Type 1

SAMPLE DESCRIPTION

Cruise Id: F~~7~~6-87-~~S~~N C Size: Various Location: Santa Lucia Escarpment

Sample Id: D8-1 Weight: 6 kg Depth: 2625 - 2190 m

Mn Crust Description

Surface Texture: Smooth

granules on sides of some -

Mn Crust Thickness:

Min: 8 Max: 35 Ave: 15 Tops

2 20 10 Bottoms

Layers (Outer to Inner):

	Min	Max	Ave	Texture
1.				
2.				
3.				
4.				
5.				
6.				

D8-1

Comments and XRD Mineralogy:

dk brown, reddish brown to black - Three distinct layers which are laminated when similar to type 3; laminated to massive block when similar to type 2 - some crusts loaded w/ rock fragments

Substrate Description

Rock Type: Mudstone

Description:

greenish-brown hemipelagic (?) mudstone - friable, poorly consolidated laced w/ Mn dendrites & Mn veins - mudstones maybe pebbly mudstones w/ grains of dominant chert and SS, one chert grain - 2.5 cm & one SS grain 2.0 cm - some basalt (?) frags.

ANALYSES

Subsample & Type	Analysis	Weight

Described By: d.j. Subsampled By:

Type 1

SAMPLE DESCRIPTION

Cruise Id: F~~7~~6-87-~~S~~N C Size: 16 x 13 x 7 cm Location: Santa Lucia Escarpment

Sample Id: D8-2 Weight: 1.7 kg Depth: 2625-2190 m

Mn Crust Description

Surface Texture: Smooth

Mn Crust Thickness:

Min: 7 Max: 24 Ave: 14

Layers (Outer to Inner):

	Min	Max	Ave	Texture
1.				
2.				
3.				
4.				
5.				
6.				

Sampled

D8-2

Comments and XRD Mineralogy:

outer laminated, inner porous layers

Substrate Description

Rock Type: Mudstone, pebbly

Description:

green-brown mudstone laced w/ Mn dendrites & veins - some SS pebbles

ANALYSES

Subsample & Type	Analysis	Weight
D8-2 Bulk	CC	0-24 mm
	XRD	(45g)
D8-2B		SUBSTRATE (Anal 2 9/92
	OC	64g
	XRD	
		Paleo to P.Q.

Described By: d.j. Subsampled By: d.j. / AGG

Type 2

SAMPLE DESCRIPTION

Cruise Id: FT-87-SC Size: Various Location: Santa Lucia Escarpment

Sample Id: D8-3 Weight: 4 kg Depth: 2625 – 2190 m

Mn Crust Description

Surface Texture: Smooth

Mn Crust Thickness:

Min: 25 (7) Max: 55 (30) Ave: 40 (15) Thickest side / Thinnest side

Layers (Outer to Inner):

	Min	Max	Ave	Texture
1.				
2.				
3.				
4.				
5.				
6.				

D8-3

Comments and XRD Mineralogy:

block, porous. Laminated to massive Mn nodules, smooth places are rich w/ sand-sized rock frags. other areas contain only a few fragments frag. of old crust in one –

Substrate Description

Rock Type: Mudstone

Description:

greenish brown, lacced w/ Mn dendrites + veins

ANALYSES

Subsample & Type	Analysis	Weight

Described By: d.j. Subsampled By:

Type 2

SAMPLE DESCRIPTION

Cruise Id: F7-87-SC (6 N) Size: 11 x 10 x 13 Location: Santa Lucia Escarpment

Sample Id: D8-4 Weight: 1.5 kg Depth: 2625 - 2190 m

Mn Crust Description

Surface Texture: smooth — Mn Nodules

Mn Crust Thickness:

Min: 35 Max: 50 Ave: 40

Layers (Outer to Inner):

	Min	Max	Ave	Texture
1.		20	28	Porous mn cemented gs
2.			3	massive layer/dense
3.			8	Laminated-wavy
4.			1	massive layer/dense
5.			18	massive porous
6.				

D8-4

Comments and XRD Mineralogy:

black Porous to dense massive + laminated Mn Nodules

Substrate Description

Rock Type: Mudstone

Description:

Yellow-greenish-brown local w/ Mn

ANALYSES

Subsample & Type	Analysis	Weight
D8-4A	CC	0-16mm 16 mm
Porous Mn cemented	XRD	(22.5g)
gs; layer 1		
D8-4B	CC	16-27 mm 11 mm
Layer 2+3	XRD	(19g)
D8-4C		27-45 18 mm
layers 4+5	CC	(12g)
	XRD	

Recent Mud local in layers 1 + 5 - removed ~90% in Chem Sample

Described By: LJ. Subsampled By: LJ

over

D8-4; A = 1
B = 2+3
C = 4+5

Type 3

SAMPLE DESCRIPTION

Cruise Id: F~~7~~6-87-~~S~~N C Size: various Location: Santa Lucia Escarpment

Sample Id: D8-5 Weight: 8.5 kg Depth: 2625 - 2190 m

Mn Crust Description

Surface Texture: Smooth

Mn Crust Thickness:

Min: 15 Max: 32 Ave: 22

Layers (Outer to Inner):

	Min	Max	Ave	Texture
1.			6	dk brown laminated
2.			9	" " "
3.			8	" " "
4.				
5.				
6.				

D8-5

Comments and XRD Mineralogy:

dk brown laminated crusts that split easily into 3 layers - because of thin layers of detrital sand grains. Some have abundant sand + pebble-sized by frags in crust (* glassy breccia?)

Contact w/ subst. is commonly irregular, but sharp

outer layer more easily removed

Substrate Description

Rock Type: Mudstone -

Description:

Same as Types 1 + 2

ANALYSES

Subsample & Type	Analysis	Weight

D8-5

Described By: d.j. Subsampled By:

SAMPLE DESCRIPTION

Type 3

Cruise Id: F7-87-SC (6 N) Size: 22 x 22 x 6 cm Location: Santa Lucia Escarpment

Sample Id: D8-6 Weight: 2.8 kg Depth: 2625-2190 m

Mn Crust Description

Surface Texture: Smooth

Mn Crust Thickness:

Min: 14 Max: 25 Ave: 20

Layers (Outer to Inner):

	Min	Max	Ave	Texture
1.			5	Lam.
2.			8	Lam.
3.			8	Lam.
4.				
5.				
6.				

Comments and XRD Mineralogy:

Typical as described for D8-5

Substrate Description

Rock Type: Mudstone

Description:

greenish brown w/ Abundant Mn dendrites

½ of sample used

rest of wet half (substrate) discarded

ANALYSES

Subsample & Type	Analysis	Weight
D8-6A	CC, XRD	0-5 mm 5 mm (101 g)
	Pt, Au, REE	"
D8-6B	" "	5-13 mm 8 mm (158.5 g)
D8-6C	" "	13-20 mm 7 mm (78 g)
layer be most dense		
D8-6D	OC	Mn dendrite + mudstone (15.5 g)

Described By: dj Subsampled By: dj

over

A
B
C
D

T3

SAMPLE DESCRIPTION

Cruise Id: F6-87-NC Size: 34 x 23 x 11 Location: Santa Lucia Escarpment

Sample Id: D8-7 Weight: 8.2 kg Depth: 2625 – 2190 m

Mn Crust Description

Surface Texture: Smooth

Mn Crust Thickness:

Min: 18 Max: 22 Ave: 20

11 mm custom side of Rx.

Layers (Outer to Inner):

	Min	Max	Ave	Texture
1.			12	Lam porous
2.			8	Lam - porous
3.				
4.				
5.				
6.				

D8-7

Comments and XRD Mineralogy:

Same as other

D8-7B → XRD, sander, intraclasts 9/9/02 fine grain MS

Substrate Description

Rock Type: mudstone (w/ slightly sandier intraclasts - cross cuts by mudstone)

Description:

Dom Mn mixed Mem others

ANALYSES

Subsample & Type	Analysis	Weight
D8-7A	CC	0-20 mm
Bulk	XRD	(151 g)
	REE	0-20 mm (11.1 g) (a)
D8-7B	OC	Mn-Free mudstone
	XRD	(19 g)
D8-7A (extra sample from xrd portion sent for)	Hg	
		Refer to P.Q.

Described By: DJ Subsampled By: DJ / AEG

Type 3 & 4

SAMPLE DESCRIPTION

Cruise Id: F6-87-NC Size: 34 X 18 X 11 Location: Santa Lucia Escarpment

Sample Id: D8-8 Weight: 5.2 kg Depth: 2625-2190 m

Mn Crust Description

Surface Texture: Smooth

Mn Crust Thickness:

Min: 13 Max: 37 Ave: 22

Layers (Outer to Inner): laminated & layered

	Min	Max	Ave	Texture
1.				
2.				
3.				
4.				
5.				
6.				

D8-8

Comments and XRD Mineralogy:

Same as others

D8-8B-1 REE: Tried to eliminate all Mn, only blades
OC: Bulk, including some Mn coating

Substrate Description

Rock Type: Mudstone + Boxwork

Description:

boxwork - cream colored mixed w/ Mn dendrites - in places is yellow colored

ANALYSES

Subsample & Type	Analysis	Weight
D8-8A	XRD	Boxwork yellow
D8-8B	XRD	" Cream
B-1	XRD REE 2.8g OC 8.1g	Bulk Boxwork (9/92)
D8-8C	XRD	BULK CRUST (21.0g)
	CC (13.28g) (9/92)	0-23 mm
	REE (6.58g) (9/92)	
natural break of layers	XRD	0-6 mm
	XRD	6-16 mm (9/92)
	XRD	16-23 mm
D8-8D	XRD	Mudstone
	OC	13.75g (9/92)
	REE	4.5g
~~[illegible]~~ Paleo - ~~[illegible]~~		to P.Q

Described By:

Subsampled By: AEG

Type 4 Photo w/ 35 m

SAMPLE DESCRIPTION

Cruise Id: F6-87-NC Size: broken into 3 pieces ~17 x 16 x 10 = largest Location: Santa Lucia Escarpment

Sample Id: D8-9 Weight: 2 kg Depth: 2625-2190 m

Mn Crust Description

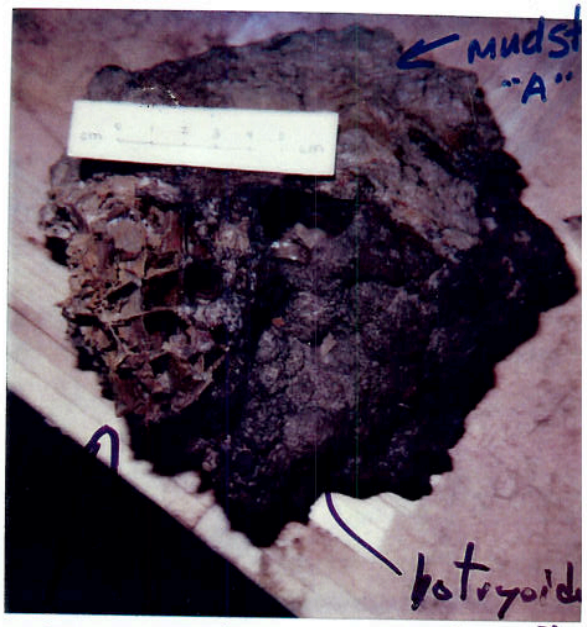
Surface Texture: botryoidal

Mn Crust Thickness:

Min: _____ Max: _____ Ave: ~10

Layers (Outer to Inner):

	Min	Max	Ave	Texture
1.				
2.				
3.				
4.				
5.				
6.				



boxwork Crust

D8-9

Comments and XRD Mineralogy:

ANALYSES

Subsample & Type	Analysis	Weight
D8-9	XRD	Boxwork Blades
D8-9A	REE (9/92) OC XRD	4.9g Mudstone 5.6gms
D8-9B	REE (9/92) OC	2.4g Boxwork Blades 5.3g
D8-9C	XRD	Lt. Brown Clay infilling boxwo
D8-9D	XRD	wavy coherent sediment near to
D8-9E	XRD	sediment further away from
D8-9F	XRD	Bulk Crust ~19.5g
	REE	4.75g (9/92) 0-10
	CC	14.9g
Paleo (1)	MS "in" boxwork	
(2)	MS	

Substrate Description

Rock Type: Mudstone + boxwork

Description:

Yellow-brown boxwork

Mudstone Chem sample; tried to keep away from Mn staining, but not fully successful. Mudstone closer to boxwork was more wavy & coherent than that in other spots. Chem sample contains both kinds.

A different type of sediment that is brown w/ Mn spots filled in Boxwork above (where Mn Crust exists)

Described By:

Subsampled By: JSS - HEG

D8-9

D8-9

D8-9

Palygorskite

I	dA	2θ
10	5.40	16.42
10	2.587	34.65
8	3.35	26.61
8	2.674	33.45
4	2.851	31.35
2	4.13	21.52
2	3.44	25.90

21-550

copy

I	dA°	2θ
(100)	10.4	8.50
(20)	4.47	19.86
(20)	4.26	20.85
(20)	2.539	35.35
(16)	3.68	24.18
(16)	3.10	28.79
(14)	6.36	13.92
(12)	3.18	28.06
(12)	2.567	34.95

Palygorskite

$MgAl\,Si_4O_{10}(OH)\cdot 4H_2O$

29-855

I	dA	2θ	I	dA	2θ
3	4.11	21.62	100	10.34	8.55
3	3.23	27.62	19	3.17	28.15
3	2.508	35.80	16	2.230	40.45
2	3.35	26.61	15	6.34	13.97
2	2.675	33.50	12	4.47	19.86
2	2.341	38.45	8	2.583	34.73
2	2.161	41.80	7	5.38	16.48
2	2.141	42.21	6	2.536	35.39
2	2.029	44.66	6	2.113	42.80
2	1.8005	50.70	4	3.66	24.32
2	1.5371	60.20	4	3.09	28.89
2	1.5314	60.45	3	4.27	20.80
2	1.5077	61.50			
2	1.4881	62.40			

OVER→

I	dÅ	2θ
1	3.95	22.51
1	3.45	25.82
1	2.746	32.61
1	2.607	34.40
1	2.076	43.60
1	1.9649	46.20
1	1.8139	50.30
1	1.7523	52.20
1	1.7217	53.20
1	1.6723	5490
1	1.6104	57.20
1	1.5851	58.20
1	1.5631	59.10