DREDGE 4

# Dredge Sample Summary Sheet

| Sample ID | Bulk CC | Layer CC | Pt & Au | Ree | OC | DPTS/TS | XRD | 35mm Photo | Paleo | Archive |
|---|---|---|---|---|---|---|---|---|---|---|
| D4-10-1 | X | | | | | | X | | | |
| D4-10 | | | | | | X | | | | |
| D4-12-1 | X | | | | | X | X | | | |
| -12-2 | X | | | | X | | X | | | |
| | | | | | | | | | | |
| D4-12,8 | | X | | | | | X | | | |

# SAMPLE DESCRIPTION

Cruise Id: 91-AV-19/2 Size (cm): ≈ 80 x 80 x 90 Location: V2-91-CP

Sample Id: D4-1 Weight (kg): 80 Depth (m): 3300-2900

## Mn Crust Description

Surface Texture: granular patina patchy

## Mn Crust Thickness (mm):

Min:_____ Max:_____ Ave: < 1

## Outer to Inner Layers (mm)

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

D4-1

## Comments and XRD Mineralogy:

Subsan

## Substrate Description

Rock Type: 1 large Pillow Basalt

Description: only v. highly vesicular outer rind removed - vesicles are filled w/ calcite or OFA

All To USSR

Biology (?):

Described by: HEIN

Subsampled by:

D4-1

# SAMPLE DESCRIPTION

Cruise Id: 91-AV-19/2 Size (cm): pebbles Location: V2-91-CP

Sample Id: D4-2 Weight (kg): ~ 1.5 Depth (m): 3300 - 2900

## Mn Crust Description

Surface Texture: smooth

## Mn Crust Thickness (mm):

Min:_____ Max:_____ Ave:_____

## Outer to Inner Layers (mm)

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

NONE

## Comments and XRD Mineralogy:

## Analyses

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

## Substrate Description

Rock Type: Fragments of Fe-Mn impregnated MudSt.

Description:

Biology (?):

Described by: HEIN

Subsampled by:

# SAMPLE DESCRIPTION

Cruise Id: 91-AV-1912 Size (cm): pebbles Location: V2-91-CP

Sample Id: D4-3 Weight (kg): ~1.5 Depth (m): 2300 : drop

## Mn Crust Description

Surface Texture: smooth

## 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:**

## Substrate Description

Rock Type: Fragments of hyaloclastite

Description:

Biology (?):

Described by: HEIN

## Analyses

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

Subsampled by:

# SAMPLE DESCRIPTION

Cruise Id: 91-AV-191z Size (cm): 20-30 pebbles Location: V2-91-CP

Sample Id: D4-4 Weight (kg): 1 Depth (m): 3300-2900

## Mn Crust Description

Surface Texture: smooth
low botryoids

## Mn Crust Thickness (mm):

Min: 5 Max: 20 Ave: 10

## Outer to Inner Layers (mm)

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

None

**Comments and XRD Mineralogy:**

Misc. fragments of crusts

## Analyses

| Subsample No. | Analysis | Layer Thick. | Wt.(g) |
|---|---|---|---|
| | ± USGS | | |
| | ± USSR | | |

## Substrate Description

Rock Type: Breccia

Description: Phosphatized matrix with basalt clasts.

Biology (?): None

Described by: G.S

Subsampled by:

## SAMPLE DESCRIPTION

Cruise Id: 91-AV-19/2 Size (cm): 30-40 Pebbles Location: V2-91-CP

Sample Id: DA-5 Weight (kg): 1.5 to 2 Depth (m): 3300-2900

### Mn Crust Description

Surface Texture: petina to smooth, low botryoids

### Mn Crust Thickness (mm):

Min: petina Max: 12 Ave: 5

None

### Outer to Inner Layers (mm)

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

### Comments and XRD Mineralogy:

Black, dense - smooth w/ low botryoids

### Substrate Description

Rock Type: Basalt / Brecia

Description: Altered basalt + breccia pebbles

pebbles from breccia!

Biology (?): none

### Analyses

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

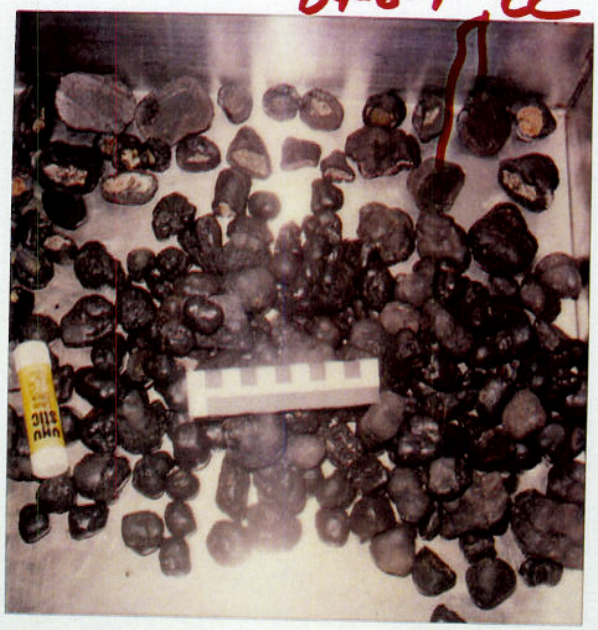
Described by: G.S.

Subsampled by:

# SAMPLE DESCRIPTION

Cruise Id: 91-AV-19/2 Size (cm): Pebbles – Location: V2-91-CP

Sample Id: D4-6 Weight (kg): ~6 Depth (m): 3300-2900




## Mn Crust Description

Surface Texture: Smooth, subdued botryoidal, some polished

## Mn Crust Thickness (mm):

Min:_____ Max:_____ Ave:_____

## Outer to Inner Layers (mm)

| | Min | Max | Ave | Texture & Color |
|---|---|---|---|---|
| 1 | | | | 100% To |
| 2 | | | | 3mm Crusts – |
| 3 | | | | 70% large |
| 4 | | | | Nucleus – 30% |
| 5 | | | | Small |
| 6 | | | | Nucleus |

## Comments and XRD Mineralogy:

Flat ones have mudst nucleus, others are ~ 20% Nod-nucleus 10% Basalt, 10% CFA, 30% hyaloclastite 20% mudstone, 10% Limestone

Subsample N

D4-6-1 CC 0-45mm – 74gm

XRD

↓

Nod w/ Nod Nucleus sep. w/ layer of CFA

Nucl. = 2.2mm

Crust 0-6 cm = 32 x 45 mm

whole Nod.

## Substrate Description

Rock Type: Mn Nodules w/ Fe-Mn oxide, Basalt, Mudst, CFA, hyaloclastite, + Lms nuclei

Description:

Biology (?):

Described by: HEIN

Subsampled by: HEIN

½ USGS

½ USSR

D4-6

# SAMPLE DESCRIPTION

Cruise Id: 91-AV-19/2 Size (cm): 5.5 x 3.7 x 3.7 13.5 x 9.5 x 6.3 Location: V2-91-CP

Sample Id: D4-7 Weight (kg): 1.4 Depth (m): 3300-2900

**Mn Crust Description**

Surface Texture: Current Modified Botryoids

**Mn Crust Thickness (mm):**

Min: Palina Max: 15 Ave: 7

**Outer to Inner Layers (mm)**

| | Min | Max | Ave | Texture & Color |
|---|---|---|---|---|
| 1 | | | | Black Dense |
| 2 | | | | Minor Porosity |
| 3 | | | | |
| 4 | | | | |
| 5 | | | | |
| 6 | | | | |

D4-7

**Comments and XRD Mineralogy:**

there are 2 nodules

Subsa

**Substrate Description**

Rock Type: Brown-Red-White Basalt Breccia

Description: Breccia with angular large to small pebble sized vesicular basalt clasts in Phosphorite cement

Some basalt clasts have cooling rims with orange glassy layer

Biology (?): e some plag phenocrysts in the basalt clasts

½ USGS ½ USSR

Described by: J.W.

Subsampled by:

# SAMPLE DESCRIPTION

Cruise Id: 91-AV-19/2 Size (cm): 31 x 21 x 9 / 5 x 5 x 2.5 Location: V2-91-CP

Sample Id: D4-8 Weight (kg): 1.5 Depth (m): 3300-2900

## Mn Crust Description

Surface Texture: Cement smooth botryoids

## Mn Crust Thickness (mm):

Min: Patina Max: 20 Ave: 12

## Outer to Inner Layers (mm)

| | Min | Max | Ave | Texture & Color |
|---|---|---|---|---|
| 1 | | | | Black Dense |
| 2 | | | | w/ minor porosity |
| 3 | | | | some microfracturing |
| 4 | | | | minor PO4 in crust |
| 5 | | | | filling porous areas |
| 6 | | | | |

Crust, Surface Scrape

D4-8

## Comments and XRD Mineralogy:

Subsample N

D4-112, 8 cc 2 pieces used for Surface Scrape 5.3g

## Substrate Description

Rock Type: Yellow-Green Breccia

Description: Angular large Pebble to large sand sized clast - mostly altered basalt clasts and semi-calcareous foram sandstone clasts (phosphatized?) and rare soft foram sandstone clasts

Biology (?): encrusting forams

Described by: J.W.

Subsampled by: JW/LEV

m hyaloclastite matrix

SAMPLE DESCRIPTION

Cruise Id: 91-AV-19/2 Size (cm): 4 x 3.4 x 6.5 x 6 x 5 Location: V2-91-CP

Sample Id: D4-9 Weight (kg): 0.234 Depth (m): 3300-2900

**Mn Crust Description**

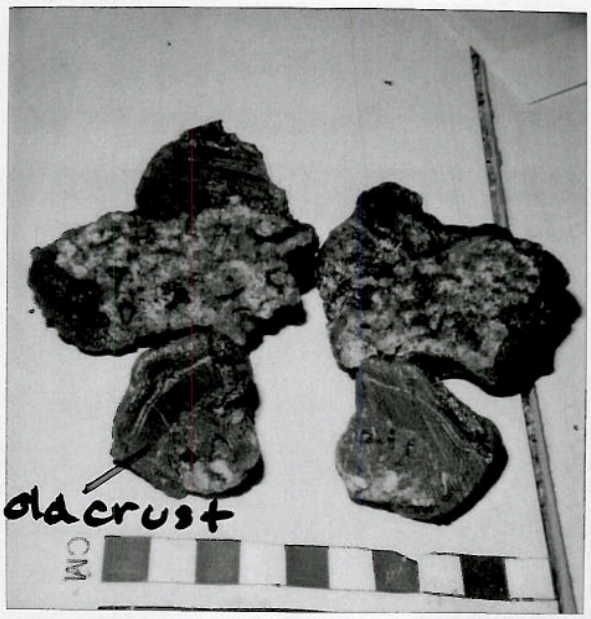
Surface Texture: Modified current - smooth botryoids

**Mn Crust Thickness (mm):**

Min: Patina Max: 17 Ave: 12

**Outer to Inner Layers (mm)**

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




D4-9

**Comments and XRD Mineralogy:**

Brown Black Dense
Minor porosity
Minor to some PO4 in Crust
Small piece has a new
Crust growth on top of
an old crust and 2 phosphatized layers

**Substrate Description**

Rock Type: Green Gray
Phosphorite

Description: Phosphorite
with bored holes,
60% impregnated
by Mn-Fe oxide
and Mn-Fe oxide lines bored holes

Biology (?): holes filled by PO4

Subs

1/2 U.S.G.S.
1/2 USSR

Described by:

J.W.

Subsampled by:

# SAMPLE DESCRIPTION

Cruise Id: 91-AV-19/2 Size (cm): 8.5 x 5.5 x 2 Location: V2-91-CP

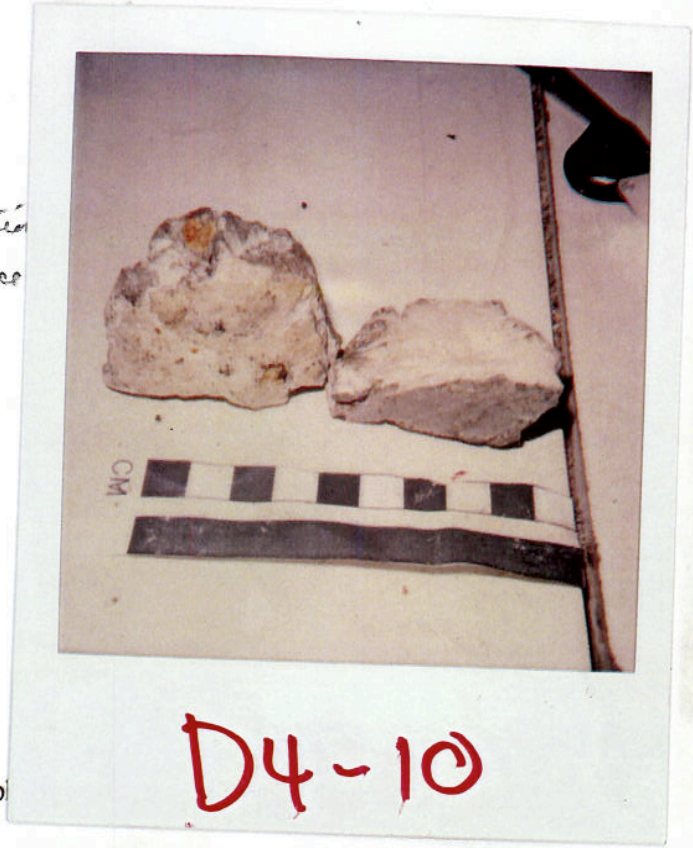
Sample Id: D4-10 Weight (kg): .14 Depth (m): 3300-2900

~~Mn Crust Description~~

Surface Texture: Current Smooth Phosphorite layer w/ sprinkles of Mn-Fe $PO_4$ impregnation mostly on surface

~~Mn~~ Crust Thickness (mm):

Min: 1 Max: 6 Ave: 3.5




Outer to Inner Layers (mm)

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

Comments and XRD Mineralogy:

Beige. $PO_4$ layer

Subsamp

D4-10 DRTS entire sample

Substrate Description

Rock Type: Red-brown Basalt

Description: Basalt w/ some vesicles filled w/ $PO_4$

1/2 USGS 1/2 USSR

Biology (?):

Described by: J.W.

Subsampled by:

D4-10

# SAMPLE DESCRIPTION

Cruise Id: 91-AV-19/2 Size (cm): 8 x 6 x 3.5 large Pebbles Location: V2-91-CP

Sample Id: D4-11 Weight (kg): .91 Depth (m): 3300-2900

## Mn Crust Description

Surface Texture: Smooth current modified bartriadal surfaces

1/2 nodules 1/2 not nodule

91-AV-19/2
D4-11

## Mn Crust Thickness (mm):

Min: 2 Max: 24 Ave: 20

## Outer to Inner Layers (mm)

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

## Comments and XRD Mineralogy:

Black dense layer
Porous near + bottom
of thicker crust
Some filled w/ $PO_4$

Sub

## Substrate Description

Rock Type: Grey Phosphorite

Description: Bioturbated Phosphorite
Impregnated with Mn oxide - line + fill bored holes and fractures

1/2 USGS 1/2 USSR

Biology (?):

Described by: J.W.

Subsampled by:

# SAMPLE DESCRIPTION

Cruise Id: 91-AV-19/2 Size (cm): 1.5 x 1.5 x 1.2 / 18 x 14 x 5.8 Location: V2-91-CP

Sample Id: D4-12 Weight (kg): 4.1 Depth (m): 3300-2900

91-AV-19/2 D4-12 • Use for Surface Scrape

## Mn Crust Description

Surface Texture: Smooth Current modified botryoids

## Mn Crust Thickness (mm):

Min: Patina Max: 32 Ave: 20

## Outer to Inner Layers (mm)

| | Min | Max | Ave | Texture & Color |
|---|---|---|---|---|
| 1 | | | | Black dense |
| 2 | | | | to Porous. |
| 3 | | | | near the bottom |
| 4 | | | | Phosphorite fill |
| 5 | | | | most porous area |
| 6 | | | | or vugs and some microfr |

## Comments and XRD Mineralogy:

Sub:

D4-12-1A CC Bulk Crust 16mm 10.4g
D4-12-1A XRD
D4-12,8 CC Surface Scrape 5mm 5.3g
D4-12,8 XRD
D4-12-1 DPTS
D4-12-1B OC 35.6g
D4-12-1B XRD

## Substrate Description

Rock Type: Beige Phosphorite

Description: Phosphorite with a mudstone texture. Bioturbated Mn oxide line bored holes, fractures and some speckled Mn impregnations

1/2 USGS 1/2 Soviet

Biology (?):

Described by: J.W.

Subsampled by: JW/LEV

# SAMPLE DESCRIPTION

Cruise Id: 91-AV-1912 Size (cm): mostly cobbles, but Boulders To Pebbles Location: V2-91-CP

Sample Id: D4-13 Weight (kg): ~55 Depth (m): 2300-2900

## Mn Crust Description

Surface Texture: Smooth to granular patchy patina

## Mn Crust Thickness (mm):

Min: <1 Max: 3 Ave: <1

## Outer to Inner Layers (mm)

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

## Comments and XRD Mineralogy:

Subsamp

## Substrate Description

Rock Type: Pillow Basalt

½ USGS
½ USSR

Description: Vesicular, aphanitic Basalt - Pillow fragments w/ altered red brown glassy rinds; rind fragments - Calcite & CFA - filled vesicles

C & O isotopes on Calcite vesicle fill

Biology (?):

Described by: HEIN

Subsampled by:

# SAMPLE DESCRIPTION

Cruise Id: 91-AV-1912 Size (cm): ~8 Cobbles Location: V2-91-CP

Sample Id: D4-14 Weight (kg): 6 Depth (m): 3300-2900

## Mn Crust Description

Surface Texture: smooth - cement smoothed or Polished

## Mn Crust Thickness (mm):

Min: 5 Max: 15 Ave: 10

## Outer to Inner Layers (mm)

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

## Comments and XRD Mineralogy:

Subsamp

## Substrate Description

Rock Type: Vesicular Basalt

Description: Pillow Basalt Fragments w/ crusts minor pillow breccia - Same as D4-13, but w/ Crust

50% USGS
50% USSR

Biology (?):

Described by: HE IN

Subsampled by:

SAMPLE DESCRIPTION

8

Cruise Id: 91-AV-19/2 Size (cm): Cobbles & Pebbles Location: V2-91-CP

Sample Id: D4-15 Weight (kg): ~4 Depth (m): 3300-2900

**Mn Crust Description**

Surface Texture: NONE

**Mn Crust Thickness (mm):**

Min:_____ Max:_____ Ave:_____

**Outer to Inner Layers (mm)**

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

91-AV-19/2

D4-15

**Comments and XRD Mineralogy:**

Subsa

**Substrate Description**

Rock Type: Basalt

Description: Plagioclase phyric Basalt vesicular To massive

All to USGS

K-Ar date

Ox C on Calcite xstals

Biology (?):

Described by:

HEN

Subsampled by:

91-AV-1912
D9-15