Dredge 18

Sample Description

Cruise I.D: L5-83-HW

Sample I.D: Sta: D18 A-1

Location: Horizon

Size: 36x18x18cm Weight: 11.9 Kg x cut for Alice

Mn crust thickness:

Total: min: 5cm max: 5.5cm ave: 3.5 cm

Inner crust: min: 8mm max: 3.5cm ave: 2.5 cm

Outer crust: min: 1mm max: 6cm ave: 1.5 cm

Surface texture: botryoidal

Internal structure:

layered: ✓ 2
laminated: ✓
massive: ✓
porous:
dendritic:
other:

Mineralogy (XRD):

Associated alteration, phosphorite, or hydrothermal deposits:
Phosphorite veins

Substratum:

Rock type: vols. breccia

Description: Mn crust surrounds entire rock, which consists of sub-angular, very closely packed, slightly vesicular altered basalt clasts (≈1-6cm long) w/ altered pheno crysts of plagioclase & olivine? Some smaller angular basalt clasts are "caught up in" the outer Mn layer. Also a few white phosphate veins & phosphatized clasts.

Mineralogy (XRD):

L5-83-HW
D18-A1

Analyses and subsamples:

analysis:	analyst:
Sample to (~1kg)	Donald G. Foot Jr., Salt Lake City Research Co

Sample Description

Cruise I.D: L5-83-HW

Sample I.D: Sta: D18-A2

Location: Horizon Guy

Size: 30x24x21cm Weight: 12.22 Kg
already cut & broken

Mn crust thickness:

Total: min: .5cm max: 4.5cm ave: 2.5cm

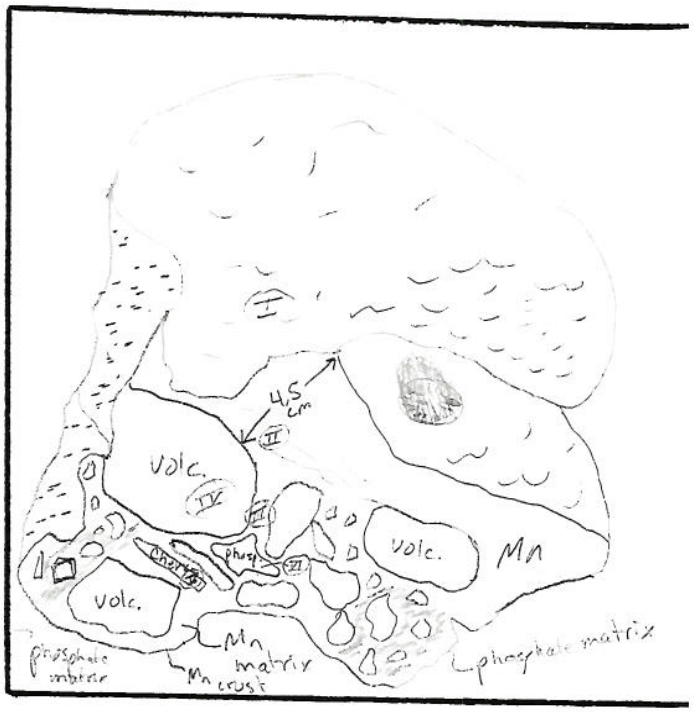
Inner crust: min: max: ave: 1-1.5cm

Outer crust: min: max: ave: 2-3cm

Surface texture: abraided smooth

Internal structure:

layered: ✓ ~2
laminated: ✓ inner layer only
massive: ✓ outer
porous:
dendritic:
other:



Mineralogy (XRD):

Associated alteration, phosphorite, or hydrothermal deposits:

Substratum:

Rock type: Volcaniclastic breccia

Description: Mn crust surrounds entire rock; Breccia is poorly sorted, loosely packed; subrounded clasts (~5mm - 7cm size) of basalt?, chert?, phosphate? in a well-cemented Mn matrix.
Some fracturing in matrix & around clasts filled in w/ phosphate. Some of the basalt clasts have vesicles which are filled with glass?

Mineralogy (XRD):

Analyses and subsamples:

analysis:	analyst:
XRD:	C Daniel
I Mn outer crust	
II " inner " (Laminated)	
III Mn matrix	
IV Volc clast	
V chert "	
VI white sed.	
Doubly Polished Thin Section	
Subsampled forams	Paula Quinterno
Slabbed for Paleocean ographic study but several crusts fall off so not being used.	
Gave two slabs to	Chinese

L5-83-HW
D18-A2

Sample Description

Cruise I.D: L5-83-HW

Sample I.D: Sta: D18-B1

Location: Horizon

Size: ≈ 35x35x22 cm Weight: ≈ 24 Kg

1 end broken (actually cut several times) & missing

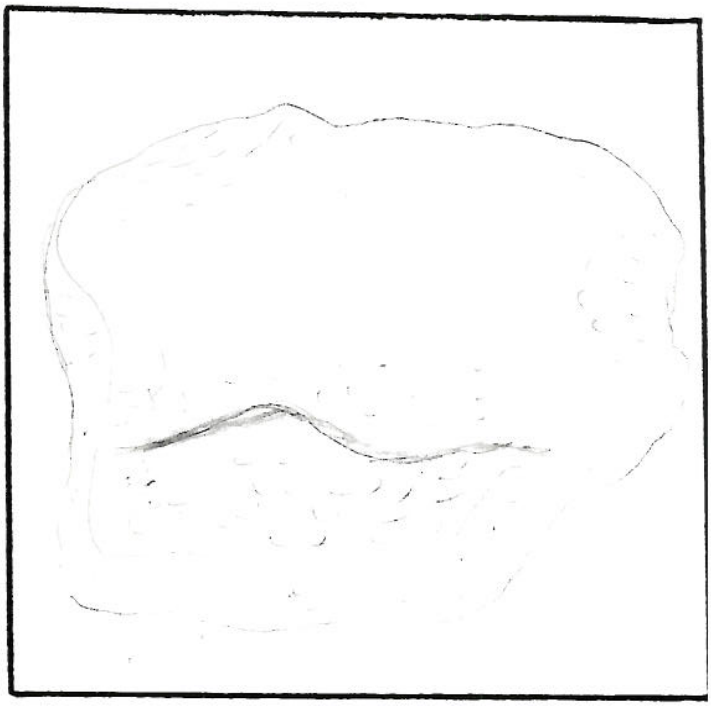
*cut for Alice

Mn crust thickness:

Total: min: 2cm max: 5.5cm ave: 4cm

Inner crust: min: 1.2cm max: 4cm ave: 3cm

Outer crust: min: 8mm max: 5mm ave: 0mm



Surface texture: Botryoidal (small) to abraded smooth

Internal structure:

layered: ✓ 2

laminated: ✓ inner

massive:

porous: ✓ outer

dendritic:

other:

Mineralogy (XRD):

Associated alteration, phosphorite, or hydrothermal deposits:

Substratum:

Rock type: Basalt

Description: Gray green aphanitic basalt w/abundant white plagioclase & altered olivine phenocrysts. Basalt is fractured w/large veins of carbonate & phosphatic material

Mineralogy (XRD):

Analyses and subsamples:

analysis:	analyst:
chemistry of a = outer 0-0.5cm	
b = inner 0.5-2.0cm	
- pt group (12/86)	Floyd Brown - Reston
- Au analysis (12/86)	Dave McKown - Den

L5-83-HW
D18-81

Sample Description

Cruise I.D: L5-83-HW

Sample I.D: Sta: D18-B2

Location: Horizon

Size: 40X35X18cm Weight: 18.73 kg

cut

Mn crust thickness:

Total: min: 3.5 max: 6cm ave: 4.5cm

Inner crust: min: 3cm max: 4.8cm ave: 3.5cm

Outer crust: min: 6mm max: 13mm ave: 10mm

Surface texture:

Internal structure:

layered: ✓ 2

laminated: ✓ inner

massive:

porous: ✓ outer

dendritic:

other:

Mineralogy (XRD):

Associated alteration, phosphorite, or hydrothermal deposits:

Substratum:

Rock type: Basalt

Description: Same as D18-B1 only more fractured w/ large fracture filled w/ Mn

Mineralogy (XRD):

L5-83-HW

D18-B2

Analyses and subsamples:

analysis:	analyst:
endpiece given to: 27X10X10cm	John Toth Analytical Services C Cardiff by the Sea, Ca.
Sampled for XRD	
D18-B2-I outer large Mn	C. Daniel
II inner	
III Basalt	

Sample Description

Cruise I.D: L5-83-HW

Sample I.D: Sta: D18-B3-1

Location: [illegible]

Size: ≈10x9x10cm Weight: 7.9 Kg

Mn crust thickness: outer layer is almost completely broken off

Total: min: 1cm max: 3cm ave: 2.5cm

Inner crust: min: max: ave: 1.5cm

Outer crust: min: max: ave: 1cm

Surface texture: Slightly botryoidal - coralloid smooth

Internal structure:

layered: ✓ 2

laminated: ✓ inner

massive:

porous: ✓ outer

dendritic:

other:

Mineralogy (XRD):

Associated alteration, phosphorite, or hydrothermal deposits:

Substratum:

Rock type: Basalt

Description: Basalt clast (8.5x4.5cm) surrounded by Mn. Basalt is gray, angular fractured very fine grained w/ abundant phenocrysts of plagioclase & olivine. Also has [illegible]

Mineralogy (XRD):

L5-83-HW
D18-B3-1

[surface layer of Mn is broken off]

Analyses and subsamples:

analysis:	analyst:
XRD: inner + outer Mn	Kaczmarek?
≈1 Kg sample to [illegible]	Donald G. Fox Jr. Salt Lake City Research Ctr

Sample Description

Cruise I.D: L5-83-HW Sample I.D: Sta: D18-83-2 Location: Horizon

Size: 13x11x4 cm Weight: 880 g

cut

Mn crust thickness:

Total: min: 7mm max: 14mm ave: 7mm

Inner crust: min: max: ave:

Outer crust: min: max: ave:

Surface texture: Smooth

Internal structure:

layered: ✓ ~2

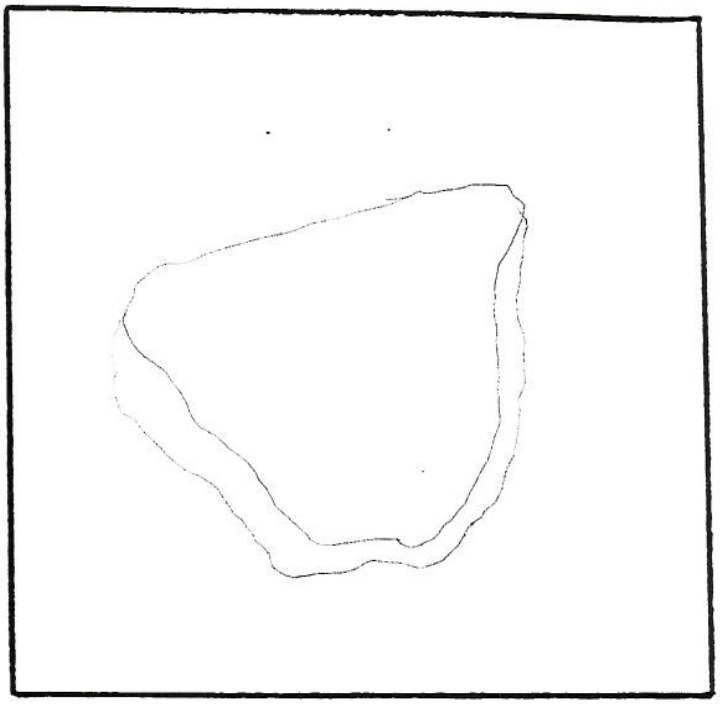
laminated:

massive: ✓

porous:

dendritic:

other:



Mineralogy (XRD):

Associated alteration, phosphorite, or hydrothermal deposits:

White phosphorite veins in crust

Substratum:

Rock type: Basalt

Description: Mn crust surrounding 1 gray altered basalt clast (9x2½cm) with small phosphorite veins. One half of bottom side covered w/ white phosphorite material

Mineralogy (XRD):

Analyses and subsamples:

analysis:	analyst:

Sample Description

Cruise I.D: L5-83-HW Sample I.D: Sta: D 18-[illegible] Location: [illegible]

Size: 13x10x3cm Weight: 560g Cut

Mn crust thickness:

Total: min: 2mm max: 12mm ave: 5mm

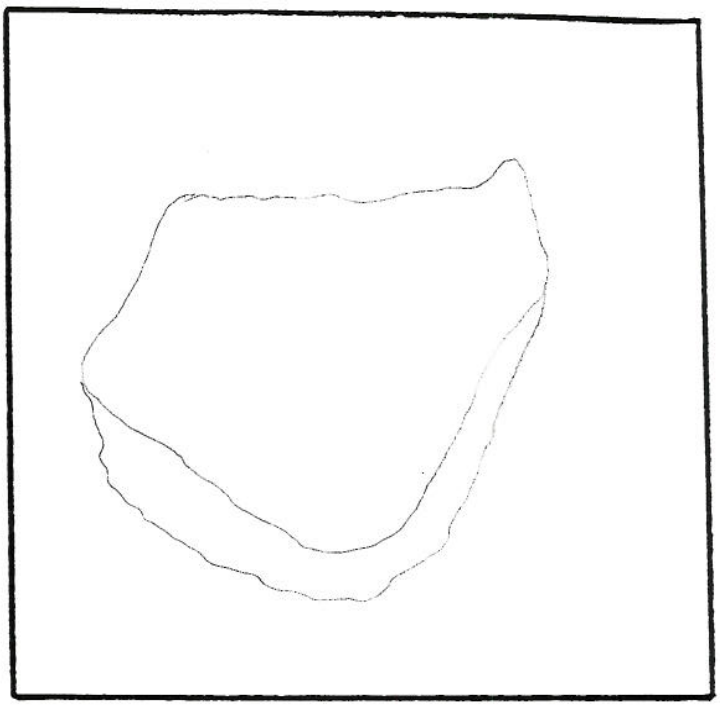
Inner crust: min: max: ave:

Outer crust: min: max: ave:

Surface texture: Smooth

Internal structure:

layered: ✓ ~ 2
laminated:
massive: ✓
porous:
dendritic:
other:



Mineralogy (XRD):

Associated alteration, phosphorite, or hydrothermal deposits:

Substratum:

Rock type: Basalt

Description: Mn crust surrounding 1 area altered basalt clast (8x2 cm) with phosphorite surrounding part of clast & small phosphorite veins

Mineralogy (XRD):

Analyses and subsamples:

analysis:	analyst:
Sampled for XRD DIX-83-3-D: Hard Mn	C. Daniel

Sample Description

Cruise I.D: L5-83-HW Sample I.D: Sta: D 18-83-4 Location: Horizon

Size: ~6x4x1.5cm Weight: ~160g bag of 3 small pieces of crust

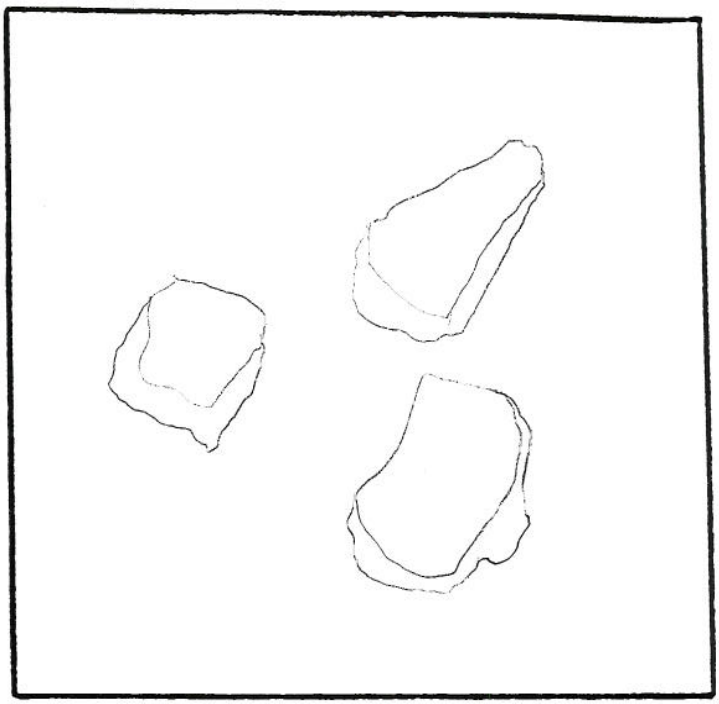
Mn crust thickness:

Total: min: 1.5 max: 2.5 ave: 1.5cm

Inner crust: min: max: ave:

Outer crust: min: max: ave:

Surface texture: rough + porous



Internal structure:

layered:
laminated:
massive:
porous:
dendritic:
other:

Mineralogy (XRD):

Associated alteration, phosphorite, or hydrothermal deposits:

Substratum: Mn crust

Rock type:

Description:

Mineralogy (XRD):

Analyses and subsamples:

analysis:	analyst:

Sample Description

Cruise I.D: L5-83-HW

Sample I.D: Sta: D18-B3-5

Location: Horizon

Size: 40x25x9cm Weight: 10.1 kg

Mn crust thickness:

Total: min: 3cm max: 4.5cm ave: 4cm

Inner crust: min: 3cm max: 3.5cm ave: 3cm

Outer crust: min: 8mm max: 11mm ave: 10mm

Surface texture: Smooth w/some small cavities
Knobby on bottom

Internal structure:

layered: ✓ 2
laminated:
massive: ✓
porous:
dendritic:
other:

Mineralogy (XRD):

Associated alteration, phosphorite, or hydrothermal deposits:

Minor Feoxide staining

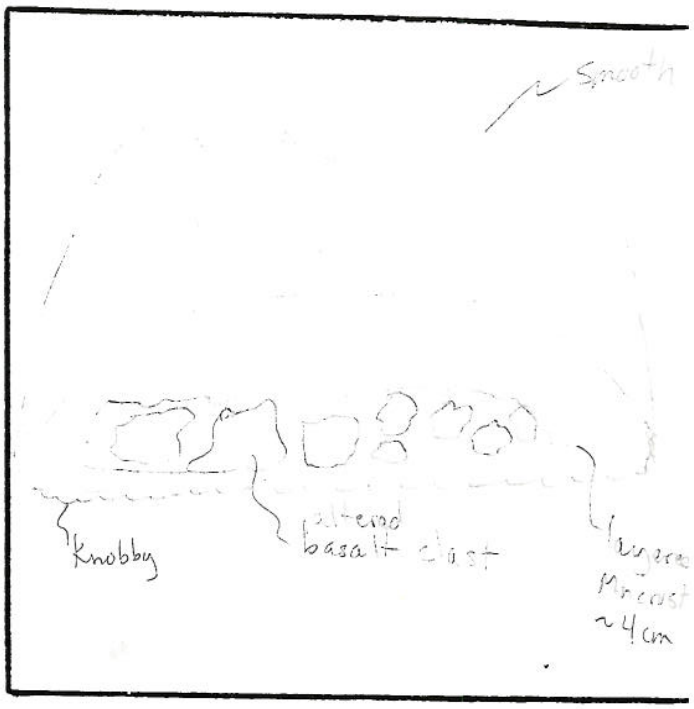
Substratum:

Rock type: Volc. Breccia

Description: Mn crust covers entire rock; only 5-8mm thick on bottom; breccia consists of altered subangular gray green basalt? clasts (1-3cm). Matrix? appears to be replaced by pink phosphorite.

Mineralogy (XRD):

P. 1 of 2



Analyses and subsamples:

analysis:

* Slabbed for Paleoavan-bainfor study

Mn crust	Min	Max
1)	[illegible]	[illegible]
2)	3.4	4.7
3)	3.4	5.2 cm
4)	3.7	5.8
5)	3.5	6.0
6)	3.9	4.8

Sampled for XRD every 3mm
Chemistry every 3mm
dissolution studies " " "

Doubly Polished Thin Section of Man Petro.

analyst:

REE sampled on 3mm interval

D18-B3-5A	0-3 m
D18-B3-5B	3-6 mm
" " 5C	6-9 mm
" " 5D	9-12 mm
" " 5E	12-15 mm
" " 5F	15-18 mm
" " 5G	18-21 mm
" " 5H	21-24 m
" " 5I	24-27 m
" " 5J	27-30 m
" " 5K	30-33 m
" " 5L	33-36 m
" " 5M	36-39 m
" " 5N	39-42 m
" " 5O	42-45 m

REE samples recombined for Hg chem. Sent as 6mm intervals by combining powders in equal parts

Sample Description

Cruise I.D: L5-83-HW

Sample I.D: Sta: D18-B3-5

Location: Horizon Guyot

Size: 13cm x 8cm x 4.5cm Weight: _____

Mn crust thickness:

Total: min: _____ max: _____ ave: _____

Inner crust: min: _____ max: _____ ave: _____

Outer crust: min: _____ max: _____ ave: _____

Surface texture: _____

Internal structure: _____

layered: _____
laminated: _____
massive: _____
porous: _____
dendritic: _____
other: _____

Mineralogy (XRD): _____

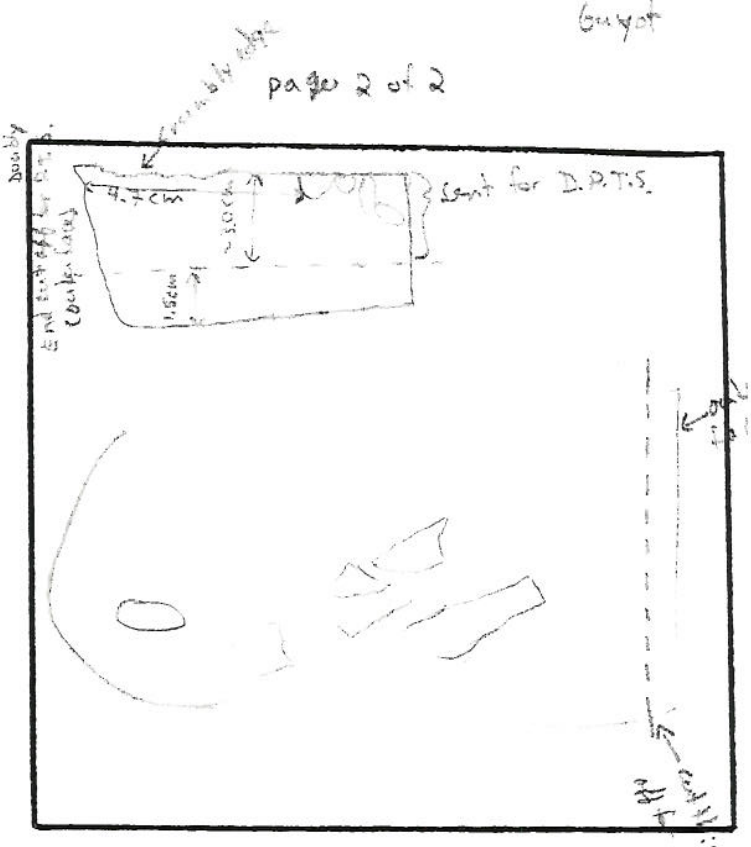
Associated alteration, phosphorite, or hydrothermal deposits:

Substratum:

Rock type: _____

Description: _____

Mineralogy (XRD):



Analyses and subsamples:

analysis:	subsampler or analyst:
Doubly P.T.S.: see diagram. Section made of outer face. Do microprobe analysis across 9.7 cm transect between outer surface + substrate. Sent to Rudolf von Huene to make D.P.T.S.	REE
Reston, Denver	
CC + REE of mn crust	Jung-Kook Kang (6/88
I 0-3 mm ? gm (CC)	Job #SL032 (REE)
II 3-10 " 7 " "	" " BZ89 (CC)
III 10-18" 8 " "	
IV 18-28" 9 " "	
V 28-38" 9 " "	

Resampled + sent 5mm intervals of crust for Isotope to Hsueh-wen, June 21, 1989

Sample Description

Cruise I.D: L5-83-HW Sample I.D: Sta: D 18-B3-6 Location: Hawaii

Size: 28x20x16cm Weight: 8.34 Kg cut

Mn crust thickness:

Total: min: 2.8 max: 3.7cm ave: 3cm

Inner crust: min: max: ave: 2.2cm

Outer crust: min: max: ave: 8mm

Surface texture: Smooth botryoidal & porous

Internal structure:

layered: ✓ 2a 2mint

laminated: ✓ inner

massive:

porous: ✓ outer

dendritic:

other:

Mineralogy (XRD):

Associated alteration, phosphorite, or hydrothermal deposits:

2-3mm layer of phosphorite

Substratum:

Rock type: Basalt/Breccia

Description: Mn coated rounded boulder, top half of rock is a large (15x5cm) sub-rounded, basalt clast w/ plagioclase phenocrysts & w/a glassy Mn coating along the bottom side. The bottom half consists of a breccia w/ loosely packed sub-rounded basalt clasts in various states of alteration. The matrix is Mn w/ some phosphorite

Mineralogy (XRD):

L5-83-HW
D18-83-6

Analyses and subsamples:

analysis:	analyst:

Sample Description

Cruise I.D: L5-83-HW Sample I.D: Sta: D18-B3-7 Location: Horizon

Size: 17x17x7 cm Weight: 3Kg — cut —

Phosphate Study

Mn crust thickness:

Total: min: ____ max: ____ ave: ____ ?

Inner crust: min: 6mm max: 12mm ave: 10mm Sides are 6mm - 20mm

Outer crust: min: ____ max: ____ ave: ____ Spalled off

Surface texture: Abraded smooth

Internal structure:

layered: ✓ 2

laminated: ✓

massive:

porous:

dendritic:

other:

L5-83-HW

D18-B3-7

Mineralogy (XRD):

Associated alteration, phosphorite, or hydrothermal deposits:

Phosphorite intermixed in crust <1mm to 3mm layers thru crust

Substratum:

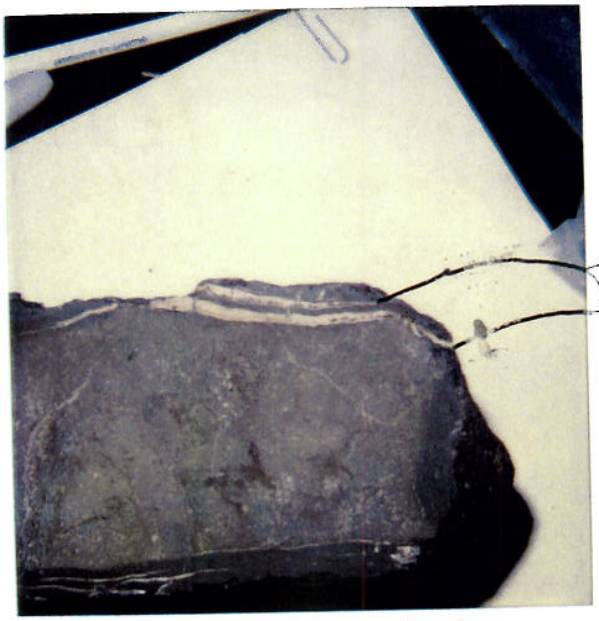
Rock type: Basalt

Description: Mn coated round pancake-like boulder; large (6x4cm) sub-rounded gray basalt clast w/ altered plag & olivine phenocrysts; phosphorite veins

Mineralogy (XRD):

Analyses and subsamples:

analysis:	analyst:
35mm Slide	G. Smith
D18-B3-7 DPTS 2/2G	G. Smith
of crust, phos + basalt	G.S
D18-B3-7A 2-5mm	Phos - Sr + O_2
D18-B3-7B 7-10mm	" " "
Binoc Fotovoids	XRD for [illegible]



L5-83-HW

D18-B3-7

Sample Description

Cruise I.D: L5-83-HW

Sample I.D: Sta: D 18-[illegible]

Location: [illegible]

Size: 32x30x15cm Weight: 9.965 kg

-Cut-

Mn crust thickness:

Total: min: max: ave: 2.5cm

Inner crust: min: 5mm max: 2cm ave: 2cm

Outer crust: → most is spalled off
min: max: ave:

Surface texture: Small Brt [illegible] -abraded smooth top middle very smooth due to loss of outer crust

Internal structure:

layered: ✓ 2

laminated: ✓

massive:

porous:

dendritic:

other:

L5-83-HW
D18-B3-8

Mineralogy (XRD):

Associated alteration, phosphorite, or hydrothermal deposits:

Mn dendrites on basalt clast

Substratum:

Rock type: Breccia

Description: Mn coated round boulder Subangular to subrounded poorly sorted (1mm - 9cm) loosely packed basalt clasts - many w/abundant [illegible] plano crusts. One of the larger (10cm) basalt clasts is dark grey & has large (up to 1cm) vesicles partially filled w/phosphorite

Mineralogy (XRD):

Analyses and subsamples:

analysis:

analyst:

Sample Description

Cruise I.D: L5-83-HW

Sample I.D: Sta: D18-B3-9

Location: Horizon

Size: 22x18x11cm Weight: 4.41 Kg cut

Mn crust thickness:

Total: min: 3cm max: 5.4cm ave: 4.2cm

Inner crust: min: max: ave: ≈ 3.4cm

Outer crust: min: max: ave: ≈ 8mm

Surface texture: Smooth to porous

Internal structure:

layered: very faint

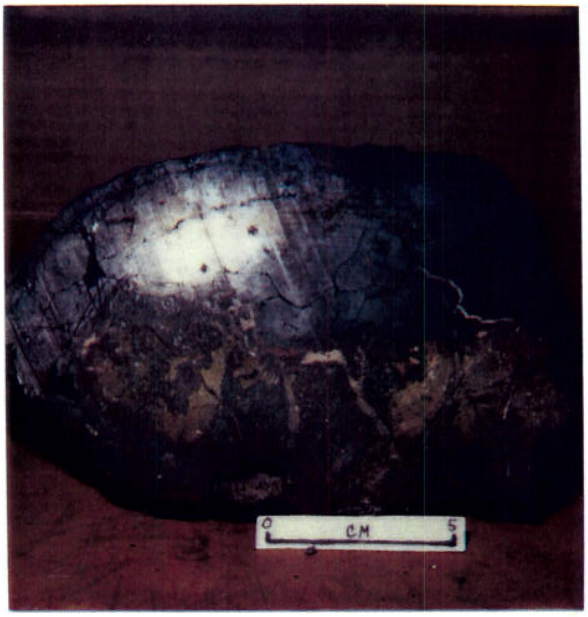
laminated: ✓

massive:

porous: ✓ outer

dendritic:

other:



L5-83-HW
D18-B3-9

Mineralogy (XRD):

Associated alteration, phosphorite, or hydrothermal deposits:

Forams on surface of Mn

Substratum:

Rock type: Basalt

Description: Mn coated round boulder; Subrounded gray to brown altered basalt clast (13x4cm) w/ plag. & clinopheno crysts fragmented w/ phosphorite veins

Mineralogy (XRD):

Analyses and subsamples:

analysis:	analyst:
Sampled for XRD	C Daniel
D18-B3-9-I outer M	
D18-B3-9-II inner M	
Doubly Polished Thin Section by Mann Petro.	

Sample Description

Cruise I.D: L5-83-HW **Sample I.D: Sta:** D18-B3-10 **Location:** Horizon

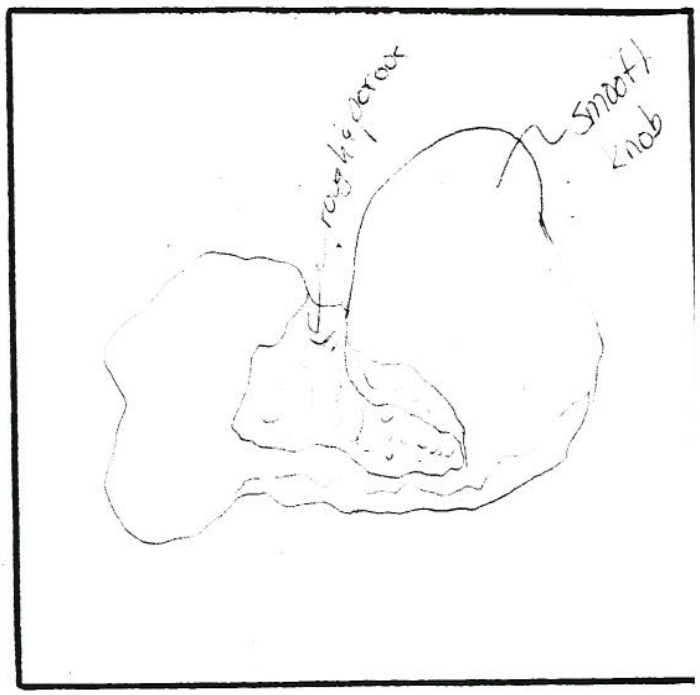
Size: 19x15x11cm **Weight:** 2.1 kg * cut for Alice

Mn crust thickness:

hard to * **Total:** min: 2.5cm max: 5cm ave: 3.5cm
tell which is up Mn around all sides

Inner crust: min: ____ max: ____ ave: ____

Outer crust: min: ____ max: ____ ave: ____



Surface texture: smooth to small botryoids

Internal structure:

layered: ✓ faintly
laminated: ✓ inner
massive:
porous: ✓ outer
dendritic:
other:

Mineralogy (XRD):

Associated alteration, phosphorite, or hydrothermal deposits:

Substratum:

Rock type: Basalt

Description: Completely coated w/ Mn; Two basalt clasts (2.5x7cm) & (4x5.5cm) surrounded [illegible] cemented together w/ Mn. Basalt clasts are gray sugary textured w/ [illegible] clay? phenocrysts. One clast has 2-3mm thick [illegible] phosphorite on one side.

Mineralogy (XRD):

Analyses and subsamples:

analysis:	analyst:

Sample Description

Cruise I.D: L5-83-HW **Sample I.D: Sta:** D18-B3-11 **Location:** Horizon

Size: ≈ 12x8x7cm **Weight:** ≈ 810 g already cut by Alice who took 1 piece

Mn crust thickness:

Total: min: 4mm max: 10mm ave: 6mm

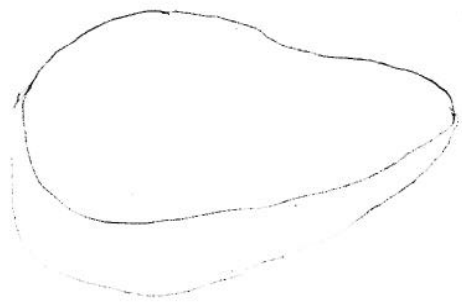
Inner crust: min: max: ave:

Outer crust: min: max: ave:

Surface texture: smooth

Internal structure:

layered: ✓ ~2 outer missing in places
laminated:
massive: ✓
porous:
dendritic:
other:



egg-shaped

Mineralogy (XRD):

Associated alteration, phosphorite, or hydrothermal deposits:

Substratum:

Rock type: Basalt

Description: Mn surrounding a gray altered basalt clast (5x6cm) [illegible] ite veins. Basalt is well rounded and [illegible] Sugary [illegible] w/ olivine phenocrysts [illegible]

Mineralogy (XRD):

Analyses and subsamples:

analysis:	analyst:

Sample Description

renumbered to CLD

Cruise I.D: L5-83-HW

Sample I.D: Sta: 26 D 18-33-1 (C3-2)

Location: Horizon

Size: 16x10x8 Weight: ~1.1 kg *Cut for Alice

D = 1799 - 1780 m

Mn crust thickness: very variable

Total: min: 0 max: 3cm ave: 1cm

Inner crust: min: max: ave:

Outer crust: min: max: ave:

Surface texture: smooth to botry.

Internal structure:

layered: ✓ very faint

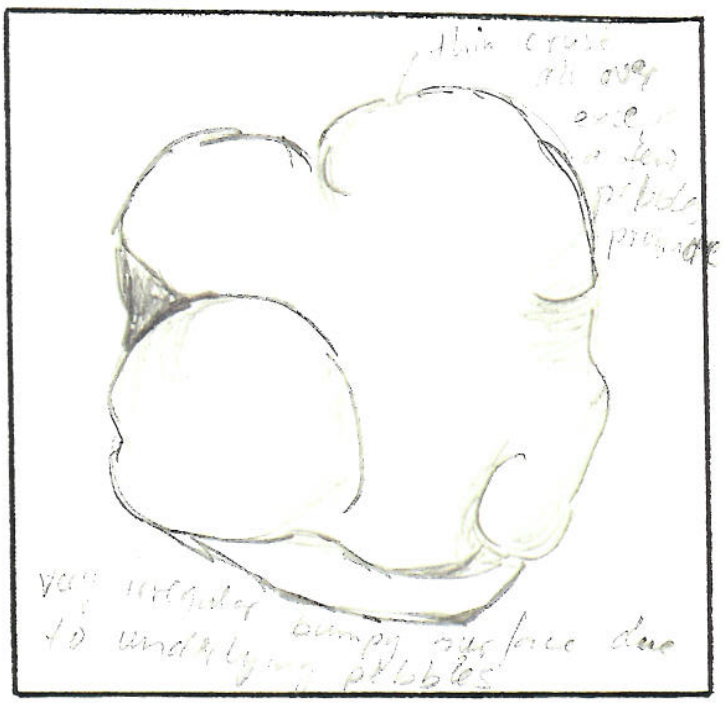
laminated: ✓ crinkled

massive: ✓

porous:

dendritic:

other:



Mineralogy (XRD):

Associated alteration, phosphorite, or hydrothermal deposits:

Substratum:

Rock type: volcaniclastic conglomerate w. well rounded volcanic

Description: pebbles -

Mineralogy (XRD):

Analyses and subsamples:

analysis:	analyst:
Organic matter	Bill Orem 3/27/8
XRD - inner & outer	LISA