DREDGE 28
Cross-Chain
Smt. South

SAMPLE ID	Mn CHEM	Pt & Au	REE	Si Chem	P.Sect.	35mm Pho	Archive	Paleo	Organics			
D28-1	Layers			✓								
D28-2				✓	✓							
D28-3	Bulk											
D28-4	Bulk		Bulk		✓				Chc When Yeh			
D28-5												
D28-6	Bulk				2 DPTS				Ch. When			
D28-7	Bulk											
D28-8												
D28-9												

MARIANA ISLANDS Sample Description

Cruise I.D: ~~L5-83-HW~~ Sample I.D: Sta: D28-1 Location: Cross Chain Seamt

Size: 17x10x7cm Weight: 970g DEPTH: 1715-1350m

Mn crust thickness:

Total: min: 4.5cm max: 7cm ave: 6cm

hydrothermal Inner crust: min: 4.2cm max: 6.3 ave: 5.5cm

hydrogenous Outer crust: min: 3mm max: 7mm ave: 5mm

Surface texture:

Internal structure:

layered: ✓ SEVEN !

laminated: ✓

massive:

porous:

dendritic:

other: hydrogenous outer - hydrothermal inner 6

MARIANA~~S~~ ISLANDS
D28-1

Mineralogy (XRD):

Associated alteration, phosphorite, or hydrothermal deposits:

Substratum:

Rock type: Pumice clasts floating

Description: Sub-rounded to sub-angular yellow, completely fractured pumice clasts (2mm - 2.5cm in size) a few are speckled w/mafics? or Mn?

pumice clasts highly altered

Mineralogy (XRD):

Analyses and subsamples:

analysis:	analyst:
D28-1-A - LAYER 1.	M. Morrison 10-12-8
D28-1-B LAYER 2	
D28-1-C-I LAYER 3 (see back)	
D28-1-C-II Layer 3	
D28-1-D Layer 4	Mn Chem Pkg & XRD
D28-1-E Layer 5	
D28-1-F Layer 6	
D-28-1-G Layer 7	
D-28-1-H pumice clast	(silicate chem & XRD)
LA-ICP-MS	Collier
[illegible]	Linda Gorney
D, E & G	

See Back!

Disaster strikes! beautiful sample falls apart being sliced for polished sections!
(will Jones have this job long?)

MARIANAS ISLANDS
D28 - 1

Layer 1 - OUTER HYDROGENOUS LAYER
VERY GRANULAR, with "IRON" staining
D28-1-A 0 - 5mm thick

Layer 2 - Dense Layer - restricted material between layers
layers break apart easily 5cm thick

Layer 3 - in 3 parts upper massive
middle part
lower part [illegible]

Lower layer broke off quite distinctly
Chemistry as a separate sample.
1 cm thick - 7 mm 1ST LAYER
2ND LAYER
3 mm 3RD LAYER

Layer 4 - 4 to 5 mm
Layers 4 & 5 difficult
to sample separately pencil fractures
perpendicular to layering occurred.
Layer 4 - lighter in color bubbles
vesicals at top of layer
Layers 4 & 5 when powered or scrached - look
like graphite

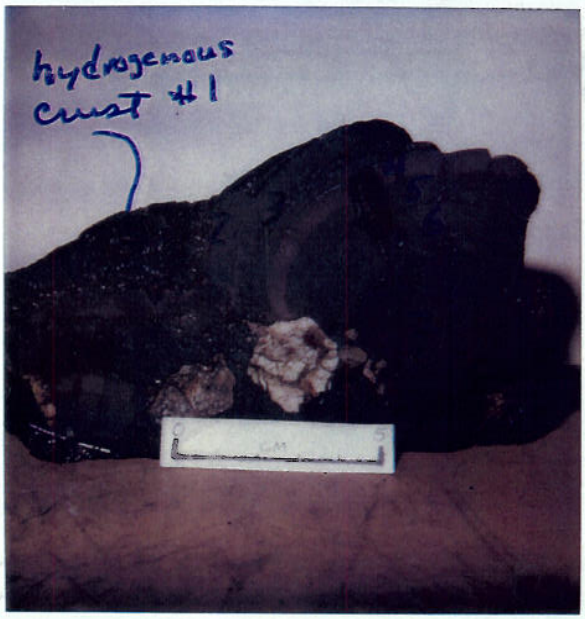
Layer 5 - 5 to 6 mm
bubbles throughout

Layer 6 - 1cm to 1.3cm
Separated easily from layer 5
massive no vesicals, concoidal fracture

Layer 7 4 to 5cm
Rounded clast (?), when sampled layer 4 fractured into
small erratic pieces. Does appear to have some
internal lamanations. Almost as if layers
were deformed while soft (?)

Where Mn layers in
contact with a pumice
Clast pieces of the clast
would be incorporated (nearly)
into the Mn.

Where cobbles are larger
layers not continuous.



D28-1 Mariana Is

D28-1
Mariana Is

D 28-1
Mariana

Sample Description

Cruise I.D: ~~L5-83-HW~~ Mariana Islands

Sample I.D: Sta: D28-2

Location: Cross Chain Seam

Size: 20x8x6cm Weight: 920g

Depth: 1715-1350m

Mn crust thickness:

Total: min: 2 max: 10 ave: 6mm

Inner crust: min: 1 max: 7 ave: 4mm

Outer crust: min: 1 max: 3 ave: 2mm

Surface texture: Botryoidal & granular

Internal structure:

layered: ✓ 3
laminated: ✓ Inner
massive:
porous: ✓ outer
dendritic:
other:

MARIANA ISLANDS
D28-2

Mineralogy (XRD):

Associated alteration, phosphorite, or hydrothermal deposits:

Fe-oxidized worm tubes

Substratum:

Rock type: Volc. Breccia

Description: Green red gray & white sub-rounded, loosely packed well indurated, volcanic clasts in a greenish-brown sandy? & black Mn matrix. A few clasts are Mn? or mafics?

Mineralogy (XRD):

Analyses and subsamples:

analysis:	analyst:
XRD:	Charlaine
D28-2-I: outer Mn	
-II: inner Mn	
III: bulk breccia	
Doubly Polished Thin Section	Mann Petro
D28-2-IV XRD of white grains picked out of slab some look calcitic w/ cleavage that is good looking for zeolites.	

Mn - hydrothermal dense layers

D28-2

Mariana Islands

D28-2

Mariana Islands

Sample Description

Cruise I.D: ~~L5-83-HW~~ MARIANA ISLANDS

Sample I.D: Sta: D28-3

Location: Cross Chain Seamt

Size: 9x11x9cm Weight: 620g

Mn crust thickness:

Total: min: 8 max: 19 ave: 12mm

Inner crust: min: max: ave:

Outer crust: min: max: ave:

Surface texture: Rough & porous (slightly botryoidal)

Internal structure:

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

Mineralogy (XRD):

Associated alteration, phosphorite, or hydrothermal deposits:

* Small CRAB in cavity on surface of crust! Forams, sponge, & Fe oxidized worm tubes

Substratum:

Rock type: Volc. Breccia

Description: Yellow, tan, white, gray & green sub-rounded to sub-angular, poorly sorted (1-55mm), well indurated, moderately packed basalt clasts in a Mn & sand & matrix

Mineralogy (XRD):

MARIANA ISLANDS
D28-3

Analyses and subsamples:

analysis:	analyst:
XRD:	Charlaine
D28-3-I: bulk Mn	
Chemistry	
D28-3-A: bulk Manheim pkg.	E Brown Reston USGS
D28-3-A, Bulk, for Hg, 4.0gms,	

Sample Description

Cruise I.D: ~~L5-83-HW~~ MARIANA ISLANDS Sample I.D: Sta: D 28-4 Location: Cross Chain Seamt

Size: 12X9X7cm Weight: 710 g

Mn crust thickness:

Total: min: 1.5 max: 7cm ave: 5.4 cm

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

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

Surface texture: Botryoidal

Internal structure:

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

Mineralogy (XRD):

Associated alteration, phosphorite, or hydrothermal deposits:

Fe-oxidized worm tubes

Substratum: NONE

Rock type:

Description: Small amount of tan silt & slightly sandy silt on underside of mn crust.

Actually this sample looks like hydrothermal Mn (convoluted) w/ a hydrogenous crust on top.

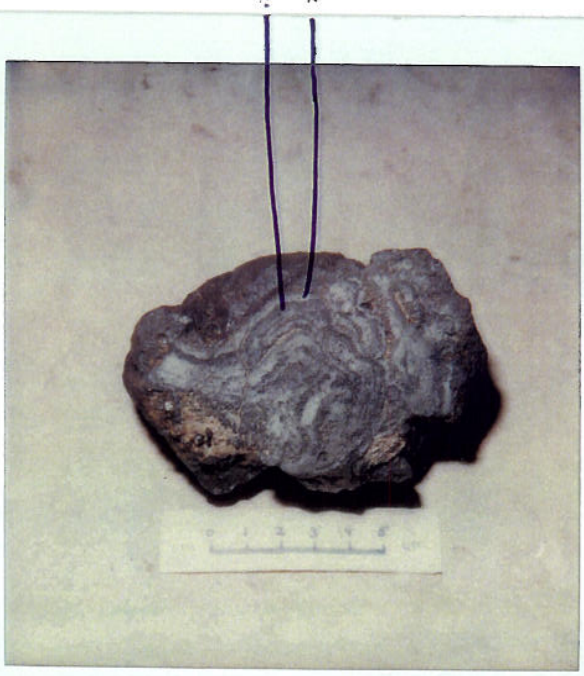
Mineralogy (XRD):

MARIANA ISLANDS
D28-4

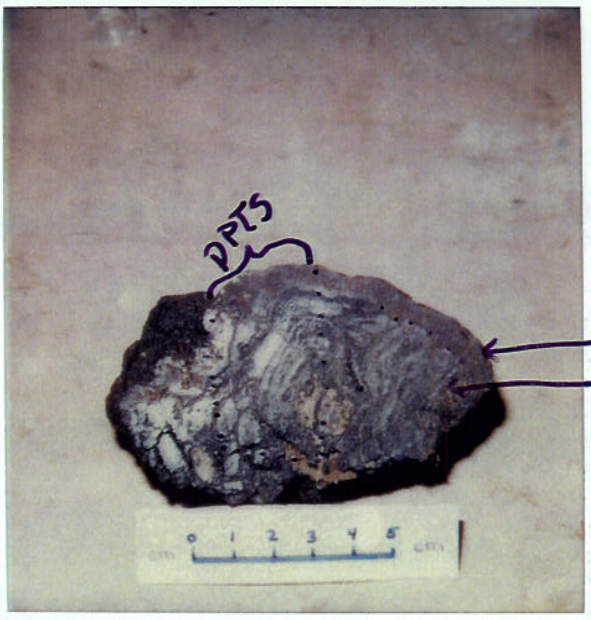
Analyses and subsamples:

analysis:	analyst:
XRD:	
D28-4-I: bulk Mn	
Chemistry:	
D28-4-A: bulk Mn - Manheim pkg.	F. Brown Boston USGS
D28-4-B: REE bulk Mn	Denver USGS
Oxygen Isotopes	Cho When Yeh
½ of rock given to:	P. Halbach
XRD - Mn	
D28-4 C. Hydrothermal lighter colored massive	
D28-4D Hydrothermal darker, porous	
DPTS	
piece laminated hydrothermal surrounded [illegible]	Linda Godfrey

MARIANAS ISLANDS
D28-4



Mariana Islands
D28-4



Mariana Islands
D28-4

Sample Description

Cruise I.D: ~~L5-83-HW~~ MARIANA ISLANDS

Sample I.D: Sta: D28-5

Location: Trans Chain Seg

Size: 10X8X5cm Weight: 215g

Mn crust thickness:

Total: min: 3.5 max: 5cm ave: 4.5cm

Inner crust: min: max: ave:

Outer crust: min: max: ave:

Surface texture: Botryoidal & granular

Internal structure:

layered:
laminated: ✓ start of one layer of dense hydrothermal Mn near bottom
massive:
porous: ✓ w/ void in center
dendritic:
other:

MARIANA ISCANDS
D28-5

Mineralogy (XRD):

Associated alteration, phosphorite, or hydrothermal deposits:

Substratum: None

Rock type:

Description:

Mineralogy (XRD):

Analyses and subsamples:

analysis:	analyst:
XRD:	Charlene
D28-5-I: bulk Mn	

MARIANA ISLANDS

Sample Description

Cruise I.D: ~~L5-83-HW~~ Sample I.D: Sta: D28-6 Location: Cross Chain Seamt

Size: 12x10x7cm Weight: 520 g

Mn crust thickness:

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

Inner crust: min: max: ave:

Outer crust: min: max: ave:

* Surface texture: Botryoidal or porous

Internal structure:

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

Mineralogy (XRD):

Associated alteration, phosphorite, or hydrothermal deposits:

Substratum:

Rock type: Siltstone ? (Altered breccia) or Claystone ?

Description: Yellow orange, slightly sandy, very soft (poorly compacted) siltstone w/a couple small (1-2mm) sub-rounded clasts of basalt ?? The siltstone itself looks like stretched-apart blobs floating in Mn

Mineralogy (XRD):

MARIANA ISLANDS
D28-6

Analyses and subsamples:

analysis:	analyst:
XRD: D28-6-I: bulk Mn	Charlaine
Chemistry: D28-6-A: bulk Mn Manheim pkg	F. Brown Reston USGS
Oxygen Isotopes	Che When Yeh
DPTS	

Pull out sample & Desc / Morph - Mn is

* Not sure which is top round cobble w/Mn on a sides. I would think the botryoidal surface top except the crust is much thinner than on the porous side so I will assume the [illegible] to be the top. Charlaine

Sample Description

Cruise I.D: ~~L5-83-HW~~ MARIANA ISLANDS Sample I.D: Sta: D28-7 Location: Cross Chain Seamt

Size: 15x10x5cm (rx) Weight: 905 g

Mn crust thickness: ?

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

Inner crust: min: max: ave:

Outer crust: min: max: ave:

Surface texture: Granular

Internal structure:

layered:
laminated: ✓ dense hydrothermal Mn layer near bottom
massive:
porous: ✓
dendritic:
other: ✓ basalt clasts & fragments of claystone are intermixed in the Mn crust

Mineralogy (XRD):

Associated alteration, phosphorite, or hydrothermal deposits:

Substratum:

Rock type: "Claystone" (Altered Breccia)

Description: Orange, fragmented but well-indurated claystone intermixed w/ Mn. A few unaltered gray, subrounded, basalt? clasts (1-3mm)

Mineralogy (XRD):

Mariana Islands
D28-7

Analyses and subsamples:

analysis:	analyst:
1/3 rx to	Koiche
XRD:	
D28-7-I: bulk Mn + Claystn	Chaulaine
Chemistry:	
D28-7-A: bulk rx 'Manheim' pkg	F Bravo-Reston USGS
D28-7-A Bulk RX For Hg	

MARIANA ISLANDS

Sample Description

Cruise I.D: ~~L5-83-HW~~ Sample I.D: Sta: D28-8 Location: Cross Chain Seamount

Size: 13x12x4cm Weight: 485g

Mn crust thickness:

Total: min: 1mm max: 4mm ave: 1mm

Inner crust: min: max: ave:

Outer crust: min: max: ave:

Surface texture: Botryoidal

Internal structure:

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

Mineralogy (XRD):

Associated alteration, phosphorite, or hydrothermal deposits:

Substratum:

Rock type: Basalt

Description: Dark gray aphanitic basalt covered w/ microscopic vesicles! Orange Fe layer btw basalt & Mn crust A little tan silty sediment coating on sides & underneath rock

Mineralogy (XRD):

MARIANAS ISLANDS
D28-8

Analyses and subsamples:

analysis:	analyst:
XRD: D28-8-I: bulk Mn	Charlaine

Sample Description

Cruise I.D: ~~L5-83-HW~~ MARIANA ISLANDS Sample I.D: Sta: D 28-9 Location: Cross Chain Seamt

Size: 7x5x3cm Weight: 335g

7 broken pieces of Mn + a little substrate

Mn crust thickness:

Total: min: ____ max: ____ ave: ____

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

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

Surface texture: Botryoidal

Internal structure:

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

Mineralogy (XRD): ____

Associated alteration, phosphorite, or hydrothermal deposits:

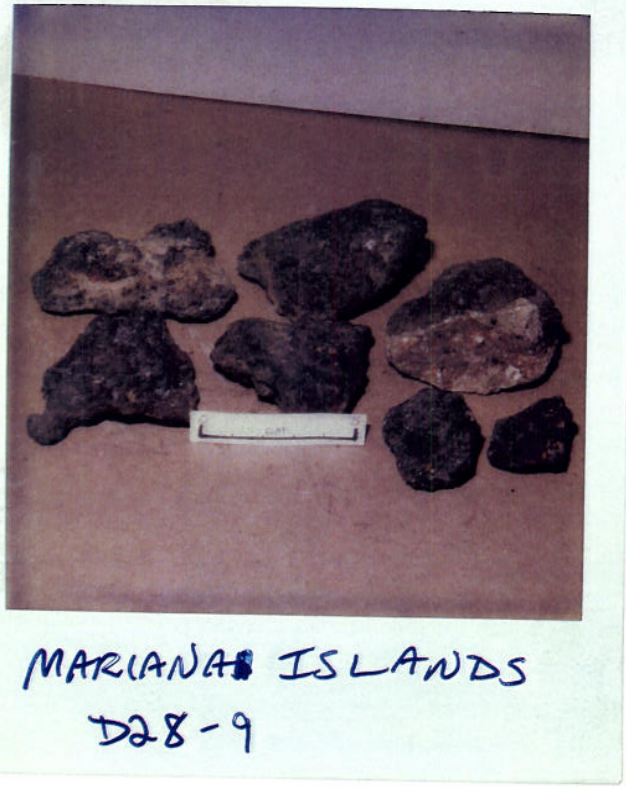
Fe oxide in Mn crust

Substratum: very little

Rock type: Siltstone, sandstone & breccia

Description: 3 of the 7 pieces of Mn have a little (.5-2.5cm thick) substrate. One is altered? yellow-orange soft siltstone. The second is a tan fine grained well-indurated sandstone. The third is volcanic breccia w/ a white to tan very well indurated, sandy silt matrix

Mineralogy (XRD): ____



Analyses and subsamples:

analysis:	analyst: