DREDGE 5

S.Johnston
Is Ridge

AMPLE ID	Mn CHEM	Pt & Au	REE	Si Chem	DP Sect.	35mm Pho	Archive	Paleo					
CD5-1	Layers	Layers	~~Layers~~ Bulk		✓				Basalt to	D. Clague			
CD5-2	Layers												
CD5-3	Layers				✓								
CD5-4													
CD5-5													
CD5-6	Bulk				thin section								
CD5-7													
CD5-8													
CD5-9													
CD5-10													
CD5-11	Layers				✓								
CD5-12													
CD5-13								✓					
CD5-14								✓					
CD5-15													
CD5-16													
CD5-17													

F7-86-HW
Karin Ridge
Johnston Is

Sample Description

Cruise I.D: **Sample I.D:** Sta: 07 CD5-1 **Location:** S. Johnston I. Ridge

Size: 42x34x23cm **Weight:** 30 kg

Mn crust thickness:

Total: min: max: ave:

Inner crust: min: max: ave:

Outer crust: min: max: ave:

Surface texture: Botryoidal Top
Bottom - smooth to granular

Internal structure:

layered:
laminated:
massive: ✓
porous: ✓ in places esp. upper part of crust
dendritic:
other:

Mineralogy (XRD):

Associated alteration, phosphorite, or hydrothermal deposits:

Substratum:

Rock type: Basalt

Description: amphibole? phyric basalt

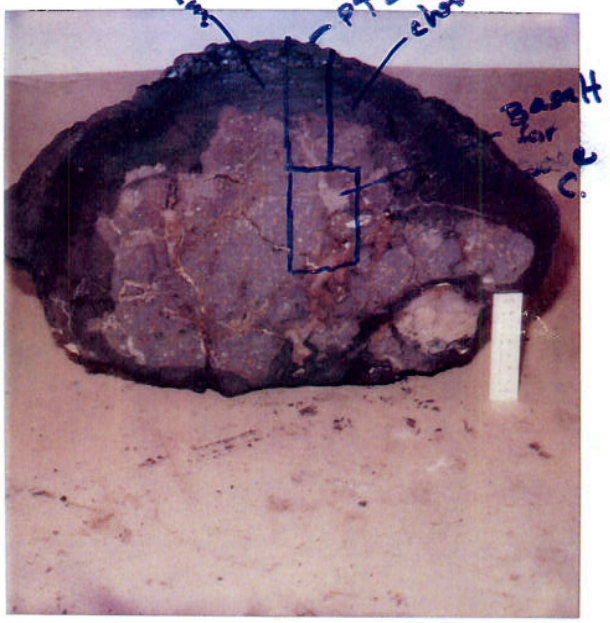
Mineralogy (XRD):

CD5-1

F7-86-HW
Karin Ridge
Johnston Is

Analyses and subsamples:

analysis:	analyst:
	not sub. for REE
D.P.T.S. II - did not	
Slab IV - cut again Aug.	
Received slab of 18	



CDS-1-II
(slab II)

F7-86-HW
Karin Ridge
Johnston Is

[illegible]

II A = [illegible] 13-18 mm thick [illegible] for chem. 84.7 gms for [illegible] + pt group + Au. [illegible] weathering [illegible]

II B = inner crust. [illegible] for chem. 103.9 gms for [illegible] pkg + pt group + Au. [illegible] This [illegible] product [illegible]

II C = bulk crust. [illegible] mm thickness sent for chem. 102.7 g for "Maximum pkg" + pt group + Au. [illegible] for [illegible] weathering product present [illegible] A + B.

Polished T.S.

II = as marked in photo. Includes both crust layers of basalt + brown phosphorite

Basalt for [illegible]

II = as marked in photo. Has brown phenocrysts he thinks are

11-6-87
Slab II slabbed Again Alice Davis wants a fresh piece of the basalt

F7-86-HW
Karin Ridge
Johnston Is

Sample Description

Cruise I.D: **Sample I.D: Sta:** 07 CD5-2 **Location:** S. Johnston Is Ridge

Size: 29x23x9cm **Weight:** ≈ 4 Kg

Mn crust thickness: — needs to be sent —

Total: min: 4 max: 9cm ave: 6cm

slab I ① laminated

Inner crust: min: 19 mm max: 24 mm ave: 20 mm

slab II ① massive 2 mm 12 mm 8 mm

Outer crust: min: 5mm max: 9mm ave: 7 mm

Surface texture: Botryoidal - very rounded cap-like shape

Internal structure:

layered: ✓ @ least 3

laminated: ✓ inner (middle)

massive:

porous:

dendritic:

other: phosphorite in other layers & laminations

Some of the upper layers are spalled off in places

Mineralogy (XRD):

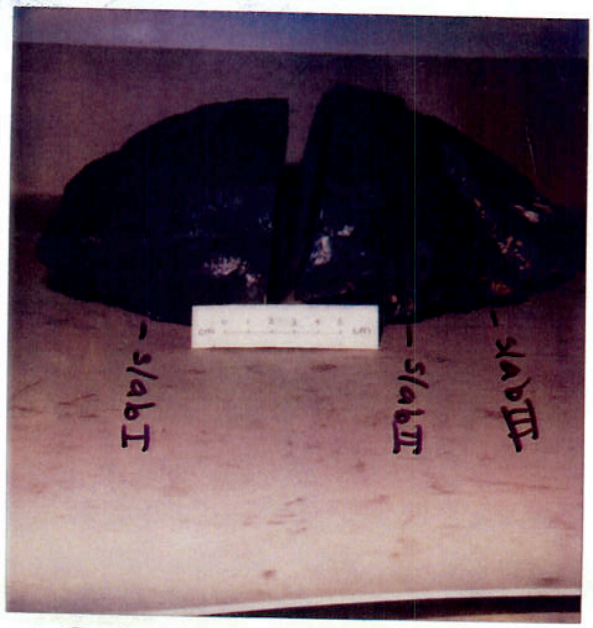
Associated alteration, phosphorite, or hydrothermal deposits:

Substratum:

Rock type: Basalt?

Description: Gray basalt speckled w/ Mn on bottom. Thin patches of beige silty sediment & greenish tan mud.

Mineralogy (XRD):



CD5-2

F7-86-HW
Karin Ridge
Johnston Is

Analyses and subsamples:

analysis:	analyst:
Chemistry: Manheim pty	[illegible]
II A outer 2-9	
II B laminated inner 19-23	
II C massive inner 7-20	
II D bulk [illegible]	
XRD	[illegible]
II A outer	
II B laminated inner	
II C massive inner	
II D [illegible]	
II E [illegible]	

CD5-2-II
(slab II)

F7-86-HW
Karin Ridge
Johnston IS

F7-86-HW
Karin Ridge
Johnston Is

Sample Description

Cruise I.D: **Sample I.D: Sta:** 07 D CD5 3 **Location:** S Johnston Is Ridge

Size: 18x18x11cm **Weight:** ≈2.5 kg

Mn crust thickness:

Total: min: 30mm max: 70mm ave: 50mm

Inner crust: min: 20mm max: 22mm ave: 21mm

Outer crust: min: 10mm max: 12mm ave: 11mm

Surface texture:

Internal structure:

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

Mineralogy (XRD):

Associated alteration, phosphorite, or hydrothermal deposits:

Substratum:

Rock type: Volcanic Breccia w/ phosphorite cement

Description: One clast totally replaced w/ phosphorite seems to have be calcareous with worm bioturbations. Worm tubes fill w/ white phosphorite. Rest of clast replaced by Red phosphorite. Phosphorite also breaches in the crust as crack filling?

Mineralogy (XRD):

CD5-3

F7-86-HW
Karin Ridge
Johnston Is

Analyses and subsamples:

analysis:	analyst:
Mn crust Chem XRD	
CD5-3A Outer layer	0-11mm
CD5-3B Inner layer	11-21mm
CD5-3C Bulk	0-21mm
XRD CD5-5D phosphorite	
D.P. thin section	
1 Slab - Be, Nd, Pb, U isotopes	Keith O'Nions
Various layers Sr, Pb isotopes	Hein

CD5-3

F7-86-HW
Karin Ridge
Johnston Is

CD5-3-I
ARCHIVED

F7-86-HW
Karin Ridge
Johnston Is

F7-86-HW
Karin Ridge
Johnston Is

Sample Description

Cruise I.D: **Sample I.D: Sta:** 07 D CD5-4 **Location:** S. Johnston IS Ridge

Size: 27x16x5cm **Weight:** 3.1 Kg

Mn crust thickness:

Total: min: 2.5 max: 5 ave: 3 cm

Inner crust: min: max: ave: ?? SUBSTRATE

Outer crust: min: 7mm max: 12mm ave: 9.5mm

CD5-4

F7-86-HW
Karin Ridge
Johnston IS
CD5-4

Surface texture: Elongate botryoidal
tiny patches of [illegible] white sediment on sfc.

Internal structure:

layered: ✓ maybe 2
laminated: ✓ [illegible]
massive: ✓ [illegible]
porous:
dendritic:
other: very smooth underside probably scraped off mudstone like other [illegible] ridge

Mineralogy (XRD):

Associated alteration, phosphorite, or hydrothermal deposits:

Thin phosphorite veins on crust
A few forams on surface

Substratum: NONE

Rock type:

Description: Outer crust massive [illegible]
Inner crust has platy shaley layers 1 to 2mm thick above & below massive crust. Shaley layers 10 to 12mm thick total.

Mineralogy (XRD):

Analyses and subsamples:

analysis:	analyst:

F7-86-HW
KarinRidge
Johnston Is

Sample Description

Cruise I.D:

Sample I.D: Sta: 07 CD5-5 **Location:** S. Johnston Is

Size: 29x13x5 **Weight:** 23.1.5 kg

crust thickness:

Total: min: 2.5 max: 5 ave: 3 cm

Inner crust: min: max: ave: 1.5

Outer crust: min: max: ave: 1.5 cm

Surface texture: Botryoidal

Internal structure:

layered: ✓ ≈ 3
laminated: ✓ innermost
massive: ✓ outer
porous: ✓ middle w/ warm lubricated fluids
dendritic:
other:

Mineralogy (XRD):

Associated alteration, phosphorite, or hydrothermal deposits:

Substratum:

Rock type: None - well mixed some phosphorite incorporated in the bottom

Description:

Mineralogy (XRD):

CD5-5

F7-86-HW
Karin Ridge
Johnston Is

Analyses and subsamples:

analysis:	analyst:

F7-86-HW
Karin Ridge
Johnston Is

Sample Description

Cruise I.D: **Sample I.D: Sta:** 07 B CD5-6 **Location:** S. Johnston Is Ridge

Size: 18x15x7cm **Weight:** ≈ 800g

Mn crust thickness:

Total: min: 1mm max: 3cm ave: 1.5cm

Inner crust: min: max: ave:

Outer crust: min: max: ave:

Surface texture: Small Botryoidal
light dusting of white sediment on surface

Internal structure:

layered:
laminated:
massive: ✓ in places
porous: ✓ " "
dendritic:
other:

Mineralogy (XRD):

Associated alteration, phosphorite, or hydrothermal deposits:

Substratum:

Rock type: Mudstone

Description: Greenish-tan, well-indurated mudstone. Underneath side to speckled w/ Mn? has some Fe-oxide staining

Phosphorite Nodule discovered when slabbed: (Thin Section of Nodule) there is a hollow above the Nodule in the crust. Almost looks like must not accumulate when phosphorite is not covered by mudstone!?

Mineralogy (XRD):

- need to be cut -

Phosphorite Nodule

CD5-6

F7-86-HW
Karin Ridge
Johnston Is

Analyses and subsamples:

analysis:	analyst:
Mn Crust - Chem & XRD	
CD5-6A Bulk 17.8 gm sample	
Silicate Chem 20.6 gm sample	
XRD CD5-6B ⇒ smectite	
XRD CD5-6C - Nodule ⇒ Barite	
TS phosphorite - mudst.	

(OVER)

Notes:

Substrate has "dots" of Mn and pyrolusite like staining

(Crust thickness varies from 3mm to 20mm for no immediately apparent reason (Currents effecting crust formation?)

Cutting one slide for thin section, Mudstone broke away from phosphorite nodule (Just what we wanted to look at. So, I stabbed other ½ of rock for thin section.

F7-86-HW
Karin Ridge
Johnston Is

Sample Description

Cruise I.D:

Sample I.D: Sta: 07 D CD5-7 **Location:** S. Johnston Is Ridge

Size: 18X12x6cm **Weight:** ~1 kg

Mn crust thickness:

Total: min: 4.5 max: 6 ave: 5.2 cm

laminated **Inner crust:** min: max: ave: 3 cm

massive + porous **Outer crust:** min: max: ave: 2cm

Surface texture: Botryoidal w/ thin white sediment coating

Internal structure:

layered: ✓ ~3
laminated: ✓ innermost
massive: ✓ outer
porous: ✓ middle
dendritic:
other: Porous Mn on bottom

Mineralogy (XRD):

Associated alteration, phosphorite, or hydrothermal deposits:

Substratum: None

Rock type:

Description: Small amount of Fe oxide/mudy sediment on underside of crust

Mineralogy (XRD):

CD5-7

F7-86-HW
Karin Ridge
Johnston Is

Analyses and subsamples:

analysis:	analyst:

F7-86-HW
Karin Ridge
Johnston Is

Sample Description

Cruise I.D: **Sample I.D: Sta:** 07 D CD5-8 **Location:** S. Johnston Is Ridge

Size: 20x15x2.5cm **Weight:** ~600g

Mn crust thickness:

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

Inner crust: min: max: ave: 2mm

Outer crust: min: max: ave: 1.8cm

Surface texture: Irregular botryoidal w/greater relief than normal btw the highs & lows

Internal structure:

layered: ✓
laminated: ✓ w/ phosphorite veins in betw
massive:
porous: ✓ outer
dendritic:
other:

CD5-8

F7-86-HW
Karin Ridge
Johnston IS

Mineralogy (XRD):

Associated alteration, phosphorite, or hydrothermal deposits:

Substratum: None

Rock type:

Description: Smooth to broken up underneath side of Mn crust → probably broken off mudstone substrate, has a minor amount of tan muddy sediment coating

Appears to have the same laminated layers that other crusts from this dredge have; but doesn't have the thicker, massive layers over the laminations m.m.

Mineralogy (XRD):

Analyses and subsamples:

analysis:	analyst:

F7-86-HW
Karin Ridge
Johnston Is

Sample Description

Cruise I.D:

Sample I.D: Sta: 07 D CD5-9

Location: S. Johnston Is Ridge

Size: 17X10X5cm **Weight:** ~ 600gr

Mn crust thickness:

Total: min: 3.5 max: 5 ave: 4cm

Inner crust: min: ____ max: ____ ave: 2 cm

Outer crust: min: ____ max: ____ ave: 2cm

Surface texture: Small botryoidal w/ thin white sediment coating

Internal structure:

layered: ✓ x 3
laminated:
massive: ✓ inner & outer
porous: ✓ middle
dendritic:
other: Inner most layer has phosphorite veins

CD5-9

F7-86-HW
Karin Ridge
Johnston Is

Mineralogy (XRD):

Associated alteration, phosphorite, or hydrothermal deposits:

Substratum:

Rock type: Mudstone

Description: Thin (1-4mm thick) greenish-tan to Fe oxidized, well-indurated mudstone

Mineralogy (XRD):

Analyses and subsamples:

analysis:	analyst:

Sample Description

Cruise I.D.: F7-86-HW Karin Ridge Johnston Is

Sample I.D.: Sta: 07 D CD5-10

Location: S. Johnston IS Ridge

Size: 16x13x6cm Weight: ≈2 Kg

Mn crust thickness:

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

Inner crust: min: max: ave:

Outer crust: min: max: ave:

Surface texture: Smooth botryoidal to a bladed Smooth w/thin white, sed. coating

Internal structure:

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

Mineralogy (XRD):

Associated alteration, phosphorite, or hydrothermal deposits:

Substratum:

Rock type: Mudstone

Description: Irregular-shaped greenish-yellow, well-indurated mudstone w/Mn dendrites & some Fe oxide staining

Mineralogy (XRD):

CD5-10

F7-86-HW
Karin Ridge
Johnston Is

Analyses and subsamples:

analysis:	analyst:

F7-86-HW
Karin Ridge
Johnston Is

Sample Description

Cruise I.D: **ample I.D: Sta:** 07 D CD5-11 **Location:** S. Johnston IS Ridge

Size: 13x12x6.5cm **Weight:** ≈1 kg

Mn crust thickness:

Total: min: 3.5 max: 6.3cm ave: 4.5cm

Inner crust: min: [illegible] max: [illegible] ave: 3 cm

Outer crust: min: 0.9 max: [illegible] ave: 1.4 cm

Surface texture: Small botryoidal, abraded smooth w/then white sediment coating; porous on one side

Internal structure:

layered: ✓ 3
laminated: ✓ innermost, very shiny
massive: ✓ outer
porous: ✓ middle
dendritic:
other:

Mineralogy (XRD):

Associated alteration, phosphorite, or hydrothermal deposits:

Numerous forams on surface

Substratum:

Rock type: Mudstone

Description: 0-8mm thick. See #6

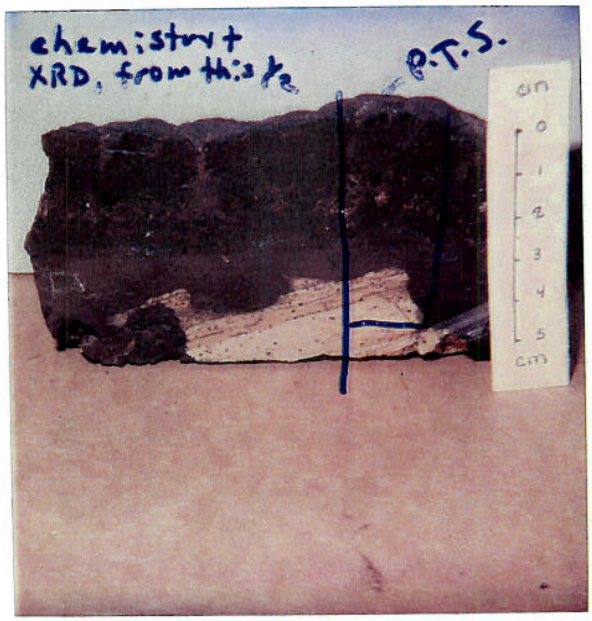
Mineralogy (XRD):

CD5-11

F7-86-HW
Karin Ridge
Johnston Is

Analyses and subsamples:

analysis:	analyst:
Chemistry: "Manheim pkg" crust	Lisa Gein
A = outer + inner porous, 22-32 mm	
B = inner laminated, shiny, 12-20 mm	
C = bulk, 45-50 mm	
XRD	Lisa Gein
A = outer + inner porous	
B = inner laminated, shiny	
C = not sampled	
D = mudstone substrate	
D. Polished T.S.	Lisa Gein → Mann Pet.



CD5-11

F7-86-HW
Karin Ridge
Johnston Is

crust

30.7g.

shiny,

23.3 g

32.1g.

Cruise I.D: F7-86-HW Karin Ridge Johnston Is

Sample Description

Sample I.D: Sta: 07 CDS-12 Location: S Johnston Isl. Ridge

Size: 8.5x5x9cm Weight: ~400g

Mn crust thickness:

Total: min: 1.5 max: 3 ave: 2.2cm

Inner crust: min: ___ max: ___ ave: 12mm

Outer crust: min: ___ max: ___ ave: 11mm

Surface texture: Small botryoidal w/thin white coating of sediment ?

Internal structure:

layered: ✓ 3?
laminated: ✓ innermost ?
massive: ✓ outer
porous: ✓ middle
dendritic:
other:

Mineralogy (XRD):

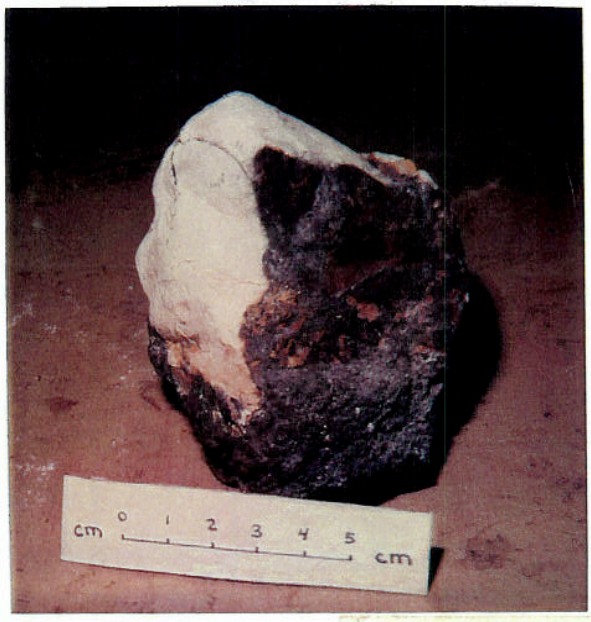
Associated alteration, phosphorite, or hydrothermal deposits:

Substratum:

Rock type: Mudstone

Description: ~16cm thick. See # CDS-6 for description

Mineralogy (XRD):



CDS-12

F7-86-HW
Karin Ridge
Johnston IS

Analyses and subsamples:

analysis:	analyst:

F7-86-HW
Karin Ridge
Johnston Is

Sample Description

Cruise I.D: **Sample I.D: Sta:** D CD5-13 **Location:** S Johnston Is. Ridge

Size: 15X12X6cm **Weight:** ≈ 800g

Mn crust thickness: thin patch coating

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

Inner crust: min: max: ave:

Outer crust: min: max: ave:

Surface texture: Smooth

Internal structure:

layered:
laminated:
massive:
porous:
dendritic:
other: Mn dendrites

Mineralogy (XRD):

Associated alteration, phosphorite, or hydrothermal deposits:

Substratum:

Rock type: Mudstone

Description: Irregular shaped well indurated greenish yellow mudstone w/ Mn dendrites & some Fe-oxide staining. Also some small patches of white sediment & one small patch of phosphorite

Mineralogy (XRD):

CD5-13

F7-86-HW
Karin Ridge
Johnston Is

Analyses and subsamples:

analysis:	analyst:
Paleo-	

Cruise I.D: F7-86-HW Karin Ridge Johnston Is

Sample Description

Sample I.D: Sta: 07 D CDS-14

Location: S. Johnston Is Ridge

Size: 15x10x6cm Weight: ≈ 1 Kg

Mn crust thickness: None - very light spotting all over rock

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: Bioclastic limestone

Description: Dirty white to dark beige well-indurated limestone w/numerous borings

Mineralogy(XRD):

CD5-14

F7-86-HW
Karin Ridge
Johnston Is

Analyses and subsamples:

analysis:	analyst:
Paleo	

Cruise I.D: F7-86-HW Karin Ridge Johnston Is

Sample Description

Sample I.D: Sta: 17 D CD5-15 Location: S. Johnston I Ridge

Size: 10x9.5x5.5cm Weight: 2400g

Mn crust thickness:

Total; min: 3 max: 5.5 ave: 4.5cm

Inner crust: min: max: ave:

Outer crust: min: max: ave:

Surface texture: Small botryoidal w/thin white sediment dusting

Internal structure:

layered: ✓ ≈ 3-5?

laminated: ✓ innermost w/chrysotile veins

massive: ✓ outer

porous: ✓ middle & bottom

dendritic:

other:

Mineralogy (XRD):

Associated alteration, phosphorite, or hydrothermal deposits:

Fe oxide staining in porous & laminated layers

Substratum: NONE

Rock type:

Description:

Mineralogy (XRD):

Analyses and subsamples:

analysis:	analyst:

F7-86-HW
Karin Ridge
Johnston Is

Sample Description

Cruise I.D:

Sample I.D: Sta: 07 D C05-16

Location: S. Johnston Is Ridge

Size: 12x6x4.5cm Weight: ~500 g

Mn crust thickness: upper surface spalled off

Total: min: 3 max: 6.5cm ave: 5cm

Inner crust: min: max: ave:

Outer crust: min: max: ave:

Surface texture: spalled off

Internal structure:

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

Mineralogy (XRD):

Associated alteration, phosphorite, or hydrothermal deposits:
abundant phosphorite in crust also Fe oxide stains & a little white sediment

Substratum: NONE

Rock type:

Description:

Mineralogy (XRD):

C05-16

F7-86-HW
Karin Ridge
Johnston Is

Analyses and subsamples:

analysis:	analyst:

F7-86-HW
Karin Ridge
Johnston Is

Sample Description

Cruise I.D: **ample I.D:** Sta: 07 D CD5-17 **Location:** S. Johnston Is

Size: 12x9x3.5cm **Weight:** ~400g

Mn crust thickness:

Total: min: 1.5 max: 3.5 ave: 3cm

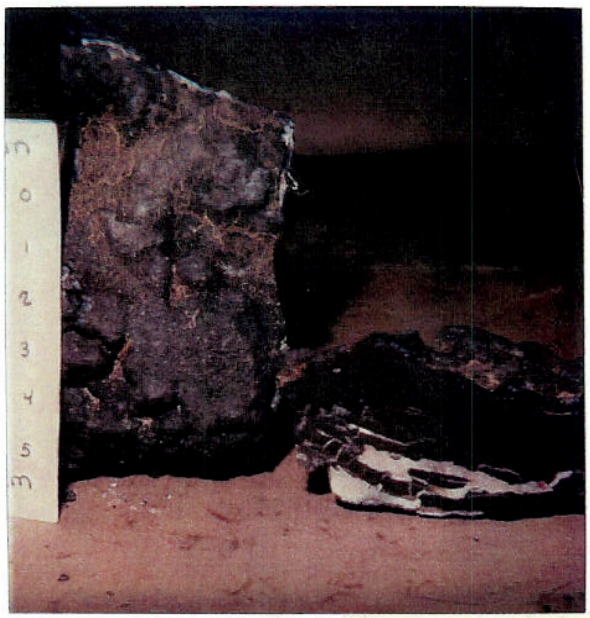
Inner crust: min: max: ave:

Outer crust: min: max: ave:

Surface texture: Botryoidal w/worm tubes & Fe oxide staining

Internal structure:

layered:
laminated:
massive: ✓
porous:
dendritic:
other: w/ phosphorite veins & 5mm thick phosphorite layer on underneath side of crust



CD5-17

F7-86-HW
Karin Ridge
Johnston Is

Mineralogy (XRD):

Associated alteration, phosphorite, or hydrothermal deposits:

Substratum: None

Rock type:

Description:

Mineralogy (XRD):

Analyses and subsamples:

analysis:	analyst: