DREDGE 1

Dredge Sample Summary Sheet

Sample ID	Bulk CC	Layer CC	Pt & Au	Ree	OC	DPTS/TS	XRD	35mm Photo	Paleo	Archive
DI-1A	X						X			
DI-1B	X						X			
DI-2										
DI-3										
DI-4					X PC + OC	X SUB SAMPLE			X	
DI-5										
DI-6					X		X			
DI-7										
DI-8	X	X (6)	X X	X			7 X	X surface		
DI-9	X	surface x					X			
DI-10										
DI-11										
DI-12										Y2 mod. w/ H2O
DI-13										
DI-14										
DI-15										
DI-16										

SAMPLE DESCRIPTION

Ave 4 cm Min 2 cm max 6 cm diameter

Cruise Id: F11-90-CP Size (cm): 2-6 cm Location: Pohnpei A

Sample Id: D1-1-1 Weight (kg): ≈ 250 Depth (m): 2200 - 2105 m

Mn Crust Description

Surface Texture: Botryoidal
some smoothed by currents

Mn Crust Thickness (mm):

Min:_____ Max:_____ Ave:_____

Outer to Inner Layers (mm)

	Min	Max	Ave	Texture & Color
1				
2				
3				
4				
5				
6				

representative group from one box

D1-1-1

Comments and XRD Mineralogy:

Nodules - mostly abyssal Type

Substrate Description

Rock Type: Nodules Not Cut

Probably phosphorite -

Description: hyaloclastite or with larger nodules

Biology (?):

1 Nodule

Subs

D1-1-1A CC Composit bulk of 8 small (≤30mm) diameter Nodules (163gms)

D1-1-1B CC Composit bulk of 2 large (60mm) diameter nodules (168gms and 208gms) * Two bottl

35mm slide from Boxed noduals
3 boxes of Nodules to KORDI
4 boxes of Nodules to USGS

Various layers Sr isotopes, PTS Hein

Described by:
GS.

Subsampled by:
J. Hein + Jung-Ho A

* Send D1-1-1A and D1-
for comparison of chemical

See D1-13 for Chem of layers

35mm slide too dark take another if Box is opened

D1-1-1
F11-90-CP

SAMPLE DESCRIPTION

Cruise Id: F11-90-CP Size (cm): 3-5 cm Location: Daikpei A

Sample Id: D1-1-2 Weight (kg): .05 Depth (m): 2200 - 2105

Mn Crust Description

Surface Texture: Some Mn crust

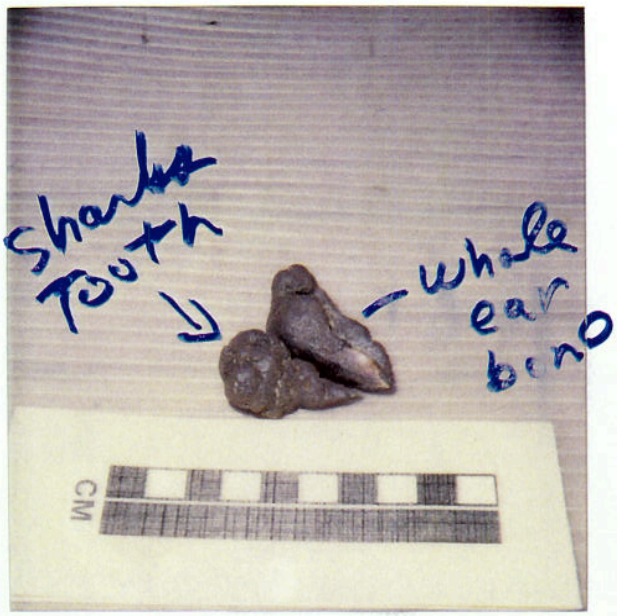
Botyroidal on shark - tooth + whale ear bone

Mn Crust Thickness (mm):

Min:_____ Max:_____ Ave:_____

Outer to Inner Layers (mm)

	Min	Max	Ave	Texture & Color
1				
2				
3				
4				
5				
6				



D1-1-2

Comments and XRD Mineralogy:

Su

Substrate Description

Rock Type:

Description:

Biology (?):

Described by:

G.S., S.H.YOON

Subsampled by:

SAMPLE DESCRIPTION

Cruise Id: F11-90-CP Size (cm): 22X17X6.5 Location: Pohnpei A

Sample Id: D1-3 Weight (kg): 2.2 Depth (m): 2200-2105 m

Mn Crust Description

Surface Texture: Medium botryoids,

Mn Crust Thickness (mm):

Min:_____ Max: 58 Ave:_____

Outer to Inner Layers (mm)

	Min	Max	Ave	Texture & Color
1			18	Black laminated
2			12	Fe stained fractures porous
3			25	Massive w/ some iron stained fractures
4				porous Fe-stained
5				
6				

Columnar growth massive just at botryoids

Comments and XRD Mineralogy: Surface – Some mostly vertical fractures

Subsan

D1-3

Substrate Description

Rock Type: None - but most of crust is present

Description:

½ to Kordi ½ to USGS

Biology (?): Encrusting Forams

Described by: JW

Subsampled by:

SAMPLE DESCRIPTION

Cruise Id: F11-90-CP Size (cm): 28 X 19 X 14 Location: Pohnpei A

Sample Id: D1-4 Weight (kg): 7.7 Depth (m): 2200-2105

Mn Crust Description most Recent lower crust is

Surface Texture: Abraded Smooth -

Most recent upper surface = subdued botryoidal - polished - All surfaces w/ patches of yellow - green hyaloclastite -

Mn Crust Thickness (mm):

lower Crust Min: 15 Max: 40 Ave: 25

upper Crust 3 10 7

Outer to Inner Layers (mm)

	Min	Max	Ave	Texture & Color
1	2	13	10	Porous, Black, fractured
2	3	17	8	Black massive dense
3				Fe-stained micro - fractures
4				
5	upper crust massive black			
6				

D1-4

most recent upper surface

Comments and XRD Mineralogy:

Cobble Talus entirely coated with crust & whole sample covered with or deposited in hyaloclastite debris flow

Substrate Description

Rock Type: Biege Phosphorite Breccia

various shades of brown

Description: Angular Phosphorite Clasts with minor basalt and hyaloclastite clasts in PO4 cement + minor Fe-Mn oxide cement;

Biology (?): encrusting forams (<1%)

Subs

D1-4A Paleo soft sediment filled veins

1/5 to Koro 4/5 to USGS

D1-4B-1 PC 31.1g

D1-4B-1 OC 13.8g

D1-4B-2 DPT

D1-4B-1 XRD

D1-4B-3 DPT

* Cut lengthwise down center + to PC, OC & DPTS of substrate

across sample covering as many varieties of Phos. as possible

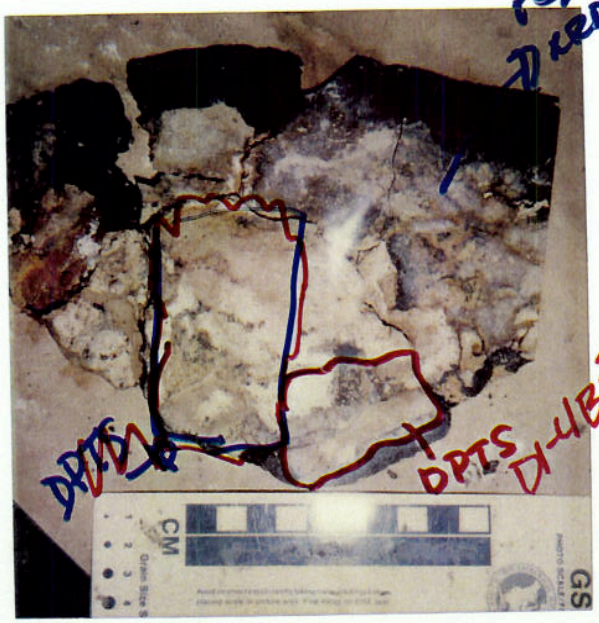
Described by: JW

Subsampled by: JW

few Soft Sediment veins sampled for paleo

D1-4

D1-4



D1-4 picture for scale

D1-4

D1-4

D1-4

SAMPLE DESCRIPTION

Cruise Id: F11-90-CP Size (cm): 17 X 12 X 4.2 Location: Pohnpei A

Sample Id: D1-5 Weight (kg): 0.57 Depth (m): 2200-2013

Mn Crust Description to elongate

Surface Texture: Smooth botroids

bottom is smooth

Mn Crust Thickness (mm):

Min: 25 Max: 42 Ave: 35

Outer to Inner Layers (mm)

	Min	Max	Ave	Texture & Color
1	10	22	18	Submetallic black massive dense
2	2	20	15	black porous - few large pores
3				
4				
5				
6				

D1-5

Comments and XRD Mineralogy:

few vugs, reddish iron staining + Trace of sediment

Subsa

Substrate Description

Rock Type: None - all crust present Crust may not be complete

Description:

½ HORDT
½ USGS

Biology (?): Encrusting Forams

Described by: JW

Subsampled by:

SAMPLE DESCRIPTION

Cruise Id: F11-90-CP Size (cm): 18 x 16 x 8 Location: Pohnpei A

Sample Id: D1-7 Weight (kg): 7.5 Depth (m): ~200 ~210 m

Mn Crust Description

Surface Texture: Botryoidal (5~15cm) - some elongated

Mn Crust Thickness (mm):

Min: 60 Max: 75 Ave: 70

Outer to Inner Layers (mm)

	Min	Max	Ave	Texture & Color
1	20	22	21	Slightly porous: black
2	10	14	12	Highly porous. brown
2a	6	10	8	Highly porous: black
3	12	15	13	Highly porous: brown
4		11	15	Slightly porous. massive
5				
6				

F11-90-CP
D1-7

Comments and XRD Mineralogy:

Columnar growth structures in layers 2 and 3; layer 2a is crudely laminated; pores filled with phosphorite and iron oxide

Sub

Substrate Description

Rock Type: Absent -- but central part of crust is moderately complete

Description:

Biology (?): Encrusting foram

Described by: Yoon

Subsampled by:

½ HORD1
½ USGS

SAMPLE DESCRIPTION

Cruise Id: F11-90-CP Size (cm): 25x19x7 Location: Pohnpei A

Sample Id: D1-8 Weight (kg): 3.2 Depth (m): 2200~2105

F11-90-CP
D1-8

Mn Crust Description

Surface Texture: Botryoidal (0.5~1.5cm) with high relief - many elongate botryoids

Mn Crust Thickness (mm):

Min: 60 Max: 70 Ave: 65

Outer to Inner Layers (mm)

	Min	Max	Ave	Texture & Color
Columnar in places 1	20	27	25	Massive (all black layers)
2	9	12	10	few large vugs Highly porous - columnar
3	5	8	7	Slightly porous & laminated
4	6	12	10	Columnar Highly porous - Fe-stained
5	8	10	9	Slightly porous
6	5	7	6	Massive dense

Comments and XRD Mineralogy:

· Some pores and fractures are filled with soft sediment and iron oxide

· Columnar growth structures of botryoids are identified in layers 1, 2, 4.

Substrate Description

Rock Type: Absent - but central part of crust is complete

Description:

Biology (?): Encrusting forams

Described by: Yoon

Subsa

35mm - surface texture

D1-8A CC, Pt, REE, Au Bulk (0-
144gms

D1-8B CC, Pt, REE, Au Layer 0-15
112.5

D1-8C CC, Pt, REE, Au Layer 15-2
D1-8D CC, Pt, REE Au Layer 27-
65gm - D1-8E CC, Pt, REE, Au Layer 34-4
D1-8F CC, Pt, REE, Au layer 44-
34gm
35 mm photos of botryoidal

Subsampled by: Hein 35mm, G.S, Dr Abn Surface

D1-8G CC, Pt, REE, Au, layer 50-

SAMPLE DESCRIPTION

Cruise Id: F11-90-CP Size (cm): 30 x 22 x 14 Location: Pohnpei A

Sample Id: D1-9 Weight (kg): 14 Depth (m): 2200 - 2100 m

Mn Crust Description

Surface Texture: Botryoidal (0.3-1cm) smooth to granular in nine and bottom

Mn Crust Thickness (mm):

Min: 12 Max: 48 Ave: 40

Outer to Inner Layers (mm)

	Min	Max	Ave	Texture & Color
1	3	13	10	Massive; black
2	6	17	10	Highly porous - vuggy
3	2	4	3	Massive
4	5	17	13	Highly porous - vuggy, columnar, Fe-Stained
5				
6				

* Layer boundaries are gradational and irregular.

F11-90-CP
D1-9

Comments and XRD Mineralogy:

- Outer two layers paleo encrust bottom of sample.
- Layer 2: pores filled w/ soft sediment
- Layer 3: Columnar growth structure of botryoids

Substrate Description

Rock Type: Breccia

Description: vesicular basalt fragments are cemented by phosphorite and Phosphorite clasts

Individual basalt fragment is encrusted by a thin (<3 mm) manganese layer

Biology (?): Encrusting forams

Described by: Yoon

Subsa

D1-9A 5gm CC 0-≤0.5 mm, Surface Scrap (5 gms)

D1-9B CC Bulk (0-40 mm) (68.7 gms)

D1-9B- XRD

most Vesicles filled w/ phosphorite - some with Calcite brown altered basalt

* Slab sample to look for Fresh Basalt

Subsampled by: 1st Slab on large piece G.S. - surface SCRAPE Sample for bulk CC - be sure to use piece where surface was not scraped

J.W.

SAMPLE DESCRIPTION

Cruise Id: F11-90-CP Size (cm): 25 x 23 x 7.0 Location: Pohnpei A

Sample Id: D1-10 Weight (kg): 5.0 Depth (m): 2100 ~ 2105

Mn Crust Description

Surface Texture: Botryoidal (0.5~1cm)
some elongate

Mn Crust Thickness (mm):

Min:_____ Max: 70 Ave:_____

Outer to Inner Layers (mm)

	Min	Max	Ave	Texture & Color
1	17	25	20	Massive & dense
2	5	13	10	Highly rugs porous - Fe
3	22	25	24	Slightly porous (empty)
4	9	12	10	Slightly porous (filled)
5	10	12	11	massive and dense
6				

F11-90-CP
D1-10

Comments and XRD Mineralogy:

Layer 2 : dendritic growth structure; some cracks filled with soft sediment
Layer 4 : micro pores and cracks are filled with phosphorite (?) + Fe oxide

Subs

Substrate Description

Rock Type: Absent - but complete Crust in central part

Description:

Biology (?): Encrusting forams

Described by: S.H. Yoon

Subsampled by:

≒ 40RDT
≒ 45GS

SAMPLE DESCRIPTION

Cruise Id: F11-90-CP Size (cm): 20 x 11 x 3.4 Location: Pohnpei A

Sample Id: D1-11 Weight (kg): 0.7 Depth (m): 1200 ~ 2105

Mn Crust Description

Surface Texture: Botryoidal (2~12 mm) and partially granular on side & bottom

Mn Crust Thickness (mm):

Min: ____ Max: 34 Ave: 30

Outer to Inner Layers (mm)

	Min	Max	Ave	Texture & Color
1	8	15	10	Massive & dense
2	15	18	17	Slightly columnar porous
3		7	5	Highly porous
4				
5				
6				

F11-90-CP
D1-11

Comments and XRD Mineralogy:

* Granular surface is underlain by very porous layer on edge
- Layer 3: pores filled with soft sediment or iron oxide

Sub

Substrate Description

Rock Type: Absent — not Complete Crust - layers 1 + part of 2 present

Description:

½ HORD1
½ HORDT

Biology (?): Encrusting foram

Described by: S.H. Yoon

Subsampled by:

SAMPLE DESCRIPTION

Cruise Id: F11-90-CP Size (cm): 14 x 11 x 3 Location: Pohnpei A

Sample Id: D1 - 12 Weight (kg): 0.5 Depth (m): 22m - 210 fm

Mn Crust Description

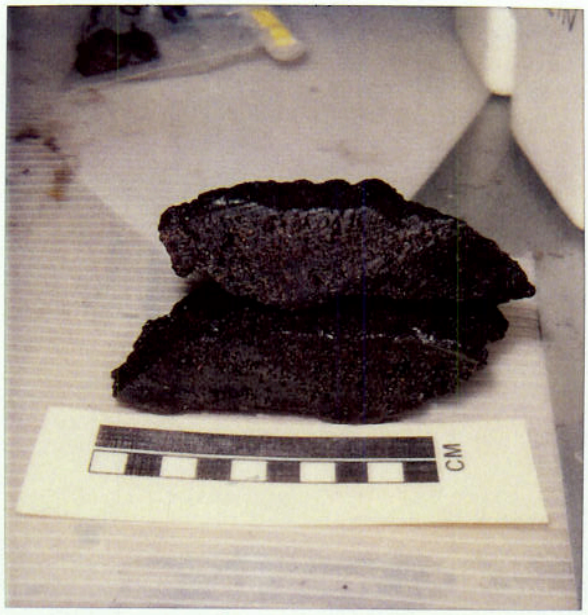
Surface Texture: Granular subdued botryoidal (low relief botryoids)

Mn Crust Thickness (mm):

Min: 22 Max: 30 Ave: 28

Outer to Inner Layers (mm)

	Min	Max	Ave	Texture & Color
1	22	30	28	Highly porous Fe-stained
2				
3				
4				
5				
6				



F11-90-CP
D1-12

Comments and XRD Mineralogy:

Some pores filled with iron oxide

Subs

Substrate Description

Rock Type: Absent - crust probably not complete - porous side crust

Description:

½ HORDI
½ USGS

Biology (?):

Described by: Yoon

Subsampled by:

SAMPLE DESCRIPTION

Cruise Id: F11-90-CP Size (cm): 3.5 ~ 13 cm Location: Pohnpei A

Sample Id: D1-13 Weight (kg): 50 kg Depth (m): 2705 ~ 2705m

Mn Crust Description

Surface Texture: Botryoidal (dominant) partially smooth or granular

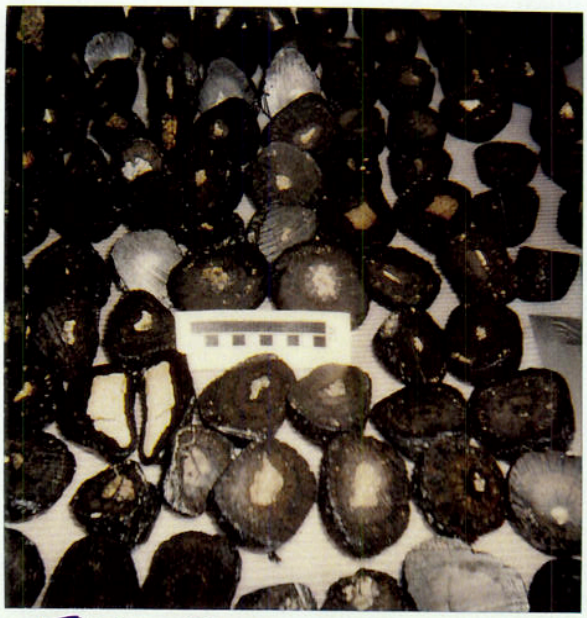
* Botryoids mostly less than 1cm in diameter. Nodule radius (min)

~~Mn Crust Thickness (mm)~~:

Min: 5 Max: 53 Ave: 30

Outer to Inner Layers (mm)

	Min	Max	Ave	Texture & Color
1				
2				
3				
4				
5				
6				



F11-90-CP

D1-13

Comments and XRD Mineralogy:

Nodules mostly show 2 to 3 layers which are slightly porous and fractured; some fractures and pores filled with iron oxide and phosphorite

Subsample N

10 35mm slides

Substrate Description

~~Rock Type~~: Basalt, hyaloclastite and phosphorite (Z ~ 70 mm)

Description:

pores of basalt nuclei filled with phosphorite;

Biology (?):

Described by: Yoon

Subsampled by:

(#1) ~75% nuclei (~5%)

* All w/ basalt nuclei Separate for Alice Davis

<5% Large (Seamount Type) nuclei

20% medium-sized nuclei

75% small or NO nuclei (Abyssal Type)

(~20%) (#2)

60% to USGS

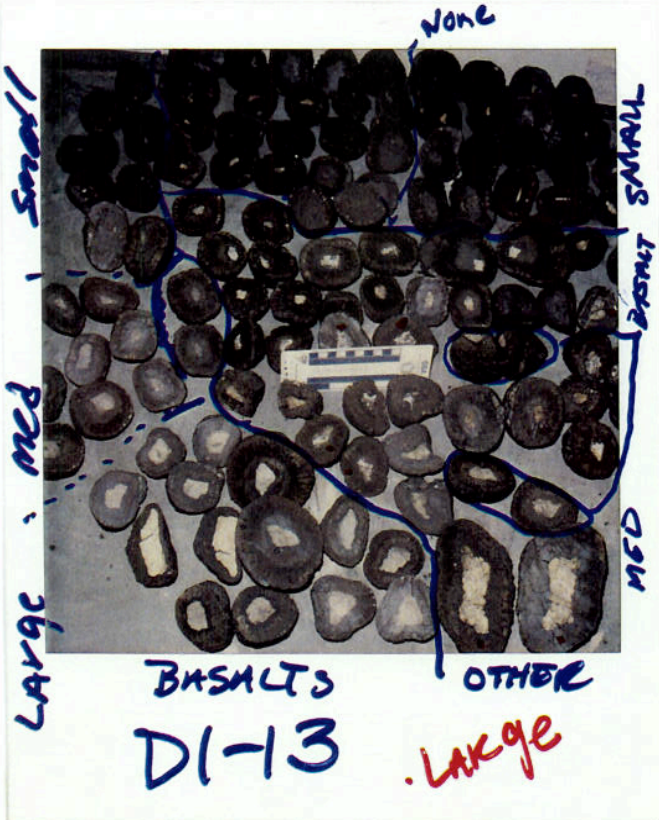
40% To HORDI

½ of a Nodule H2O - Archive

G.S.

See other Polaroid on back.

over


None
Small
Med
Large
SMALL
BASALT
MED
BASALTS
OTHER
D1-13
Large

SAMPLE DESCRIPTION

Cruise Id: F11-90-CP Size (cm): Typical Location: [redacted]

Sample Id: D1-13 Weight (kg): Nodule

Mn Crust Description

Surface Texture:

Mn Crust Thickness (mm):

Min:_____ Max:_____ Ave:_____

Outer to Inner Layers (mm)

	Min	Max	Ave	Texture & Color
1				
2				
3				
4				
5				
6				

Comments and XRD Mineralogy:

Subsample No.	Analysis	Layer Thick.	Wt.(g)
D1-13-1A	CC	0-3mm	8.1g
D1-13-1B	CC	3-9mm	8.2g
D1-13-1C	CC	9-18mm	6.3g
D1-13-1D	CC	18-23mm	5.5g

Substrate Description

Rock Type:

Description:

Biology (?):

Described by:

Subsampled by:

See D1-1 for Chem of Bulk Nodules

Ferro-manganese Dating Project - 1993

Sample F11-90-CP, D1-13

DESCRIPTION

A nodule with approximate spherical (70x60x55 mm) shape. Total weight is about 256g and is cut in half. Growth surface is botryoidal. Botryoids are covered with smaller (<1mm) botryoidal projections (these may be the outer expression of the columnar texture on thin sections) which give the surface a rough feel. Growth surface is dusky brown (5 yr 2/2). Cut surface reveals a phosphoritic (?) angular shaped and partially brecciated, yellowish gray (5 y 7/2) nucleus approximately 20x12 mm in area with the third dimension unknown. Several stages of growth are noticeable: an inner relatively dense layer (2-4mm thick) with phosphorite and/or carbonate infillinng (fizzes moderately) microfractures, followed by a dense, relatively clean layer (~2-5mm thick), followed by a porous interval (~10-14mm thick) and finally a thin dense, relatively clean layer on the outside (2-5mm thick). Cut surface is dusky brown with porous intervals filled with yellowish to orangish material that fizzes very poorly (phosphorite or carbonate infilling ?).

ADDITIONAL

At the time of sampling no thin sections or chemical data exist of this sample, as a result sampling intervals were chosen based on visual and microscopic analysis.

W. BLOECHL (8/93)

SAMPLE DESCRIPTION

Cruise Id: F11-90-CP Size (cm): various Location: Pohnpei A

Sample Id: D1-14 Weight (kg): 24 Depth (m): 2200 - 2105

Mn Crust Description

Surface Texture: Botryoidal + Smooth

Misc. Fragments of Nodules + Crusts + hyaloclastite + some whole Nodules

Mn Crust Thickness (mm):

Min: ~5 Max: ~30 Ave: ~20

Outer to Inner Layers (mm)

	Min	Max	Ave	Texture & Color
1				
2				
3				
4				
5				
6				

Comments and XRD Mineralogy:

Substrate Description

Rock Type:

Description:

Biology (?):

Analyses

Subsample No.	Analysis	Layer Thick.	Wt.(g)
	13 kg USGS		
	11 kg KORDI		

Described by: Hein

Subsampled by:

SAMPLE DESCRIPTION

pebbles & Cobbles

Cruise Id: F11-90-CP Size (cm): Various Location: Pohnpei A

Sample Id: D1-15 Weight (kg): 6 Depth (m): 2200-2105

Mn Crust Description

Surface Texture:

Mn Crust Thickness (mm):

Min:_____ Max:_____ Ave:_____

Outer to Inner Layers (mm)

	Min	Max	Ave	Texture & Color
1				
2				
3				
4				
5				
6				

NO photo

Comments and XRD Mineralogy:

Analyses

Subsample No.	Analysis	Layer Thick.	Wt.(g)

Substrate Description

Rock Type: misc. pieces of phosphorite & hyaloclastite

(1)

Description: Variably phosphatized Lmst.

(2) mixed hyaloclastite-Fe-Mn oxide rock

(3) hyaloclastite - yellow green

60% USGS

40% NORDI

Biology (?):

Described by: HEIN

Subsampled by:

SAMPLE DESCRIPTION

Cruise Id: F11-90-CP Size (cm): Various Cobble Location: Pohnpei A

Sample Id: D1-16 Weight (kg): 5.5 Depth (m): 2200-2105

Mn Crust Description

Surface Texture: botryoidal to smooth

Mn Crust Thickness (mm):

Min: _____ Max: 74 Ave: 40

Outer to Inner Layers (mm)

	Min	Max	Ave	Texture & Color
1				
2				
3				
4				
5				
6				

NO photo

Comments and XRD Mineralogy:

Misc Crust Fragments + Nodules - Cut because Thought to be rock fragments -

Analyses

Subsample No.	Analysis	Layer Thick.	Wt.(g)

Substrate Description

Rock Type:

Description: 60% MSS
40% MORDI

Biology (?):

Described by: HEIN

Subsampled by: