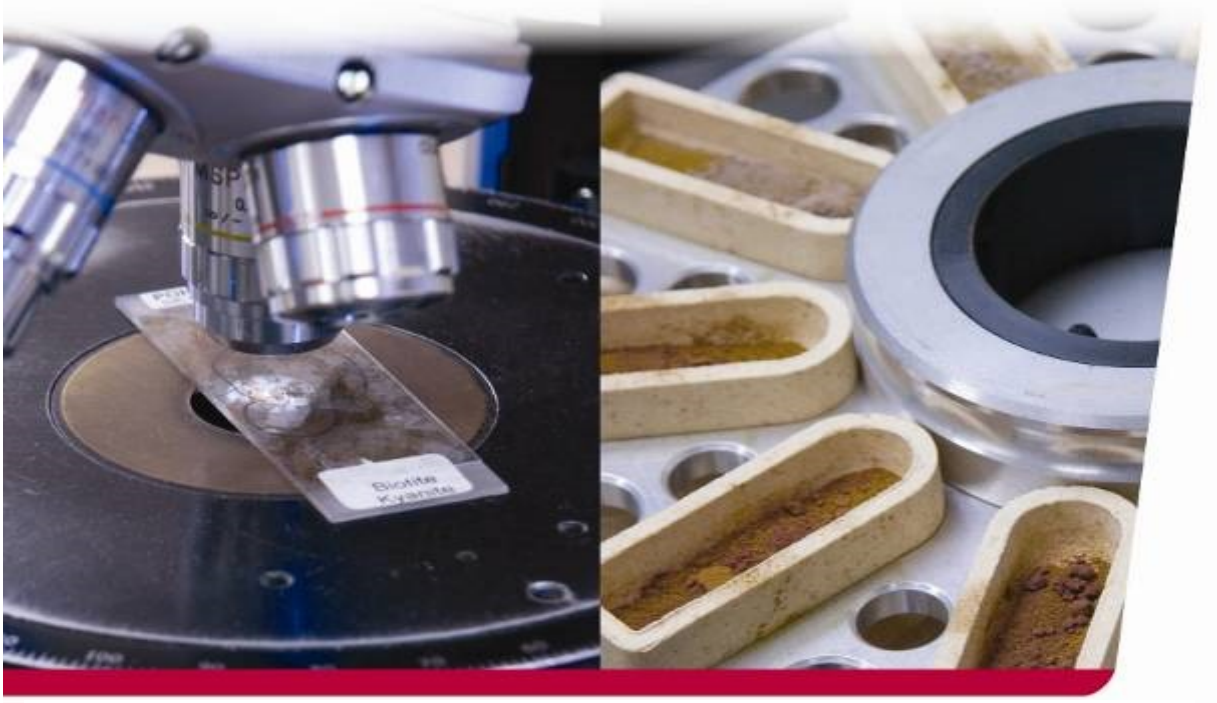
BUREAU VERITAS

MINERAL LABORATORIES



MINERALOGY REPORT: N7382XD16

XRD & SEM ANALYSIS OF ONE DUST SAMPLE

CLIENT: EPA

CLIENT DETAILS

Company	Environment Protection Authority (EPA)
Address	Building 22/310 Richmond Road, Netley, S.A. 5037, AUSTRALIA

The EPA submitted 1 dust sample on a filer paper, as well as a blank filter paper for XRD and SEM analysis. Please see below table for sample information

Sample	**BV ID**	**XRD**	**SEM/EDS**
AB9183	AB9183	1	1
Blank	Blank	1	N/A
TOTAL		2	1

Note: Non-hazardous samples will be automatically disposed of after 3 months; hazardous samples will be automatically returned to the client, at the client expense, after 3 months, unless otherwise advised by the client.

QXRD Analyses

25mm circles were cut from both the sample filter paper as well as blank filter and stuck to a piece of aluminium prior to be placed into the XRD holder. The XRD trace was collected under the following instrument conditions.

XRD system	PANalytical X'Pert Pro PW3040 diffractometer, 40 kV, 40 mA
Filter	Iron
Radiation	CoKa (l = 1.789Å)
Angular range	5° to 80° 2θ
Angular speed	0.04426° 2θ/second
Step size	0.0167°
Divergence Slit	¼°
Anti-scatter Slit	½°
Spinning	0.50 second per revolution

Mineral identification was undertaken using the X'Pert HighScore Plus search/match software.

A high degree of uncertainty exists when determining trace minerals (<5 wt%) by XRD. This is due to the relatively high background noise which tends to obscure minor peaks, which are required for a positive identification of a particular mineral. X-Ray Diffraction (XRD) analysis provides information on the presence and abundance of crystalline mineral phases in a sample. XRD is unable to identify amorphous (non-crystalline) material.

SEM Analyses

The sample was mounted using a double sided carbon tab; circles were cut from the sample filter paper and on the double sided carbon tab. The sample block was coated with carbon prior to SEM analysis.

SEMEDS cannot measure elements below Sodium, in particular Oxygen, Carbon and Hydrogen. It must also be noted that the energies of the characteristic X-rays emitted by the elements in a sample allow them to be identified however there are many overlapping peaks from different elements, such as S, Mo and Pb. Thus the chemical composition data presented should be treated as indicative only.

The EDS results are calculated using standardless ZAF correction on the basis of peak-to-background ratios including light elements (data is normalised to 100%)

The electron beam used to create x-ray can penetrate 2-5 microns depending on the material being analysed. Textures of more than one mineral that has a texture less than 5 microns, will obtain a mixed spectrum.

Reported by:

Mineralogy Supervisor
Bureau Veritas Australia Pty Ltd

QUALITATIVE XRD RESULTS

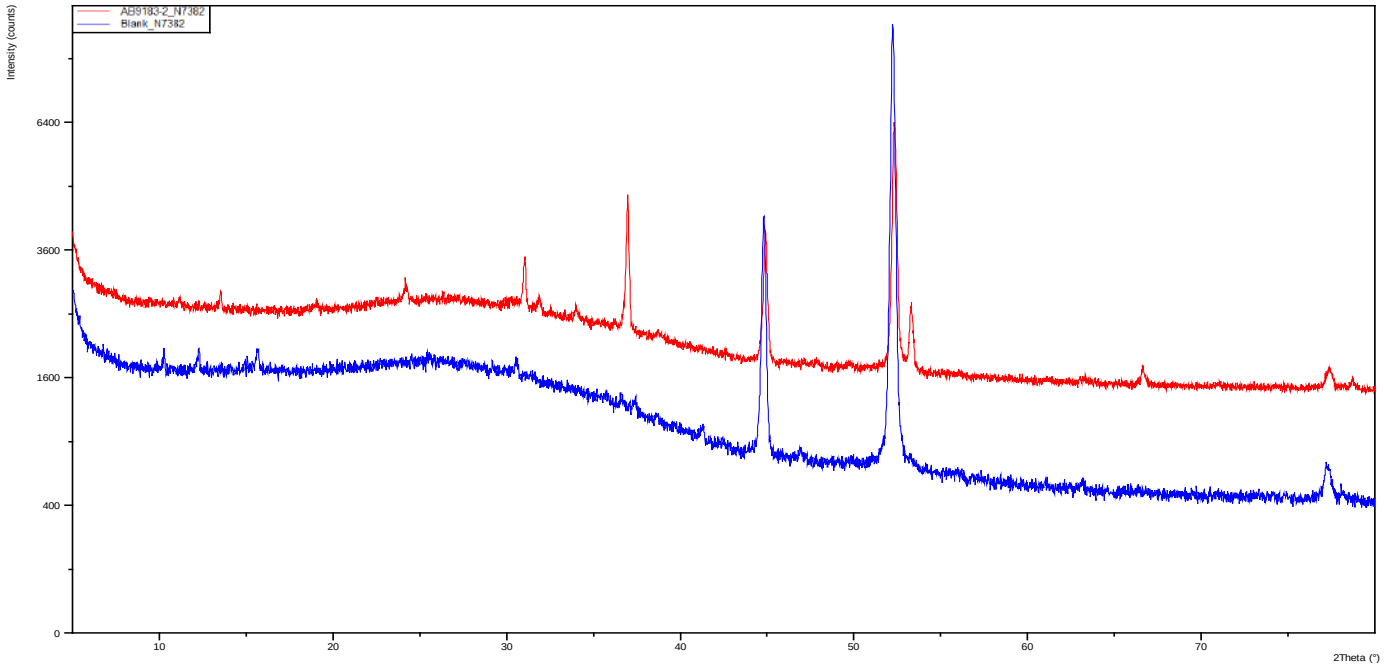
Qualitative XRD results (wt %)

Mineral	Composition	Blank	AB9183
Aluminum[1]	Al	D	D
Halite	NaCl	ND	A
Quartz	SiO_2	ND	A
Gypsum	$CaSO_4(H_2O)_2$	ND	Tr
Unassigned peak[2]	10.29°2θ, 9.99Å,	Tr	ND
Unassigned peak[2]	12.31°2θ, 8.35Å	Tr	ND
Unassigned peak[2]	15.72°2θ, 6.54Å	Tr	ND

1. Aluminium is highly likely from the Aluminium disc the filter paper was stuck too.
2. Due to peak intensity, an unidentified peak/phase was observed. Further work is required to determine the mineral giving rise to this peak.

Qualitative Abbreviations

D = Dominant. Used for the component apparently most abundant, regardless of its probable percentage level.
CD = Co-dominant. Used for two (or more) predominating components, both or all of which are judged to be present, in roughly equal amounts.
SD = Sub-dominant. The next most abundant component(s) providing its percentage level is judged above about 20%.
A = Accessory. Components judged to be present between the levels of roughly 5 and 20%.
Tr = Trace. Components judged to be below about 5%.
ND = Not Detected



SEMI QUANTITATIVE SEM/EDS

EDS Results (wt %) For Sample AB9183

Spectrum	O	Na	Mg	Al	Si	P	S	Cl	K	Ca	Ti	Mn	Fe	Sr	Ba	Pb
Bulk 1	36	8	1	3	16		1	2	0	4	0		0			
Bulk 2	36	8	1	3	16		1	2	1	4	0		0			
Bulk 3	36	8	1	3	15		1	2	0	4	0		0			
s1	24	3	4	2	3	0		0	0	1	0	1	53			
s9	27	3	2	13	17	0	0	0	2	0	1	0	8			
s8	30	13	3	13	20	1	1	9	2	2	0	0	2			
s7	13	11	3	4	14	1	1	1	0	2	0	1	53			
s6	31	2	2	14	17		1	0	3	0	0	0	7	1	0	1
s5	46	3	2	3	2		8	0	0	1	2	0	0	3	25	1
s4	26	6	2	4	6		0	4	0	2	0	0	0	1	0	54
s3	20	8	1	3	3	0		2	0	1	0	8	43			
s2	35	10	2	3	26	0		0	1	5	0	0	0			
s10	45	13	5	3	9	1	5	6	1	3	0	0	0			

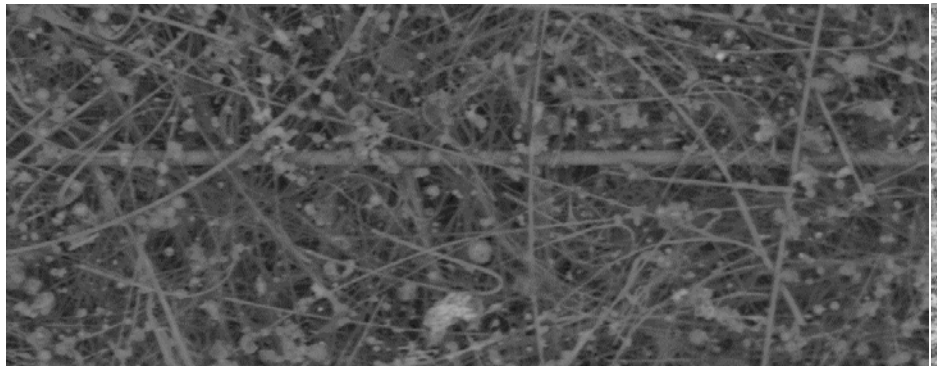
Bulk EDS analysis was collected from the whole area shown in the corresponding images, it represents an average compositions of the area

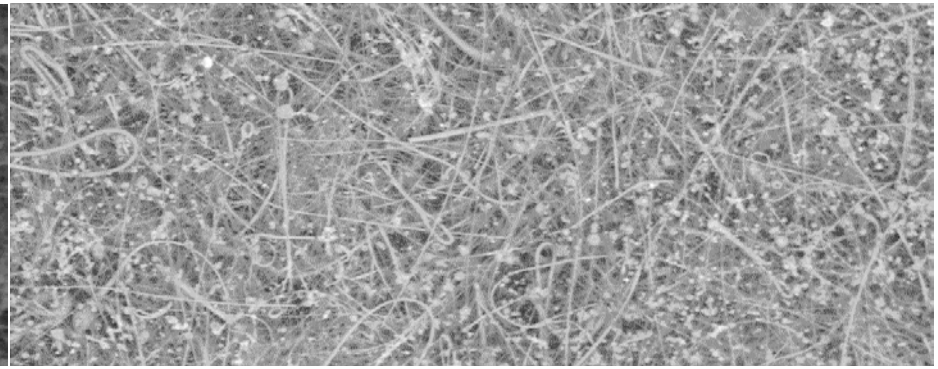
Please note that the EDS results may include elemental information from the filter paper

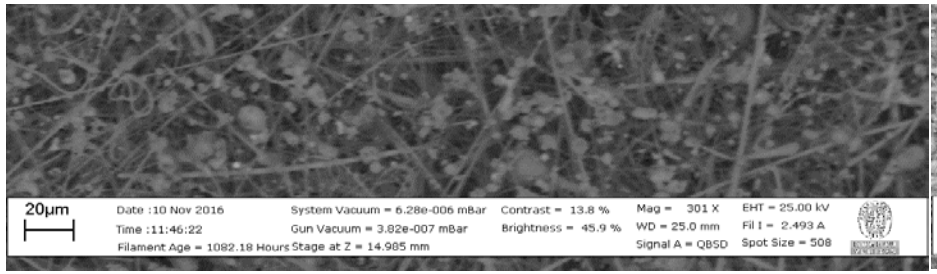
Corresponding Images

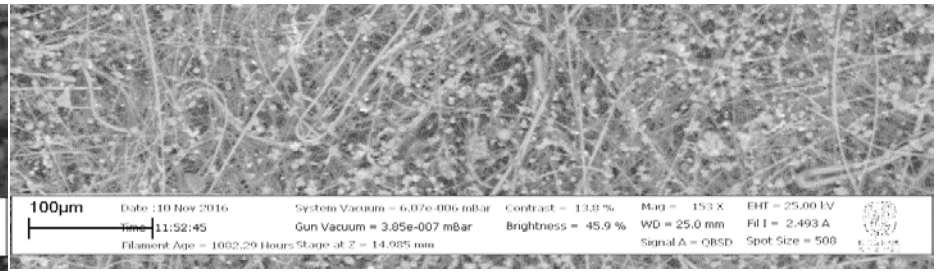
All provided images are BSE (back scatter electron) Images. The BSE detector directly response to density, brighter objects have a higher density

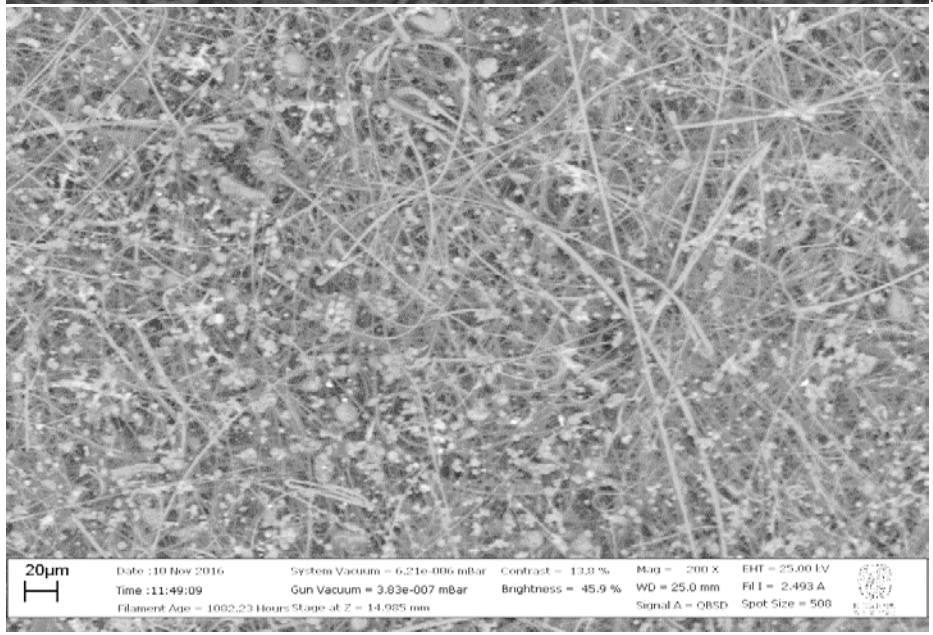
Corresponding Images (Bulk Area)



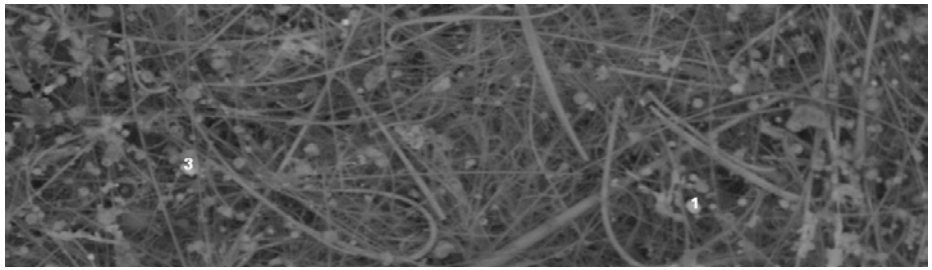


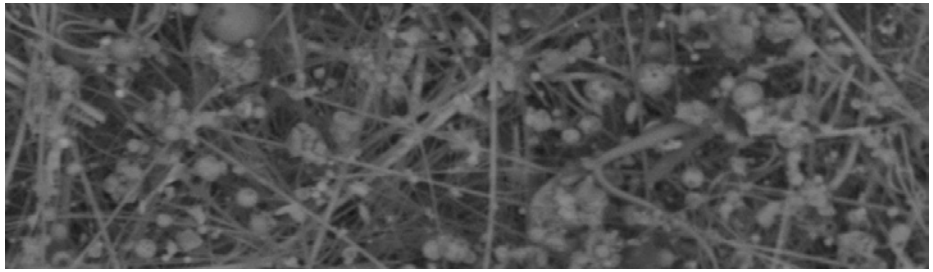


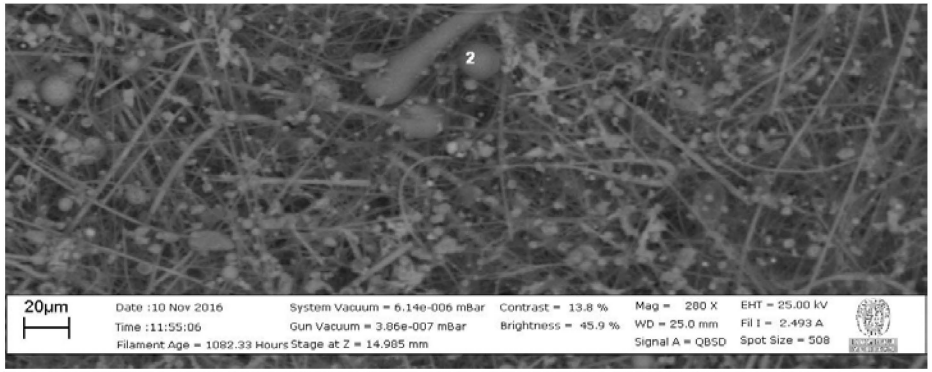


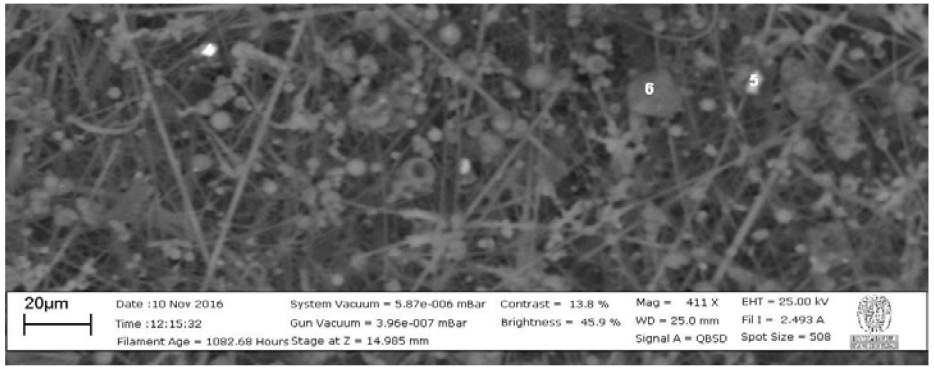


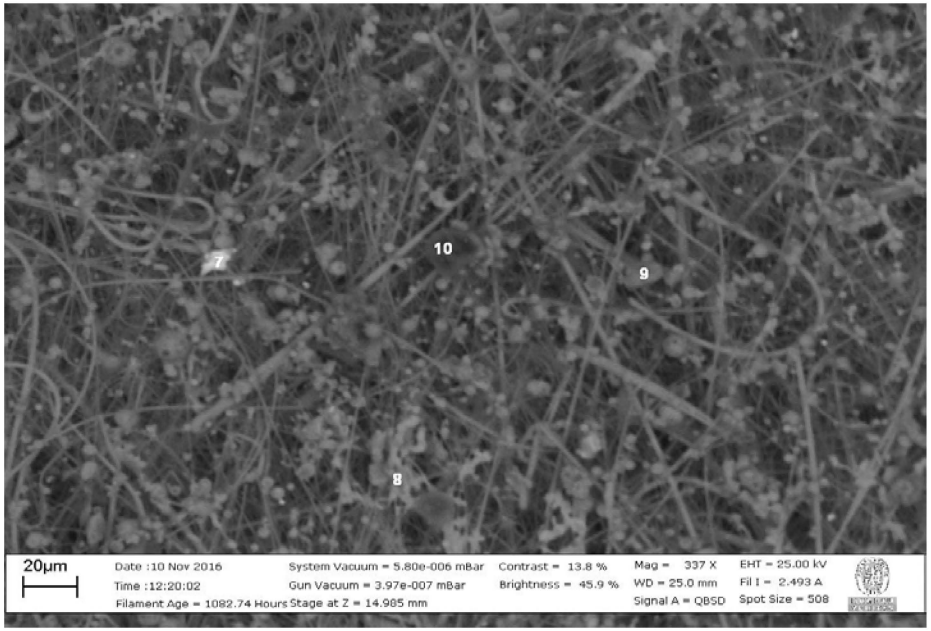
Corresponding Images (Spot Analysis)






2
20µm
Date :10 Nov 2016
Time :11:55:06
Filament Age = 1082.33 Hours
System Vacuum = 6.14e-006 mBar
Gun Vacuum = 3.86e-007 mBar
Stage at Z = 14.985 mm
Contrast = 13.8 %
Brightness = 45.9 %
Mag = 280 X
WD = 25.0 mm
Signal A = QBSD
EHT = 25.00 kV
Fil I = 2.493 A
Spot Size = 508


4
6
5
20µm
Date :10 Nov 2016
Time :12:15:32
Filament Age = 1082.68 Hours
System Vacuum = 5.87e-006 mBar
Gun Vacuum = 3.96e-007 mBar
Stage at Z = 14.985 mm
Contrast = 13.8 %
Brightness = 45.9 %
Mag = 411 X
WD = 25.0 mm
Signal A = QBSD
EHT = 25.00 kV
Fil I = 2.493 A
Spot Size = 508


7
10
9
8
20µm
Date :10 Nov 2016
Time :12:20:02
Filament Age = 1082.74 Hours
System Vacuum = 5.80e-006 mBar
Gun Vacuum = 3.97e-007 mBar
Stage at Z = 14.985 mm
Contrast = 13.8 %
Brightness = 45.9 %
Mag = 337 X
WD = 25.0 mm
Signal A = QBSD
EHT = 25.00 kV
Fil I = 2.493 A
Spot Size = 508