---|---|---|

 cm

Box 154, Section 4



LITHOLOGY-PETROGRAPHY

Upper surface part of lava flow - brownish red coloured brecciated zone. The size of breccia up to 5 cm, usually 2 - 3 cm.

901.90 - 902.80 In lower part of this core the size of the breccia decreases.

STRUCTURE

Brecciated, soft, brittle.

VESICLES/AMYGDALES

Vesicles in breccia are usually filled with zeolites, some are filled with green smectite. Vol. % of vesicles in breccia is variable from breccia to breccia. The colour of each breccia is also very variable. Some are gray-green by green smectite; some are very red by Fe-hydroxide.

FRACTURES - VEINS - BRECCIA

901.35 - 902.80 Fractures are filled with zeolites and green smectites.

ROCK ALTERATION

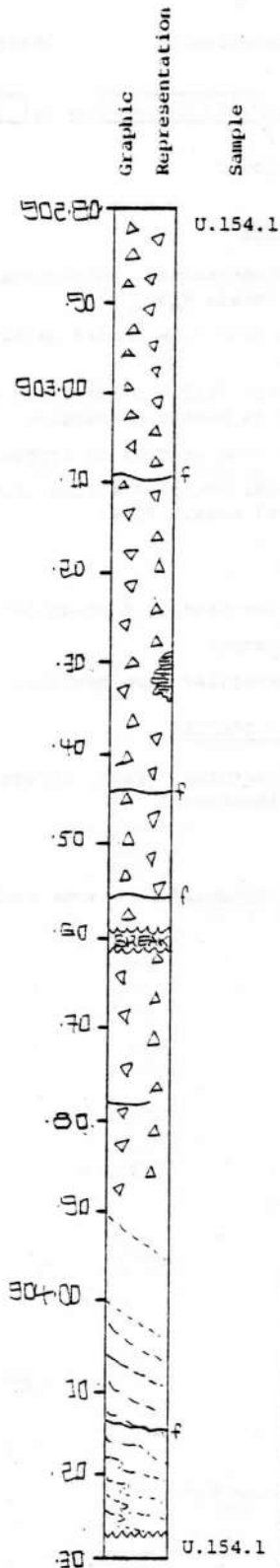
Intensely oxidized, especially matrix part - shows bright red colour caused by Fe-hydroxide. Zeolite is disseminated in matrix part, in veinlets and in pods.

Visual Core Description

Observer ...JM.....

Depth Interval 90280 cm to 90427 cm

Box 155, Section 1

LITHOLOGY-PETROGRAPHY

U154.1

Reddish gray flow top breccia with subrounded-subangular vesiculated basalt fragments. Vesicles contain white (?) zeolite and black-green smectite. Groundmass reddish brown, moderately vesicular.

903.32 Large flow banded clasts similar to the lower portion of unit 154.1

903.56 } Scouraceous highly weathered portion of flow.  
903.74

903.90 Transition from scouraceous breccia to massive, fine-grained aphyric, vesiculated basalt, with green smectite filling vesicles.

904.00 Transition from massive, fine-grained, aphyric, vesiculated basalt, to a flow banded basalt, with elongated irregular vesicles filled with white zeolite, green smectite and brown clays. Zone beginning at 904.00 oxidized.

STRUCTURE

902.80 - 903.52 Brecciated

903.60 - 903.97 Scouraceous breccia.

904.00 - 904.27 Flow banding, dipping 55°

VESICLES/AMYGDALES

902.80 - 903.72 Vesicles - irregular vesicles and vein-like vesicles filled with white zeolite, 3 mm - 1 mm in size.

904.00 Vesicles elongated, irregular, filled with green smectite and brown clays. Vesicles 1 cm - 1 mm in length.

FRACTURES - VEINS - BRECCIA

902.80 - 904.27/ Fracturing rare, fractures present are fresh, possibly due to swelling clays.

ROCK ALTERATION

902.80 - 904.27 Rock oxidized throughout this section.

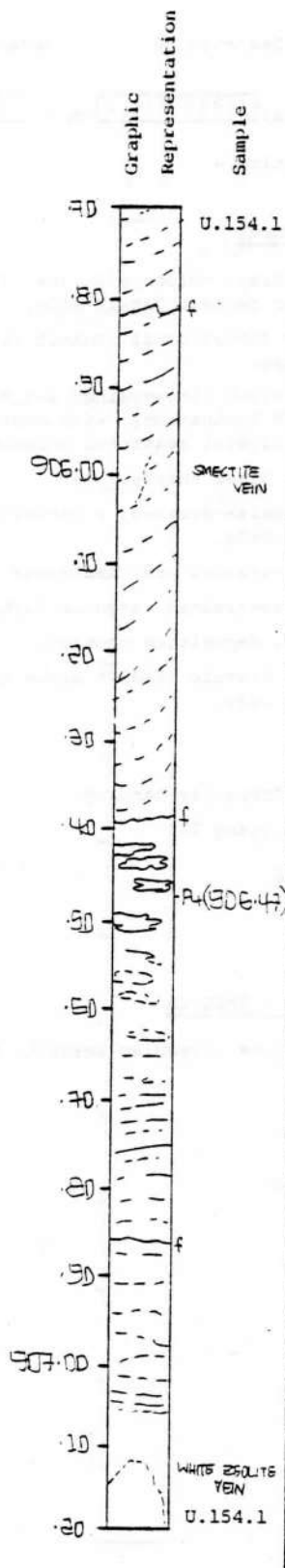
904.60 - 904.84 Groundmass show some oxidation.

Visual Core Description

Observer ... JM .....

Depth Interval 90570 cm to 90720 cm

Box 155, Section 3

LITHOLOGY-PETROGRAPHY

U.154.1 CONT'D

905.70 - 906.40 Holocrystalline, fine-grained, light - dark gray banding, aphyric basalt flow.

906.40 - 907.15 Transition where flow looks almost fragmental, but is not brecciated - material seems almost strung out.

STRUCTURE

905.82 - 906.40 Flow banding 40-50°

906.45 - 906.80 Brecciated (?)

VESICLES/AMYGDALES

905.82 - 907.08 Vesicles rare, filled with green smectite.

FRACTURES - VEINS - BRECCIA

905.82 - 907.08 Veins rare, filled with white zeolites and irregular. 907.16 White zeolite vein.

906.38 Fracture with white zeolite (laumontite ?)

ROCK ALTERATION

906.75 Minor red oxidation stains.

Visual Core Description

Observer ..... JM

Depth Interval 

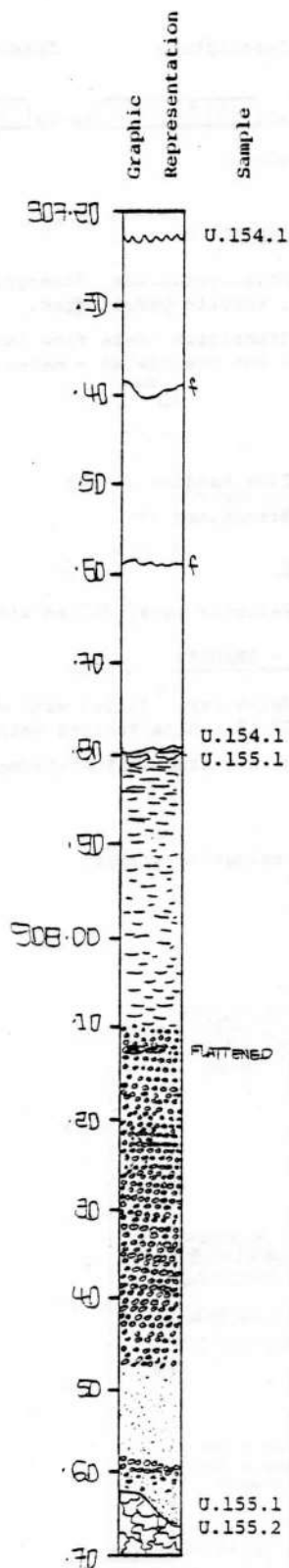
|   |   |   |   |   |
|---|---|---|---|---|
| 9 | 0 | 7 | 2 | 3 |
|---|---|---|---|---|

 cm to 

|   |   |   |   |   |
|---|---|---|---|---|
| 9 | 0 | 8 | 7 | 0 |
|---|---|---|---|---|

 cm

Box 155, Section 4

LITHOLOGY-PETROGRAPHY

U.154.1

907.20 - 907.70 Gray, holocrystalline, fine-grained, aphyric, irregular banded, basalt flow.

907.80 Irregular depositional contact with sediment (155.1) and breccia at base.

U.155.1 Reddish black fine-grained sediment, soft, planer fine-scaled laminations, with medium-grained angular feldspar crystal scattered throughout.

908.12 Flattened glass shards.

908.18 Medium, coarse-grained, subangular, lithic fragments, graded beds.

908.55 Very fine-grained gray sediments.

908.60 Very coarse-grained, angular lithic fragments.

908.67 Irregular, deposition contact.

U.155.2 Flow top breccia reddish brown in color, described on next page.

STRUCTURE

907.23 - 907.70 Irregular banding.

907.90 Bedding dipping 20°

VESICLES/AMYGDALES

U.154.1 Rare

U.155.1 Rare

FRACTURES - VEINS - BRECCIA

907.60 - 907.80 Some irregular smectite filled veins at the base.

U.155.1 Rare



Visual Core Description

Observer, ....JM.....

Depth Interval 

|   |   |   |   |   |
|---|---|---|---|---|
| 9 | 0 | 8 | 7 | 0 |
|---|---|---|---|---|

 cm to 

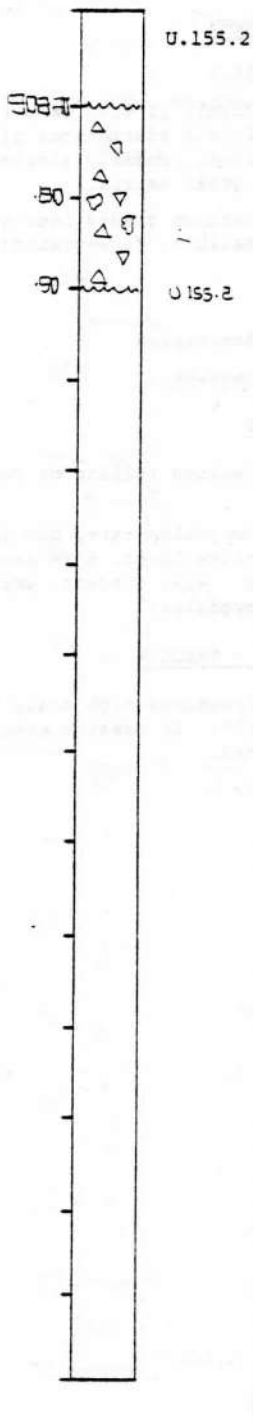
|   |   |   |   |   |
|---|---|---|---|---|
| 9 | 0 | 8 | 9 | 0 |
|---|---|---|---|---|

 cm

Box 155, Section 4 (continued)

Graphic  
Representation

Sample

LITHOLOGY-PETROGRAPHY

U.155.2

908.70 - 908.90 Flow top breccia with angular clasts in a white-green zeolite matrix, green - may be due to green smectite. Fragments range from 10 cm - 1 mm, and are fine-grained, aphyric, basalt fragments, with white zeolite filled vesicles.

STRUCTURE

Brecciated

Visual Core Description

Observer ... RHW ...

Depth Interval 

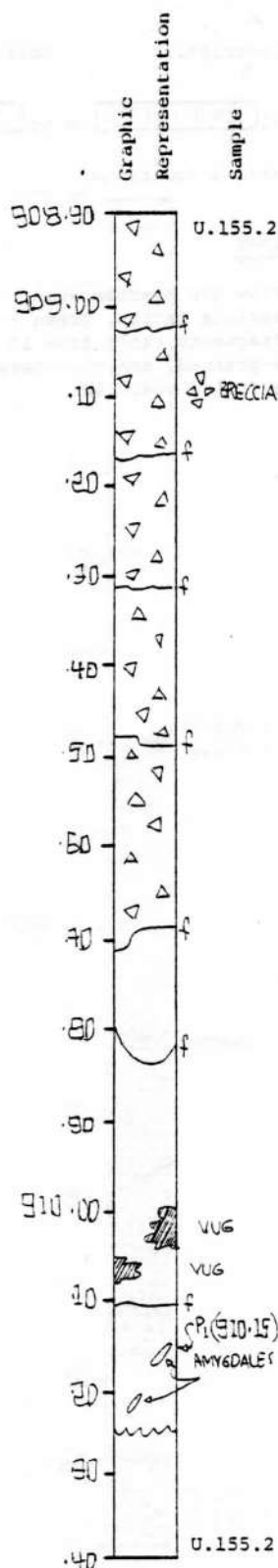
|   |   |   |   |   |
|---|---|---|---|---|
| 9 | 0 | 8 | 9 | 0 |
|---|---|---|---|---|

 cm to 

|   |   |   |   |   |
|---|---|---|---|---|
| 9 | 1 | 0 | 2 | 4 |
|---|---|---|---|---|

 cm

Box 156, Section 1

LITHOLOGY-PETROGRAPHY

Continuing Unit 155.2

908.90 - 909.60 Highly altered basaltic breccia (flow top) consisting of half scoriatic clasts. Groundmass distinctly pale green, probably altered basalt. Much fine-grained gray green matrix.

909.68 - 910.24 Section grades into greenish gray aphyric, holocrystalline, fine-grained basalt.

STRUCTURE

908.90 - 909.60 Brecciated

909.65 - 910.30 Massive

VESICLES/AMYGDALES

908.90 - 909.60 Zeolite filling or replacement in breccia zone.

909.65 - 910.30 Amygdules rare, but large (vugs up to 3 cm x 1 cm), smectite lined, then zeolite (laumontite?), and finally quartz. Also present, small (< 1 mm) smectite filled amygdules.

FRACTURES - VEINS - BRECCIA

908.90 - 910.24 Fractures high angle to fracture 60°, 45° and mostly 0-15°. In massive area, red stained and green smectite lined.

Visual Core Description

Observer RHW

Depth Interval 

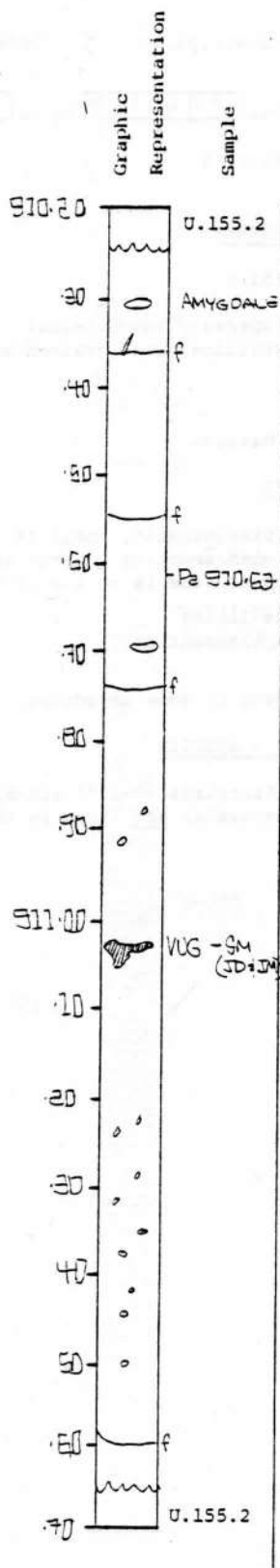
|   |   |   |   |   |
|---|---|---|---|---|
| 9 | 1 | 0 | 2 | 4 |
|---|---|---|---|---|

 cm to 

|   |   |   |   |   |
|---|---|---|---|---|
| 9 | 1 | 1 | 6 | 5 |
|---|---|---|---|---|

 cm

Box 156, Section 2

LITHOLOGY-PETROGRAPHY

Continuing unit 155.2

910.20 - 911.55 Sparsely amygdaloidal, greenish gray aphyric, holocrystalline, fine-grained basalt.

STRUCTURE

910.20 - 911.56 Massive

VESICLES/AMYGDALES

910.20 - 911.56 Disseminated, small (< 1 mm) ovoid amygduloids filled with smectite. Large amygduloids and one vug, scattered throughout. Vug is larger in diameter than core, 1-3 cm wide.

Filling: smectite lined  
zeolite (laumontite ?)  
quartz  
Large laumontite crystals, up to 1 cm long  
x .3 cm wide.

Some amygduloids have red stained linings.

FRACTURES - VEINS - BRECCIA

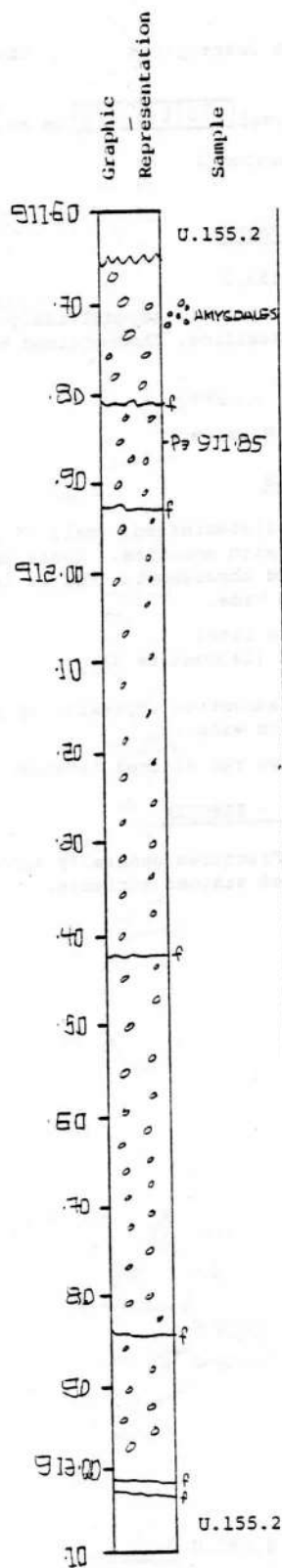
910.20 - 911.55 Fractures generally subhorizontal (0-10°), fairly fresh or red stained surfaces.

Visual Core Description

Observer ... RHW

Depth Interval 91165 cm to 91312 cm

Box 156, Section 3

LITHOLOGY-PETROGRAPHY

Continuing unit 155.2

911.65 - 913.05 Sparsely amygdaloidal, greenish-gray, aphyric, holocrystalline, fine grained basalt.

STRUCTURE

911.65 - 913.05 Massive

VESICLES/AMYGDALES

911.65 - 913.00 Disseminated, small (&lt; 1 mm) ovoid amygdaloides filled with smectite. Large amygdaloides, scattered throughout, size is to 1 x .5 cm.

Filling: smectite lining  
zeolite (laumontite ?)  
quartz

Red staining present in some amygdaloides.

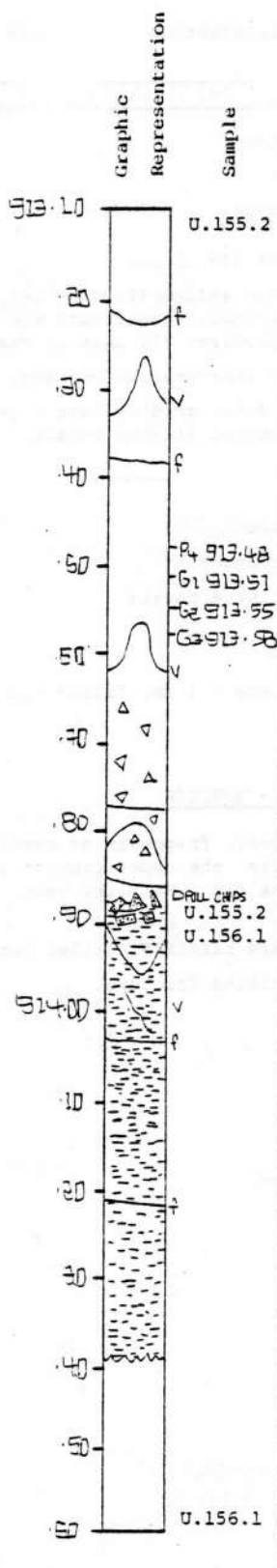
FRACTURES - VEINS - BRECCIA911.65 - 913.05 Fractures (0-10°) either fresh, or red stained, generally not lined in the smectite.

Visual Core Description

Observer RHW

Depth Interval 91312 cm to 91439 cm

Box 156, Section 4



# LITHOLOGY-PETROGRAPHY

Continuing unit 155.2

U.155.2 Fine grained, iron stained, aphyric, holocrystalline, equigranular basalt. Several zones of "washed out" red stain around fractures and veins.

913.65 - 913.90 Basaltic. Breccia at base of massive section, overlying pyroclastic sediments.

U.156.1 Pyroclastic sediments.

Roughly bedded, poorly sorted volcaniclastics. Grain size extremely variable, up to 5 cm long. Some distinct, well sorted bands of clay size and sand sized particles. Well indurated, bedding subhorizontal. Clasts are of various types, scoriaceous and non-vesicular.

## STRUCTURE

U.155.2 Massive

U.156.1 Bedded (bedding subhorizontal, difficult to measure).

## VESICLES/AMYGDALES

U.155.2 Disseminated, small vesicles, filled with smectite. Many red stained. Larger amygdules, characteristic of upper sections absent here.

## FRACTURES - VEINS - BRECCIA

U.155.2 Fractures 0-20°, red stained.

913.90 Fracture at contact.

913.94 ~ 70°

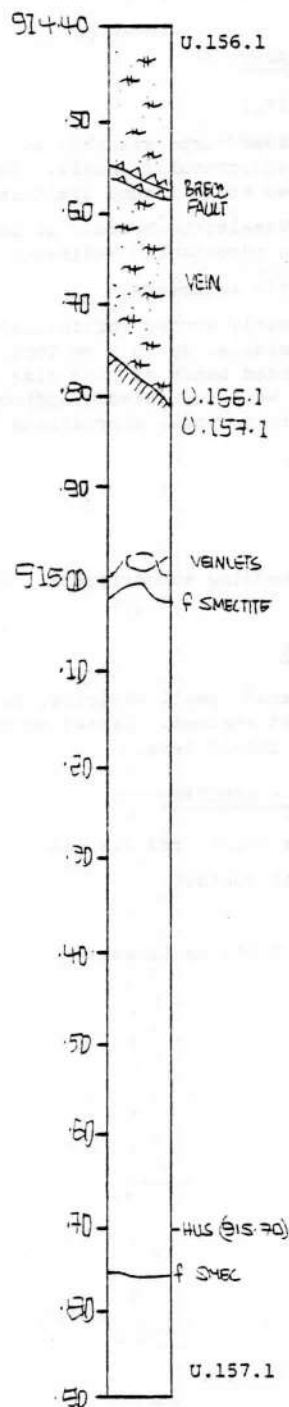
914.00 Fractures ~ 0°, no lining.

Visual Core Description

Observer ...Vierack...

Depth Interval 91439 cm to 91586 cm

Box 157, Section 1

LITHOLOGY-PETROGRAPHY

Continuation of Box 156.

U.156.1 Pyroclastic sediments, dark gray, sandy, silty groundmass, porphyritic, phenocrysts are < 1 mm in size, light colour (plagioclase ?), unit is vesicular.

914.78 Dark gray fine-grained contact.

U.157.1 Basaltic dyke, grading into a greenophitic aphyric, medium-grained olivine basalt.

STRUCTURE

U.156.1 Pyroclastic

914.78 Chilled contact

915.20 Ophitic olivine basalt

VESICLES/AMYGDALES

U.156.1 Vesicles are < 1 mm, filled with quartz ?, and zeolite.

U.157.1 None

FRACTURES - VEINS - BRECCIA

914.55 Fault breccia, fragments of pyroclast, rocks are baked by zeolite, the upper contact shows slicken sides in direction of the dip. Hairlike vein, filled with zeolite.

914.98 Veinlets are hairlike, filled with zeolite.

915.02 Smectite coated fracture.

Visual Core Description

Observer ..... Viereck .....

Depth Interval 

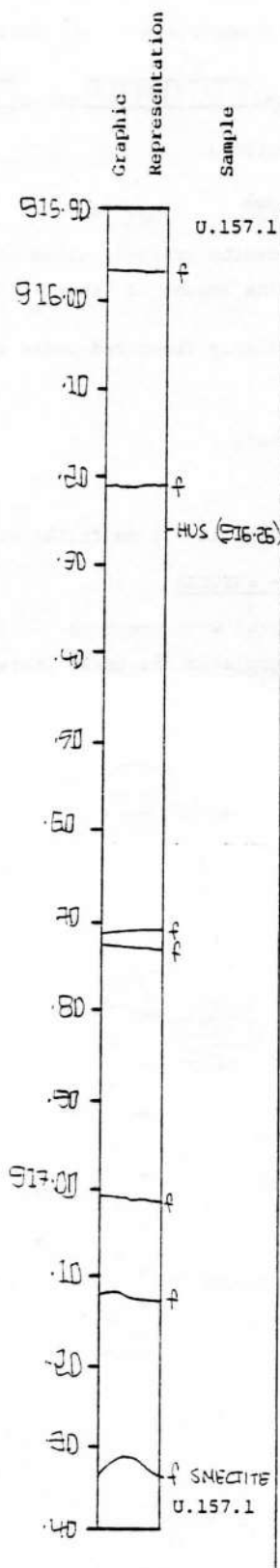
|   |   |   |   |   |
|---|---|---|---|---|
| 9 | 1 | 5 | 8 | 6 |
|---|---|---|---|---|

 cm to 

|   |   |   |   |   |
|---|---|---|---|---|
| 9 | 1 | 7 | 4 | 0 |
|---|---|---|---|---|

 cm

Box 157, Section 2

LITHOLOGY-PETROGRAPHY

915.86 - 916.25 Ophitic, aphyric, medium-grained, green olivine basalt.

916.25 - 916.70 The ophitic texture is the coarsest in the whole unit.

STRUCTURE

Ophitic, olivine basalt

VESICLES/AMYGDALES

Few vesicles, round ~ 2 mm in diameter filled with zeolite.

Few irregular patches of smectite.

FRACTURES - VEINS - BRECCIA

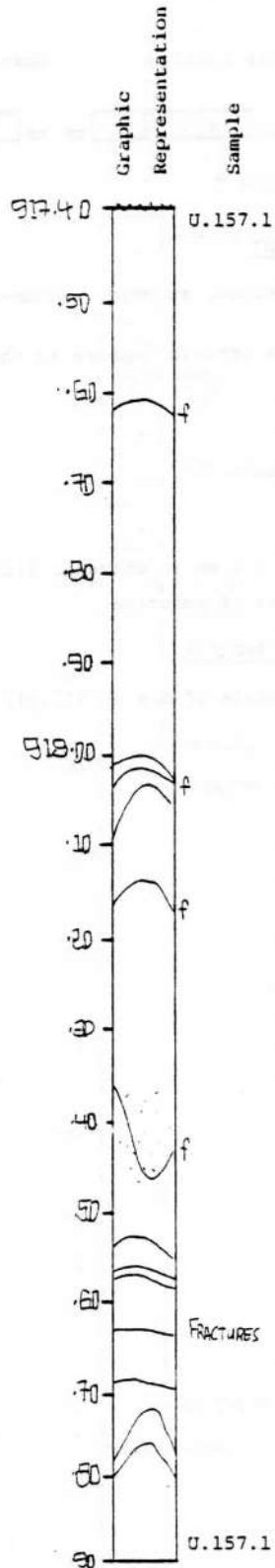
917.12 Fracture - angle of dip at 917.35. Core to angle fracture ~ 70°.

OTHER

Visual Core Description      Observer Viereck

Depth Interval 91740 cm to 91891 cm

Box 157, Section 3



LITHOLOGY-PETROGRAPHY

Ophitic, aphyric, medium grained, green olivine basalt.  
 918.35 downward. The amount of vesicles is slightly increasing.  
 918.50 downward. Highly fractured under steep angles.

STRUCTURE

Ophitic olivine basalt

VESICLES/AMYGDALES

918.35 Vesicle - size is ~ 1 mm filled with zeolite.

FRACTURES - VEINS - BRECCIA

Fractures often coated with smectite.  
 918.50 Irregular unplanar fractures increase - Core to angle fracture ~ 70°

OTHER

Dyke



Visual Core Description

Observer Viereck

Depth Interval 

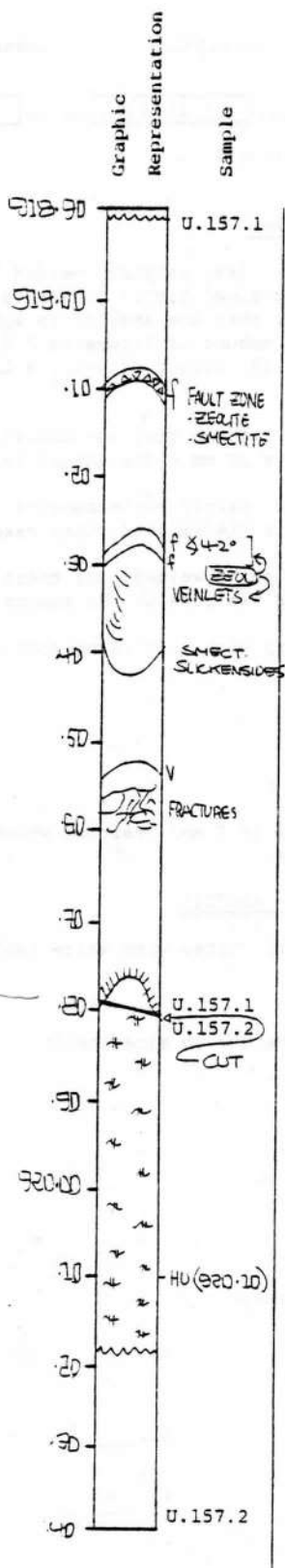
|   |   |   |   |   |
|---|---|---|---|---|
| 9 | 1 | 8 | 9 | 1 |
|---|---|---|---|---|

 cm to 

|   |   |   |   |   |
|---|---|---|---|---|
| 9 | 2 | 0 | 1 | 3 |
|---|---|---|---|---|

 cm

Box 157, Section 4



# LITHOLOGY-PETROGRAPHY

U157.1

Ophitic, pahyric, medium-grained, green olivine basalt; becoming finer grained towards the contact. Colour changes from green to greenish gray.

919.78 Fine-grained gray contact zone of 10 mm.

919.81 The contact is lined by veinlets filled with zeolite. The contact area is a little fractured and coated with smectite with stickensides on the fracture planes.

U157.2

The lithic fragments in the tuff vary between less than 1 mm - 20 mm, the pumiceous pale coloured fragments are up to 40 mm long.

Light gray groundmass; lighter pumice fragments oriented subhorizontally. Gray lithic (basaltic) fragments slightly porphyritic (feldspar).

## STRUCTURE

919.81 Chilled contact. Core to angle fracture  $\sim 67^\circ$ .

U.157.2 Pyroclastic unit. Welded, porphyritic.

## VESICLES/AMYGDALES

U.157.1 Tiny vesicles  $< 1 \text{ mm } \phi$  filled with zeolite. Irregular patches of smectite.

U.157.2 Few vesicles with white filling (?).

## FRACTURES - VEINS - BRECCIA

919.10 Fracture zone with brecciated basalt. Smectite coated plane at the upper contact.

919.27 - 919.42 Veinlets and fractures are coated with zeolite and smectite.

U.157.2 Fractures are concentrated on just below the contact.

## OTHER

Dyke

919.40 Slickensides are in the direction of dip. Core to angle fracture  $60^\circ$ .

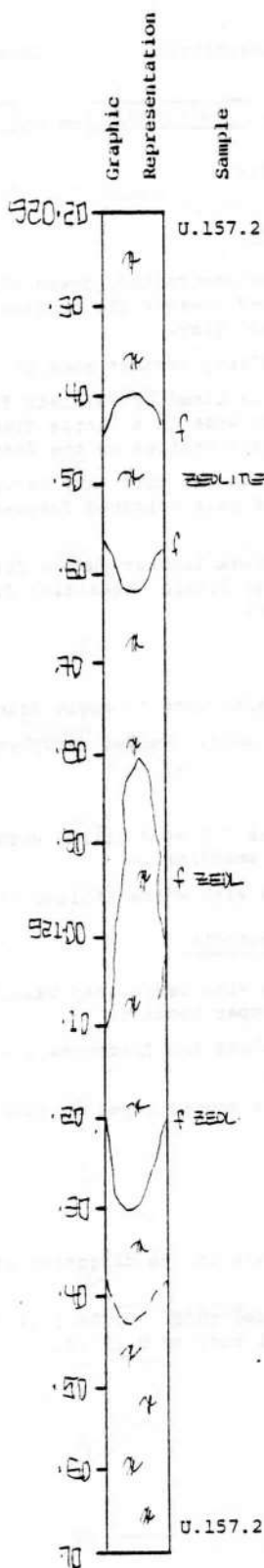
U.157.2 Top of a welded tuff. U.156.1 is the uppermost part, probably airfall tuff of U.157.2.

Visual Core Description

Observer ..Vierck....

Depth Interval 92020 cm to 92163 cm

Box 158, Section 1

LITHOLOGY-PETROGRAPHY

(Lithic fragments). Gray to pink, welded acid tuff, fine gray matrix, fine-grained lithic fragments vary in size from 1 mm to 40 mm, they are angular to subangular, the amount varies; the amount of fragments > 5 mm decreases from 920.90 to 921.38, colour is gray, a little darker than the groundmass.

Pumice fragments. Lighter gray to pinkish, vary in size from a < 1 x 3 mm to 10 x 30 mm - the amount is nearly uniform.

Phenocrysts. White, partly hypidiomorphic felspar (?) - crystals are equally distributed, they reach a length of 1 mm.

This portion seems to be welded, for there is nearly no open or secondary filled vesicles in the pumice fragments.

Pumice fragments dip with  $\sim 20^\circ$ , the rock is very porous.

STRUCTURE

Eutaxitic

VESICLES/AMYGDALES

There are few small (< 2 mm) vesicles which are filled with white zeolites.

FRACTURES - VEINS - BRECCIA

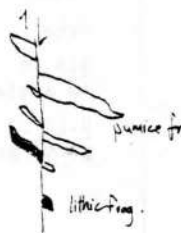
Fractures are mostly coated with white zeolites and calcite.

ROCK ALTERATION

Pink colour might be due to alteration.

OTHER

At 920.35



Visual Core Description

Observer ..Vierck.....

Depth Interval 

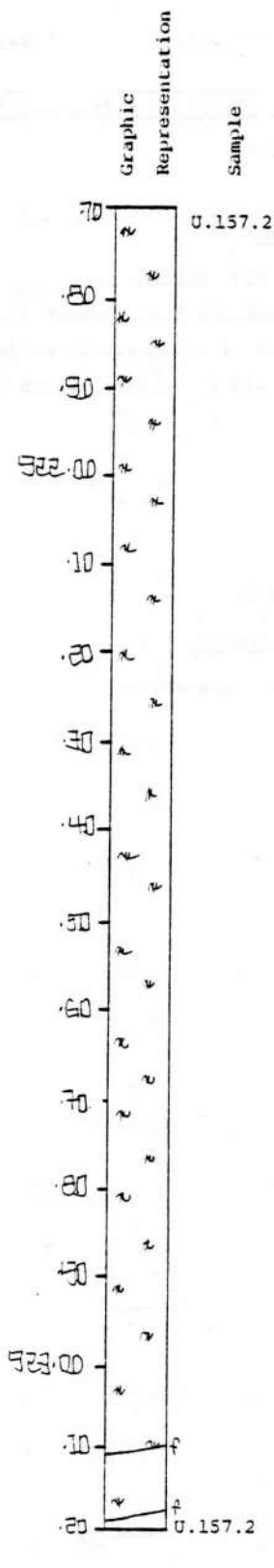
|   |   |   |   |   |
|---|---|---|---|---|
| 9 | 2 | 1 | 6 | 8 |
|---|---|---|---|---|

 cm to 

|   |   |   |   |   |
|---|---|---|---|---|
| 9 | 2 | 3 | 3 | 9 |
|---|---|---|---|---|

 cm

Box 158, Section 2



LITHOLOGY-PETROGRAPHY (continuing from Box 158, # 1)

Very uniform section of brownish gray welded acid tuff (exact description see Box 158, Section 1).

Differences from Box 158, # 1 - Porphyritic basic lithic fragment at 922.65.

Huge pumice fragment at 922.92: 50 x 15 mm

Dip of fragments is still  $\sim 20^\circ$

STRUCTURE

Eutaxitic

VESICLES/AMYGDALES

Only a few tiny vesicles  $\sim 1$  mm  $\phi$

FRACTURES - VEINS - BRECCIA

923.11-923.18 Fracture dip is  $\sim 15^\circ$

Visual Core Description

Observer ...Vierck...

Depth Interval 

|   |   |   |   |   |
|---|---|---|---|---|
| 9 | 2 | 3 | 3 | 9 |
|---|---|---|---|---|

 cm to 

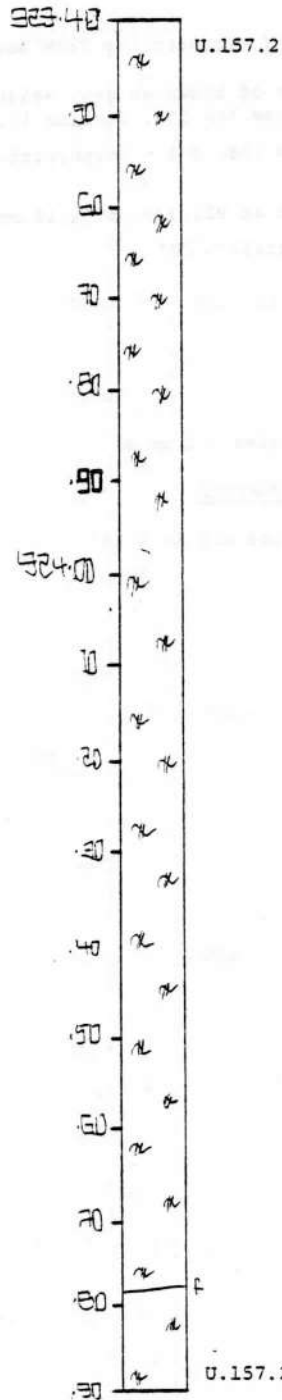
|   |   |   |   |   |
|---|---|---|---|---|
| 9 | 2 | 4 | 9 | 0 |
|---|---|---|---|---|

 cm

Box 158, Section 3

Graphic  
Representation

Sample

LITHOLOGY-PETROGRAPHY

Continuing from Box 158, Section 2.

(Exact description see Box 158, Section 1).

Brownish gray section of a moderately welded acid tuff.

Specialities to Box 158.2: Slight colour change to gray from 924.50 downward.

STRUCTURE

Eutaxitic

VESICLES/AMYGDALES

See Box 158, Section 2.

FRACTURES - VEINS - BRECCIA

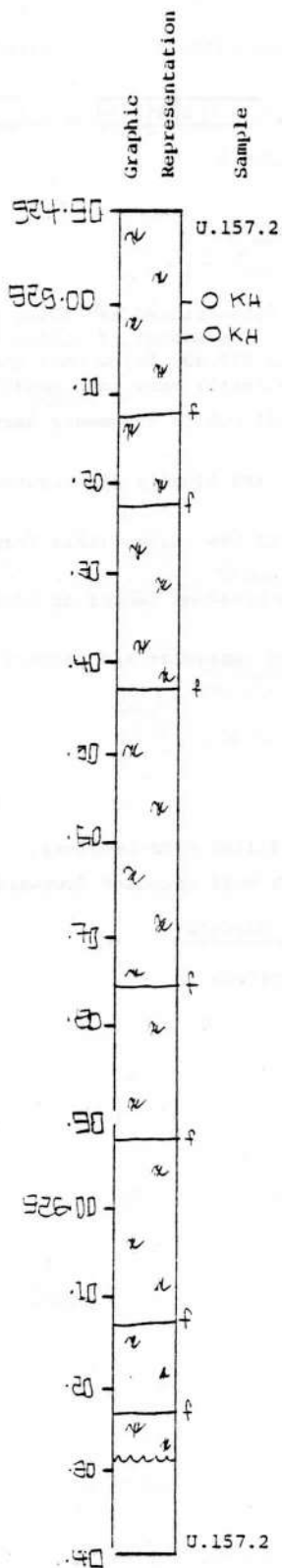
Only one fracture, not coated.

Visual Core Description

Observer Viereck

Depth Interval 92490 cm to 92629 cm

Box 158, Section 4

LITHOLOGY-PETROGRAPHY

Continuing from Box 157 over Box 158, # 1, # 2 and 3.

Same unit as in the Boxes before - exact description see Box 158.1.

Differences:

Colour is gray all over the section.

At 925.47 is a hige (50 x 30 mm) vesicular basalt fragment, vesicles are filled with white zeolites and green smectite minerals.

A few dark gray lithic fragments have reddish rims.

The average size of lithic fragments is ~ 5 mm.

STRUCTURE

Eutaxitic

VESICLES/AMYGDALES

See sections before.

FRACTURES - VEINS - BRECCIA

Fractures are not coated.

ROCK ALTERATION

Along the outside of lithic fragments reddish colouring.

Visual Core Description

Observer ..Viereck...

Depth Interval 

|   |   |   |   |   |
|---|---|---|---|---|
| 9 | 2 | 6 | 2 | 9 |
|---|---|---|---|---|

 cm to 

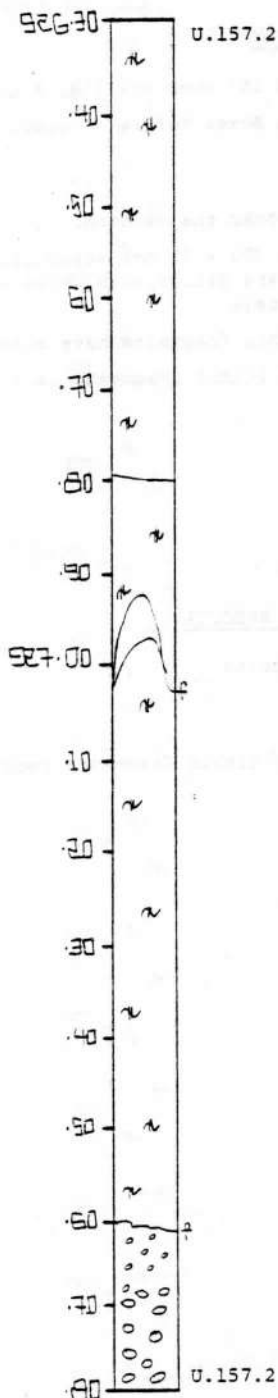
|   |   |   |   |   |
|---|---|---|---|---|
| 9 | 2 | 7 | 8 | 2 |
|---|---|---|---|---|

 cm

Box 159, Section 1

Graphic  
Representation

Sample



# LITHOLOGY-PETROGRAPHY

Continuing Box 158.

Moderately welded, fine-grained ash flow, porous, light gray, fine-grained. The amount of lithic fragments is uniform only down to 927.40, below that the amount of fragments > 4 mm is nearly zero down to 927.61.

926.60 The amount of pumice fragments decreases rapidly downward.

928.90 Phenocrysts are equally distributed, <1 mm in length.

927.36 - 927.59 Very few large lithic fragments, colour is dark gray.

927.60 Increase in size and amount of fragments (> 6 mm) of basalt.

$\phi$  > 10-20 mm, partly vesicular and porphyritic.

## STRUCTURE

Eutaxitic

## VESICLES/AMYGDALES

Few tiny vesicles, filled with zeolites.

927.60 Vesicles are more abundant downward.

## FRACTURES - VEINS - BRECCIA

Fractures are not coated.

Visual Core Description

Observer, ....Vierck.....

Depth Interval 

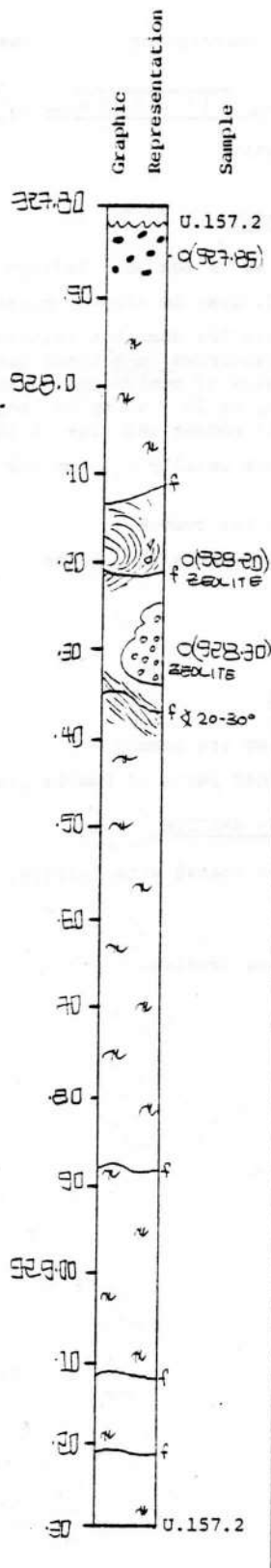
|   |   |   |   |   |
|---|---|---|---|---|
| 9 | 2 | 7 | 8 | 2 |
|---|---|---|---|---|

 cm to 

|   |   |   |   |   |
|---|---|---|---|---|
| 9 | 2 | 9 | 3 | 4 |
|---|---|---|---|---|

 cm

Box 159, Section 2.

LITHOLOGY-PETROGRAPHY

Continuing from Box 195, Section 1.

Same kind of rock as the lower part of Section 1.

927.85 Change in colour: light gray to gray. Pumice fragments appear again, they are highly flattened. Increase in phenocrysts, white (feldspar?) lithic fragments are partly rounded. The amount and size is still above average. Colour is light to dark gray.

928.20 Contorted, highly vesicular part, slightly brecciated, zeolites.

928.30 Highly vesicular greenish-dark gray fragment?

928.54 Rapid increase in amount of pumice fragments. The size is about 10 mm, few are up to 20 mm and are filled with zeolites. Lithic fragments are common and equally distributed. Phenocrysts are continuing throughout the box, their size is always < 1 mm.

STRUCTURE

Eutaxitic.

Contorted textures between 928.16 and 928.36.

928.70 Eutaxitic

VESICLES/AMYGDALES

Vesicles increase in the contorted part. Below that they are equally distributed and core to angle fracture 1 mm in size.

FRACTURES - VEINS - BRECCIA

Fractures don't seem to be coated.

ROCK ALTERATION

928.16 Reddish colouring

From 928.28 on downward pumice fragments have been altered strongly and become reddish-brown in colour.

OTHER

927.85 Contact between two flow units which seem to belong to one cooling unit.

Below the contorted portion down into Box 160 the unit seems to be less welded (if at all), for pumice fragments are poorly flattened and filled with secondary minerals.

Visual Core Description

Observer ..Viereck...

Depth Interval 

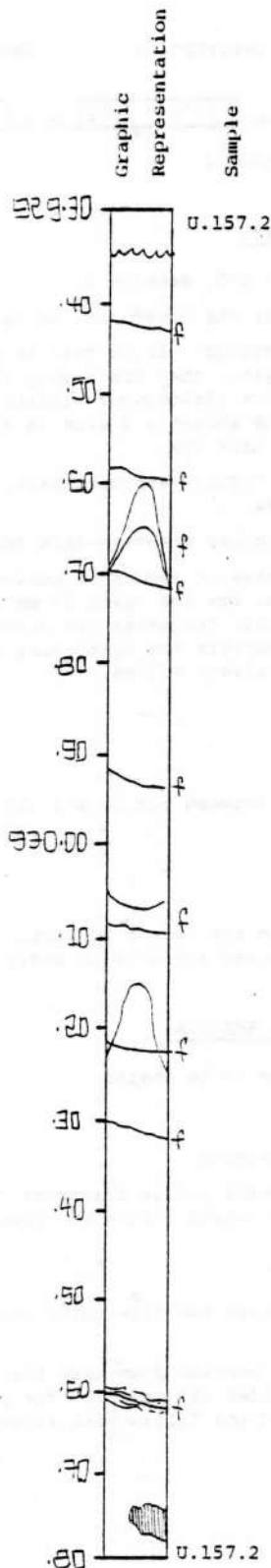
|   |   |   |   |   |
|---|---|---|---|---|
| 9 | 2 | 9 | 3 | 4 |
|---|---|---|---|---|

 cm to 

|   |   |   |   |   |
|---|---|---|---|---|
| 9 | 3 | 0 | 8 | 3 |
|---|---|---|---|---|

 cm

Box 159, Section 3

LITHOLOGY-PETROGRAPHY

Same kind of rock as in Box 159, Section 2.

Weakly welded tuff, gray to kind of blueish gray.

Pumice fragments are the dominant features: they are altered to a reddish-brown, the inner part is filled with white zeolites. Size of pumice fragments increases from 929.30 to 929.60 up to 20 - 40 mm in length, below that they are equally in amount and size in the section.

Lithic fragments are usually < 10 mm and are very rare, gray in colour.

Phenocrysts &lt; 1 mm are common.

930.76 Lithic fragments - 30 x 40 mm.

STRUCTURE

Eutaxitic

VESICLES/AMYGDALES

Tiny &lt; 1 mm vesicles are common.

Zeolites in the inner parts of pumice fragments.

FRACTURES - VEINS - BRECCIA

Fractures are often coated with zeolite.

ROCK ALTERATION

Pumice fragments are reddish.



Visual Core Description

Observer...Viereck.....

Depth Interval 

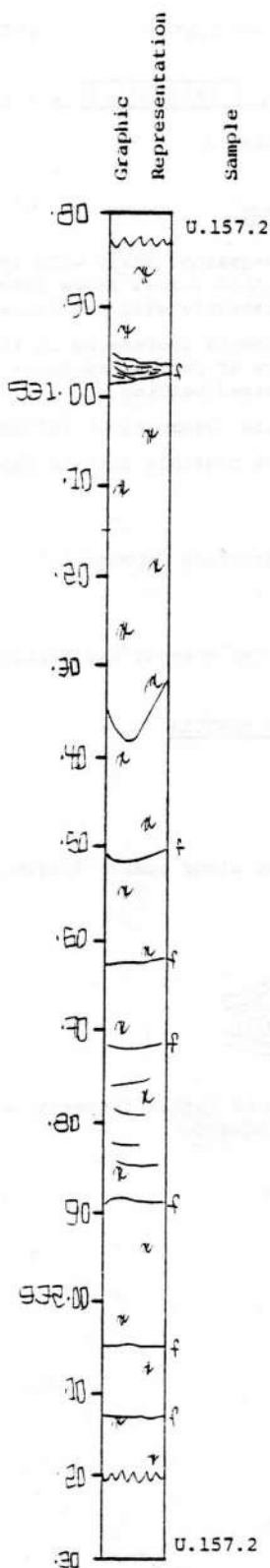
|   |   |   |   |   |
|---|---|---|---|---|
| 9 | 3 | 0 | 8 | 3 |
|---|---|---|---|---|

 cm to 

|   |   |   |   |   |
|---|---|---|---|---|
| 9 | 3 | 2 | 2 | 0 |
|---|---|---|---|---|

 cm

Box 159, Section 4.

LITHOLOGY-PETROGRAPHY

Same kind of rock as before. Exact description see Box 159, Section 3.

Differences:

Increase in size of pumice fragments to 40 mm. Decrease in amount of pumice fragments during the whole section. Downwards they get less flattened.

Lithic fragments of ~ 10 mm are rare, small ones ~ 2 mm are common.

Decrease in amount of phenocrysts downward.

The dip of the pumice fragments varies throughout the Box between 0° - 20°.

STRUCTURE

Eutaxitic

VESICLES/AMYGDALES

Pumice of a length of up to 30 mm are filled with zeolite.

FRACTURES - VEINS - BRECCIA

The whole section is strongly fractured.

ROCK ALTERATION

Strong reddish-brown alteration between 931.50 - 931.80 and 931.90 - 932.02.

Visual Core Description

Observer ..JM.....

Depth Interval 

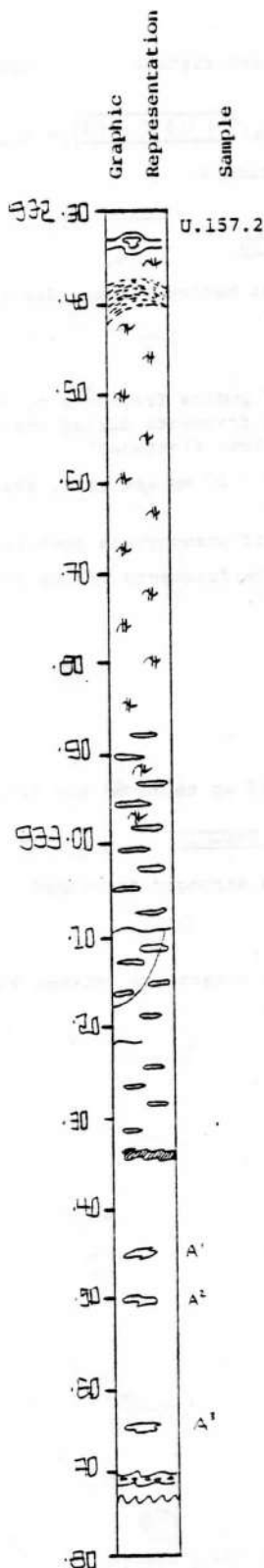
|   |   |   |   |   |
|---|---|---|---|---|
| 9 | 3 | 2 | 2 | 6 |
|---|---|---|---|---|

 cm to 

|   |   |   |   |   |
|---|---|---|---|---|
| 9 | 3 | 3 | 7 | 3 |
|---|---|---|---|---|

 cm

Box 160, Section 1



#### LITHOLOGY-PETROGRAPHY

932.35 Welded fine-grained tuffs with sporadic lithic clasts, basaltic lithic clasts range from 5 mm - 3 cm in size. Light greenish-gray with red oxidation stains.

932.50 Pumice fragments increasing in size downward. Eutaxitic structure of pumice fragments decreasing downward with decreased welding.

933.35 Large zeolite (laumontite) filled pumice fragments.

933.71 Breccia zone possibly between flows.

#### STRUCTURE

Planer eutaxitic structure dipping 10°.

#### VESICLES/AMYGDALES

Vesicles formed by replacement and filling of unwelded pumice fragments.

#### Fractures - VEINS - BRECCIA

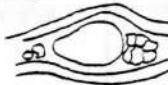
932.75 Fracture

#### ROCK ALTERATION

Red oxidation stains along pumice fragments and around lithic fragments.

#### OTHER

932.32



Glass compacted around lithic fragment, with white zeolite inside of lithic fragment.

Visual Core Description

Observer...JM.....

Depth Interval 

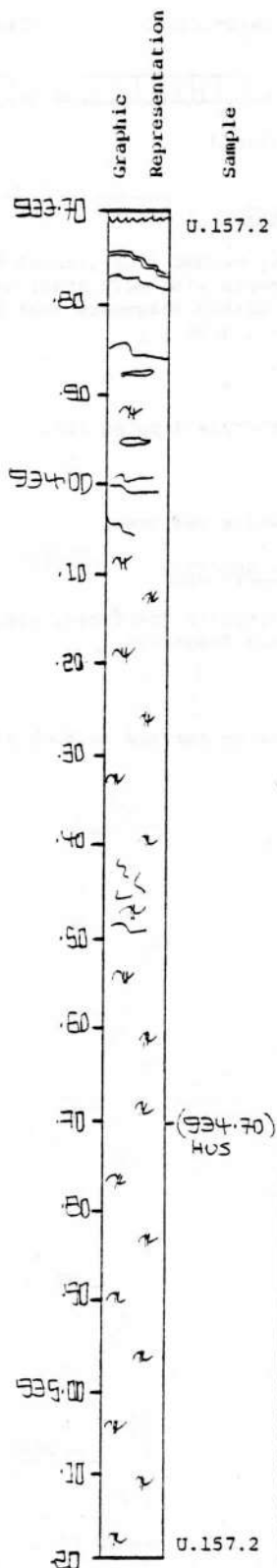
|   |   |   |   |   |
|---|---|---|---|---|
| 9 | 3 | 3 | 7 | 1 |
|---|---|---|---|---|

 cm to 

|   |   |   |   |   |
|---|---|---|---|---|
| 9 | 3 | 5 | 2 | 1 |
|---|---|---|---|---|

 cm

Box 160, Section 2

LITHOLOGY-PETROGRAPHY

Bluish-gray with red oxidation batches. Fine-grained ash flow tuff with decreased pumice fragments and sparse lithic fragments. Eutaxitic structure giving planar features to the rock still apparent.

Section becoming more densely welded downward in the section, with the unwelded zeolite filled pumice fragment in upper 40 cm.

933.73 Fractures through white laumontite filled pumice fragments.

STRUCTURE

Planar structure dipping 30°.

VESICLES/AMYGDALES

Vesicles are zeolite replaced pumice fragments filled with white zeolite (laumontite).

FRACTURES - VEINS - BRECCIA

Fractures with red oxidation stains occur between 934.40 - 934.65.

Visual Core Description

Observer JM

Depth Interval 

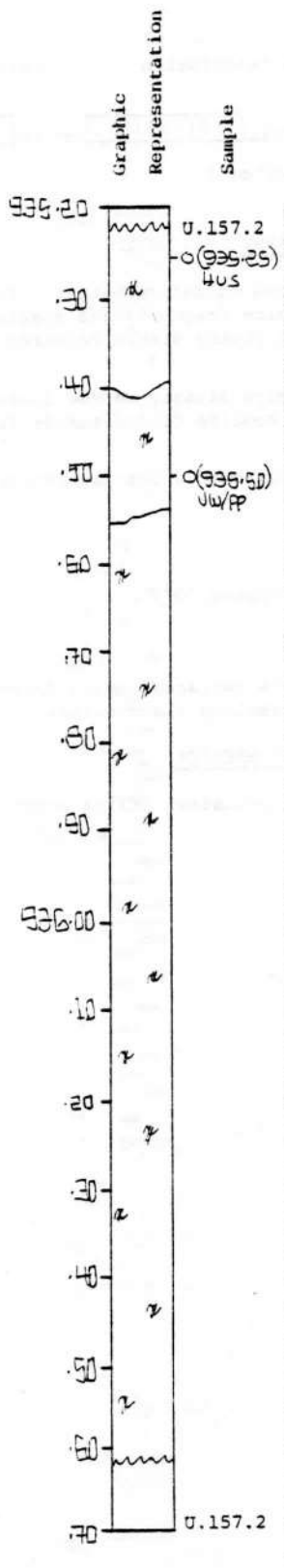
|   |   |   |   |   |
|---|---|---|---|---|
| 9 | 3 | 5 | 2 | 2 |
|---|---|---|---|---|

 cm to 

|   |   |   |   |   |
|---|---|---|---|---|
| 9 | 3 | 6 | 6 | 1 |
|---|---|---|---|---|

 cm

Box 160, Section 3



LITHOLOGY-PETROGRAPHY

Blueish-gray densely welded fine-grained tuff, very sparse lithic fragments with only minor zeolite filled pumice fragments. Lithic fragments that are present are basaltic and 2 cm - .3 mm.

STRUCTURE

Planar eutaxtic structure dipping 20°.

VESICLES/AMYGDALES

Rare, filled with white zeolites.

FRACTURES - VEINS - BRECCIA

Minor amounts of irregular fractures, near there are zeolite filled pumice fragments.

ROCK ALTERATION

Red oxidation stains on surface or rock along fractures.

Visual Core Description

Observer ...JM.....

Depth Interval 

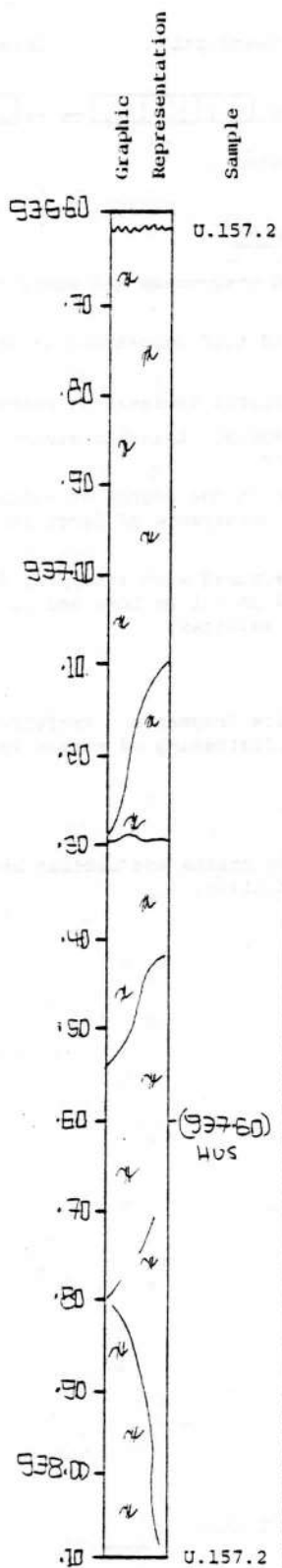
|   |   |   |   |   |
|---|---|---|---|---|
| 9 | 3 | 6 | 5 | 2 |
|---|---|---|---|---|

 cm to 

|   |   |   |   |   |
|---|---|---|---|---|
| 9 | 3 | 8 | 1 | 0 |
|---|---|---|---|---|

 cm

Box 160, Section 4



LITHOLOGY-PETROGRAPHY

Fine-grained, bluish-gray densely welded with slight increase in lithic fragments, lithic fragments range from 1.5 cm - 1 mm and are basaltic fragments.

STRUCTURE

Planer feature due to welding 10-20° dip.

VESICLES/AMYGDALES

Vesicles - rare.

FRACTURES - VEINLETS - BRECCIA

Irregular fractures with minor zeolite mineralization along the fractures. Planer fracture surfaces covered with zeolites.

ROCK ALTERATION

937.85 Red alteration stains at base of section.

Visual Core Description

Observer N. Gruver

Depth Interval 

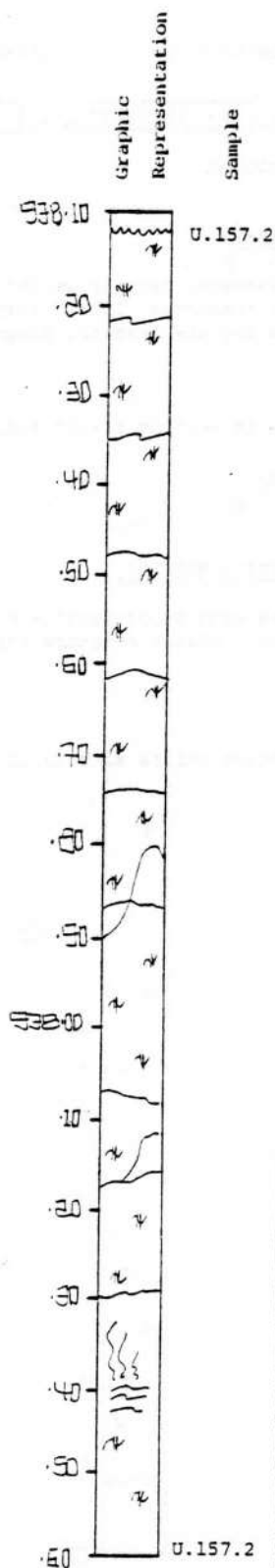
|   |   |   |   |   |
|---|---|---|---|---|
| 9 | 3 | 3 | 1 | 2 |
|---|---|---|---|---|

 cm to 

|   |   |   |   |   |
|---|---|---|---|---|
| 9 | 3 | 9 | 6 | 0 |
|---|---|---|---|---|

 cm

Box 161, Section 1

LITHOLOGY-PETROGRAPHY

Acid tuff, mottled gray-green and rusty red grading to bluish-gray.

Densely welded acid tuff decreasing in the amount of welding downward.

938.35 - 939.20 Slight increase in phenocrysts.

939.30 upward to 938.50 Eutaxtic structure increases upward with welding.

939.20 Transition in the degree of welding most apparent with the occurrence of large zeolite, replacing pumice fragments.

939.40 Highly fractured with irregular fresh fractures. Pumice fragments 4 cm - 1 cm long and .2 cm - 1 cm wide, filled with white zeolites.

STRUCTURE

Flattening of pumice fragments. Preferred orientation of phenocrysts to flattening of pumice fragments. (Flow banding).

ROCK ALTERATION

Red-brown oxidation stains and reddish brown vesicles (?) filling and vein filling.

Visual Core Description

Observer .....JM

Depth Interval 

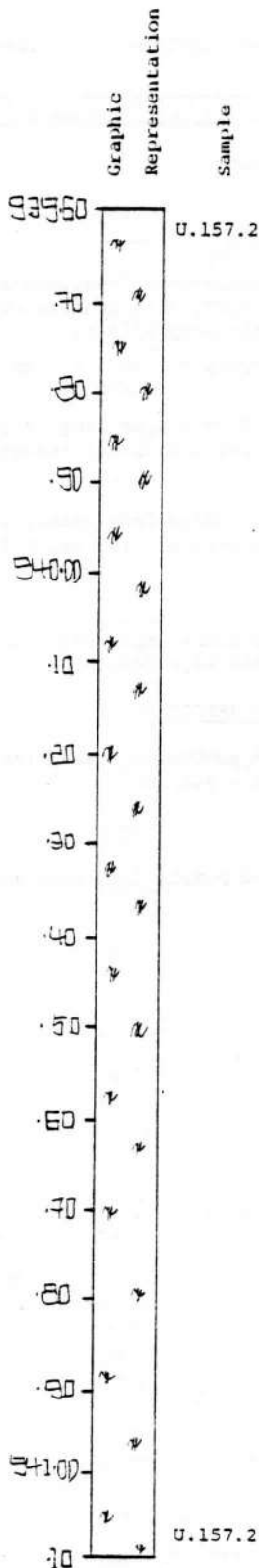
|   |   |   |   |   |
|---|---|---|---|---|
| 9 | 3 | 9 | 6 | 0 |
|---|---|---|---|---|

 cm to 

|   |   |   |   |   |
|---|---|---|---|---|
| 9 | 4 | 1 | 1 | 3 |
|---|---|---|---|---|

 cm

Box 161, Section 2

LITHOLOGY-PETROGRAPHY

Bluish gray poorly welded, with large white zeolite replaced pumice fragments imparting planer feature to the section. Phenocrysts increasing in abundance, phenocrysts are plagioclase laths 1 mm and less in size. Pumice fragments 1 cm wide.

STRUCTURE

Weakly eutaxitic.  
Planer structure dipping 15-10°.  
Some orientation of feldspar phenocrysts.

FRACTURES - VEINS - BRECCIA

Highly fractured, with fresh irregular fractures.

ROCK ALTERATION

Reddish-brown alteration stains around pumice fragments.

Visual Core Description

Observer JM

Depth Interval 

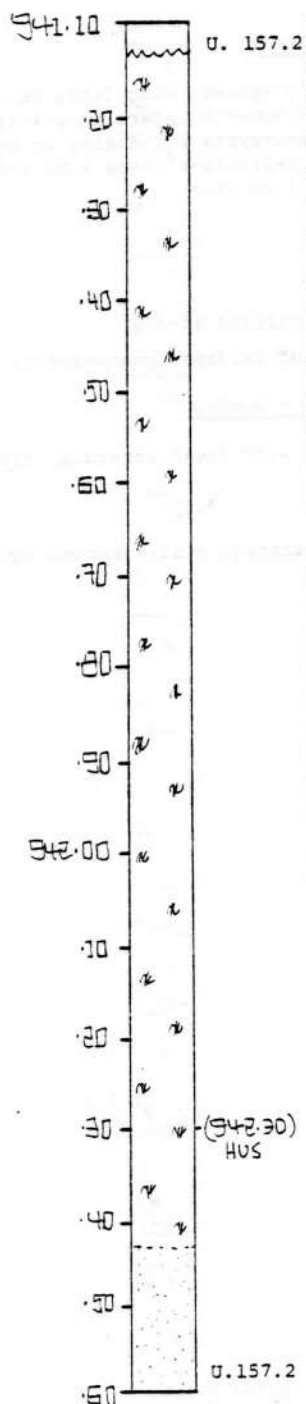
|   |   |   |   |   |
|---|---|---|---|---|
| 9 | 4 | 1 | 1 | 3 |
|---|---|---|---|---|

 cm to 

|   |   |   |   |   |
|---|---|---|---|---|
| 9 | 4 | 2 | 6 | 0 |
|---|---|---|---|---|

 cm

Box 161, Section 3

LITHOLOGY-PETROGRAPHY

941.13 - 942.43 Bluish-gray, medium-grained, weakly eutaxtic, ash flow tuff, with zeolite replaced pumice fragments, moderately porphyritic.

Plagioclase phenocrysts - 1 mm - < 1 mm in size, more abundant.

Pumice fragments. 2 cm - 4 mm long, filled/replaced by white zeolite. In parting planer structure on section.

942.43 Gradational change from weakly welded blue ash flow, to white fine-grained ash bed ~ 20 cm thick.

STRUCTURE

Weakly eutaxtic structure imparting planer structure dipping 20-30°. (941.13 - 942.40)

FRACTURES - VEINS - BRECCIA

Extremely fractured rock with fresh, irregular unfilled fractures. (941.13 - 942.25)

ROCK ALTERATION

Red oxidation around pumice fragments and fractures. (941.13 - 942.20).



Visual Core Description

Observer J.M.

Depth Interval 

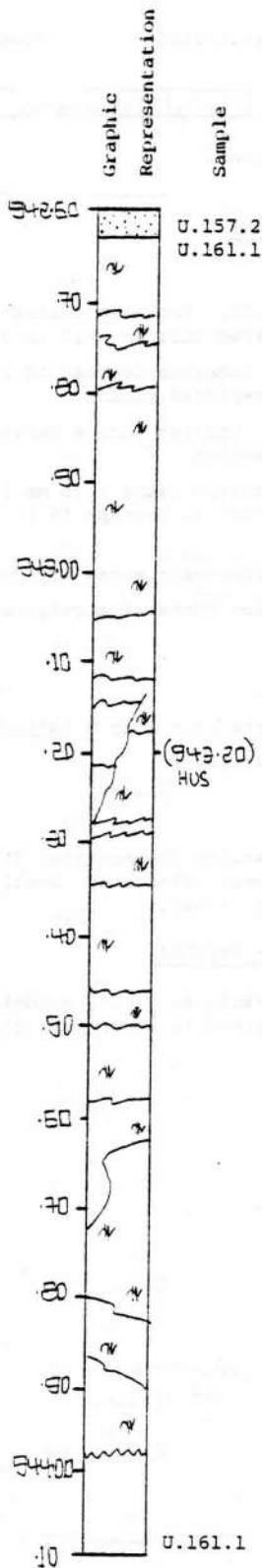
|   |   |   |   |   |
|---|---|---|---|---|
| 9 | 4 | 2 | 6 | 0 |
|---|---|---|---|---|

 cm to 

|   |   |   |   |   |
|---|---|---|---|---|
| 9 | 4 | 3 | 9 | 8 |
|---|---|---|---|---|

 cm

Box 161, Section 4

LITHOLOGY-PETROGRAPHY

U.157.2 Fine-grained, white, ashy, massive, bed in sharp contact with U.161.1, contact-depositional.

U.161.1 Blue-gray, weakly eutaxitic, poorly welded, moderately porphyritic, ash flow tuff.

Pumice fragment replaced by white zeolites, with some as large as the diameter of core.

Phenocrysts - 2mm - 1 mm, plagioclase-phenocrysts moderately abundant.

Phenocrysts increase in amount downward.

STRUCTURE

U.161.1 Structure, eutaxitic, planar dipping 10-15°.

FRACTURES - VEINS - BRECCIA

U.161.1 Highly fractured, with irregular fresh fractures, little or no alteration along fractures.

ROCK ALTERATION

Reddish brown alteration around zeolite replaced pumice fragments. Reddish-brown alteration increases downward.

Visual Core Description

Observer ..... RHW

Depth Interval 

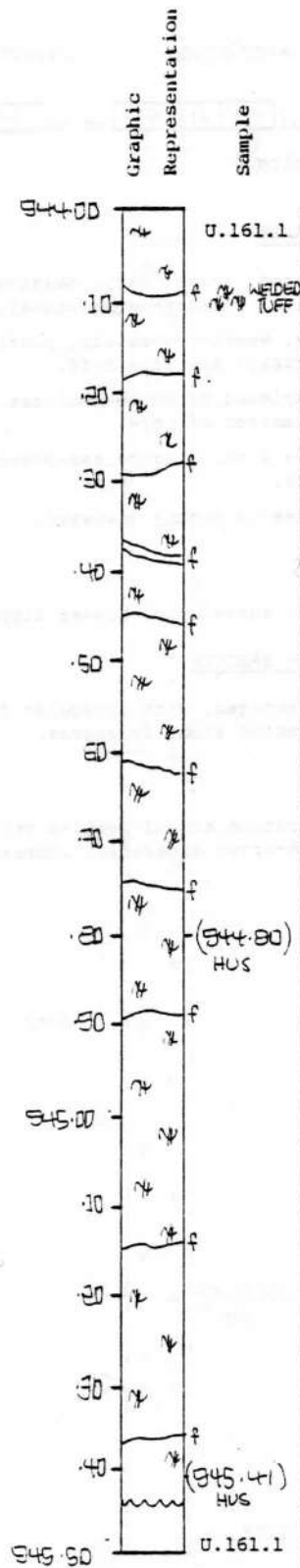
|   |   |   |   |   |
|---|---|---|---|---|
| 9 | 4 | 3 | 9 | 8 |
|---|---|---|---|---|

 cm to 

|   |   |   |   |   |
|---|---|---|---|---|
| 9 | 4 | 5 | 4 | 4 |
|---|---|---|---|---|

 cm

Box 162, Section 1

LITHOLOGY-PETROGRAPHY

Continuing U.161.1

Weakly eutaxitic tuff. Replaced pumice fragments, 2-3 cm in diameter, scattered through unit to 944.70.

Entire section has numerous patches of red staining, especially around replaced pumice.

Color is blue-gray, grading into a darker gray to gray green at base of section.

Phenocrysts, plagioclase laths ~ .5 mm long, 2-3% in upper part (eutaxitic) to perhaps 5% in darker, lower end of section.

Elongate pumice replacement zones dip perhaps 10°.

Lower part of section contains angular basaltic clasts, up to 1 cm x 1 cm.

STRUCTURE

943.98 - 944.68 Eutaxitic (dip ~ 10°).

944.70 - 945.44 Massive

VESICLES/AMYGDALES

943.98 - 945.22 Zeolite (laumontite) filling or replacement of pumice. Ovoid, elongate. Small (&lt; 1 mm) vesicles throughout (&lt; 1%).

FRACTURES - VEINS - BRECCIA

943.98 - 945.12 Fractures 0-10°, nondescript in upper section, smectite lined in lower part of section.

Visual Core Description

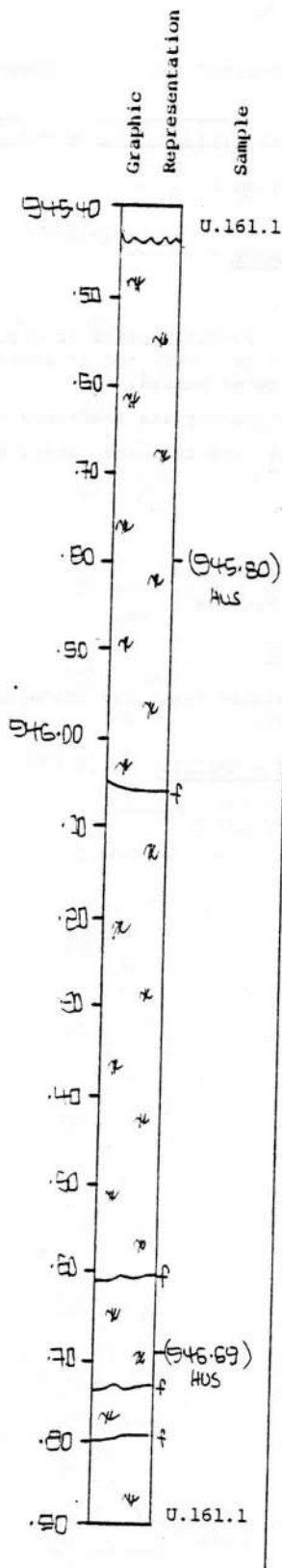
Observer RHW

Depth Interval 

|   |   |   |   |   |
|---|---|---|---|---|
| 9 | 4 | 5 | 4 | 4 |
|---|---|---|---|---|

 cm to 

|   |   |   |   |   |
|---|---|---|---|---|
| 9 | 4 | 6 | 9 | 2 |
|---|---|---|---|---|

 cmLITHOLOGY-PETROGRAPHY

Continuing U.161.1

Eutaxitic tuff, gray-green, porphyritic, grading into a more pinkish gray by 946.30.

Phenocrysts of plagioclase laths, .5 mm long, 2-3% volume.

Flattened pumice shards dipping  $\sim 10^\circ$ .

Red staining, mostly in pinkish part of section.

Angular clasts up to  $\sim 1$  cm x 1 cm, generally basalt.STRUCTUREEutaxitic (dip  $\sim 10^\circ$ )VESICLES/AMYGDALES1% vesicular, vesicles  $< 1$  mm diameter. Some zeolite filled, other smectite, many empty.FRACTURES - VEINS - BRECCIAFractures at  $0-15^\circ$ , not lined with any different mineralogy than the rest of the altered rock.

Visual Core Description

Observer, ..... RHW

Depth Interval 

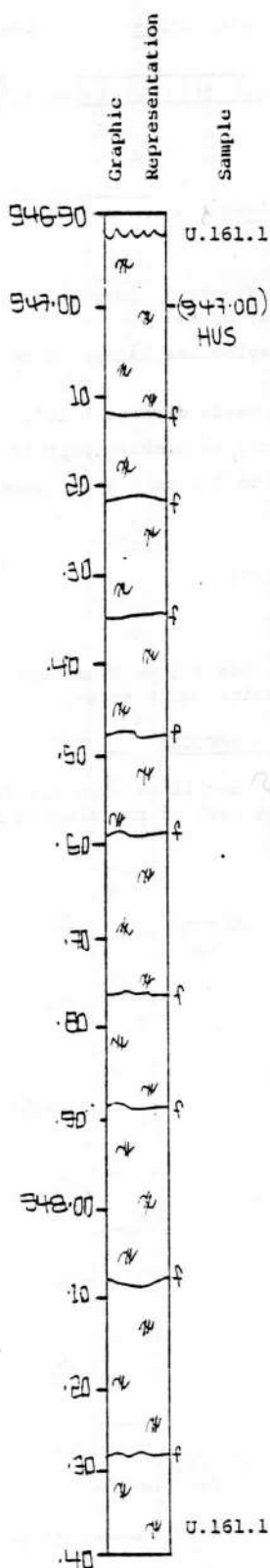
|   |   |   |   |   |
|---|---|---|---|---|
| 9 | 4 | 5 | 9 | 2 |
|---|---|---|---|---|

 cm to 

|   |   |   |   |   |
|---|---|---|---|---|
| 9 | 4 | 3 | 4 | 2 |
|---|---|---|---|---|

 cm

Box 162, Section 3

LITHOLOGY-PETROGRAPHY

Continuing U.161.1

Pink tuff, mainly (50-70%) clasts of angular basalt, up to 1.5 cm x 1.5 cm. Very top of section seems to contain some flattened pumice.

.5 mm plagioclase phenocrysts scattered throughout.

Pink color becomes less distinct, going to a more greenish tint.

STRUCTURE

946.92 - 947.00 Eutaxitic

947.00 - 948.42 Massive

VESICLES/AMYGDALES

Several small vesicles scattered throughout, but essentially absent.

FRACTURES - VEINS - BRECCIA

Fractures 0-15°

Visual Core Description

Observer, RHW - K. Hattori

Depth Interval 

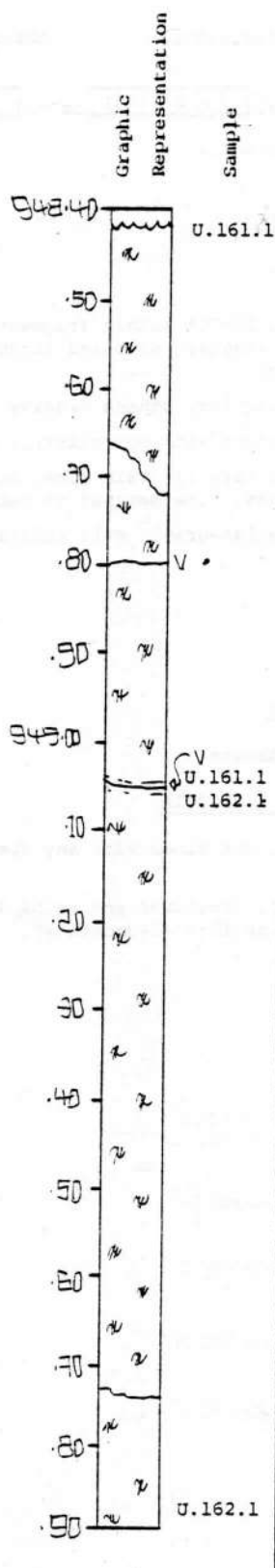
|   |   |   |   |   |
|---|---|---|---|---|
| 9 | 4 | 8 | 4 | 2 |
|---|---|---|---|---|

 cm to 

|   |   |   |   |   |
|---|---|---|---|---|
| 9 | 4 | 9 | 9 | 2 |
|---|---|---|---|---|

 cm

Box 162, Section 4

LITHOLOGY-PETROGRAPHY

Continuing U.161.1

U.161.1 Welded tuff composed mostly (40-60%) of fragments of basalt. Fragments up to 1.5 cm, but mainly finer grained.

Color greenish pink, very pale.

Plagioclase ( $\phi \sim 4$  mm) fairly abundant in matrix. No orientation.

949.00 - 949.10 Transitional zone. No fragments, very fine-grained, pink-grey colour.

U.162.1 Welded tuff.

Matrix; light green colour, soft.

Fragments; dark green, brown green

In matrix in this unit, no plagioclase phenocryst.

STRUCTURE

U.161.1 Massive

U.162.1 Massive

VESICLES/AMYGDALES

Slightly flattened.  $\sim$  flattened vesicles are present throughout, filled with zeolite.

FRACTURES - VEINS - BRECCIA

949.05 Veinlets along boundary; calcite  $\sim 2$  mm.

ROCK ALTERATION

U.161.1 Matrix; green smectite.

Adjacent area of fracture; intensely clayey.

U.162.1 Matrix; strongly altered to green smectite. Calcite is also disseminated in matrix.

Fragment; Fe-hydroxides

Visual Core Description

Observer .... RHW.....

Depth Interval 

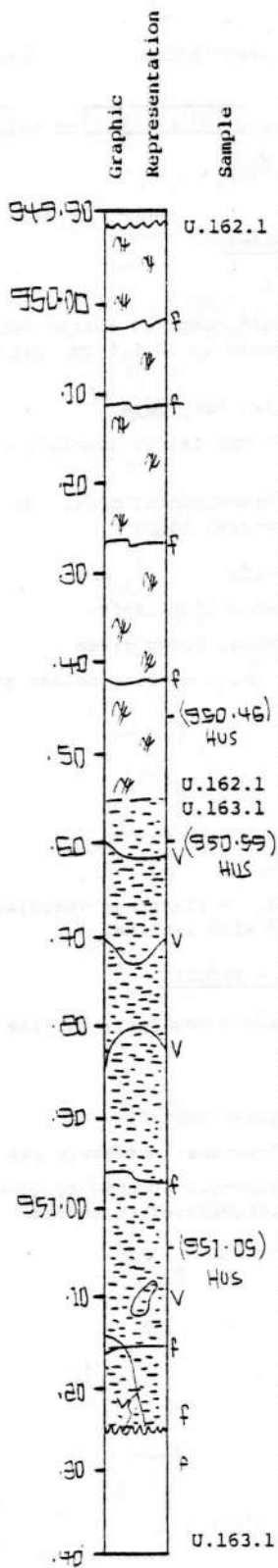
|   |   |   |   |   |
|---|---|---|---|---|
| 9 | 4 | 9 | 9 | 2 |
|---|---|---|---|---|

 cm to 

|   |   |   |   |   |
|---|---|---|---|---|
| 9 | 5 | 1 | 2 | 5 |
|---|---|---|---|---|

 cm

Box 163, Section 1

LITHOLOGY-PETROGRAPHY

Continuing U.162.1

U.162.1

Phyroclastic flow, 50-70% lithic fragments, light green color. Fragments angular, of mixed lithology and size, 1 cm long (largest).

Some fragments vesicular, others massive.

950.55 Abrupt contact with pyroclastic, bedded sediments.

U.163.1 Sediments vary in grain size, more or less in well sorted bands, fine-grained to pebble size (3 mm).

Color gray to greenish-gray. Well indurated. Dip ~ 50°.

STRUCTURE

U.162.1 Massive

U.163.1 Bedded

VESICLES/AMYGDALES

949.92 - 951.10 Absent

FRACTURES - VEINS - BRECCIA

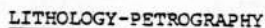
U.162.1

Fractures at 0-5°, not lined with any special material.

U.163.1

One fracture at 0°, fractures and veins @ 60-70°, lined with smectite and zeolite (laumontite).

Box 163, Section 2



U.163.1 Bedded pyroclastic sediments. Various grain sizes generally in well sorted bands. Well indurated. Pebble size (up to 1 cm) clasts are angular. Lithology of fragments varied.

Lowermost part of the sediment unit (951.70 - contact), is very fine grained (clay size), dark gray.

952.22 Probably sediment contact with porphyritic unit of unknown origin (upper margin equivocal, lower intruded).

U.163.2 Unit has laths of plagioclase, generally about 1 mm in length, 25-30% by volume, locally up to 50%.

Groundmass medium-gray, equigranular, holocrystalline basalt.

After first 10 cm, unit becomes increasingly amygdaloidal,  
10% by section bottom.

## STRUCTURE

U.163.1 Bedded

U.163.2 Porphyritic

VESICLES/AMYGDALES

U.163.2 Amygdales absent in first 10 cm, increasing to ~ 10% in lower part of section. Most ~ 1 mm long, ovoid. Smectite filled or smectite lined and zeolite or calcite filled.

FRACTURES - VEINS - BRECCIA

Fractures at 0-10°, one at 65°.

Dull green smectite lining fractures in porphyritic unit.

Visual Core Description

Observer, RHW

Depth Interval 

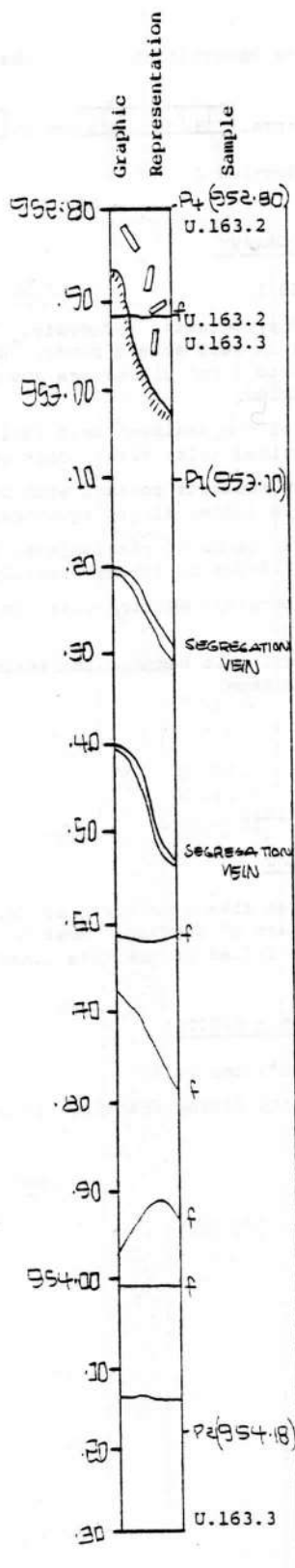
|   |   |   |   |   |
|---|---|---|---|---|
| 9 | 5 | 2 | 7 | 7 |
|---|---|---|---|---|

 cm to 

|   |   |   |   |   |
|---|---|---|---|---|
| 9 | 5 | 4 | 3 | 4 |
|---|---|---|---|---|

 cm

Box 163, Section 3

LITHOLOGY-PETROGRAPHY

Continuing U.163.2

Porphyritic unit. Plagioclase laths, 1 mm long, groundmass medium-gray basalt.

952.96 Chilled contact dipping 80°.

163.3 Unit is the younger unit. Basalt - gray-green, fine-grained near contact, grading to medium-grained by mid section, aphyric, holocrystalline, granular, equigranular. Two "segregation" veins of coarser grained material within the finer grained zone. Dipping 75-80°.

STRUCTURE

U.163.2 Porphyritic

U.163.3 Massive

VESICLES/AMYGDALES

U.163.2 Smectite and zeolite filled amygdulae (1 mm), ovoid, ~ 10% vol.

U.163.3 Essentially absent.

FRACTURES - VEINS - BRECCIA

U.163.3 Fractures and veins at high core to angle fracture 70-80°, filled with smectite and carbonate.



Visual Core Description

Observer <sup>RHW</sup> .....

Depth Interval 

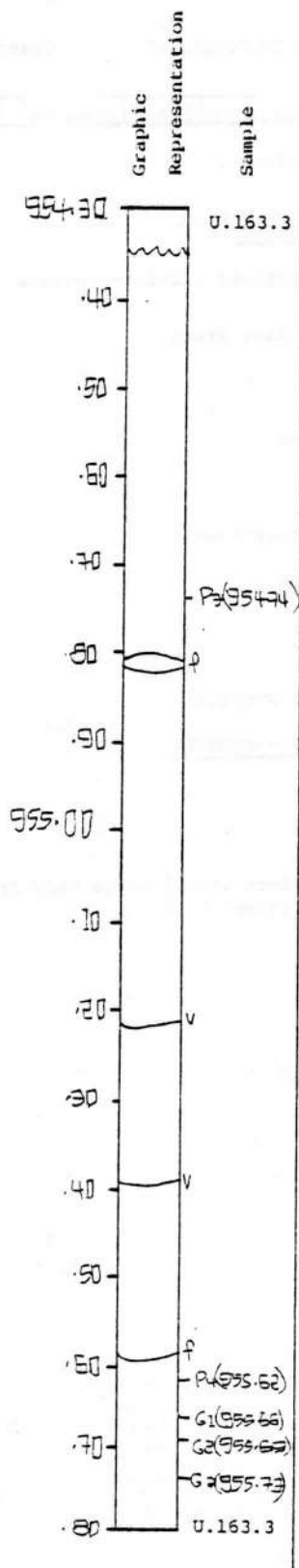
|   |   |   |   |   |
|---|---|---|---|---|
| 9 | 5 | 4 | 3 | 4 |
|---|---|---|---|---|

 cm to 

|   |   |   |   |   |
|---|---|---|---|---|
| 9 | 5 | 5 | 8 | 2 |
|---|---|---|---|---|

 cm

Box 163, Section 4



LITHOLOGY-PETROGRAPHY

U.163.3 Gray-green, aphyric, holocrystalline, medium-grained granular, equigranular basalt.

STRUCTURE

Massive

VESICLES/AMYGDALES

Essentially absent

FRACTURES - VEINS - BRECCIA

Fractures and veins 0-10°, filled with smectite and calcite.

Visual Core Description

Observer. .... K. Hattori

Depth Interval 

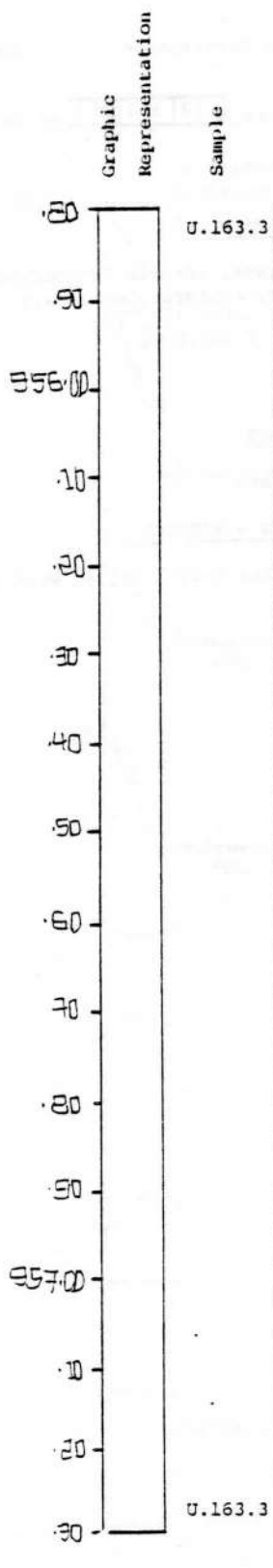
|   |   |   |   |   |
|---|---|---|---|---|
| 9 | 5 | 5 | 8 | 0 |
|---|---|---|---|---|

 cm to 

|   |   |   |   |   |
|---|---|---|---|---|
| 9 | 5 | 7 | 4 | 0 |
|---|---|---|---|---|

 cm

Box 164, Section 1

LITHOLOGY-PETROGRAPHY

Medium - coarse grained olivine-pyroxene, holocrystalline, dolerite dyke.

Color: yellowish dark green

Olivine - 1 mm

Pyroxene - 2 mm

Plagioclase - 3 mm

STRUCTURE

Very compact, homogeneous

VESICLES/AMYGDALES

Vesicles (~ 3 mm).

&lt; 1 Vol. %

Filled with green smectite.

FRACTURES - VEINS - BRECCIA

None

ROCK ALTERATION

955.90 - 956.50 Rock itself looks very fresh, but pyrite is fairly common (4 mm) ~ 1%.

ICELAND RESEARCH DRILLING PROJECT - REYDARFJORDUR 1978

Visual Core Description

Observer ... K. Hattori

Depth Interval 

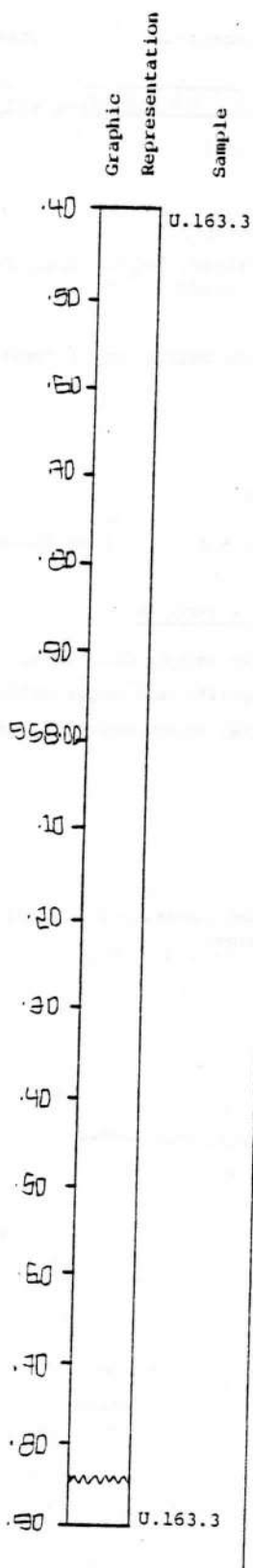
|  |  |  |  |  |
|--|--|--|--|--|
|  |  |  |  |  |
|--|--|--|--|--|

 cm to 

|   |   |   |   |   |
|---|---|---|---|---|
| 9 | 5 | 8 | 9 | 4 |
|---|---|---|---|---|

 cm

Box 164, Section 2



LITHOLOGY-PETROGRAPHY

Medium - coarse grained olivine-pyroxene. Holocrystalline, dolerite.

Colour - yellowish dark green

Olivine - 1 mm

Pyroxene - 2 mm

Plagioclase - 3 mm

Entirely the same as Section # 1.

Very homogeneous

STRUCTURE

957.40 - 958.78 Compact

VESICLES/AMYGDALES

957.40 - 958.70 Compared to Section 1, vesicles decrease.

FRACTURES - VEINS - BRECCIA

957.40 - 958.70 None

ROCK ALTERATION

Looks very fresh, small amount of clay minerals in vesicles.

Pyrite (~ 7 mm) disseminate within whole body.

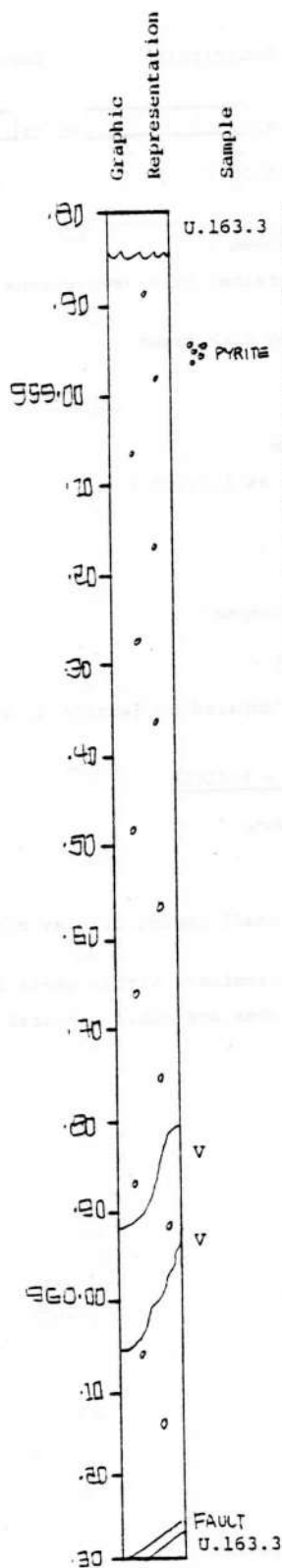
Usually anhedral, some are cubic euhedral shape.

Visual Core Description

Observer K. Hattori

Depth Interval 958.84 cm to 960.31 cm

Box 164, Section 3



# LITHOLOGY-PETROGRAPHY

Medium - coarse grained, holocrystalline, dark-green coloured pyroxene dolertie.

Pyroxene ~ 3 mm

The size of crystals become small compared to Section 2.

## STRUCTURE

Compact

## VESICLES/AMYGDALES

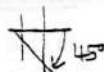
Vesicles; ~ 1 Vol. %  $\phi$ ; 2 ~ 3 mm filled with green smectite.

## FRACTURES - VEINS - BRECCIA

958.84 - 959.83 No veins, fractures.

V - vein (3 mm) zeolite and minor calcite

960.31 Fault plane; green smectite, one flattened pyrite.



## ROCK ALTERATION

Pyrite disseminated (usually 3 ~ 5 mm) rarely up to 7 mm, anhedral shape.

Visual Core Description

Observer ....K. Hattori.....

Depth Interval 

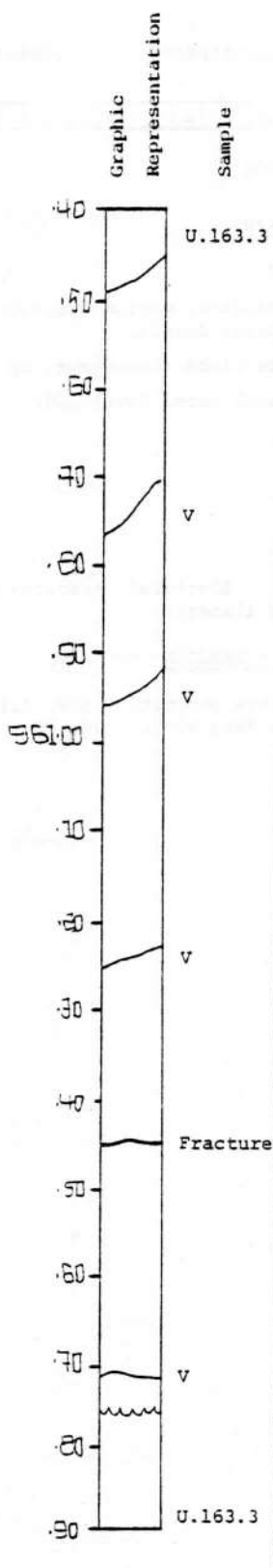
|   |   |   |   |   |
|---|---|---|---|---|
| 9 | 6 | 0 | 4 | 0 |
|---|---|---|---|---|

 cm to 

|   |   |   |   |   |
|---|---|---|---|---|
| 9 | 6 | 1 | 7 | 5 |
|---|---|---|---|---|

 cm

Box 164, Section 4



LITHOLOGY-PETROGRAPHY

Medium - coarse grained, holocrystalline, pyroxene dolerite.

Very fresh pyroxene crystals (3 mm)

961.10 No change, very homogeneous

STRUCTURE

960.40 - 961.25 Compact

961.41 - 961.45 Disturbed crushed

961.55 - 961.75

VESICLES/AMYGDALES

Vesicles (< 1 Vol.%) filled with green smectite.

FRACTURES - VEINS - BRECCIA

940.50 Fault plane; green smectite

V - vein (zeolite)

961.71 V - vein (quartz) (~ 3 mm)

ROCK ALTERATION

The amount of pyrite decreases.

Adjacent area of cracks and faults are clayey.

Visual Core Description

Observer RHW

Depth Interval 

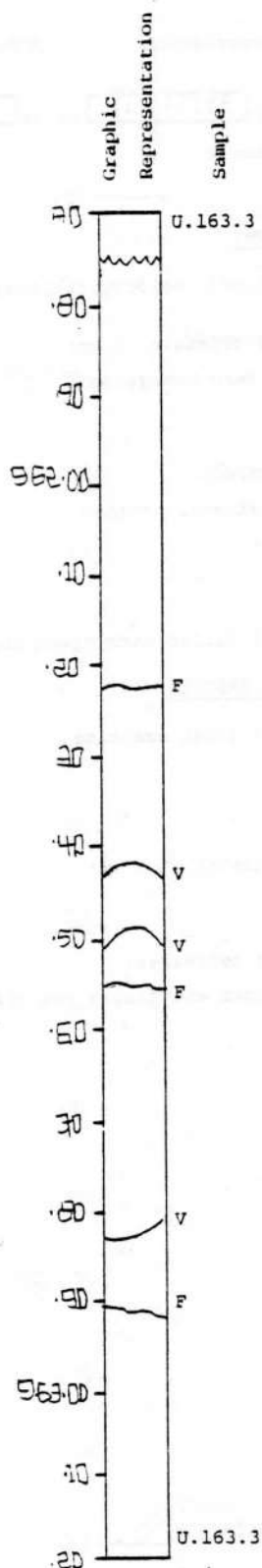
|   |   |   |   |   |
|---|---|---|---|---|
| 9 | 6 | 1 | 7 | 5 |
|---|---|---|---|---|

 cm to 

|   |   |   |   |   |
|---|---|---|---|---|
| 9 | 6 | 1 | 2 | 7 |
|---|---|---|---|---|

 cm

Box 165, Section 1

LITHOLOGY-PETROGRAPHY

Continuing U.163.3

Aphyric, holocrystalline, medium grained, gray-green, granular, equigranular basalt.

Disseminated pyrite blebs throughout, up to 5 mm diameter.

No good cubic crystal faces developed.

STRUCTURE

Massive

VESICLES/AMYGDALES

Essentially absent. Scattered, smectite filled vesicles throughout (&lt; 1 mm diameter)

FRACTURES - VEINS - BRECCIA

Fractures 0-5°, veins smectite lined, filled with quartz and zeolite (dip 50°). (961.75 - 962.91)

Visual Core Description

Observer, ....RHW.....

Depth Interval 

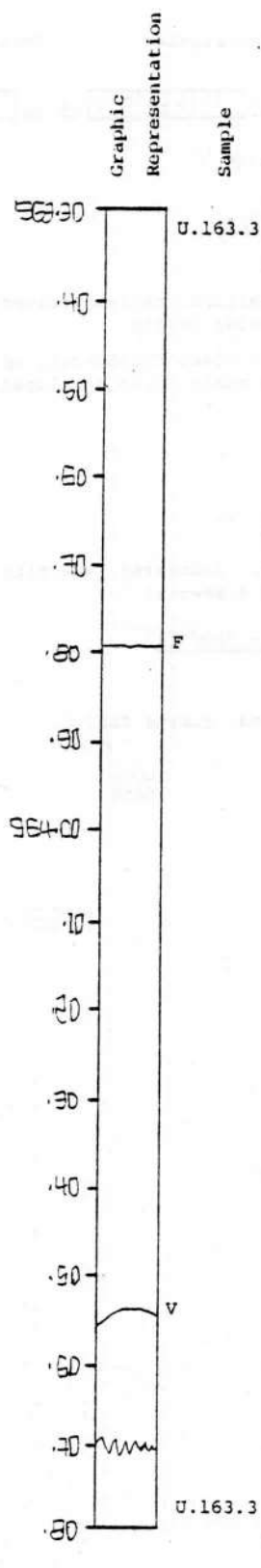
|   |   |   |   |   |
|---|---|---|---|---|
| 9 | 6 | 3 | 2 | 7 |
|---|---|---|---|---|

 cm to 

|   |   |   |   |   |
|---|---|---|---|---|
| 9 | 6 | 4 | 7 | 0 |
|---|---|---|---|---|

 cm

Box 165, Section 2

LITHOLOGY-PETROGRAPHY

Continuing U.163.3

Aphyric, holocrystalline, medium grained, gray-green, granular, equigranular basalt.

Disseminated pyrite blebs throughout, up to 5 mm diameter. No good cubic crystals faces developed.

STRUCTURE

Massive

VESICLES/AMYGDALES

Essentially absent, scattered, smectite filled vesicles throughout (&lt; 1 mm diameter). Amygdule, quartz filled, at 2 mm diameter @ 964.15.

FRACTURES - VEINS - BRECCIA

Fracture at 0°, smectite lined. Vein has quartz and smectite.

Visual Core Description

Observer ..RHW

Depth Interval 

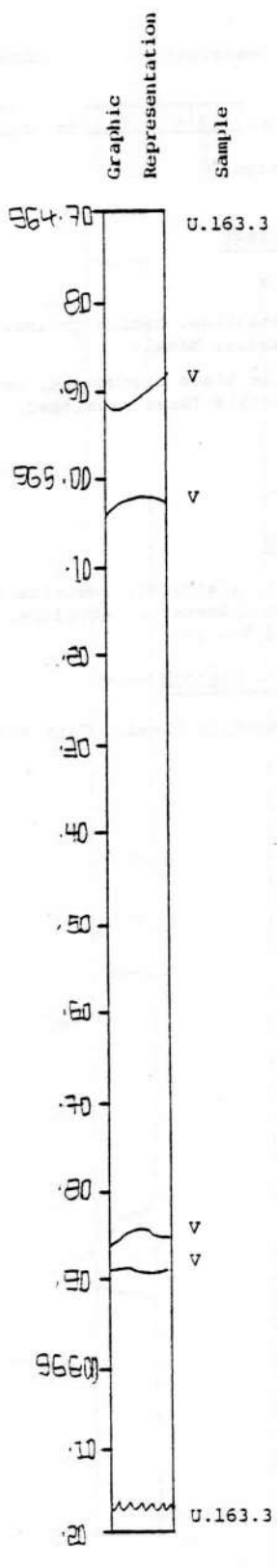
|   |   |   |   |   |
|---|---|---|---|---|
| 9 | 6 | 4 | 7 | 0 |
|---|---|---|---|---|

 cm to 

|   |   |   |   |   |
|---|---|---|---|---|
| 9 | 6 | 6 | 1 | 7 |
|---|---|---|---|---|

 cm

Box 165, Section 3



LITHOLOGY-PETROGRAPHY

Continuing U.163.3

Aphyric, holocrystalline, medium-grained, gray-green, granular, equigranular basalt.

Disseminated pyrite blebs throughout, up to 5 mm diameter. No good cubic faces developed.

STRUCTURE

Massive

VESICLES/AMYGDALES

Essentially absent. Scattered, smectite filled vesicles throughout (< 1 mm diameter)

FRACTURES - VEINS - BRECCIA

Fractures absent.

Veins smectite lined, quartz filled.

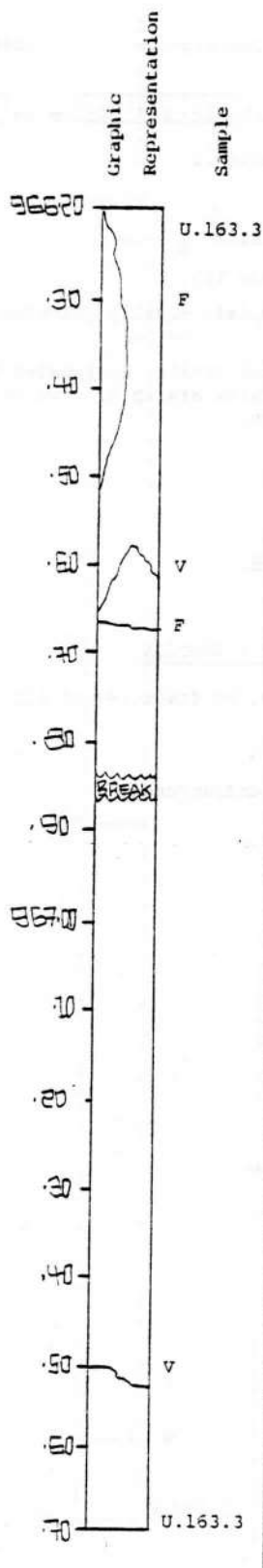


Visual Core Description

Observer RHW

Depth Interval 96617 cm to 96775 cm

Box 165, Section 4

LITHOLOGY-PETROGRAPHY

Continuing U.163.3

Aphyric, holocrystalline, medium grained, gray-green, granular, equigranular basalt.

Disseminated pyrite blebs throughout, up to 5 mm diameter. No good cubic crystals faces developed.

STRUCTURE

Massive

VESICLES/AMYGDALES

Essentially absent. Scattered smectite filled vesicles throughout (&lt; 1 mm diameter).

FRACTURES - VEINS - BRECCIA

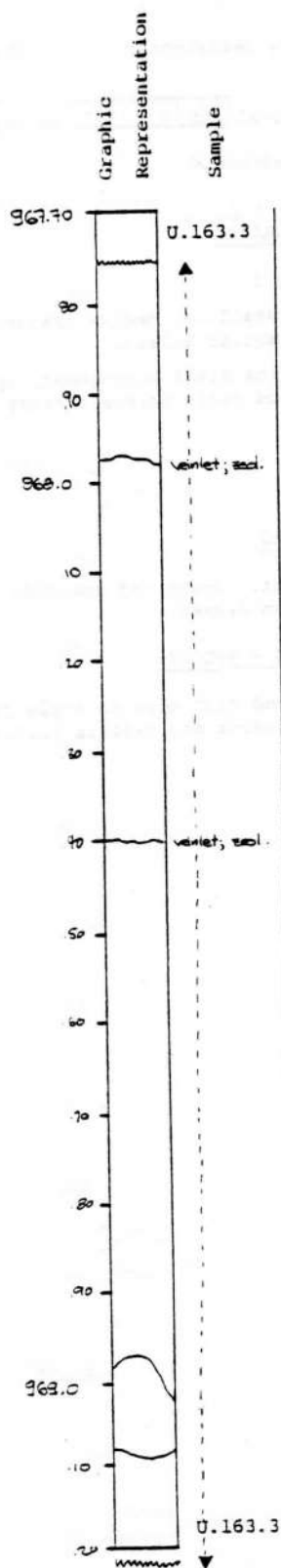
Fractures 0-10° and high core to angle fracture 80-90°. Smectite lined, quartz and zeolite filled.

Visual Core Description

Observer, ..... Viereck

Depth Interval 96776 cm to 96924 cm

Box 166, Section 1



LITHOLOGY-PETROGRAPHY

Continuation of Box 165.

Green, medium grained, equally granular, aphyric, massive basalt.

Widely disseminated pyrite, aggregates of minute crystals. Aggregates are up to 6 mm in diameter and are a few cm apart.

STRUCTURE

Massive

VESICLES/AMYGDALES

Essentially none

FRACTURES - VEINS - BRECCIA

Hairlike veinlets, no fractures at all.

OTHER

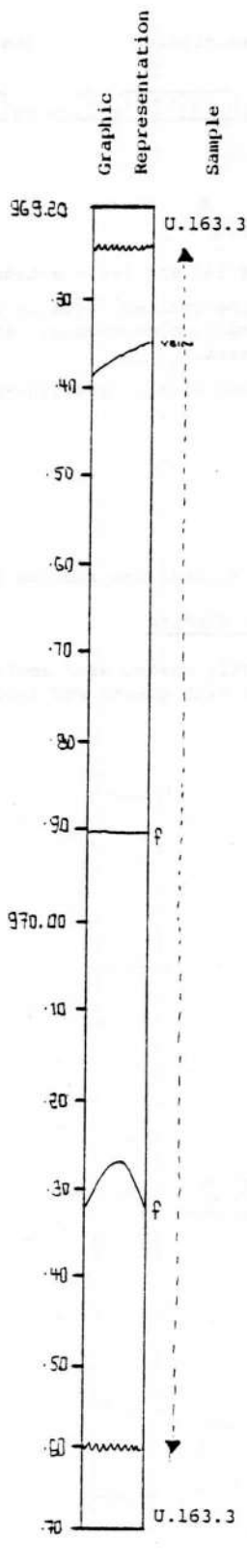
Complete section unfractured.

Visual Core Description

Observer Viareck

Depth Interval 96924 cm to 97060 cm

Box 166, Section 2



LITHOLOGY-PETROGRAPHY

Green, medium-grained, aphyric, homogeneous, massive basalt.

There is a slight decrease in grain size downward.

Amount of pyrite aggregates (see Box 166, Section 1) is slightly higher.

STRUCTURE

Massive

VESICLES/AMYGDALES

Very few tiny amygdales (< 1 mm) filled with zeolites and/or smectites.

FRACTURES - VEINS - BRECCIA

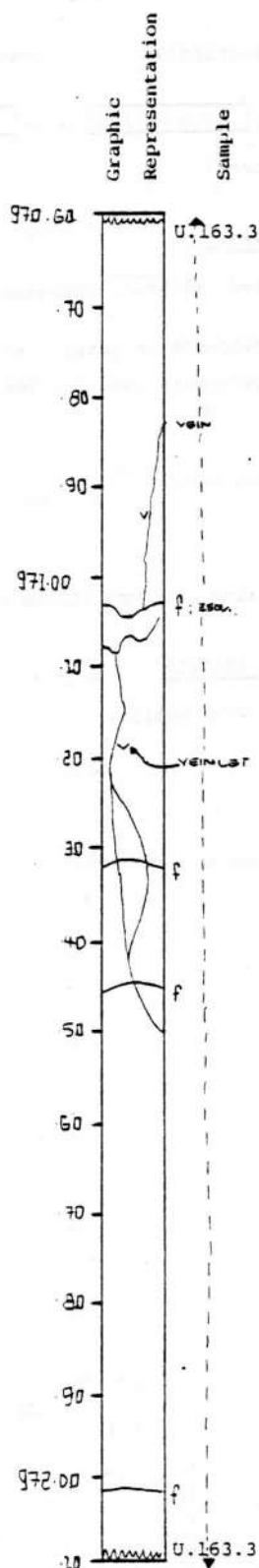
Veinlets are filled with zeolite.

Visual Core Description

Observer, Viereck

Depth Interval 97060 cm to 97210 cm

Box 166, Section 3

LITHOLOGY-PETROGRAPHY

Continuation of Box 165 and 166 (Section 1 &amp; 2)

Green, medium to fine-grained, equally granular, aphyric massive basalt, homogeneous. Slight decrease in grain size downward.

Pyrite aggregates are widely disseminated,  $\phi$  up to 4 mm.

STRUCTURE

Massive

VESICLES/AMYGDALES

Few tiny amygdales filled with zeolite and/or smectite.

FRACTURES - VEINS - BRECCIA

Fractures are slightly coated with zeolite. Hairlike veinlets are filled with quartz and zeolite?

### Visual Core Description

Observer ..... Viereck

Depth Interval 

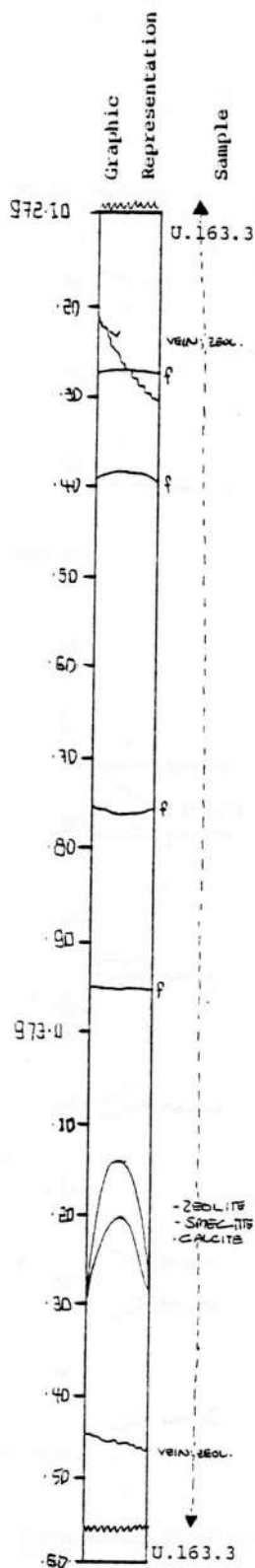
|   |   |   |   |   |
|---|---|---|---|---|
| 9 | 7 | 2 | 1 | 0 |
|---|---|---|---|---|

 cm to 

|   |   |   |   |   |
|---|---|---|---|---|
| 9 | 7 | 3 | 5 | 6 |
|---|---|---|---|---|

 cm

Box 166, Section 4



## LITHOLOGY-PETROGRAPHY

Green, fine to medium-grained, equally granular, homogeneous, aphyric massive basalt.

Pyrite aggregates are still common (see Section 163, # 1 and 2). The amount decreases downward.

## STRUCTURE

Massive

### VESICLES/AMYGDALES

Tiny (< 1 mm) amygdales are filled with zeolite and/or smectite.

FRACTURES - VEINS - BRECCIA

Fractures are coated by smectite, zeolite and calcite.

Fractures are mostly unplanar.

973.20 Angle of dip of the fracture  $\sim 60^\circ$ .

Visual Core Description

Observer PTR

Depth Interval 

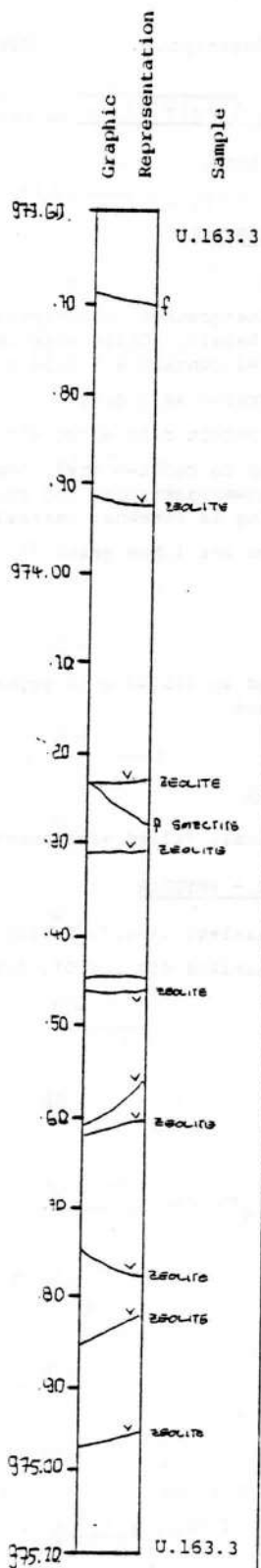
|   |   |   |   |   |
|---|---|---|---|---|
| 9 | 7 | 3 | 5 | 7 |
|---|---|---|---|---|

 cm to 

|   |   |   |   |   |
|---|---|---|---|---|
| 9 | 7 | 5 | 1 | 0 |
|---|---|---|---|---|

 cm

Box 167, Section 1

LITHOLOGY-PETROGRAPHY

Continues U.163.3

Greenish-gray, fine-to medium-grained, holocrystalline, equigranular, aphyric basalt.

STRUCTURE

Massive

VESICLES/AMYGDALES

1%, 1 mm, spherical, filled with smectite and minor zeolite.

FRACTURES - VEINS - BRECCIA

Veinlets 20-50°, hairline to 2 mm, filled with zeolite. Most fractures parallel to veins; one dip 40°, coated with smectite.

Visual Core Description

Observer ..... PTR

Depth Interval 

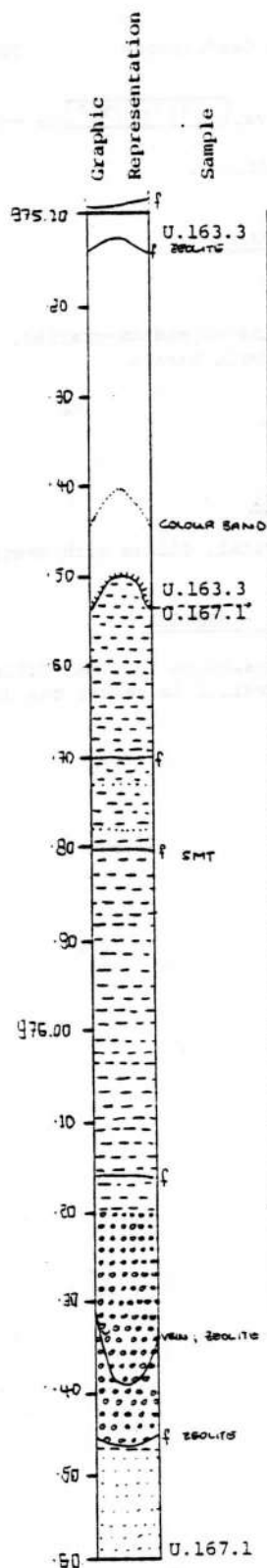
|   |   |   |   |   |
|---|---|---|---|---|
| 9 | 7 | 5 | 1 | 0 |
|---|---|---|---|---|

 cm to 

|   |   |   |   |   |
|---|---|---|---|---|
| 9 | 7 | 6 | 6 | 3 |
|---|---|---|---|---|

 cm

Box 167, Section 2

LITHOLOGY-PETROGRAPHY

Continues U.163.3

Greenish-gray, fine-grained, holocrystalline, equigranular aphyric basalt. Grain size decreases gradually downward to chilled contact @ 975.54 m.

U.163.3 is interpreted as a dike.

975.54 Chilled contact dips about 40°.

U.167.1 Dark-gray to reddish-gray, poorly bedded claystone, siltstone, sandstone and grit, moderately well indurated. Bedding is somewhat variable but ~ 20°.

976.58 Lower 5 cm are light gray.

STRUCTURE

U.163.3 Massive

975.43 Color band at 975.43 m is probably due to flow parallel to contact.

U.167.1 Bedded

VESICLES/AMYGDALES

1-2%, 1 mm spherical, filled with smectite (U.163.3)

FRACTURES - VEINS - BRECCIA

U.163.3 Minor veinlets 15-40°, filled with zeolite.

U.167.1 A few veinlets dip 30-70°, filled with zeolite.

Visual Core Description

Observer PTR

Depth Interval 

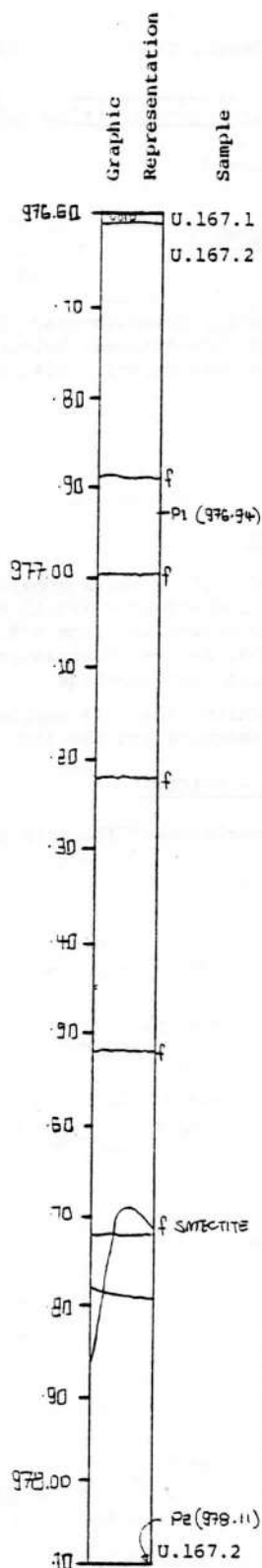
|   |   |   |   |   |
|---|---|---|---|---|
| 9 | 7 | 6 | 6 | 3 |
|---|---|---|---|---|

 cm to 

|   |   |   |   |   |
|---|---|---|---|---|
| 9 | 7 | 8 | 1 | 5 |
|---|---|---|---|---|

 cm

Box 167, Section 3

LITHOLOGY-PETROGRAPHY

Continues U.167.1

Dark reddish-gray fine-grained claystone and siltstone. Depositional contact top of lava flow. No chilling or baking.

U.167.2 Light gray to faintly greenish-gray, plagioclase-phyric basalt with fine-grained, holocrystalline groundmass. Rock is highly (15-20%) amygdaloidal. Plagioclase phenocrysts ~ 2-10 mm, prismatic laths, ~ 15%.

STRUCTURE

U.167.2 Massive

VESICLES/AMYGDALES

U.167.2 Fairly large (1-1.5 cm), irregular amygdules are common to about 977.90. Below this amygdules are 1-3 mm, spherical and filled with smectite. Larger amygdules are lined with smectite and completely filled with zeolite. 15-20% in upper part of section, decreasing downward to ~ 5% @ 977.90.

977.90 5% in lower part below ~ 977.90.

FRACTURES - VEINS - BRECCIA

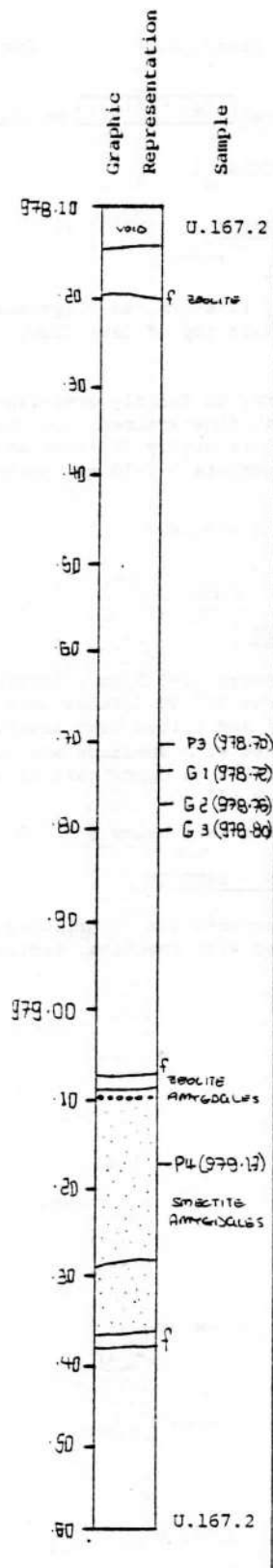
U.167.1 Most fractures due to drilling. One @ 977.68 dips ~ 80°, coated with smectite, zeolite and minor pyrite (?).



Visual Core Description

Observer PTRDepth Interval 978.15 cm to 979.66 cm

Box 167, Section 4

LITHOLOGY-PETROGRAPHY

Continues U.167.2

Light gray to slightly greenish-gray, plagioclase-phyric basalt with fine-grained, holocrystalline groundmass. Plagioclase phenocrysts ~ 15%, 2-10 mm, subhedral laths.

STRUCTURE

Massive

VESICLES/AMYGDALES

Sparse to ~ 979.00. 11 cm thick zone of zeolite-filled amygdales from 979.00 - 979.11 mm. These are up to 1 cm, spherical to irregular, from 979.11 to ~ 979.36. Amygdales are ~ 10%, 2-3 mm, decreasing in size downwards, spherical and filled with smectite.

Lower 30 cm of section have ~ 5% amygdales, 1-5 cm, filled with both smectite and zeolite.

FRACTURES - VEINS - BRECCIA

Fractures all subhorizontal, probably due to drilling.

Visual Core Description

Observer ...<sup>KHJ</sup>.....Depth Interval 

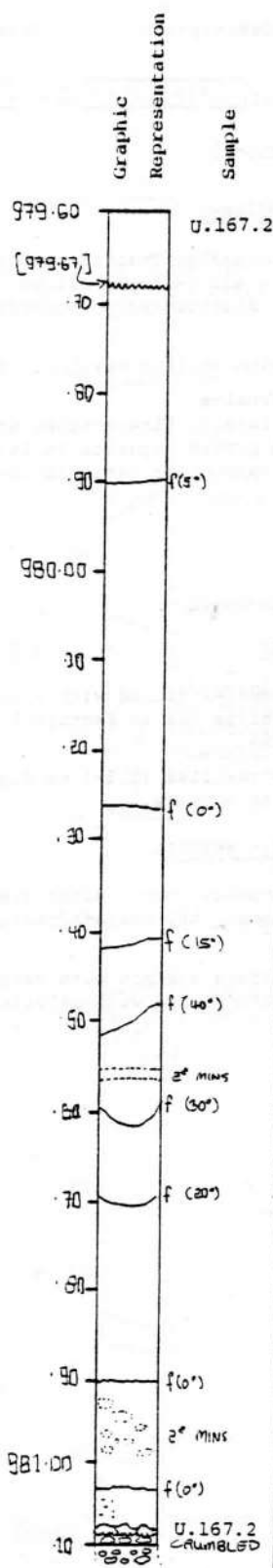
|   |   |   |   |   |
|---|---|---|---|---|
| 9 | 7 | 9 | 6 | 7 |
|---|---|---|---|---|

 cm to 

|   |   |   |   |   |
|---|---|---|---|---|
| 9 | 8 | 1 | 1 | 9 |
|---|---|---|---|---|

 cm

Box 168, Section 1

LITHOLOGY-PETROGRAPHY

Light gray, fine-grained amygdaloidal basalt, also porphyritic (plagioclase).

Holocrystalline

Phenocrysts 0.5 - 2 mm, 30% conc.

STRUCTURE

Massive

VESICLES/AMYGDALES

Amygdales filled with:

dark gray smectite (minor)

white zeolite (Laumontite ?)

most amygdales have outer coating of dark gray smectite with zeolite inside.

From 0.5 - 4 mm diameter, about 15%.

980.90 Very high concentration of secondary minerals

FRACTURES - VEINS - BRECCIA

Easily crumbled, relatively loose rock.

Minor green smectite on fracture surfaces.

All sealed fractures filled with white zeolites.

ROCK ALTERATION

980.80 downward - very highly scoriaceous, slightly brecciated.

Visual Core Description

Observer ..... KHJ

Depth Interval 

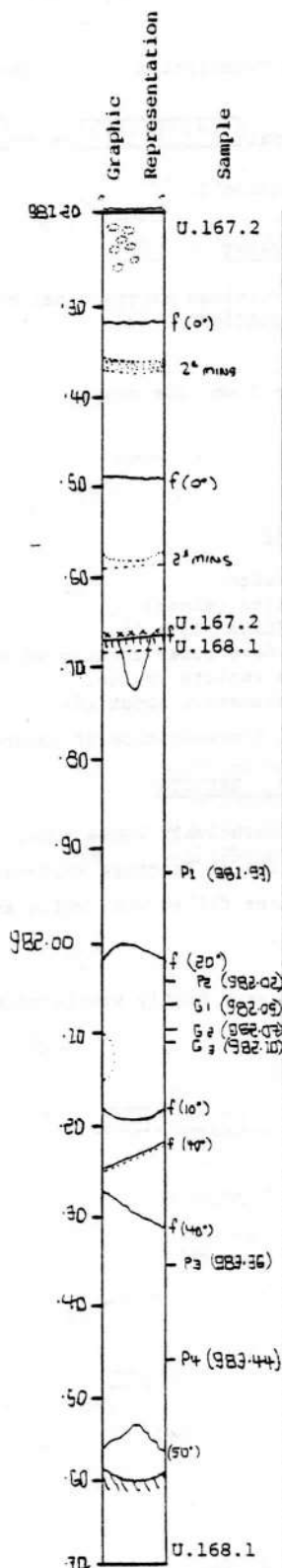
|   |   |   |   |   |
|---|---|---|---|---|
| 9 | 8 | 1 | 1 | 9 |
|---|---|---|---|---|

 cm to 

|   |   |   |   |   |
|---|---|---|---|---|
| 9 | 8 | 2 | 4 | 9 |
|---|---|---|---|---|

 cm

Box 168, Section 2

LITHOLOGY - PETROGRAPHY

U.167.2 Light gray, fine-grained porphyritic and amygdular basalt - all vesicles filled. Holocrystalline. Plagioclase phenocrysts 0.5 - 2 mm (30% conc.)

981.67 Contact with chilled margins. 20°-40° dip.

U.168.1 Unit intrusive.

Light gray-green basalt, fine-grained and very uniform with disseminated pyrite deposits (< 1%, 2-4 mm). Holocrystalline, very minor vesiculation (< 0.1%).

STRUCTURE

U.167.2 Massive

U.168.1 Massive

VESICLES/AMYGDALES

U.167.2 - All amygdales filled with - dark gray smectite (minor), white zeolite (as in Section 1), from 0.5-4 mm diameter, about 15%.

U.168.1 Very few vesicles (0.5-1 mm dip). Filled with calcite and zeolite mixture.

FRACTURES - VEINS - BRECCIA

U.167.2 Loose, crumbly rock. Minor green smectite on fracture surfaces. All sealed fractures filled with white zeolite.

U.168.1 Some fracture surface with gray-green smectite. Veinlets (fractures) filled with calcite and zeolite in platy crystals.

Visual Core Description

Observer ..... KHJ

Depth Interval 

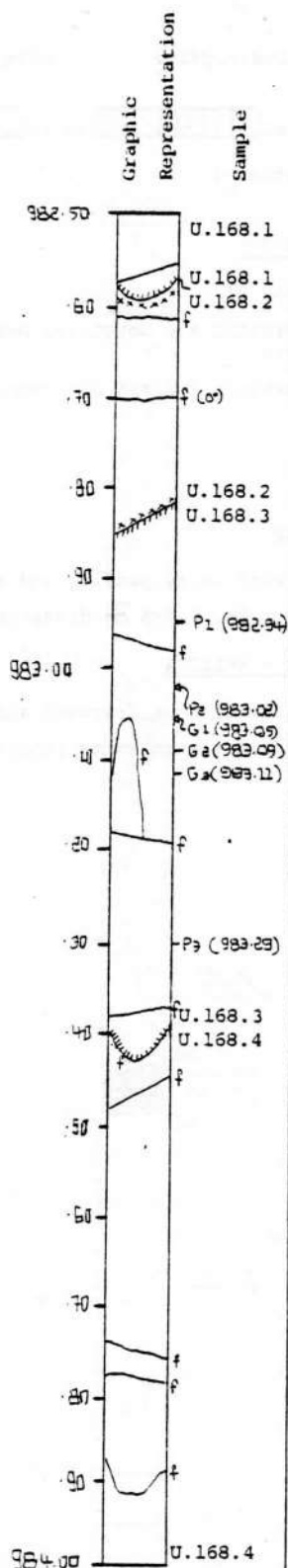
|   |   |   |   |   |
|---|---|---|---|---|
| 9 | 8 | 2 | 4 | 9 |
|---|---|---|---|---|

 cm to 

|   |   |   |   |   |
|---|---|---|---|---|
| 9 | 8 | 4 | 0 | 5 |
|---|---|---|---|---|

 cm

Box 168, Section 3

LITHOLOGY-PETROGRAPHY

U.168.1 - Chilled contact, 60° dip, this side intrusive, see Section 2 or U.168.3 for description.

U.168.2 - This unit continuation of 167.2. See Sections 1 and 2 or 168.4 below for description.

982.81 Chilled contact, 55° dip, this side intrusive.

U.168.3 - Light gray-green basalt, fine-grained and uniform. Holocrystalline with very minor vesiculation (< 0.1%). Similar to U.168.1.

983.40 Chilled contact, 65° dip, this side intrusive (U.168.3).

U.168.4 - This unit probable continuation of U.167.2 and 168.2, but less crumbly and scoriaceous. Light gray porphyritic and amygdular basalt with fine-grained matrix. Holocrystalline. Plagioclase phenocrysts 0.5 - 2 mm diameter, white, 30% conc.

STRUCTURE

U.168.3 Massive

U.168.4 Massive

VESICLES/AMYGDALES

U.168.3 All vesicles filled with calcite and white zeolite mixture (0.5 - 3 mm diameter).

U.168.4 All amygdales filled with white zeolite and calcite. 1-4 mm diameter, 25% conc.

FRACTURES - VEINS - BRECCIA

U.168.3 - Some fracture surfaces with gray-green and black smectite. Some fractures filled with veinlets of calcite and zeolite in platy crystals.

U.168.4 - Veinlets filled with calcite/white zeolite mixture. Minor gray-green smectite on some fracture surfaces. More consolidated rock than U.167.2 and U.168.2.

Visual Core Description

Observer KHJ

Depth Interval 

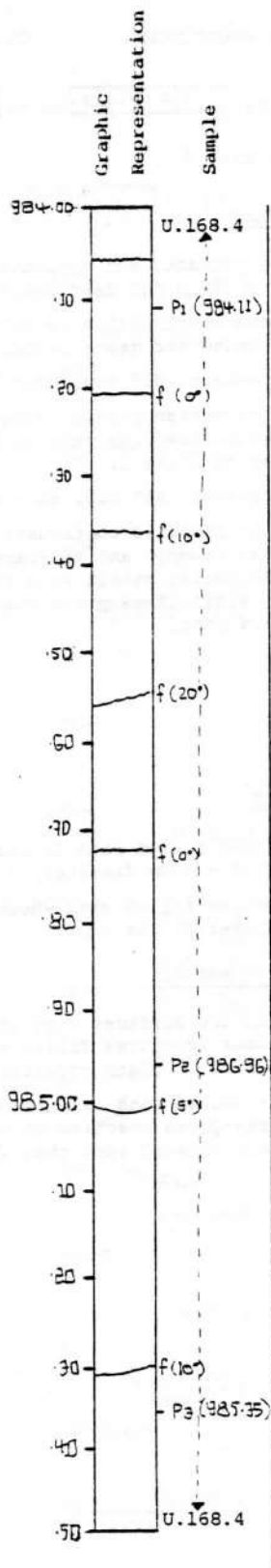
|   |   |   |   |   |
|---|---|---|---|---|
| 9 | 3 | 4 | 0 | 5 |
|---|---|---|---|---|

 cm to 

|   |   |   |   |   |
|---|---|---|---|---|
| 9 | 3 | 5 | 4 | 6 |
|---|---|---|---|---|

 cm

Box 168, Section 4

LITHOLOGY-PETROGRAPHY

Continuation of 167.2.

Medium-gray porphyritic and amygdular basalt in a fine-grained matrix.

Plagioclase phenocrysts (white) 25% conc., 1-4 mm.

STRUCTURE

Massive

VESICLES/AMYGDALES

Amygdales filled with white zeolite and calcite.

Even distribution, 10%, 0.5-4 mm diameter.

FRACTURES - VEINS - BRECCIA

Minor green smectite on some fracture surfaces.

Sealed fractures filled with white zeolite and calcite.

Visual Core Description

Observer ..... Viereck

Depth Interval 

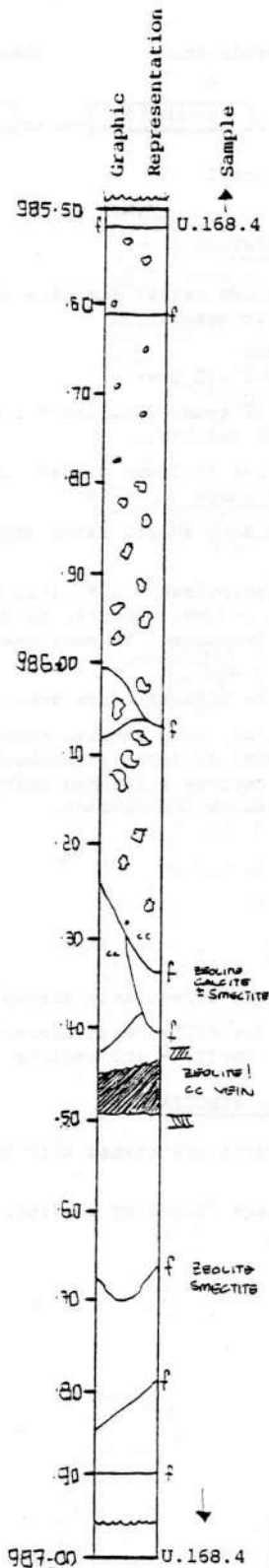
|   |   |   |   |   |
|---|---|---|---|---|
| 9 | 8 | 5 | 4 | 6 |
|---|---|---|---|---|

 cm to 

|   |   |   |   |   |
|---|---|---|---|---|
| 9 | 8 | 6 | 9 | 6 |
|---|---|---|---|---|

 cm

Box 169, Section 1

LITHOLOGY-PETROGRAPHY

Continuation of Box 168.

Greenish gray porphyritic, vesicular basalt, matrix is fine-grained and equally granular throughout the section.

Phenocrysts are feldspars, ~ 15% length is up to 5 mm, they are oriented subhorizontally.

Olivine phenocrysts ~ 1%, 1-3 mm euhedral to subhedral, altered to red and green smectite.

The section is increasingly vesicular downward to 986.20; decrease from that on downward in size and amount.

986.50 Below the vein there is a 20 mm wide nearly aphyric, non vesicular zone. It continues being porphyritic, slightly vesicular, massive, homogeneous.

STRUCTURE

Porphyritic, vesicular, amygdaloidal. Increase in vesicles downwards (985.70 - 985.90). (986.20 - 986.34) decrease in vesicles.

VESICLES/AMYGDALES

Vesicles are irregular in shape, up to 30 mm in length around 986.00 elongated at 985.70. Normally there is no preferred orientation.

Vesicles are coated on the outside with smectite and filled with zeolite. Some show an intergrowth of both, above 985.50 there are some empty vesicles.

Some of the tiny vesicles are only filled with smectite.

FRACTURES - VEINS - BRECCIA

Fractures are sometimes coated by zeolite, calcite and smectite.

986.49 Vein is filled with

Smectite  
Calcite  
Zeolite  
Calcite  
Smectite

Visual Core Description

Observer ..... Viereck

Depth Interval 

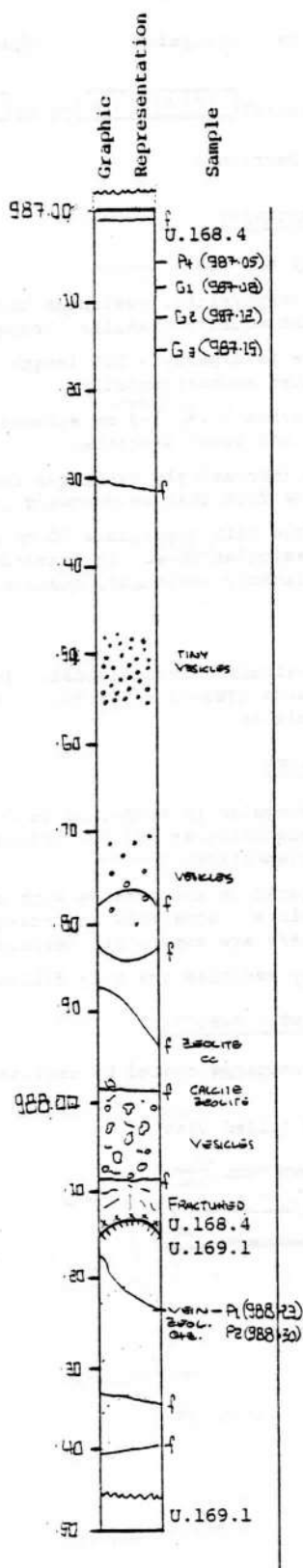
|   |   |   |   |   |
|---|---|---|---|---|
| 9 | 8 | 6 | 9 | 6 |
|---|---|---|---|---|

 cm to 

|   |   |   |   |   |
|---|---|---|---|---|
| 9 | 8 | 8 | 4 | 6 |
|---|---|---|---|---|

 cm

Box 169, Section 2

LITHOLOGY-PETROGRAPHY

U.168.4

Greenish-gray, massive rather homogeneous, fine-grained, porphyritic basalt.

Vesicularity changes:

slightly vesicular all over

at 987.50 a lot of round vesicles &lt; 1 mm in size filled with smectite and zeolite.

at 987.75 amygdalae (&lt; 10mm) filled with zeolite ± smectite rounded shape

at 988.00 irregularly shaped large amygdalae with zeolite filling.

Phenocrysts are plagioclase ~ 15%, 1-10 mm, subhedral; and olivine, ~ 1%, 1-3 mm, euhedral to subhedral, partly altered to smectite. In zone near contact some olivine is fresh.

988.14 Contact fine grained, dark gray, chilled contact.

U.169.1 Fine-grained, gray basalt, aphyric, massive to vesicular, because of local enrichment of oriented vesicles the unit becomes a layered texture. Vesicles are aligned parallel to the contact.

STRUCTURE

U.168.4 Porphyritic

VESICLES/AMYGDALES

U.168.4 Vesicles are irregularly shaped to subrounded.

U.169.1 Vesicles are filled with smectite, larger ones (&gt; 1 mm) with smectite and zeolite.

FRACTURES - VEINS - BRECCIA

U.168.4 Few fractures are coated with zeolite and calcite.

U.169.1 Veinlets are filled by zeolite, calcite, quartz (?).

Visual Core Description

Observer ... Viereck .....

Depth Interval 

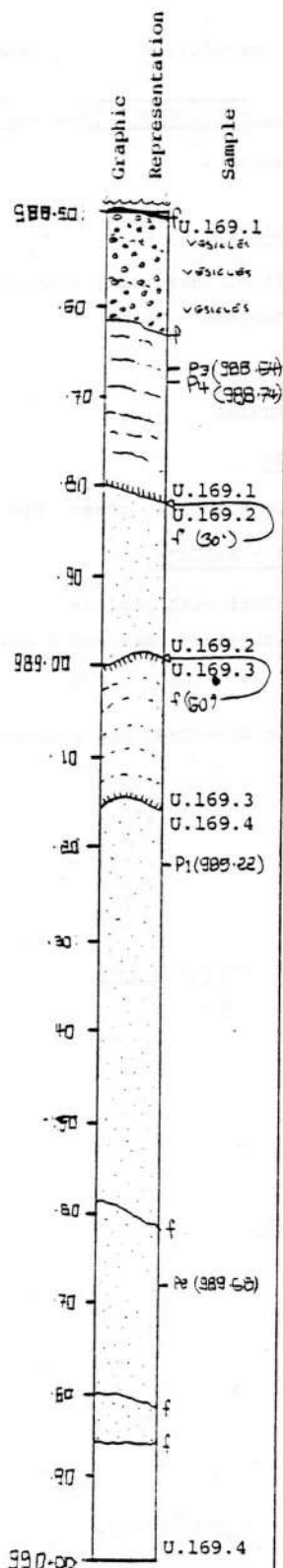
|   |   |   |   |   |
|---|---|---|---|---|
| 9 | 8 | 8 | 4 | 6 |
|---|---|---|---|---|

 cm to 

|   |   |   |   |   |
|---|---|---|---|---|
| 9 | 8 | 9 | 8 | 6 |
|---|---|---|---|---|

 cm

Box 169, Section 3

LITHOLOGY-PETROGRAPHY

U.169.1 Gray, fine-grained, aphyric, (vesicular in some zones) basalt with an internal banding marked by enriched vesicles, lined up parallel to the contact.

U.169.2 Porphyritic, vesicular, gray basalt, plagioclase phenocrysts 1-2 mm, 10-15%, also olivine 1%. Probably same as U.169.4.

989.00 dark gray

U.169.3 Dense, aphyric basalt, gray, vesicles enriched in zones parallel to the contacts.

989.16 dark gray

U.169.4 Porphyritic, vesicular, gray, fine-grained, altered, softened reddish in a definite zone. Plagioclase phenocrysts < 5 mm irregular vesicles up to 6 mm. Unit is rather uniform downward into Section 4.

STRUCTURE

U.169.1 Vesicular to massive banded.

988.81 chilled margin

U.169.2 Porphyritic

989.00 chilled margin

U.169.3 Dense banding

989.16 chilled margin

U.169.4 Porphyritic

VESICLES/AMYGDALES

U.169.1 Vesicles are filled with smectite and/or zeolite.

U.169.2 Vesicles filled with smectite, zeolite, celadonite ?, vesicles < 5 mm.

U.169.3 Vesicles filled with smectite ± zeolite, < 2 mm.

U.169.4 Vesicles are filled with smectite and zeolite.

FRACTURES - VEINS - BRECCIA

U.169.1 Few hairlike veins filled with zeolite ± calcite

U.169.2 - U.169.4 Few hairlike veins filled with zeolite ± calcite.

U.169.4 Fractures are sometimes coated by green smectite.

ROCK ALTERATION

U.169.4 Colour change down to 989.60 to a reddish dark gray. Rock is weakened and fractured.

OTHER

U.169.2 is comparable to U.168.4

U.169.3 is comparable to U.169.1. U.169.1 - dyke

U.169.4 is comparable to U.168.4 and U.169.2.



Visual Core Description

Observer ... Viereck .....

Depth Interval 

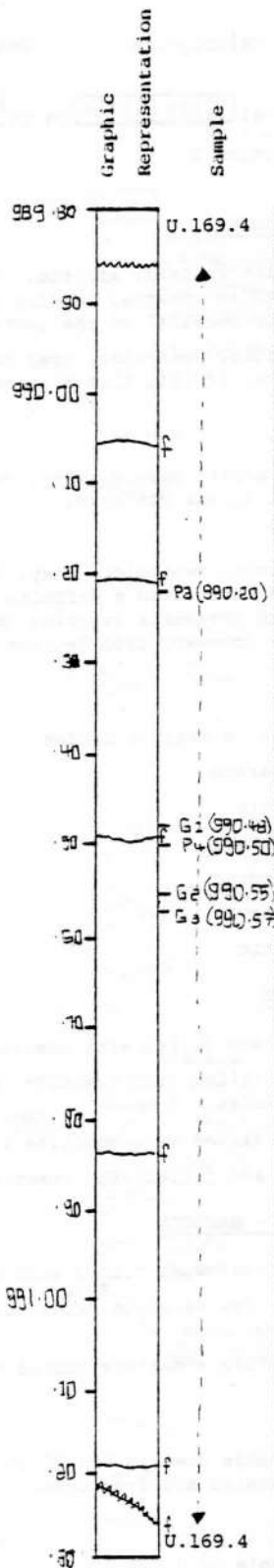
|   |   |   |   |   |
|---|---|---|---|---|
| 9 | 8 | 9 | 8 | 6 |
|---|---|---|---|---|

 cm to 

|   |   |   |   |   |
|---|---|---|---|---|
| 9 | 9 | 1 | 2 | 5 |
|---|---|---|---|---|

 cm

Box 169, Section 4



LITHOLOGY-PETROGRAPHY

Uniform, porphyritic, vesicular, gray, porous basalt.

Plagioclase phenocrysts: <6 mm

STRUCTURE

Porphyritic, vesicular

VESICLES/AMYGDALES

Filling is zeolite smectite (green, red).

FRACTURES - VEINS - BRECCIA

Few hairlike veinlets with zeolite.

991.25 Coated with green smectite ± calcite.

ROCK ALTERATION

Smectitic vesicles sometimes are reddish.

Visual Core Description

K. Hattori

Observer .....

Depth Interval 

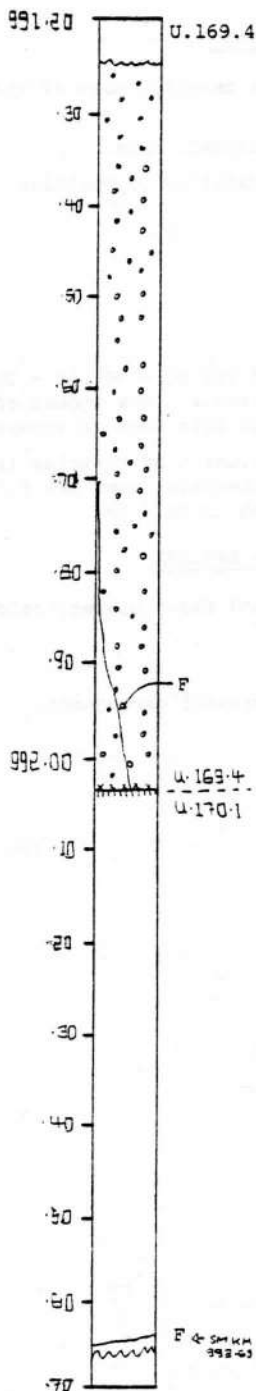
|   |   |   |   |   |
|---|---|---|---|---|
| 9 | 9 | 1 | 2 | 4 |
|---|---|---|---|---|

 cm to 

|   |   |   |   |   |
|---|---|---|---|---|
| 9 | 9 | 2 | 6 | 5 |
|---|---|---|---|---|

 cm

Box 170, Section 1

LITHOLOGY-PETROGRAPHY

U.169.4

Light gray coloured holocrystalline, phyric basic rocks.

Plagioclase phenocrysts; usually 3-4 mm up to 7 mm.

No orientation.

Plagioclase 15-20%, subhedral, fresh. Olivine phenocrysts 1-2%, 2-4 mm, euhedral to subhedral, altered to iddingsite.

U.170.1

Boundary; chilled against the upper unit; very sharp boundary; boundary is slightly altered to clayey.

Grain size increases lightly downward.

Apparently, U.170.1 is dyke. Section 1 is a marginal fine-grained part of this dyke. Aphyric, no phenocryst can be observed.

STRUCTURE

U.169.4 Massive

U.170.1 Massive

VESICLES/AMYGDALES

U.169.4 Very small vesicles, irregular shape, ~ 1 mm.

U.170.1 No vesicles

FRACTURES - VEINS - BRECCIA

991.93 Fracture; (core to angle fracture 85°) fault plane is covered with green smectite.

992.65 Fracture

ROCK ALTERATION

U.169.4 Vesicles are filled with green smectite. Some fragments are oxidized.

U.170.1 Green smectite.

Visual Core Description

K. Hattori

Observer .....

Depth Interval 

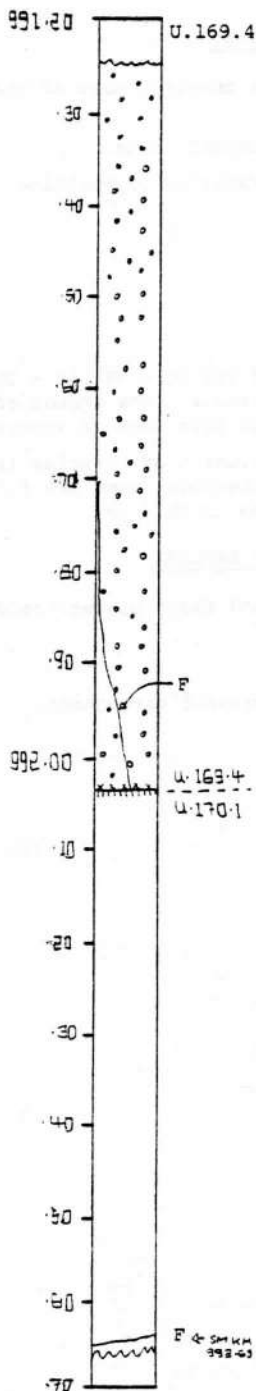
|   |   |   |   |   |
|---|---|---|---|---|
| 9 | 9 | 1 | 2 | 4 |
|---|---|---|---|---|

 cm to 

|   |   |   |   |   |
|---|---|---|---|---|
| 9 | 9 | 2 | 6 | 5 |
|---|---|---|---|---|

 cm

Box 170, Section 1



# LITHOLOGY-PETROGRAPHY

U.169.4

Light gray coloured holocrystalline, phyric basic rocks.

Plagioclase phenocrysts; usually 3-4 mm up to 7 mm.

No orientation.

Plagioclase 15-20%, subhedral, fresh. Olivine phenocrysts 1-2%, 2-4 mm, euhedral to subhedral, altered to iddingsite.

U.170.1

Boundary; chilled against the upper unit; very sharp boundary; boundary is slightly altered to clayey.

Grain size increases lightly downward.

Apparently, U.170.1 is dyke. Section 1 is a marginal fine-grained part of this dyke. Aphyric, no phenocryst can be observed.

# STRUCTURE

U.169.4 Massive

U.170.1 Massive

# VESICLES/AMYGDALES

U.169.4 Very small vesicles, irregular shape, ~ 1 mm.

U.170.1 No vesicles

# FRACTURES - VEINS - BRECCIA

991.93 Fracture; (core to angle fracture 85°) fault plane is covered with green smectite.

992.65 Fracture



# ROCK ALTERATION

U.169.4 Vesicles are filled with green smectite. Some fragments are oxidized.

U.170.1 Green smectite.

Visual Core Description

Observer . K. Hattori...

Depth Interval 

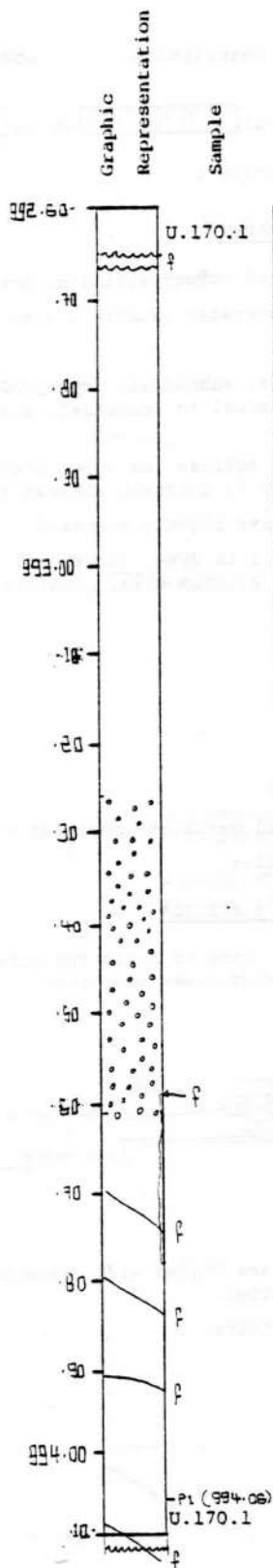
|   |   |   |   |   |
|---|---|---|---|---|
| 9 | 9 | 2 | 6 | 5 |
|---|---|---|---|---|

 cm to 

|   |   |   |   |   |
|---|---|---|---|---|
| 9 | 9 | 4 | 1 | 2 |
|---|---|---|---|---|

 cm

Box 170, Section 2

LITHOLOGY-PETROGRAPHY

This section 2 is a marginal part of the dyke rock unit 170.1.

Dark gray-green coloured, fine.

993.55 - 994.05 Gradually crystalline

STRUCTURE

Massive

VESICLES/AMYGDALES

992.65 - 993.20 and 993.60 - 994.12 - The amount of vesicles and the size is variable. The amount of vesicles is fairly large, though this rock is apparently dyke rock.

993.25 - 993.60 Volume % of vesicles is more than 10% filled with green smectite, some are filled with zeolites. Size is usually 2 mm up to 4 mm.

FRACTURES - VEINS - BRECCIA

993.60 - Fracture and fault planes; calcite precipitate.

ROCK ALTERATION

Green smectite is present throughout.

Visual Core Description

Observer K. Hattori

Depth Interval 

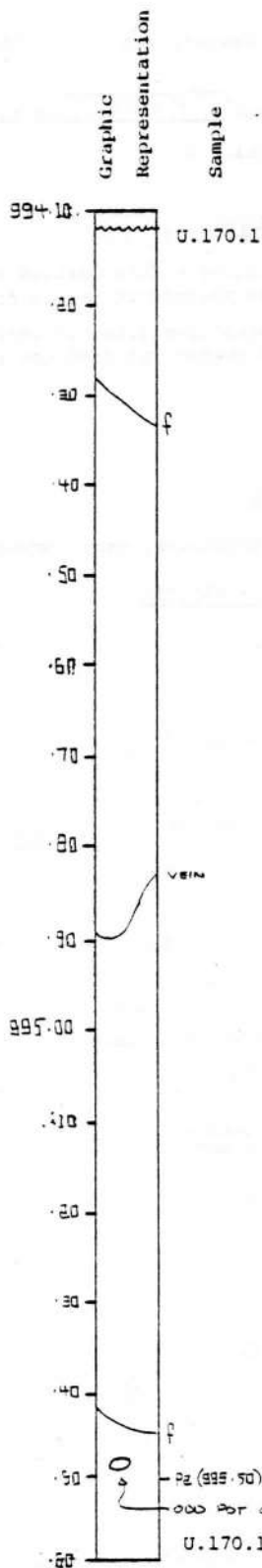
|   |   |   |   |   |
|---|---|---|---|---|
| 9 | 9 | 4 | 1 | 2 |
|---|---|---|---|---|

 cm to 

|   |   |   |   |   |
|---|---|---|---|---|
| 9 | 9 | 5 | 6 | 0 |
|---|---|---|---|---|

 cm

Box 170, Section 3

LITHOLOGY-PETROGRAPHY

Light gray-green coloured, aphyric very fine grained basalt dyke.

Compared to Section # 1, # 2, # 3 is much crystalline, massive, fresh and hard.

Plagioclase phenocrysts (3 mm) appeared. Volume is less than 1%.

995.49 Odd pot of quartz and zeolite.

STRUCTURE

Massive

VESICLES/AMYGDALES

Not observed with naked eyes.

FRACTURES - VEINS - BRECCIA

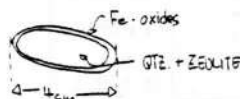
994.30 Fracture (core to angle fracture 50°)

994.86 Vein - Fe-hydroxide < 2 mm.

995.44 Fracture (core to angle fracture 45°) green smectite, pyrite disseminated.

ROCK ALTERATION

Not noticeable



Visual Core Description

Observer ..... K. Hattori

Depth Interval 

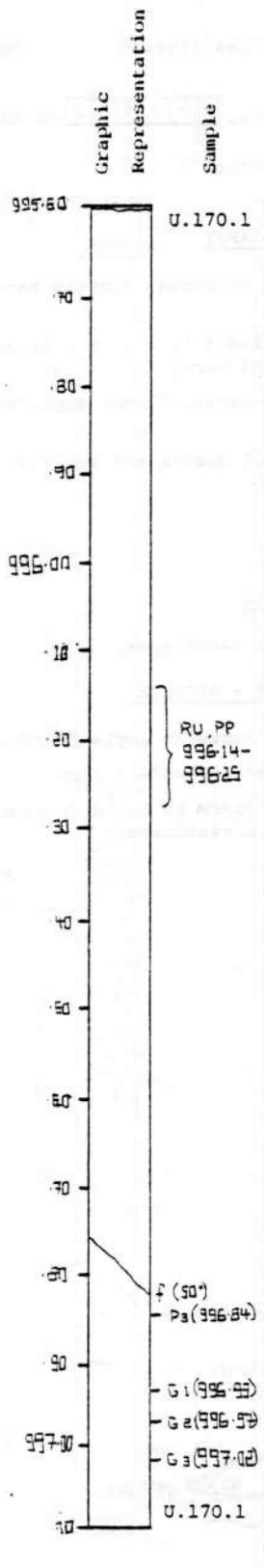
|   |   |   |   |   |
|---|---|---|---|---|
| 9 | 9 | 5 | 6 | 0 |
|---|---|---|---|---|

 cm to 

|   |   |   |   |   |
|---|---|---|---|---|
| 9 | 9 | 7 | 3 | 2 |
|---|---|---|---|---|

 cm

Box 170, Section 4



LITHOLOGY-PETROGRAPHY

Grayish-green coloured - fine grained aphyric basic dyke. Plagioclase phenocryst rarely found.

The amount of plagioclase slightly increases (996.20), but volume percent of phenocryst does not exceed 3%.

STRUCTURE

Massive

VESICLES/AMYGDALES

No vesicles, no amygdales, very compact.

FRACTURES - VEINS - BRECCIA

No veinlets.

ROCK ALTERATION

Very fresh.

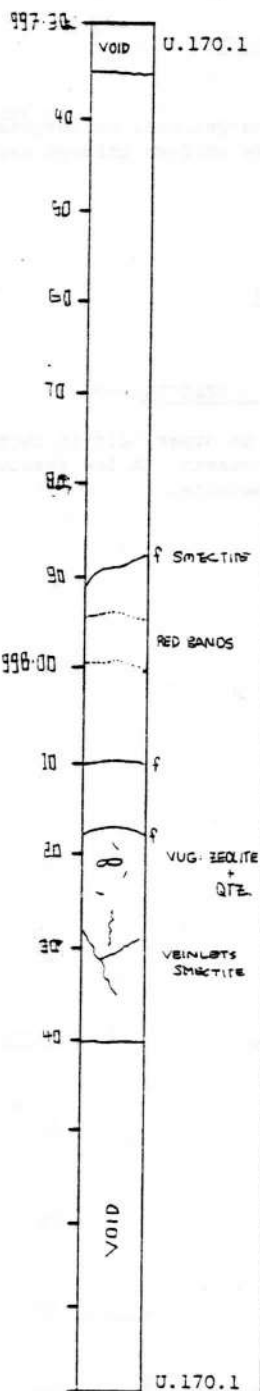
Visual Core Description

Observer PTR

Depth Interval 997.35 cm to 998.35 cm

Box 171, Section 1

NOTE: THIS SECTION WAS ADJUSTED TO FIT INDICATED DEPTHS

LITHOLOGY-PETROGRAPHY

Continues U.170.1

Greenish-gray, fine-grained, holocrystalline, aphyric basalt.

STRUCTURE

Massive

VESICLES/AMYGDALES

None

FRACTURES - VEINS - BRECCIA

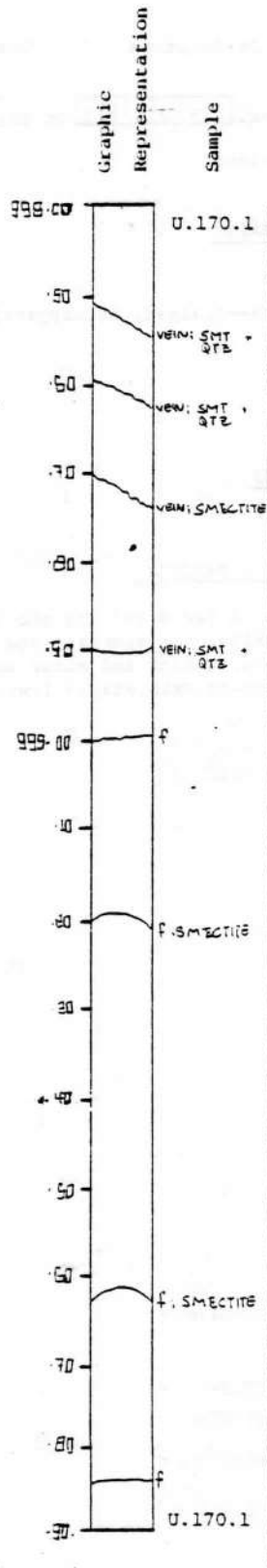
Fractures sparse. A few @ 20° and one @ 60°. Minor coating with smectite. An elongate vug occurs at 998.21 filled with zeolite, quartz and minor smectite, associated with hairline smectite veinlets in lower 15 cm.

Visual Core Description

Observer PTR

Depth Interval 99839 cm to 99990 cm

Box 171, Section 2

LITHOLOGY-PETROGRAPHY

Continues U.170.1

Greenish-gray, fine-grained, holocrystalline, aphyric basalt. Grain size uniform through section.

STRUCTURE

Massive

VESICLES/AMYGDALES

None

FRACTURES - VEINS - BRECCIA

Hairline veinlets in upper half of section filled with smectite and quartz. A few fractures dip 30-40°. Some have minor smectite.



Visual Core Description

Observer .PTR.....

Depth Interval 

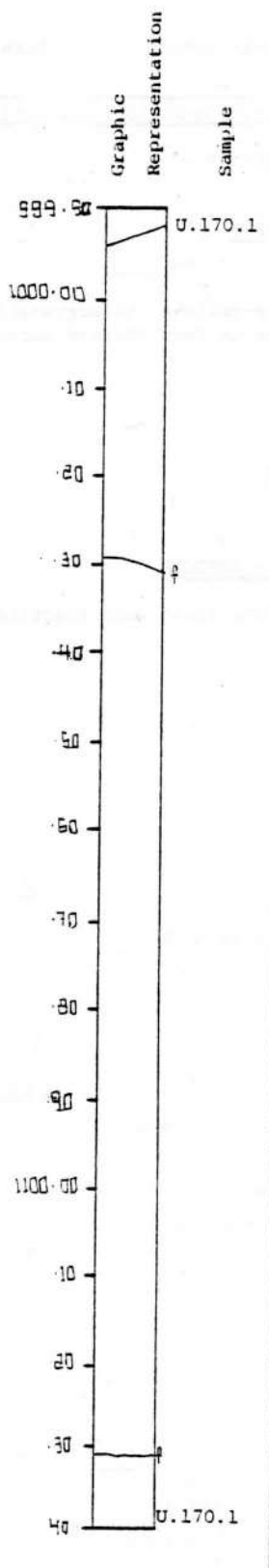
|   |   |   |   |   |
|---|---|---|---|---|
| 9 | 9 | 9 | 9 | 0 |
|---|---|---|---|---|

 cm to 

|   |   |   |   |   |   |
|---|---|---|---|---|---|
| 1 | 0 | 0 | 1 | 5 | 0 |
|---|---|---|---|---|---|

 cm

Box 171, Section 3



LITHOLOGY-PETROGRAPHY

Continues U.170.1

Greenish-gray, fine-grained, holocrystalline, aphyric basalt.

VESICLES/AMYGDALES

None

FRACTURES - VEINS - BRECCIA

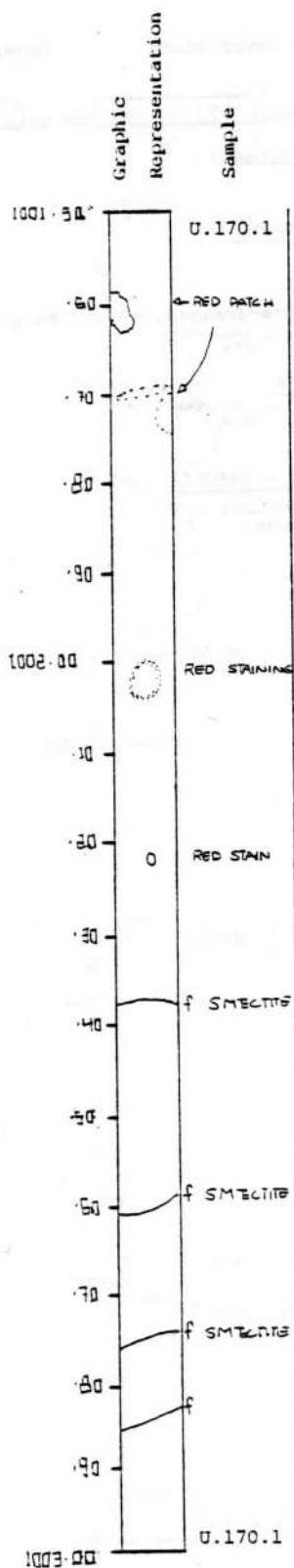
No natural fractures.

Visual Core Description

Observer .. PTR .....

Depth Interval 100150 cm to 100299 cm

Box 171, Section 4

LITHOLOGY-PETROGRAPHY

Continues U.170.1

Greenish-gray, fine-grained, holocrystalline, aphyric basalt. Grain size uniform through section.

STRUCTURE

Massive

VESICLES/AMYGDALES

None

FRACTURES - VEINS - BRECCIAMost fractures  $\sim 30^\circ$ , lined with smectite.

Visual Core Description

Observer ...PTR

Depth Interval 

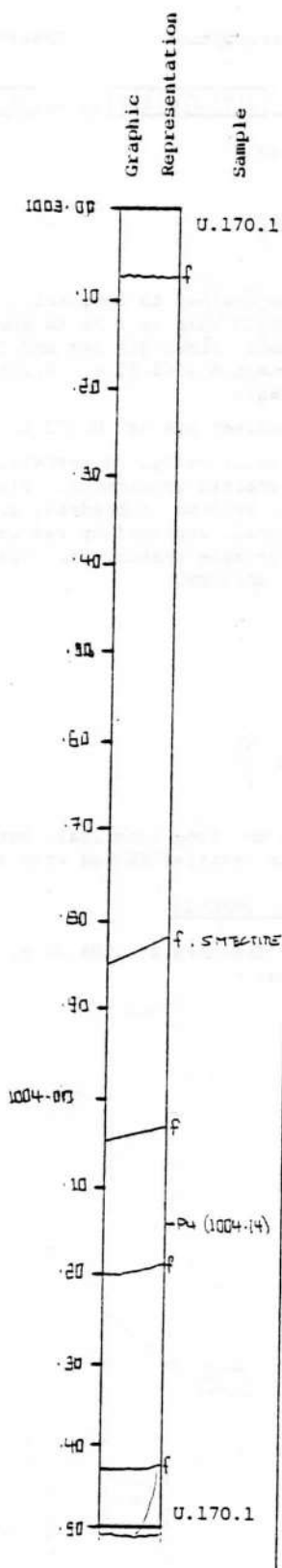
|   |   |   |   |   |   |
|---|---|---|---|---|---|
| 1 | 0 | 0 | 2 | 9 | 9 |
|---|---|---|---|---|---|

 cm to 

|   |   |   |   |   |   |
|---|---|---|---|---|---|
| 1 | 0 | 0 | 4 | 5 | 2 |
|---|---|---|---|---|---|

 cm

Box 172, Section 1



LITHOLOGY-PETROGRAPHY

Continues U.170.1

Greenish-gray, fine-grained, holocrystalline, aphyric basalt. Grain size uniform through section. No contacts.

STRUCTURE

Massive

VESICLES/AMYGDALES

None

FRACTURES - VEINS - BRECCIA

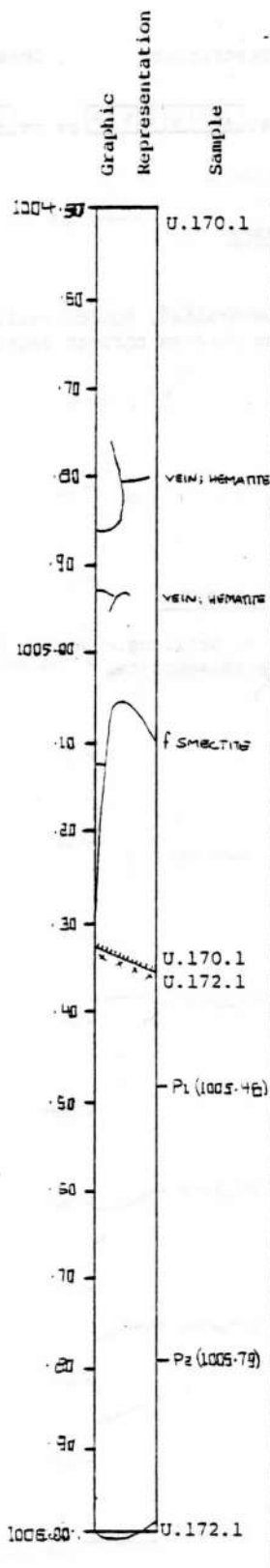
Most fractures due to drilling. One at 1003.83 m dips 30° and is coated with smectite.

Visual Core Description

Observer ... PTR

Depth Interval 1004.52 cm to 1006.01 cm

Box 172, Section 2

LITHOLOGY-PETROGRAPHY

Continues U.170.1

Greenish-gray, fine-grained to aphaneric, holocrystalline, aphyric basalt. Grain size is fine to about 1004.90, then rock becomes gradually finer-grained and darker gray toward chilled contact @ 1005.53 m. U.170.1 is interpreted as an intrusive.

1005.34 Chilled contact against U.172.1

U.172.1 Faintly reddish-gray, holocrystalline porphyritic basalt, with fine-grained groundmass. Plagioclase phenocrysts 15-20%, 2-10 mm, subhedral, olivine phenocryst 1-2%, 1-2 mm, euhedral, replaced by red iddingsite. Rare glassy clinopyroxene phenocryst. Grain size and phenocryst content uniform.

STRUCTURE

U.170.1 Massive

U.172.1 Massive

VESICLES/AMYGDALES

U.170.1 None

U.172.1 3-4%, 2-5 mm, some spherical, but most narrow, elongate, irregular cavities called with smectite.

FRACTURES - VEINS - BRECCIA

U.170.1 One major fracture at 1005.04 m, dips 80°, lined with smectite.

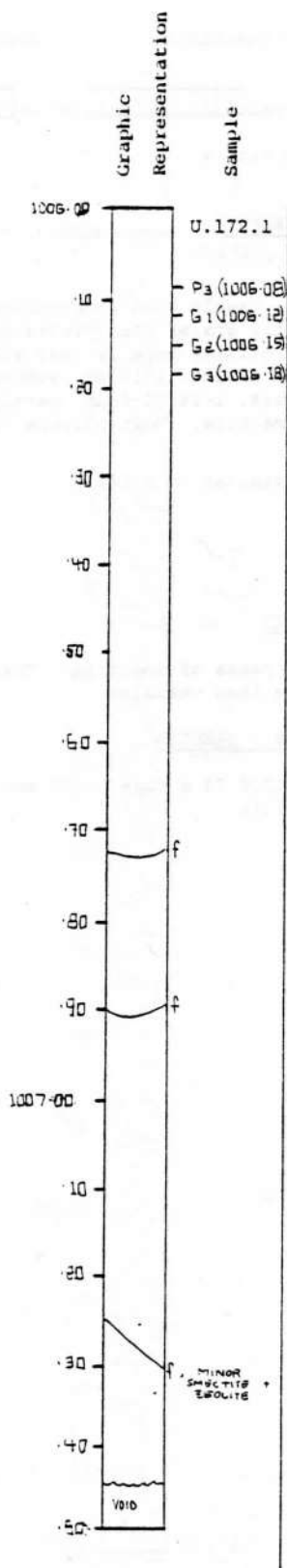
U.172.1 None

Visual Core Description

Observer ...PTR.....

Depth Interval 100601 cm to 100745 cm

Box 172, Section 3



# LITHOLOGY-PETROGRAPHY

Continues U.172.1

Very faintly reddish-gray, porphyritic basalt with fine-grained groundmass. Plagioclase phenocrysts 15-20%, 2-10 nm, subhedral, fresh. Olivine phenocryst 2-3%, 1-5 mm, euhedral, replaced by reddish iddingsite. Grain size and phenocryst content uniform through section. No contacts.

## STRUCTURE

Massive

## VESICLES/AMYGDALES

~ 2%, 1-5 mm, mostly narrow, irregular cavities filled with green smectite.

## FRACTURES - VEINS - BRECCIA

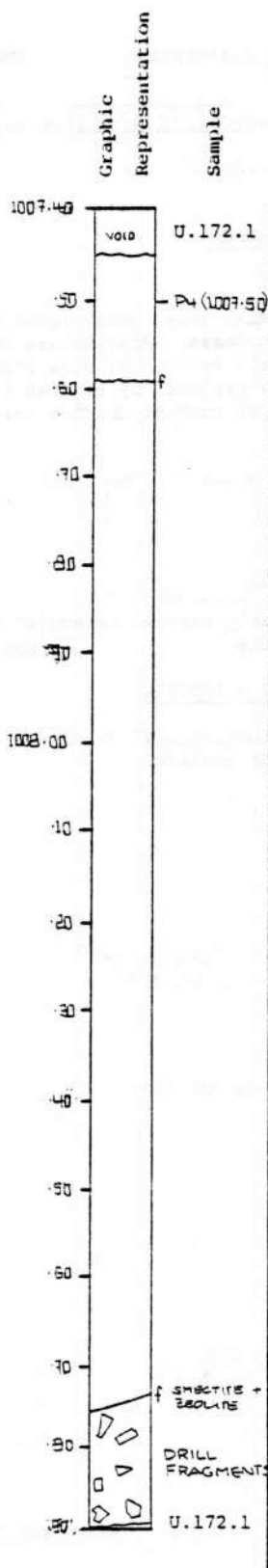
One natural fracture at 1007.25 dips ~ 50°, coated with minor smectite and zeolite.

Visual Core Description

Observer .PTR.....

Depth Interval 1007.45 cm to 1008.90 cm

Box 172, Section 4

LITHOLOGY-PETROGRAPHY

Continues U.172.1

Gray, porphyritic basalt with fine-grained groundmass. Color is distinctly grayer than preceding section, probably because olivine here is less altered. Plagioclase phenocrysts 15-20%, 1-10 mm, subhedral, fresh. Olivine phenocrysts, 1-2%, 1-3 mm, partly altered to iddingsite and smectite. Most olivine in lower part of section is fresh.

U.172.1 is very similar to U.169.4.

STRUCTURE

Massive

VESICLES/AMYGDALES

~ 1%, elongate streaks of smectite. These may reflect flow laminae more than vesicles.

FRACTURES - VEINS - BRECCIA

One fracture at 1008.75 m dips ~ 30° and is coated with smectite and zeolite.

Visual Core Description

Observer, ..... RHW

Depth Interval 

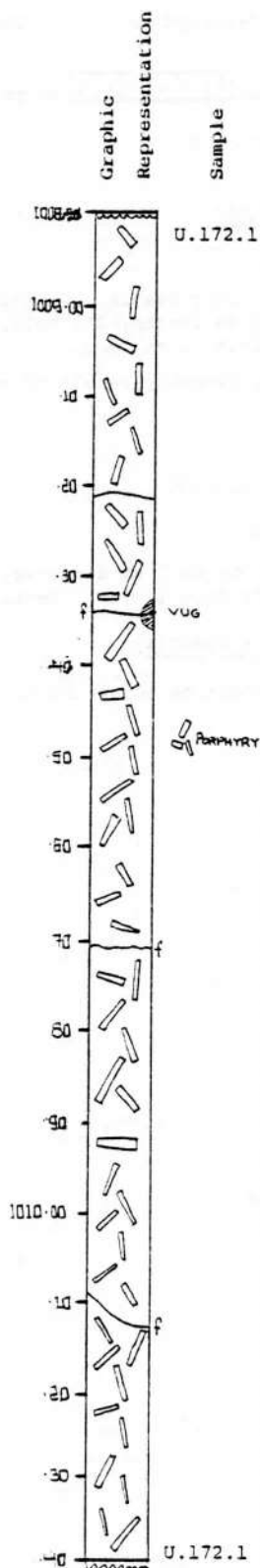
|   |   |   |   |   |   |
|---|---|---|---|---|---|
| 1 | 0 | 0 | 3 | 9 | 0 |
|---|---|---|---|---|---|

 cm to 

|   |   |   |   |   |   |
|---|---|---|---|---|---|
| 1 | 0 | 1 | 0 | 4 | 1 |
|---|---|---|---|---|---|

 cm

Box 173, Section 1

LITHOLOGY-PETROGRAPHY

Continued U172.1.

Medium gray porphyritic basalt. Plagioclase phenocrysts, subhedral, up to 1 cm length, 25% olivine phenocrysts to 1 mm, 5%, euhedral.

Red stained areas running throughout, probably alteration of olivine.

STRUCTURE

Massive

VESICLES/AMYGDALES

Several vugs around 1009.30 - smectite lined, calcite and laumontite filling.

Other amygdules, up to 1 cm, scattered throughout. Not a significant percent of volume.

FRACTURES - VEINS - BRECCIA

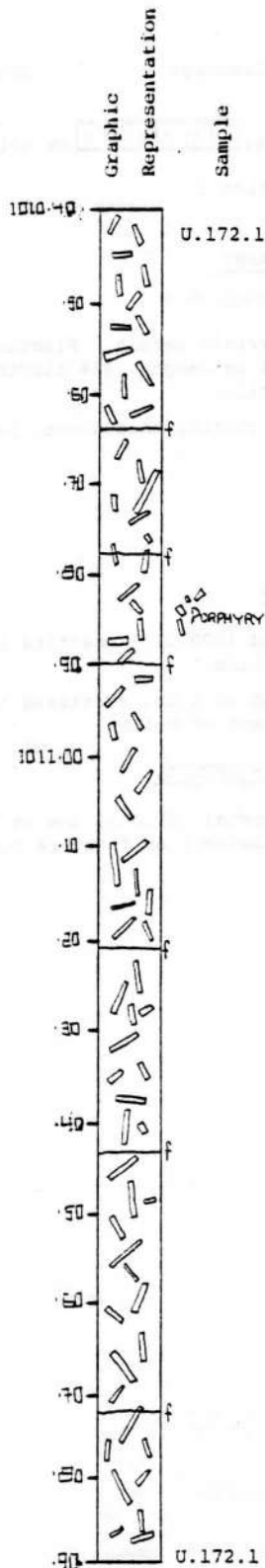
Fractures subhorizontal (0-10°), one at ~ 45°. Smectite present (patchy) on fracture surfaces.

Visual Core Description

Observer ..... RHW

Depth Interval 101041 cm to 101191 cm

Box 173, Section 2

LITHOLOGY-PETROGRAPHY

Continuing U.172.1

Medium gray porphyritic basalt. Plagioclase phenocrysts, subhedral, up to 1 cm length, 25% vol., olivine phenocrysts, altered, 1-3%, 1 mm long.

Red stained areas, probably result of olivine alteration.

STRUCTURE

Massive

VESICLES/AMYGDALES

Several amygdules, up to 1 cm diameter, scattered randomly throughout core length. Zeolite filled.

FRACTURES - VEINS - BRECCIA

Fractures 0-10°, smectite occurring on surfaces.



Visual Core Description

Observer' ..... RHW

Depth Interval 

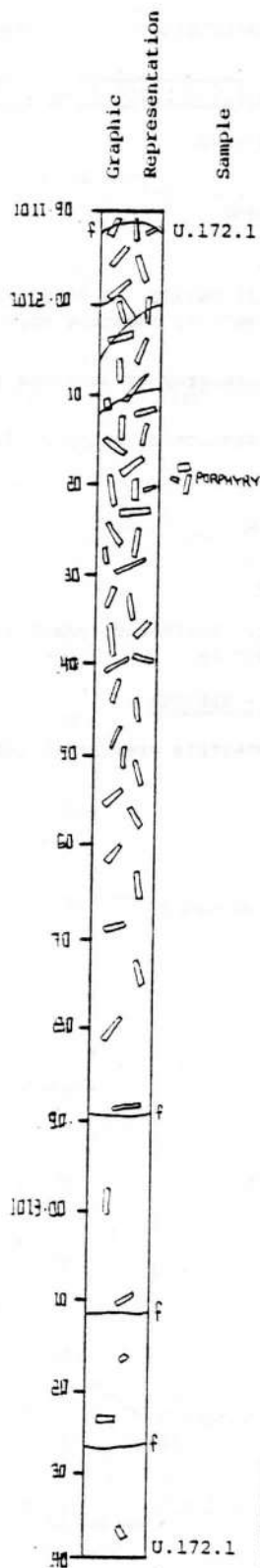
|   |   |   |   |   |   |
|---|---|---|---|---|---|
| 1 | 0 | 1 | 1 | 9 | 1 |
|---|---|---|---|---|---|

 cm to 

|   |   |   |   |   |   |
|---|---|---|---|---|---|
| 1 | 0 | 1 | 3 | 4 | 3 |
|---|---|---|---|---|---|

 cm

Box 173, Section 3

LITHOLOGY-PETROGRAPHY

Continuing U.172.1

Porphyritic basalt, with 20-25% plagioclase phenocrysts and minor (1-3%) altered olivine.

At ~ 1012.30 or so, the plagioclase content of the rock reduces drastically until, by 1013.00, it is down to ~5%, where it remains for the rest of the section.

The phenocrysts below 1013.00 are much smaller, on the average, than those above, only up to ~ 3 mm.

STRUCTURE

Massive

VESICLES/AMYGDALES

Occasional zeolite filled, smectite lined "pods" throughout, up to 1 cm in diameter.

FRACTURES - VEINS - BRECCIA

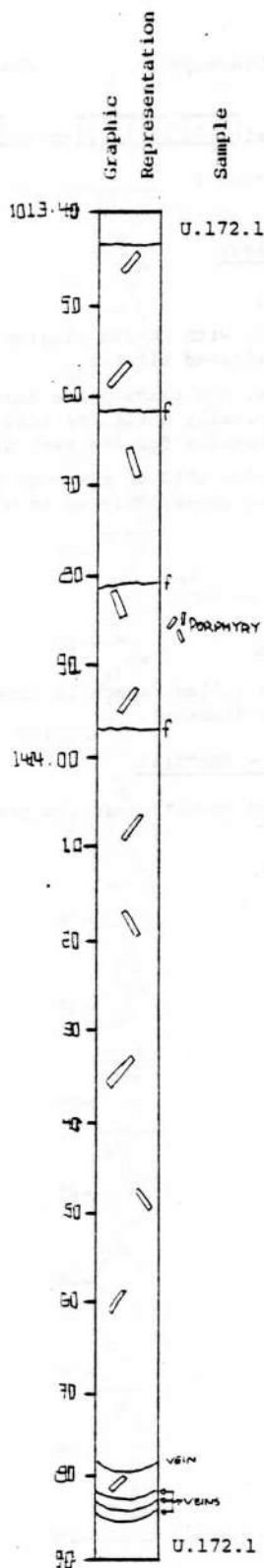
Fractures 0-10° and 40-60°, smectite present on surfaces.

Visual Core Description

Observer ..... RHW

Depth Interval 1013.40 cm to 1444.00 cm

Box 173, Section 4



# LITHOLOGY-PETROGRAPHY

Continuing U.172.1

Sparsely porphyritic basalt. 1-2% plagioclase laths in upper part of section, becoming more and more scarce lower in section.

Color changes from the gray of sections above to more gray-green.

Lowermost part of section is aphyric; fine-grained.

## STRUCTURE

Massive

## VESICLES/AMYGDALES

Effectively absent. Scattered, small (< 1 mm) patches of alteration (smectite).

## FRACTURES - VEINS - BRECCIA

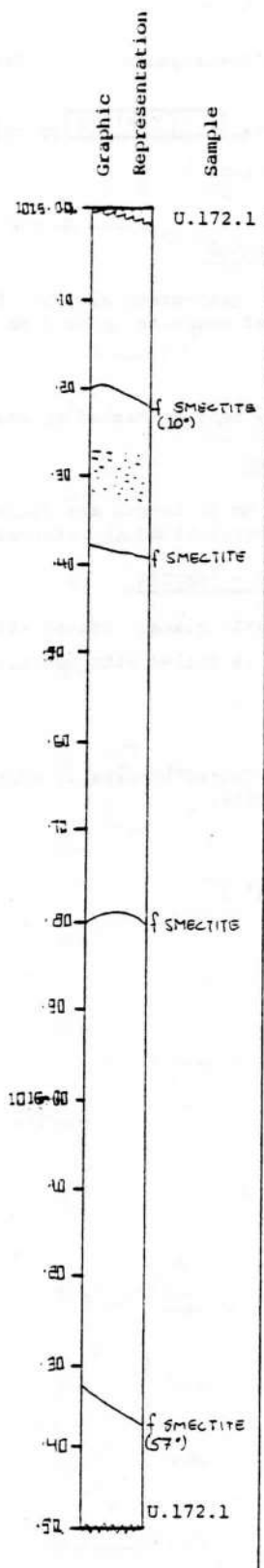
Fractures 0-10°, smectite present in linings.

Visual Core Description

Observer ..... Viereck

Depth Interval 101498 cm to 101650 cm

Box 174, Section 1



LITHOLOGY-PETROGRAPHY

Continuation of Box 173.

Massive, uniform, gray-green, aphyric, fine-grained basalt; patches of smectite up to 3 mm in length = zeolite are common.

STRUCTURE

Massive

VESICLES/AMYGDALES

Small vesicles (< 1 mm) usually irregularly scattered throughout the section but sometimes are enriched in zones up to 5 cm width so the rock gets in internal "flow banding".

FRACTURES - VEINS - BRECCIA

Fractures are planar, coated with black smectite and are parallel to an internal flow banding.

ROCK ALTERATION

Between 1016.20 and 1016.45 rock shows rusty brown streaks and coloured smectite patches.

OTHER

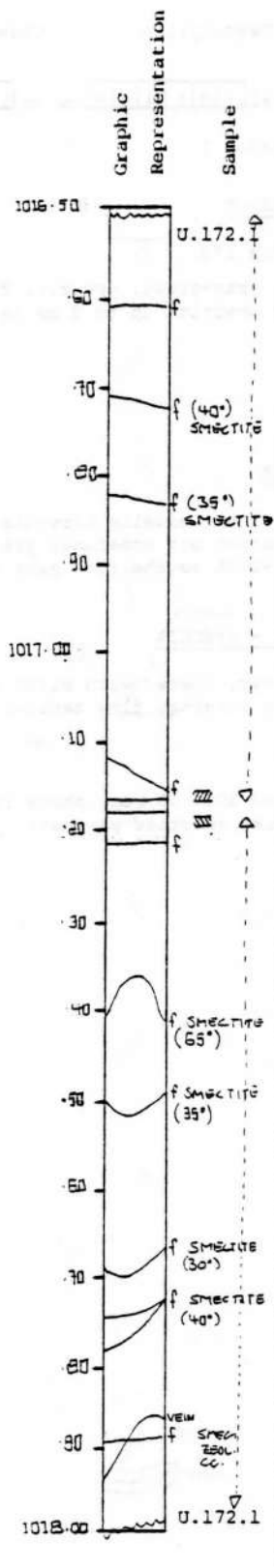
Same Unit as U.167.2

Visual Core Description

Observer ... Viereck .....

Depth Interval 101650 cm to 101800 cm

Box 174, Section 2



# LITHOLOGY-PETROGRAPHY

Uniform, massive, gray-green aphyric, fine-grained basalt, patches of smectite up to 3 mm are common.

## STRUCTURE

Massive with flow banding marked by smectite patches.

## VESICLES/AMYGDALES

Vesicles up to 3 mm in length are filled with smectite (black) and are parallel to an internal flow texture.

## FRACTURES - VEINS - BRECCIA

Fractures are mostly planar, coated with smectite.

1017.90 Veinlet is filled with smectite, zeolite + calcite.

## ROCK ALTERATION

Irregularly distributed streaks of rusty brown colour and altered smectite.

## OTHER

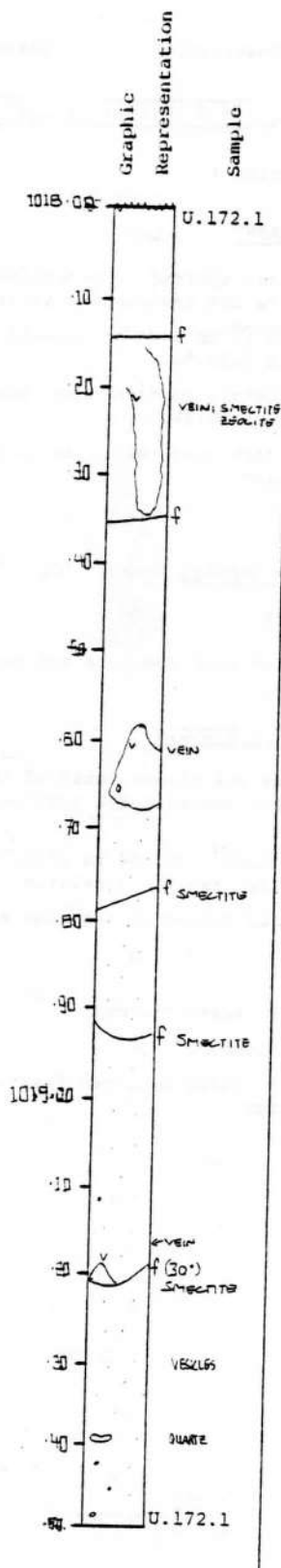
Same unit as U.167.2

Visual Core Description

Observer, ..... Viereck

Depth Interval 1018.00 cm to 1019.50 cm

Box 174, Section 3



#### LITHOLOGY-PETROGRAPHY

Massive, uniform, gray-green aphyric, fine-grained basalt. The amount of vesicles < 10 m is increasing downward, patches of smectite up to 3 mm in length are common and the give the rock an internal flow texture.

#### STRUCTURE

Massive

#### VESICLES/AMYGDALES

Vesicles increase in amount and size downward. The filling is smectite and zeolite and/or quartz and/or calcite.

#### FRACTURES - VEINS - BRECCIA

Fractures are often coated by black smectite, veinlets filled by smectite plus zeolite and/or quartz ± calcite.

#### ROCK ALTERATION

Black green smectite is sometimes altered to a rusty brown colour.

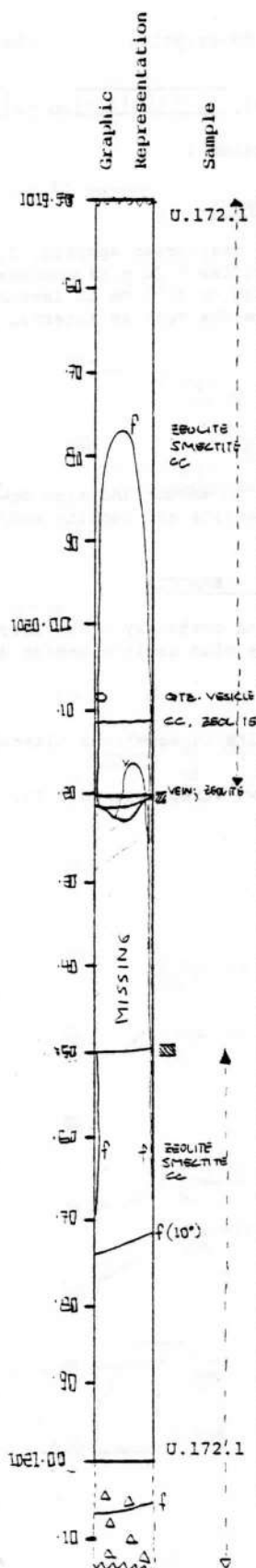
Intense rusty brown streaks at 1018.15.

Visual Core Description

Observer...Vierack.....

Depth Interval 1019.50 cm to 1021.13 cm

Box 174, Section 4

LITHOLOGY-PETROGRAPHY

Massive, gray green, aphyric, fine-grained basalt, patches of smectite and zeolite are aligned.

Few vesicles up to 10 mm down to 1020.12, less vesicles below that down to 1020.84.

1020.83 Dark, slightly reddish-gray, porous, with zeolite veins and vesicles.

1021.10 Reddish dark gray vesicular to brecciated, with zeolite filling.

STRUCTURE

Massive with flow banding down to 1020.70.

VESICLES/AMYGDALES

Vesicles are filled with smectite and quartz plus zeolite ± calcite.

FRACTURES - VEINS - BRECCIA

Very few fractures are planar, most of them are coated with green to black smectite and zeolite, none follows the flow banding.

The one long fracture, 1019.80 to 1020.70 is coated with green smectite, zeolite ± calcite.

Veinlets are mainly filled in the same manner.

ROCK ALTERATION

1019.60 - 1019.82 Rusty colouring

1020.05 Rusty colouring

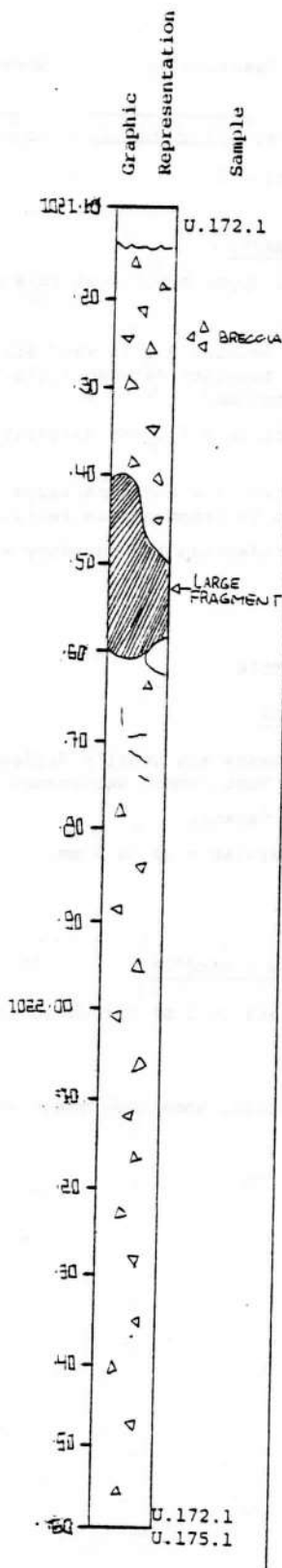
1020.42 - 1020.72 Rusty coloured fractures and rusty streaks in the rock.

Visual Core Description

Observer K. Hattori

Depth Interval 1021.40 cm to 1022.60 cm

Box 175, Section 1



# LITHOLOGY-PETROGRAPHY

Bottom brecciated zone of the flow U.172.1.

Dark brown red colour breccia

It is very difficult to determine the boundary between U.172.1 and U.175.1. Anywhere from 1022 - 1024 can be conceivable.

Arbitrarily the boundary is settled at 1022.6. Some reasons are written down on next page.

## STRUCTURE

Brecciated

## VESICLES/AMYGDALES

Vesicles in fragments are filled with zeolites.

## FRACTURES - VEINS - BRECCIA

Fractures, veinlets; filled with zeolites.

## ROCK ALTERATION

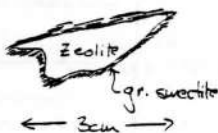
Zeolite - replace the matrix part.

Calcite is disseminated throughout the core.

Zeolites is filling vesicles in fragments.

Fe-hydroxide is abundant.

Small amount of green smectite is observed to surround zeolite pod.

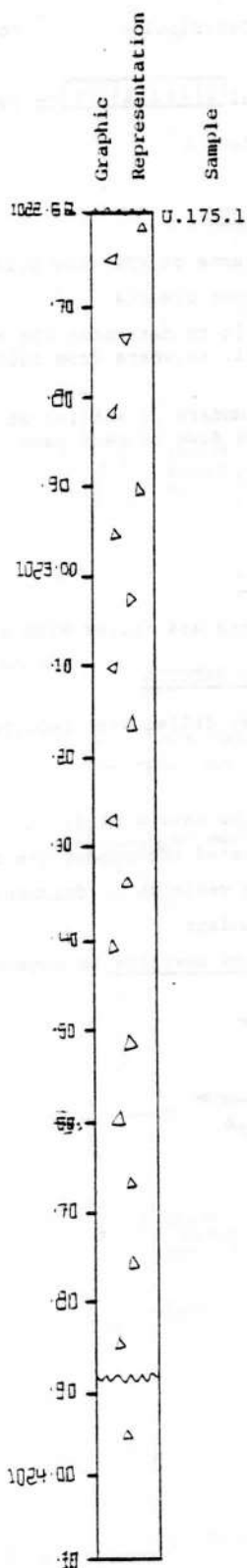


Visual Core Description

Observer...K. Hattori...

Depth Interval 102260 cm to 102388 cm

Box 175, Section 2

LITHOLOGY-PETROGRAPHY

Strongly oxidized upper brecciated zone of flow U.175.1.  
Strong red brown.

Lithology of the Section # 2 is very similar to those of Section # 1, the boundary between U.175.1 and U.172.1 is arbitrarily determined.

The colour of Section # 2 looks slightly darker than that of # 1.

Fragments in Section # 2 contains large amounts of vesicles compared to fragments in Section # 1.

Based on these evidences, the boundary was determined at 1022.60 m.

STRUCTURE

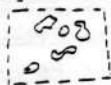
Brecciated. Brittle.

VESICLES/AMYGDALES

Vesicles in fragments are usually filled with zeolites green smectite. Most common occurrence.

Rarely these are vacant.

The shape is irregular - up to 3 mm.



Mixture of  
thin films of gr. smectite

FRACTURES - VEINS - BRECCIA

Many small veinlets (~ 1 m) throughout the cores.

ROCK ALTERATION

Fe-hydroxide calcite; sometimes green smectite often fill vesicles.



Visual Core Description

Observer ...K. Hattori...

Depth Interval 

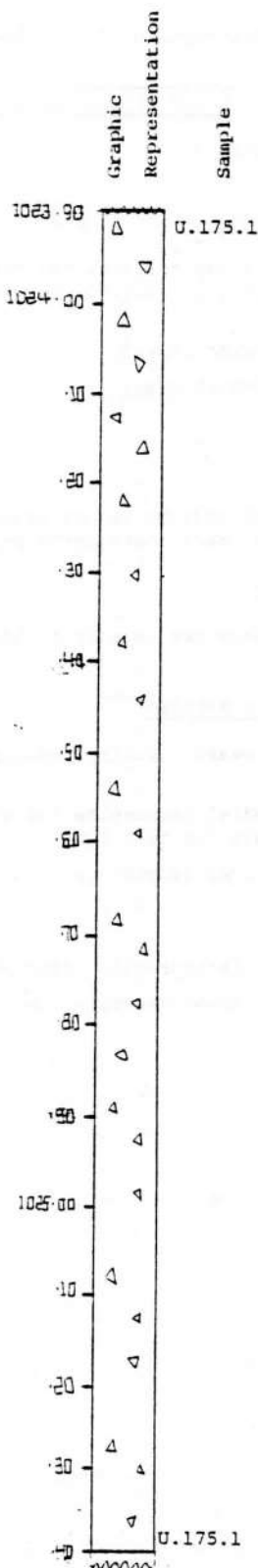
|   |   |   |   |   |   |
|---|---|---|---|---|---|
| 1 | 0 | 2 | 3 | 8 | 8 |
|---|---|---|---|---|---|

 cm to 

|   |   |   |   |   |   |
|---|---|---|---|---|---|
| 1 | 0 | 2 | 5 | 4 | 2 |
|---|---|---|---|---|---|

 cm

Box 175, Section 3



#### LITHOLOGY-PETROGRAPHY

Upper oxidized brecciated zone of this flow unit.

Dark reddish-brown colour compared to section # 2, the colour becomes greyish dark.

The size of fragment ~ 5 cm.

Sometimes it is very difficult to distinguish the shape of fragments from matrix when these parts are strongly altered.

#### STRUCTURE

Brecciated

1025.30 - 1025.42 Crushed several fault planes.

#### VESICLES/AMYGDALES

Vesicles in fragments  $\phi \sim 2 - 3$  mm. Irregular shape. Vesicles in some fragments are oriented and flattened. But the direction of the orientation is so different from fragment to fragment.

Usually vesicles are filled with green smectite and zeolites.

#### FRACTURES - VEINS - BRECCIA

Some calcite veinlets occur.

1025.30 - 1025.42 Fault planes are covered with green smectite.

#### ROCK ALTERATION

Fe-hydroxide calcite.

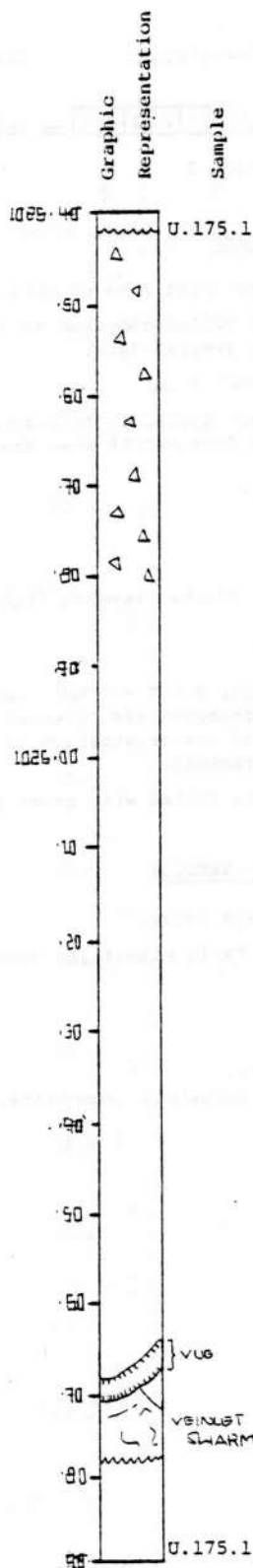
Zeolite. Some are certainly laumontite, chabasite (?).

Visual Core Description

Observer ... K. Hattori

Depth Interval 1025.42 cm to 1026.78 cm

Box 175, Section 4



#### LITHOLOGY-PETROGRAPHY

This section # 4 is the transitional zone from oxidized brecciated upper part (< 1025.70) to central flow unit (> 1026.00).

Upper portion; reddish brown.

Lower portion; brownish gray.

#### STRUCTURE

##### Brecciated

1026.10 Brecciated texture is not prominent, but many veinlets, fractures make these parts brittle.

#### VESICLES/AMYGDALES

Vesicles in fragments are usually filled with green smectite.

#### FRACTURES - VEINS - BRECCIA

1026.45 Veinlets swarm; usually zeolite, some are calcite.

1026.68 Vug; euhedral laumontite (up to 3 mm) and apophyllite crystals (up to 1.5 cm)

Apophyllite grows over laumontite.

#### ROCK ALTERATION

1025.42 - 1025.80 Fe-hydroxide green smectite.

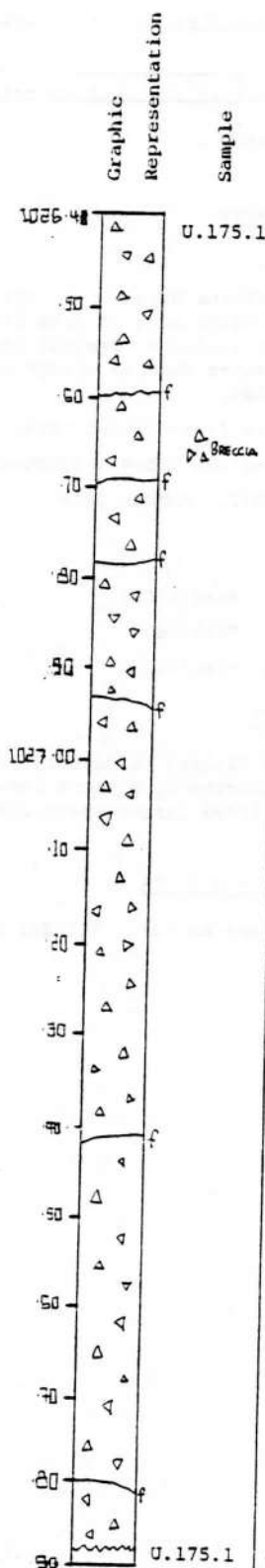
1026.10 - 1026.70 Green smectite, zeolites.

Visual Core Description

Observer... RHW

Depth Interval 102638 cm to 102788 cm

Box 176, Section 1



# LITHOLOGY-PETROGRAPHY

Continuing U.175.1

Scoriaticious basaltic breccia. Clasts of many sizes, up to 10 cm; angular, mostly scoriaticious.

Gray coloration, with large patches exhibiting a reddish hue.

Breccia ~ 90% clasts.

## STRUCTURE

Massive (brecciated).

## VESICLES/AMYGDALES

Vesicles in the clasts and voids in the matrix are filled mainly with zeolite (laumontite), minor calcite. Smectite is present everywhere, as section is well altered.

## FRACTURES - VEINS - BRECCIA

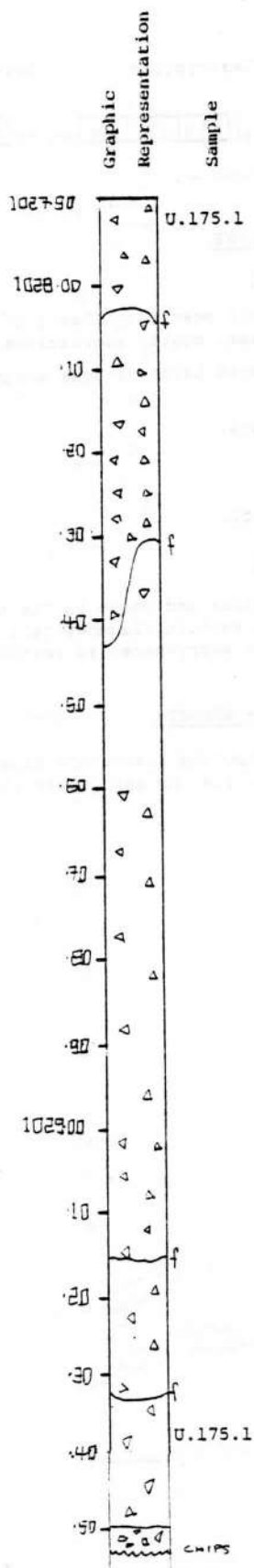
Fractures 0-10°, exposing alteration minerals present in the entire rock, i.e. no particular lining.

Visual Core Description

Observer ... RHW

Depth Interval 1027.83 cm to 1029.53 cm

Box 176, Section 2

LITHOLOGY-PETROGRAPHY

Continuing U.175.1

Brecciated, scoriaticus basalt. Clasts of varied sizes, up to 10 cm. One large zone of fine-grained, compact basalt, 1028.40 to 1028.60. Breccia seems to grade into this zone, rather than an abrupt contact, as with simply a large clast.

The compact zone is fine-grained, gray, aphyric  $\phi$ .

Color gray with reddish zones throughout.

1029.40 END OF UNIT. Rubble Zone.

STRUCTURE

1027.88 - 1028.40 Brecciated

1028.40 - 1028.60 Massive

1028.60 - 1029.50 Brecciated

VESICLES/AMYGDALES

Vesicles and void filling in breccia/clasts is zeolite + calcite, more calcite rich above compact zone than below. Smectite lines larger amygdules, fills smaller ones.

FRACTURES - VEINS - BRECCIA

Fractures 0-10°, one at 70°. 70° fracture has deep red lining.

Visual Core Description

Observer ... RHW

Depth Interval 

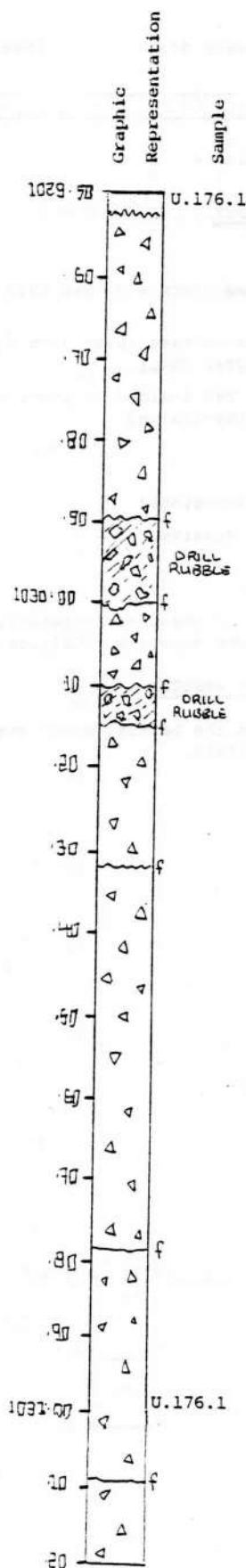
|   |   |   |   |   |   |
|---|---|---|---|---|---|
| 1 | 0 | 2 | 9 | 5 | 3 |
|---|---|---|---|---|---|

 cm to 

|   |   |   |   |   |   |
|---|---|---|---|---|---|
| 1 | 0 | 3 | 1 | 2 | 0 |
|---|---|---|---|---|---|

 cm

Box 176, Section 3



LITHOLOGY-PETROGRAPHY

Beginning U.176.1

Highly altered basaltic breccia rubble. Gray to gray-brown, clasts rounded, in many cases eaten away (weathered). Soft and crumbly in general.

1030.80 downwards - Towards the bottom of the section the breccia again become somewhat more competent. Clasts appear more angular, less scoriaticous.

STRUCTURE

Brecciated

VESICLES/AMYGDALES

Vesicles and voids in breccia are zeolite plus calcite filled, smectite lined.

FRACTURES - VEINS - BRECCIA

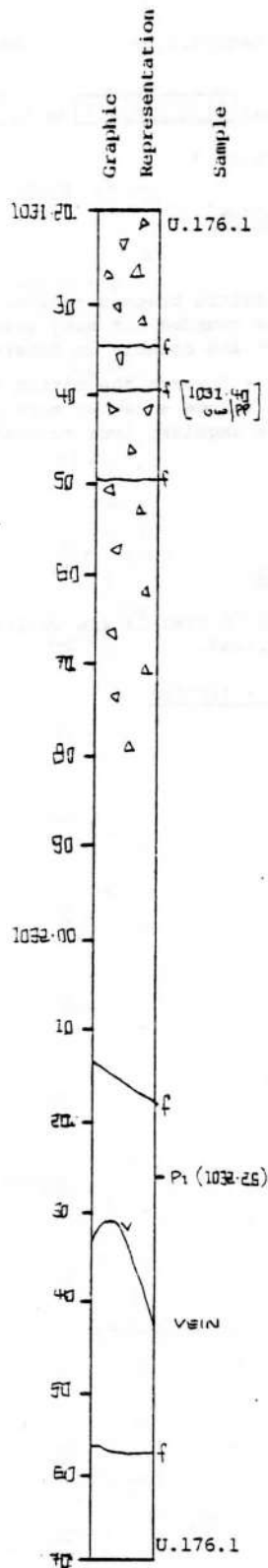
Fractures 0-10°.

Visual Core Description

Observer. <sup>RHW</sup>.....

Depth Interval 103120 cm to 103272 cm

Box 176, Section 4



#### LITHOLOGY-PETROGRAPHY

Continuing U.176.1

Moderately weathered breccia grades into competent flow.

Breccia scoriaceous, clasts up to 3 cm diameter. Generally reddish gray color.

Basalt is aphyric, red stained in lower part of section, holocrystalline, fine-grained.

#### STRUCTURE

1031.20 - 1031.75 Brecciated

1031.80 - 1032.72 Massive

#### VESICLES/AMYGDALES

Vesicles and voids in the breccia generally zeolite filled, with abundant smectite. Calcite rare.

#### FRACTURES - VEINS - BRECCIA

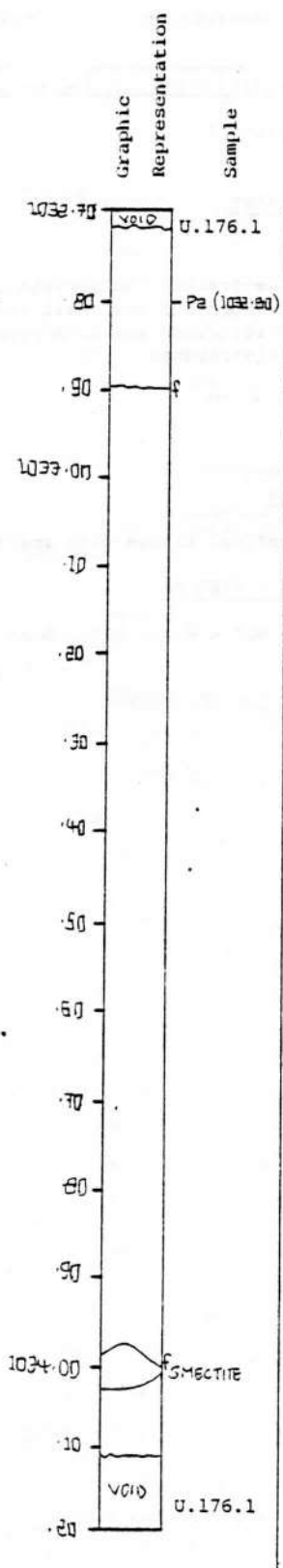
Fractures 0-20° in the basalt, green smectite lining or deep red-brown stain.

Visual Core Description

Observer PTR

Depth Interval 1032.78 cm to 1034.10 cm

Box 177, Section 1

LITHOLOGY-PETROGRAPHY

U.176.1 continued.

Greenish-gray, fine-grained, holocrystalline, very sparsely porphyritic basalt. Phenocrysts appear to be small clots of clinopyroxene and plagioclase, 1-4 mm across, randomly distributed, ~ 2 %, minor reddish staining in upper 25 cm.

STRUCTURE

Massive

VESICLES/AMYGDALES

None

FRACTURES - VEINS - BRECCIA

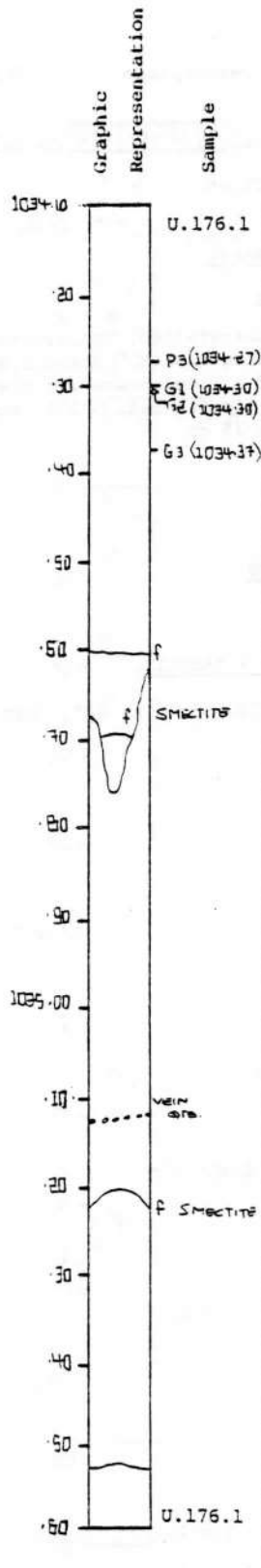
One fracture at 1033.98, dips 50°, coated with smectite.

Visual Core Description

Observer ... PTR

Depth Interval 103410 cm to 103563 cm

Box 177, Section 2

LITHOLOGY-PETROGRAPHY

Continues U.176.1

Greenish-gray, fine-grained, holocrystalline, sparsely phyrlic basalt. Phenocrysts are small irregular intergrowths of plagioclase and clinopyroxene 1-4 mm across, randomly distributed, ~ 2%.

STRUCTURE

Massive

VESICLES/AMYGDALES

< 1%, ~ 1 mm, spherical filled with smectite.

FRACTURES - VEINS - BRECCIA

One fracture dips 80° and one 50°. Both coated with smectite.

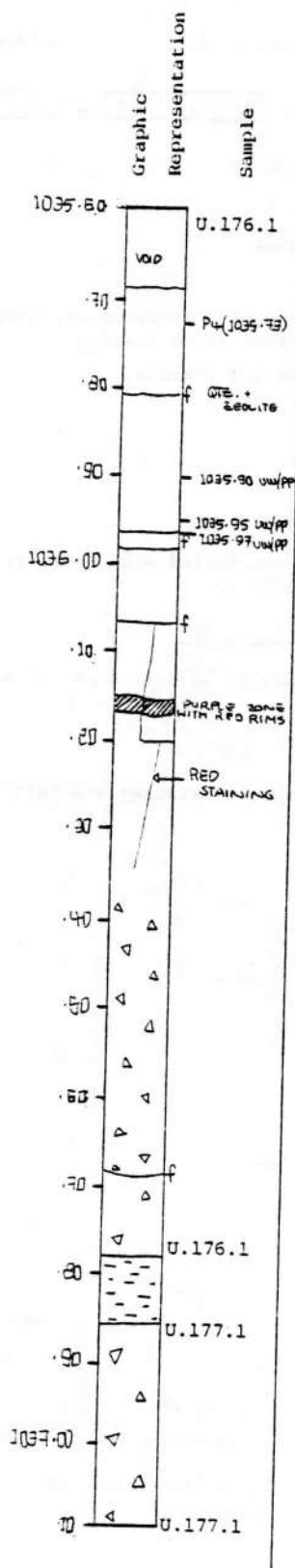


Visual Core Description

Observer...PTR.....

Depth Interval 1035.63 cm to 1037.15 cm

Box 177, Section 3



# LITHOLOGY-PETROGRAPHY

Continues U.176.1

Gray, fine-grained, holocrystalline basalt - very sparsely porphyritic with ~ 1% clots of plagioclase and clinopyroxene, 1-4 mm across, irregularly distributed.

1036.38 - 1036.75 Reddish to greenish-gray, scoriaceous basalt breccia. Interpreted as basal breccia of U.176.1.

1036.78 Depositional contact of basalt breccia on sediment. No chilling or baking.

1036.78 - 1036.86 Red brown, poorly bedded, claystone and siltstone.

1036.87 - U.177.1 Reddish gray, flow top, scoriaceous breccia.

## STRUCTURE

Massive to about 1036.38 m, then brecciated.

1036.38 Brecciated, interpreted as flow bottom breccia.

## VESICLES/AMYGDALES

1035.63 - 1036.38 < 1%, ≤ 1 mm, irregular to spherical, filled with smectite.

1036.38 - 1036.78 Scoriaceous breccia fragments. Vesicles filled with zeolite.

U.177.1 Scoriaceous fragments filled with zeolite.

## FRACTURES - VEINS - BRECCIA

1035.63 - 1036.38 One large fracture at 1036.07 dips ~ 80° and is coated with smectite and hematite.

1036.38 - 1036.78 None

1036.78 - 1036.86 None

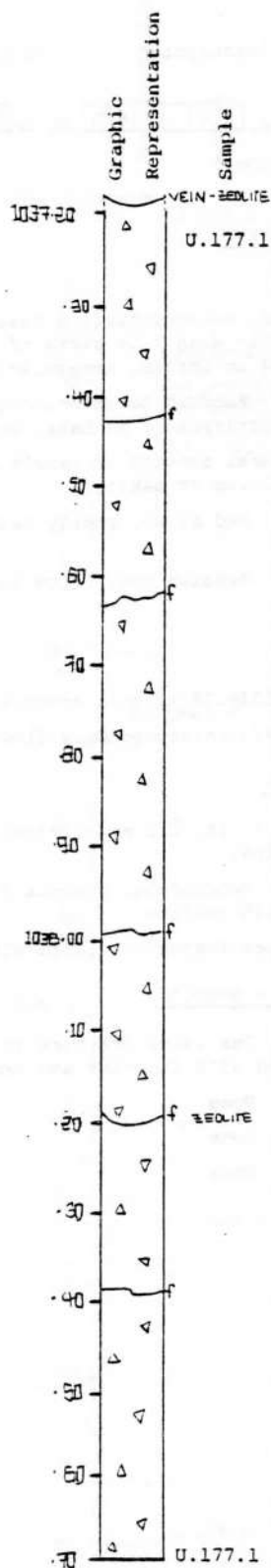
1036.87 (U.177.1) None

Visual Core Description

Observer .....PTR.....

Depth Interval 103715 cm to 103868 cm

Box 177, Section 4



# LITHOLOGY-PETROGRAPHY

Continues U.177.1

Reddish to greenish-gray, scoriaceous, basalt breccia. Some massive fragments 30 cm thick.

Interpreted as flow top breccia.

## STRUCTURE

Brecciated

## VESICLES/AMYGDALES

Scoriaceous fragments filled with zeolite. Some zeolite in groundmass of breccia.

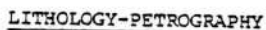
## FRACTURES - VEINS - BRECCIA

One primary fracture at 1038.19 dips 30° and is coated with zeolite.

## ROCK ALTERATION

Reddish color, probably oxidized and partly altered to smectite.

Box 178, Section 1



U.177.1 Porphyritic, slightly vesicular gray basalt.

1039.32 Chilled greenish contacts on both sides.

U.178.2 Porphyritic gray basalt, slightly vesicular, a little more fractured than U.177.1

U.177.1 Porphyritic

1039.32 Chilled contact

1039.50 Chilled contact

U.178.2 Porphyritic

U.177.1 Vesicles < 2 mm filled with smectite and zeolite.

U.178.1 Vesicles  $\sim 1$  mm are filled with green smectite and celadonite?

U.178.2 Vesicles < 2 mm filled with smectite, zeolite  
± calcite.

U.177.1 Planar, fractures are coated with zeolites and calcite.

U.178.1 Fractures and veinlets are coated with zeolite  
± calcite?

U.178.2 Veinlets filled with smectite, zeolite ± calcite.

U.178.1 Dyke

U.178.2 Same as U.177.1

Different degrees of alteration marked by slightly reddish zones at around 1040.30, 1040.65, 1041.20.

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Visual Core Description

Observer ..... Viereck

Depth Interval 

|   |   |   |   |   |   |
|---|---|---|---|---|---|
| 1 | 0 | 4 | 1 | 7 | 2 |
|---|---|---|---|---|---|

 cm to 

|   |   |   |   |   |   |
|---|---|---|---|---|---|
| 1 | 0 | 4 | 3 | 1 | 6 |
|---|---|---|---|---|---|

 cm

Box 178, Section 3

Graphic  
Representation

Sample

U.178.2

LITHOLOGY-PETROGRAPHY

U.178.2 Uniform greenish gray, fine-grained aphyric (?) basalt, slightly vesicular, irregular patches of smectite.

1043.05 Greenish to dark gray contact.

U.178.3 Dense, fine-grained grayish green basalt with an internal texture parallel to the contact marked by zonal variation in the amount of vesicles.

STRUCTURE

1043.05 Chilled margin

U.178.3 Massive

VESICLES/AMYGDALES

U.178.2 Vesicles ~ 1 mm, primarily filled with smectite, some with zeolite and calcite.

U.178.3 Vesicles are filled with smectite (green) ~ 1 mm.

FRACTURES - VEINS - BRECCIA

U.178.2 Planar fractures coated with smectite.

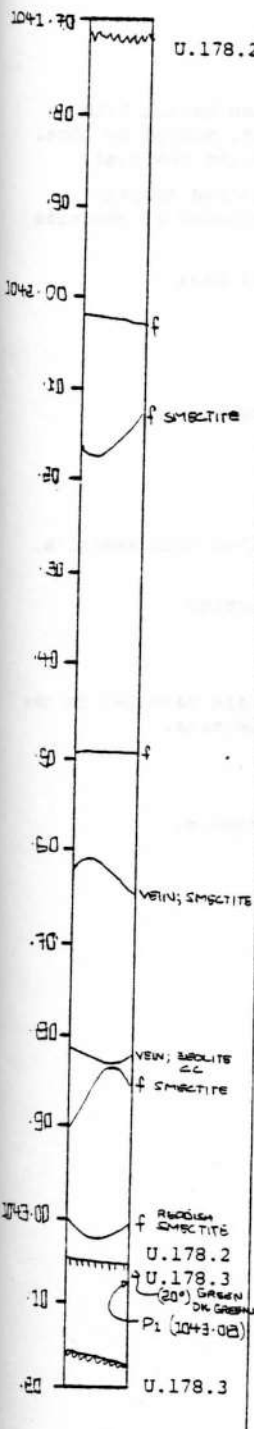
U.178.3 Veinlet is filled with zeolite ± calcite.

ROCK ALTERATION

U.178.2 Degree of alteration changes a lot, depends mainly on the degree of fracturing

OTHER

U.178.3 Dyke

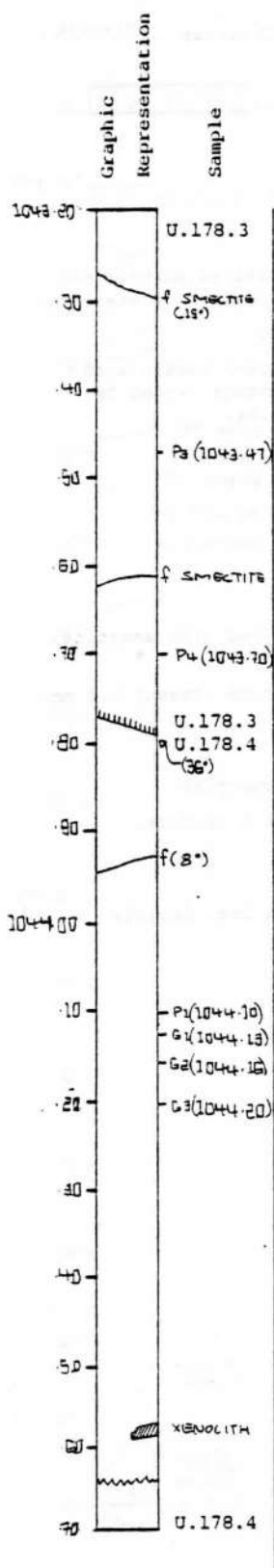


Visual Core Description

Observer Viereck

Depth Interval 1043.16 cm to 1044.64 cm

Box 178, Section 4

LITHOLOGY-PETROGRAPHY

U.178.3 Dense fine-grained grayish-green basalt with an internal texture parallel to the contact, marked by zonal variations in the amount of smectite filled vesicles.

U.178.4 Uniform grayish-green, fine-grained aphyric basalt, slightly vesicular, irregular patches of smectite (green).

1044.58 Xenolith of dark gray vesicular basalt.

STRUCTURE

U.178.3 Massive to "layered"

1043.79 Chilled dark grey to green margin.

U.178.4 Massive

VESICLES/AMYGDALES

U.178.3 Vesicles < 1 mm are mainly filled with smectite, the ones > 1 mm also contain zeolite.

U.178.4 Vesicle ~ 1 mm filled with smectite.

FRACTURES - VEINS - BRECCIA

U.178.3 and U.178.4 Planar fractures (are parallel to the layering in U.178.3) are coated with smectite.

ROCK ALTERATION

U.178.4 Some brownish smectites are visible.

OTHER

U.178.4 Same as U.178.2.

Visual Core Description

Observer'.....K. Hattori.....

Depth Interval 

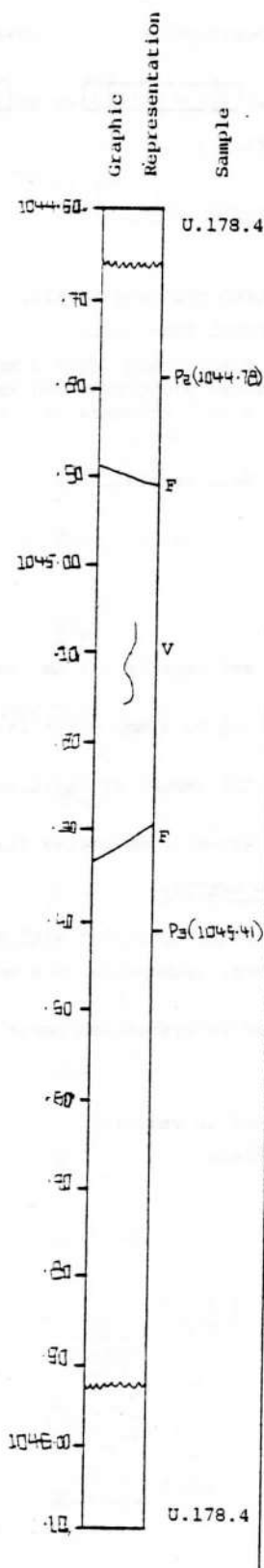
|   |   |   |   |   |   |
|---|---|---|---|---|---|
| 1 | 0 | 4 | 4 | 6 | 6 |
|---|---|---|---|---|---|

 cm to 

|   |   |   |   |   |   |
|---|---|---|---|---|---|
| 1 | 0 | 4 | 5 | 9 | 3 |
|---|---|---|---|---|---|

 cm

Box 179, Section 1



# LITHOLOGY-PETROGRAPHY

Continue U.178.4

Greenish gray coloured. Amygdoidal ( $\phi \sim 5$  mm - 1 cm) (pyroxene) basalt.

Plagioclase phenocryst ( $\phi \sim 2$  mm)  $\sim 3$  vol.%.

Pyroxene phenocryst ( $\phi \sim <1$  mm) rarely found.

Vesicles ( $\phi \sim 2$  mm) rounded shape  $\sim 3$  vol.%.

This part is central massive flow part.

# STRUCTURE

Compact, massive.

# VESICLES/AMYGDALES

Vesicles - round, irregular distribution ( $\phi \sim 2$  cm) filled with green smectite.

Amygdales - irregular shape, not flattened, up to 1 cm euhedral laumontite crystals grown inside. More than half are filled with quartz.

# FRACTURES - VEINS - BRECCIA

Fault planes are covered with Fe-hydroxide.

Vein - V; ( $< 1$  mm) Fe-hydroxide + zeolite.

Fracture - F; green smectite (core to angle fracture  $42^\circ$ ).

# ROCK ALTERATION

Fairly fresh green smectite.

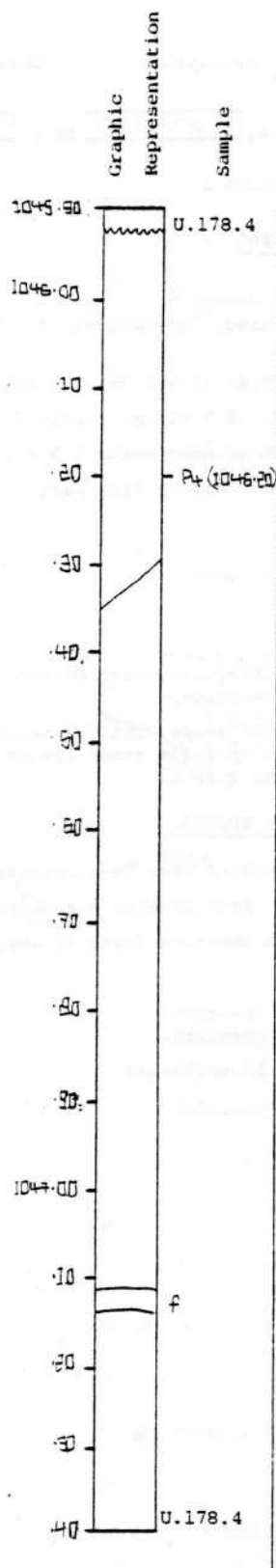
Zeolite and quartz in amygdales.

Visual Core Description

Observer... K. Hattori

Depth Interval 104593 cm to 104744 cm

Box 179, Section 2



# LITHOLOGY-PETROGRAPHY

Continue U.178.4

Greenish-gray coloured pyroxene basalt.

This section is central flow unit.

9046.30 - 1046.80 Plagioclase; ( $\phi \sim 3$  mm up to 4 mm)  
The size of plagioclase phenocryst and amount increased  
compare to Section # 1). Pyroxene ( $\phi \sim <1$  mm) rarely  
found.

1047.00 - 1047.44 Well crystalline.

## STRUCTURE

Massive

## VESICLES/AMYGDALES

Amygdales - ( $\phi \sim 1$  cm) usually  $\sim 5$  mm, vol.%  $\sim 5\%$  quartz,  
zeolite fills.

Vesicles -  $\phi \sim 3$  mm, up to 4 mm, vol.%  $3\%$ , usually filled  
with green smectite.

1046.60 - 1046.95 The amount of vesicles and amygdales  
decrease.

1047.05 - 1047.44 Actually amygdales disappear.

## FRACTURES - VEINS - BRECCIA

1046.23 Hair-like veinlets filled with green smectite.

Fracture - F, euhedral laumontite ( $\sim 8$  mm) + calcite  
( $\sim 1$  cm) + quartz.

1047.30 Veinlets of Fe-hydroxides occur.

## ROCK ALTERATION

Green smectite occurs in vesicles.

Iron-hydroxide veinlets.

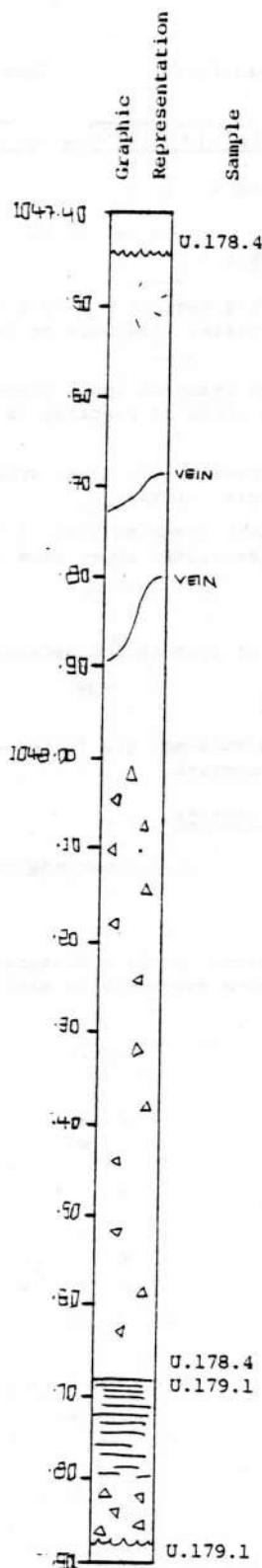


Visual Core Description

Observer . K. Hattori.....

Depth Interval 104744 cm to 104889 cm

Box 179, Section 3

LITHOLOGY-PETROGRAPHY

Continued U.178.4

Greenish gray coloured pyroxene basalt.

Central flow portion

(pyroxene  $\phi$  < 1 mm, < 1%)(plagioclase;  $\phi$  - 3 mm;  $\sim$  3%)

Fairly well crystalline compared to section # 1 and # 2.

1048.00 - 1048.68 Bottom flow part, greenish charcoal brown coloured. Brecciated zone ( $\phi$  2  $\sim$  5 cm).

U.179.1 Boundary very clear, sharp.

1048.70 - 1048.80; strongly oxidized fine-grained weathered portion.

1048.80 downward; oxidized brecciated upper part of flow U.179.1

STRUCTURE

1047.40 - 1047.95 Massive, compact.

1047.95 - 1048.04 Brecciated.

1048.05 - Brittle, soft.

1048.80 - Brecciated.

FRACTURES - VEINS - BRECCIA

1047.50 Small fracture; filled with Fe-hydroxides.

1047.70 - 1047.90 Veinlets (&lt; 1 mm); calcite + Fe-hydroxides.

ROCK ALTERATION

1048.00 - 1048.68 Calcite, Fe-hydroxide, zeolite disseminate. Green smectite.

1048.68 - 1048.74 Fe-hydroxide.

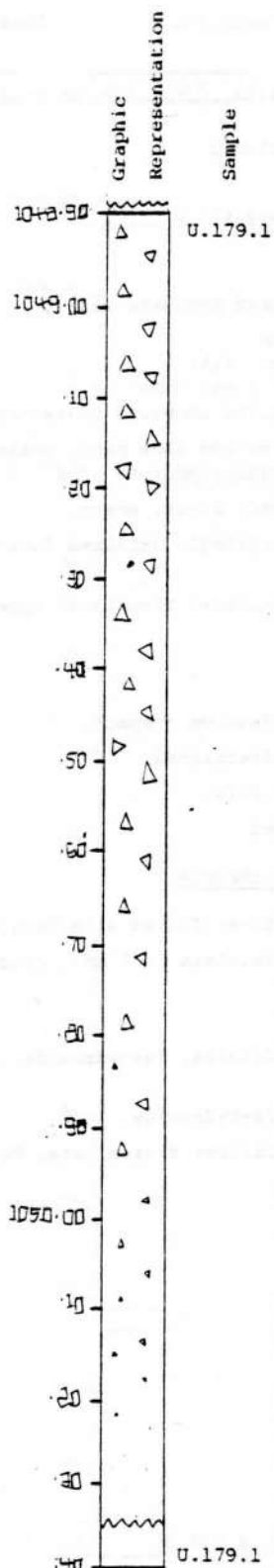
1048.80 - 1048.88 Calcite disseminate, Fe-hydroxide.

Visual Core Description

Observer ... K. Hattori

Depth Interval 1048.99 cm to 1050.35 cm

Box 179, Section 4

LITHOLOGY-PETROGRAPHY

1048.99 - 1049.66 This section # 4 is a transitional zone from upper brecciated flow unit to central massive lava flow.

Strongly oxidized red charcoal upper brecciated zone ( $\phi$  ; 3 ~ 5 cm). The shape of breccias is very sharp and angular.

1049.58 - 1049.83 Transitional zone, gradually the colour, the size of the breccia changes.

1049.83 - 1050.35 Dark greenish gray,  $\phi$  ~ (1 ~ 2 cm), this zone is still brecciated upper zone of flow U.179.1.

STRUCTURE

Brecciated - degree of brecciation decreases with depth.

VESICLES - AMYGDALES

Vesicles in breccias ( $\sim$  2 mm) are filled with zeolites and green coloured smectite.

FRACTURES - VEINS - BRECCIA

Many small veinlets run throughout the core.

ROCK ALTERATION

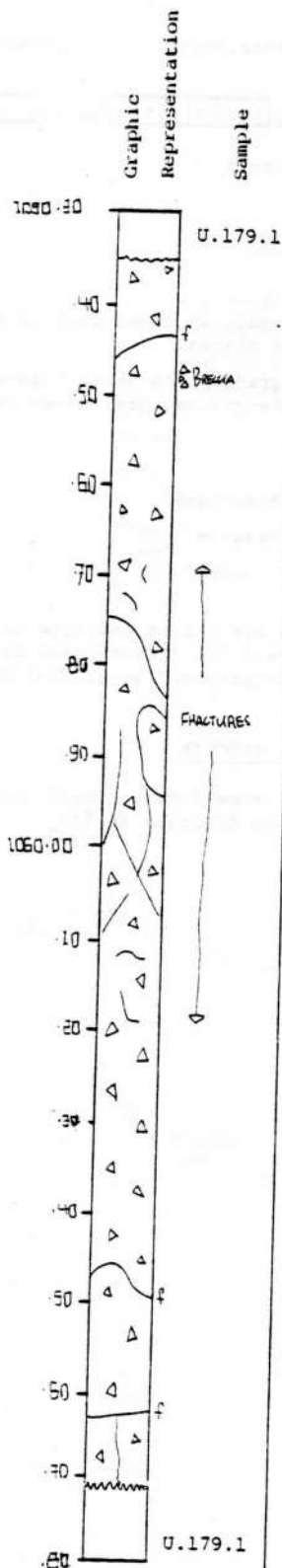
Green smectite, calcite. Zeolite disseminate throughout the cores, irrespective fragments or matrix.

Visual Core Description

Observer: RHW

Depth Interval 105035 cm to 105171 cm

Box 180, Section 1



# LITHOLOGY-PETROGRAPHY

Continuing U.179.1

Well consolidated, medium-gray breccia. Clasts mostly basaltic instead of scoriaceous. Appear to be in place, i.e. not mixed or tumbled, just broken, then healed. Section is extensively fractured. Brecciation decreases somewhat with depth.

## STRUCTURE

Brecciated

## VESICLES/AMYGDALES

Voids in the breccia are smectite lined, zeolite filled. Small (< 1 mm) amygdules also smectite and zeolite filled, or all smectite.

## FRACTURES - VEINS - BRECCIA

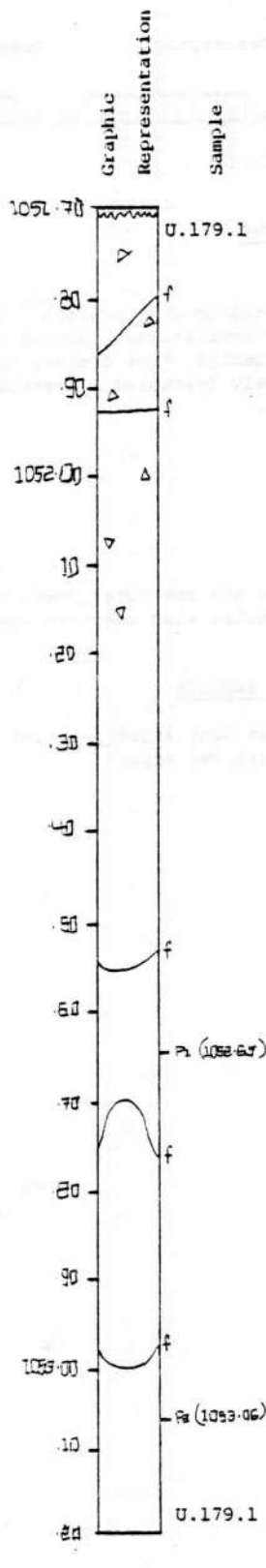
Fractures numerous at many angles, lining generally green smectite and some dark red stain.

Visual Core Description

Observer RHW

Depth Interval 1051.71 cm to 1053.20 cm

Box 180, Section 2



# LITHOLOGY-PETROGRAPHY

Continuing U.179.1

Mildly brecciated basalt in upper part of section, broken and healed in places.

1052.15 downward - grades into unbrecciated, aphyric, holocrystalline, fine-grained gray-green basalt.

## STRUCTURE

1051.71 - 1052.15 Brecciated

1052.15 - 1053.20 Massive

## VESICLES/AMYGDALES

Void filling in the breccia is smectite and zeolite, minor calcite. Basalt has disseminated blebs of smectite < 1 mm diameter. Occasional larger (1-2 mm) amygdules of zeolite.

## FRACTURES - VEINS - BRECCIA

Fractures at ~ 60°, some fresh, others zeolite and green smectite filled. One fracture at 0°.

Visual Core Description

Observer... RHW

Depth Interval 

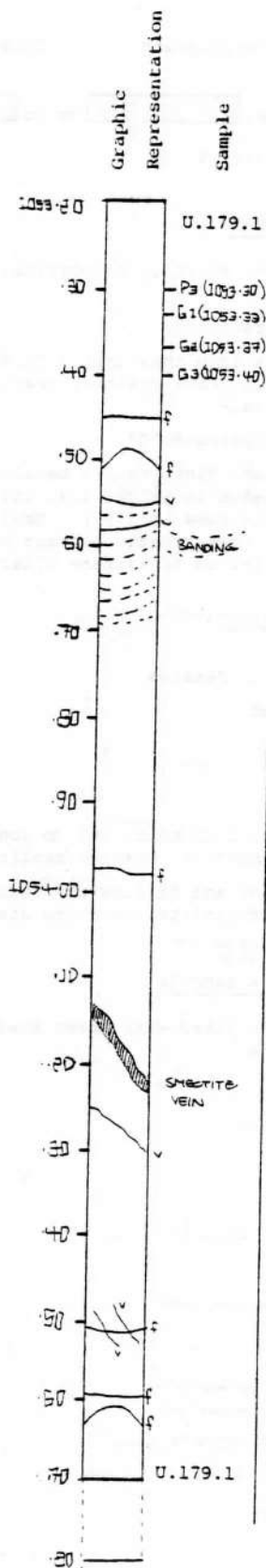
|   |   |   |   |   |   |
|---|---|---|---|---|---|
| 1 | 0 | 5 | 3 | 2 | 0 |
|---|---|---|---|---|---|

 cm to 

|   |   |   |   |   |   |
|---|---|---|---|---|---|
| 1 | 0 | 5 | 4 | 8 | 0 |
|---|---|---|---|---|---|

 cm

Box 180, Section 3

LITHOLOGY-PETROGRAPHY

Continuing U.179.1

Fine-grained, aphyric, holocrystalline, equigranular, gray-green basalt.

1053.50 - 1053.70 Vague banding.

1054.15 Smectite (?) vein, 1 cm thick, dipping  $\sim 65^\circ$  at 1054.15.STRUCTURE

1053.20 - 1053.50 Massive

1053.50 - 1053.70 Banded-dipping  $55-60^\circ$ , thin,  $\sim 1$  mm, 1 cm apart, dark (smectite disseminated in rock).

1053.70 - 1054.80 Massive

VESICLES/AMYGDALESAlmost absent. Scattered smectite filled blebs, occasional zeolite and calcite filled vesicles  $\sim .5$  cm long (ovoid in shape).FRACTURES - VEINS - BRECCIA

Veinlets of disseminated smectite forming banding. Other, more random veins, hairline, smectite filled.

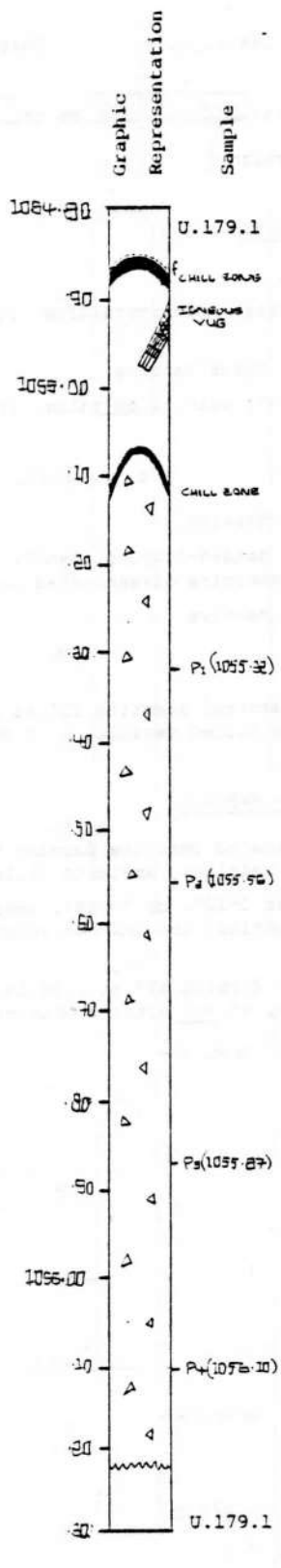
Fractures are either  $0-10^\circ$ , or  $50-65^\circ$ , smectite lined, some zeolite (laumontite) and unknown (chabazite ?) in thicker fractures.Large smectite vein dipping  $65^\circ$  at 1054.15. 1 cm thick. Contact not chilled, so not altered intrusive layer.

Visual Core Description

Observer: RHW

Depth Interval 1054.86 cm to 1056.22 cm

Box 180, Section 4

LITHOLOGY-PETROGRAPHY

U.179.1 Gray-green, aphyric, holocrystalline, fine-grained, basalt.

1054.86 Contact fractured.

U.180.1 Chill zone into this unit. U.180.1 younger than 179.1 or 180.2. Fine grained, gray, aphyric, holocrystalline basalt.

1055.09 Contact dipping @ 70°.

U.180.2 Well healed, fine-grained basaltic breccia. Appears to have healed in place, i.e. only fractured, not moved. Probably same as 179.1. Small zones of slightly vesicular rock, mostly compact basalt. Also, patches 3-4 cm, x 1-2 cm of extreme alteration to pale green smectite.

STRUCTURE

U.179.1 and U.180.1 Massive

U.180.2 Brecciated

VESICLES/AMYGDALES

U.179.1 Absent

U.180.1 Large vug, 1 cm thick, 4-5 cm long, filled with smectite, laumontite, unknown zeolite (chabazite?)

U.180.2 Replacement and filling in breccia groundmass is calcite rich and zeolite, smectite disseminated throughout rock.

FRACTURES - VEINS - BRECCIA

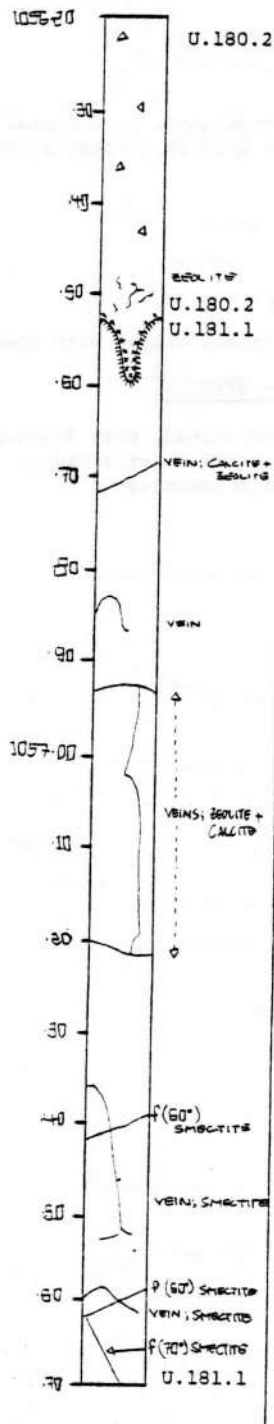
Fractures @ 65-70°, lined with green smectite, minor zeolite and calcite.

Visual Core Description

Observer PTR

Depth Interval 1056.22 cm to 1057.73 cm

Box 181, Section 1

LITHOLOGY-PETROGRAPHY

Continues U.180.2

Greenish-gray, finely brecciated, aphyric basalt. Breccia well indurated, relatively fresh, with angular fragments a few cm. across. Minor zeolite in matrix, particularly in lower 6 cm. Fragments massive, non-vesicular.

1056.54 Chilled contact against overlying Unit, dips ~ 60°.

U.181.1 Greenish-gray, fine-grained, holocrystalline, aphyric basalt. Interpreted as a dike. Grain size increases downward in section from chilled contact to base of section.

STRUCTURE

U.180.2 Brecciated

U.181.1 Massive

VESICLES/AMYGDALES

U.180.2 None

U.181.1 < 1%, < 1 mm, spherical, filled with smectite.

FRACTURES - VEINS - BRECCIA

U.180.2 No fractures.

U.181.1 Fractures mostly 60-70°, lined with smectite, hairline veinlets of calcite and zeolite also mostly 60°, some ~ 30°. Steep (70°) smectite-lined veinlets occur in lower 30°.

ROCK ALTERATION

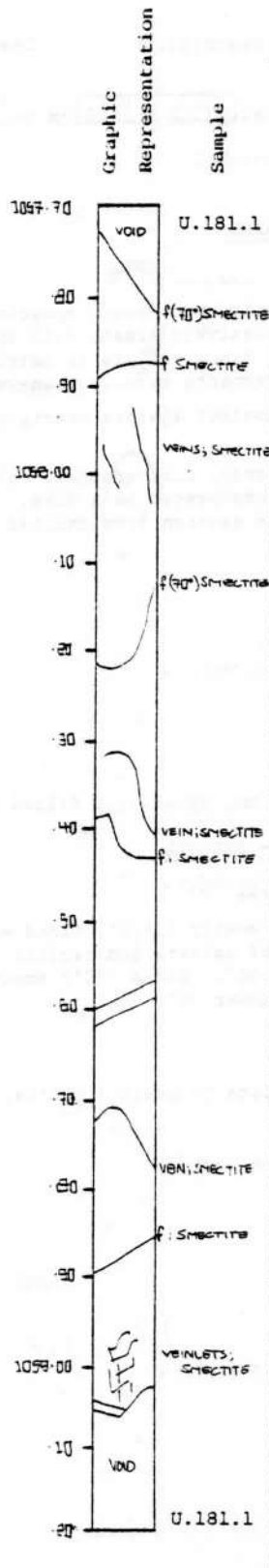
U.180.2 Minor zeolite in breccia matrix, otherwise little altered.

Visual Core Description

Observer... PTR

Depth Interval 1057.73 cm to 1059.06 cm

Box 181, Section 2

LITHOLOGY-PETROGRAPHY

Continues U.181.1

Greenish-gray, fine-grained, holocrystalline, aphyric basalt. Grain size uniform through section.

STRUCTURE

Massive

VESICLES/AMYGDALES< 1%,  $\leq$  1 mm, spherical, filled with smectite.FRACTURES - VEINS - BRECCIA

Highly fractured and veined, most fractures dip 60-70°, veins and veinlets similar but somewhat irregular. All coated or filled with smectite.

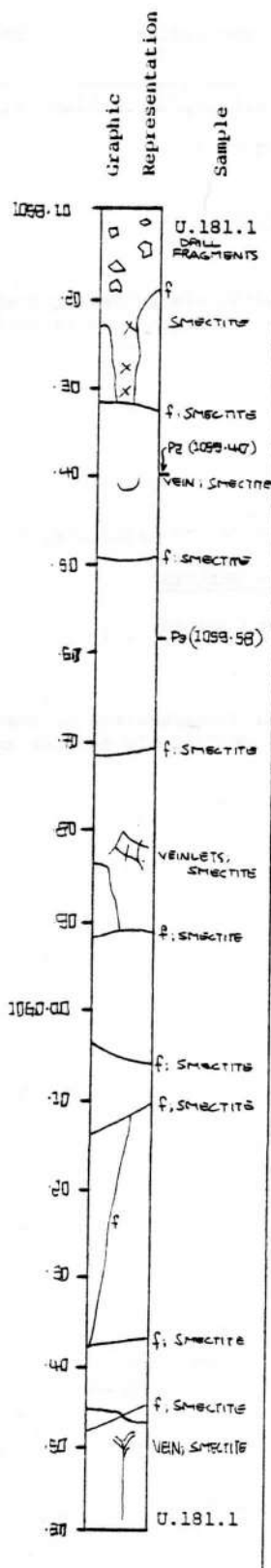


Visual Core Description

Observer...RTR.....

Depth Interval 1059.06 cm to 1060.68 cm

Box 181, Section 3



# LITHOLOGY-PETROGRAPHY

Continues U.181.1

Greyish-green, fine-grained, holocrystalline, aphyric basalt. Grain size uniform through section. No contacts.

## STRUCTURE

Massive

## VESICLES/AMYGDALES

< 1%, < 1 mm, spherical to irregular, filled with smectite.

## FRACTURES - VEINS - BRECCIA

Highly fractured and veined. Fractures dip 60-80°, veins have similar range. All coated with smectite.

## ROCK ALTERATION

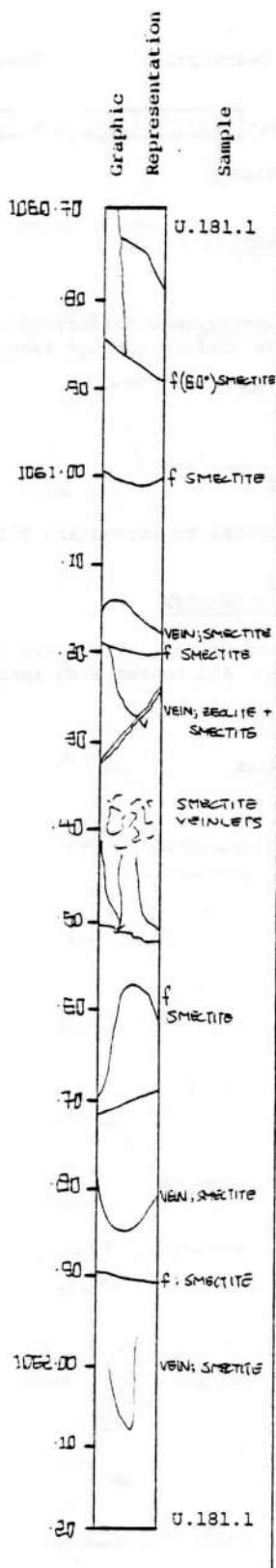
Smectite filled veins.

Visual Core Description

Observer, ... PTR

Depth Interval 106068 cm to 106218 cm

Box 181, Section 4

LITHOLOGY-PETROGRAPHY

Continues U.181.1

Grayish-green, fine-to nearly medium-grained. Holocrystalline, aphyric basalt. Grain size is uniform throughout section.

STRUCTURE

Massive

VESICLES/AMYGDALES

< 1%, < 1 mm, spherical to irregular, filled with smectite.

FRACTURES - VEINS - BRECCIA

Highly fractured and veined.

ROCK ALTERATION

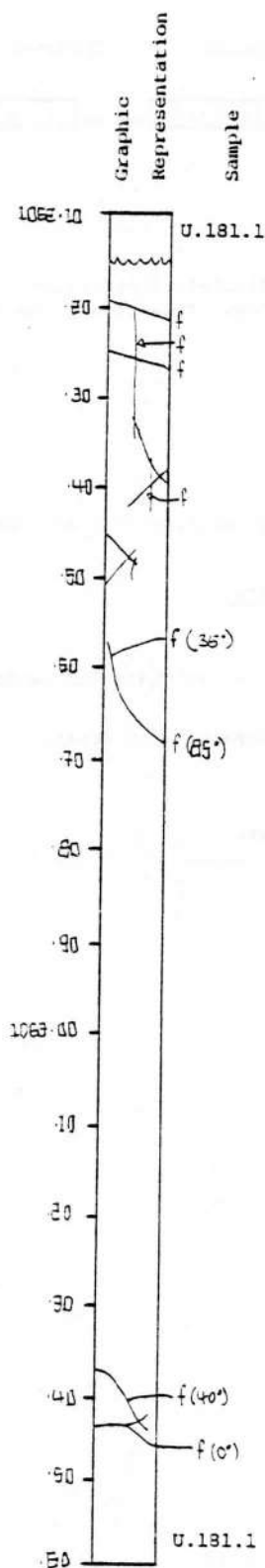
This entire unit is characterized by smectite in veins and fractures with very little zeolite and no other secondary minerals.

Visual Core Description

Observer... K. Hattori...

Depth Interval 1062.15 cm to 1063.66 cm

Box 182, Section 1

LITHOLOGY-PETROGRAPHY

Continues U.181.1

Greyish green coloured, fine-grained, holocrystalline aphyric, basic dyke. No noticeable change.

STRUCTURE

1062.20 - 1062.55 Crushed, many faults run.

1062.35 - 1062.90 Fairly compact, massive.

VESICLES/AMYGDALES1062.15 - 1062.79 Vesicles are often ( $\phi < 1$  mm) observed.

1062.62 - 1062.80 The amount decreases.

1062.85 It is very hard to find out vesicles.

FRACTURES - VEINS - BRECCIA

1062.20 - 1062.68 Fault plane; green clay. Very thin green clay veinlets are often observed.

1062.68 - 1063.00 Very thin green clay veinlets are found, but not so abundant compared to Section # 2, # 3, and # 6.

ROCK ALTERATIONPyrite euhedral crystal can be often found ( $\phi \sim 1$  mm). Another alteration product is not conspicuous.

Visual Core Description

Observer ..K. Hattori.....

Depth Interval 

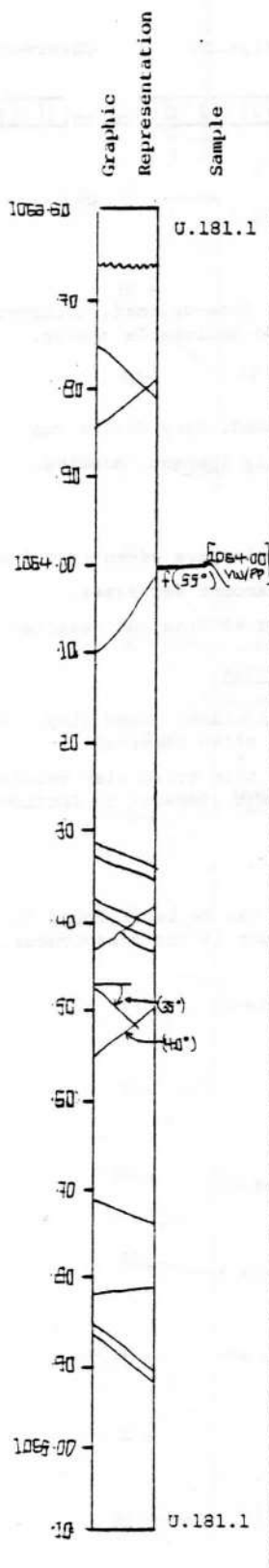
|   |   |   |   |   |   |
|---|---|---|---|---|---|
| 1 | 0 | 6 | 3 | 6 | 6 |
|---|---|---|---|---|---|

 cm to 

|   |   |   |   |   |   |
|---|---|---|---|---|---|
| 1 | 0 | 6 | 5 | 1 | 1 |
|---|---|---|---|---|---|

 cm

Box 182, Section 3

LITHOLOGY-PETROGRAPHY

U.181.1 Greyish green coloured, fine-grained, holocrystalline aphyric basic dyke rocks. No noticeable change.

STRUCTURE

Many fault runs

VESICLES/AMYGDALES

Very small amount of tiny vesicles (< 1 mm) can be observed.

FRACTURES - VEINS - BRECCIA

Fault planes; green-clay.

Very tiny (< 1 mm) green clay veinlets run randomly, very abundant.

The amount of veinlets increase with depth.

ROCK ALTERATION

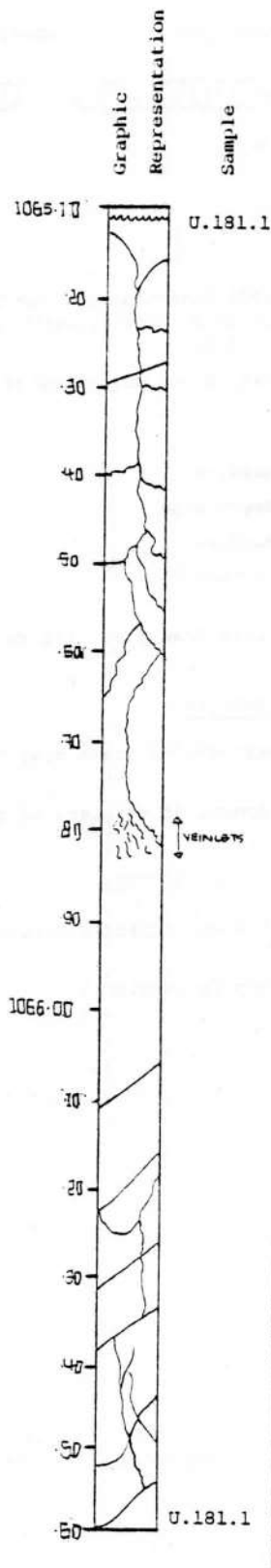
Pyrite spatters throughout.

Visual Core Description

Observer...K. Hattori.....

Depth Interval 106511 cm to 106660 cm

Box 182, Section 3



# LITHOLOGY-PETROGRAPHY

Continues U.181.1

Greyish green coloured, fine-grained, aphyritic, holocrystalline, basic dyke.

Plagioclase phenocryst (~ 2 mm) very small amount.

Brecciation is characteristic.

## STRUCTURE

1065.17 - 1065.50 Very complicated, many faults are observed.

1065.50 - 1065.60 Crushed up and brittle.

1066.18 - 1066.60 Brecciation once crushed but cemented with green clay.

## VESICLES/AMYGDALES

Very tiny vesicles (< 1 mm) can be found but small in amount.

## FRACTURES - VEINS - BRECCIA

Veinlets (< 1 mm) of green clay, very abundant.

1065.80 Swarm of veinlets. Small amount of calcite and zeolite occur.

## ROCK ALTERATION

Pyrite disseminate (< 2 mm)

Green coloured clay veins run throughout. (Width usually less than 1 mm; some are 3 mm).

All these clay veins are used to be fault planes. After fault movement, these rocks were cemented with green clay.

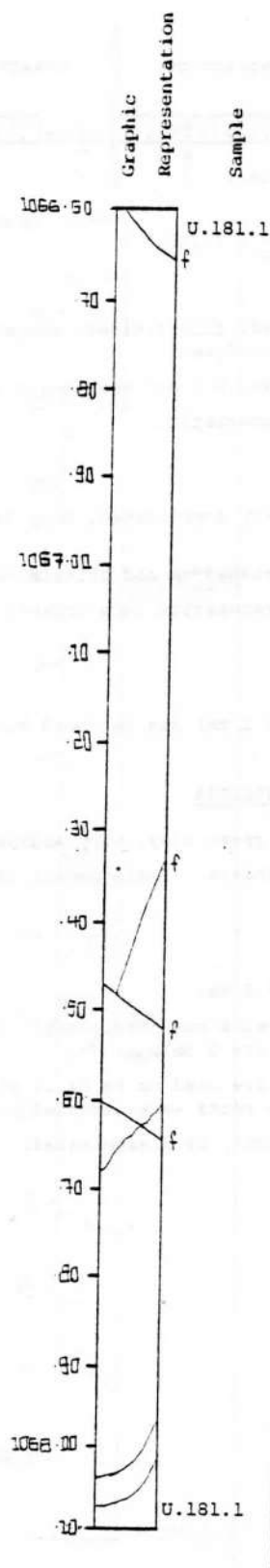
Calcite, minor in amount, is disseminated.

Visual Core Description

Observer ...K. Hattori...

Depth Interval 10660 cm to 106811 cm

Box 182, Section 4



#### LITHOLOGY-PETROGRAPHY

Continues U.181.1

Greyish-green coloured fine-grained, aphyritic, holocrystalline basic dyke. Crystallinity is better than that of Section # 1 ~ # 3.

Plagioclase phenocryst ( $\phi \sim 2$  mm) occupies  $\sim 3\%$ .

#### STRUCTURE

1066.64 - 1067.00 Massive

1067.00 - 1067.25 Brecciated

1067.30 - 1068.11 Massive

#### VESICLES/AMYGDALES

Very tiny vesicles (less than 1 mm) are found. But small in amount.

#### FRACTURES - VEINS - BRECCIA

Many fractures and veinlets of green clay throughout the core.

1067.15 downwards - amount of veinlets of green clay decreases.

#### ROCK ALTERATION

Well crystalline ( $\phi$  ; 1 mm) euhedral pyrite occurs in fault plane.

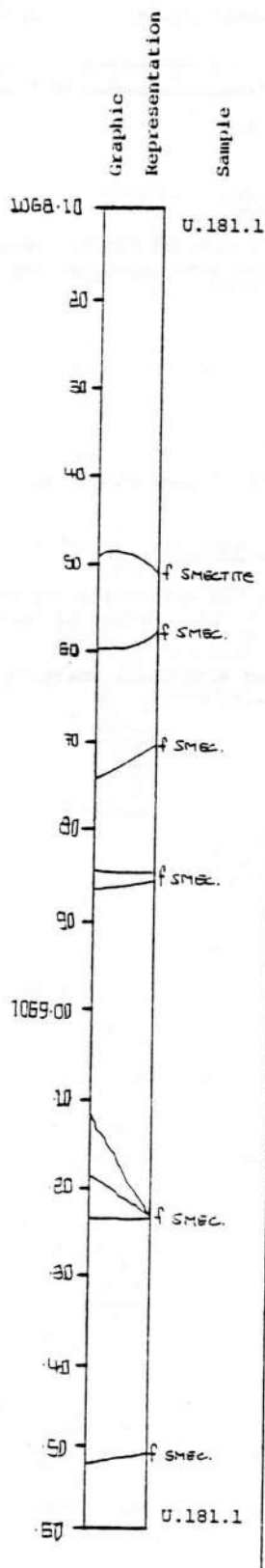
Green clay occurs along fault planes.

Visual Core Description

Observer Viereck

Depth Interval 106810 cm to 106970 cm

Box 183, Section 1



# LITHOLOGY-PETROGRAPHY

Continuation of Box 182.

Uniform green, fine-grained basalt with few vesicles and abundant veins which are the most obvious feature.

## STRUCTURE

Massive

## VESICLES/AMYGDALES

Vesicles < 1 mm, filled either with smectite or zeolite.

## FRACTURES - VEINS - BRECCIA

Veins are abundant with an average dip of 70° and are coated with black smectite.

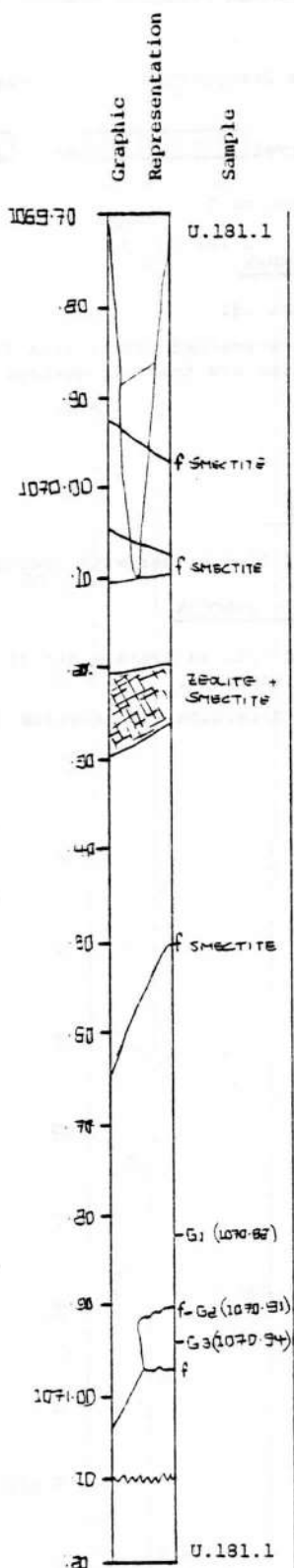
Fractures vary in direction with average dip 25° - 30°.

Visual Core Description

Observer ..Vierack.....

Depth Interval 106970 cm to 107110 cm

Box 183, Section 2

LITHOLOGY-PETROGRAPHY

Uniform, green, fine-grained aphyric basalt with abundant veins coated with smectite, one is filled with zeolite.

STRUCTURE

Massive

VESICLES/AMYGDALES

Few vesicles, < 1 mm, filled either with smectite or zeolite.

FRACTURES - VEINS - BRECCIA

Veins are abundant, but are relatively less than in Section 1, and dip  $\sim 70^\circ$ . Amount of veins decreases downward.

Fractures are coated with black smectite, average dip is  $\sim 30^\circ$ , few dip with  $> 70^\circ$ .

OTHER

Dyke

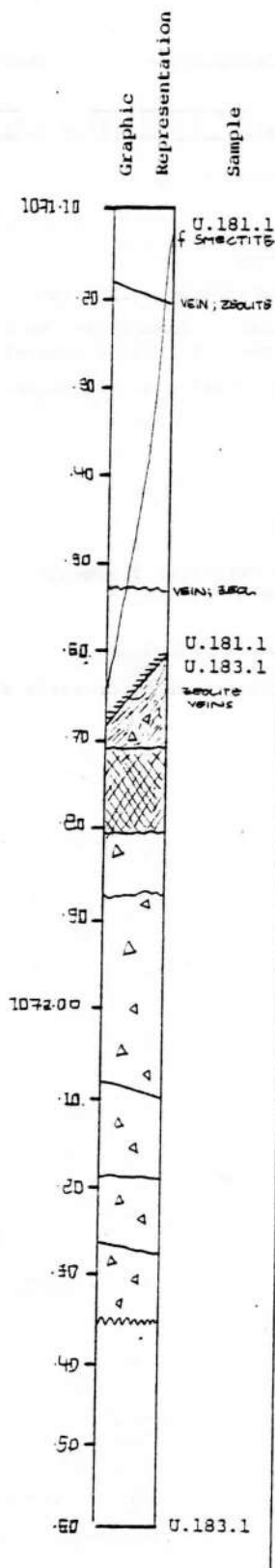


Visual Core Description

Observer ..... Viereck

Depth Interval 107110 cm to 107235 cm

Box 193, Section 3



#### LITHOLOGY-PETROGRAPHY

U.181.1 Uniform, dense, fine-grained, aphyric basalt which gets increasingly grayish green towards the contact.

1071.60 Contact is fractured.

U.183.1 Greenish-gray to gray, well indurated breccia, relatively fresh, with angular to subangular fragments, a few mm to cm across, amount of zeolite varies.

Fragments vary from massive gray to vesicular.

#### STRUCTURE

U.181.1 Massive

U.183.1 Breccia

#### VESICLES/AMYGDALES

U.183.1 Vesicles < 4 mm ( $\phi \sim 1-2$  mm), filled with zeolites and calcite. Appear in fragments.

#### OTHER

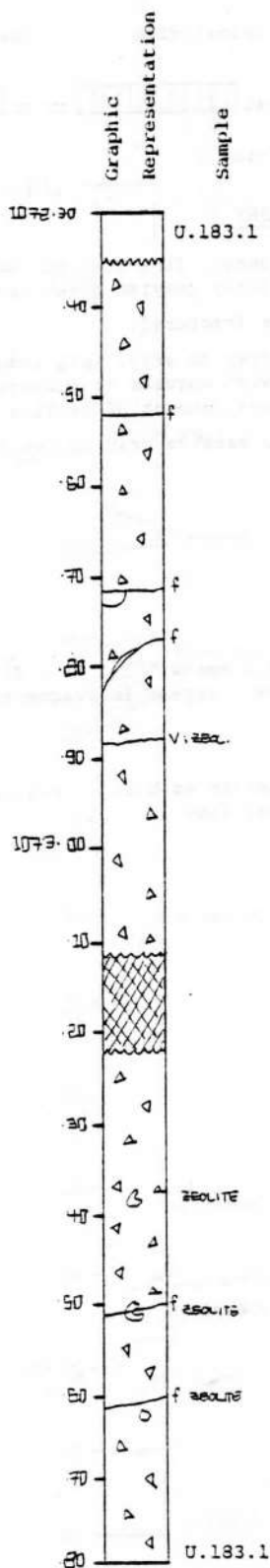
U.183.1 Unit is similar as U.180.2 and U.179.1, but seems to be the top of another flow.

Visual Core Description

Observer...Viereck.....

Depth Interval 107235 cm to 107381 cm

Box 183, Section 4



LITHOLOGY-PETROGRAPHY

Uniformly well indurated breccia, gray.

Fragments are angular to subangular, mm to a few cm across, amount in zeolite filling changes.

Fragments are gray, massive to vesicular.

STRUCTURE

Breccia

VESICLES/AMYGDALES

Vesicles appear in vesicular fragments (< 2 mm), are filled with zeolite + calcite.

FRACTURES - VEINS - BRECCIA

Vein filling of larger zeolite crystals at 1073.40 - 1073.50.

Visual Core Description

Observer, ... RHW

Depth Interval 

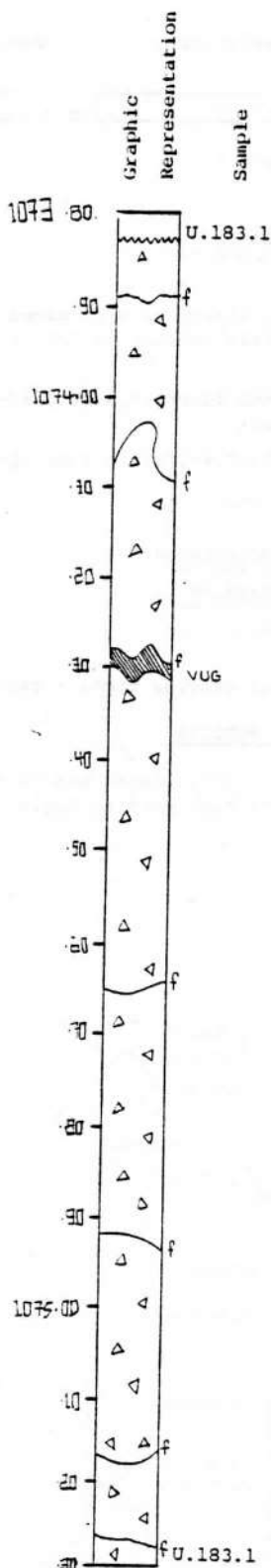
|   |   |   |   |   |   |
|---|---|---|---|---|---|
| 1 | 0 | 7 | 3 | 8 | 2 |
|---|---|---|---|---|---|

 cm to 

|   |   |   |   |   |   |
|---|---|---|---|---|---|
| 1 | 0 | 7 | 5 | 3 | 1 |
|---|---|---|---|---|---|

 cm

Box 184, Section 1



LITHOLOGY-PETROGRAPHY

Continuing U.183.1

Scoriaceous breccia, medium gray. Most clasts scoriaceous, angular, poorly sorted, size up to 15 cm. Well healed.

STRUCTURE

Brecciated.

VESICLES/AMYGDALES

Calcite and zeolite filling + smectite lining in groundmass of breccia and clasts of breccia. Vesicles in clasts minute (< .5 mm).

FRACTURES - VEINS - BRECCIA

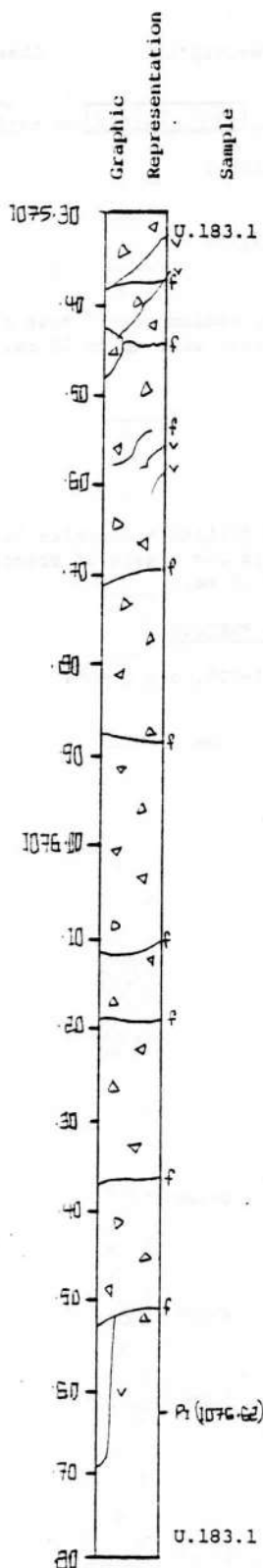
Fractures mostly @ 0-10°, one @ 60°.

Visual Core Description

Observer.. RFW.....

Depth Interval 1075.31 cm to 1076.80 cm

Box 184, Section 2

LITHOLOGY-PETROGRAPHY

Continuing U.183.1

Scoriatic breccia, clasts of very mixed size, up to 30 cm. About 1/2 clast scoria, to 1/3 or so about mid section.

Gradually grading into fine-grained, gray-green, aphyric, holocrystalline basalt.

Brecciated zone is purple-gray in some spots.

STRUCTURE

1075.31 - 1076.50 Brecciated

1076.50 - 1076.80 Massive

VESICLES/AMYGDALES

Filling in breccia is calcite rich, + zeolite + smectite.

FRACTURES - VEINS - BRECCIA

Fractures 0-10° and ~ 30°, lining not distinct.

Calcite rich veins at high core to angle (60-70°).

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Visual Core Description

Observer... RHW

Depth Interval 

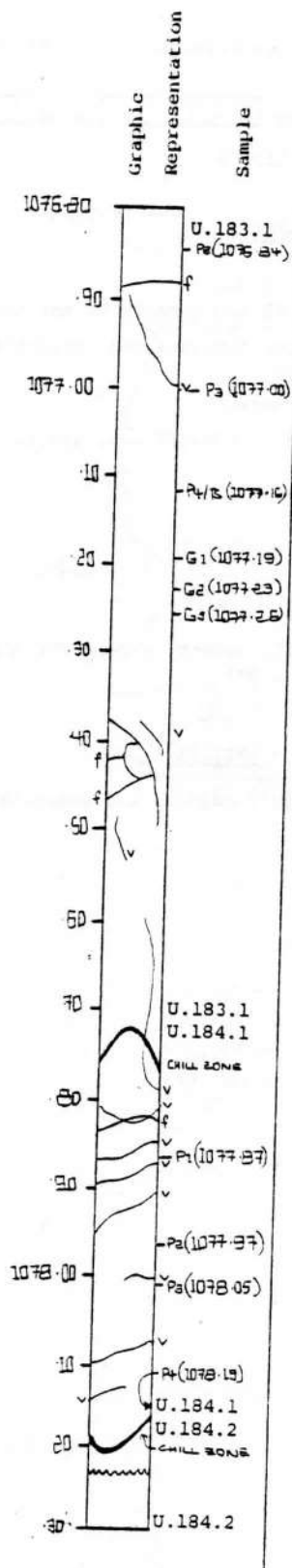
|   |   |   |   |   |   |
|---|---|---|---|---|---|
| 1 | 0 | 7 | 6 | 8 | 0 |
|---|---|---|---|---|---|

 cm to 

|   |   |   |   |   |   |
|---|---|---|---|---|---|
| 1 | 0 | 7 | 8 | 2 | 1 |
|---|---|---|---|---|---|

 cm

Box 184, Section 3



## LITHOLOGY-PETROGRAPHY

U.183.1 Gray-green, aphyric, fine-grained, holocrystalline, equigranular basalt. Chill zone towards U.184.1

1077.73 Contact ~ 60°.

U.184.1 Younger. Gray, fine-grained, aphyric, holocrystalline basalt. Chill zone towards 184.2.

1078.18 Contact ~ 60°.

U.184.2 Same as U.183.1

## STRUCTURE

Massive

## VESICLES/AMYGDALES

U.183.1 Absent, except for small (< 1 mm) disseminated smectite veins.

U.184.1 Absent

U.184.2 As in U.183.1

## FRACTURES - VEINS - BRECCIA

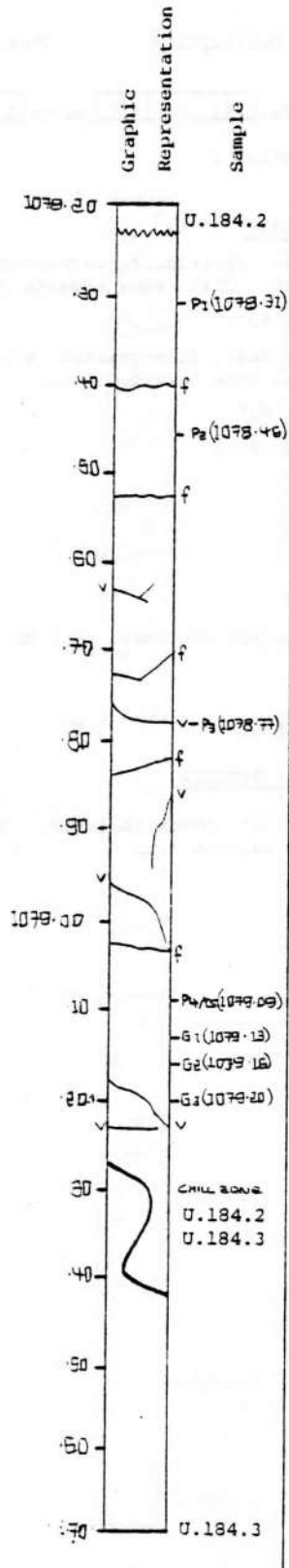
Fractures ~ 60° or 30°, smectite lined. Veins, veinlets hairline to .5 mm, calcite rich.

Visual Core Description

Observer, ... RHW.....

Depth Interval 107823 cm to 107967 cm

Box 184, Section 4



# LITHOLOGY-PETROGRAPHY

Continuing U.184.2

Much the same as 183.1, probably is the same.

Gray-green, aphyric, fine-grained, holocrystalline, equigranular basalt.

1079.34 Chilled contact.

U.184.3 is younger. Fine-grained, aphyric, holocrystalline, gray basalt.

## STRUCTURE

Massive

## VESICLES/AMYGDALES

U.184.2 Essentially absent, except for minor disseminated smectite blebs (< 1 mm).

U.184.3 Absent.

## FRACTURES - VEINS - BRECCIA

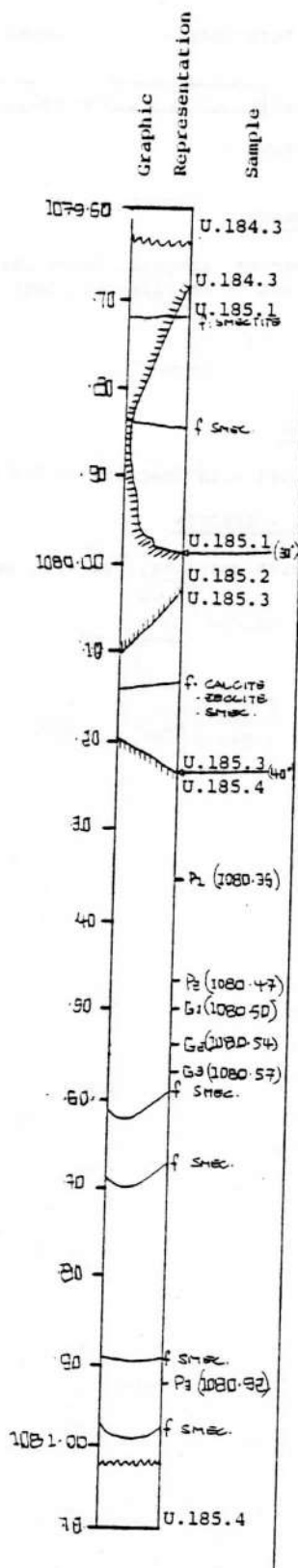
Fractures 0-10°, 30°, calcite and smectite lining.

Visual Core Description

Observer ..Viereck.....

Depth Interval 1079.63 cm to 1081.02 cm

Box 185, Section 1



#### LITHOLOGY-PETROGRAPHY

Continuation of Box 184.

U.184.3 Very fine grained, dense, greenish gray basalt.

U.185.1 Fine grained, grayish-green, basalt, aphyric, dense, slightly coarser in grain than U.184.3.

U.185.2 Same as U.184.3. See above.

U.185.3 Same as U.185.1. See above.

U.185.4 Along the contact very fine grained greenish-gray, aphyric basalt.

Throughout the section grayish green, fine-grained, uniform massive, aphyric.

#### STRUCTURE

U.184.3 (1079.68) Chilled contact.

U.185.1 Massive.

U.185.2 Chilled contact.

U.185.3 Massive.

1080.23 Chilled margin.

U.185.4 Massive.

#### VESICLES/AMYGDALES

U.184.3 Aphyric

U.185.2 None

U.185.3 None

U.185.4 Few vesicles are irregularly distributed, up to 3 mm across, filled with zeolites.

#### FRACTURES - VEINS - BRECCIA

U.184.3 Fractures coated with black smectite. Contact at .70 is lined by zeolite.

U.185.1 Hairlike veins are parallel to the following chilled margin, filled with zeolite.

U.185.2 Few hairlike veinlets, zeolite.

U.185.3 See above under U.185.1

U.185.4 Most veinlets are filled with smectite. Some are lined with zeolite. Fractures are coated with black smectite, average dip - 25°-40°.

#### OTHER

U.185.3 Large flat calcite crystals on smectite.

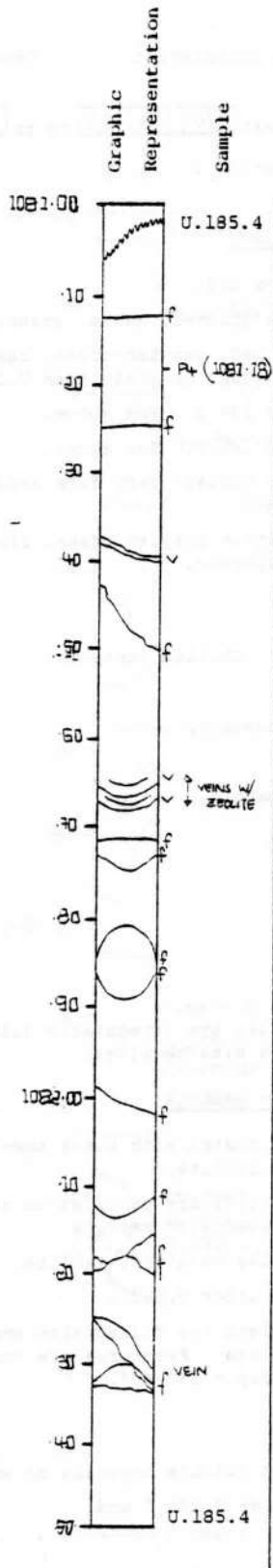
U.185.4 Same Unit as U.184.3 and

Visual Core Description

Observer ..Viereck.....

Depth Interval 108102 cm to 108245 cm

Box 185, Section 2



LITHOLOGY-PETROGRAPHY

Uniform, grayish-green, aphyric, dense basalt. Fine-grained, densely cut by hairlike veinlets.

STRUCTURE

Massive

VESICLES/AMYGDALES

Tiny vesicles filled with smectite (< 0.5 mm)

FRACTURES - VEINS - BRECCIA

Veinlets coated with smectite, few with zeolite too, hairlike.



Visual Core Description

Observer, ... Viereck

Depth Interval 

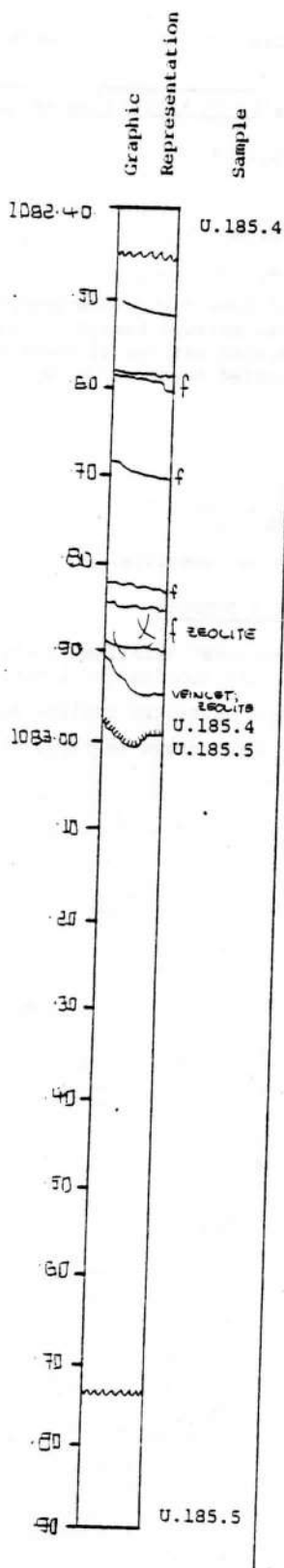
|   |   |   |   |   |   |
|---|---|---|---|---|---|
| 1 | 0 | 8 | 2 | 4 | 5 |
|---|---|---|---|---|---|

 cm to 

|   |   |   |   |   |   |
|---|---|---|---|---|---|
| 1 | 0 | 8 | 3 | 7 | 3 |
|---|---|---|---|---|---|

 cm

Box 185, Section 3



#### LITHOLOGY-PETROGRAPHY

U.185.4 Aphyric, dense, fine-grained basalt. Colour changes from grayish green to almost gray downward to the contact.

1082.98 Fine-grained, dark gray contact

U.185.5 Dense, gray to greenish gray, aphyric, fine-grained basalt with interesting colour changes. No planar features, mainly contortion structures indicated by colour changes and a few patches of smectite.

#### STRUCTURE

U.185.4 Massive

1082.98 Chilled margin

U.185.5 Massive with some internal contortion structures.

#### VESICLES/AMYGDALES

U.185.4 Few tiny vesicles filled with smectite.

U.185.5 Irregularly shaped and distributed patches of smectite.

#### FRACTURES - VEINS - BRECCIA

U.185.4 Big amount of hairlike veins, mainly coated with smectite, few contain zeolite.

1082.90 Fractured zone rich in zeolite veins ~ 1 mm.

U.185.5 Veins are abundant and are filled with zeolite, up to 3 mm wide, preferred dip 50-60°.

#### OTHER

U.185.4 dyke

1082.98 Contact isn't that clearly developed

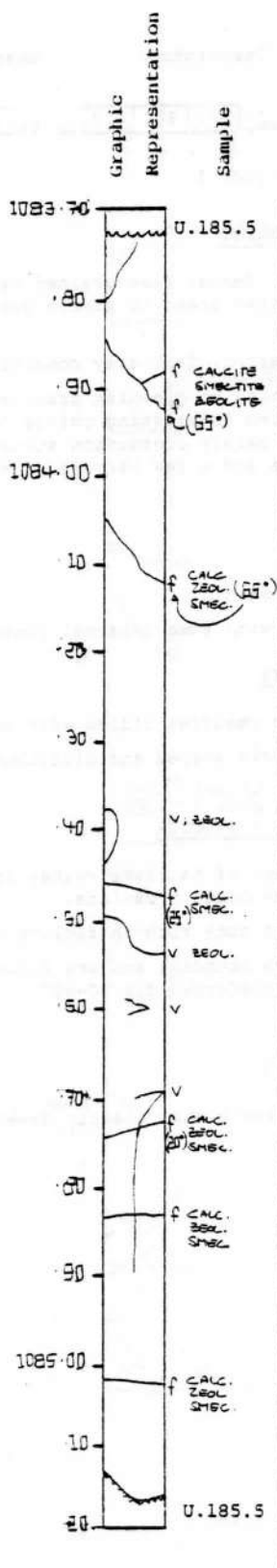
U.185.5 flow?

Visual Core Description

Observer ...Viereck.....

Depth Interval 103373 cm to 103513 cm

Box 185, Section 4



# LITHOLOGY-PETROGRAPHY

Same as Unit above.

Greenish gray with some changes to grayish green, aphyric, dense, fine-grained massive basalt. Internal contortion indicated by elongated patches of smectite changes in colours and regularly oriented smectite veins.

## STRUCTURE

Massive

## VESICLES/AMYGDALES

Patches of dark green smectite.

## FRACTURES - VEINS - BRECCIA

Huge amount of veinlets, hairlike, coated with smectite. A few are filled with zeolite (<< 1 mm).

Fractures are often coated by zeolite and dark gray smectite.

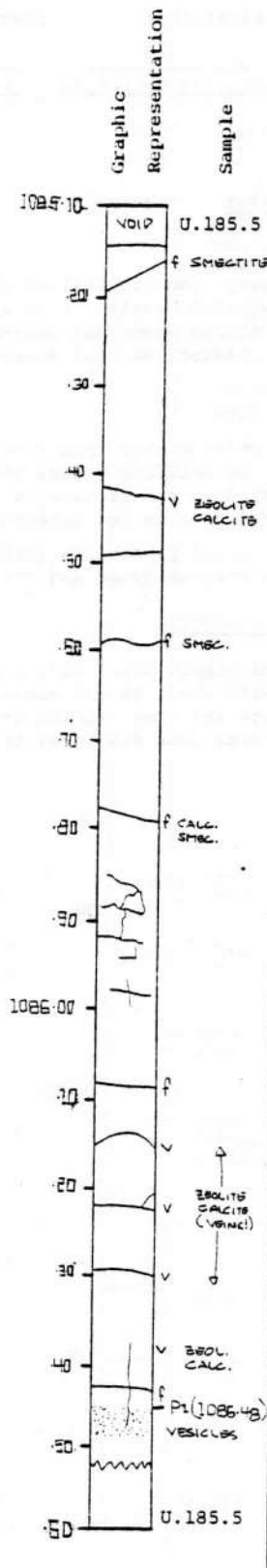
1084.46 Calcite often grown in large flat crystals.

Visual Core Description

Observer ..... PTR

Depth Interval 1085.75 cm to 1086.52 cm

Box 186, Section 1



# LITHOLOGY-PETROGRAPHY

Continues U.185.5

Gray to greenish-gray, fine-grained holocrystalline, aphyric basalt. Minor green staining along some veins. One vein @ 1086.34 has red, oxidized halo.

This unit is interpreted as a flow based on contacts in other boxes.

? Icelandite lava flow.

## STRUCTURE

Massive

## VESICLES/AMYGDALES

None in most of section. Vesicle zone occurs at 1086.45. Vesicles, 1-5 mm, irregular - filled with smectite and minor quartz.

## FRACTURES - VEINS - BRECCIA

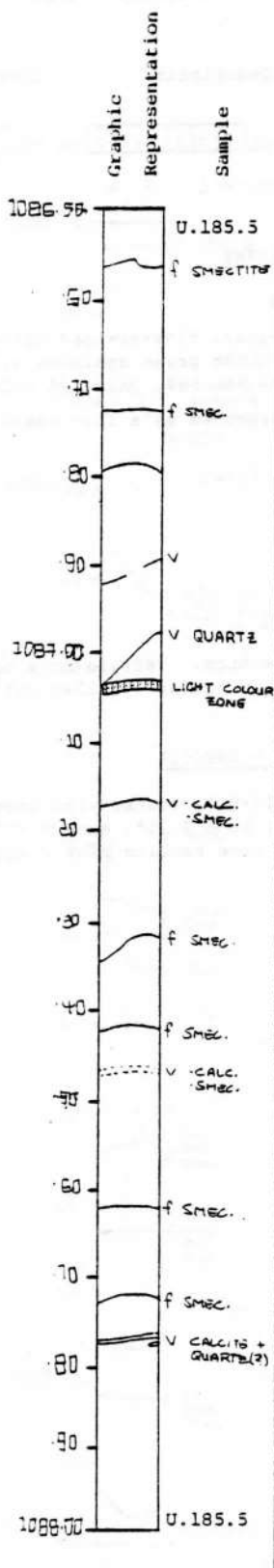
Fractures mostly 20-30°, coated with smectite. Many hairline veinlets, some @ 30°, some @ 70°, filled with smectite and some zeolite plus calcite.

Visual Core Description

Observer PTR

Depth Interval 108652 cm to 108804 cm

Box 186, Section 2

LITHOLOGY-PETROGRAPHY

Continues U.185.5

Gray to greenish-gray, locally stained red, fine-grained, holocrystalline, aphyric basalt. 1 cm wide zone at 1087.03 is light colored, somewhat coarser grained and perhaps richer in plagioclase than surrounding rock. Also has minor pyrite.

? Icelandite lava flow.

1086.79 Distinct color change from green above to gray below at 1086.79. No chilling occurs here and similar color zones occur further down the section, e.g. between 1087.05 and 1087.30. Hence, this is not interpreted as a contact.

1087.05 - 1087.39 Color banding in this interval with alternate bands of grayish-green and gray basalt.

FRACTURES - VEINS - BRECCIA

Fractures and veins mostly dip  $\sim 30^\circ$ , 1 at  $\sim 60^\circ$ .

Fractures coated with smectite and minor calcite veins filled with smectite and some calcite and quartz. Minor reddish staining along some fractures in lower part of section.

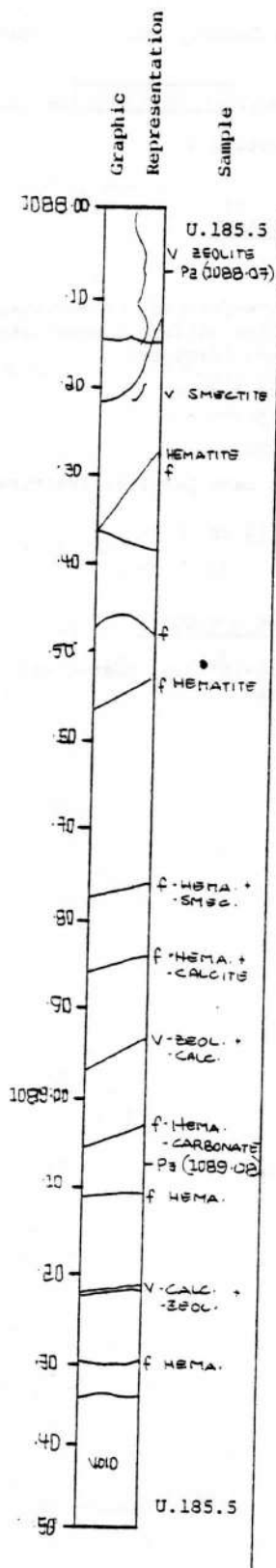
ICELAND RESEARCH DRILLING PROJECT - REYDARFJORDUR 1978

Visual Core Description

Observer PTR

Depth Interval 103804 cm to 103933 cm

Box 186, Section 3



LITHOLOGY-PETROGRAPHY

Continues U.185.5

Gray to reddish-gray, fine-grained holocrystalline, aphyric basalt. Reddish zones are mostly halos along hematite coated fractures. Lower 25 cm of section is reddish throughout. Grain size uniform through section. No contacts.

? Icelandite lava flow.

STRUCTURE

Massive

VESICLES/AMYGDALES

None

FRACTURES - VEINS - BRECCIA

Fractures and veins mostly 30°; a few at 60°. Fractures coated with hematite giving rock a reddish color. Some also have minor smectite and calcite. Veins are hairline to 2 mm, filled with zeolite plus calcite.

Visual Core Description

Observer .....PTR.....

Depth Interval 

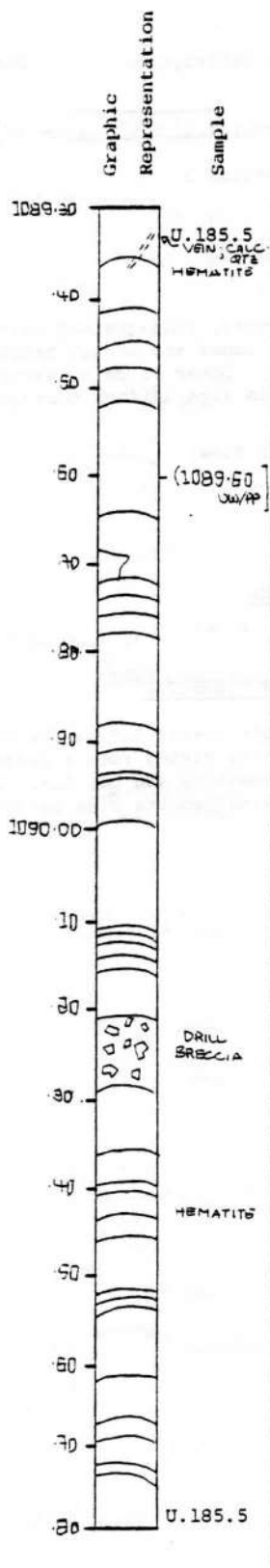
|   |   |   |   |   |   |
|---|---|---|---|---|---|
| 1 | 0 | 8 | 9 | 3 | 3 |
|---|---|---|---|---|---|

 cm to 

|   |   |   |   |   |   |
|---|---|---|---|---|---|
| 1 | 0 | 9 | 0 | 7 | 9 |
|---|---|---|---|---|---|

 cm

Box 186, Section 4



LITHOLOGY-PETROGRAPHY

Continues U.185.5

Reddish-gray, fine-grained, holocrystalline, aphyric basalt. Grain size uniform through section. Reddish stain mostly along fractures.

? Icelandite lava flow.

STRUCTURE

Massive but with many parallel fractures

VESICLES/AMYGDALES

None

FRACTURES - VEINS - BRECCIA

Many fractures 60-70° dip, coated with hematite and sometimes calcite.