Dredge 6

USGS DREDGE STATION LOG Erikub SW 770

SHIP / LEG L9-84-CP

	on bottom	off bottom
LATITUDE	08°45.275	08°46.906
LONGITUDE	169°47.528	169°43.035

STATION NO. 05

LINE NO. Dredge 6

DAY/MONTH/YEAR

DATE 30/7/84

TYPE OF STORAGE (check one)

☐ DRY ☐ COLD ☐ FROZEN

Depth: 2900 m

SAMPLE NO. TYPE & ID.	UNCORRECTED DEPTH (M)	CORE LENGTH	BASIC LITHOLOGY	AGE OF BOTTOM

REMARKS: Total recovery: ≈ 300 lbs. volcanic breccia in beige phosphatized limestone, volcanic breccia with less phosphatized sandy matrix, angular cobbles of basalt pillow pieces, pieces all covered with Mn crust, several flat pieces all Mn crust (or very flat nucleus inside)? with polished surface that has grooved appearance of scour marks. Mn crust: varies from thin coating to 4cm thick on pieces that are only crust. Surface texture ranges from highly porous to knobby and botryoidal and fluted polished in scoured crust samples.

NEBCO

Soft white material out of fractures of D6

SMEAR SLIDE DESCRIPTION

LOCATOR	SAMPLE NO.	SEC.	INTERVAL	STATION NO.	Dom. LITH.	Minor LITH.	OBSERVER
S.W. of Erikub Atoll	D6-1			5		✓	JAH & AD

Sediment Name: Foraminiferal Nannofossil Ooze

ABUNDANCE	TEXTURE	SPECIFIC DATA	
	Sand		
29	Silt		
71	Clay		
	COMPOSITION		
	Quartz		
	Feldspar		
	Mica		
1	Heavy Mnls./opaques		
	Total Detrital		
5	Clay Mnls.		
	Volc. Glass		
	Palagonite		
	Chlorite		
	Glauconite		
	Pyrite		
	Micro Nodules		
	Dolo. Rhombs		
TR	Zeolite		
	Auth. Carb.		
2	Rock Frags.		
27	Foraminifera		
65	Calc. Nannos		
	Diatoms		
	Radiolarians		
	Sponge Spic.		
	Silicoflag.		
	Fish Remains		
	Plant Debris		

PER-CENT	DETAILED MINERALOGY

REMARKS:

Snowflake mud.

Lots of discoasters as well as coccoliths

DATA CODE LEGEND

Fossil preservation
G = good
M = moderate
P = poor

Abundance code
1% = TR (trace)
1-5% = R (rare)
5-25% = C (common)
25-75% = A (abundant)
75% = D (dominant)

NEBCO

Description

Cruise I.D: L9-84-CP Sample I.D: Sta: 05 D 6-1 Location: Erikub SW 7?

Size: 45x40x20cm Weight: ~16kg Depth: 2900 m

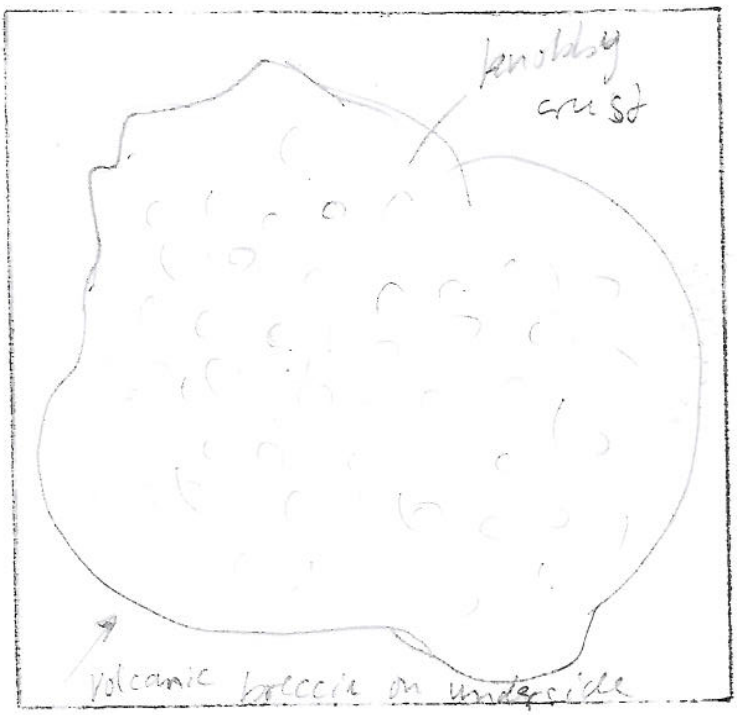
(more than 1 rock(?)) I measured 20x17x14 cm (CO) at 6 kg

Mn crust thickness:

Total: min: 1 cm max: 3 cm ave: 2 cm

Inner crust: min: — max: — ave: —

Outer crust: min: — max: — ave: —



Surface texture: knobby on top, porous on sides

Internal structure:

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

Mineralogy (XRD):

Associated alteration, phosphorite, or hydrothermal deposits:
abundant Fe oxide stains

Substratum:

Rock type: volcanic breccia

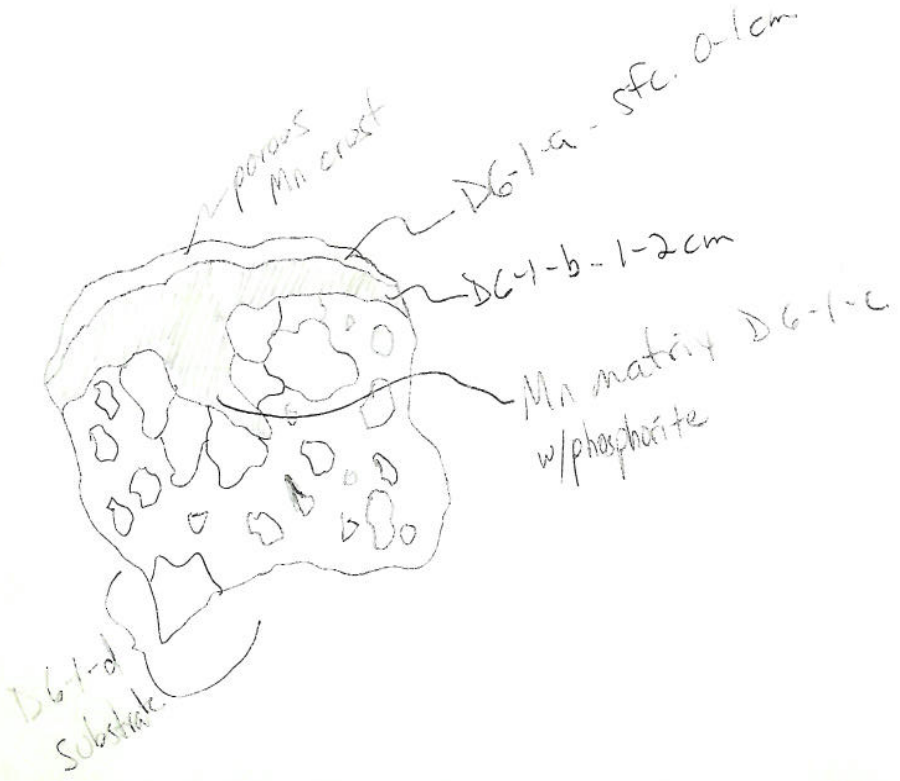
Description: altered red-brown volcanic clasts in phosphatized lime matrix — has soft white ooze in fractures (see next page for description)
volcanic clasts of at least 2 types red-brown, vesicular highly altered and massive, gray, less altered aphyric "basalt" Hawaiian?

Mineralogy (XRD):

Analyses and subsamples:

analysis:	analyst:
crust scraped off XRF	Tim Ling
~2.5kg piece to piece for T.S.	Janet Haggerty
small piece	A. Davis
" "	Bill Schwab
	Henry Meyer
* Sampled for chemistry:	S. Daniel
D6-1-a sfc 0-1cm } continuous interval	
D6-1-b 1-2cm	
D6-1-c Mn matrix	
D6-1-d substrate (bulk)	
Sampled for XRD	on ship
D6-1 Mn crust bulk 0-3cm	

* see back


porous Mn crust
D6-1-a - sfc. 0-1cm
D6-1-b - 1-2cm
Mn matrix D6-1-c
w/phosphorite
D6-1-d
Substrate

Cruise I.D: L[illegible]

Sample I.D: Sta 5 D 6-2

Location: Erikub SW 77[illegible]

Size: 42x30x12 cm Weight: ~ 12 kg

Depth: 2900 m

Mn crust thickness:

Total: min: 2 cm max: 5 cm ave: 3 cm

Inner crust: min: — max: — ave: —

Outer crust: min: — max: — ave: —

Surface texture: Knobby to granular (small botryoids)

Internal structure: abndt. vugs + pores

layered: ✓ very faintly (?)

laminated:

massive: ✓

porous:

dendritic:

other: lower 2cm appear to be replacing rock

Mineralogy (XRD):

Associated alteration, phosphorite, or hydrothermal deposits:

Substratum:

Rock type: volcanic breccia

Description: red-brown, altered angular volcanic cobbles in phospatized lime matrix angular 2-5cm clasts cut clast looks fairly fresh dark-gray; mostly aphyric similar to other D.6 basalt clasts

Mineralogy (XRD):

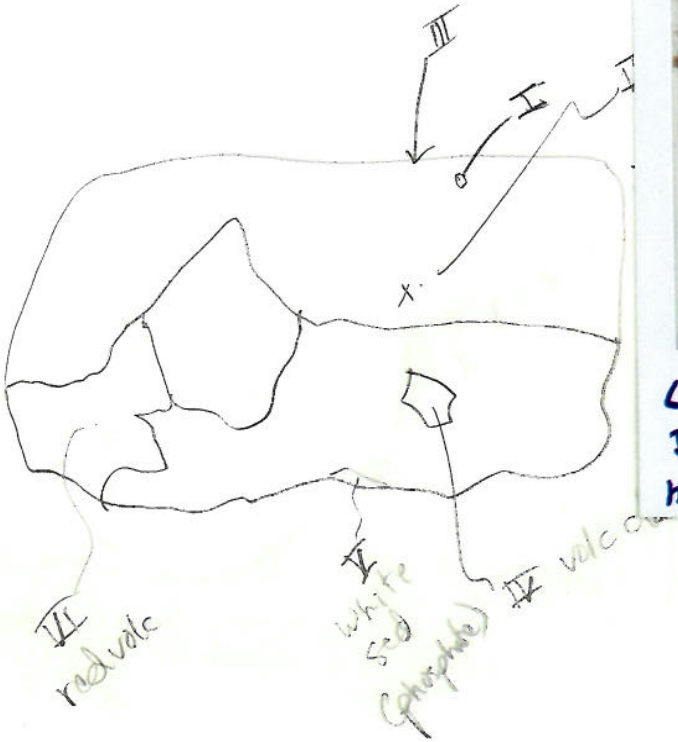
- Rock has been slabbed -

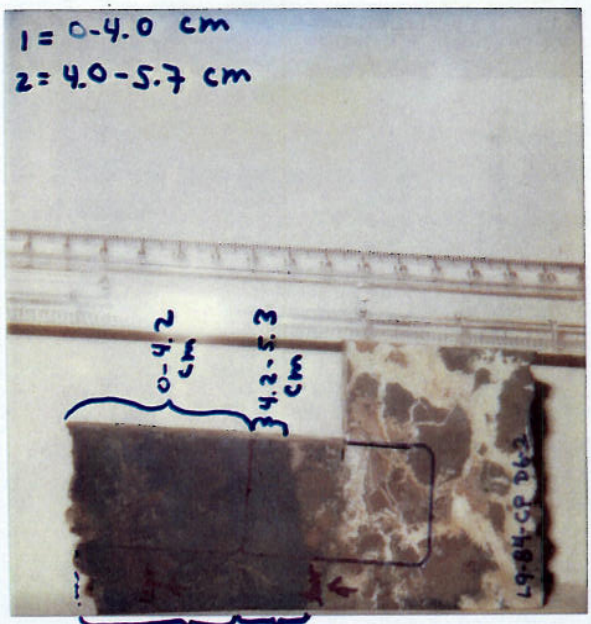
Analyses and subsamples:

analysis:	analyst:
piece of crust	Lauren M. (Scripp
~ 1.5 kg	Tim Ling
~ 1.0 kg	Bob Weldin
~ 1.0 kg	Janet Haggerty
piece for T.S.	A. Davis
Slab to	Doris Puteanus
XRD:	C. Daniel
I outer Mn crust 1-2.5cm	
II inner " " 2.5-5cm	
III outer surface Mn 0-.7cm	
IV volc. clast	
V phosphate matrix	
VI red volc.	
* Sampled for chem.:	C. Daniel
D6-2-a - botryoidal surface (0-7mm)	
D6-2-b - (7-15 mm)	
D6-2-c - (20-40mm)	
D6-2-D - (40-60mm)	

* from piece (~6cm thick) not of rubble bag

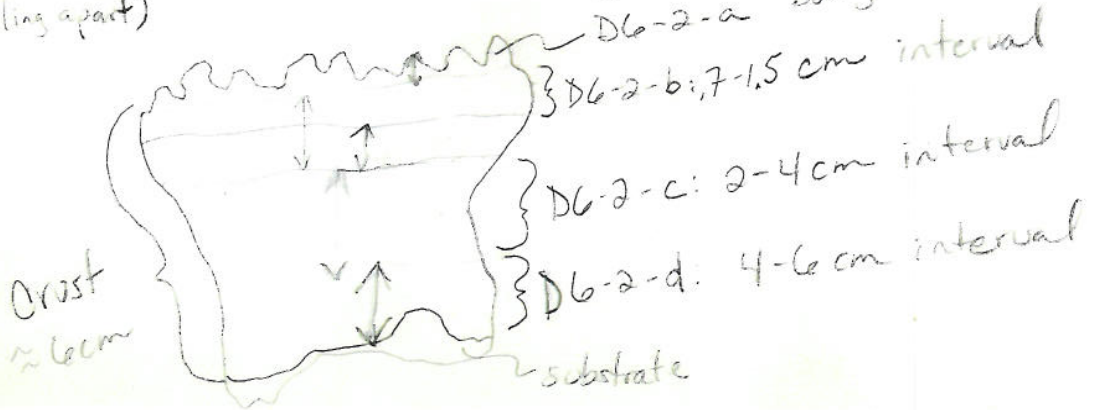
7/15/88: Sent again for DPTS, 7/15/88 to Mann Petrog. as 1st ones not clearly marked. misnumbered on slide causing doubt as to identity and slide mn section was broken, discontinuous LMG





L9-84-CP' sent for D.P.T.S. 7/15/88
D6-2 Lynn sampled on reverse side for isotopes
Marshall Is.

≈8X6x5 cm piece sampled for chemistry
(falling apart)



L9-84-CP

Cruise I.D: ~~[illegible]~~

Sample Description

Sample I.D: Sta: S D 6-2

Location: E. [illegible]

Size: _____ Weight: _____

Depth = 2900 m

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: _____

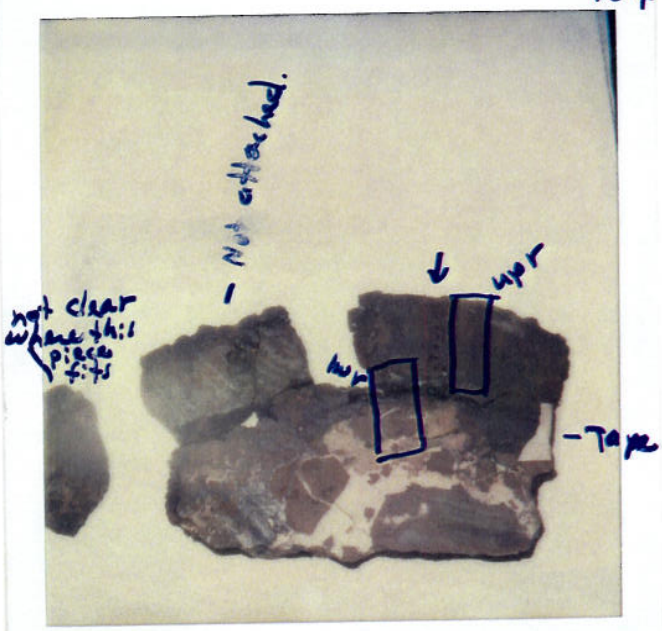
Mineralogy (XRD):

Analyses and subsamples:

analysis:	analyst:
4-16-86 resampled for chemistry for REE (not enough material the first time)	Denver
D6-2 I: 0-10mm botryoidal surface	
D6-2 II: 10-30mm-outer porous-Fe oxidized	
D6-2 III 30-50mm: inner massive	
Sampled Twice by Lynn Ingram 2 different Sr & Nd isotope	Lynn Ingram (see back)
Sent for Polished Section 5 Sept 87	Mann (see back)
The above REE powders were resubmitted for Hg Chem	

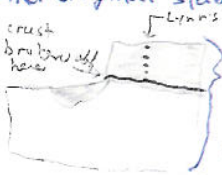
OVER→

9/87



L9-84-CP D6-2 Arrow shows where Lynn Ingram sampled for Sr/Nd isotopes. □ indicates pieces requested for doubly PTS.

Lynn Ingram resampled D6 2 for Sr/Nd isotopes. Couldn't find original slab, so she sampled the one pictured.



Sent these 2 pieces to Dave Mann to make doubly polished thin sections, suitable for microprobe. Asked him to preserve sample as much as possible, esp where Lynn sampled, + to send a vial of mixture sample was impregnated in - so if we need to resample we can get mixture chemically analyzed. Crust thickness where Lynn samples is 5 cm.

L9-84-CP D6-2 slab sampled by Lynn Ingram for Sr/Nd isotopes, + sent for doubly PTS to Dmann

Sample Description

Cruise I.D: L9-84-CP Sample I.D: Sta: 5 : 6-3 Location: Erikub SW 770

Size: 25x16x8 cm Weight: ~4 kg Depth: 2900 m

Mn crust thickness:

Total: min: 0 max: < 1mm ave:

Inner crust: min: max: ave:

Outer crust: min: max: ave:

Surface texture: porous, dendritic

Internal structure:

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

Mineralogy (XRD):

Associated alteration, phosphorite, or hydrothermal deposits:
Fe oxide stains
phosphorite matrix

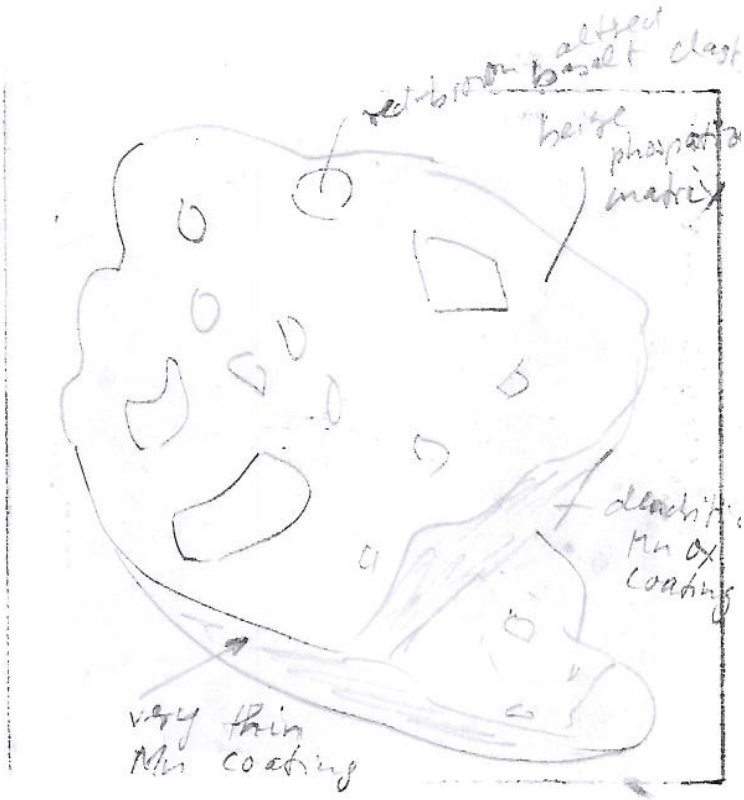
Substratum:

Rock type: phosphatized limestone with minor amount of volcanics

Description: red-brown angular + sub-rounded volcanic clasts in beige phosphatized limestone matrix
forams of Cretaceous age

Mineralogy (XRD):

Phos. Study Finished



Analyses and subsamples:

analysis:	analyst:
small piece for T.S. ~ 1/2 of total to	A. Davis
	Janet Haggerty
3.5mm slide 6/28/90	G. Smith
	G. Smith
Polaroids Back	
D6-3 DPTS	
Layer A, B, + D	
sampled for O_2, Sr + XRD	

Packed w/ L9-84-CP D18-3

D6-3
L9-84-CP

Clum location
xED
O_2
Sr

A
B
D

L9-84-CP
D6-3

Sample Description

Cruise I.D: L9-84-CP Sample I.D: Sta: 5 D 6-4 Location: Erikub SW 770

Size: 18x15x3 cm Weight: ~1.5 kg Depth: 2900 m

Mn crust thickness:

Total: min: 1 mm max: 5 mm ave: 2 mm

Inner crust: min: — max: — ave:

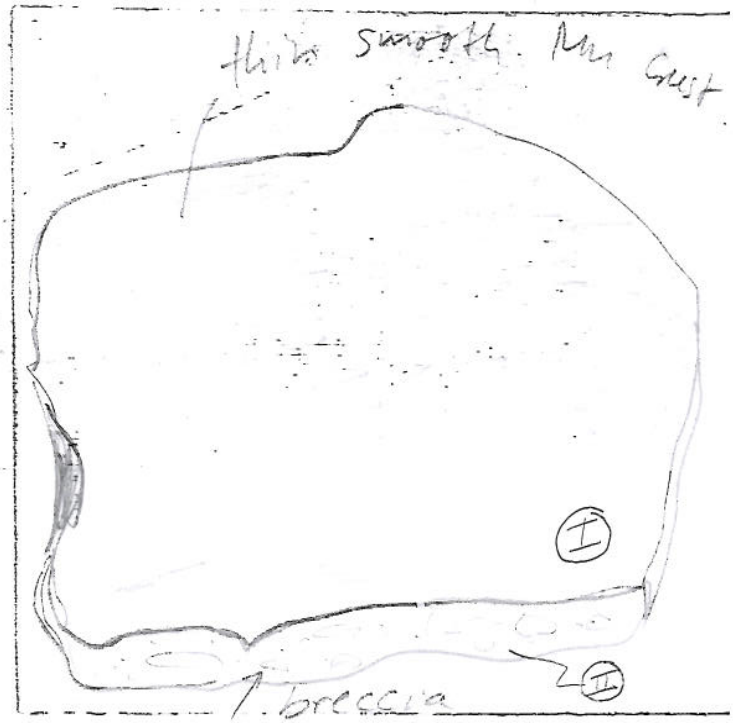
Outer crust: min: max: ave:

Surface texture: smooth to granular

Internal structure: —

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

Mineralogy (XRD):



Associated alteration, phosphorite, or hydrothermal deposits:
red-brown + yellow-brown Fe oxide stains

Substratum:

Rock type: volcanic breccia in beige phosph. lime matrix

Description: angular clasts (sand size to several cm) of highly altered volcanic clasts in beige phosphatized limestone matrix

Mineralogy (XRD):

Analyses and subsamples:

analysis:	analyst:
2 small pieces	Janet Haggerty
Sampled for chem	C. Daniel
D6-4-a sfc Mn (0-5mm)	
D6-4-b bulk substrate	
Sampled for XRD:	C. Daniel
D6-4-I bulk Mn crust 0-5mm	
D6-4-II bulk Substrate	

Sample Description

Cruise I.D: L9-84-CP Sample I.D: Sta: 5 D 6-5 Location: Erikub SW 770

ize: 14x10 x 5cm Weight: ~1.5 kg. Depth: 2900 m

Mn crust thickness: thin coating

Total: min: max: ave:

Inner crust: min: max: ave:

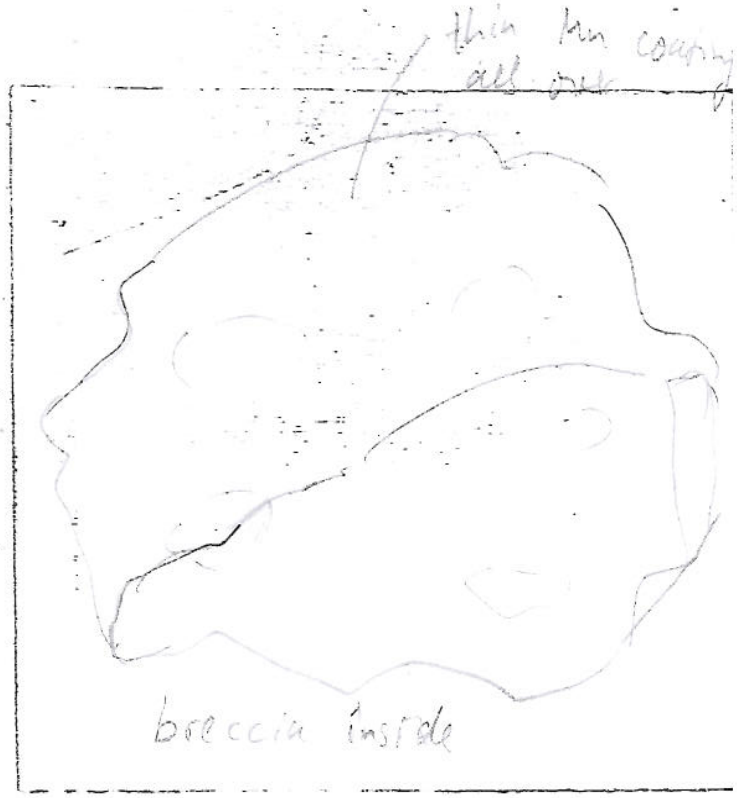
Outer crust: min: max: ave:

Surface texture: following underlying surface

Internal structure:

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

Mineralogy (XRD):



Associated alteration, phosphorite, or hydrothermal deposits:

Substratum:

Rock type: volcanic breccia in phosphatized limest. matrix

Description: angular to subrounded clasts of volcanics and phosphorite(?) some with their own Mn crust in pinkish-beige phosphatized matrix (won't fizz)

Mineralogy (XRD):

Analyses and subsamples:

analysis:	analyst:

Sample Description

Cruise I.D: L9-84-CP Sample I.D: Sta: 5 D 6-6 Location: Erikuls S

Size: 16x10x3 cm Weight: ~1.5 kg Depth: 770

3 pieces all crust

Mn crust thickness:

Total: min: 1 cm max: 3.5 cm ave: 3 cm

Inner crust: min: max: ave:

Outer crust: min: max: ave:

Surface texture: shiny smooth on top with scour marks, dull smooth underside

Internal structure:

layered: ✓

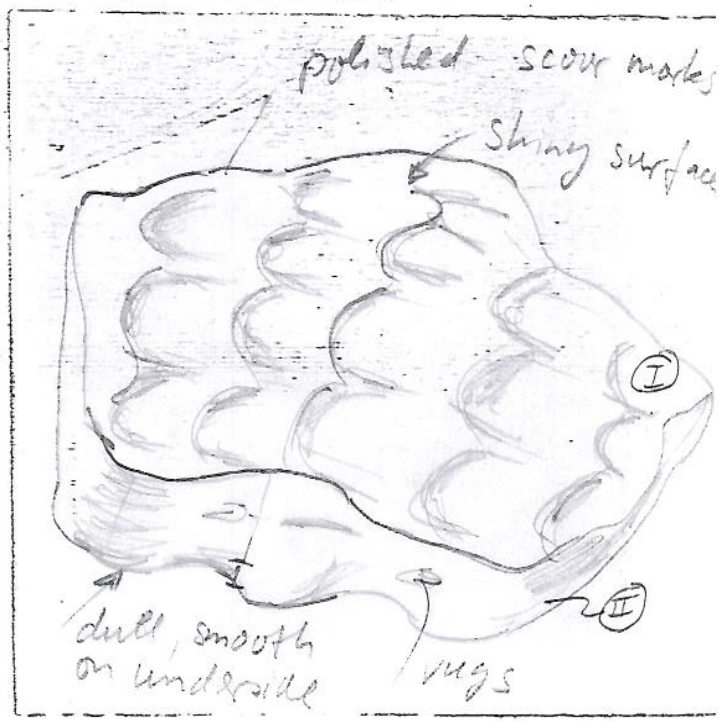
laminated: ✓ v. faint (?)

massive:

porous: ✓

dendritic:

other: vuggy, folded + kinky



Mineralogy (XRD):

Associated alteration, phosphorite, or hydrothermal deposits:

Substratum:

Rock type: None

Description:

Mineralogy (XRD):

Analyses and subsamples:

analysis:	analyst:
small piece to	Henry Meyer
" " "	Janet Hagger
Sampled for chem	C. Daniel
D6-6-a - surface (0-1cm)	
D6-6-b - 1-2.5cm	
D6-6-c - 2.5-3.5cm (bottom sfc)	
Sampled for XRD:	C Daniel
D6-6-I sfc. Mn 0-1cm	
D6-6-II bottom Mn 1-3.5cm	

DG-6 Fluted crust
L9-84-CP

Sample Description

Cruise I.D: L9-84-CP

Sample I.D: Sta: 5 D 6-7

Location: Erikub Sm 770

Size: 19x12x5 Weight: ~2 kg.

Depth: 2900 m

Mn crust thickness: thin coating

Total: min: max: ave:

Inner crust: min: max: ave:

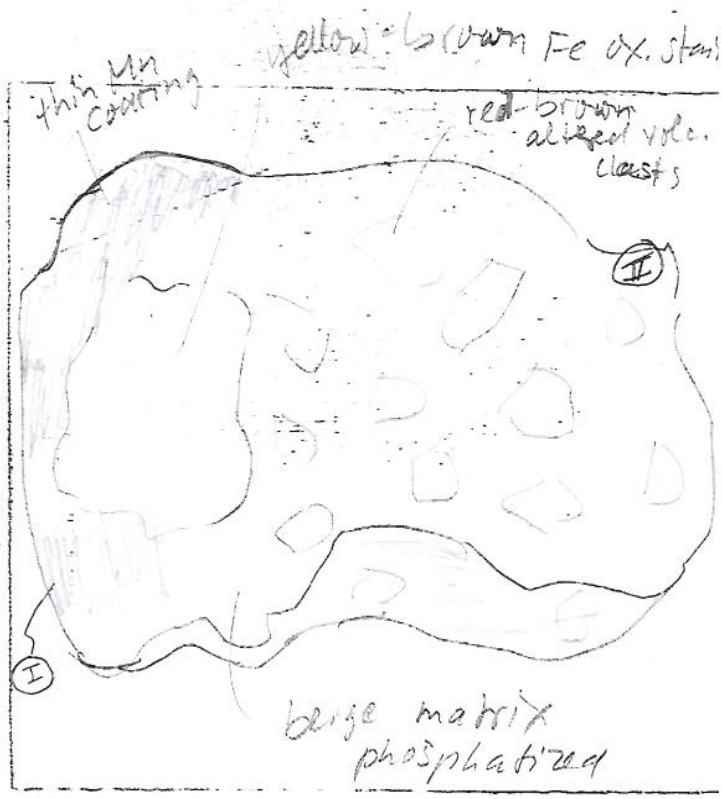
Outer crust: min: max: ave:

Surface texture:

Internal structure:

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

Mineralogy (XRD):



Associated alteration, phosphorite, or hydrothermal deposits:
Fe oxide stains

Substratum:

Rock type: volcanic breccia in beige matrix

Description:
highly altered, angular, red-brown clasts in beige phosphatized limestone matrix (dendritic MnO_2 in matrix)

basalt: trachytic texture abndt. brown Fe ox. (?) in ground mass may be olivine pseudomorphs

Mineralogy (XRD):

Analyses and subsamples:

analysis:	analyst:
piece for T.S.	A. Davis
piece to	Janet Haggerty
Sampled for XRD:	C. Daniel
D6-7-I - bulk Mn (0-2mm)	
D6-7-II bulk substrate	

Sample Description

Cruise I.D: L9-84-CP Sample I.D: Sta: 5 D 6-8 Location: Erikub SW 77C

Size: 10x8x4 cm Weight: 0.3 kg. Depth: 2900 m

Mn crust thickness:

Total: min: 1cm max: 4cm ave: 3 cm
Mn crust piece w/substrate only 2.5cm max

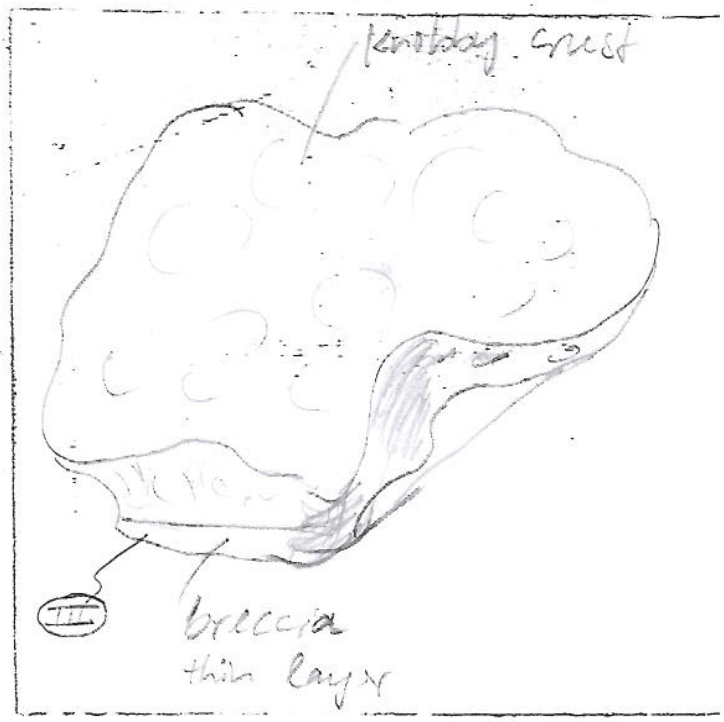
Inner crust: min: max: ave:

Outer crust: min: max: ave:

Surface texture: knobby, porous

Internal structure:

layered: ✓ faintly
laminated:
massive:
porous: ✓
dendritic:
other: vuggy, folded + kinky
vugs filled w. ooze + Fe oxide



Mineralogy (XRD):

Associated alteration, phosphorite, or hydrothermal deposits:
Fe oxide in vugs

Substratum:

Rock type: volcanic breccia

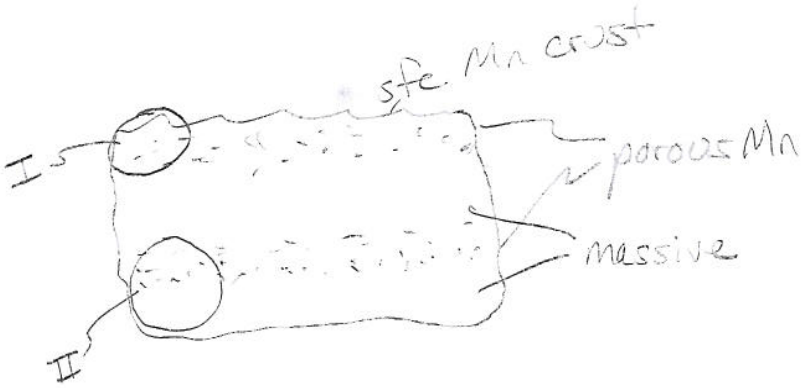
Description: dark-gray sandy matrix with irregular red-brown volcanic clasts

Mineralogy (XRD):

Analyses and subsamples:

analysis:	analyst:
* Sampled for XRD:	C. Daniel
D6-8-I - sfc. Mn 0-1cm	
- II inner Mn 1-2.5cm	
- III bulk Substrate	

*See back


sfc. Mn crust
I
II
porous Mn
massive

Sample Description

Cruise I.D: L9-84-CP

Sample I.D: Sta: 5 D 6-9

Location: Erikub Sh 770

Size: 20x16x3 cm Weight: ~1 kg.

Depth: 2900 m

Mn crust thickness: thin coating only

Total: min: max: ave:

Inner crust: min: max: ave:

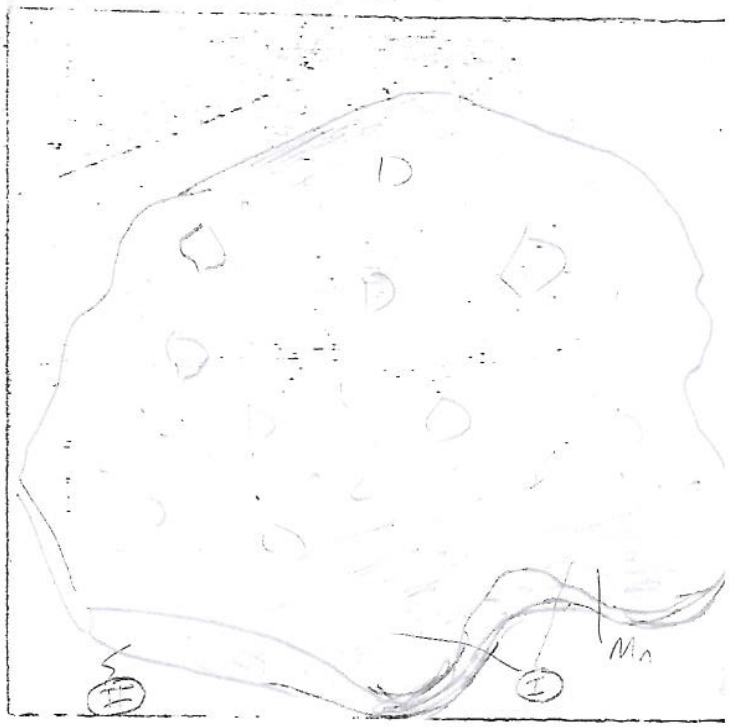
Outer crust: min: max: ave:

Surface texture: Like substratum

Internal structure:

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

Mineralogy (XRD):



Associated alteration, phosphorite, or hydrothermal deposits:
lots of yellow-brown Fe oxide stains

Substratum:

Rock type: Volcanic breccia

Description: highly altered angular to subrounded volcanic clasts in greenish-gray granular matrix (looks like rounded calcarenite matrix but won't fizz very well - phosphatized)

Mineralogy (XRD):

Analyses and subsamples:

analysis:	analyst:
piece for T.S.	A. Davis
Sampled for XRD:	C. Daniel
D69-I - Composite Mn w/subst	
D69-II - Bulk Substrate	

Sample Description

Cruise I.D: L9-84-CP Sample I.D: Sta: 5 D 6-10 Location: Erikub S 770

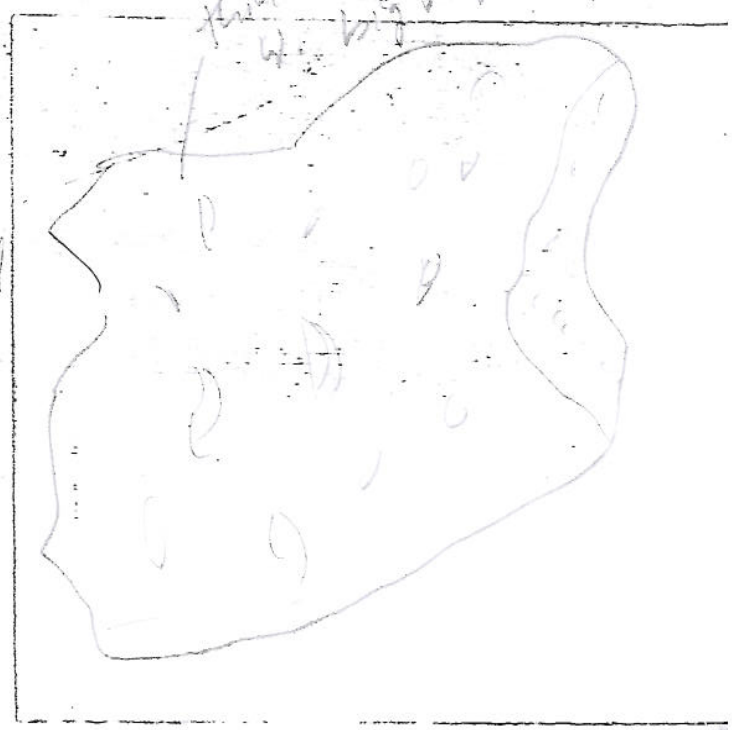
ize: 16x10x4 cm Weight: < 1 kg Depth: 2900 m

Mn crust thickness:

Total: min: 1/2 cm max: 2 cm ave: 1 cm

Inner crust: min: — max: — ave: —

Outer crust: min: — max: — ave: —



Surface texture: vuggy + porous & botryoidal

Internal structure:

layered: ✓
laminated:
massive:
porous: ✓
dendritic: ✓ thruout rock
other:

Mineralogy (XRD):

Associated alteration, phosphorite, or hydrothermal deposits:

Substratum:

Rock type: bioturbated phosphatized limey siltstone

Description: (dessicated) very light weight beige to brown porous (bioturbated) (foram?) siltstone w/ some Fe oxide staining & Mn filled vugs

Mineralogy (XRD):

Analyses and subsamples:

analysis:	analyst:
*Sampled for XRD:	C. Daniel
D6-10-I - Sfc. Mn crust (0-5cm)	
D6-10-II - composite substrate w/ Mn	

* see back

I
mottled siltstone ? covered by Mn ?
Vugs or bioturbations
Mn
siltstone
II

Sample Description

Cruise I.D: L9-84-CP Sample I.D: Sta: 5 D6-11 Location: Erikub SW 77C

Size: _____ Weight: ~1.5 kg Depth: 2900 m

Mn crust thickness:

Total: min: 1cm max: 4cm ave: 2cm

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

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

Surface texture: nobby to granular

Internal structure:

layered: ✓
laminated:
massive: ✓
porous: ✓ slightly
dendritic:
other: vuggy

Mineralogy (XRD):

Associated alteration, phosphorite, or hydrothermal deposits:

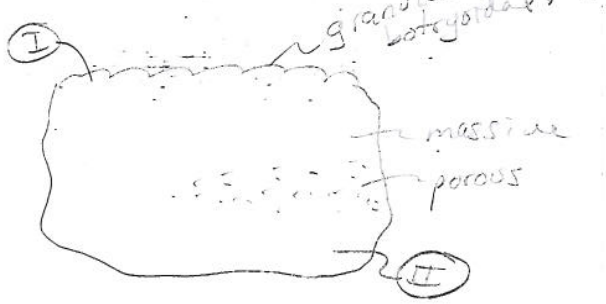
Substratum:

Rock type: None

Description: looks like Mn crust is replacing highly porous bioturbated siltstone in a few pieces which are less dense than the other solid Mn pieces

Mineralogy (XRD):

bag of small pieces that appear to be all Mn crust



Analyses and subsamples:

analysis:	analyst:
piece to	Henry Meyer
" "	Bob Weldin
Sampled for XRD:	C. Daniel
D6-11-I sfc. Mn 0-.5cm	
-II inner 2.5-3cm Mn	

Sample Description

Cruise I.D: L9-84-CP Sample I.D: Sta: 5 D 6-12 Location: Erikub SW 770

Size: 24x14x8cm Weight: ~3 kg Depth: 2900 m

Needs to be cut!

Mn crust thickness:

Total: min: 1 cm max: 5 cm ave: 3 cm

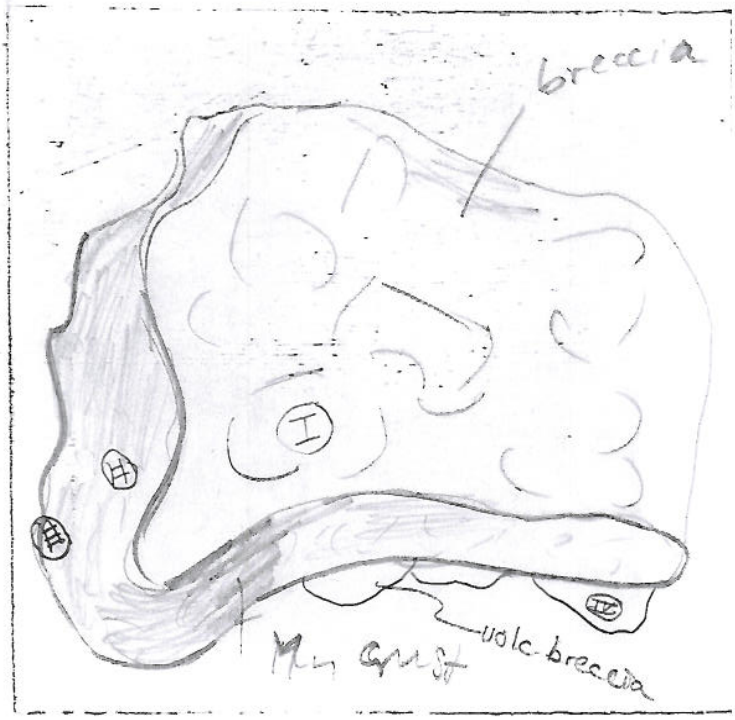
Inner crust: min: max: ave:

Outer crust: min: max: ave:

Surface texture: smooth granular to knobby

Internal structure:

layered: ✓ faint ~3
laminated:
massive: ✓
porous: ✓
dendritic:
other: vuggy



Mineralogy (XRD):

Associated alteration, phosphorite, or hydrothermal deposits:
Fe oxide stains

Substratum:

Rock type: volcanic breccia

Description: angular to subrounded clasts to several cm in size in gray-brown phosphatized silty matrix

Mineralogy (XRD):

Analyses and subsamples:

analysis:	analyst:
Sampled for XRD:	C. Daniel
D6-12-I Surface (0-1.0 cm) Mn	
D6-12-II middle (2-2.5 cm) Mn	
D6-12-III Bed layer (4-5 cm) Mn	
D6-12-IV Bulk Substrate	
Slab to:	Doris Puteanos
Doubly Polished Thin Section by Von Huene	

DG-12
L9-84-CP

Cruise I.D: L9-84-CP

Sample Description

Sample I.D: Sta: 5 D 6-13

Location: Erikub S 72C

Size: 22x18x5 cm Weight: ~2 kg

Depth: 2900 m

Mn crust thickness:

Total: min: 1cm max: 5cm ave: 3 cm

Inner crust: min: ___ max: ___ ave: ___

Outer crust: min: ___ max: ___ ave: ___

Surface texture: knobby + porous

Internal structure:

layered: ✓ ~3 middle layer brownish

laminated:

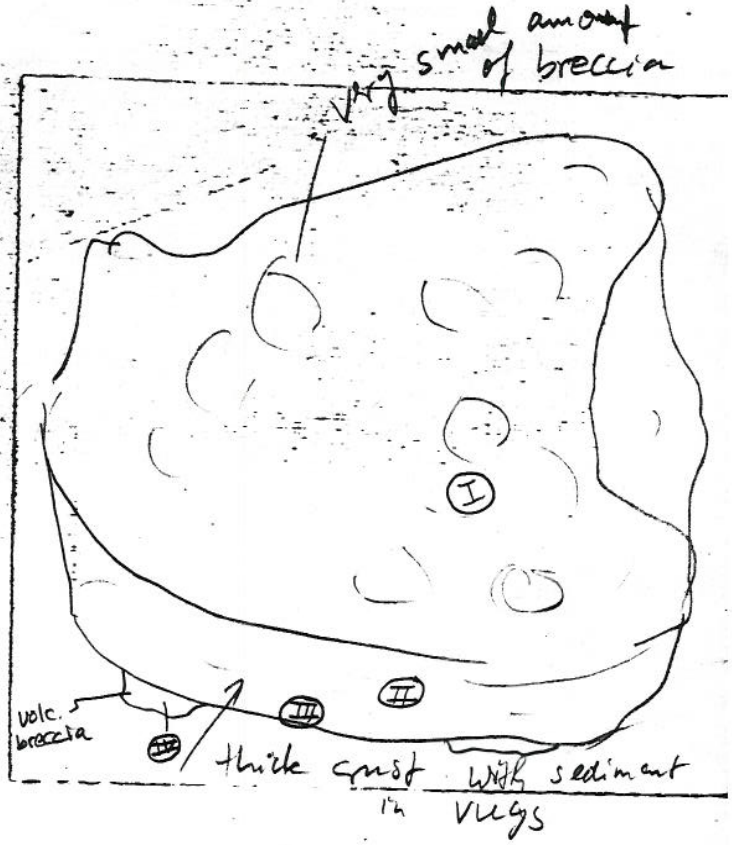
massive:

porous:

dendritic:

other: vuggy

Mineralogy (XRD):



Associated alteration, phosphorite, or hydrothermal deposits:

Substratum:

Rock type: Volcanic breccia - extremely altered -

Description: mostly thick crust with trace of breccia clinging to underside, center of crust looks brownish (mixed with sediment?) evidence of bioturbation and maybe soft sediment deformation looks almost like crust replacing rocks by filling in burrows

Mineralogy (XRD):

Analyses and subsamples:

analysis:	analyst:
Sampled for chem	C. Daniel
D6-13-a - porous surface (0-.5cm)	
D6-13-b - .5-2.5 cm	
D6-13-c - 2.5-4.5 cm	
Sampled for XRD:	C. Daniel
D6-13-I - Surface Mn crust (0-.7cm)	
D6-13-II - Middle (1-3cm) Mn	
D6-13-III - Bottom (3.5-4.5cm) Mn	
D6-13-IV - Bulk Substrate	

Sample Description

Cruise I.D: L9-84-CP

Sample I.D: Sta: 5 D6-14

Location: Erikub Sl

Size: 18x12x6 cm Weight: ~1 kg

Depth: 2900 m

Mn crust thickness:

Total: min: 0 max: 1mm ave: <1mm

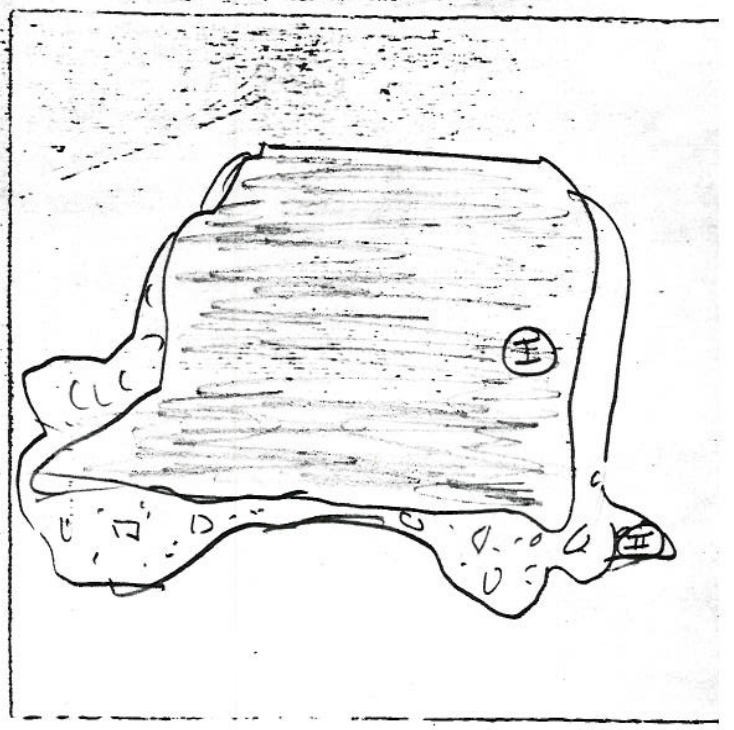
Inner crust: min: max: ave:

Outer crust: min: max: ave:

Surface texture: Smooth to granular

Internal structure: —

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



Mineralogy (XRD):

Associated alteration, phosphorite, or hydrothermal deposits:
red-brown Fe ox. stains

Substratum:

Rock type: Volcanic breccia or SST.

Description: sand size to ~1cm clasts of volcanic rock with small amount of phosphatized matrix

Mineralogy (XRD):

Analyses and subsamples:

analysis:	analyst:
small piece to	Janet Haggerty
Sampled for XRD:	C. Daniel
D6-14-I-bulk sfc. Mn crust 0-1cm	
D6-14-II-bulk substrate	

Sample Description

Cruise I.D: L9-84-CP

Sample I.D: Sta: 5 D6-15

Location: Erikub Sl 77C

Size: ____ Weight: ~ 5 kg

Depth: 2900 m

Mn crust thickness: thin coating

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: phosphatized limestone bearing volcanic clasts

Description: dendritic MnO_2 throughout matrix.

basalt clast: aphyric, v. fine grnd, trachytic looking texture

Mineralogy (XRD):

bag of vuggy limestone pieces w. very thin crust on most — typically on both sides. Volcanic clasts are not very abundant, < 1 cm in size, generally rounded to subangular and highly altered. One large clast (~ 5cm DIA) taken for T.S.

Analyses and subsamples:

analysis:	analyst:
piece for T.S.	A. Davis
Sampled for XRD:	C. Daniel
D6-15C-I - bulk sfc. Mn 0-1mm	
D6-15C-II - bulk substrate	

Sample Description

Cruise I.D: L9-84-CP

Sample I.D: Sta: 5 D 6-16

Location: Erikub Su 77

Size: 10x5x4cm Weight: 0.4 kg.

Depth: 2900 m

Mn crust thickness:

Total: min: 0 max: 1mm ave: —

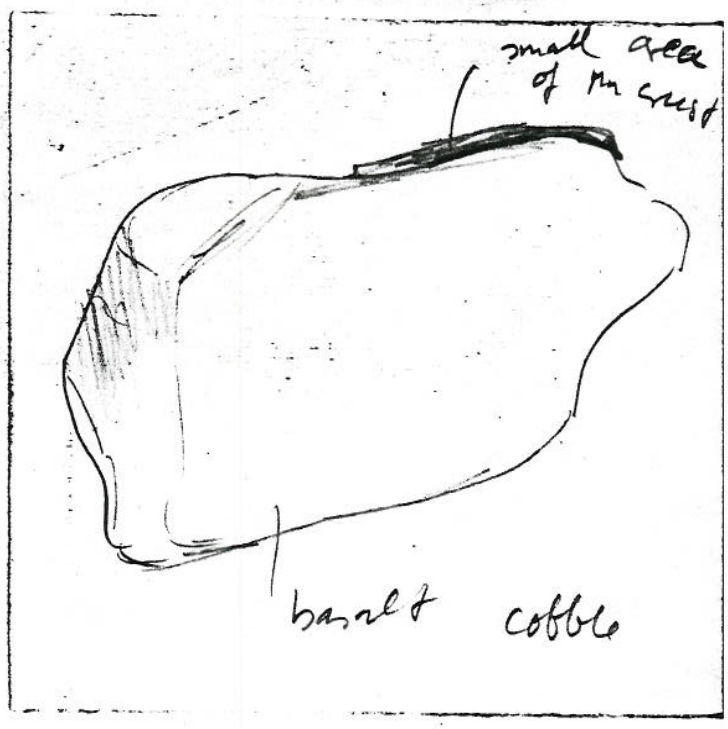
Inner crust: min: — max: — ave: —

Outer crust: min: — max: — ave: —

Surface texture: Smooth

Internal structure: —

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



Mineralogy (XRD):

Associated alteration, phosphorite, or hydrothermal deposits:
brown Fe oxide stains

Substratum:

Rock type: Subrounded dk. gray basalt cobble

Description: v. fine grnd, sparsely vesicular (<1%), sparsely plagioclase phyric (<5%) (micro-phenos) basalt; very rare (<1%) olivine(?) phenocrysts (to 2mm) completely replaced by Fe oxides

Mineralogy (XRD):

Analyses and subsamples:

analysis:	analyst:
piece for T.S	A. Davis

Cruise I.D: L9-84-CP ~~[illegible]~~

Sample Description

Sample I.D: Sta: 5 D 6-17

Location: Erikub SW 770

Size: _____ Weight: 0.2 kg

Depth = 2900 m

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): _____

2 small basalt cobbles similar to D6-16

Analyses and subsamples:

analysis:	analyst:
piece for T.S.	A. Davis

L9-84-CP

Sample Description

Cruise I.D: [redacted]

Sample I.D: Sta: 5 D 6 – 18

Location: Erikub SW

Size 14x10x7 cm Weight: ~1.5 kg

Depth = 2900 m

770

Mn crust thickness: v. thin coating

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):

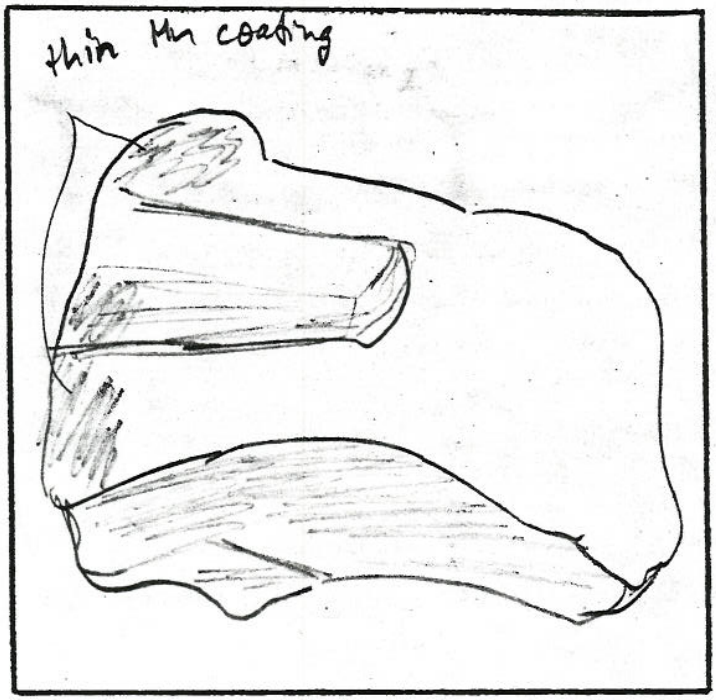
Associated alteration phosphorite, or hydrothermal deposits:

Substratum:

Rock type: basalt cobble

Description: angular to subrounded reddish-brown basalt clast dark-gray inside – fairly fresh-looking very rare plagioclase microphenocrysts – small reddish-brown specks in groundmass maybe olivine pseudomorphs(?)

Mineralogy (XRD):



Analyses and subsamples:

analysis:	analyst:
piece for T.S.	A. Davis
chemistry & K/Ar	A. Davis

L9-84-CP

Sample Description

Cruise I.D: ~~[illegible]~~

Sample I.D: Sta: 5 D 6-19

Location: Erikub SW 770

Size: 11x6x5 cm Weight: 0.3 kg

Depth = 2900 m

Mn crust thickness:

Total: min: 0 max: 9 mm ave: 3 mm

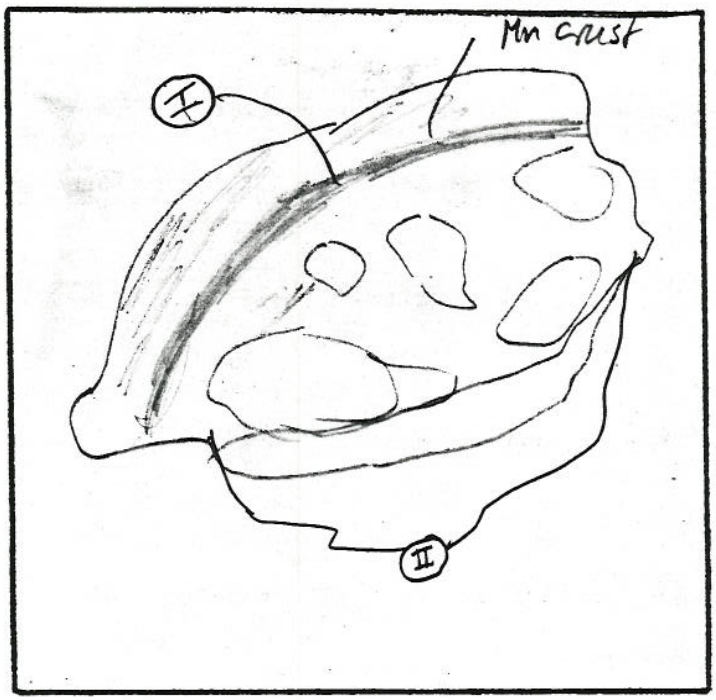
Inner crust: min: — max: — ave: —

Outer crust: min: — max: — ave: —

Surface texture: Smooth to Shiny

Internal structure:

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



Mineralogy (XRD):

Associated alteration, phosphorite, or hydrothermal deposits:

Feoxides in crust

Substratum:

Rock type: breccia with volcanic + phosphorite(?) clasts in

Description: phosphatized lime matrix

Mineralogy (XRD):

Analyses and subsamples:

analysis:	analyst:
Sampled for XRD:	C. Daniel
D6-19-I-bulk Sfc. Mn 0-9cm	
D6-19-II-bulk Substrate	

L9-84-CP

Sample Description

Cruise I.D: [redacted]

Sample I.D: Sta: 5 D 6-20

Location: Eriboll SW 270

Size: 16x6x4 cm Weight: 0.3 kg

Depth = 2900 m

Mn crust thickness:

Total: min: 0.5 max: 2cm ave: 1cm

Inner crust: min: — max: — ave: —

Outer crust: min: — max: — ave: —

Surface texture: knobby w. smooth + porous areas

Internal structure:

layered: ✓ 2 or 3 faint layers

laminated:

massive:

porous:

dendritic:

other:

Mineralogy (XRD):

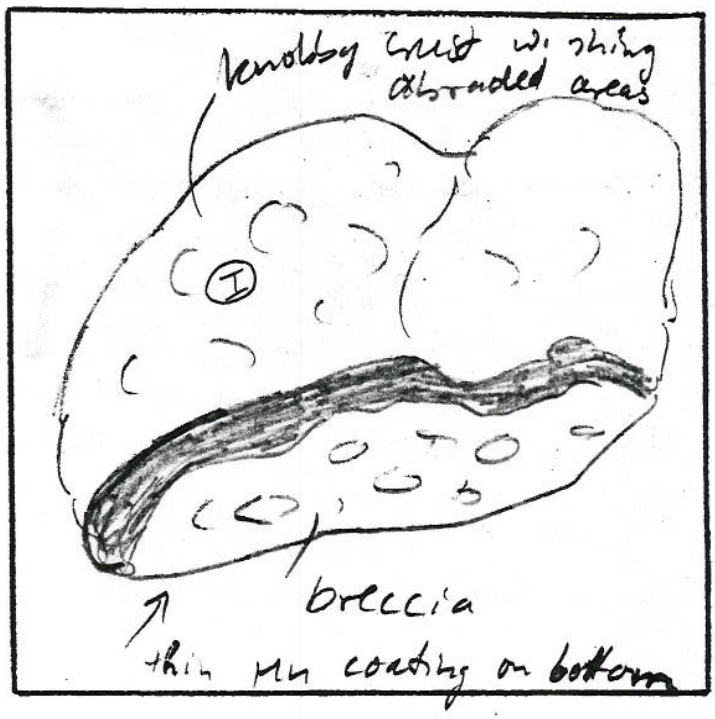
Associated alteration, phosphorite, or hydrothermal deposits:

Substratum:

Rock type: Volcanic breccia

Description: angular and rounded clasts of highly altered volcanics and phosporite in phosphatized limestone matrix

Mineralogy (XRD):



Analyses and subsamples:

analysis:	analyst:
piece for T.S.	A. Davis
Sampled for XRD:	C. Daniel
D6-20-I - Surface Mn 0-1cm	
D6-20-II - bulk substrate	

L9-84-CP

Sample Description

Cruise I.D: [redacted]

Sample I.D: Sta: 5 D6-21

Location: Eniwetok SW 770

Size: 11x7x5 cm Weight: 0.5 kg.

Depth = 2900 m

Mn crust thickness:

Total: min: 2mm max: 1.5cm ave: 8 mm

Inner crust: min 2mm max: 1cm ave: 5 mm

Outer crust: min: 0 max: 5mm ave: 3 mm

Surface texture: smooth + granular

Internal structure:

layered: 2 inner layer brownish Fe oxides

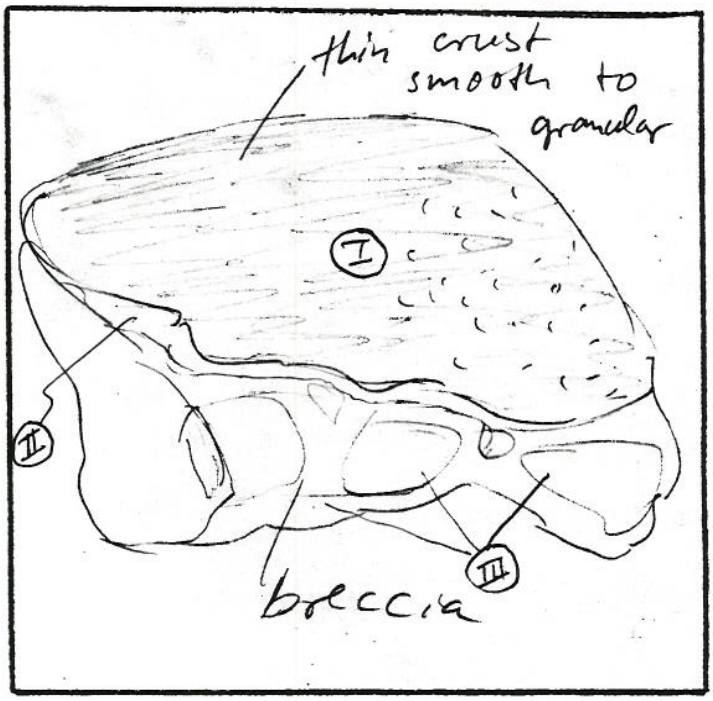
laminated:

massive: ✓

porous: ✓ inner

dendritic:

other:



Mineralogy (XRD):

Associated alteration, phosphorite or hydrothermal deposits:

Substratum:

Rock type: volcanic breccia

Description: highly altered volcanic clasts and phosphorite clasts in phosphatized, beige limestone matrix

Mineralogy (XRD):

Analyses and subsamples:

analysis:	analyst:
Sampled for XRD:	C. Daniel
D6-21-I-outer Mn 0-.5cm	
D6-21-II-inner Mn .5-1.5cm	
D6-21-III-bulk substrate	

L9-84-CP

Cruise I.D: [redacted]

Sample Description

Sample I.D: Sta: 5 D 6-22

Location: Erikub SW 770

Size: 14x9x6 cm Weight: _____

Depth = 2900 m

Mn crust thickness: — none

Total: min: _____ max: _____ ave: _____

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

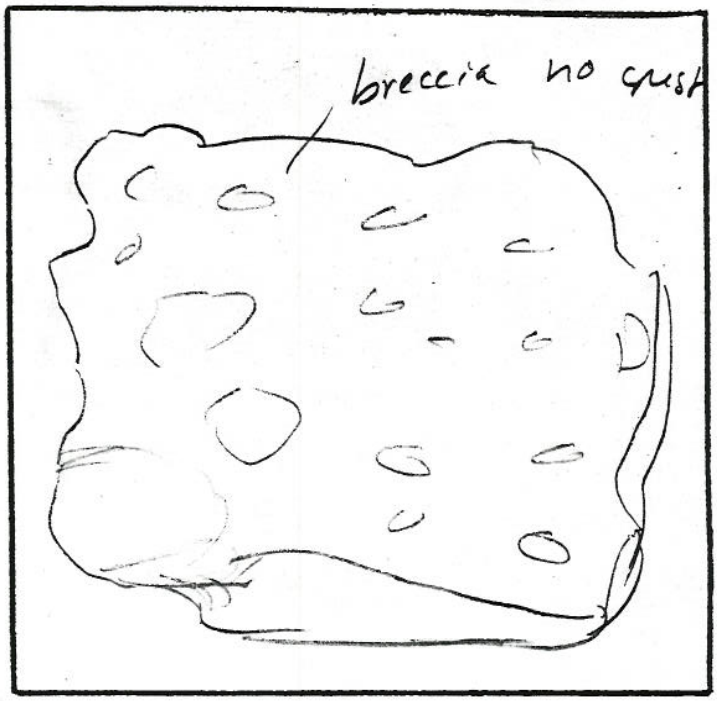
Outer crust: min: _____ max: _____ ave: _____

Surface texture: _____

Internal structure: —

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

Mineralogy (XRD): _____



Associated alteration, phosphorite, or hydrothermal deposits:
Mn dendrites in phosphorite matrix

Substratum:

Rock type: phosphatized limestone with ~25% angular clasts

Description: of massive and some vesicular basalt clasts

Mineralogy (XRD): _____

Analyses and subsamples:

analysis:	analyst:
piece for T.S.	A. Davis
Sampled for XRD: D6-22-I-composite	C. Daniel

L9-84-CP

Sample Description

Cruise I.D: [redacted]

Sample I.D: Sta: 5 D 6-23

Location: Erikeb SW70

Size: 14x12x3 cm Weight: < 1 kg

Depth = 2900 m

Mn crust thickness:

Total: min: 0.3 cm max: 1.5 cm ave: 0.5 cm

Inner crust: min: — max: — ave: —

Outer crust: min: — max: — ave: —

Surface texture: smooth to granular BOTRYOIDAL

Internal structure:

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

Mineralogy (XRD):

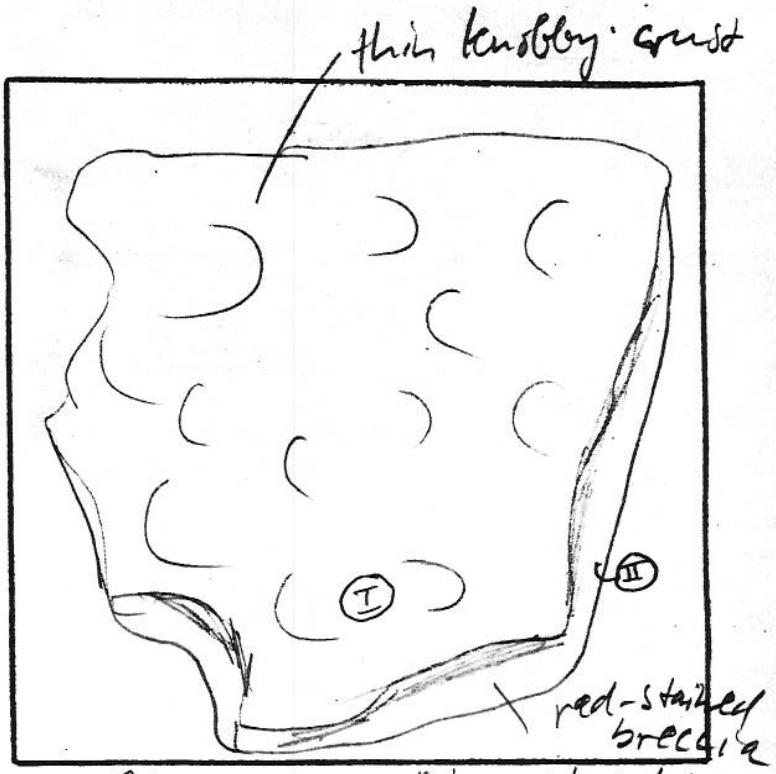
Associated alteration, phosphorite, or hydrothermal deposits:
Fe ox. stains

Substratum:

Rock type: volcanic breccia

Description: red-brown stained breccia with volcanic clasts sub to well rounded in sandy matrix

Mineralogy (XRD):



thin coating of Mn started to develop also on underside

Analyses and subsamples:

analysis:	analyst:
Sampled for XRD:	C. Daniel
D6-23-I - Surface Mn Crust 0-1cm	
D6-23-II - bulk Substrate	

L9-84-CP

Sample Description

Cruise I.D: ~~[illegible]~~

Sample I.D: Sta: D 6-24

Location: Erikub SW 770

Size: 9x6x2 cm Weight: < 0.6 kg

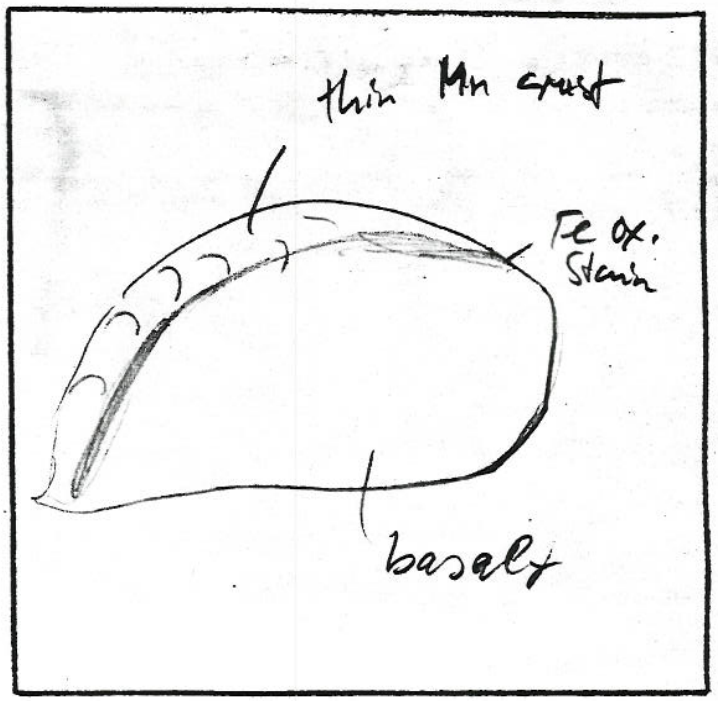
Depth = 2900 m

Mn crust thickness:

Total: min: 0 max: 1cm ave: 1/2 cm

Inner crust: min: max: ave:

Outer crust: min: max: ave:



Surface texture: granular + knobby

Internal structure:

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

Mineralogy (XRD):

Associated alteration, phosphorite, or hydrothermal deposits:

Fe oxide stain below Mn crust

Substratum:

Rock type: basalt cobble

Description: dark gray, v. fine grnd, sparsely phyric basalt rare plagioclase + pyroxene microphenocrysts (< 5%)

Mineralogy (XRD):

Analyses and subsamples:

analysis:	analyst:
piece for T.S.	A. Davis
chemistry + K/Ar	A. Davis

L9-84-CP

Sample Description

Cruise I.D: [redacted]

Sample I.D: Sta: 5 D 6-25

Location: Erikub SW 770.

Size: _____ Weight: < 0.5 kg

Depth = 2900 m

Mn crust thickness:

Total: min: 0 max: 2 mm ave: 1 mm

Inner crust: min: ___ max: ___ ave: ___

Outer crust: min: ___ max: ___ ave: ___

Surface texture: smooth to granular

Internal structure: ___

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

Mineralogy (XRD):

Associated alteration, phosphorite, or hydrothermal deposits:
Fe oxide stains

Substratum:

Rock type: phosphatized limestone

Description:

Mineralogy (XRD):

5 pieces of flat (5 cm to 9 cm DIA) limestone mildly phosphatized — with thin Mn crust on one side and thin coating of Fe oxide and Mn oxide on other side. Volcanic clast very sparse. Dendritic Mn oxide in matrix.

Analyses and subsamples:

analysis:	analyst:
2 pieces (a + b) to	Janet Haggerty
Sampled for XRD:	C. Daniel
DG-25-I: composite-Mn + substrate	