Appendix II

SEM/EDX analysis

Scanning electron microscopy combined with energy-dispersive X-ray micro-analysis (SEM/EDX). Backscatter images and EDX spot and area measurements. The SEM-EDX measurements are executed on a SFEG XL30 electron microscope of FEI (Eindhoven) with EDX detector and EDAX software (Tilburg) (AMOLF). On the basis of the morphology of the parts in the backscatter image together with the composition of the elements, most 17-century pigments can be analysed.

1. Ground layer

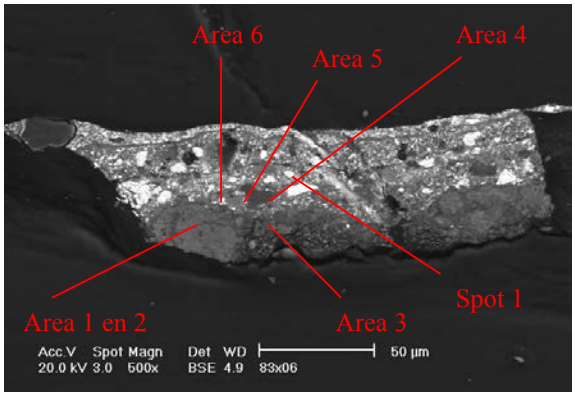


Image 3

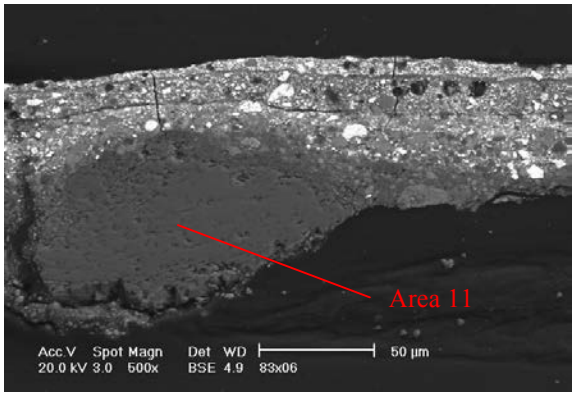
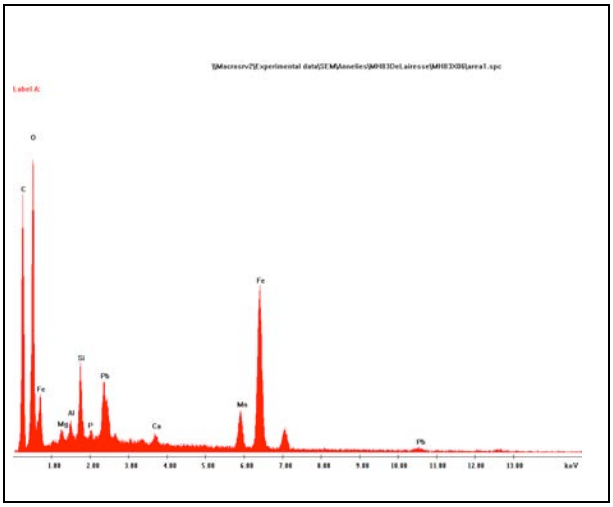


Image 7



EDX-spectrum of Area 1: Fe, Mn, Si, Pb, Al, Mg, Na, P, Cl, K, Ca

Paint cross-section 18, SEM/EDX backscatter images, overall measurements and spottings.

Area 1: large brown particle in first ground layer: Fe, Mn, Si, Pb, Al, Mg, Na, P, Cl, K, Ca
Umber
Area 2: large brown particle in first ground layer: Fe, Si, Pb, Ca, Mn, Al, Mg, (P, K, Cl)
Umber
Area 3: matrix between large umber particle and first ground layer: Ca, Si, Pb, Fe, Mg, Al, P, K, Mn
Chalk and umber
Area 4: second ground layer overall: Pb, Ca, Fe, Mn, Si, Al, Mg, (K, P)
Lead white, chalk and umber
Area 5: transparent particle in second ground layer: Ca, (Pb), C, O
Chalk
Spot 1: white particle in second ground layer: Pb, C, O
Lead white
Area 6: brown particle in second ground layer: Pb, Fe, Si, Ca, Mn, Al, Mg
Umber
Area 11: large transparent particle in first ground layer: Ca, C, O
Chalk

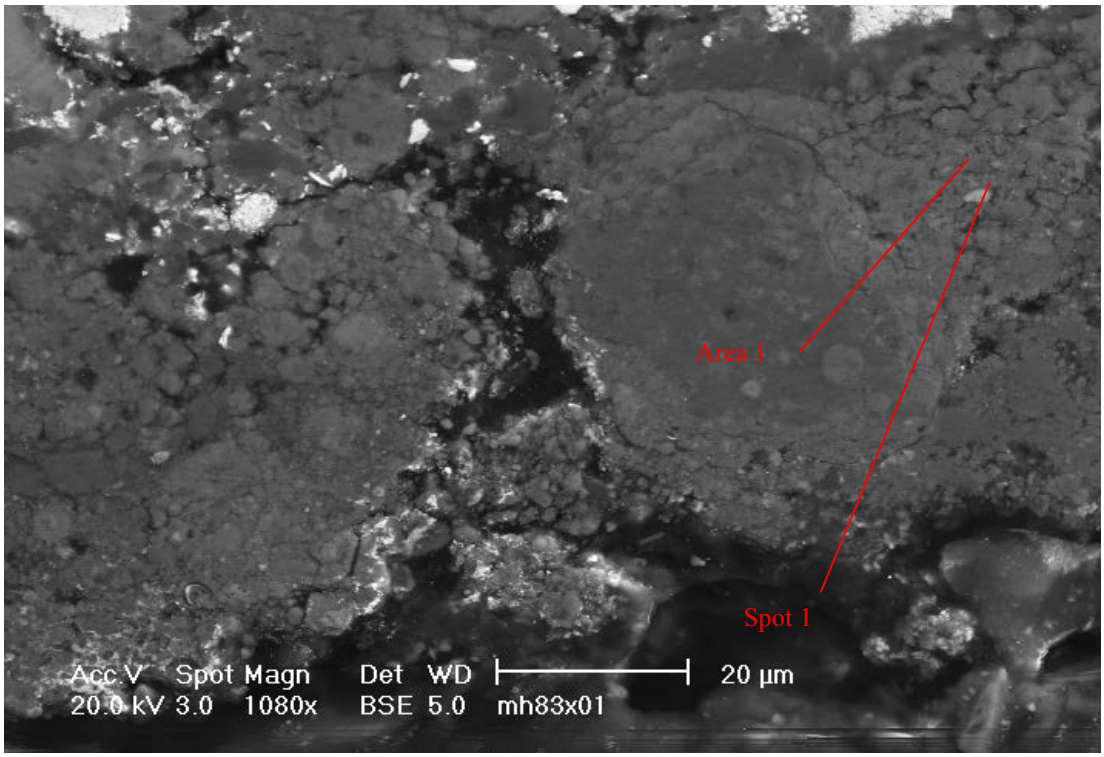


Image 2

Paint cross-section 1, SEM/EDX backscatter images, overall measurements and spottings.
Spot 1: probably red particle in first ground layer: Fe, Si, Pb, Ca, P, Al, Mg, K
Red earth pigment?
Area 1: area of spot 1: Fe, Si, Pb, Ca, P, Al, Mg, K
Earth pigment

2. Pigments in the flesh colour of Bacchus

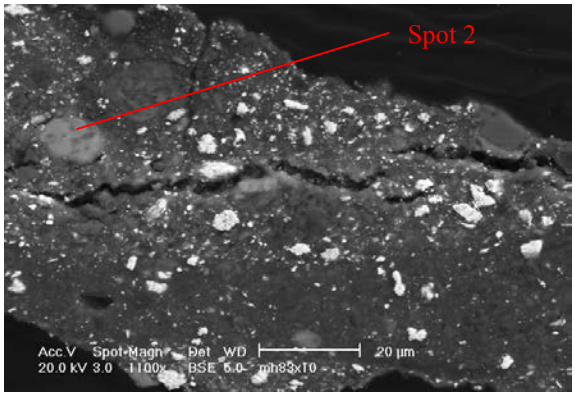


Image 2

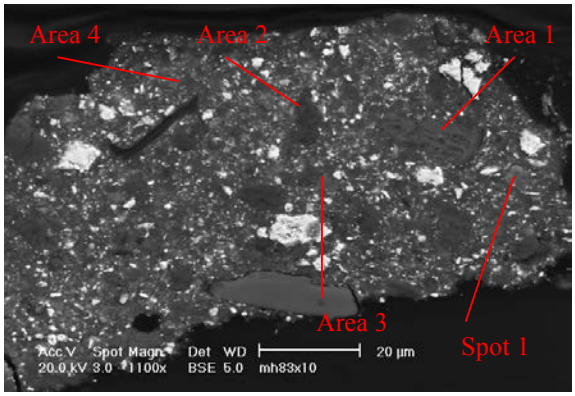
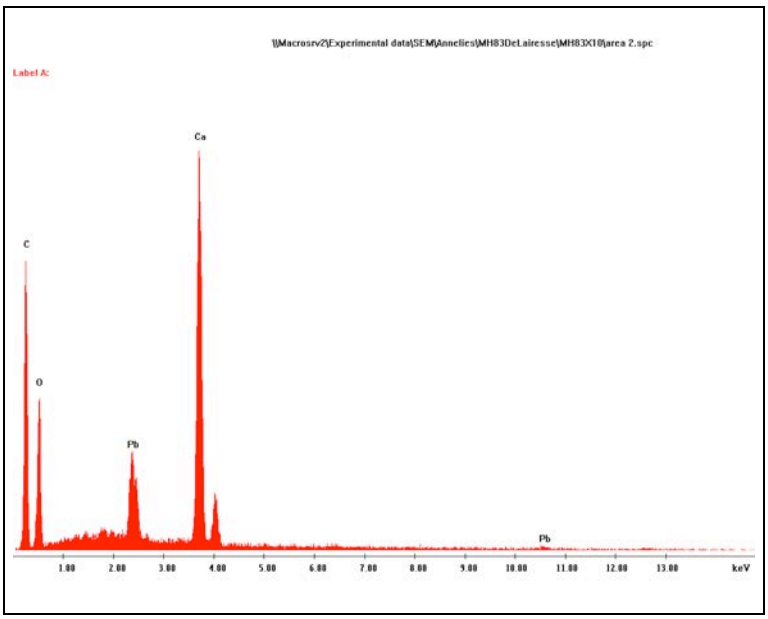


Image 4



EDX-spectrum of Area 2: Ca, Pb

Paint cross-section 4, SEM/EDX backscatter images, overall measurements and spottings.
Area 1: pink red particle in top pink flesh colour layer: Al, Pb/S, K, Ca
Red lake on aluminum substrate
Area 2: transparent particle in top pink flesh colour layer: Ca, Pb
Chalk
Area 3: brown particle in bottom pink flesh colour layer: Pb, Al, Si, K, Ca, Fe (Mg, Na, Cl)
Earth pigment
Area 4: red particle in top pink flesh colour layer: Pb, Al, Si, Ca, Fe (K)
Earth pigment
Spot 1: brown particle in top pink flesh colour layer (as in area 3): Pb, Ca, Fe, Al, Si, K, Mg
Earth pigment
Spot 2: transparent particle in bottom pink flesh colour layer (links): Pb, C
Saponified lead white particle?

3. Pigments in the flesh colour of Ariadne

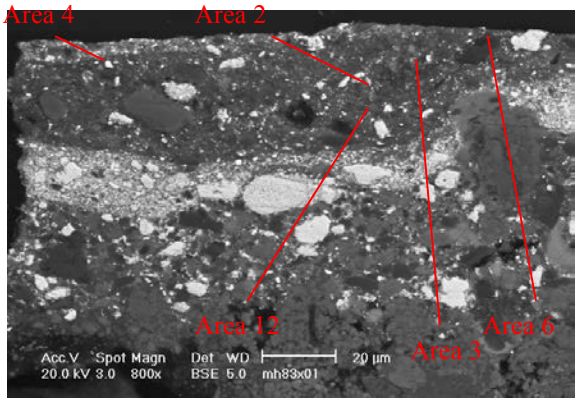


Image 3

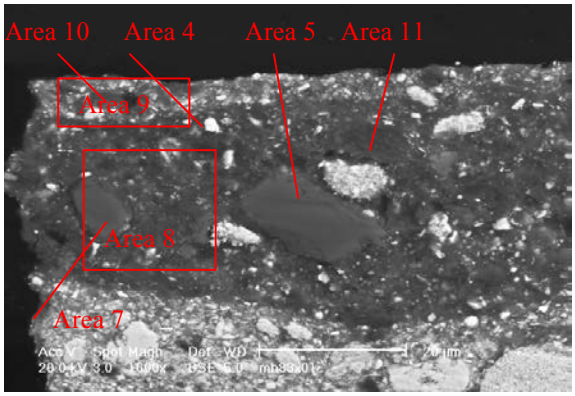
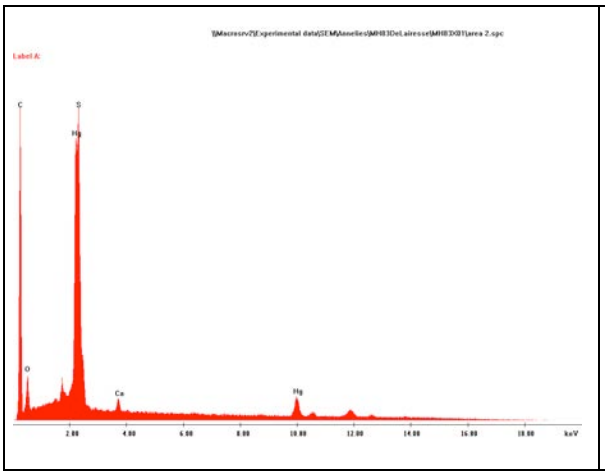
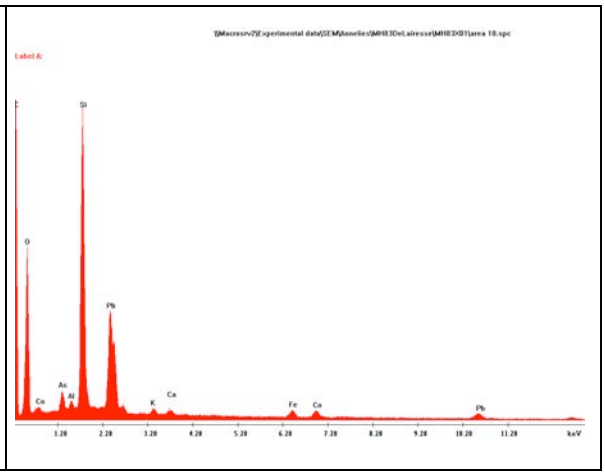


Image 4

Paint cross-section 1, SEM/EDX backscatter images, overall measurements and spottings.
Area 2: a red particle in the second layer: Hg, S, (Pb, Ca)
Vermilion
Area 3: red particle in the second layer: Hg, S, (Pb, Ca)
Vermilion
Area 4: red particle in the second layer: Hg, S, (Pb, Ca)
Vermilion
Area 5: transparent particle in the second layer: Ca, P
Calcium phosphate/bone white
Area 6: transparent particle in the second layer: Si, O
Silicate/Quartz particle. Filling?
Area 7: red particle in the second layer: Al, Pb/(S), K, (Ca)
Red lake on aluminum substrate
Area 8: flesh colour overall second layer: Pb, Ca, Al, Si, K, Ti, Fe
Lead white and chalk
Area 9: flesh colour top layer: Pb, Si, Ca, (K, Fe, Co, As, Al)
Lead white and chalk
Area 10: particle in top layer: Si, Pb, As, Al, K, Ca, Fe, Co, (Ni)
Discoloured: low K%
Area 11: yellow particle in the second layer: Al, Si, Pb, K, Ca, Fe
Yellow ocher
Area 12: black particle in the second layer: P, Ca, Pb, (Mg, Al, Si, Fe, K)
Bone black
Area 13: under paint flesh colour – red particle in lead white matrix: Hg, S, Pb
Vermilion and lead white



EDX-spectrum of Area 2: Hg, S, (Pb, Ca)



EDX-spectrum of Area 10: Si, Pb, As, Al, K, Ca, Fe, Co, (Ni)

4. Discoloration of purple garment

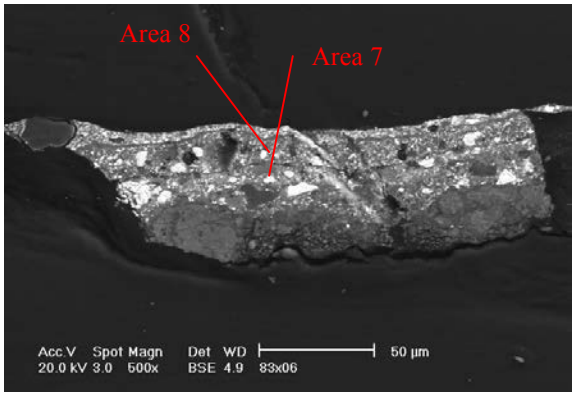


Image 3

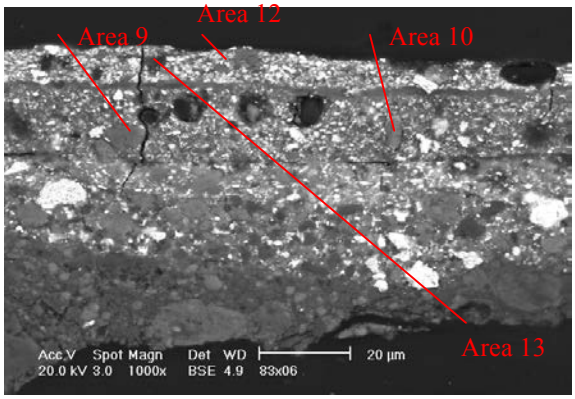


Image 11

Paint cross-section 18, SEM/EDX backscatter images, overall measurements and spottings.
Area 7: black particle in layer 3: Pb, P, Ca, Mg
Bone black and lead white
Area 8: red particle in layer 4: Pb, Si, Al, Fe, Ca
Red ocher, lead white
Area 9: transparent pink red particle in layer 4: Al, Pb/S, K (no S?)
Red lake on aluminum substrate
Area 10: transparent pink red particle in layer 4: Pb/S, Al, K
Area 12: black particle in layer 5: P, Ca, Pb, Mg
Bone black
Area 13: transparent pink red particle in layer 5: Al, Pb/S (P, K, Ca)
Red lake on aluminum substrate

7. Transparent blue overpaint

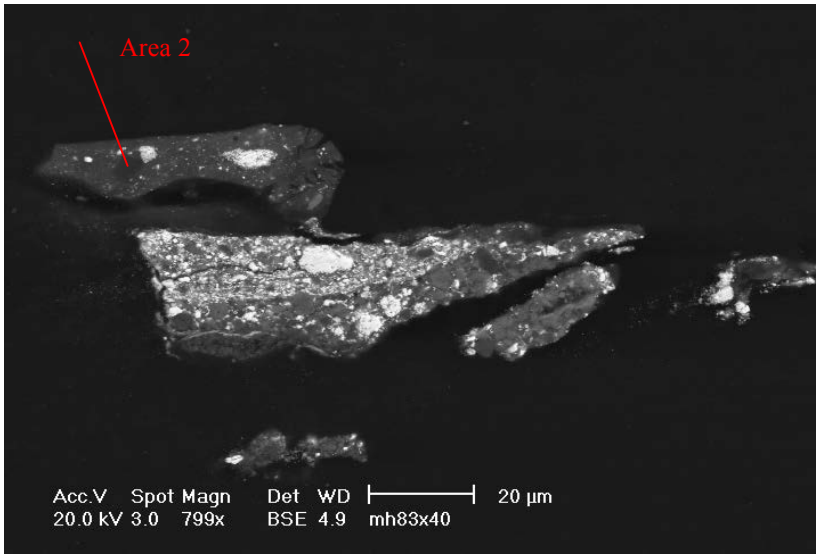


Image 1

Paint cross-section 11, SEM/EDX backscatter images, spotting.
Area 2: blue particle in transparent blue overpaint: Al, Fe, Si, P, Pb, K, Ca, N

Prussian blue with alum substrate and lead white. The N of the cyan group (CN) of Prussian blue is visible in the spectrum.

8. Original blue layer in sky area

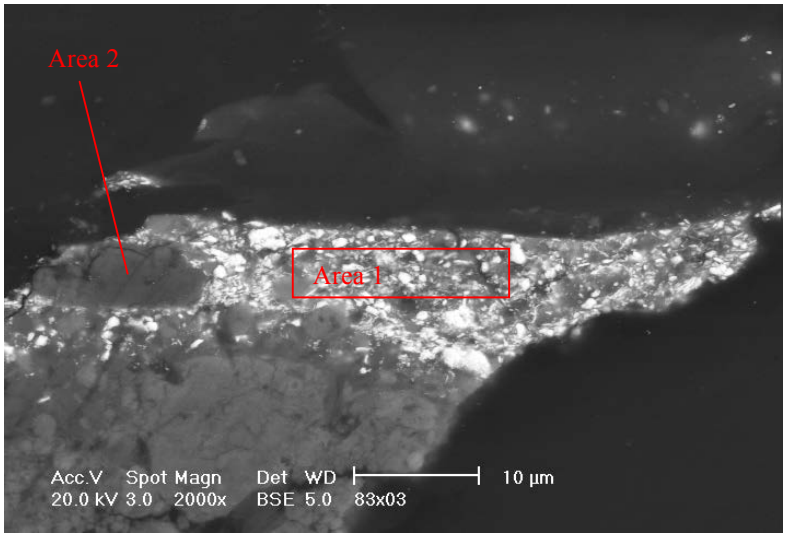


Image 3

Paint cross-section 10, SEM/EDX backscatter images, overall measurements.
Area 1: blue layer overall: Pb, Ca, Si, Fe, Al
Lead white, little chalk, probably indigo
Area 2: large transparent particle in blue layer: Ca, C, O
Chalk

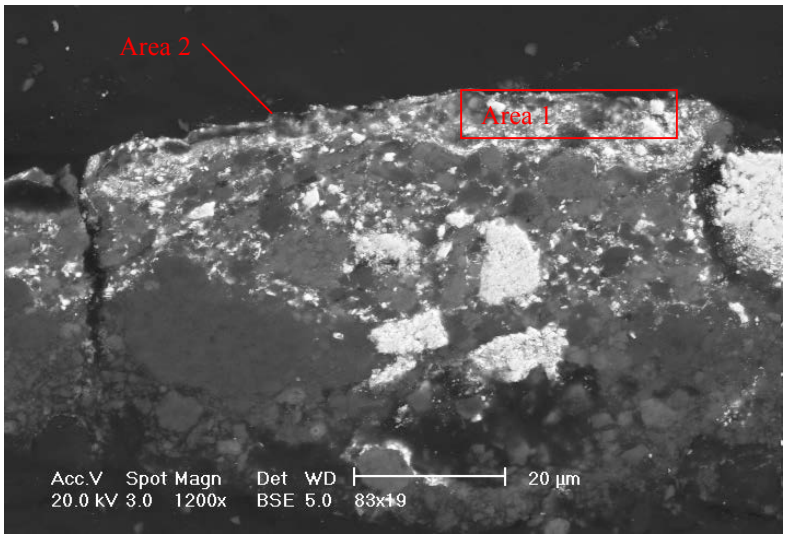
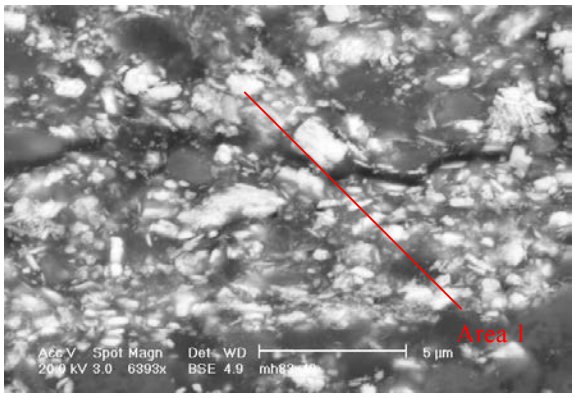


Image 5

Paint cross-section 12, SEM/EDX backscatter images, overall measurements.
Area 1: blue paint layer overall: Pb, Ca, Fe
Mostly lead white, little chalk, probably indigo
Area 2; blue paint layer top: Pb, Si, Ca, Fe
Silicium derives probably from polishing



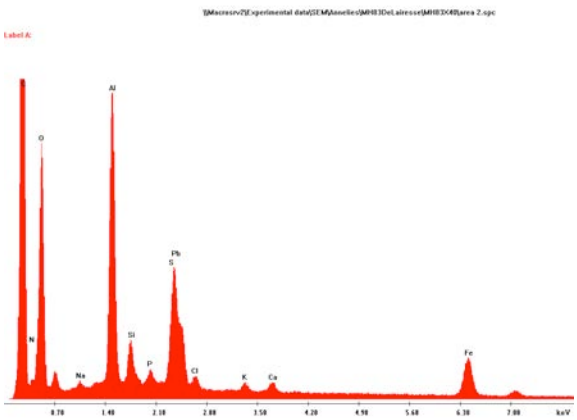


Image 2

EDX-spectrum of Area 2

Paint cross-section 11, SEM/EDX backscatter image, overall measurement.
Area 1: red particle in the indigo layer: Hg, S, Pb
Vermilion