



Analytical Diagnostics



METHODOLOGY

- Samples were embedded in polyester resin, cut and then polished. In order to study the layers structure, the cross sections were examined by:
- Visible Light and U.V. Color Fluorescence Optical Microscopy
- Scanning Electron Microscopy (SEM) and SEM-EDS



FLESH



Sample 1 Location



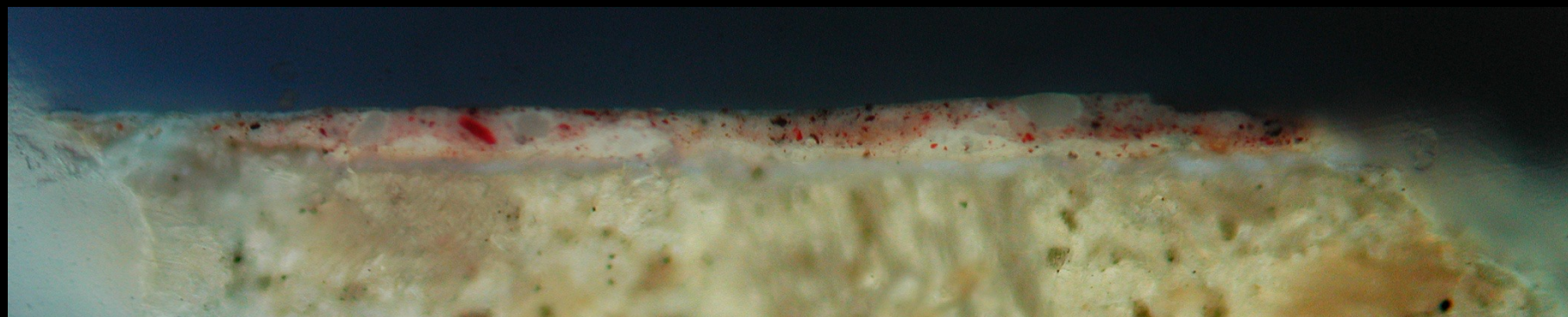
Sample 1 – Stereomicroscopy image. Front



Sample 1 – Stereomicroscopy image. Back



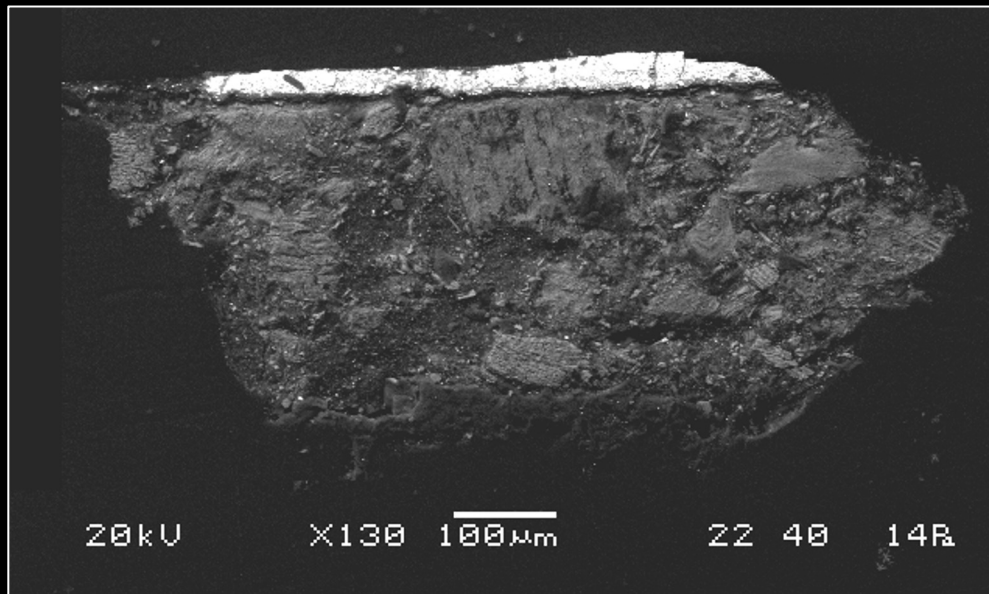
Sample 1 – Cross Section, Reflected Light



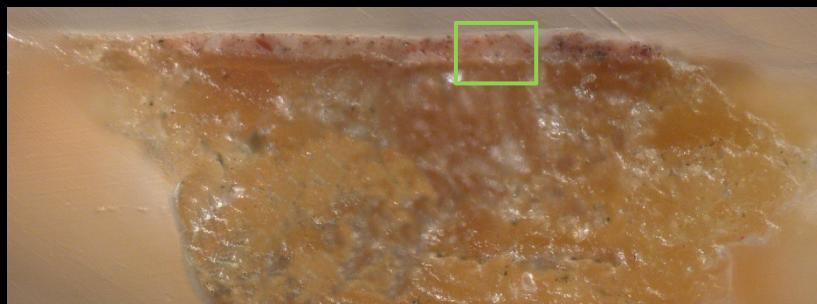
Sample 1 – Cross Section, UV Fluorescence



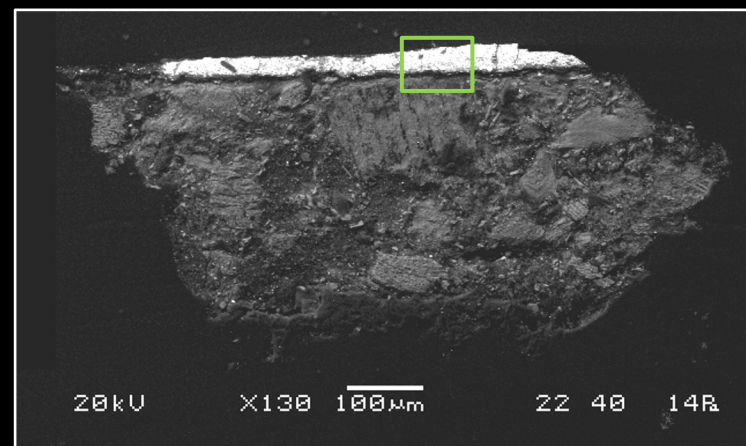
Sample 1 – Cross Section, Reflected Light



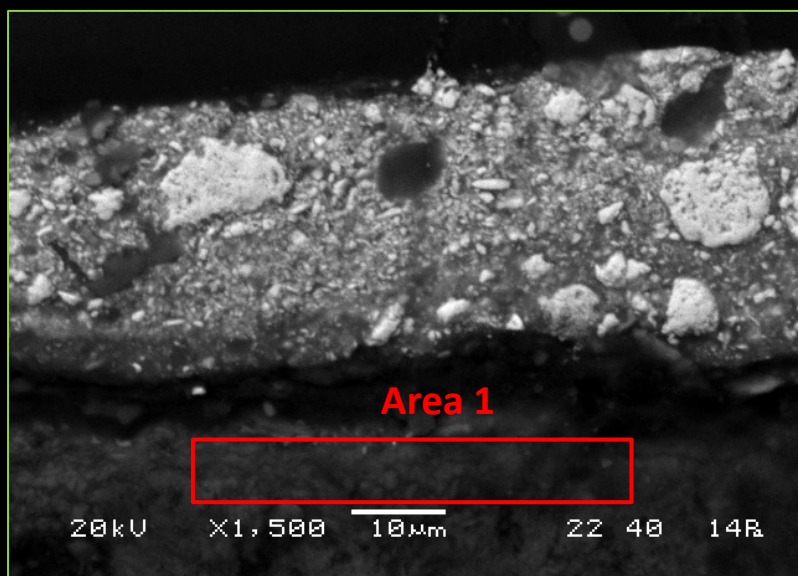
Sample 1 – Cross Section, SEM back scattered electron image



Sample 1 – Cross Section, Reflected Light

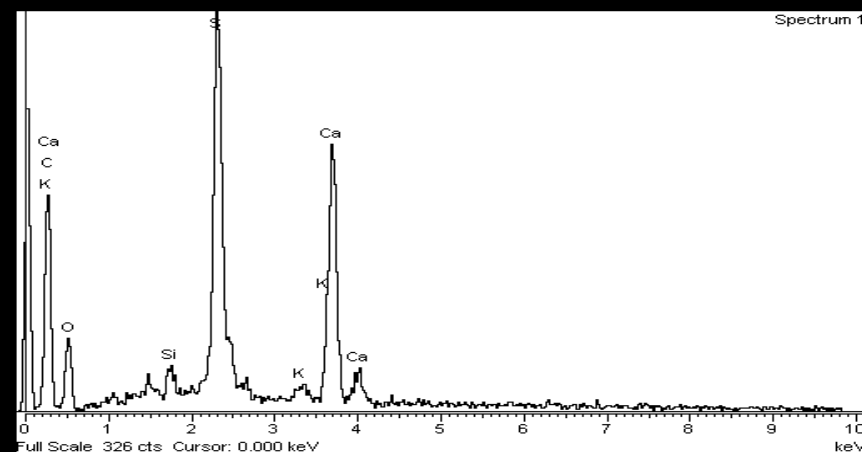


Sample 1 – Cross Section, SEM back scattered electron image

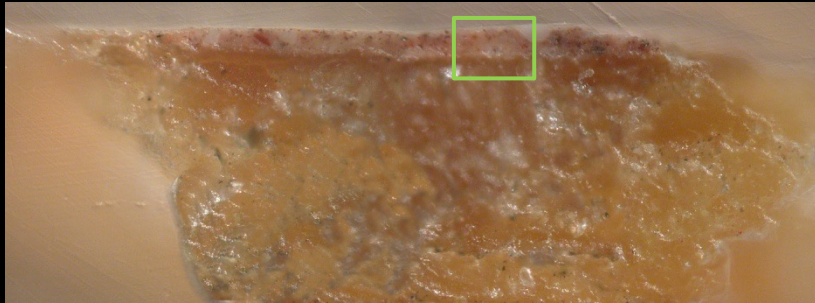


Sample 1 – Cross Section, SEM. Area 1 Microanalysis

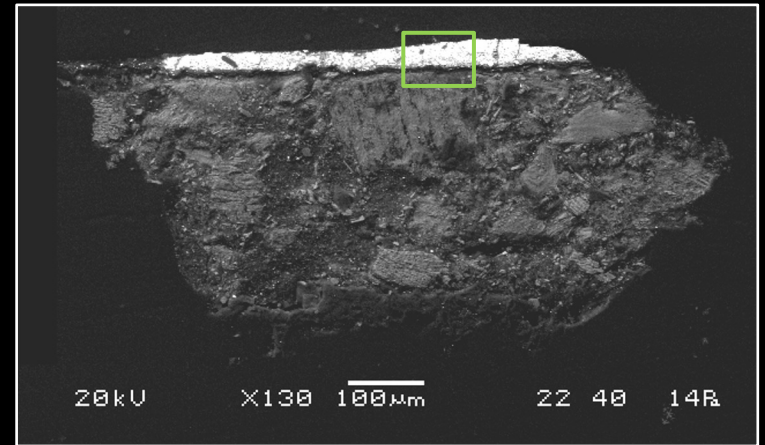
Ground Layer – Area 1: GESSO (CaSO_4) and NATURAL EARTH PIGMENTS (Si, K)



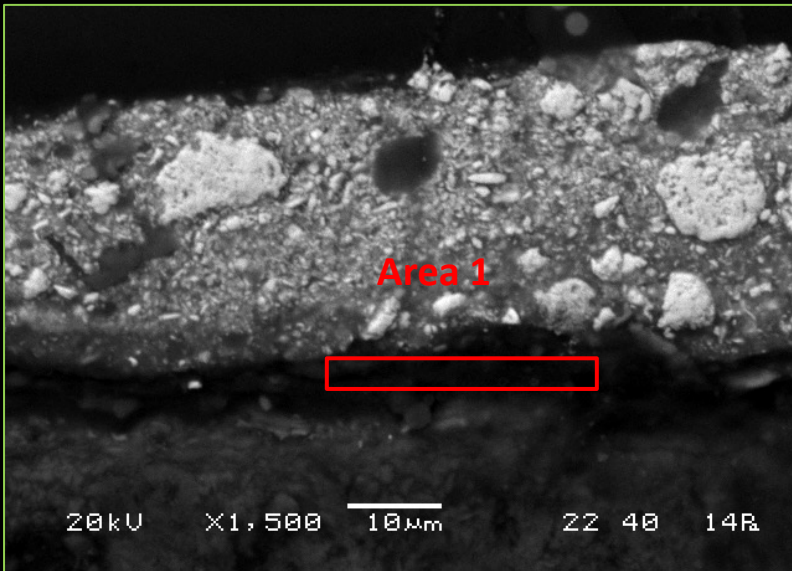
Sample 1 – Cross Section, SEM – EDS. Microanalysis



Sample 1 – Cross Section, Reflected Light



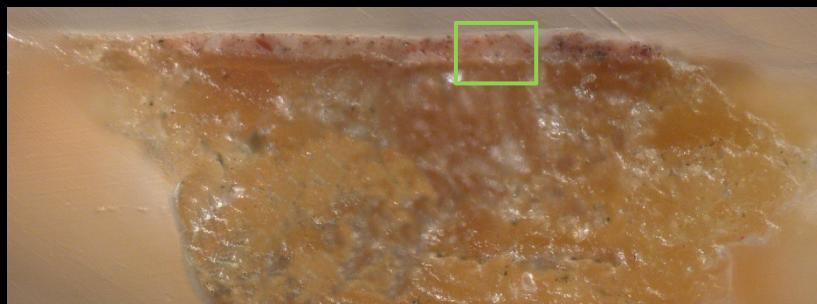
Sample 1 – Cross Section, SEM back scattered electron image



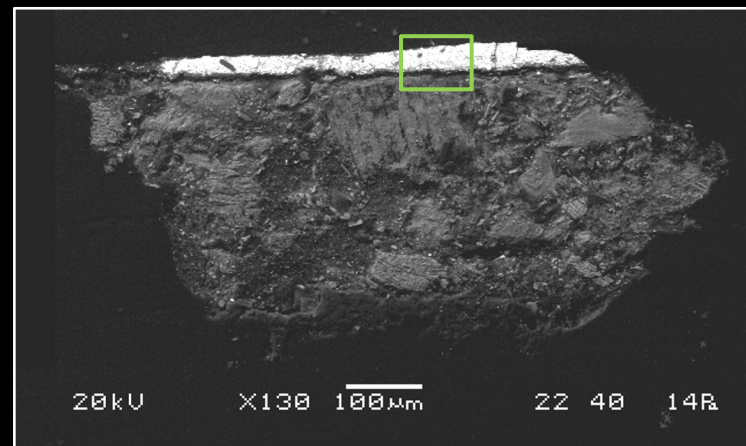
Sample 1 – Cross Section, SEM. Area 1 Microanalysis

Area 1: SEM-EDS ELEMENTAL MAPPING OF THE SAMPLE

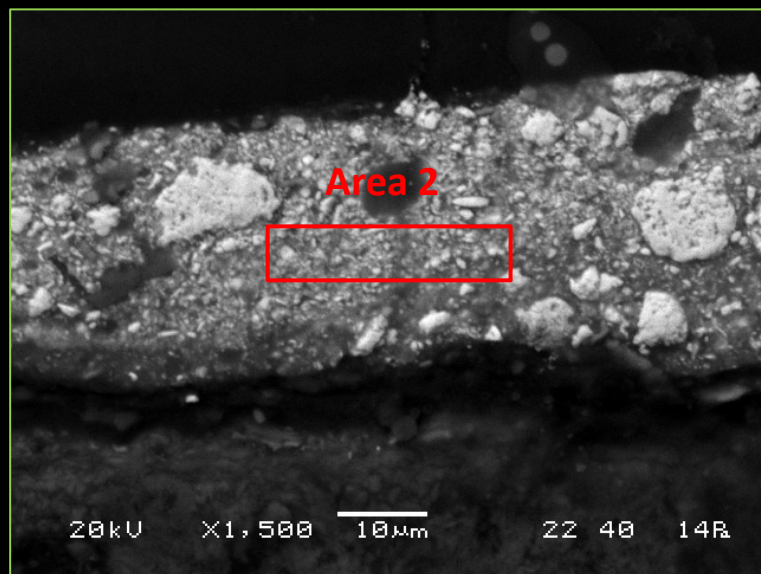
CARBON BASED LAYER (Carbon 81,7%)



Sample 1 – Cross Section, Reflected Light

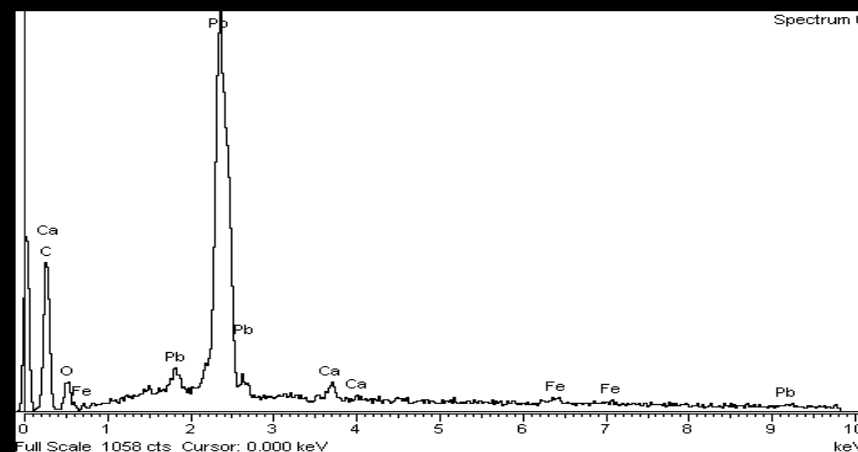


Sample 1 – Cross Section, SEM back scattered electron image

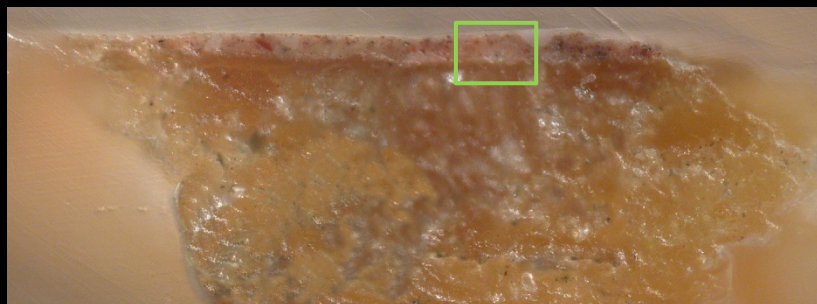


Sample 1 – Cross Section, SEM. Area 2 Microanalysis

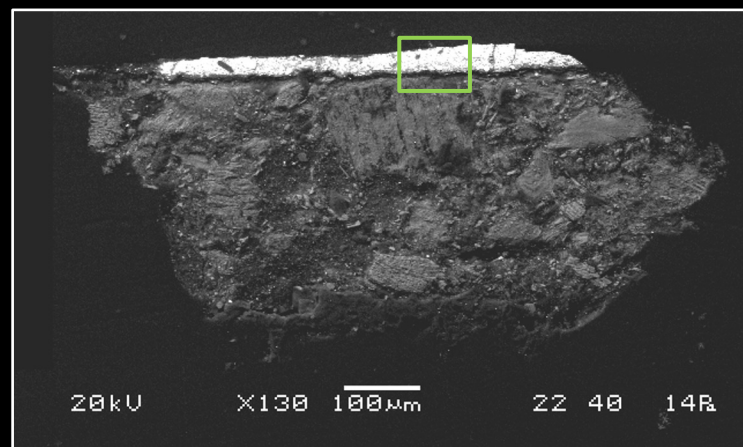
Christ Flesh Layer – Area 2: LEAD WHITE
($2\text{PbCO}_3 \cdot \text{Pb(OH)}_2$) and RED OCHRE (Fe_2O_3)



Sample 1 – Cross Section, SEM – EDS. Microanalysis



Sample 1 – Cross Section, Reflected Light

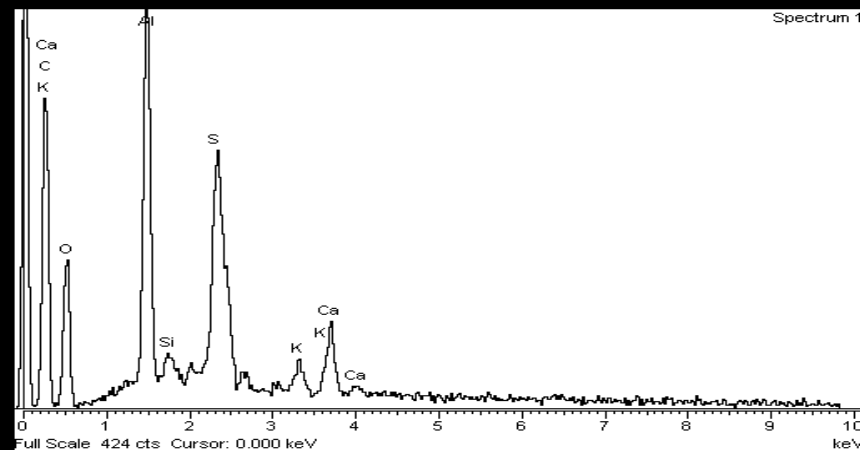


Sample 1 – Cross Section, SEM back scattered electron image

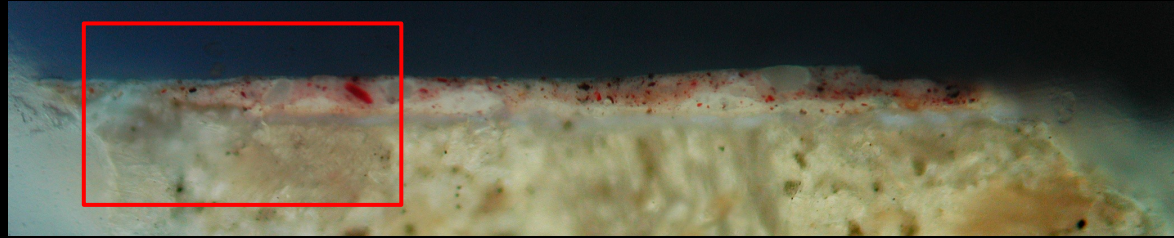
Christ Flesh Layer – Point 1: RED LAKE (Al, Si)



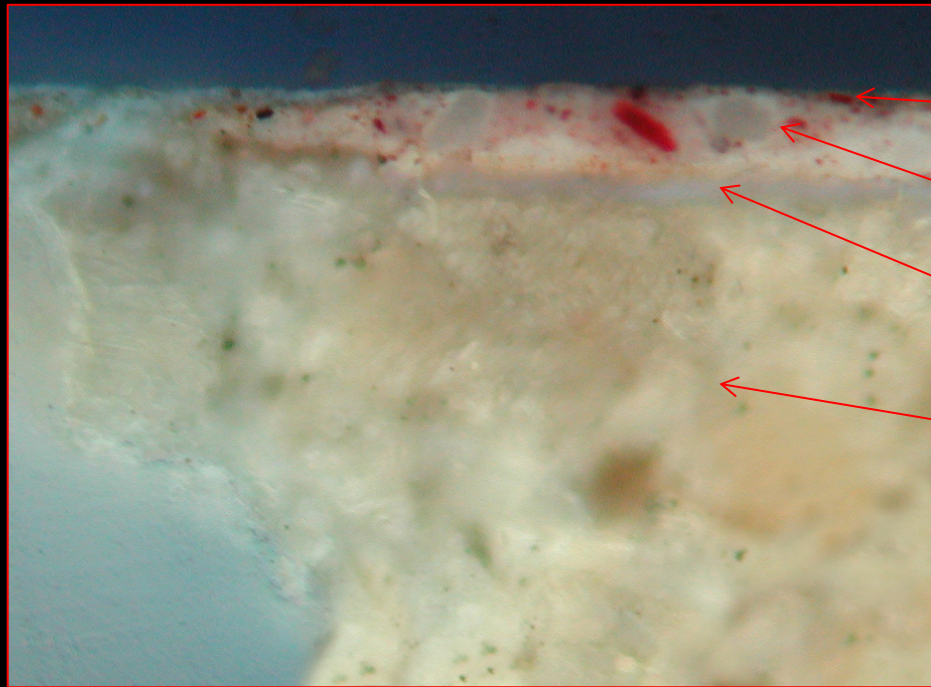
Sample 1 – Cross Section, SEM. Point 1 Microanalysis



Sample 1 – Cross Section, SEM – EDS. Microanalysis



Sample 1 – Cross Section, UV Fluorescence



4 Varnish

3 Flesh Layer **Lead White and Red Lake**

2 Organic Layer

1- Ground Layer **Gesso**

Sample 1 – Cross Section, UV Fluorescence, detail

RED ROBE



Sample 2 Location



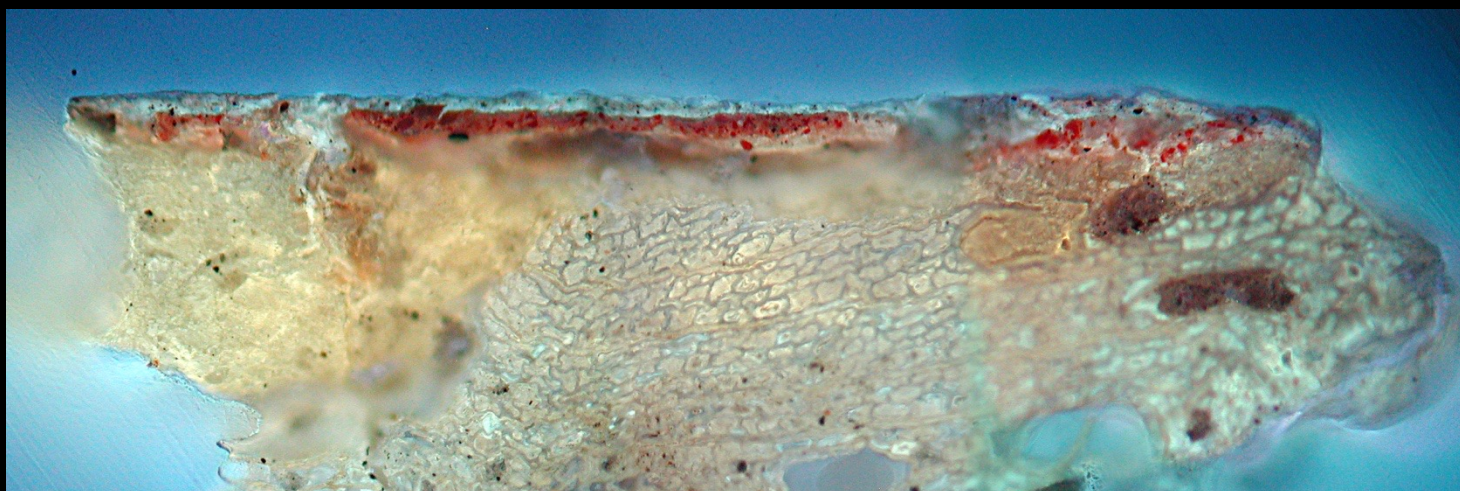
Sample 2 – Stereomicroscopy image. Front



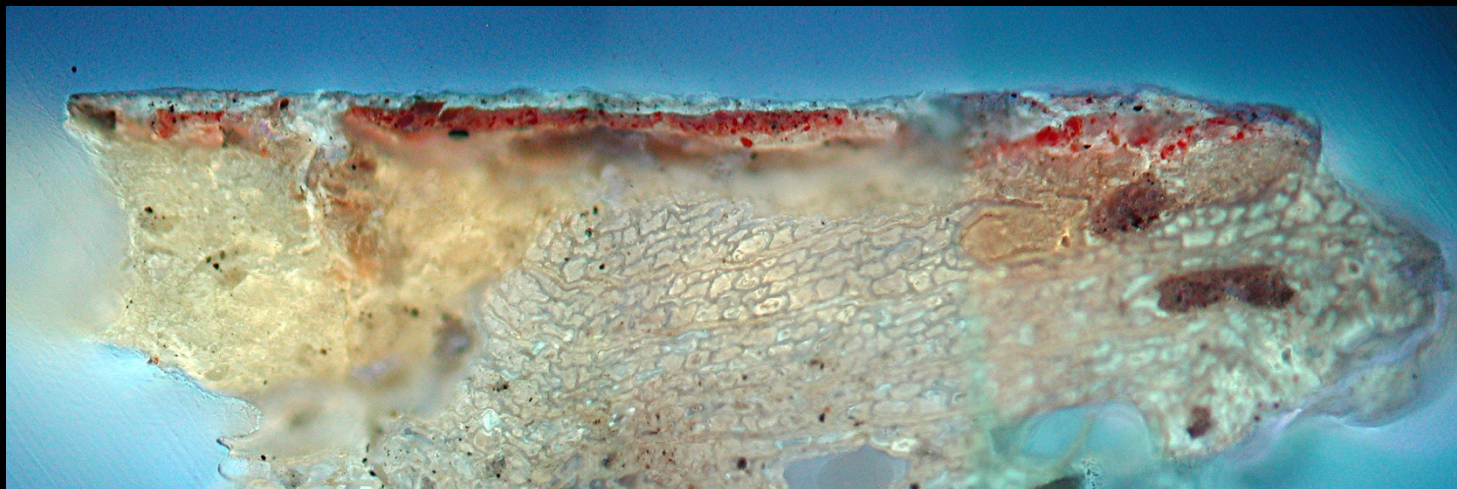
Sample 2 – Stereomicroscopy image. Back



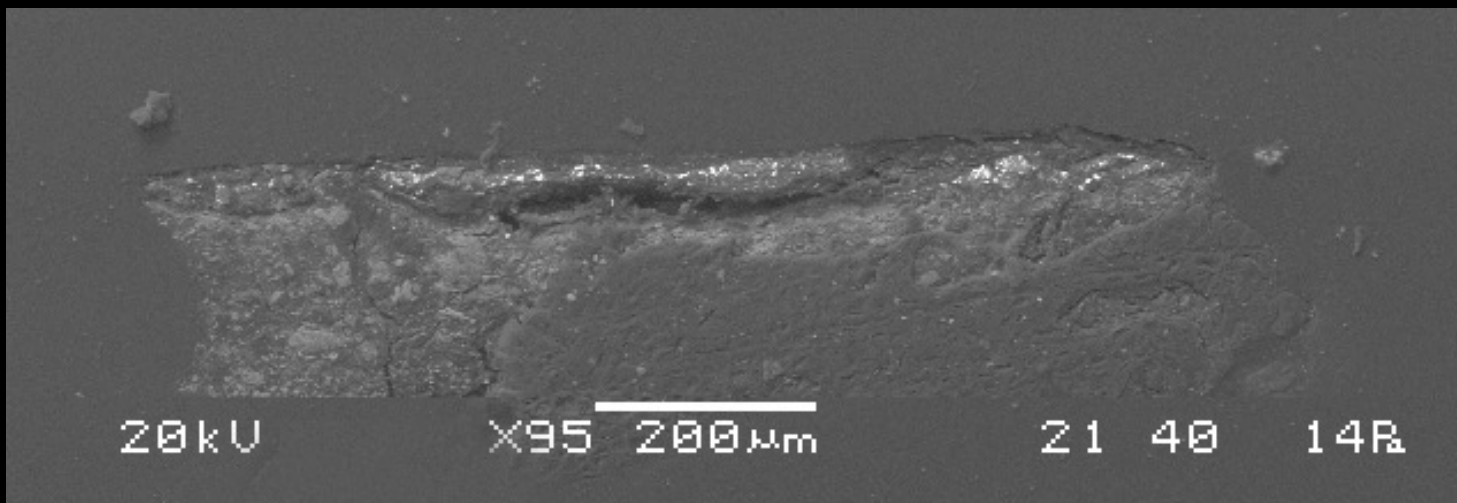
Sample 2 – Cross Section, Reflected Light



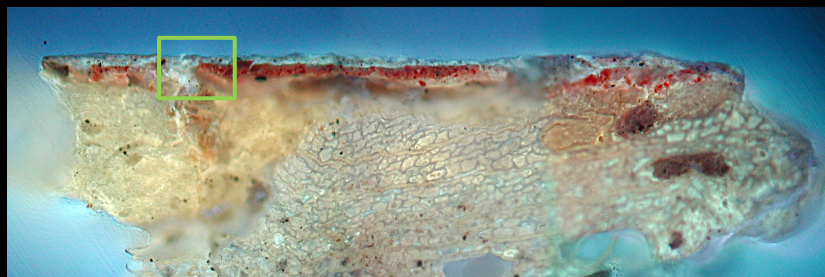
Sample 2 – Cross Section, UV Fluorescence



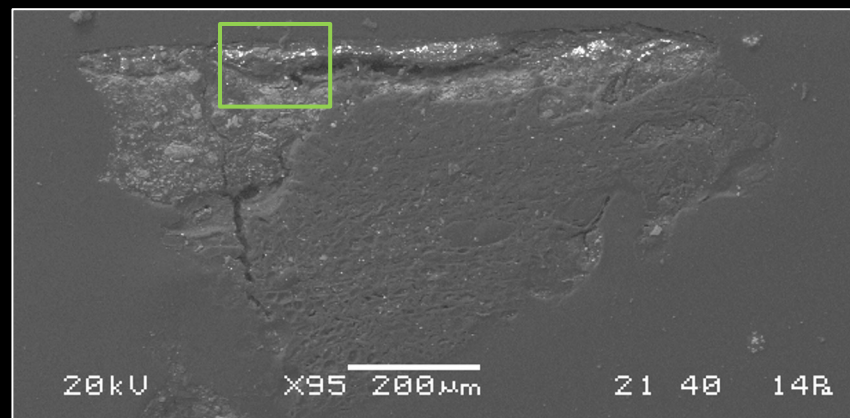
Sample 2 – Cross Section, UV Fluorescence



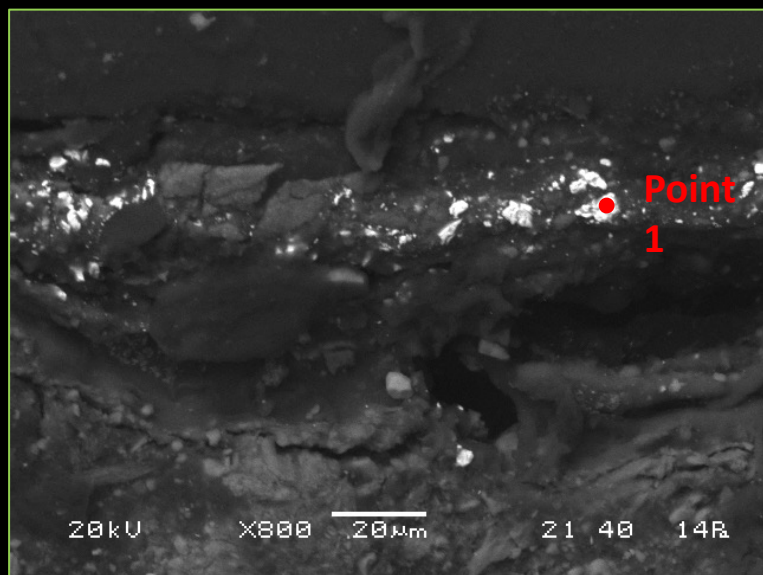
Sample 2 – Cross Section, SEM back scattered electron image



Sample 2 – Cross Section, UV Fluorescence

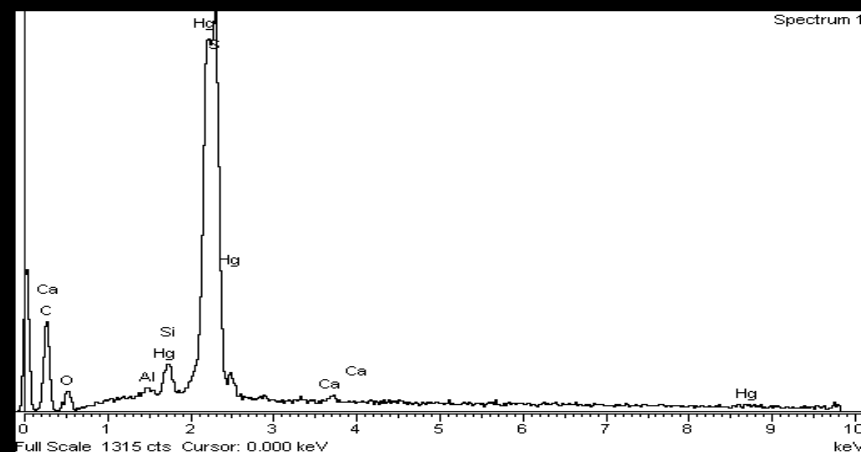


Sample 2 – Cross Section, SEM back scattered electron image

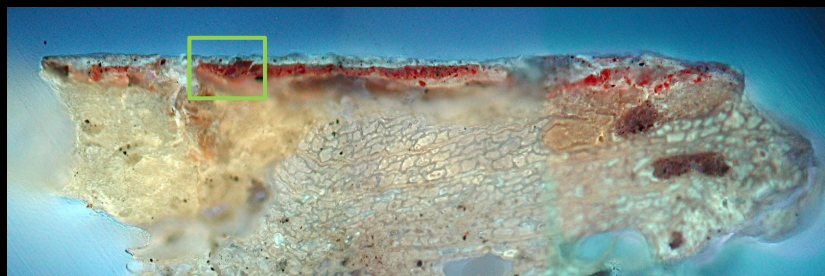


Sample 2 – Cross Section, SEM. Point 1 Microanalysis

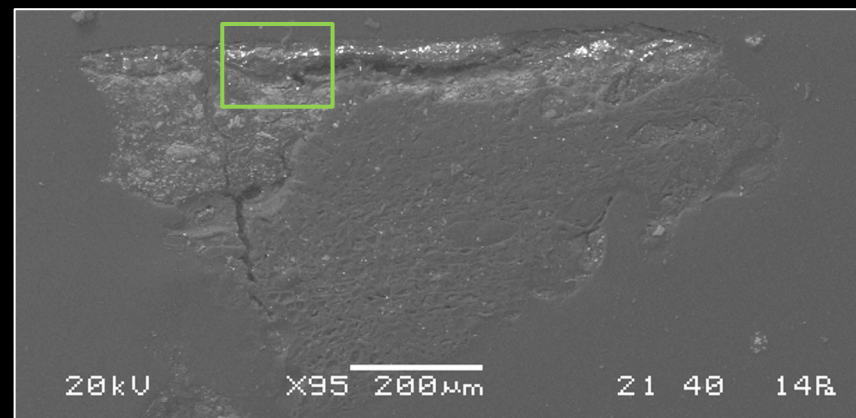
Red Layer – Point 1: VERMILION (HgS)



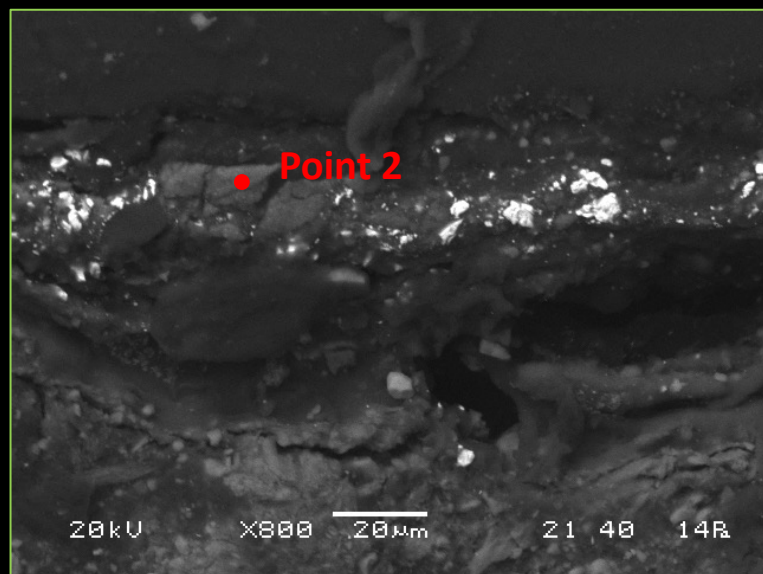
Sample 2 – Cross Section, SEM – EDS. Microanalysis



Sample 2 – Cross Section, UV Fluorescence

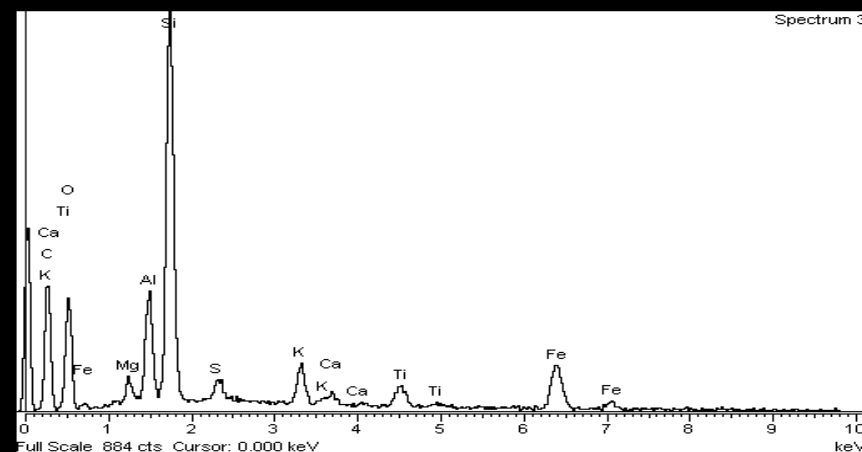


Sample 2 – Cross Section, SEM back scattered electron image

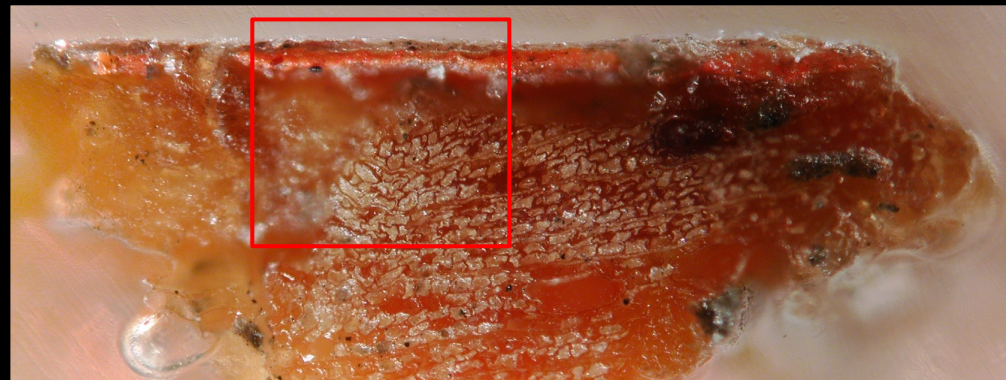


Sample 2 – Cross Section, SEM. Point 2 Microanalysis

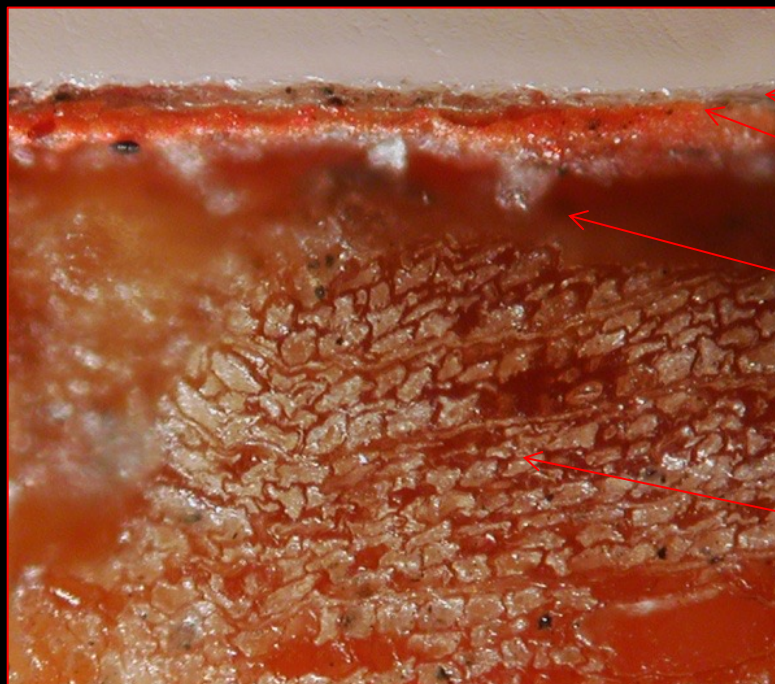
Red Layer – Point 2: RED LAKE (Al, Si)



Sample 2 – Cross Section, SEM – EDS. Microanalysis



Sample 2 – Cross Section, Reflected Light



4 Colored Varnish

3 Red Layer **Vermilion and Red Lake**

2 Ground Layer **Gesso**

1 Support **Poplar**

Sample 2 – Cross Section, Reflected Light, detail

CROWN OF THORNS



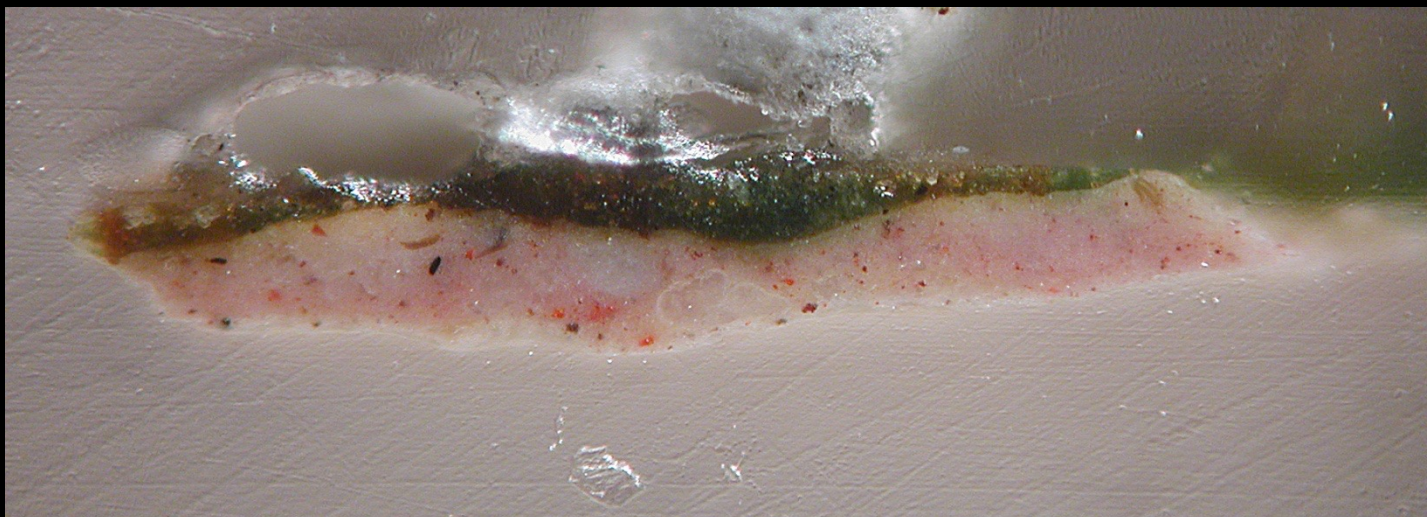
Sample 3 Location



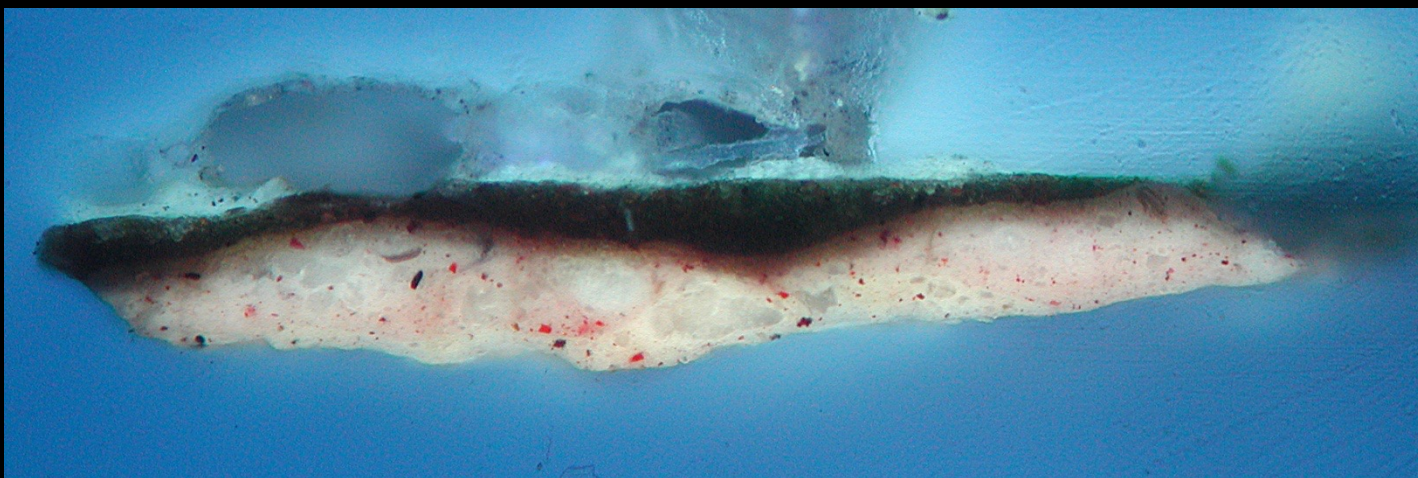
Sample 3 – Stereomicroscopy image. Front



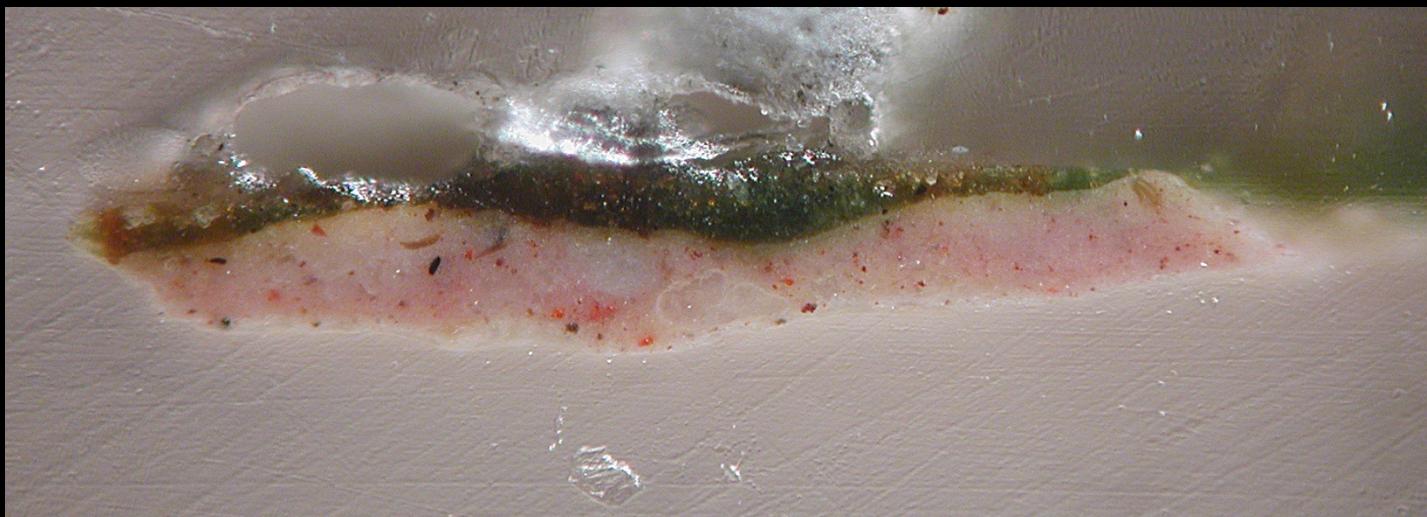
Sample 3 – Stereomicroscopy image. Back



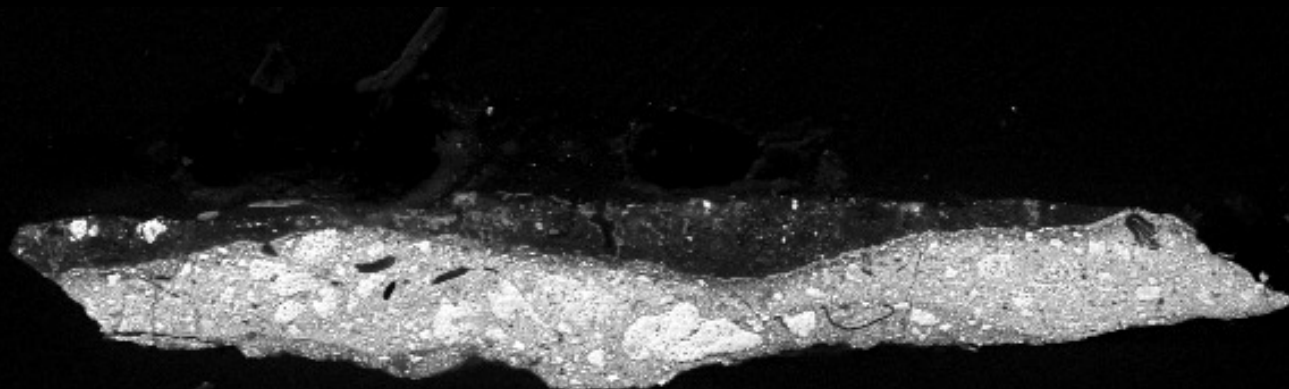
Sample 3 – Cross Section, Reflected Light



Sample 3 – Cross Section, UV Fluorescence



Sample 3 – Cross Section, Reflected Light

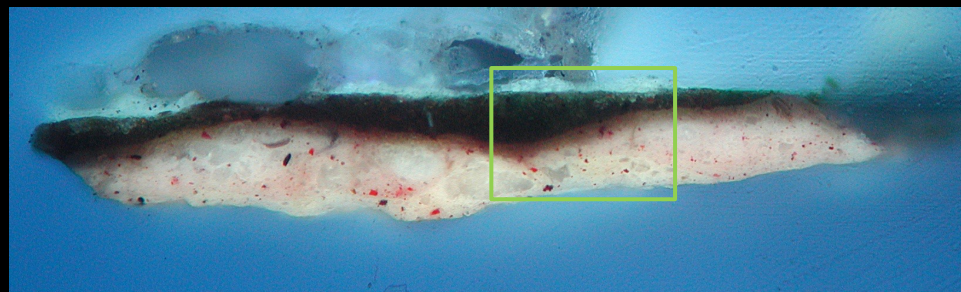


20kV

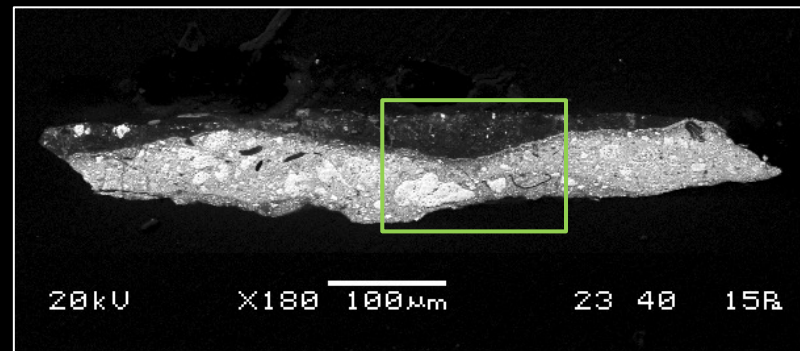
X180 100µm

23 40 15R

Sample 3 – Cross Section, SEM back scattered electron image

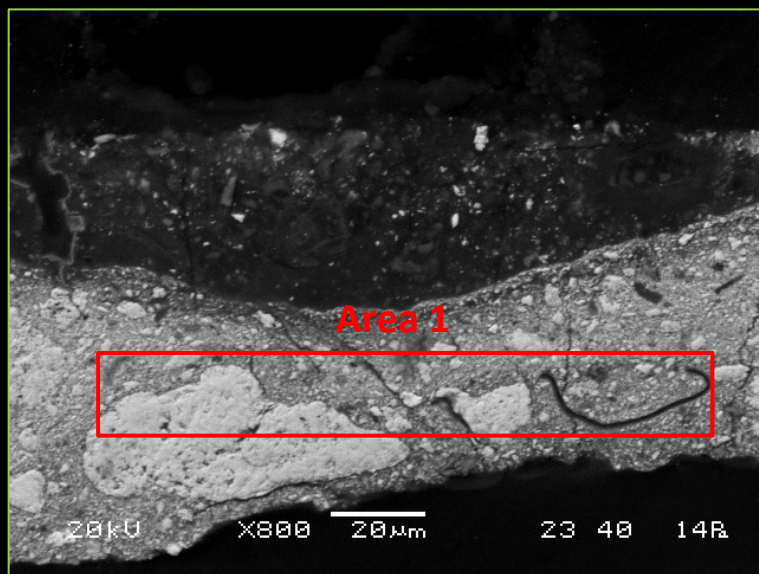


Sample 3 – Cross Section, UV Fluorescence

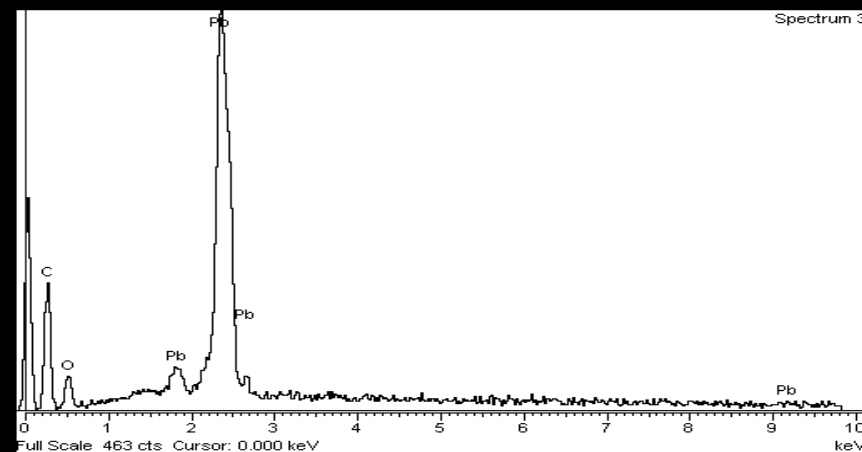


Sample 3 – Cross Section, SEM back scattered electron image

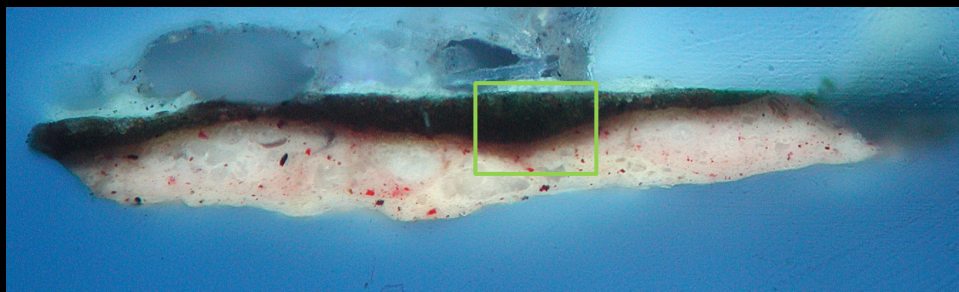
White Layer – Area 1: LEAD WHITE
 $(2\text{PbCO}_3 \cdot \text{Pb}(\text{OH})_2)$



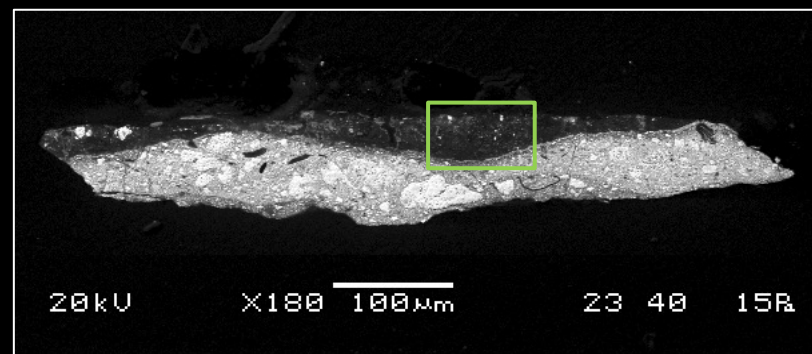
Sample 3 – Cross Section, SEM. Area 1 Microanalysis



Sample 3 – Cross Section, SEM – EDS. Microanalysis



Sample 3 – Cross Section, UV Fluorescence

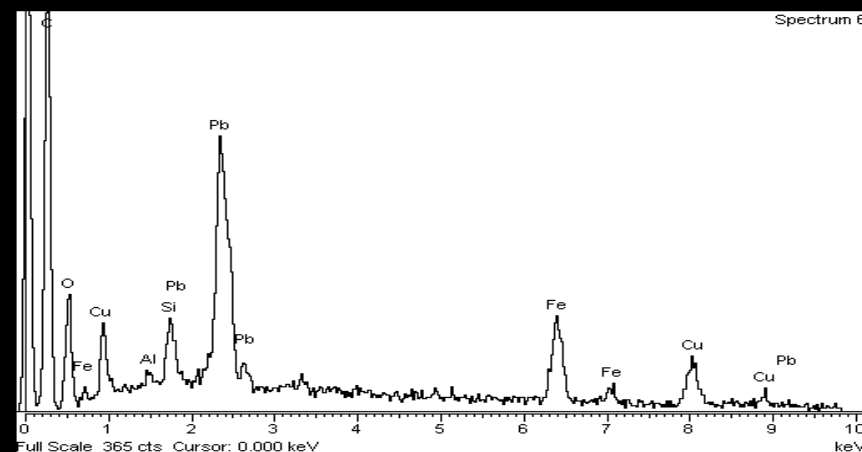


Sample 3 – Cross Section, SEM back scattered electron image

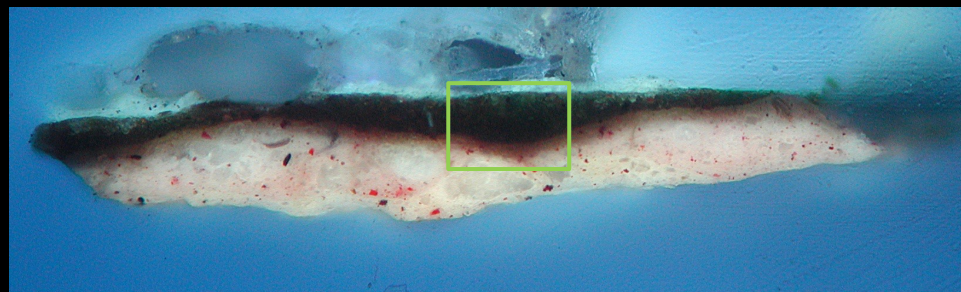
Brown Layer – Point 1: NATURAL EARTH PIGMENTS (Si, Al, K, Fe) and VERDIGRIS $\text{Cu}(\text{CH}_3\text{COO})_2$



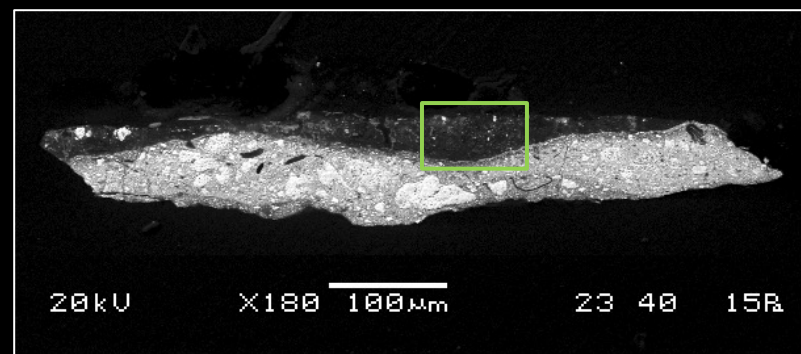
Sample 3 – Cross Section, SEM. Point 2 Microanalysis



Sample 3 – Cross Section, SEM – EDS. Microanalysis



Sample 3 – Cross Section, UV Fluorescence

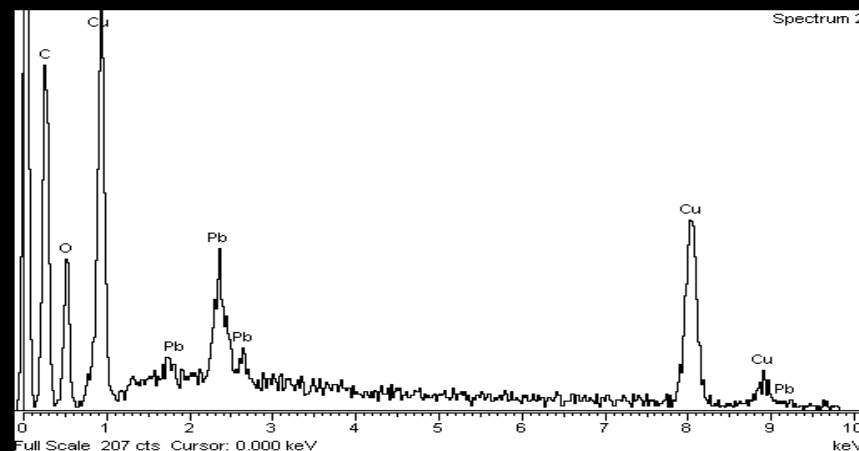


Sample 3 – Cross Section, SEM back scattered electron image

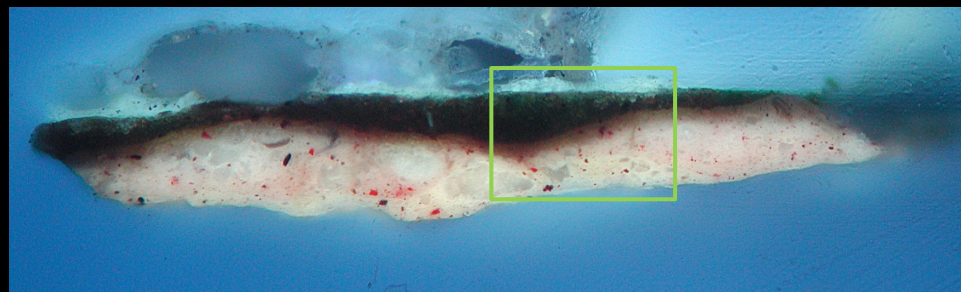
Green Layer – Point 2: VERDIGRIS $\text{Cu}(\text{CH}_3\text{COO})_2$



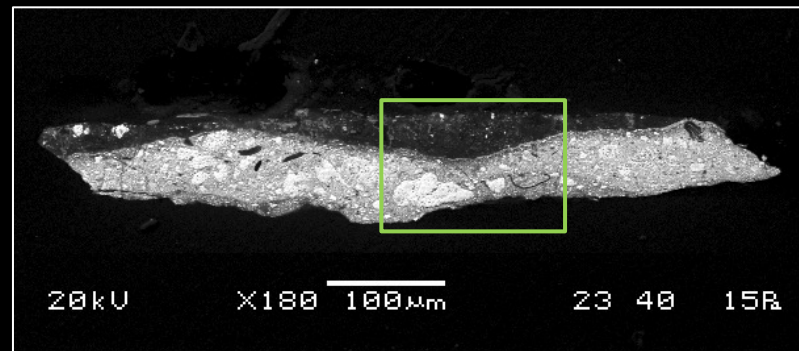
Sample 3 – Cross Section, SEM. Point 1 Microanalysis



Sample 3 – Cross Section, SEM – EDS. Microanalysis

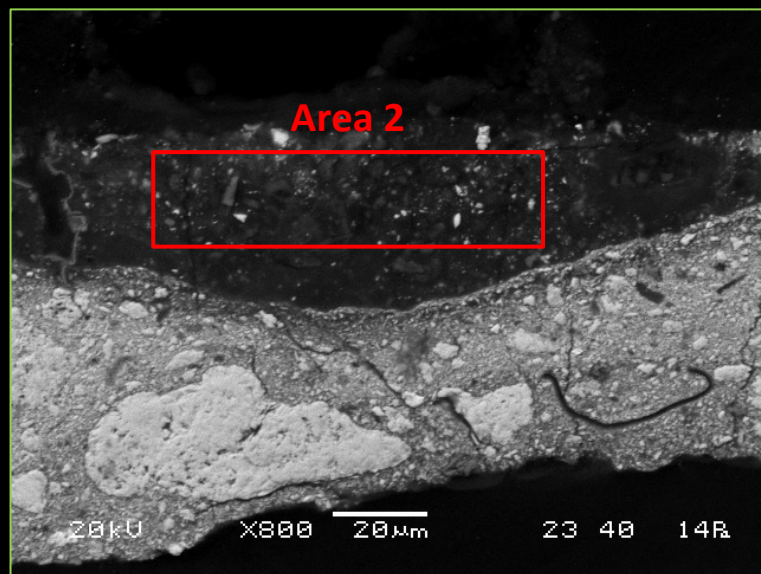


Sample 3 – Cross Section, UV Fluorescence

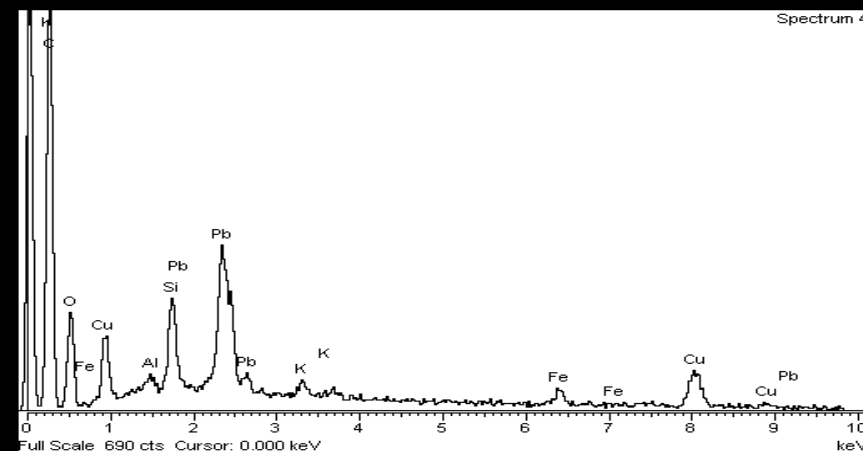


Sample 3 – Cross Section, SEM back scattered electron image

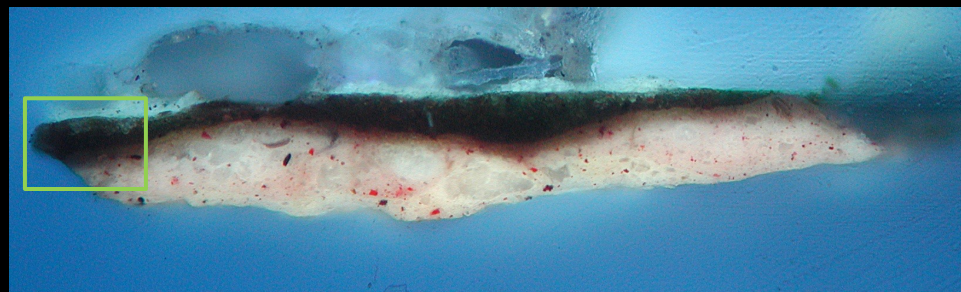
Green Layer – Area 2: NATURAL EARTH PIGMENTS (Si, Al,K,Fe) and VERDIGRIS $\text{Cu}(\text{CH}_3\text{COO})_2$



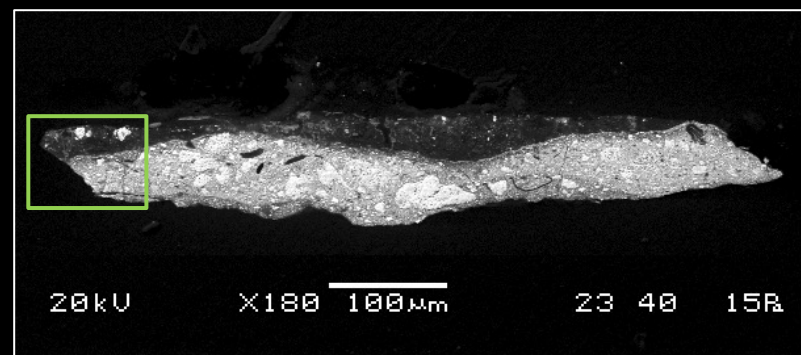
Sample 3 – Cross Section, SEM. Area 2 Microanalysis



Sample 3 – Cross Section, SEM – EDS. Microanalysis

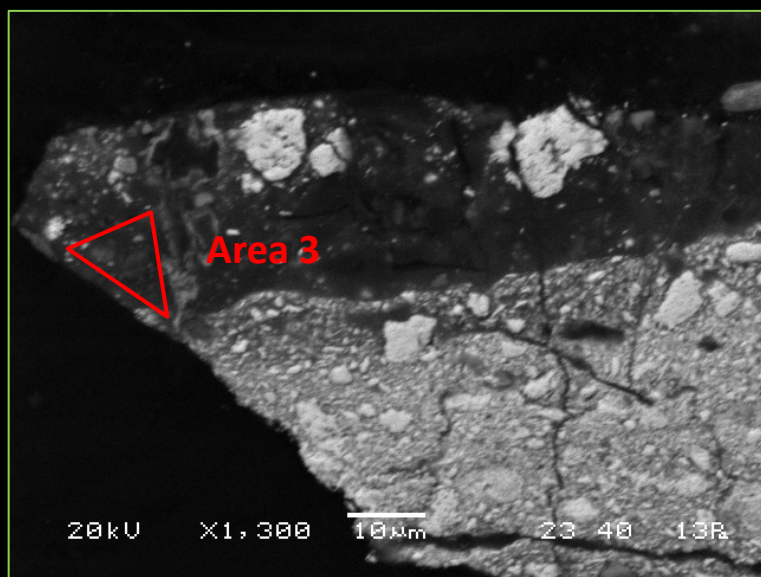


Sample 3 – Cross Section, UV Fluorescence

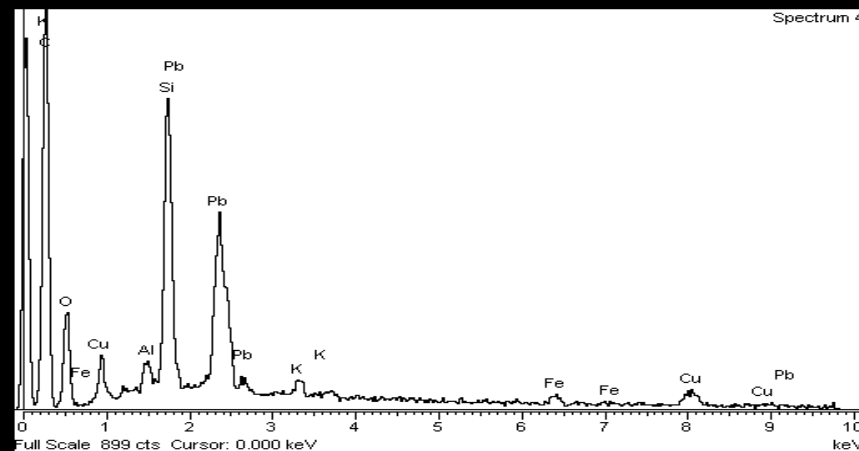


Sample 3 – Cross Section, SEM back scattered electron image

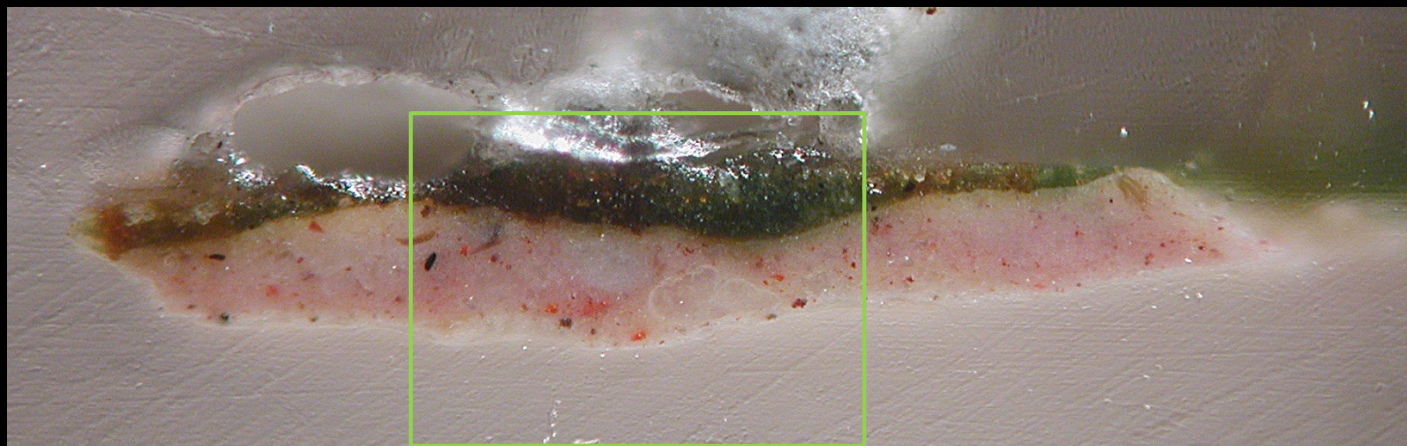
Green Layer – Area 3: NATURAL EARTH PIGMENTS (Si, Al,K,Fe) and **VERDIGRIS** $\text{Cu}(\text{CH}_3\text{COO})_2$



Sample 3 – Cross Section, SEM. Area 3 Microanalysis



Sample 3 – Cross Section, SEM – EDS. Microanalysis



Sample 3 – Cross Section, Reflected Light



3 Varnish

Green Layer **Verdigris**

1 White Layer **Lead White**

Sample 3 – Cross Section, Reflected Light, detail

THE CROSS



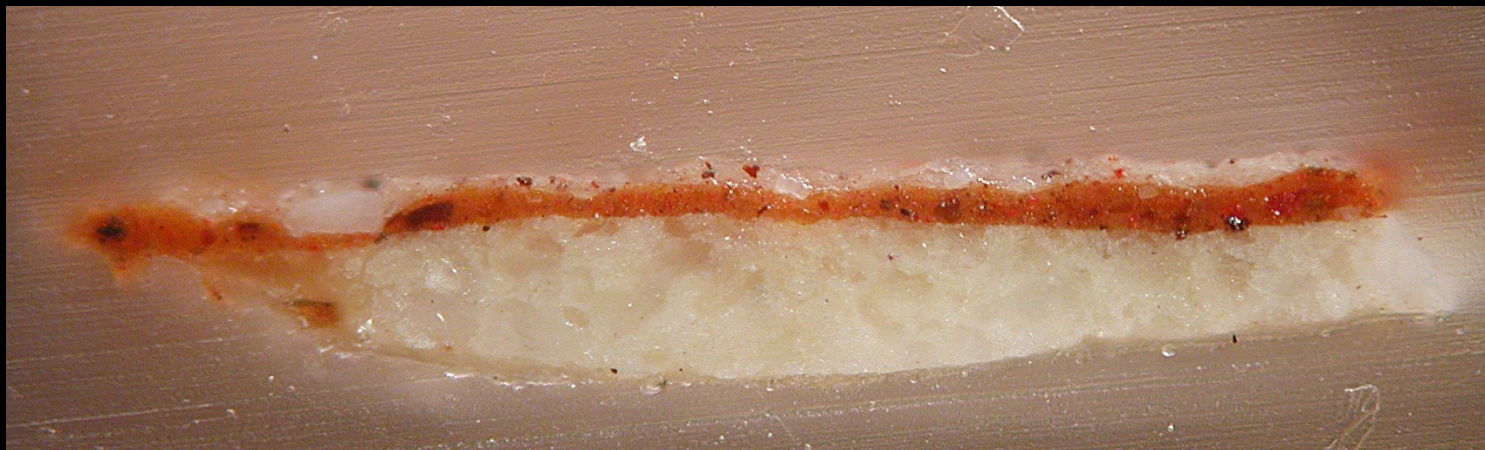
Sample 4 Location



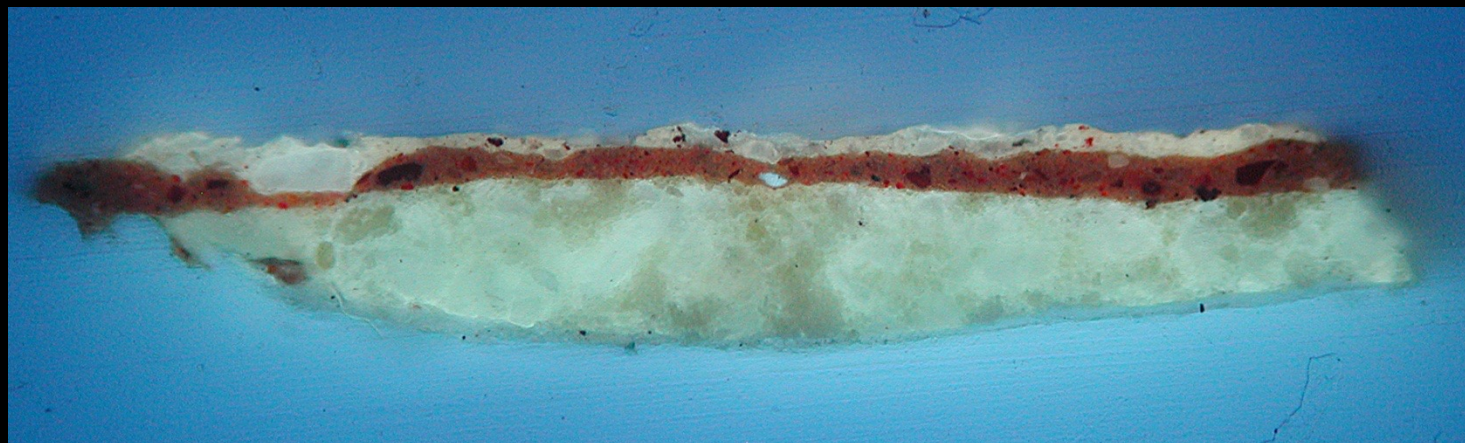
Sample 4 – Stereomicroscopy image. Front



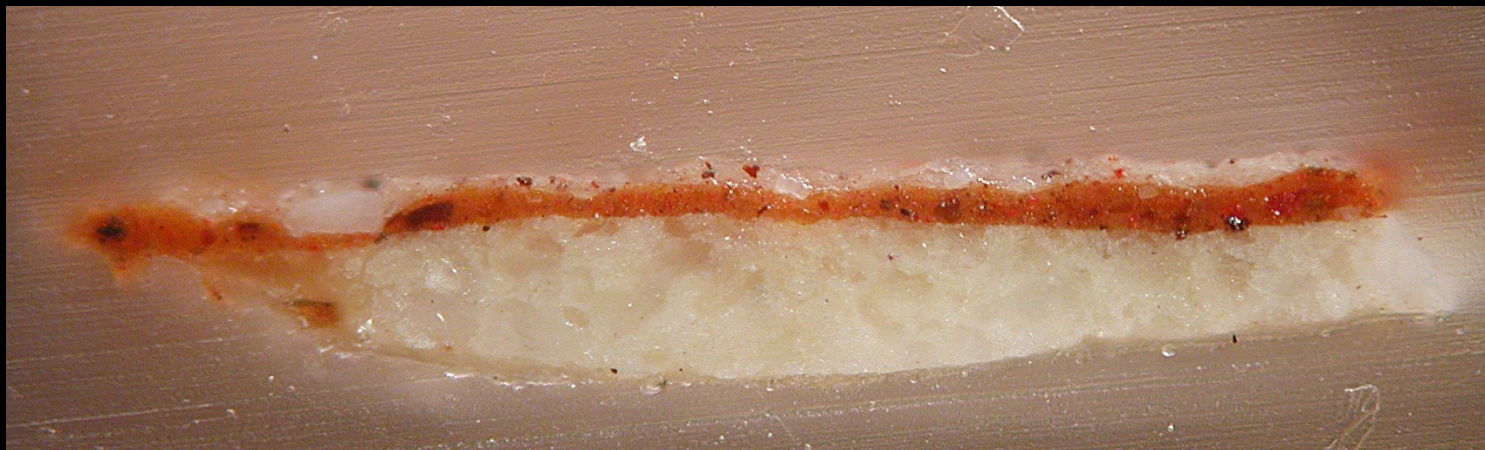
Sample 4 – Stereomicroscopy image. Back



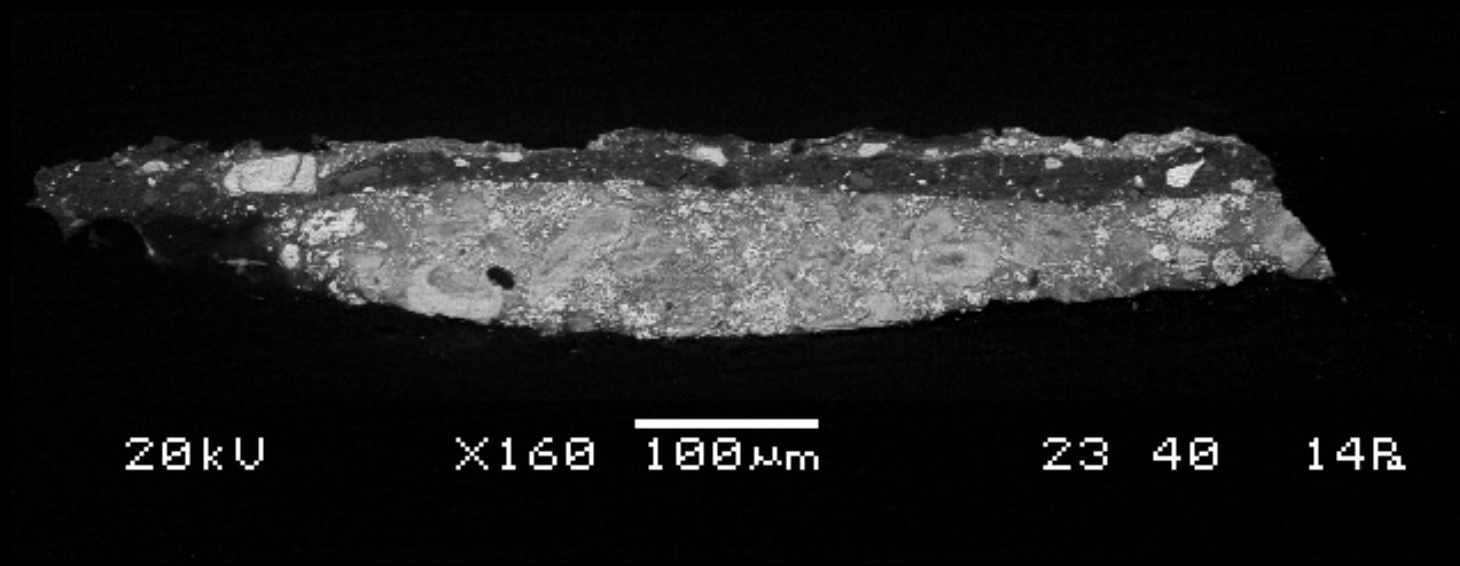
Sample 4 – Cross Section, Reflected Light



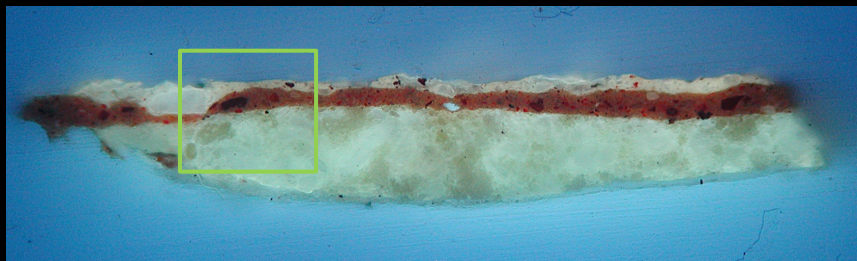
Sample 4 – Cross Section, UV Fluorescence



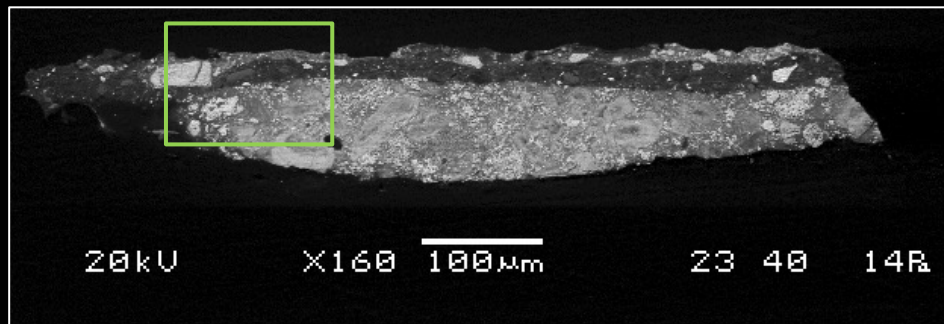
Sample 4 – Cross Section, Reflected Light



Sample 4 – Cross Section, SEM back scattered electron image



Sample 4 – Cross Section, UV Fluorescence

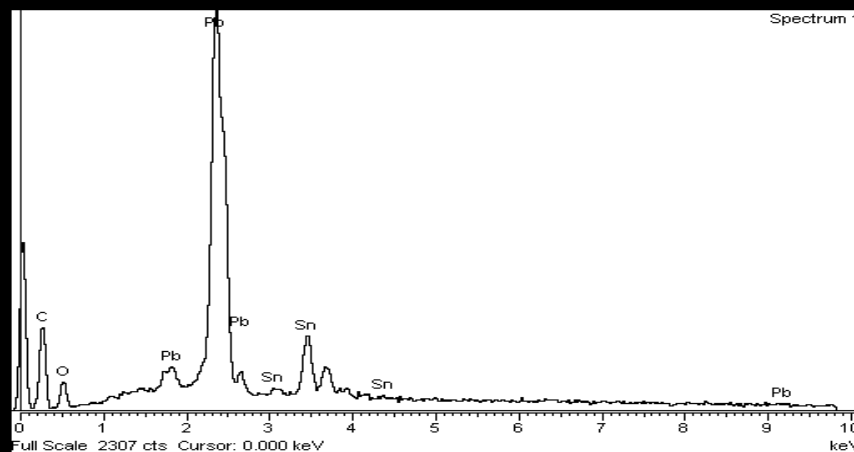


Sample 4 – Cross Section, SEM back scattered electron image

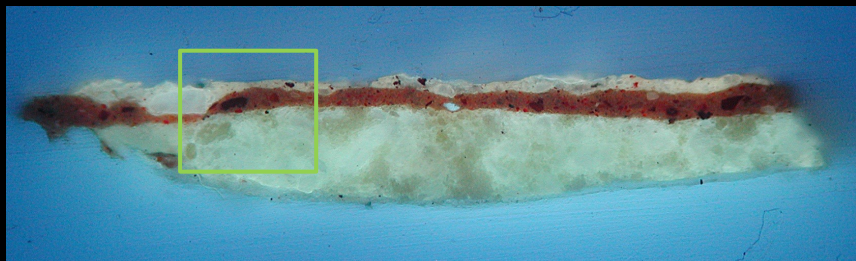


Sample 4 – Cross Section, SEM. Point 1 Microanalysis

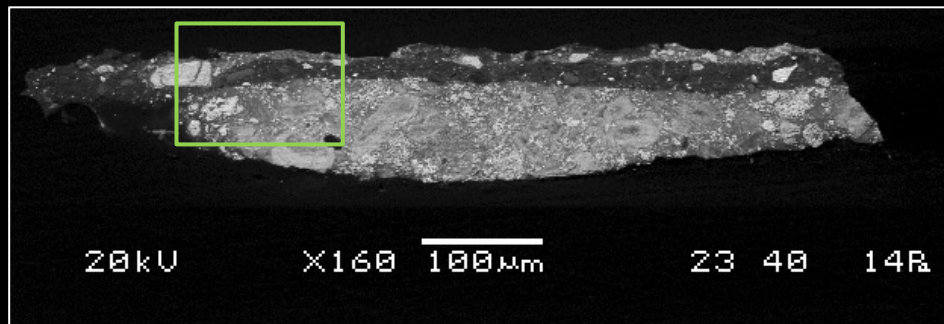
Light Yellow Layer – Point 1: LEAD-TIN YELLOW
(Pb_2SnO_4)



Sample 4 – Cross Section, SEM – EDS. Microanalysis

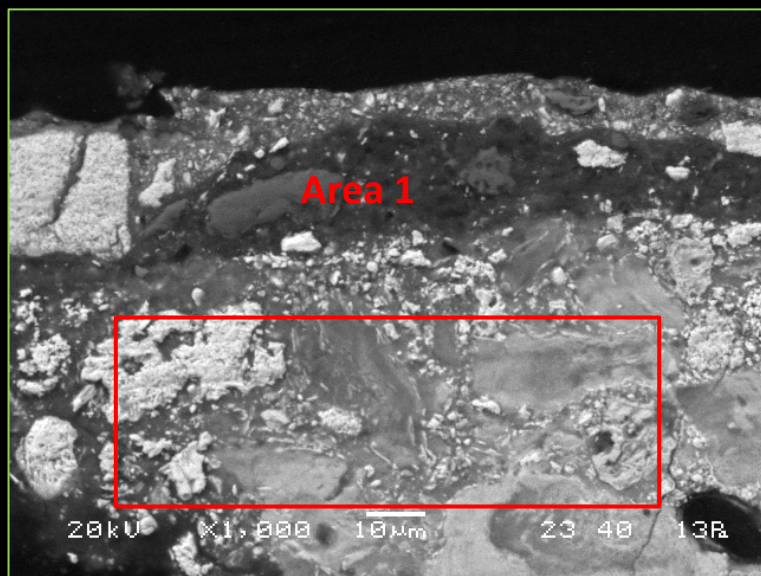


Sample 4 – Cross Section, UV Fluorescence

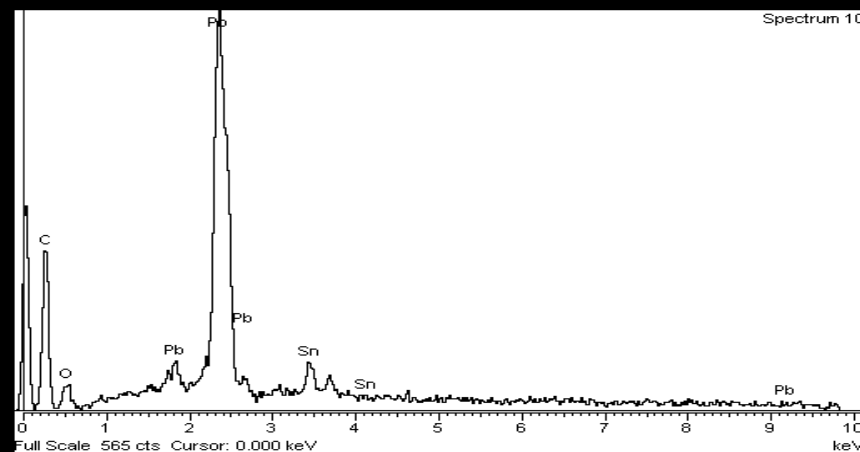


Sample 4 – Cross Section, SEM back scattered electron image

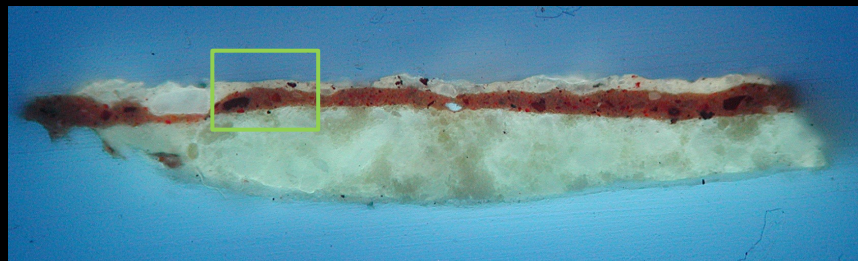
Light Yellow Layer – Area 1: LEAD-TIN YELLOW
(Pb_2SnO_4)



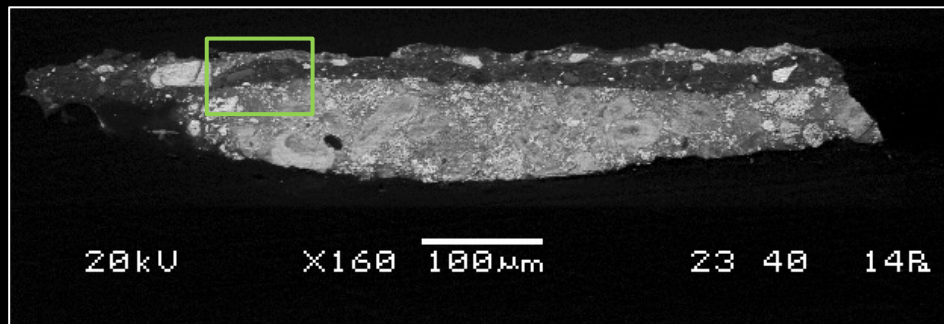
Sample 4 – Cross Section, SEM. Area 2 Microanalysis



Sample 4 – Cross Section, SEM – EDS. Microanalysis



Sample 4 – Cross Section, UV Fluorescence

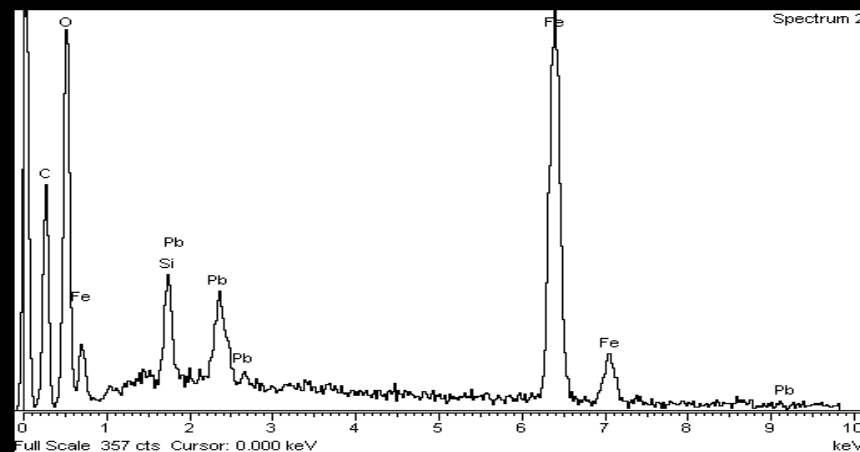


Sample 4 – Cross Section, SEM back scattered electron image

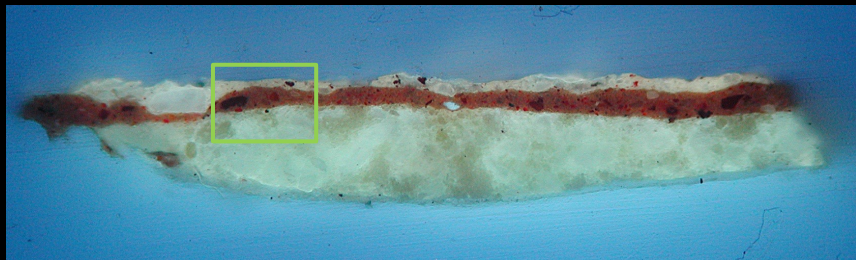
Red Layer – Point 2: RED OCHRE (Fe_2O_3)



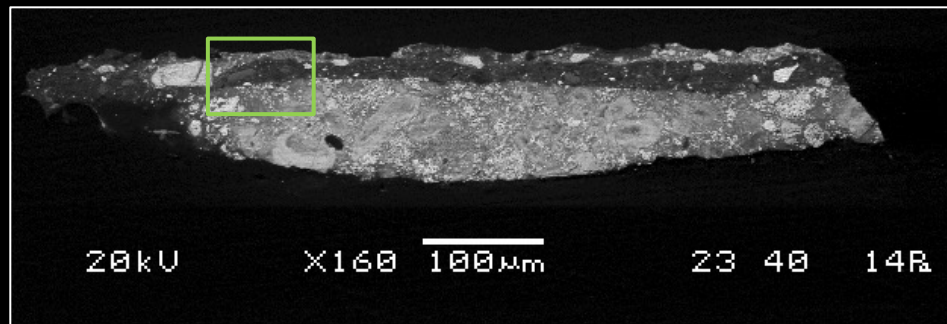
Sample 4 – Cross Section, SEM. Point 2 Microanalysis



Sample 4 – Cross Section, SEM – EDS. Microanalysis



Sample 4 – Cross Section, UV Fluorescence

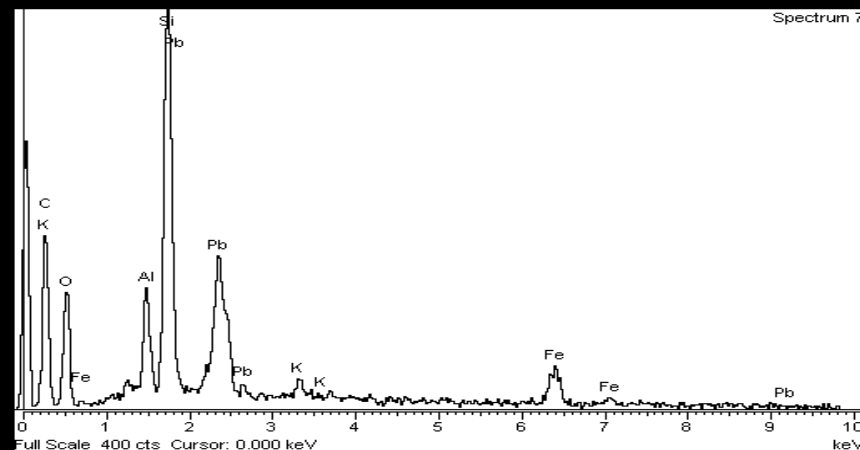


Sample 4 – Cross Section, SEM back scattered electron image

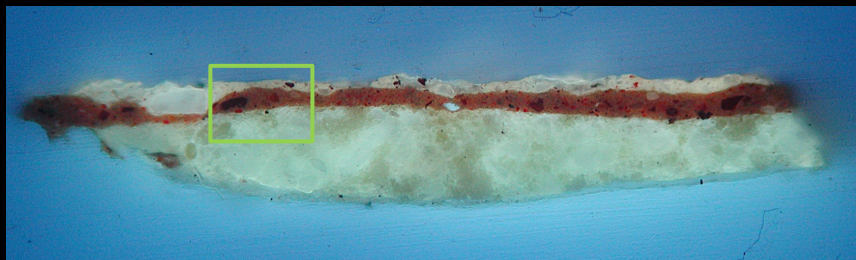
Red Layer – Area 2: RED OCHRE (Fe_2O_3),
NATURAL EARTH PIGMENTS (Si, Al, K, Fe)



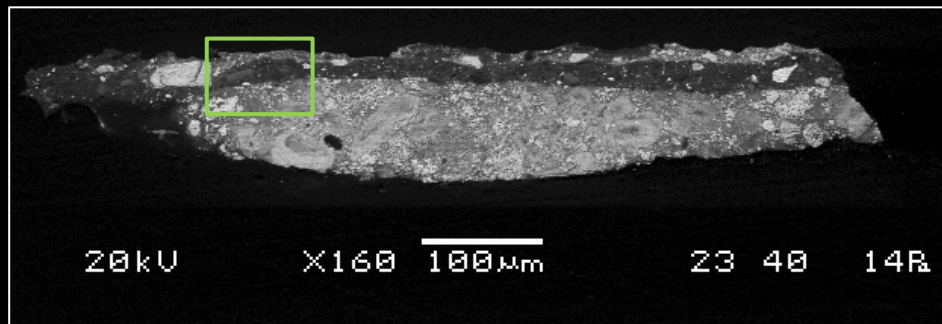
Sample 4 – Cross Section, SEM. Area 2 Microanalysis



Sample 4 – Cross Section, SEM – EDS. Microanalysis



Sample 4 – Cross Section, UV Fluorescence

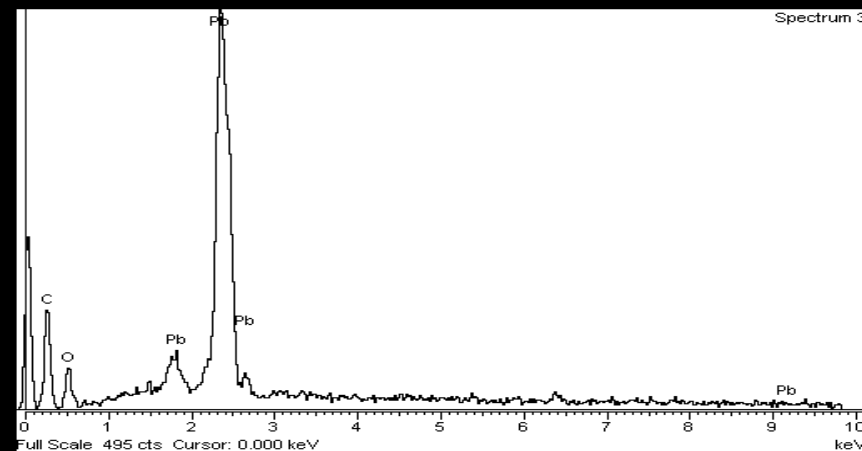


Sample 4 – Cross Section, SEM back scattered electron image

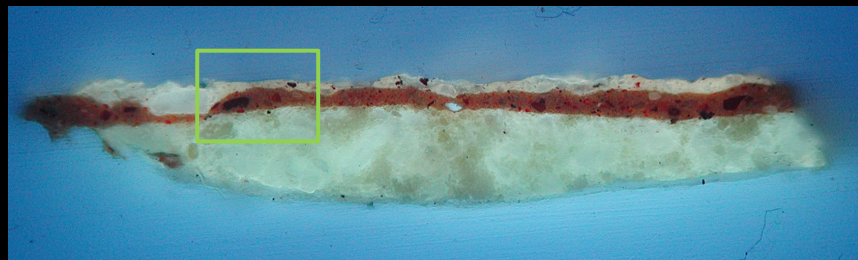
Red Layer – Point 3: $\text{LEAD WHITE } (2\text{PbCO}_3 \cdot \text{Pb}(\text{OH})_2)$



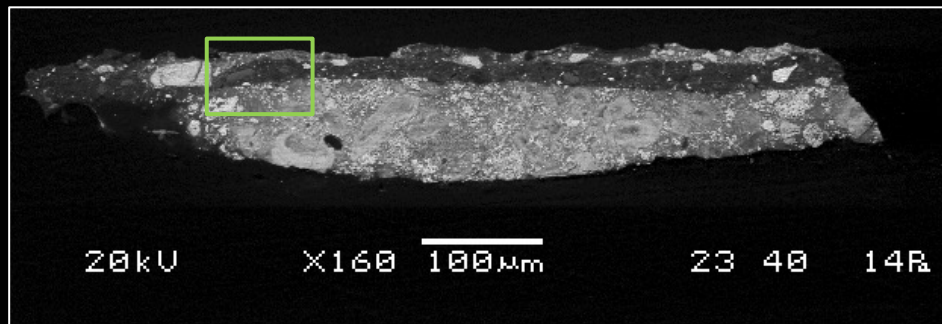
Sample 4 – Cross Section, SEM. Point 4 Microanalysis



Sample 4 – Cross Section, SEM – EDS. Microanalysis



Sample 4 – Cross Section, UV Fluorescence

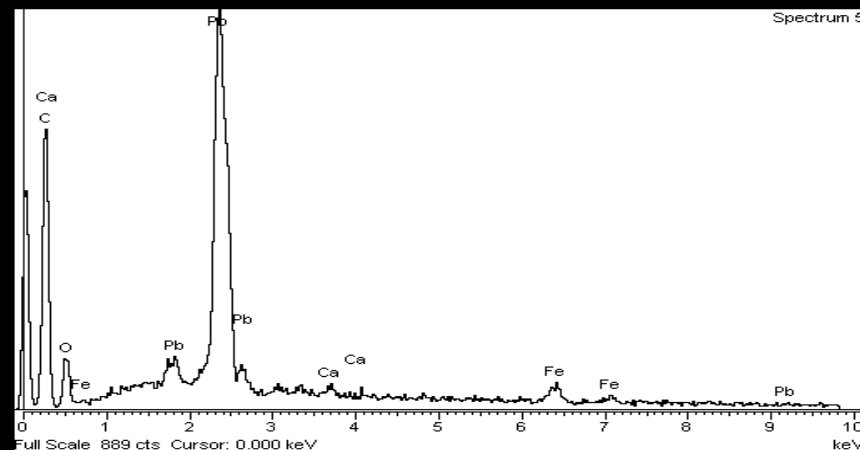


Sample 4 – Cross Section, SEM back scattered electron image

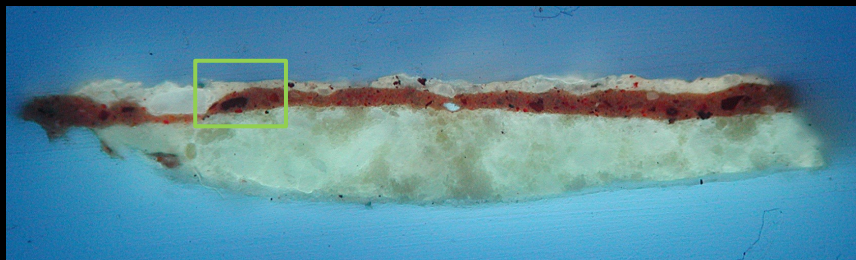
White Layer – Point 4: LEAD WHITE
 $(2\text{PbCO}_3 \cdot \text{Pb(OH)}_2)$



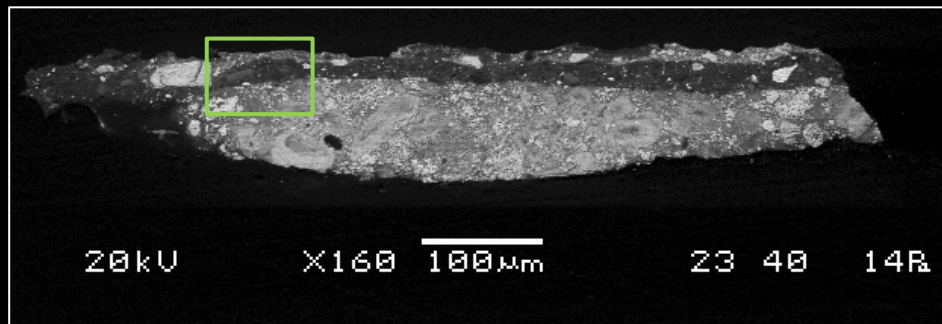
Sample 4 – Cross Section, SEM. Point 5 Microanalysis



Sample 4 – Cross Section, SEM – EDS. Microanalysis



Sample 4 – Cross Section, UV Fluorescence

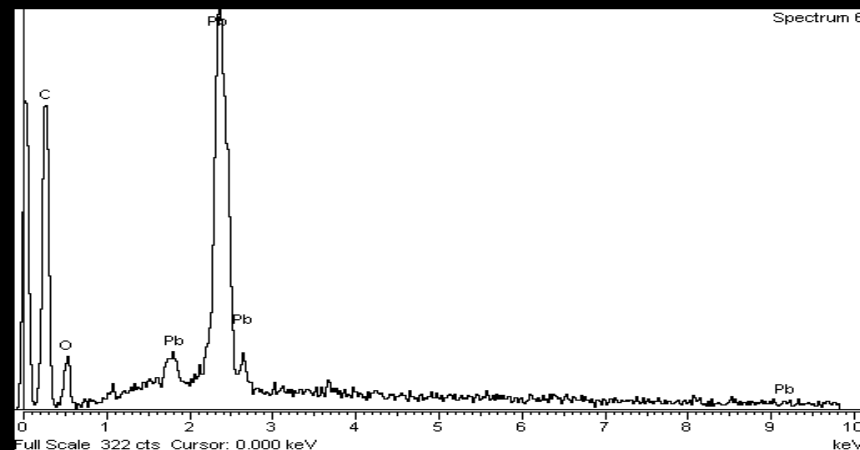


Sample 4 – Cross Section, SEM back scattered electron image

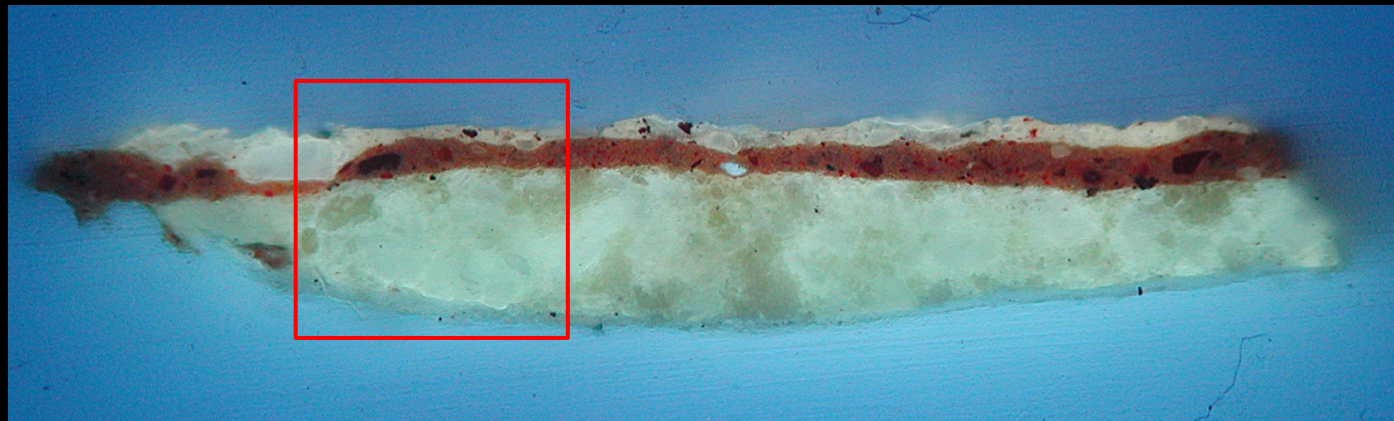
**White Layer – Point 5: LEAD WHITE
(HIGHLIGHTS) ($2\text{PbCO}_3 \cdot \text{Pb}(\text{OH})_2$)**



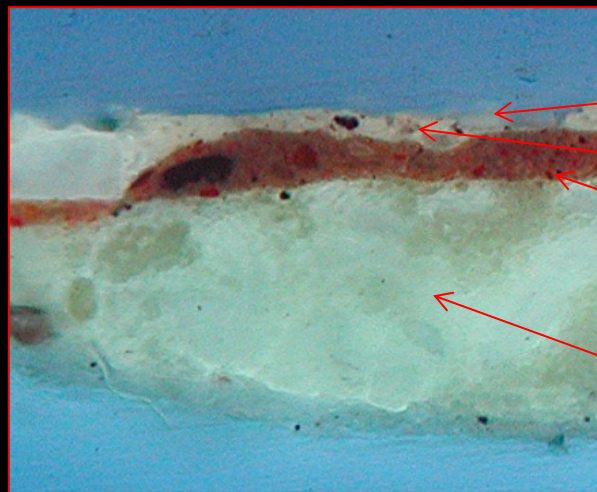
Sample 4 – Cross Section, SEM. Point 6 Microanalysis



Sample 4 – Cross Section, SEM – EDS. Microanalysis



Sample 4 – Cross Section, UV Fluorescence



4 Varnish

3 White Layer Lead White

2 Red Layer Natural Earth Pigments
and Red Ochre

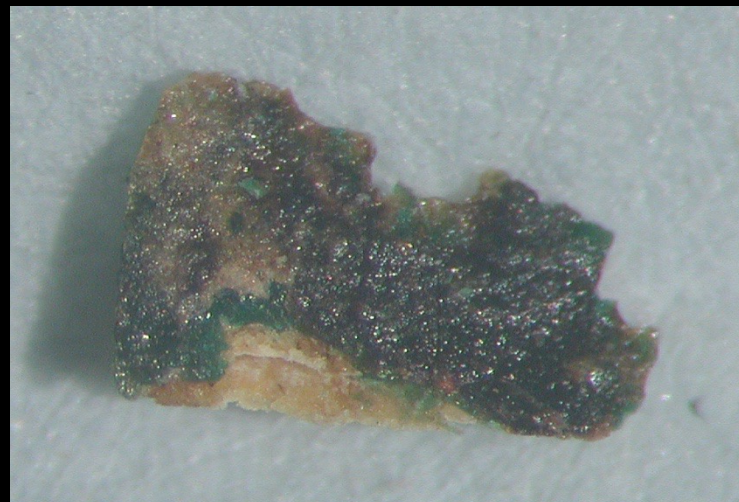
1 Light Yellow Layer Lead-tin Yellow

Sample 4 – Cross Section, UV Fluorescence, Detail

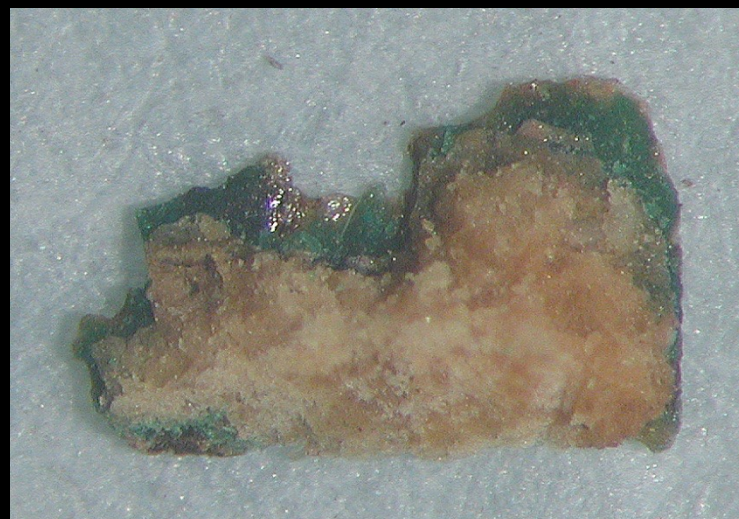
COLLAR OF GOWN



Sample 5 Location



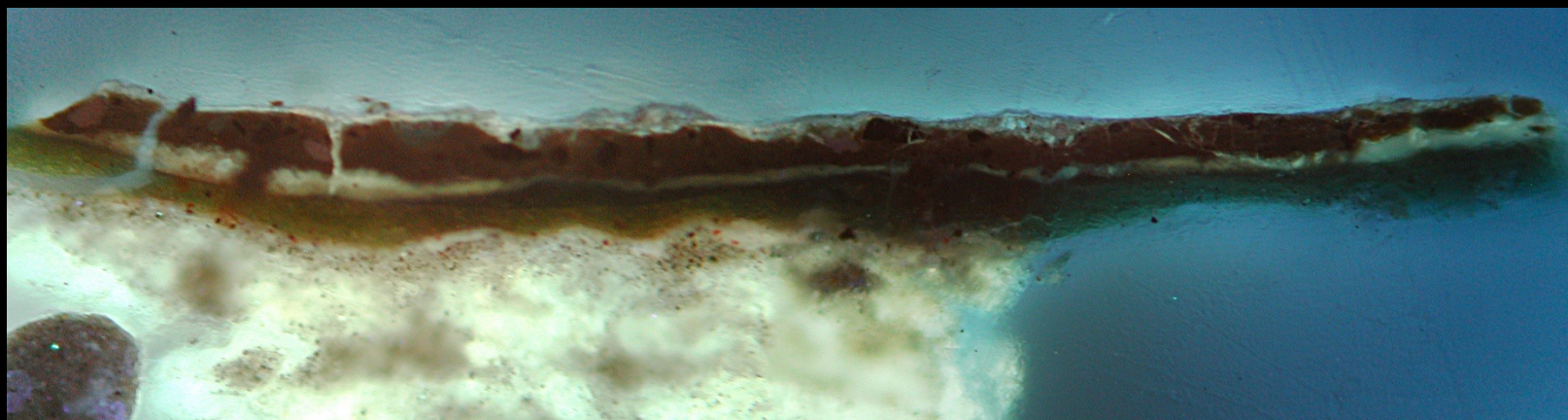
Sample 5 – Stereomicroscopy image. Front



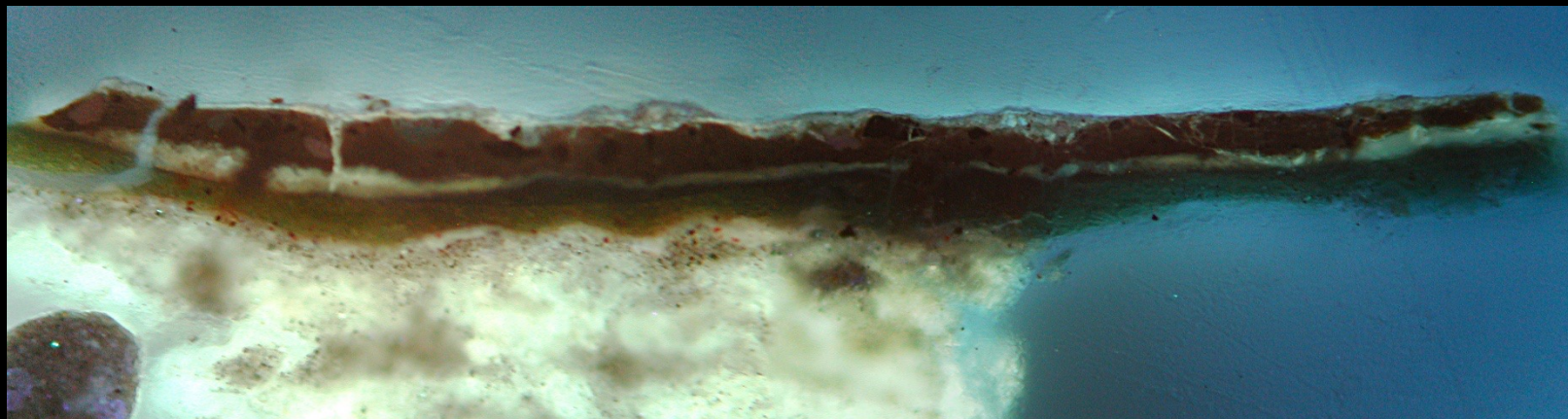
Sample 5 – Stereomicroscopy image. Back



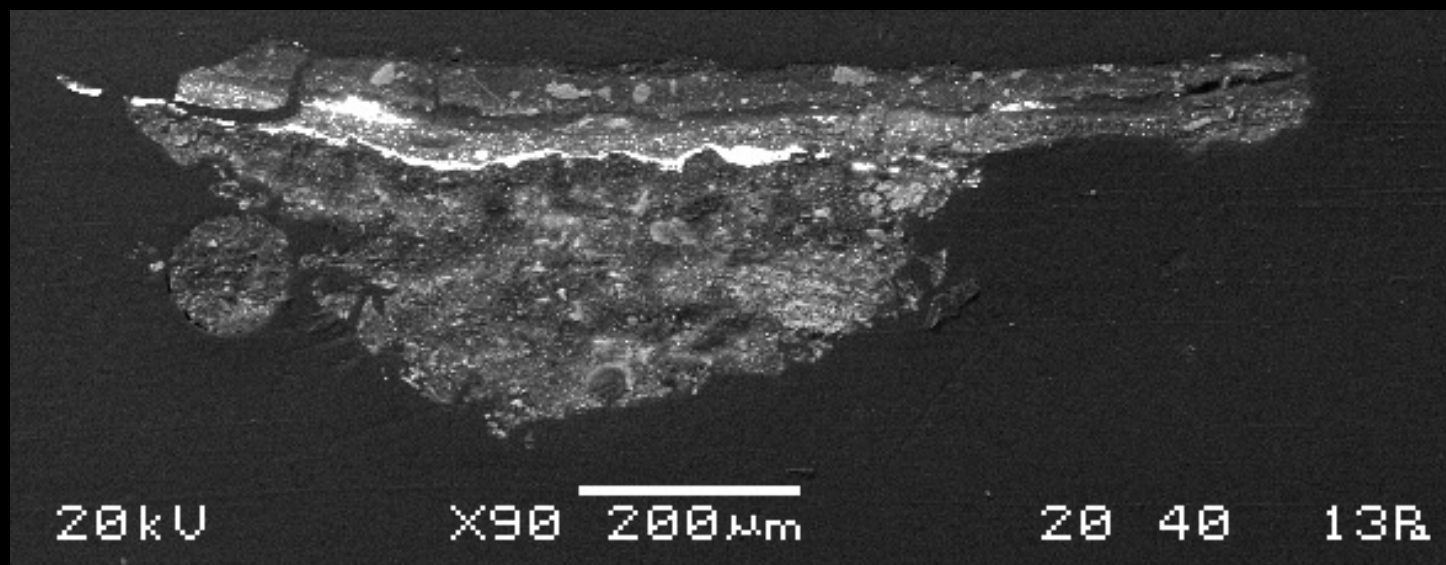
Sample 5 – Cross Section, Reflected Light



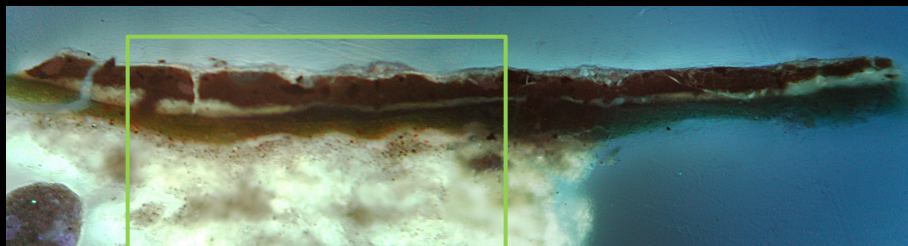
Sample 5 – Cross Section, UV Fluorescence



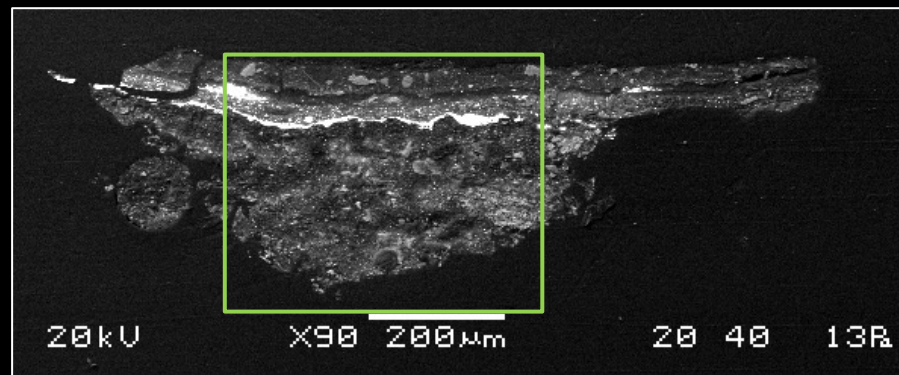
Sample 5 – Cross Section, UV Fluorescence



Sample 5 – Cross Section, SEM back scattered electron image

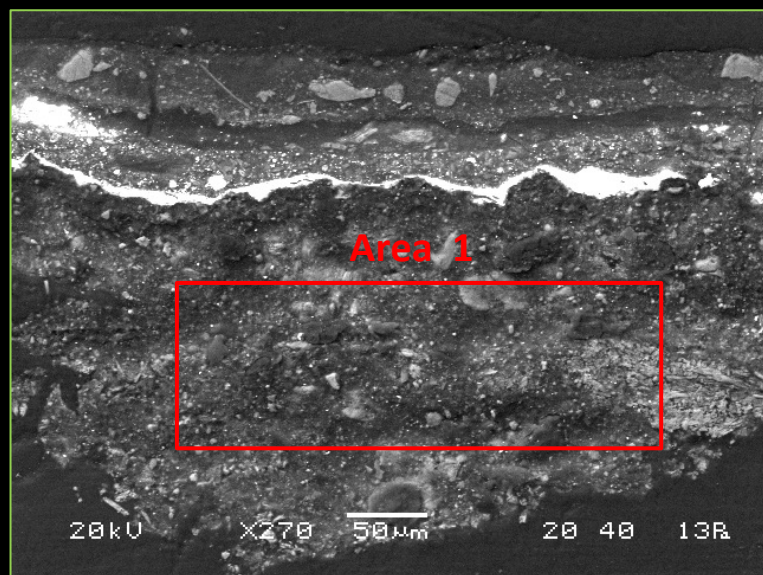


Sample 5 – Cross Section, UV Fluorescence

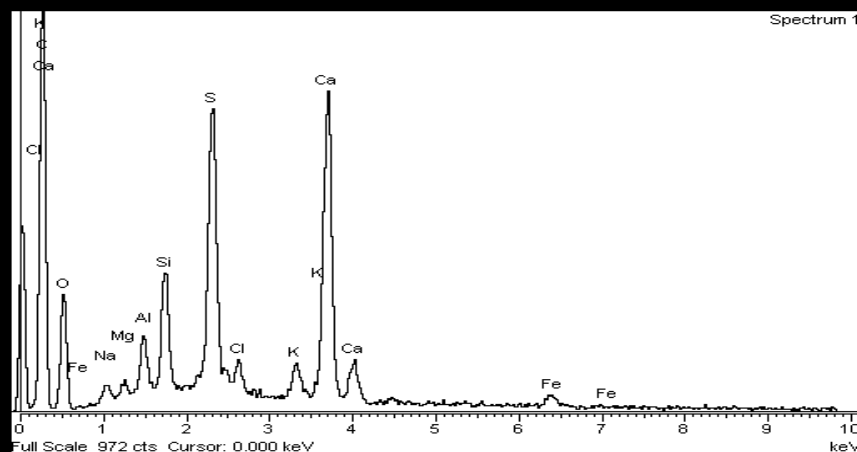


Sample 5 – Cross Section, SEM back scattered electron image

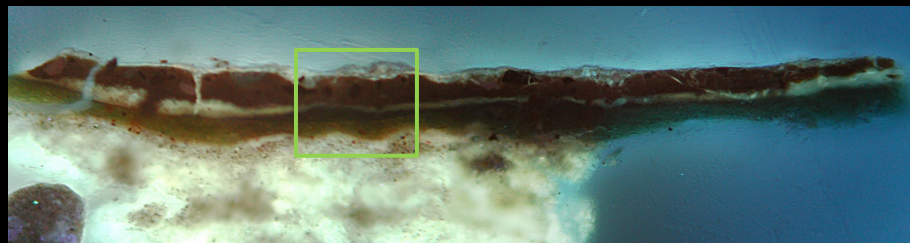
Ground Layer – Area 1: GESSO (CaSO_4) and EARTH PIGMENTS (Na, Mg, Al, Si, K)



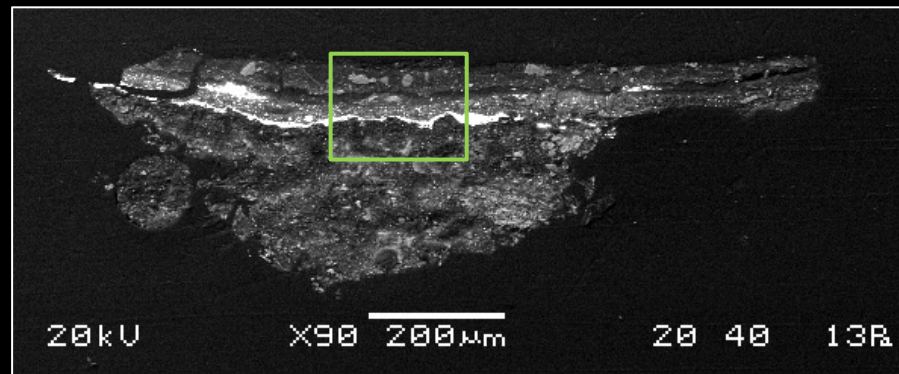
Sample 5 – Cross Section, SEM. Area 1 Microanalysis



Sample 5 – Cross Section, SEM – EDS. Microanalysis



Sample 5 – Cross Section, UV Fluorescence

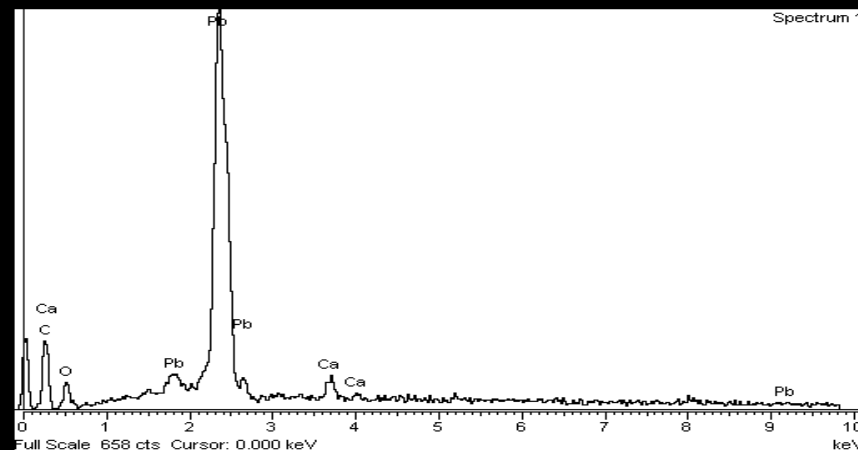


Sample 5 – Cross Section, SEM back scattered electron image

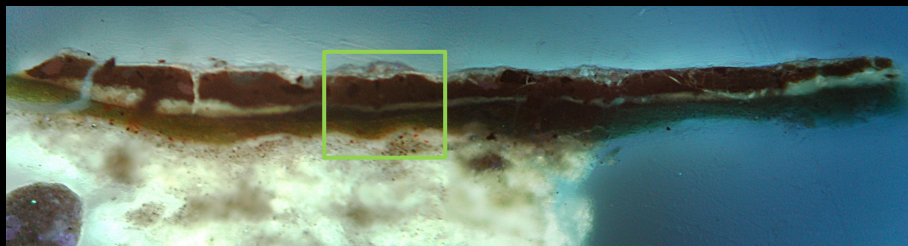
White Layer – Point 1: LEAD WHITE
 $(2\text{PbCO}_3 \cdot \text{Pb}(\text{OH})_2)$



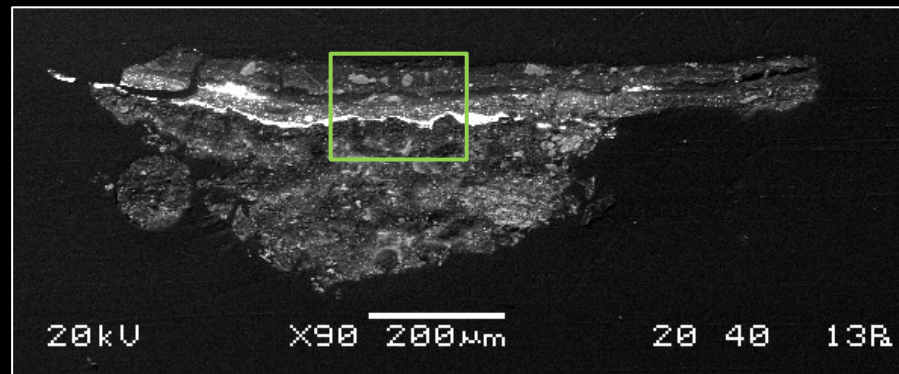
Sample 5 – Cross Section, SEM. Point 1 Microanalysis



Sample 5 – Cross Section, SEM – EDS. Microanalysis

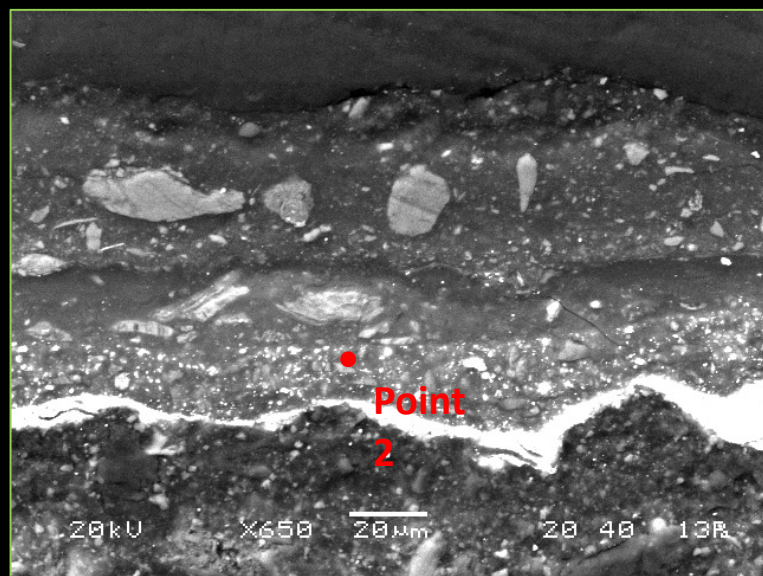


Sample 5 – Cross Section, UV Fluorescence

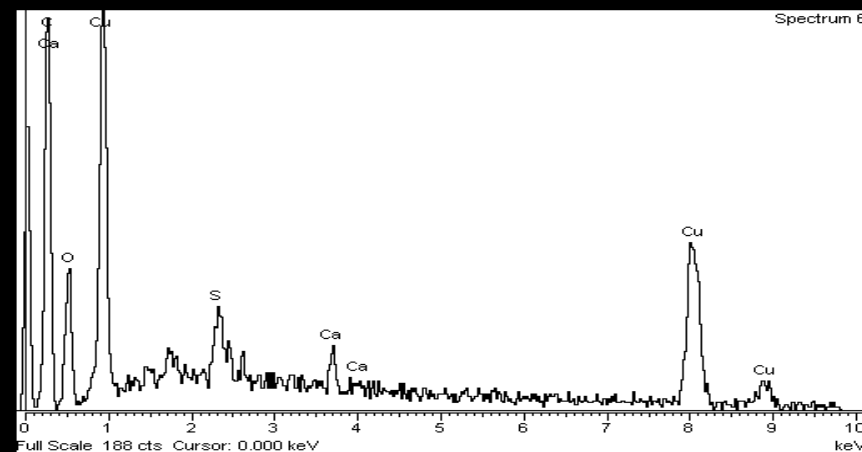


Sample 5 – Cross Section, SEM back scattered electron image

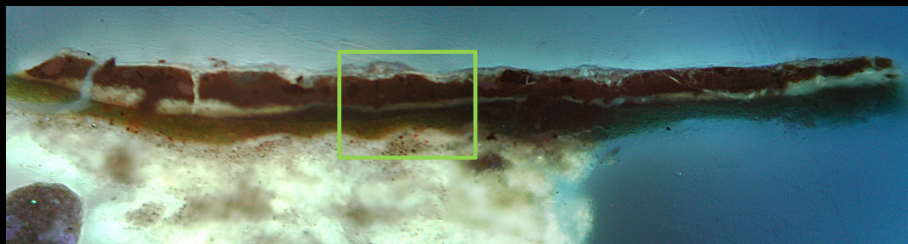
Dark Green Layer – Point 2: VIRDIGRIS
 $\text{Cu}(\text{CH}_3\text{COO})_2$



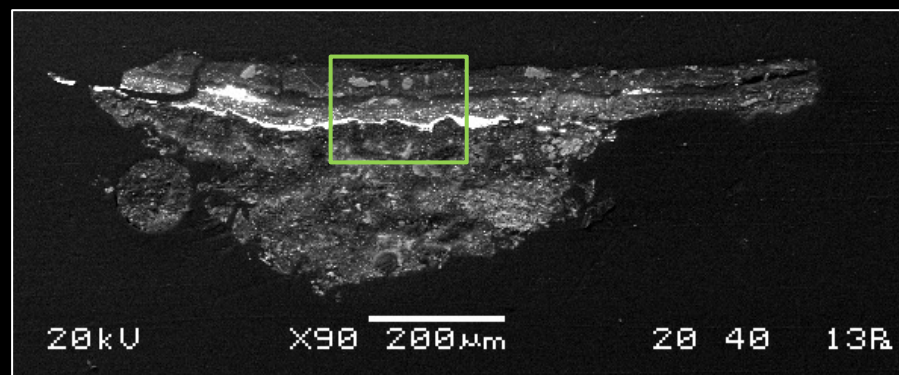
Sample 5 – Cross Section, SEM. Point 2 Microanalysis



Sample 5 – Cross Section, SEM – EDS. Microanalysis



Sample 5 – Cross Section, UV Fluorescence

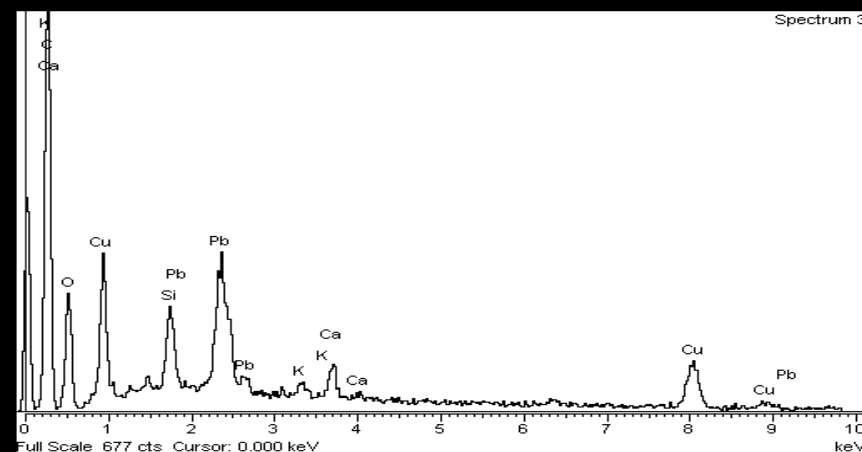


Sample 5 – Cross Section, SEM back scattered electron image

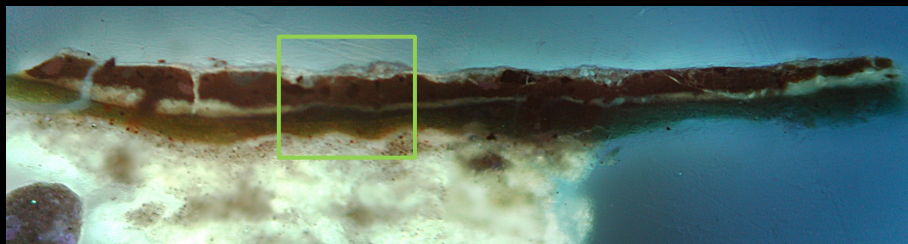
Dark Green Layer – Area 2: NATURAL EARTH PIGMENTS (Si,K) and VERDIGRIS $\text{Cu}(\text{CH}_3\text{COO})_2$



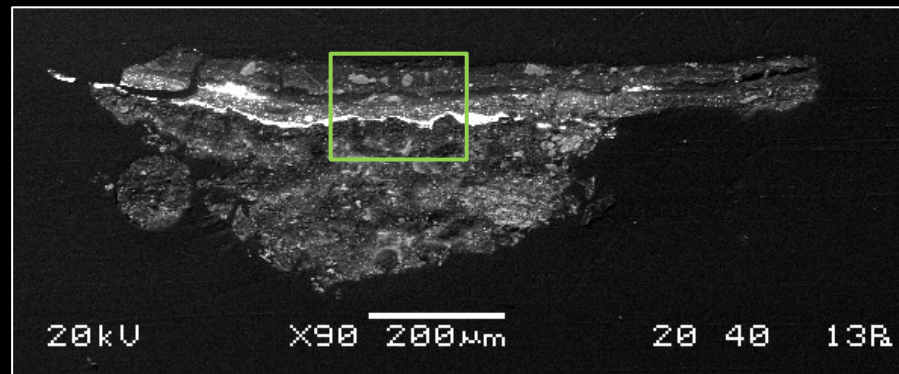
Sample 5 – Cross Section, SEM. Area 3 Microanalysis



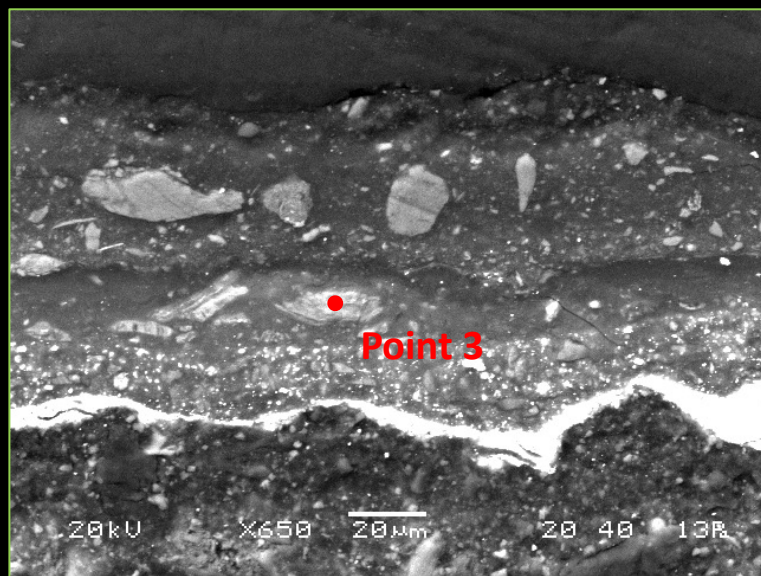
Sample 5 – Cross Section, SEM – EDS. Microanalysis



Sample 5 – Cross Section, UV Fluorescence

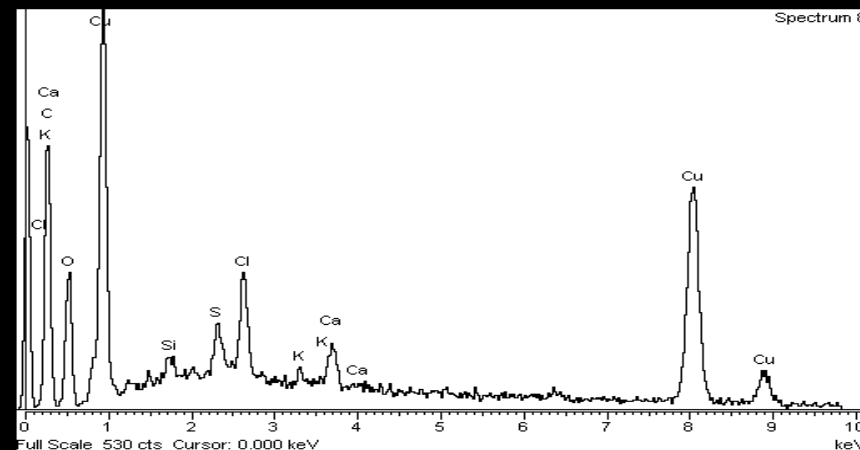


Sample 5 – Cross Section, SEM back scattered electron image

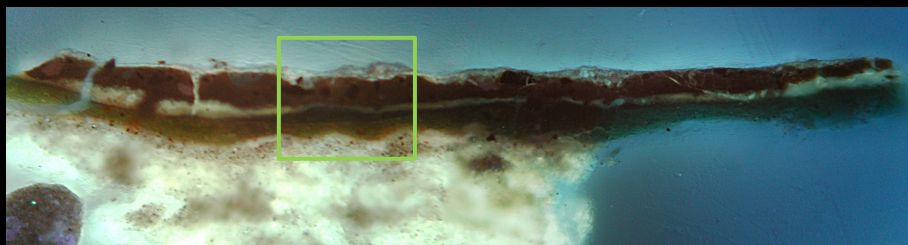


Sample 5 – Cross Section, SEM. Point 5 Microanalysis

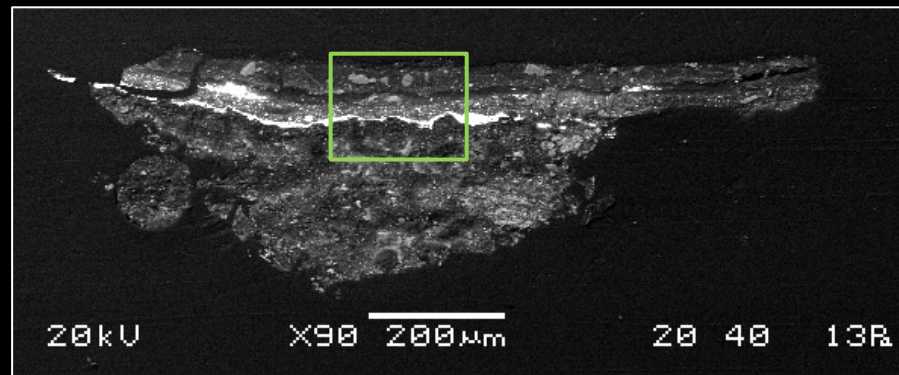
Dark Green Layer – Point 3: VERDIGRIS
 $\text{Cu}(\text{CH}_3\text{COO})_2$



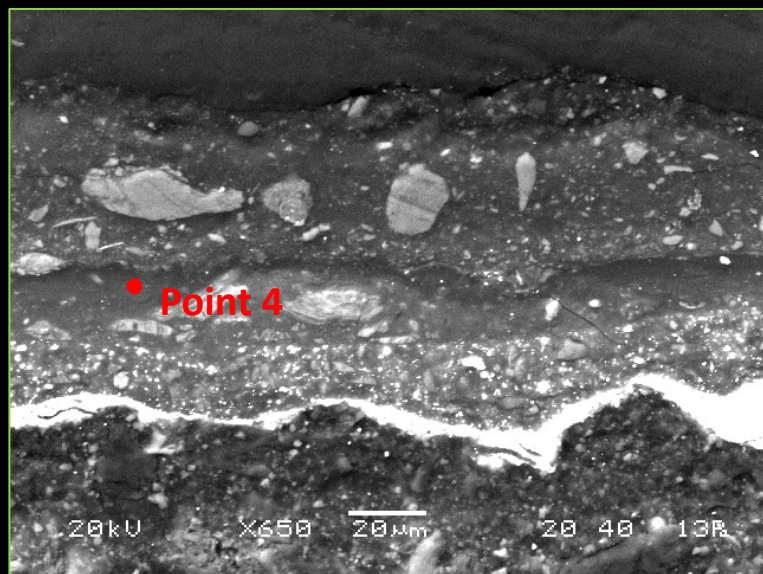
Sample 5 – Cross Section, SEM – EDS. Microanalysis



Sample 5 – Cross Section, UV Fluorescence



Sample 5 – Cross Section, SEM back scattered electron image



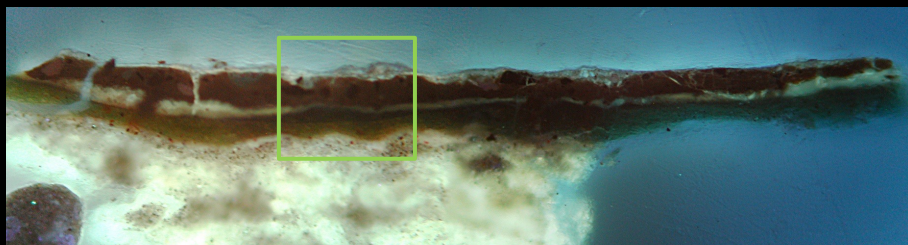
Sample 5 – Cross Section, SEM. Point 6 Microanalysis

Point 4: SEM-EDS ELEMENTAL MAPPING OF THE SAMPLE

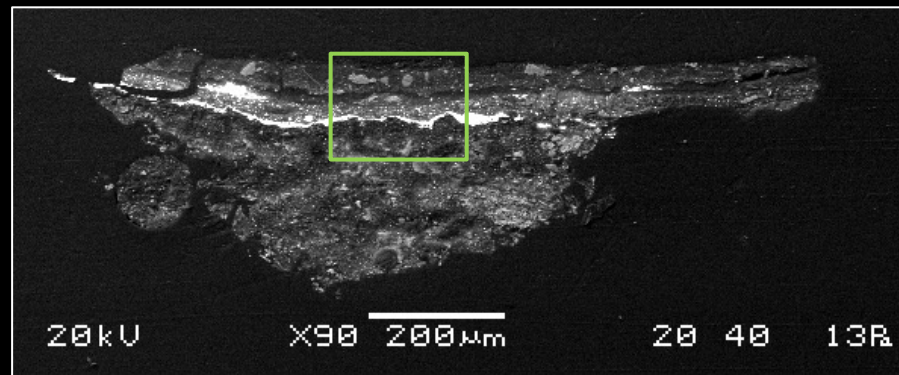
Element	App Conc.	Intensity Corn.	Weight%	Weight% Sigma	Atomic%
C	17.28	1.0619	75.55	0.22	84.19
O	1.02	0.2958	15.99	0.21	13.38
Si	0.12	0.9041	0.61	0.02	0.29
S	0.27	0.9558	1.32	0.03	0.55
Ca	0.36	0.9816	1.69	0.03	0.57
Cu	0.78	0.7467	4.84	0.12	1.02

Totals 100.00

CARBON BASED LAYER (Carbon 84%)

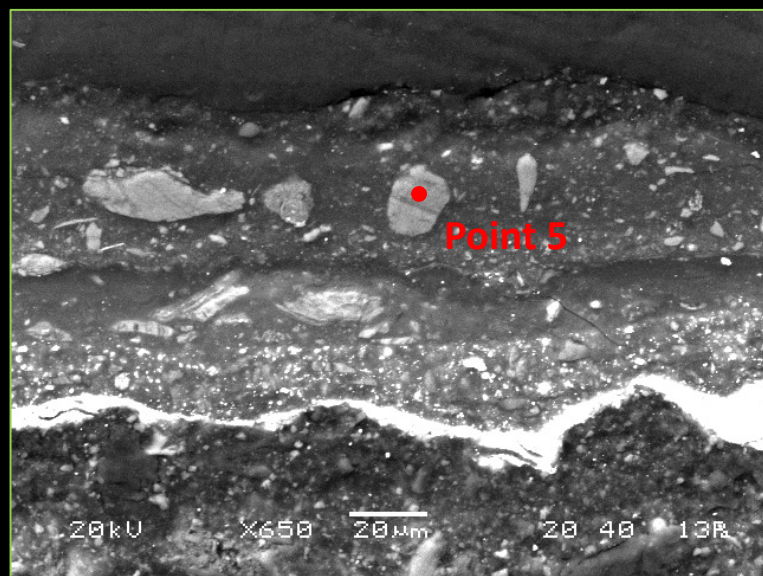


Sample 5 – Cross Section, UV Fluorescence

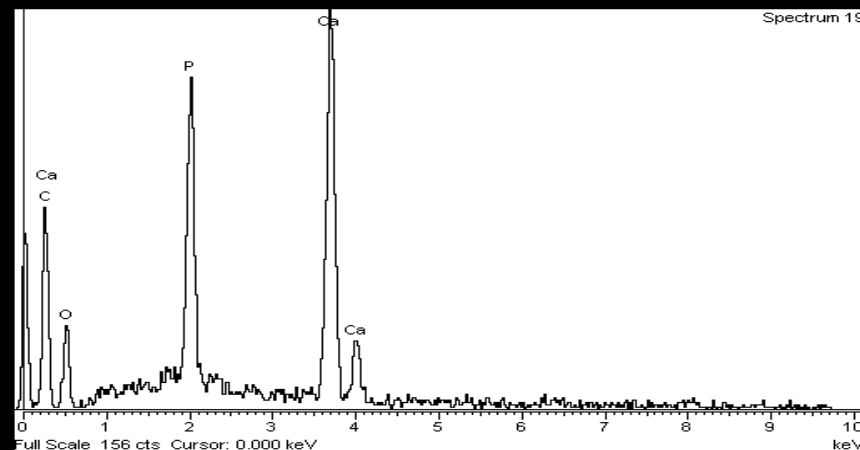


Sample 5 – Cross Section, SEM back scattered electron image

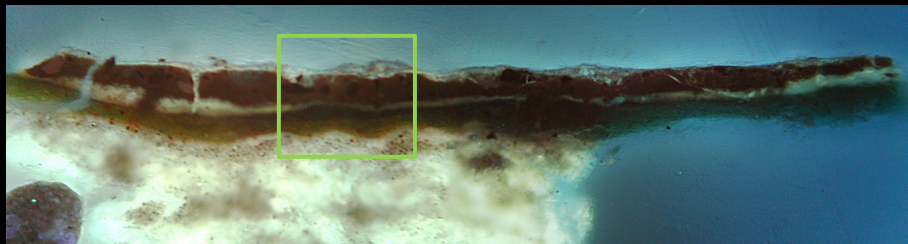
Dark Brown Layer – Point 5: BONE BLACK
 $(Ca_3(PO_3)_4)$



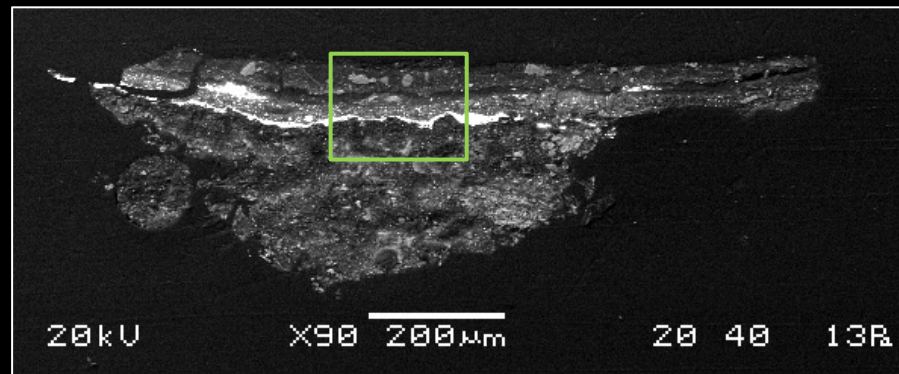
Sample 5 – Cross Section, SEM. Point 7 Microanalysis



Sample 5 – Cross Section, SEM – EDS. Microanalysis

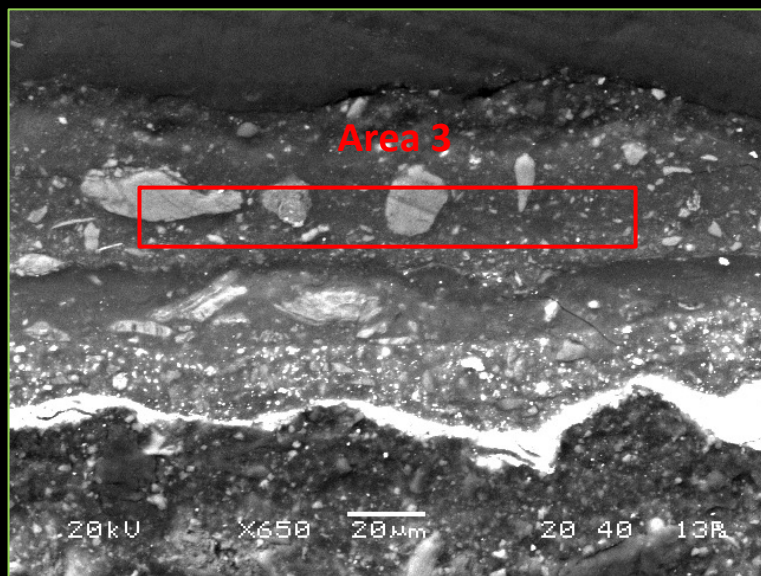


Sample 5 – Cross Section, UV Fluorescence

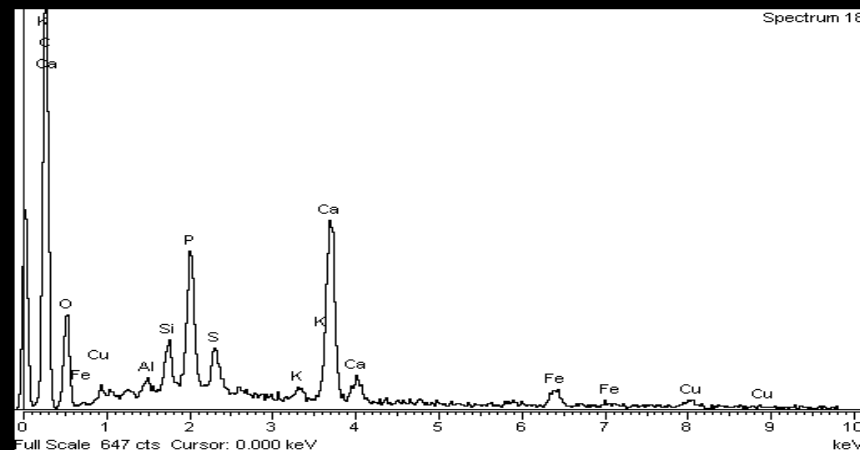


Sample 5 – Cross Section, SEM back scattered electron image

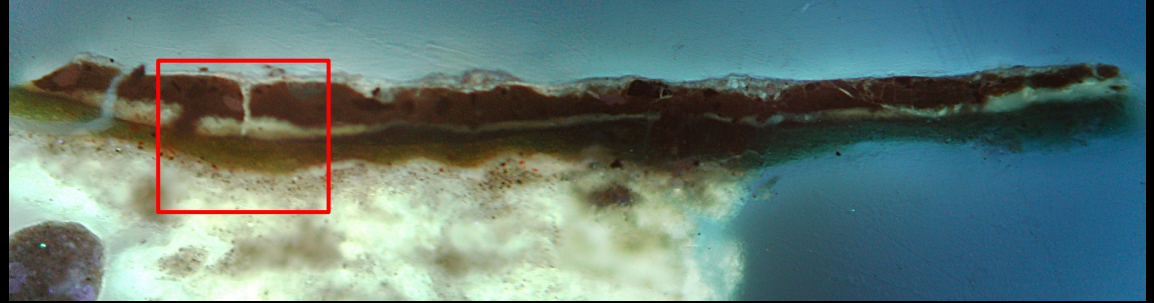
Dark Brown Layer – Area 3: BONE BLACK
($\text{Ca}_3(\text{PO}_3)_4$) and NATURAL EARTH PIGMENTS (Si, Al, K, Fe)



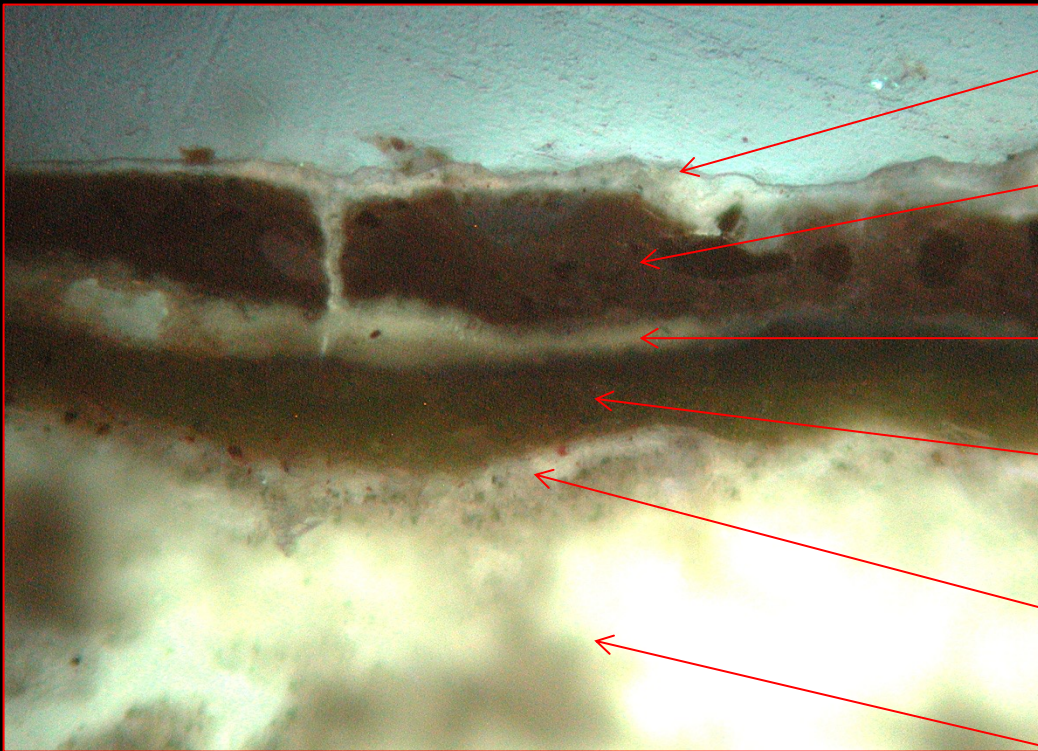
Sample 5 – Cross Section, SEM. Area 4 Microanalysis



Sample 5 – Cross Section, SEM – EDS. Microanalysis



Sample 5 – Cross Section, UV Fluorescence



- 6 Varnish
- 5 Dark Brown Layer Bone Black and Natural Earth Pigments
- 4 Varnish
- 3 Dark Green Layer Natural Earth Pigments and VERDIGRIS
- 2 White Layer Lead White
- 1 Ground Layer Gesso

Sample 5 – Cross Section, UV Fluorescence, Detail

FEMALE FIGURE'S GOWN



Sample 6 Location



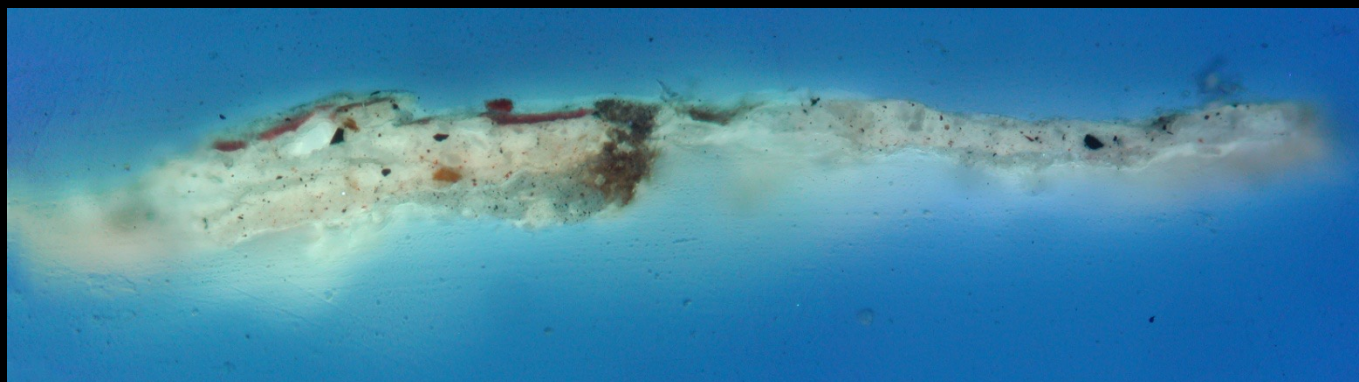
Sample 6 – Stereomicroscopy image. Front



Sample 6 – Stereomicroscopy image. Back



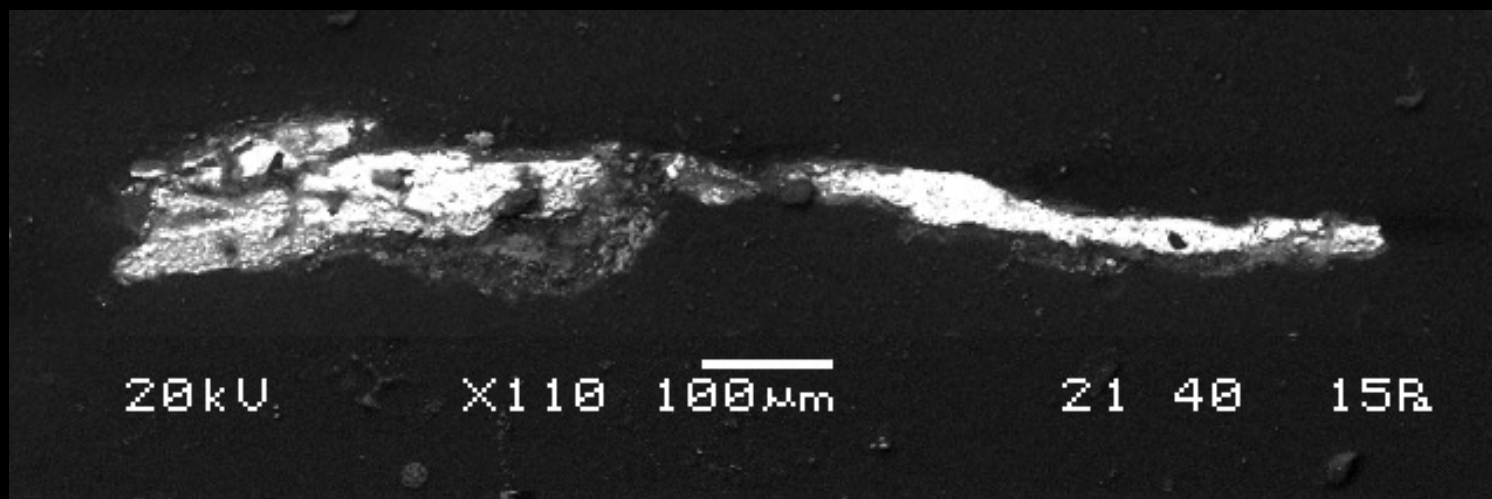
Sample 6 – Cross Section, Reflected Light



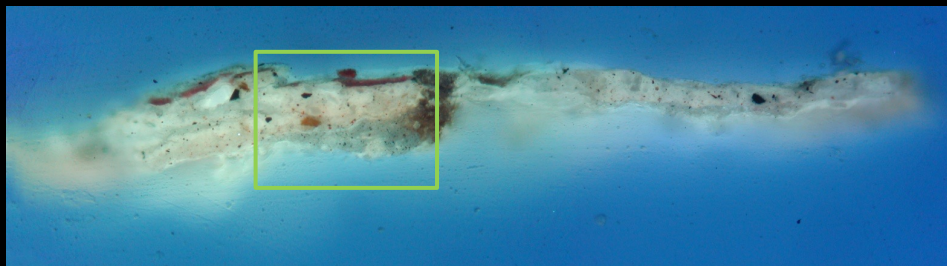
Sample 6 – Cross Section, UV Fluorescence



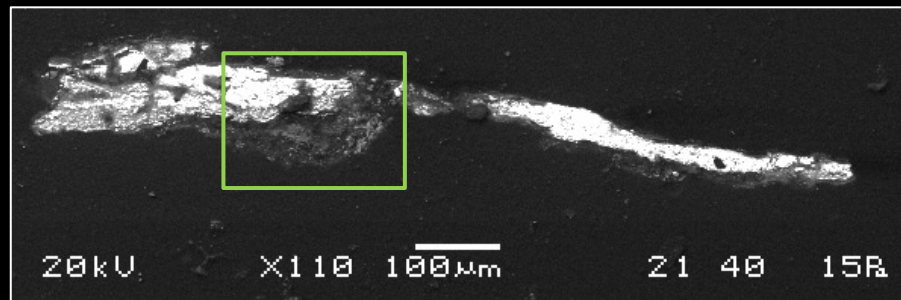
Sample 6 – Cross Section, Reflected Light



Sample 6 – Cross Section, SEM back scattered electron image

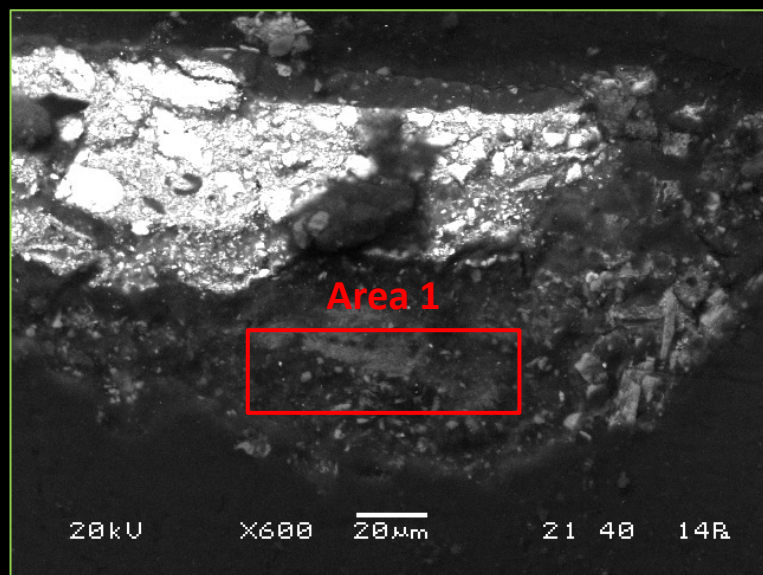


Sample 6 – Cross Section, UV Fluorescence

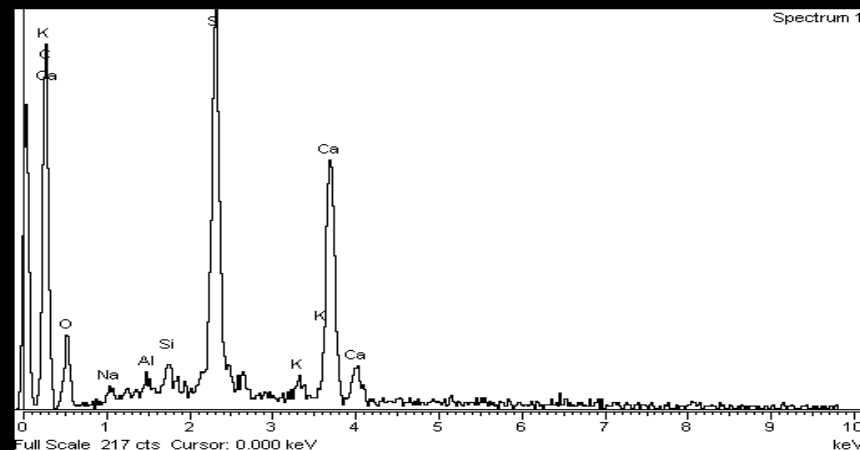


Sample 6 – Cross Section, SEM back scattered electron image

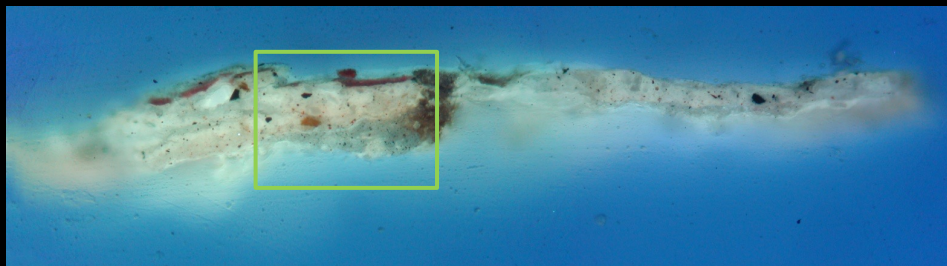
**Ground Layer – Area 1: NATURAL EARTH
PIGMENTS (Si, Al,K) and GESSO (CaSO₄)**



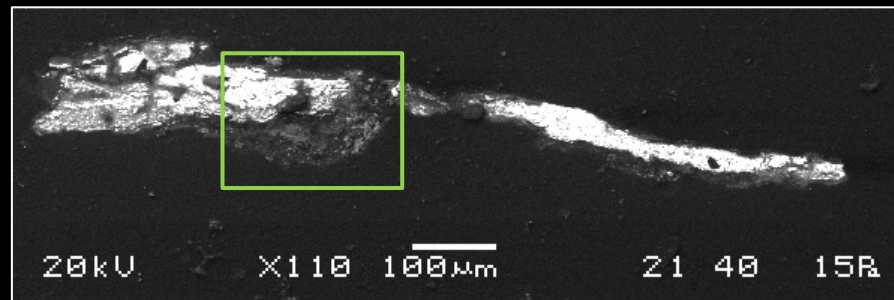
Sample 6 – Cross Section, SEM. Area 1 Microanalysis



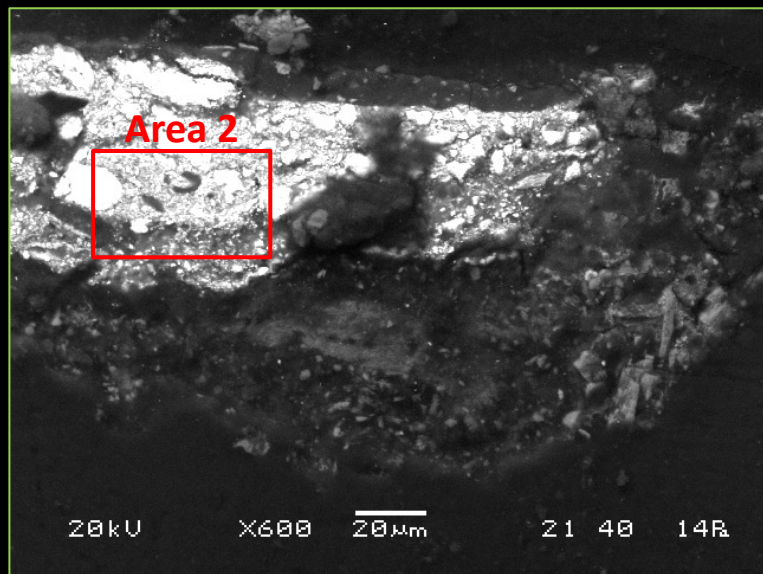
Sample 6 – Cross Section, SEM – EDS. Microanalysis



Sample 6 – Cross Section, UV Fluorescence

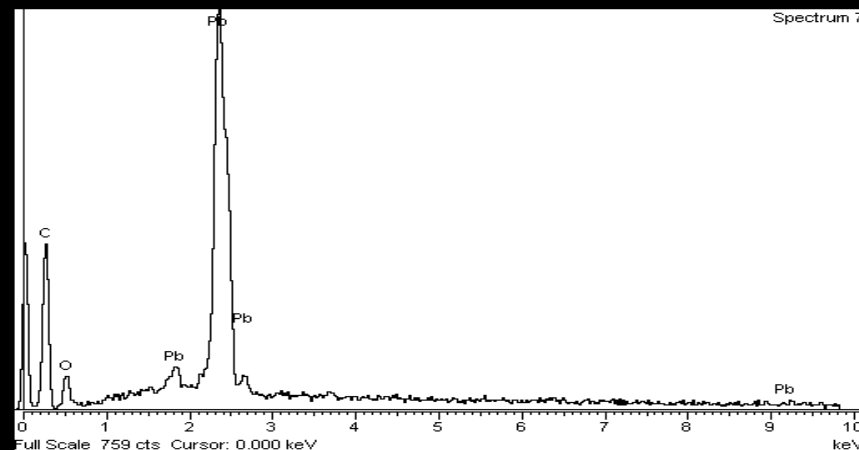


Sample 6 – Cross Section, SEM back scattered electron image

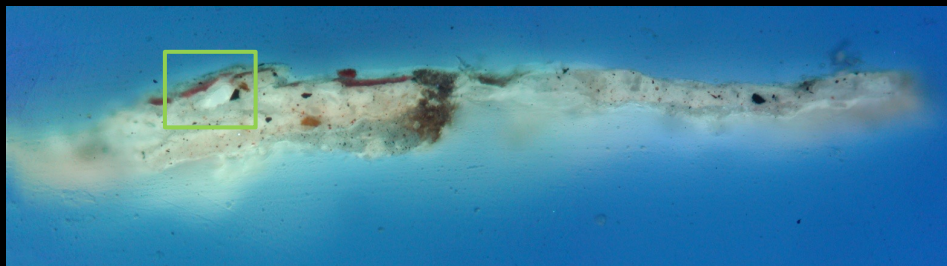


Sample 6 – Cross Section, SEM. Area 2 Microanalysis

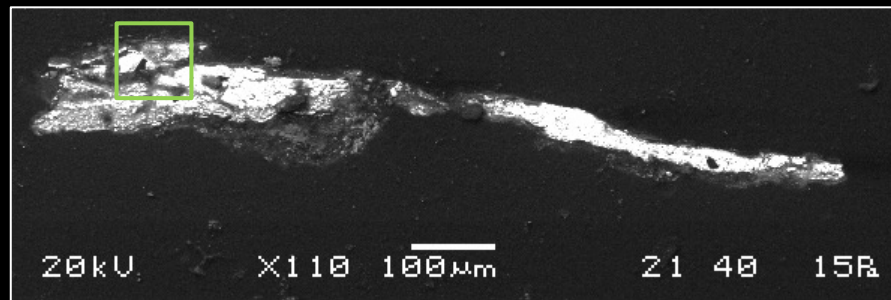
White Layer – Area 2: LEAD WHITE
($2\text{PbCO}_3 \cdot \text{Pb(OH)}_2$)



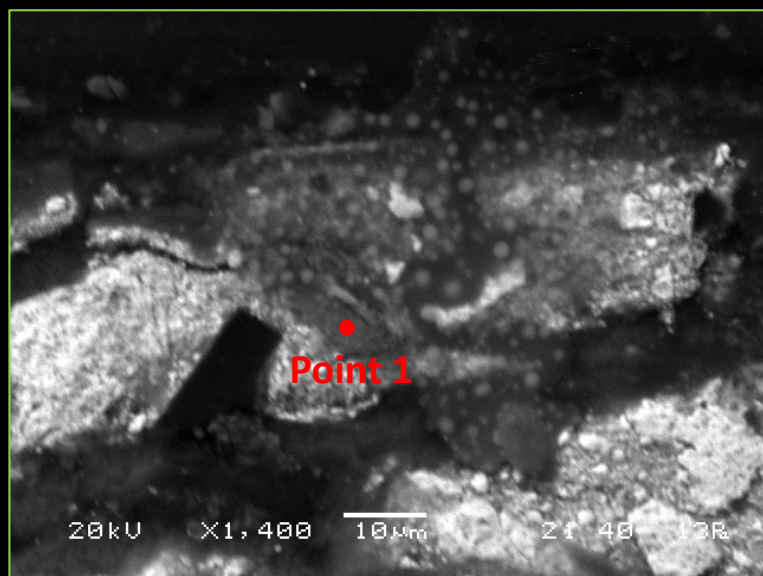
Sample 6 – Cross Section, SEM – EDS. Microanalysis



Sample 6 – Cross Section, UV Fluorescence

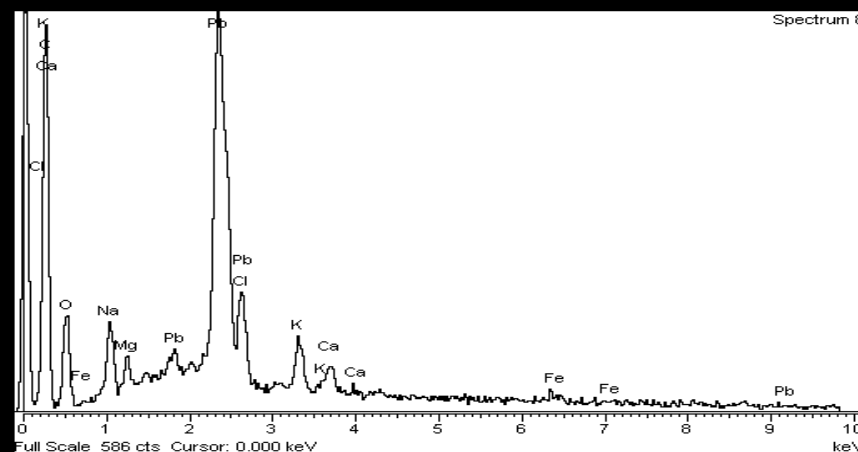


Sample 6 – Cross Section, SEM back scattered electron image

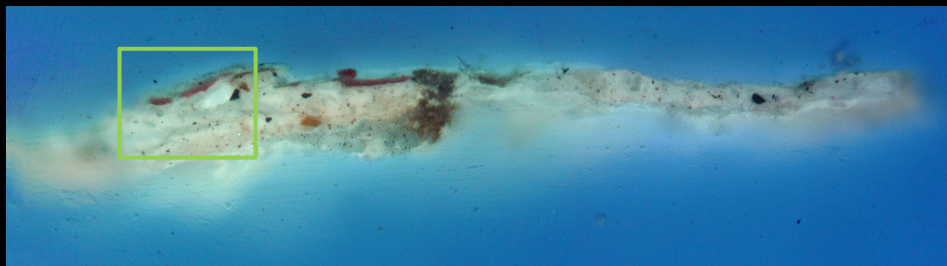


Sample 6 – Cross Section, SEM. Point 1 Microanalysis

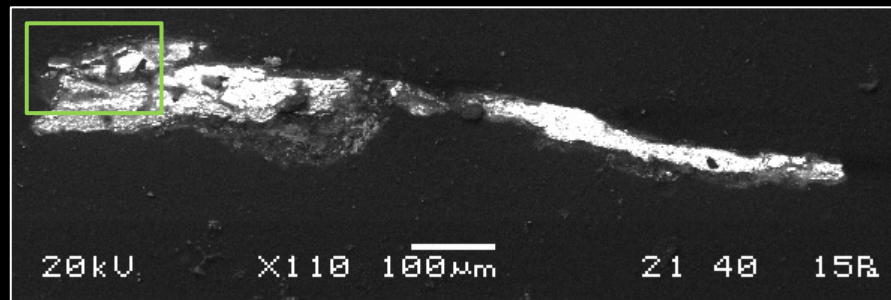
Light Brown Layer – Point 1: RED OCHRE (Fe_2O_3) and NATURAL EARTH PIGMENTS (Si, Al, Mg, K, Fe)



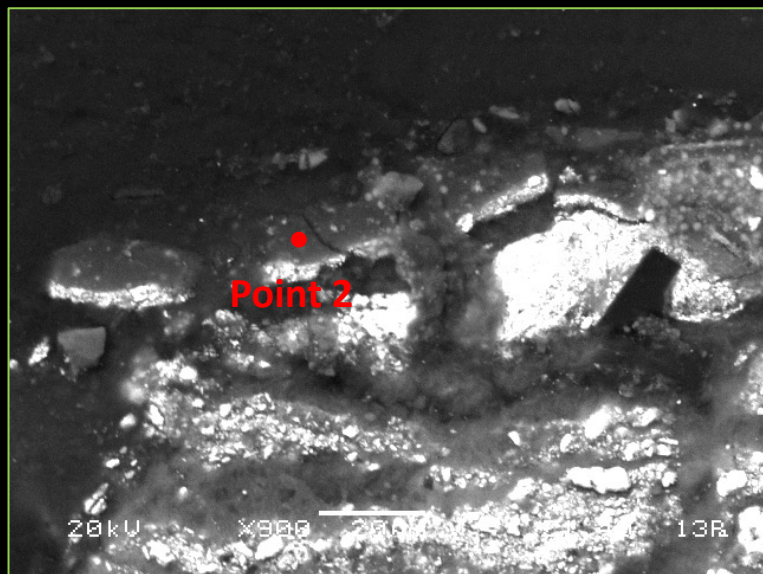
Sample 6 – Cross Section, SEM – EDS. Microanalysis



Sample 6 – Cross Section, UV Fluorescence

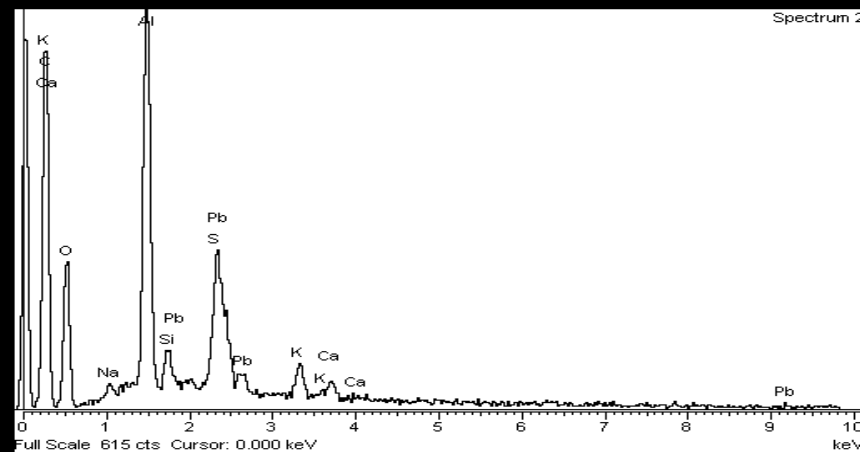


Sample 6 – Cross Section, SEM back scattered electron image

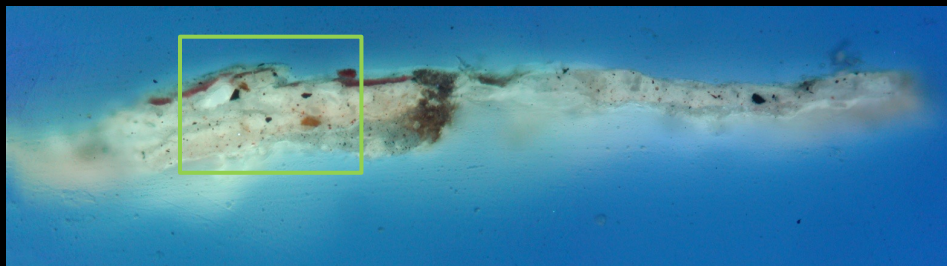


Sample 6 – Cross Section, SEM. Point 3 Microanalysis

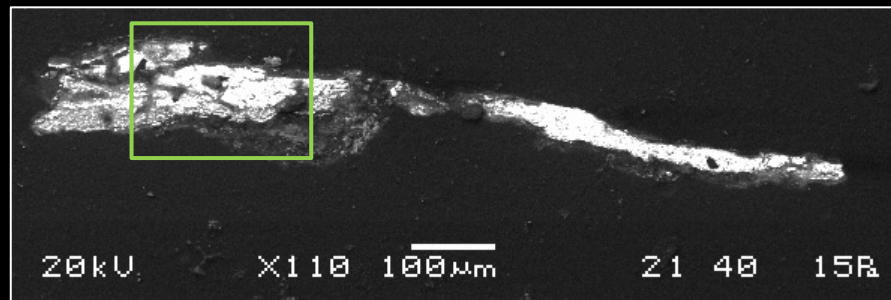
Red Layer – Point 2: RED LAKE (K Al, Si)



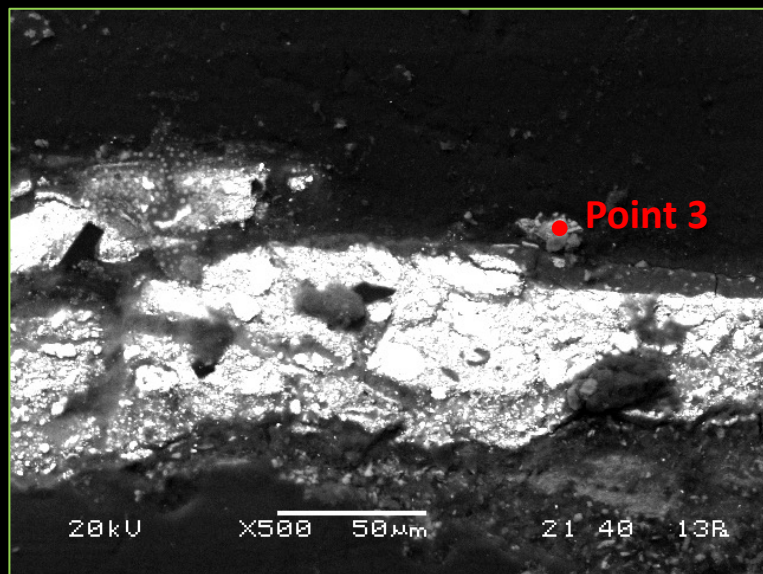
Sample 6 – Cross Section, SEM – EDS. Microanalysis



Sample 6 – Cross Section, UV Fluorescence

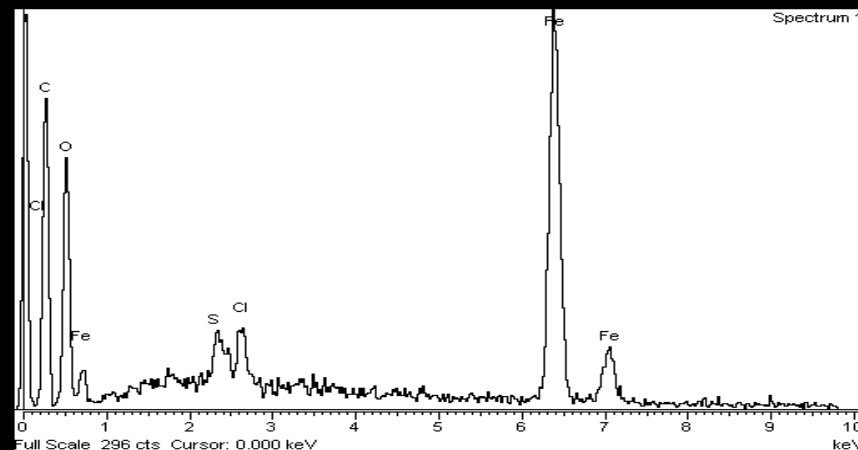


Sample 6 – Cross Section, SEM back scattered electron image



Sample 6 – Cross Section, SEM. Point 6 Microanalysis

Light Brown Layer – Point 3: RED OCHRE
(Fe_2O_3)



Sample 6 – Cross Section, SEM – EDS. Microanalysis



Sample 6 – Cross Section, Reflected Light



4 Varnish

3 Red Layer Red Lake, Red Ochre and Natural Earth Pigments

2 White Layer Lead White

1 Ground Layer Gesso and Natural Earth Pigments

Sample 6 – Cross Section, Reflected Light, Detail

BACKGROUND



Sample 7 Location



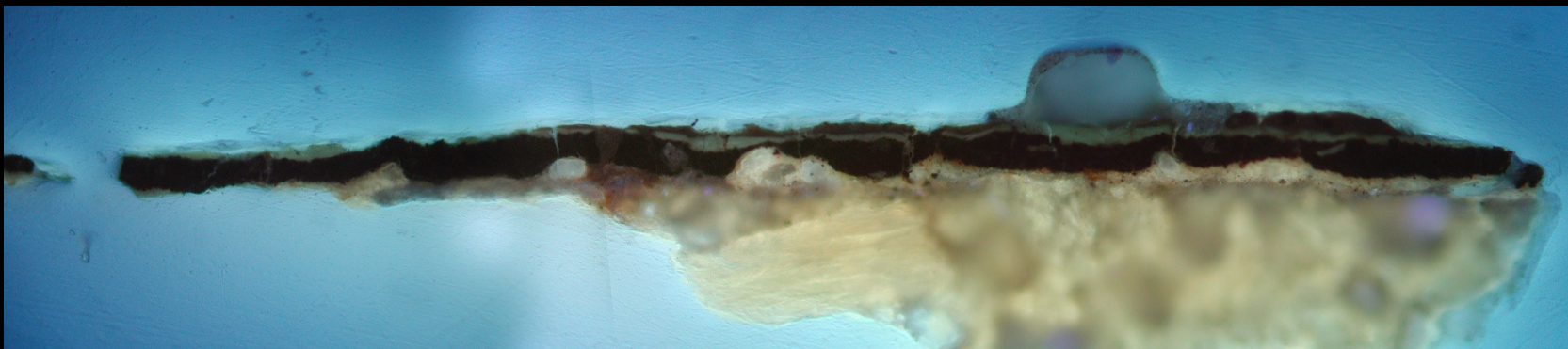
Sample 7 – Stereomicroscopy image. Front



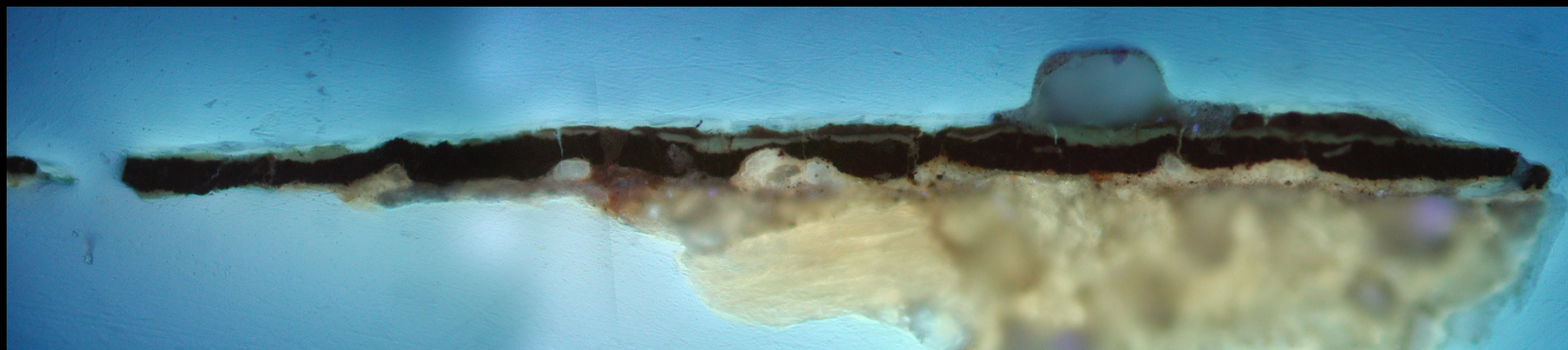
Sample 7 – Stereomicroscopy image. Back



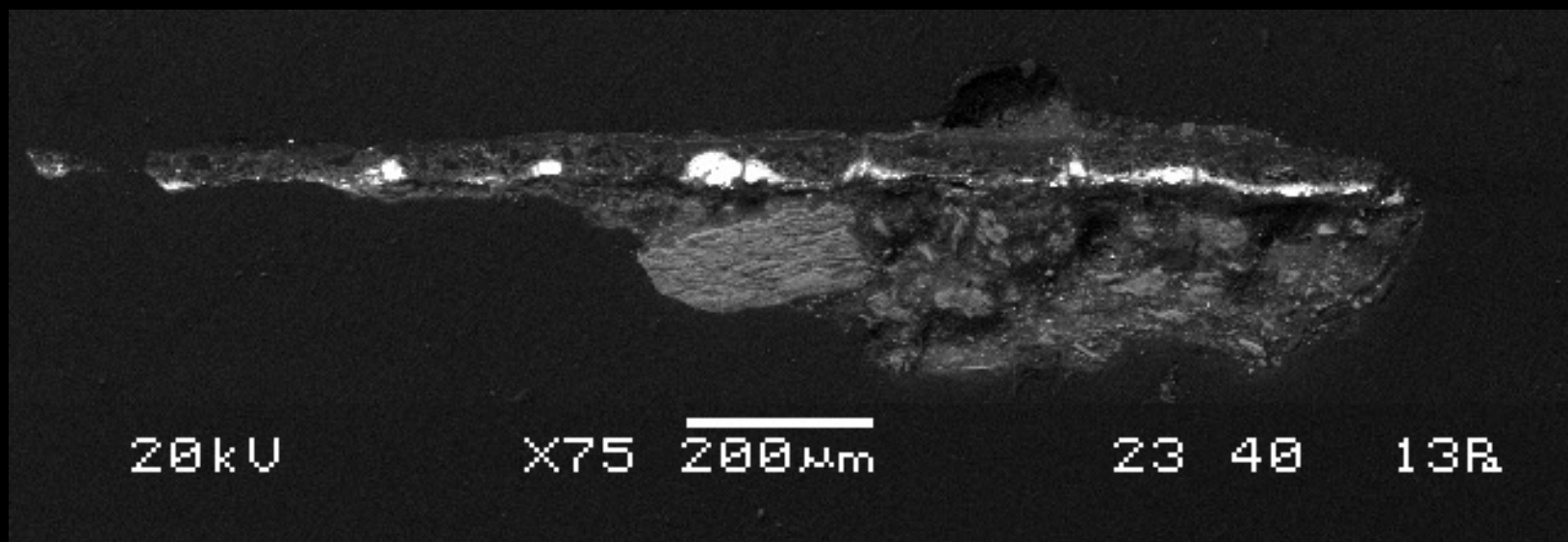
Sample 7 – Cross Section, Reflected Light



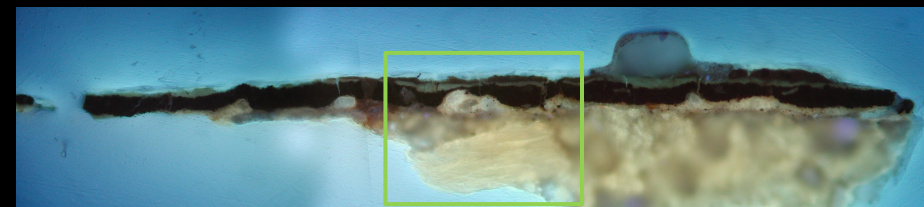
Sample 7 – Cross Section, UV Fluorescence



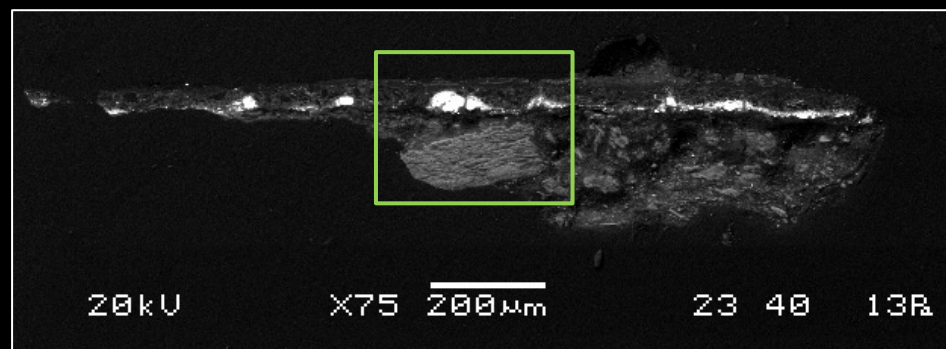
Sample 7 – Cross Section, UV Fluorescence



Sample 7 – Cross Section, SEM back scattered electron image

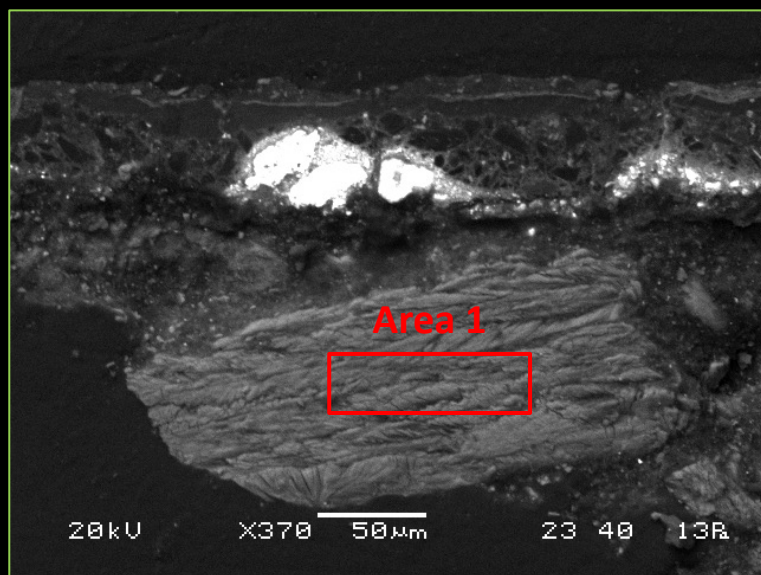


Sample 7 – Cross Section, UV Fluorescence

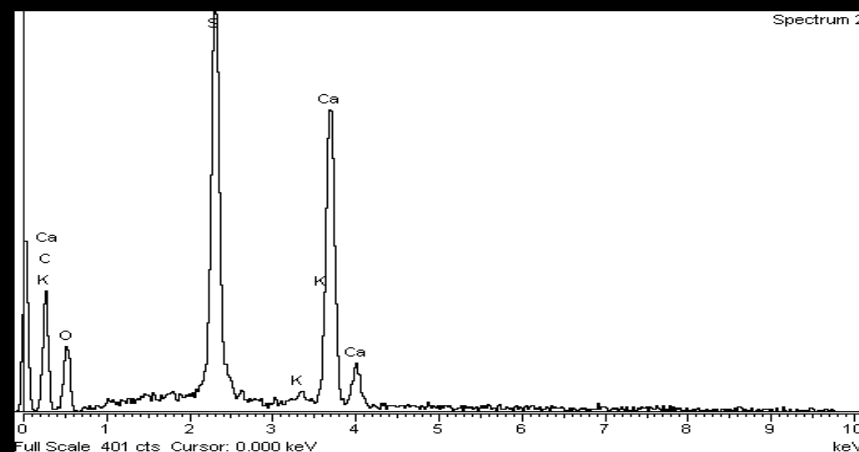


Sample 7 – Cross Section, SEM back scattered electron image

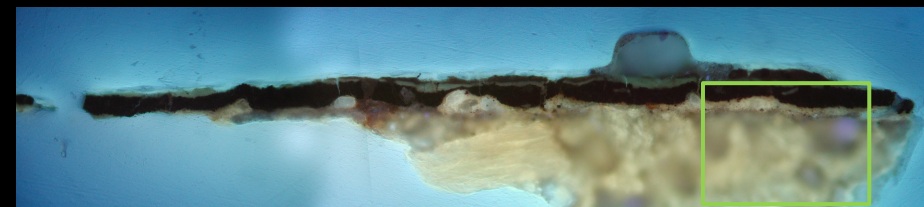
Ground Layer – Area 1: GESSO (CaSO_4)



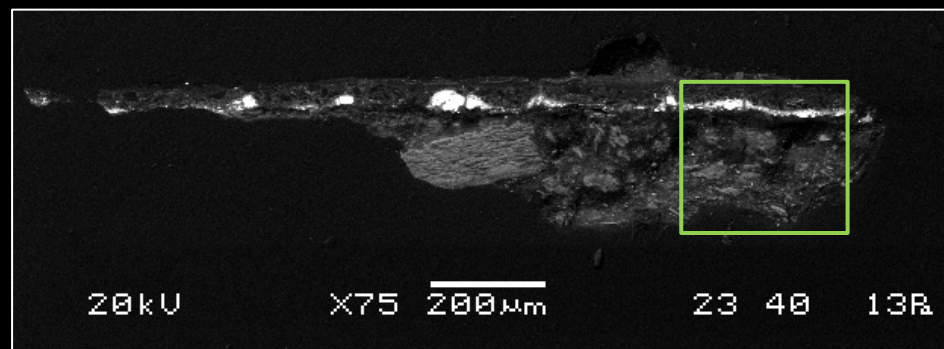
Sample 7 – Cross Section, SEM. Area 1 Microanalysis



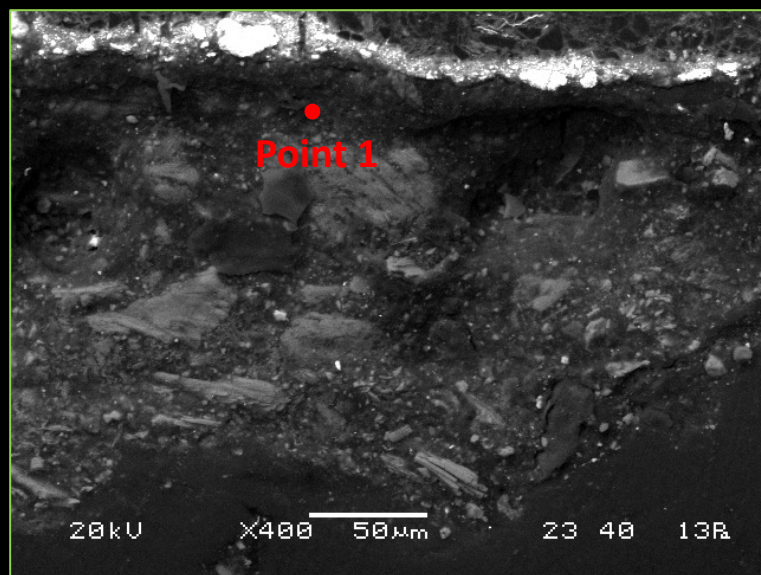
Sample 7 – Cross Section, SEM – EDS. Microanalysis



Sample 7 – Cross Section, UV Fluorescence

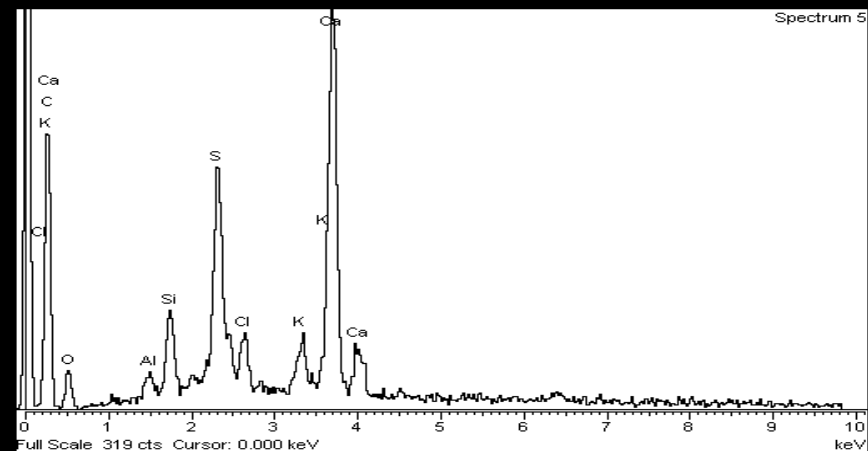


Sample 7 – Cross Section, SEM back scattered electron image

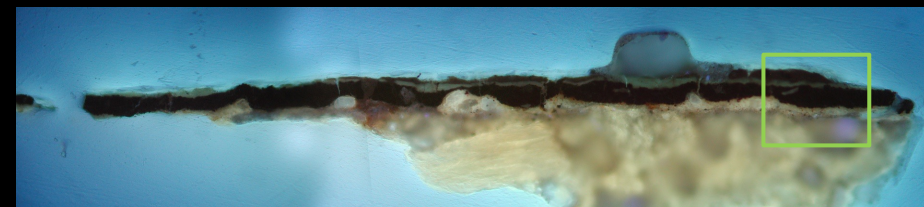


Sample 7 – Cross Section, SEM. Point 13 Mycroanalysis

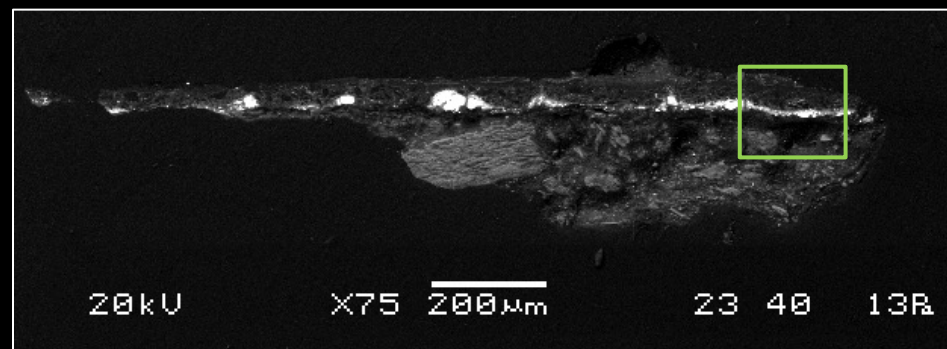
Light Brown Layer – Point 1: GESSO (CaSO_4)
and NATURAL EARTH PIGMENTS (Si, Al, K)



Sample 7 – Cross Section, SEM – EDS. Mycroanalysis

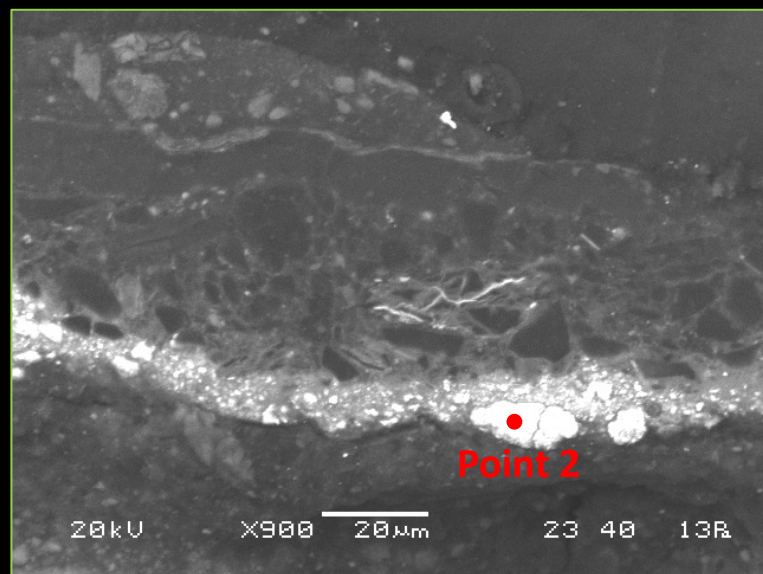


Sample 7 – Cross Section, UV Fluorescence

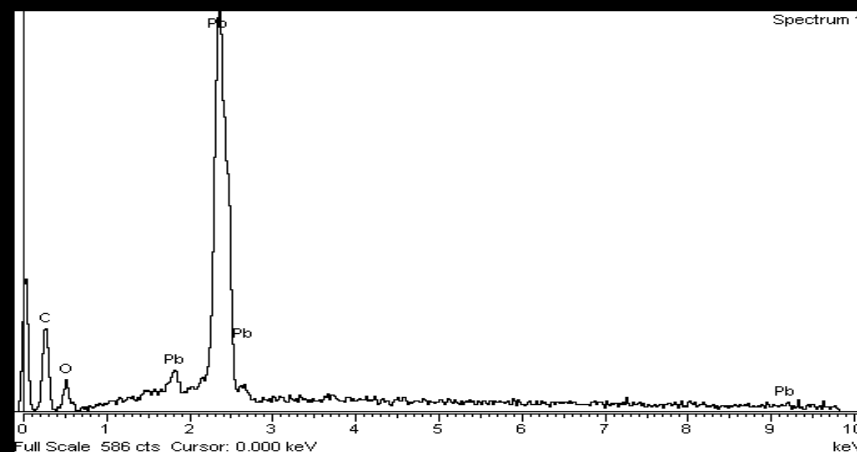


Sample 7 – Cross Section, SEM back scattered electron image

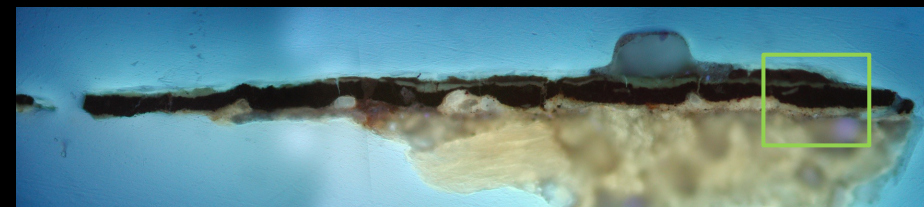
White Layer – Point 2: LEAD WHITE
($2\text{PbCO}_3 \cdot \text{Pb}(\text{OH})_2$)



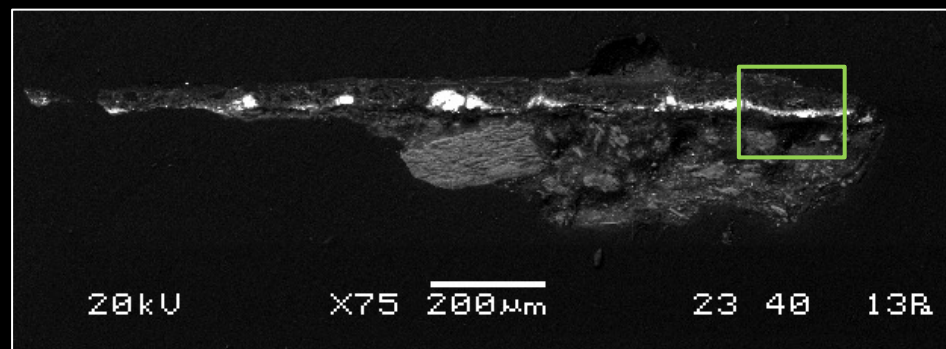
Sample 7 – Cross Section, SEM. Point 2 Microanalysis



Sample 7 – Cross Section, SEM – EDS. Microanalysis

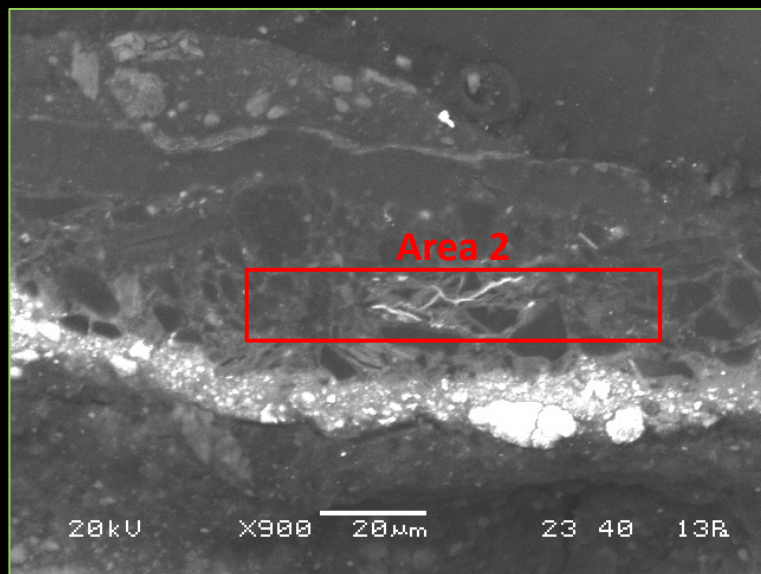


Sample 7 – Cross Section, UV Fluorescence

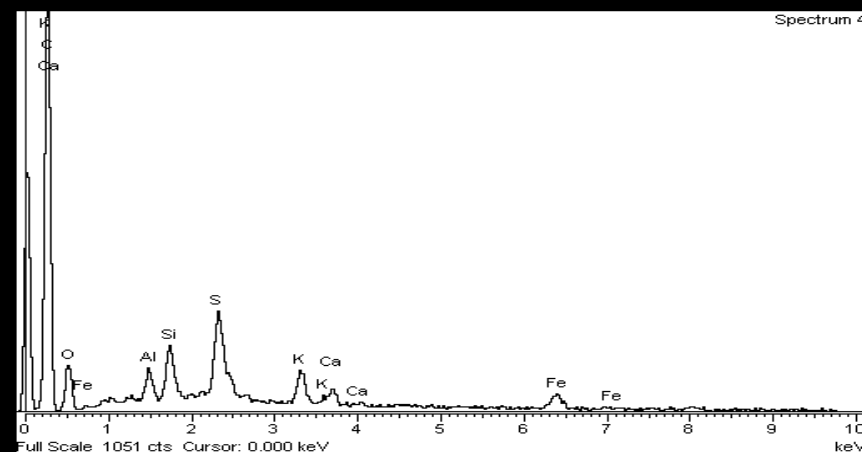


Sample 7 – Cross Section, SEM back scattered electron image

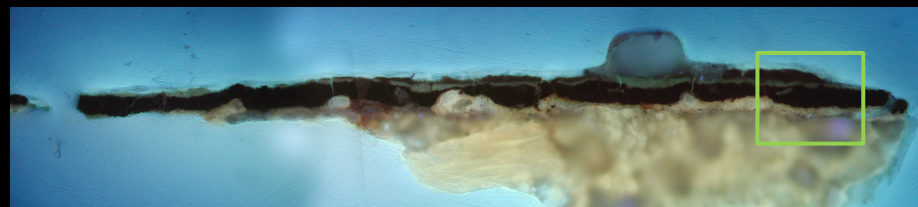
Brown Layer – Area 2: NATURAL EARTH PIGMENTS
(Si, Al, K, Fe) and CARBON BLACK (C)



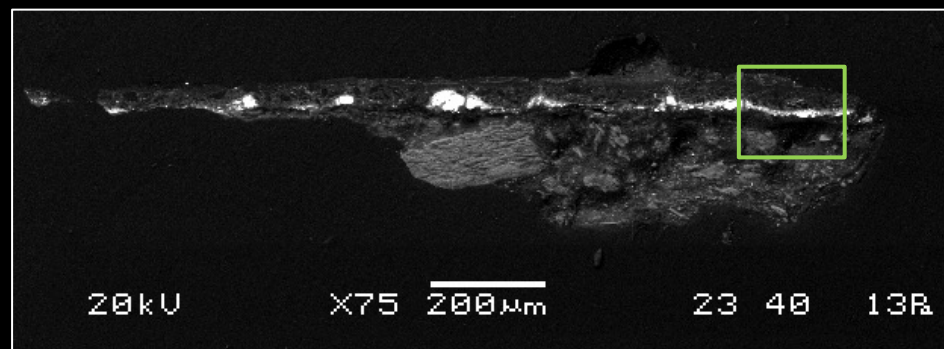
Sample 7 – Cross Section, SEM. Area 2 Microanalysis



Sample 7 – Cross Section, SEM – EDS. Microanalysis

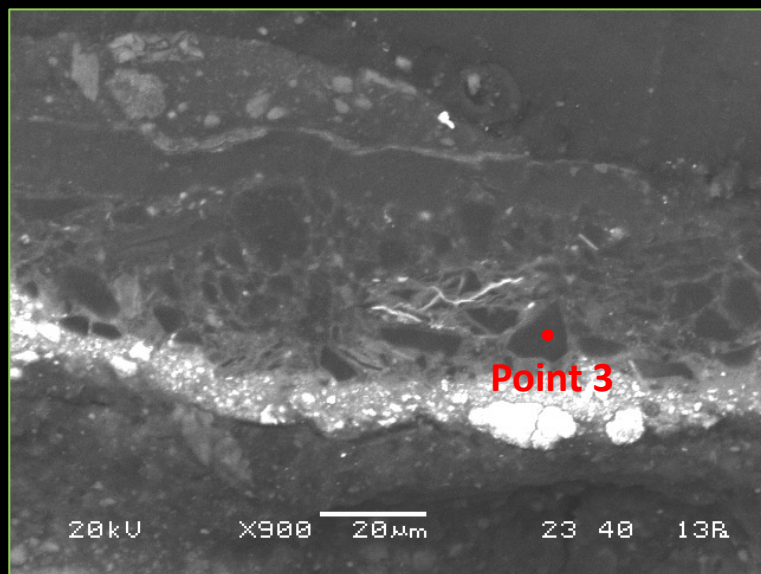


Sample 7 – Cross Section, UV Fluorescence

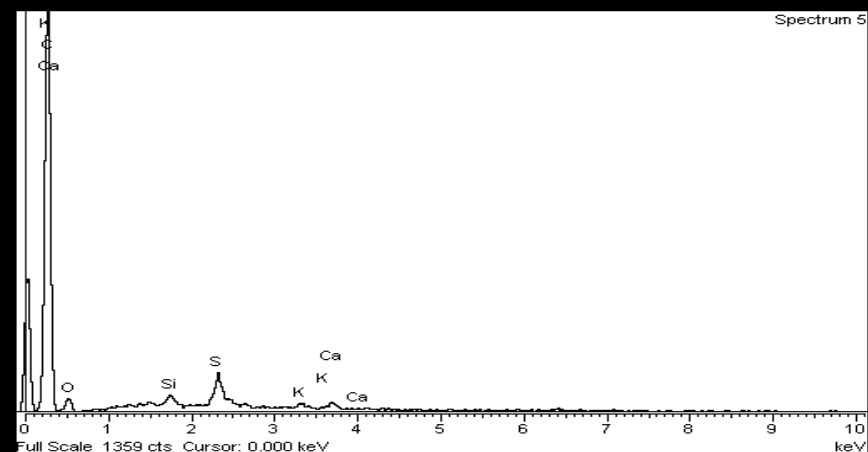


Sample 7 – Cross Section, SEM back scattered electron image

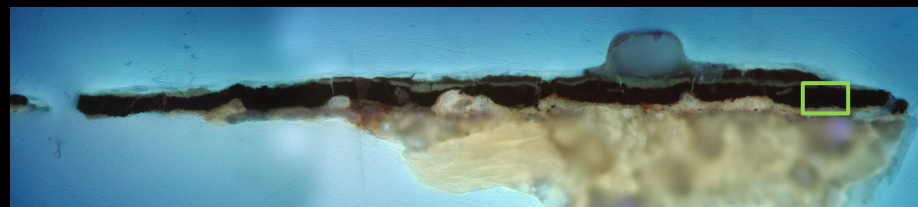
Brown Layer – Point 3: CARBON BLACK (C)



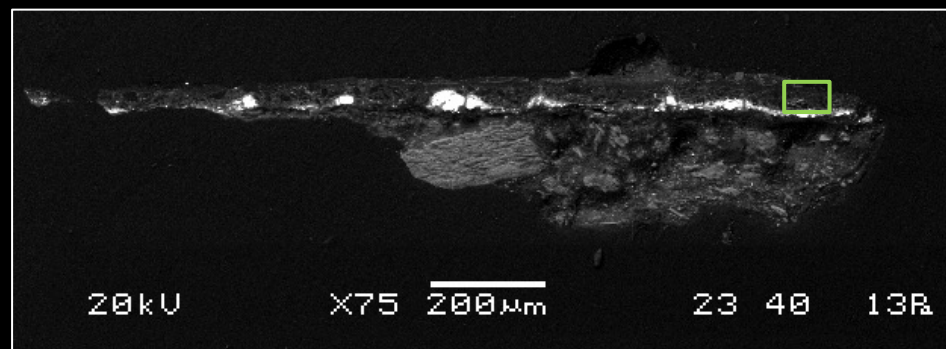
Sample 7 – Cross Section, SEM. Point 3 Microanalysis



Sample 7 – Cross Section, SEM – EDS. Microanalysis

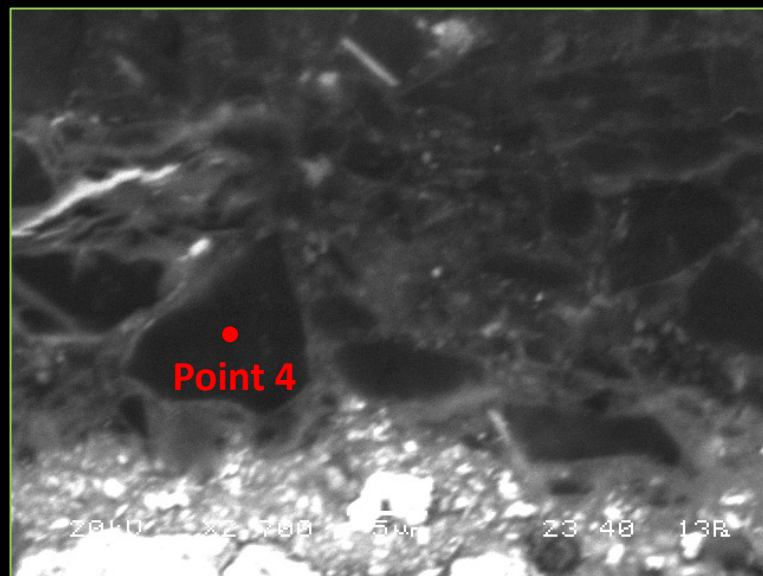


Sample 7 – Cross Section, UV Fluorescence

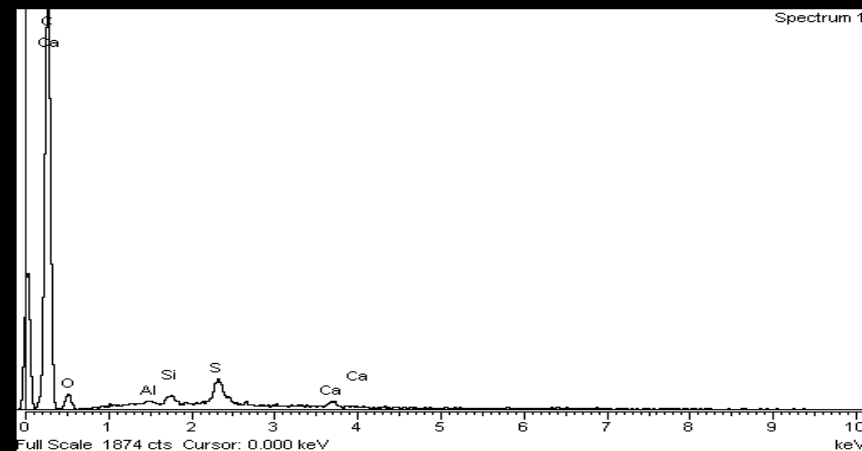


Sample 7 – Cross Section, SEM back scattered electron image

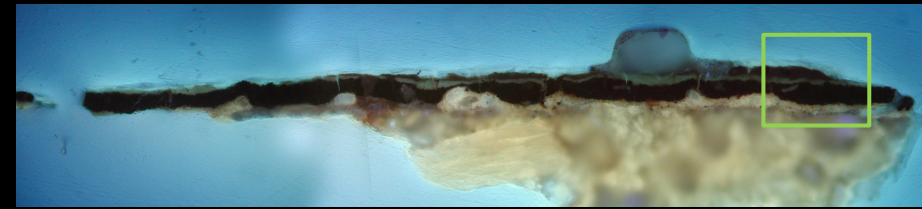
Brown Layer – Point 4: CARBON BLACK (C)



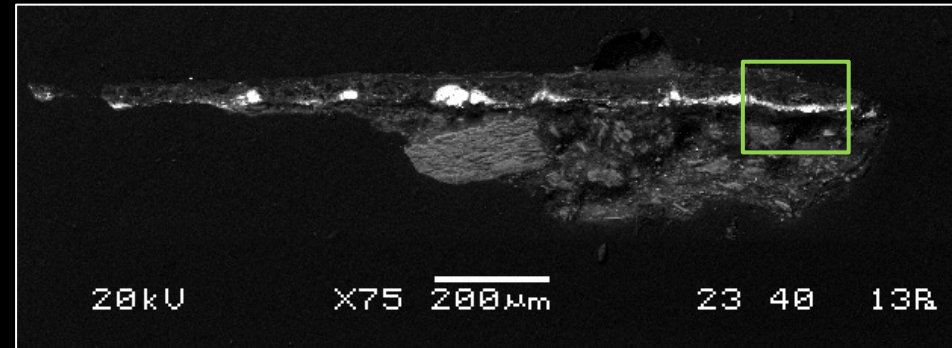
Sample 7 – Cross Section, SEM. Point 4 Microanalysis



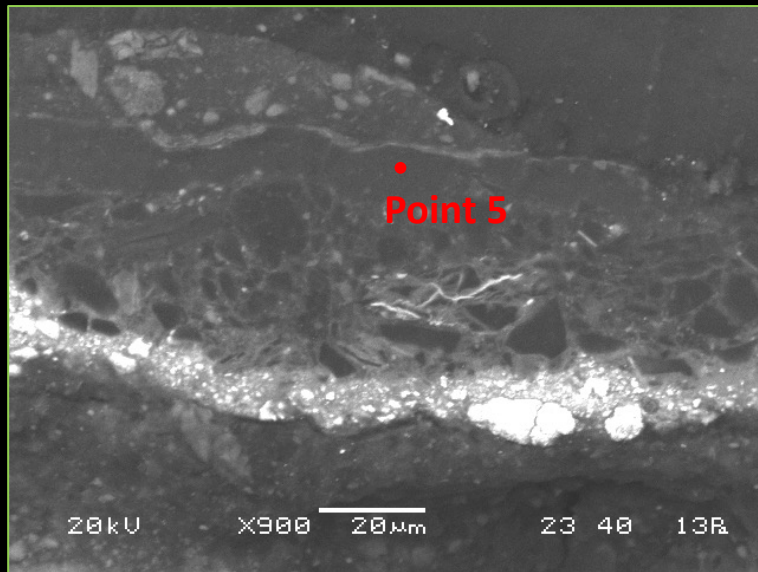
Sample 7 – Cross Section, SEM – EDS. Microanalysis



Sample 7 – Cross Section, UV Fluorescence

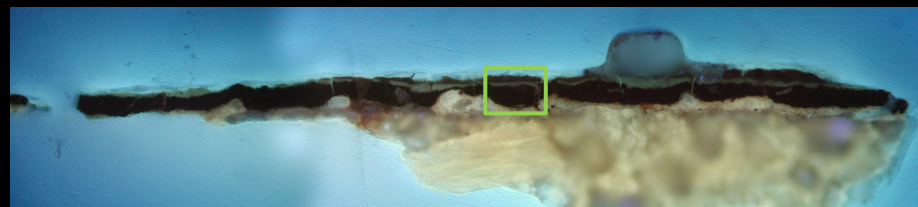


Sample 7 – Cross Section, SEM back scattered electron image

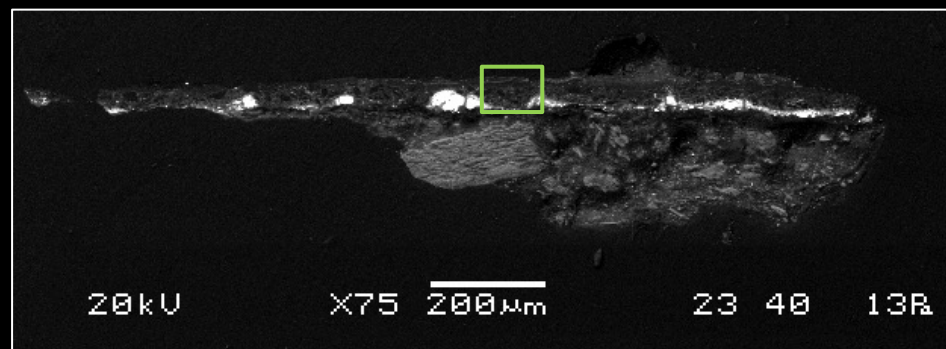


Sample 7 – Cross Section, SEM. Point 3 Microanalysis

CARBON BASED LAYER (Carbon 78%) :
Organic Layer

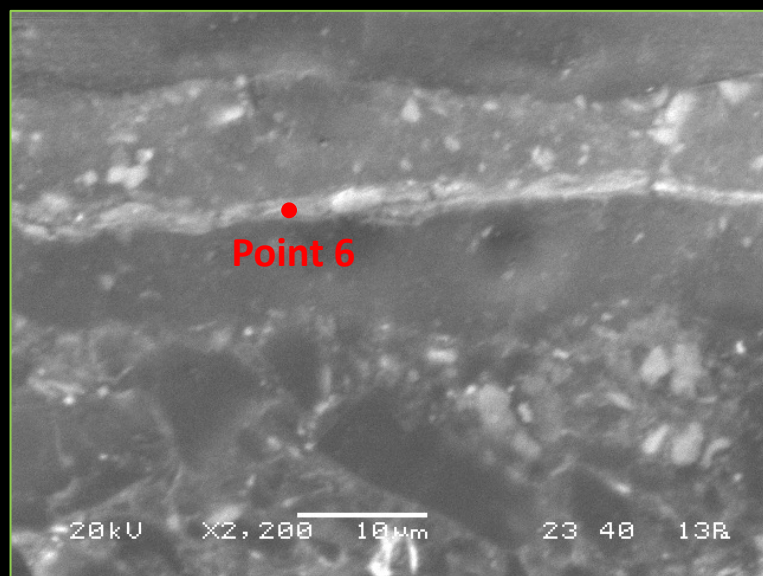


Sample 7 – Cross Section, UV Fluorescence

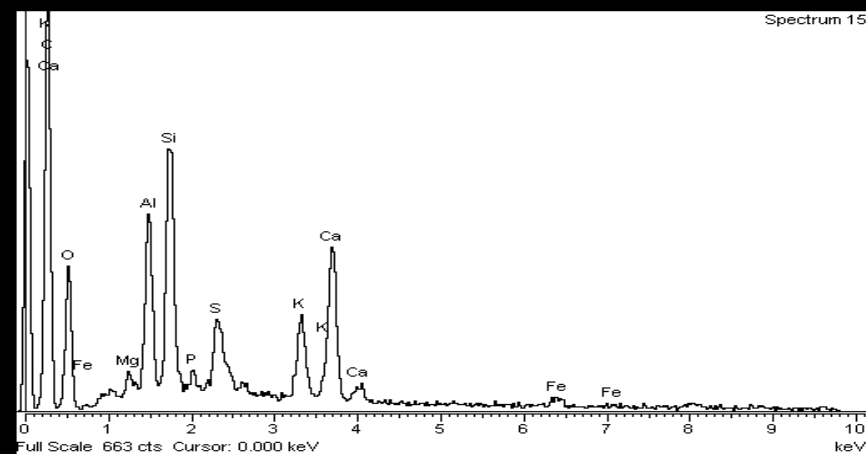


Sample 7 – Cross Section, SEM back scattered electron image

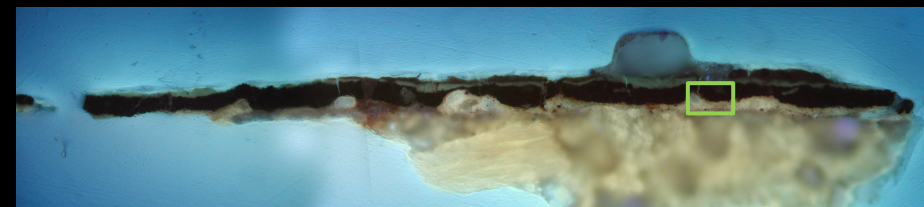
Brown Layer – Point 6: EARTH PIGMENTS (Mg, Al, Si, K) and BONE BLACK ($\text{Ca}_3(\text{PO}_3)_4$)



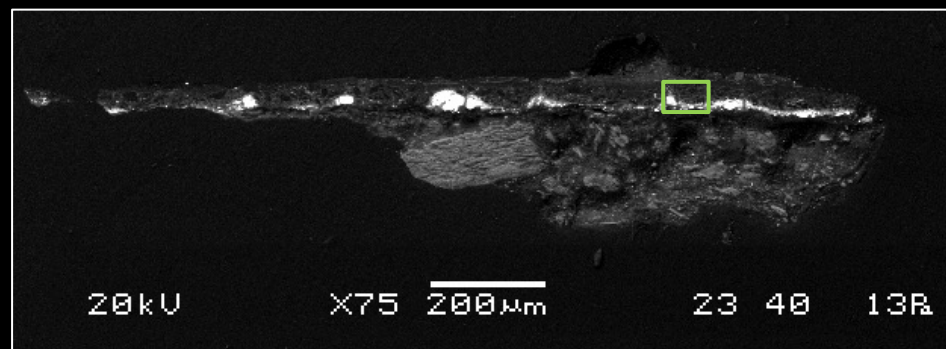
Sample 7 – Cross Section, SEM. Point 9 Microanalysis



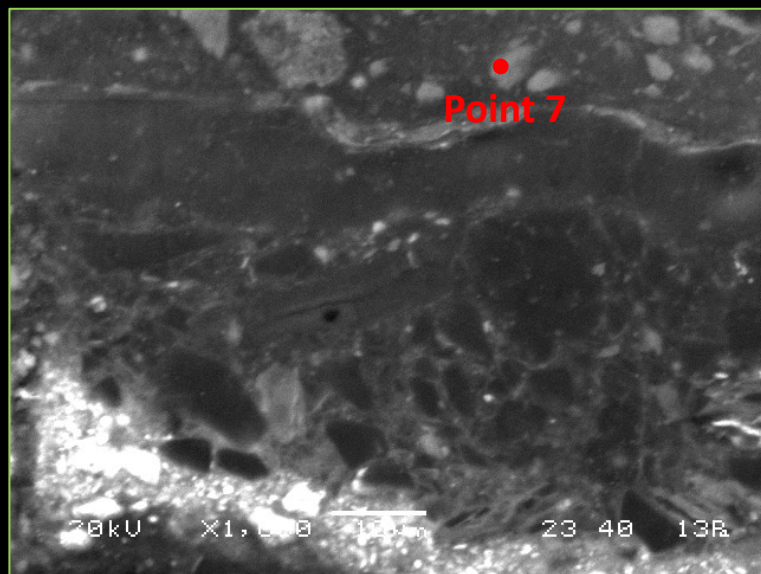
Sample 7 – Cross Section, SEM – EDS. Microanalysis



Sample 7 – Cross Section, UV Fluorescence

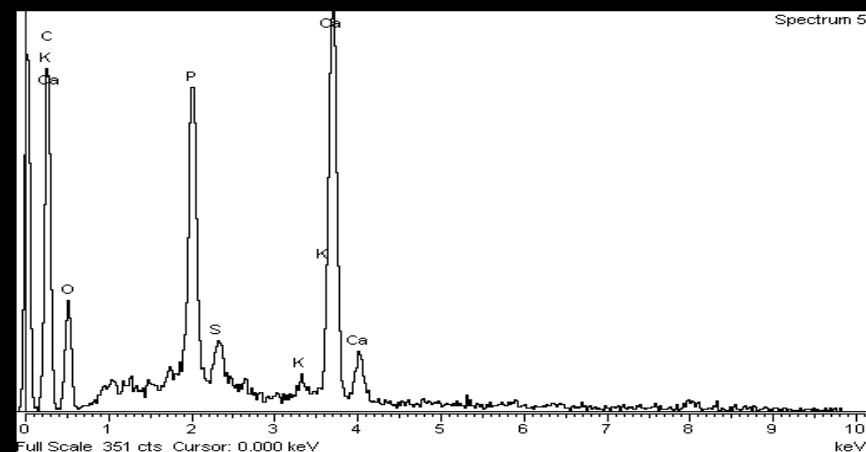


Sample 7 – Cross Section, SEM back scattered electron image

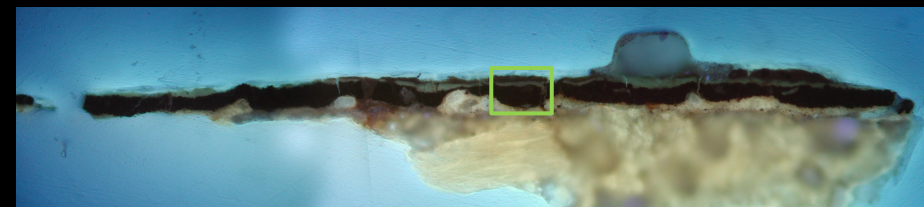


Sample 7 – Cross Section, SEM. Point 12 Microanalysis

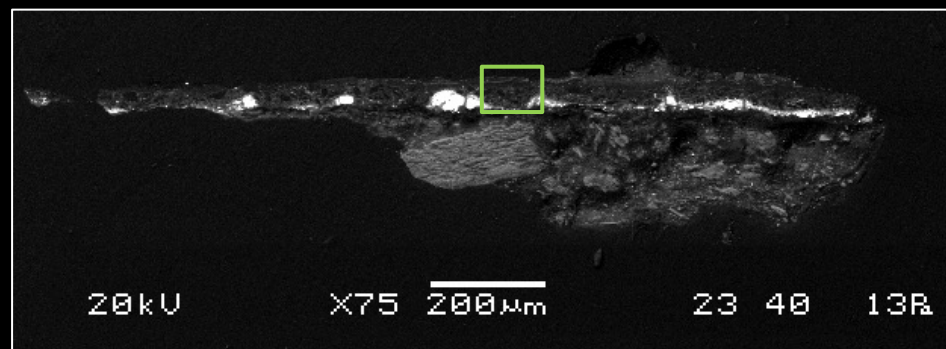
Brown Layer – Point 7: BONE BLACK
($\text{Ca}_3(\text{PO}_3)_4$)



Sample 7 – Cross Section, SEM – EDS. Microanalysis



Sample 7 – Cross Section, UV Fluorescence

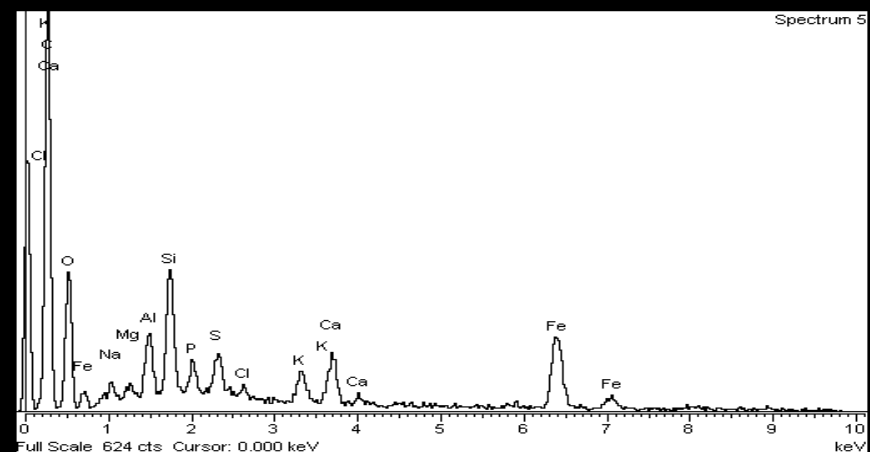


Sample 7 – Cross Section, SEM back scattered electron image

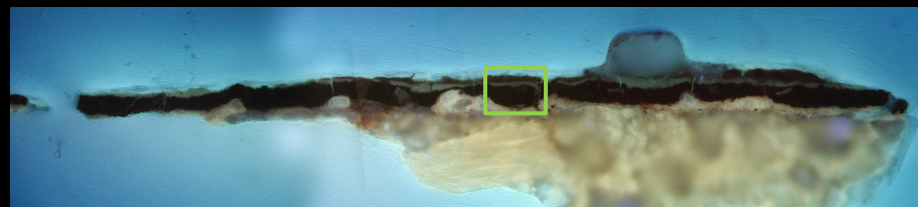
Brown Layer – Point 8: NATURAL EARTH PIGMENTS (Mg, Al, Si, K, Fe)



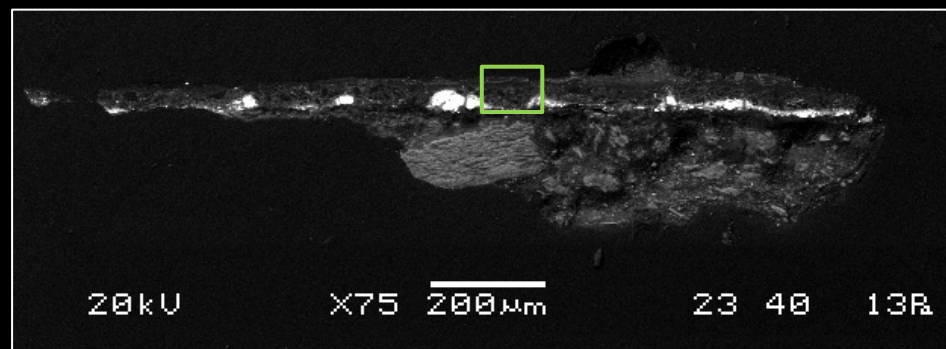
Sample 7 – Cross Section, SEM. Point 14 Microanalysis



Sample 7 – Cross Section, SEM – EDS. Microanalysis



Sample 7 – Cross Section, UV Fluorescence

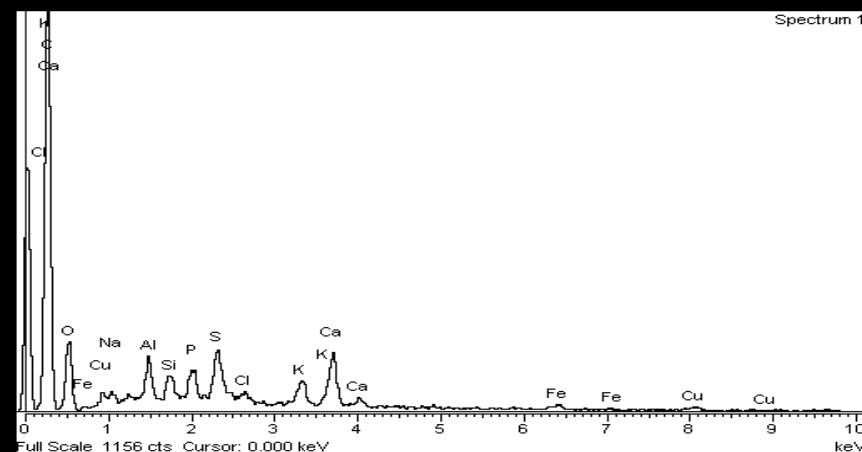


Sample 7 – Cross Section, SEM back scattered electron image

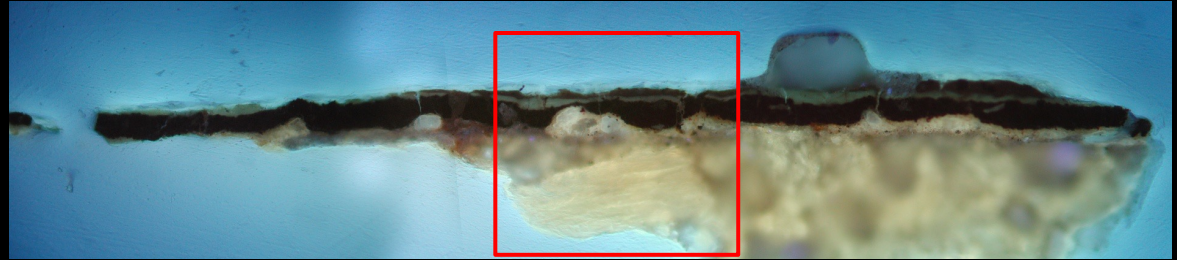


Sample 7 – Cross Section, SEM. Area 3 Microanalysis

Brown Layer – Area 3: NATURAL EARTH PIGMENTS (Mg, Al, Si, K, Fe) and BONE BLACK ($\text{Ca}_3(\text{PO}_3)_4$)



Sample 7 – Cross Section, SEM – EDS. Microanalysis



Sample 7 – Cross Section, UV Fluorescence

7 Varnish

6 Brown Layer Natural Earth Pigments and Bone Black

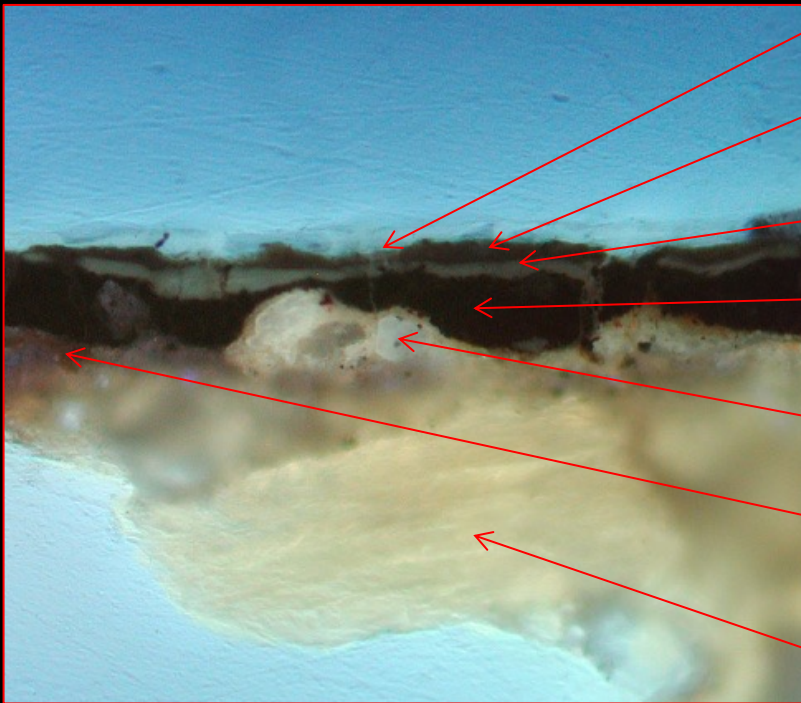
5 Varnish

4 Brown Layer Natural Earth Pigments and Carbon Black

3 White Layer Lead White

2 Light Brown Layer Gesso and Natural Earth Pigments

1 Ground Layer Gesso



Sample 7 – Cross Section, UV Fluorescence, Detail

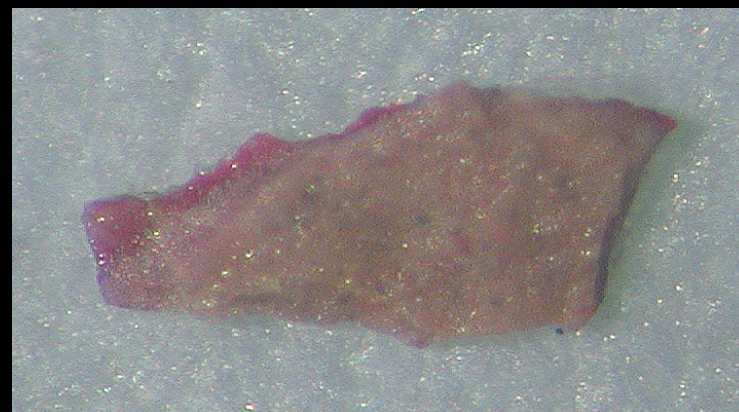
DROP OF BLOOD



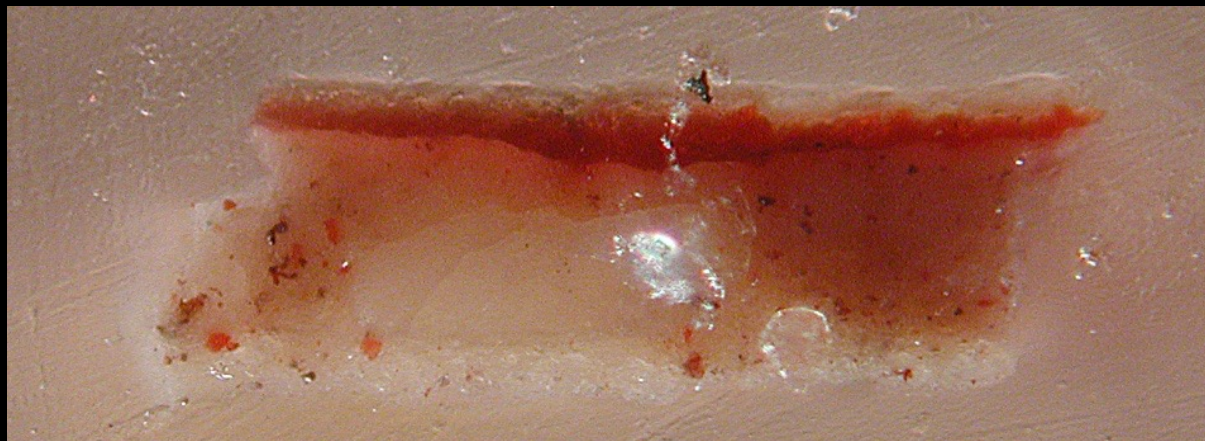
Sample 8 Location



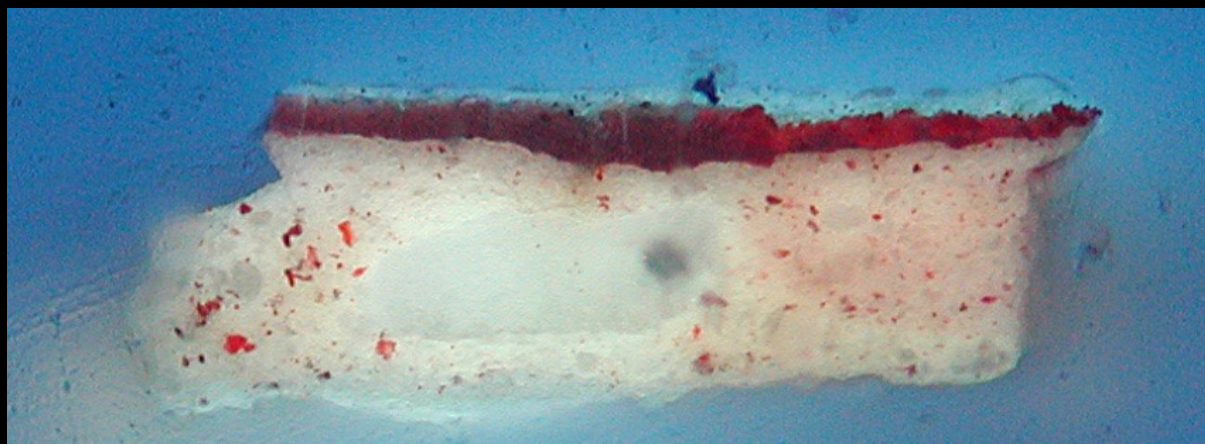
Sample 8 – Stereomicroscopy image. Front



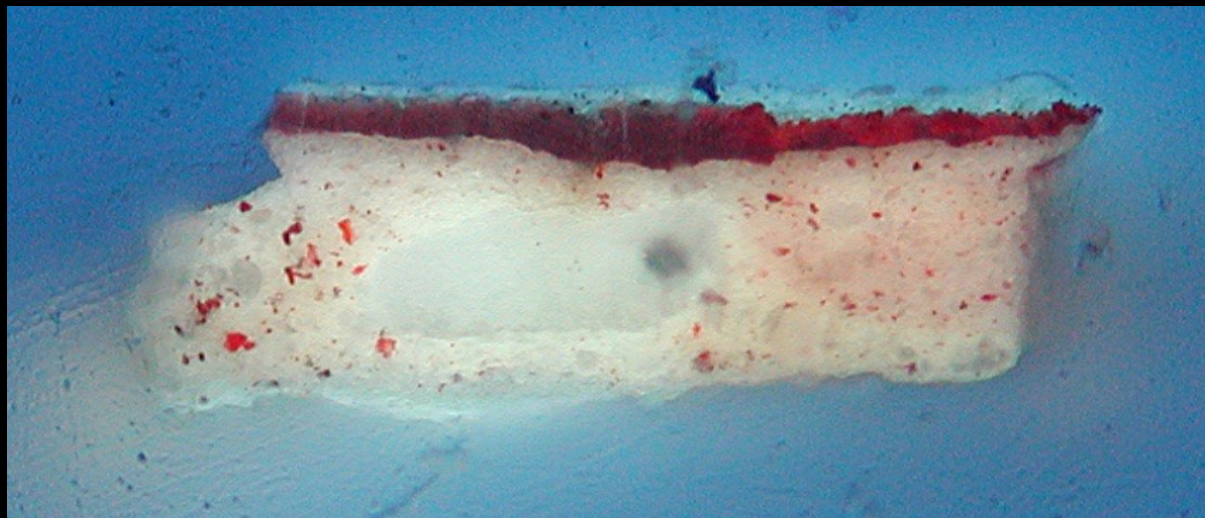
Sample 8 – Stereomicroscopy image. Back



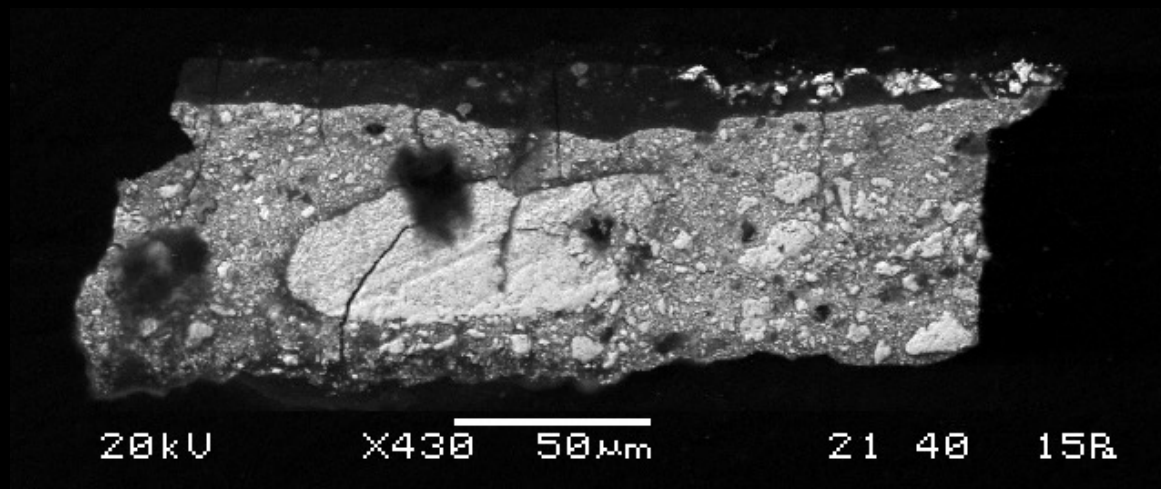
Sample 8 – Cross Section, Reflected Light



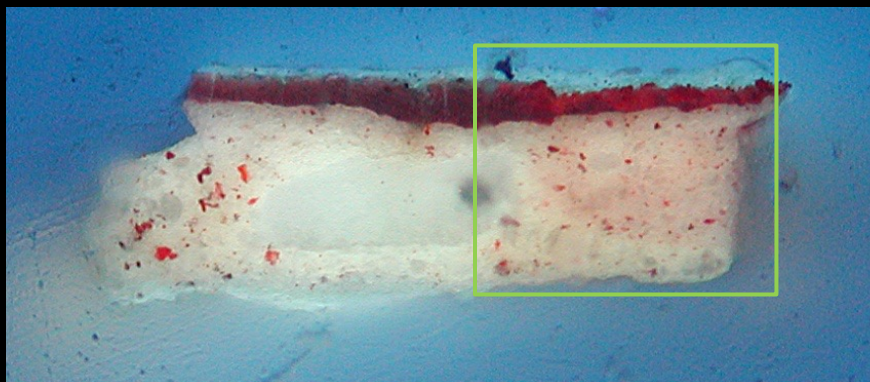
Sample 8– Cross Section, UV Fluorescence



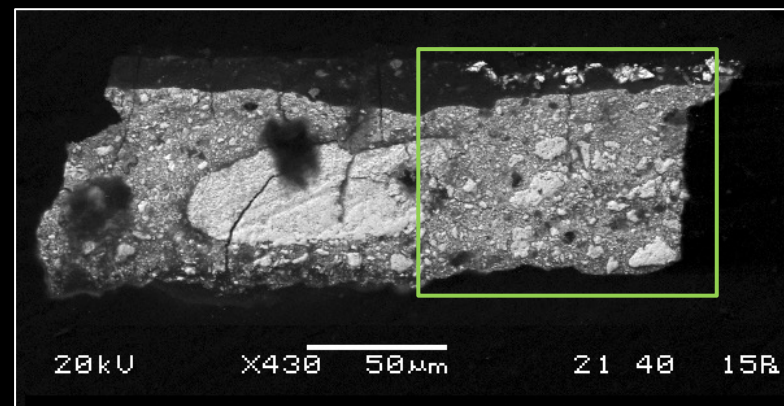
Sample 8– Cross Section, UV Fluorescence



Sample 8 – Cross Section, SEM back scattered electron image



Sample 8– Cross Section, UV Fluorescence

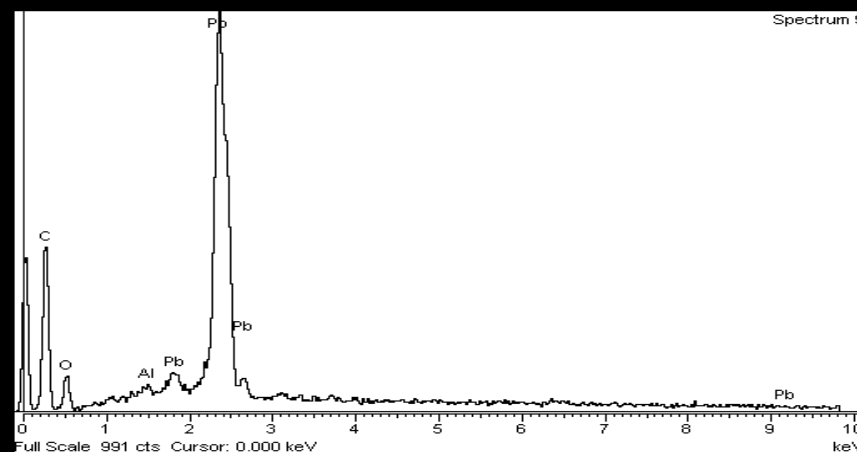


Sample 8 – Cross Section, SEM back scattered electron image

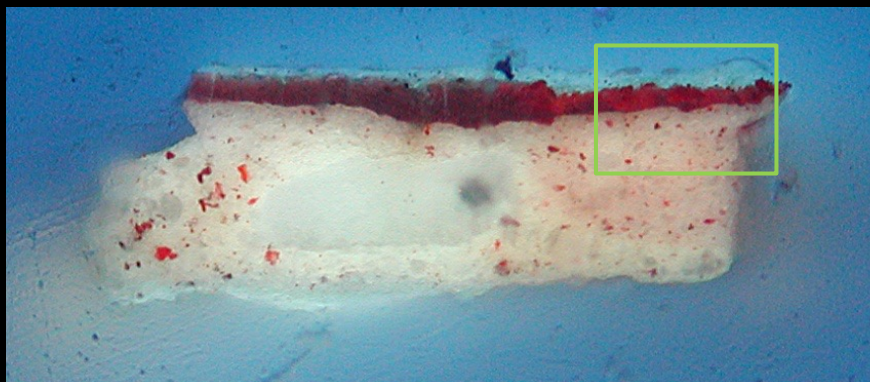


Sample 8 – Cross Section, SEM. Area 1 Microanalysis

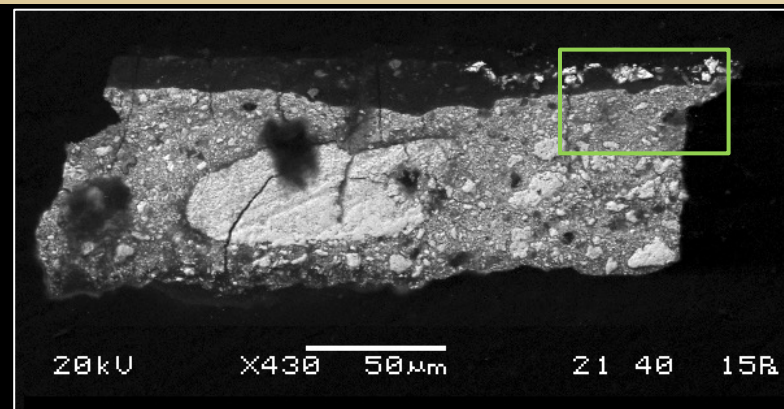
White Layer – Area 1: LEAD WHITE($2\text{PbCO}_3 \cdot \text{Pb(OH)}_2$)



Sample 8 – Cross Section, SEM – EDS. Microanalysis

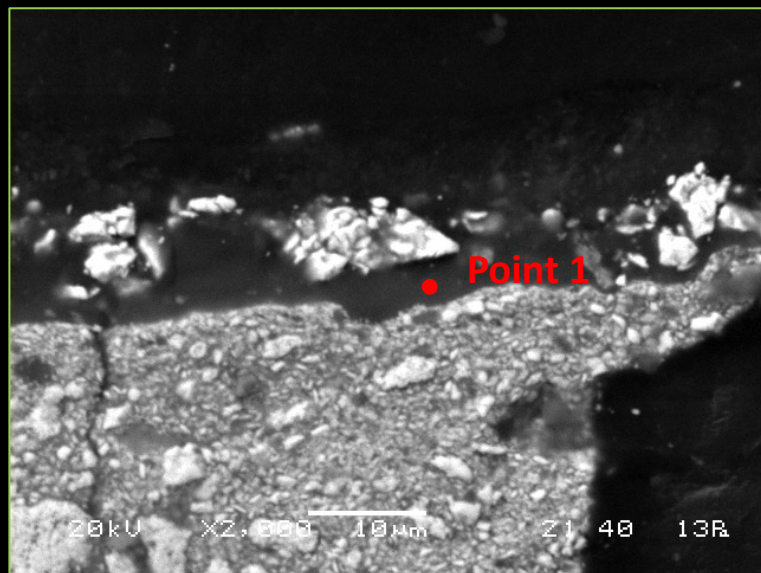


Sample 8– Cross Section, UV Fluorescence

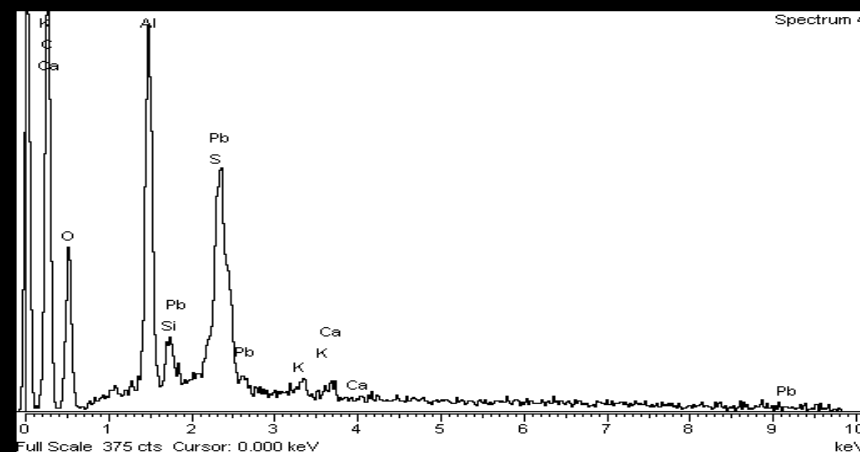


Sample 8 – Cross Section, SEM back scattered electron image

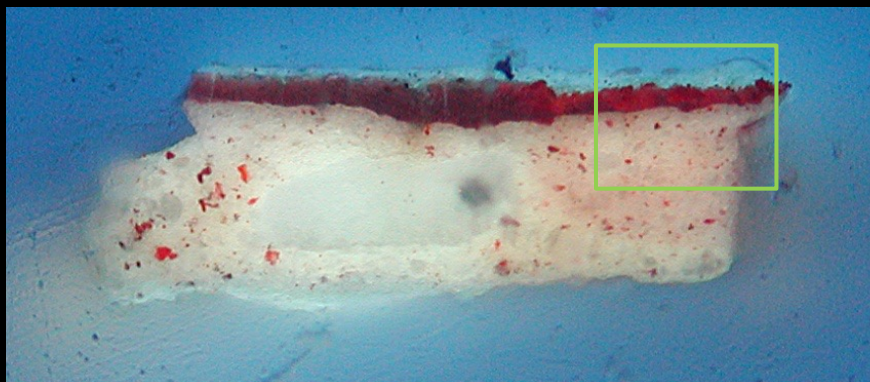
Red Layer – Point 1: READ LAKE (Al and Si)



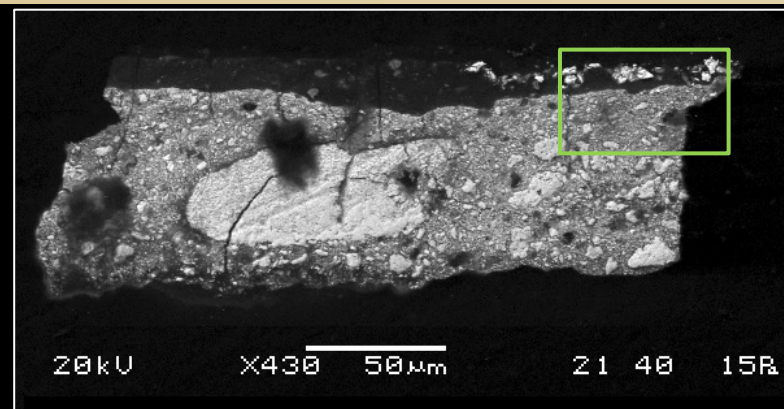
Sample 8 – Cross Section, SEM. Point 1 Microanalysis



Sample 8 – Cross Section, SEM – EDS. Microanalysis



Sample 8– Cross Section, UV Fluorescence

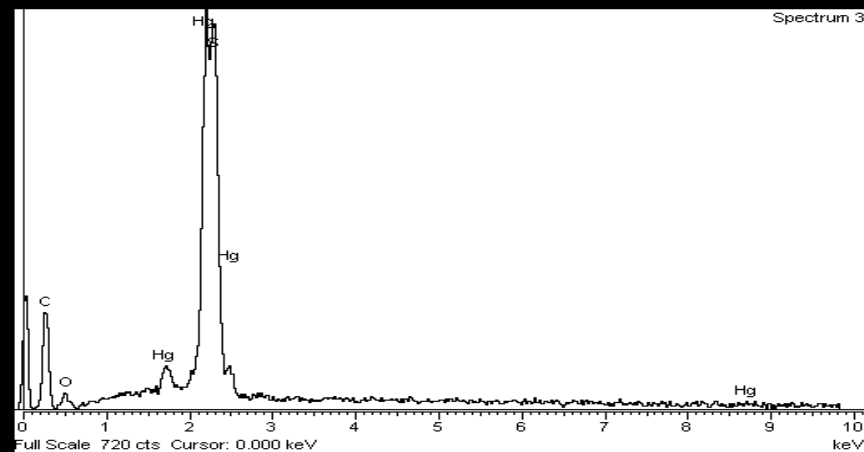


Sample 8 – Cross Section, SEM back scattered electron image

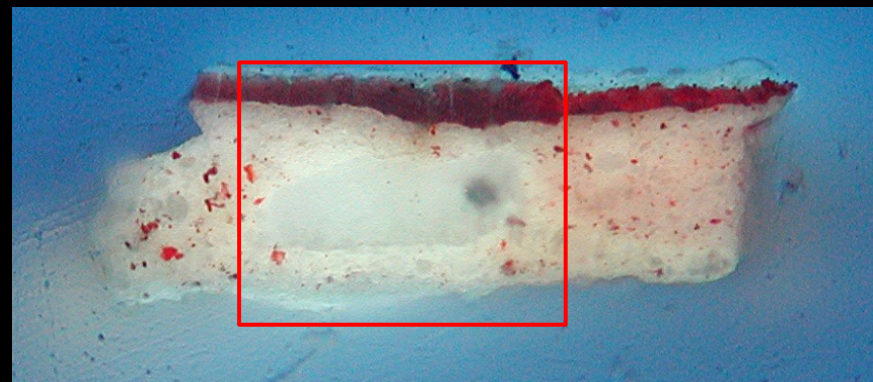
Red Layer – Point 3: Vermilion (HgS)



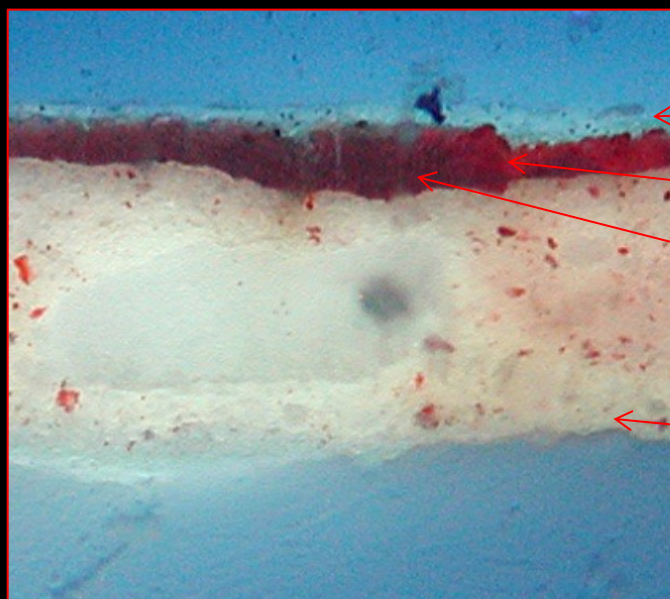
Sample 8 – Cross Section, SEM. Point 3 Microanalysis



Sample 8 – Cross Section, SEM – EDS. Microanalysis



Sample 8– Cross Section, UV Fluorescence



4 Varnish

3 Red Layer **Vermilion**

2 Red Layer **Red Lake**

1 White Layer **Lead White**

Sample 8– Cross Section, UV Fluorescence, Detail



Materials

Support:

Poplar

Ground:

Gesso (Calcium Sulphate)

Color Layers:

Lead White, Natural Earth Pigments, Cinnabar, Verdigris, Lead Tin Yellow, Red Lake, Carbon Black, Bone Black

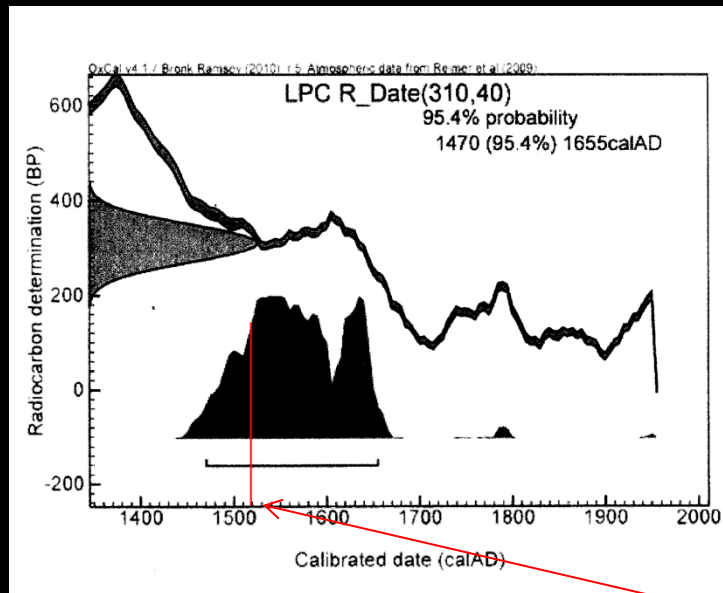
Binder:

Oil

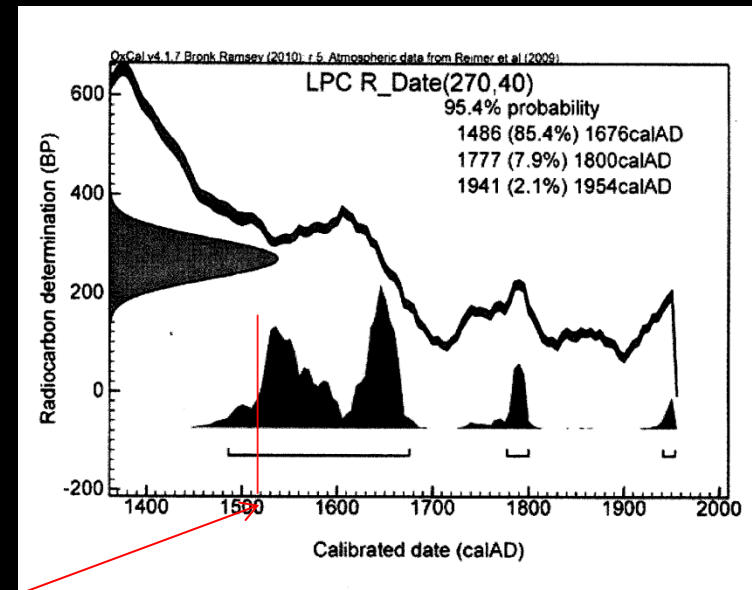
Historical note on LEAD TIN YELLOW:

Used until the 18th century, but more common in the 15th to the 17th century. Fell into use in the 1750s. Reintroduced in the 1940s it is still in use today.

Lyon



Zurich



Leonardo's Da Vinci's death (1519)

Probability:

68,2%

1516-1598 AD. 51,6%

1618-1644 AD. 16,6%

95,4 %

1470-1654 AD

Probability:

68,2%

1522-1572 AD. 31,7%

1630-1666 AD. 31,0%

1784-1795 5.5%

95,4 %

1486-1676 AD. 85,4%

1777-1800 AD. 7,9%

1941-1954 AD. 2,1%