

Mineral Resources Tasmania

Laboratory Report
LJN2019-122-1

MINERALOGICAL AND PETROLOGICAL ANALYSES, HENTY MINE



An unpublished Mineral Resources
Tasmania Report for:

R. Wolfe

By: R.S. Bottrill, J Renaud and L
Unwin

Date: 10 October 2022

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SUMMARY

A brecciated fluorite sample from the Henty mine, provided by R. Wolf, contains minor quartz, galena, chalcopyrite, and ankerite-dolomite. Judging by its deformation textures, it is likely of Cambrian age. No visible gold could be found in this sample.

INTRODUCTION

One rock sample was received for minerals identification, and details are shown in Table 1.

Table 1: Sample details.

Reg. No	Location	Description
G410114	Henty mine	Fluorite

METHODOLOGY

After examining the sample in hand specimen for color, hardness, texture, streak, and heterogeneity, the sample's general chemical composition was assessed using portable X-Ray Fluorescence (pXRF) spectrometer. A representative polished section was prepared for optical (polarized light) and electron beam microscopy (SEM/EDS). In addition, a chip of the sample was crushed and milled for mineral identification by X-ray diffraction (XRD).

METHODS AND RESULTS

In the hand specimen, the sample G410114 consists of purple, green and grey fluorite, with white quartz veins and trace sulphides (Fig. 1).

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Figure 1: Sample G410114 hand specimen. Plain light, FOV (field of view) ~90mm.

In thin section, the sample G410114 consists of purple fluorite and white quartz, with a little quartz, thin bands of muscovite flakes, and some trace sulphides.

PORTABLE XRF

The sample G410114 was analysed for major and trace elements using an Olympus Vanta M Series pXRF. The instrument uses a 4-Watt X-ray tube with application-optimized anode material (rhodium Rh and tungsten W): 8-50 kV with a large area Silicon Drift Detector. The instrument uses the built-in Olympus Vanta analysis software version 3.12.34.

The results are shown in Appendix 1 and summarised in Table 2. The most notable are the large amounts of Pb, ~0.4-1 wt%. Cu is also anomalous, probably as

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chalcopyrite. One analysis gives high V (currently inexplicable), and another high Zn (sphalerite?).

Table 2: summarised pXRF analyses

Sample ID	DL	G410114	G410114	G410114	G410114	G410114
Date	-	17/12/19	17/12/19	17/12/19	17/12/19	17/12/19
Method	-	Geochem(2)	Geochem(2)	Geochem(2)	Geochem(2)	Geochem(2)
SiO ₂ (%)	9	49.8	(8)	(6)	(9)	10.6
Al ₂ O ₃ (%)	5	21.4	(4)	(4)	(5)	(3)
CaO (%)	1	1.2	68.8	70.5	53.8	61.0
Cu (ppm)	50	470	107	101	60	140
Pb (ppm)	10	12591	426	940	3133	4759
V (ppm)	100	(0)	147	(90)	9590	(64)
Zn (ppm)	20	3405	281	48	40	67
Zr (ppm)	50	270	(9)	(8)	(13)	(11)
Results with format (30), means the results is below detection limit and is unreliable.						

XRD ANALYSIS

The sample was prepared, examined, and analysed in the MRT laboratories, Rosny Park, Tasmania. It was run on a Rigaku Miniflex 600 X-Ray Diffractometer (XRD) system provided with a 600W generator 150mm goniometer with a Cu tube; 40kV/15mA, sample spinner and a Scintillation counter (SC) with Be window, a graphite counter monochromator and a K β Ni- filter. The MRT validated XRD analysis procedure scans over the range 3 - 63° 2Theta-2Theta range, with a scanning speed of 0.5°/min, and sample rotation of 15 rpm. The raw data were processed using the Rigaku PDXL2 software, linked to the ICDD database.

Quantification is largely manual, using a series of prepared standards of the more common minerals to enable some semi-quantitative analysis. Quartz, if present, is used as an internal standard; and if not present, it is often added to the sample for a supplementary scan. Our semi-quantitative results are calculated using single-peak calibration factors derived from scans of known mixtures of minerals.

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The results (shown in Appendix 2) indicate mostly fluorite with minor quartz and possible trace Fluorocronite (lead fluoride), which may correlate with the high lead content.

SEM/EDS ANALYSIS

To check the possible presence of Fluorocronite the sample was analysed by SEM-EDS, in the CSL, University of Tasmania, with analytical conditions shown in Appendix 2. No Fluorocronite or gold were found, nor Zn or V minerals; the sample contains fluorite, with minor quartz, ankerite-dolomite and muscovite, plus traces of galena and chalcopyrite. The results for an unusually Fe-rich (Fe>Mg) ankerite/dolomite are given in Appendix 3. Some back-scattered electron (BSE) images are shown (Figs. 3 & 4) with analysis points.

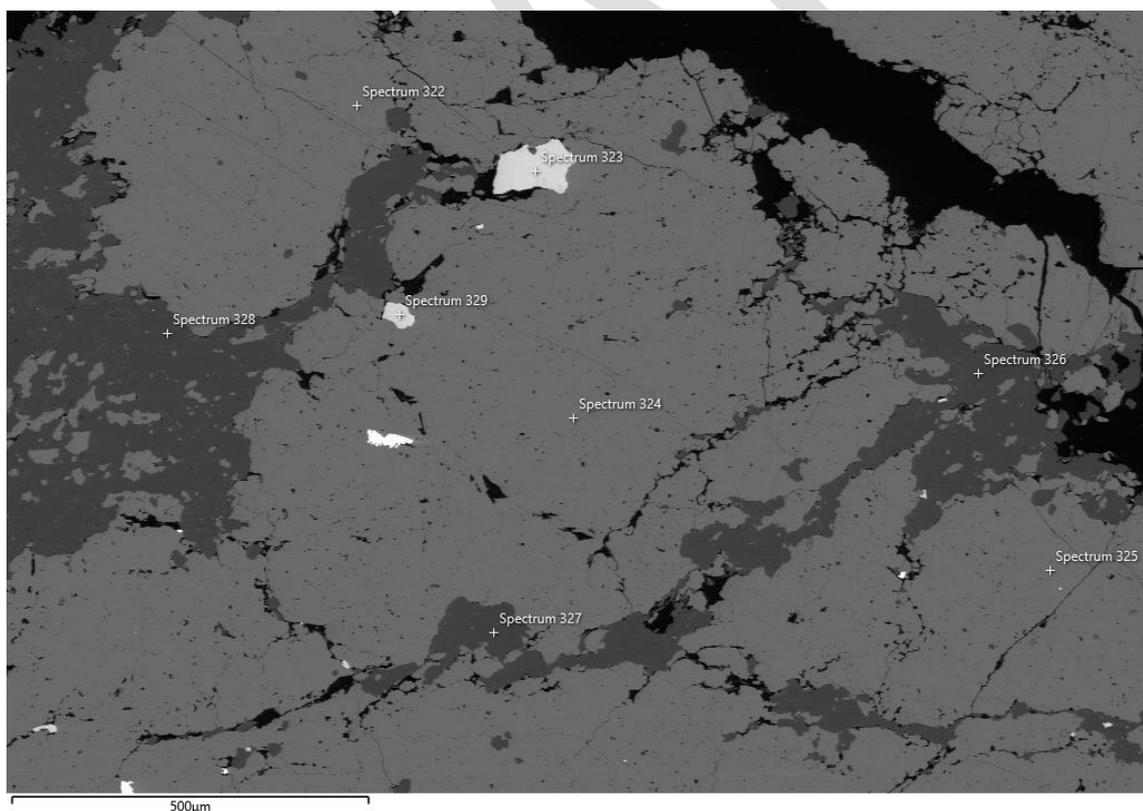


Fig. 3: Sample G410114. Pale grey material is fluorite, brecciated and veined by quartz (dark grey); bright grains are sulphides, mostly chalcopyrite and galena (brighter). Black areas are porous voids filled with epoxy. BSE (backscattered electron) image.

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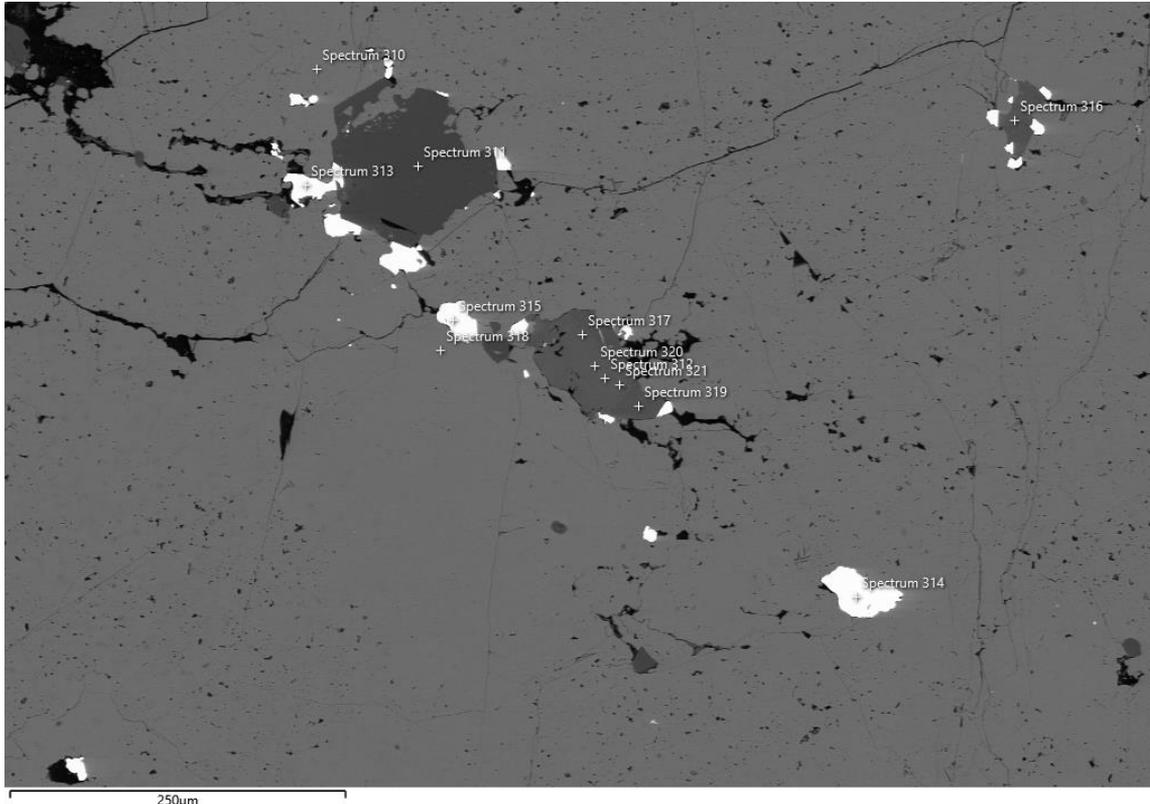


Fig. 4: Sample G410114. Pale grey material is fluorite, with inclusions of quartz (dark grey) and ankerite-dolomite (slightly brighter); bright grains are sulphides, mostly galena. BSE image.

DISCUSSION AND CONCLUSIONS

The sample of brecciated Fluorite contains minor quartz, galena, chalcopyrite and ankerite-dolomite, and appears to be of Cambrian age based on its deformation (Devonian mineralisation is typically less deformed). There was no visible gold detected but it would need a larger sample to do an accurate assessment of this.

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MINERALOGIST/PETROLOGIST

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TECHNICAL OFFICERS

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DRAFT

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Appendix 1: pXRF Analyses: MRT Laboratory Report

Client: R Wolfe

Sample Source: Henty mine

MRT Job Number: LJN2019-122-1

Analysis: Geochemistry

Method: X-Ray Diffraction

Analyst: R Bottrill

Lab Manager: R Bottrill

Date: 17/12/2019

Sample ID	DL	g410114	g410114	g410114	g410114	g410114
Date	-	17/12/19	17/12/19	17/12/19	17/12/19	17/12/19
Method	-	Geochem(2)	Geochem(2)	Geochem(2)	Geochem(2)	Geochem(2)
SiO ₂ (%)	9	49.8	(8)	(6)	(9)	10.6
TiO ₂ (%)	0.2	1.7	(0.2)	(0.2)	9.3	(0.1)
Al ₂ O ₃ (%)	5	21.4	(4)	(4)	(5)	(3)
Fe ₂ O ₃ (%)	1	1.4	(0.3)	1.1	(0.2)	(0.2)
MnO (%)	0.1	(0)	(0)	(0)	0.2	(0)
CaO (%)	1	1.2	68.8	70.5	53.8	61.0
MgO (%)	1.5	(0)	(0)	(0)	(0)	(0)
K ₂ O (%)	2	13.5	(0.2)	(0.4)	(1.2)	(0.5)
P ₂ O ₅ (%)	0.5	0.5	(0)	(0)	(0)	(0)
S (%)	1	(0)	(0)	(0)	(0)	(0)
As (ppm)	100	(0)	(0)	(0)	(0)	(0)
Cr (ppm)	50	(0)	164	(0)	(0)	(0)
Cu (ppm)	50	470	107	101	60	140
Mo (ppm)	100	(35)	(0)	(18)	(37)	(22)
Nb (ppm)	30	40	(7)	(10)	(13)	(12)
Ni (ppm)	30	(0)	40	33	(27)	(0)
Pb (ppm)	10	12591	426	940	3133	4759
Rb (ppm)	10	214	(9)	(0)	(5)	(0)
Sb (ppm)	100	(0)	(0)	(0)	(0)	(0)
Sn (ppm)	100	(0)	(0)	(0)	(0)	(0)
Sr (ppm)	10	29	33	27	63	41
Th (ppm)	100	(50)	(31)	(29)	(33)	(28)
U (ppm)	50	(12)	(0)	(9)	(11)	(0)
V (ppm)	100	(0)	147	(90)	9590	(64)
W (ppm)	100	(0)	(0)	(0)	(0)	(27)
Y (ppm)	20	(0)	53	68	29	20
Zn (ppm)	20	3405	281	48	40	67
Zr (ppm)	50	270	(9)	(8)	(13)	(11)

Disclaimer: pXRF results are highly erroneous and only provide an indication of the geochemistry. Accuracies and detection limits listed here are for ideal analytical conditions. Sample preparation grain size, porosity and composition will significant affect the validity of the results.

Results with format (30), means the results is below detection limit and is completely unreliable.

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Appendix 2: XRD Analyses: MRT Laboratory Report

Client: R Wolfe

Sample Source: Henty

MRT Job Number: LJN2019-122

Analysis: Approximate Mineralogy

Method: X-Ray Diffraction

Analyst: L Unwin

Lab Manager: R Bottrill

Date: 13/11/2019

ANALYSIS RESULTS – G410114 – QA1

GENERAL INFORMATION

Analysis date	2019/12/13 09:00:13	Measurement date	2019/12/12 11:20:59
Sample name	G410114	Operator/Analyst	lunwin
File name	G410114.ras		
Comment	Shifted -0.15		

Quantitative analysis results (RIR)

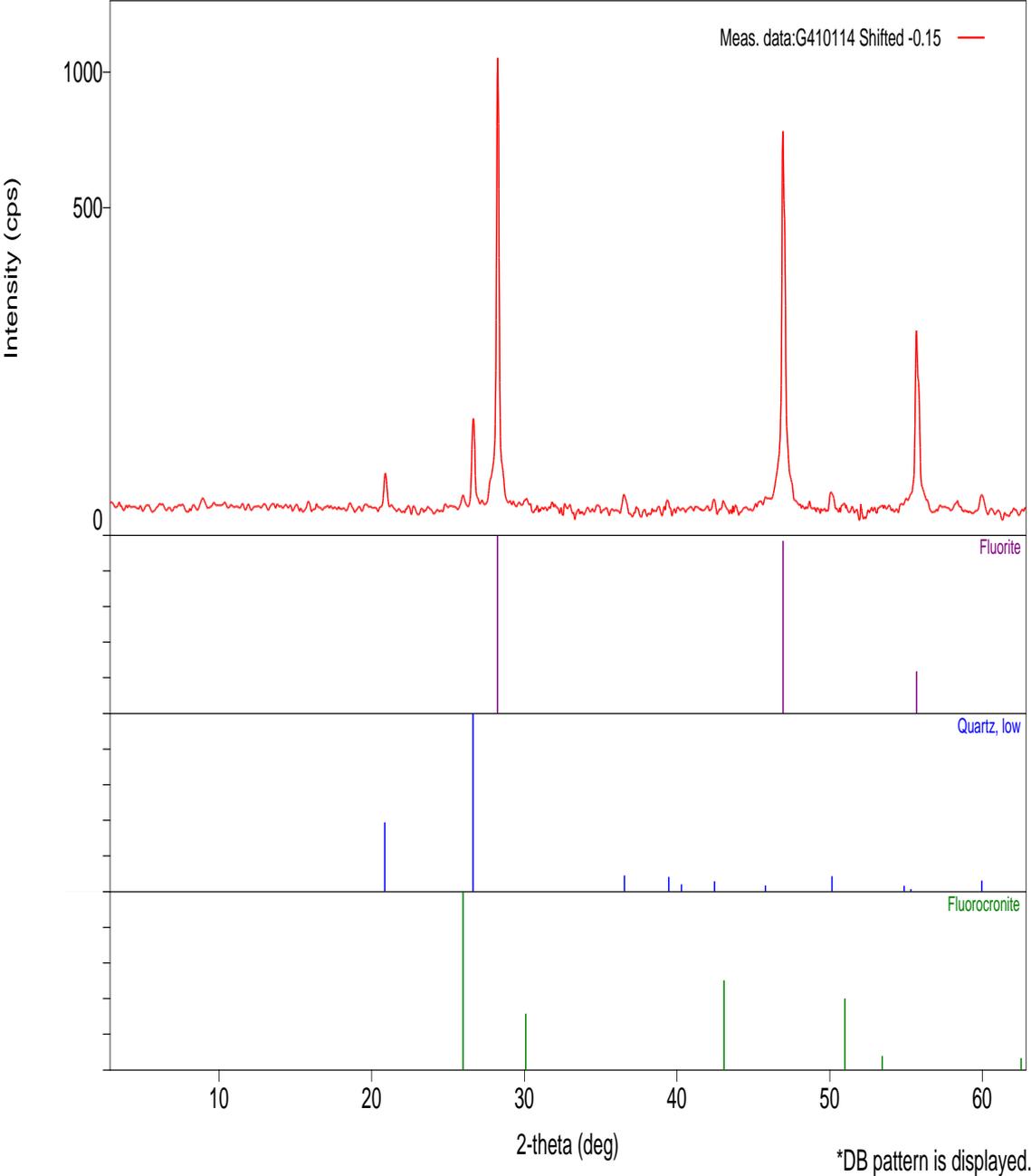
Phase name	Content(%)
Fluorite	94(3) [Peak.4]
Quartz	5(3) [Peak.3]
Fluorocronite	<1(13) [Peak.2]

PEAK LIST

No.	2-theta(deg)	d(ang.)	Phase name	Rel. int. I(a.u.)
1	20.901(7)	4.2466(14)	Quartz(1,0,0)	2.16
2	25.979	3.427	Fluorocronite(1,1,1)	0.74
3	26.652(12)	3.3419(15)	Quartz(1,0,1)	6.07
4	28.245(3)	3.1570(4)	Fluorite(1,1,1)	100.00
5	36.5267	2.45799	Quartz(1,1,0)	0.57
6	39.3457	2.28813	Quartz(1,0,2)	0.63
7	42.4329	2.12853	Quartz(2,0,0)	0.34
8	43.0248	2.1006	Fluorocronite(2,2,0)	0.27
9	46.933(3)	1.93437(13)	Fluorite(2,2,0)	95.33
10	50.1147	1.81877	Quartz(1,1,2)	1.12
11	50.9701	1.79024	Quartz, Fluorocronite(3,1,1)	0.55
12	54.6777	1.67729	Quartz(2,0,2)	0.44
13	55.690(5)	1.64917(15)	Fluorite(3,1,1)	26.64
14	58.3672	1.57974	Fluorite(2,2,2)	0.63

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15	59.9683	1.54133	Quartz(2,1,1)	1.07
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Appendix 3: SEM/EDS Analyses: MRT Laboratory Report

Client: R Wolfe

Sample Source: Henty

MRT Job Number: LJN2019-122-1

Analysis: Mineral chemistry

Method: SEM/EDS

Analyst: L Unwin

Lab Manager: R Bottrill

Date: 8/1/2021

Project Path	min	nom cat	Mg	Al	Si	S	K	Ca	Mn	Fe
2021-01-08/ G410114 Henty/Site 1	ank	2	0.42	0.00	0.00	0.00	0.00	1.04	0.04	0.50
2021-01-08/ G410114 Henty/Site 1	ank	2	0.59	0.00	0.00	0.00	0.00	1.01	0.04	0.35
2021-01-08/ G410114 Henty/Site 1	ank	2	0.52	0.00	0.00	0.00	0.00	1.06	0.04	0.38
2021-01-08/ G410114 Henty/Site 1	ank	2	0.61	0.00	0.00	0.00	0.00	1.05	0.04	0.30
2021-01-08/ G410114 Henty/Site 1	ank	2	0.42	0.00	0.00	0.00	0.00	1.04	0.04	0.50
2021-01-08/ G410114 Henty/Site 1	ank	2	0.46	0.00	0.00	0.00	0.00	1.08	0.03	0.43

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SEM analytical conditions

Hitachi SU-70 analytical field emission SEM

- Installed February 2011
- Schottky thermal field emission source
- ultra-high resolution (1.0 nm @ 15kV, 1.6 nm @ 1kV for SE imaging)
- high vacuum operation only (i.e. no variable pressure in chamber)
- Hitachi in-chamber and in-lens scintillation detectors, Super ExB filter, beam deceleration
- Hitachi in-chamber 5-segment solid state BSE detector, retractable
- in-column Faraday cup with picoammeter for beam current measurement
- anticontamination cold plate, liquid nitrogen cooled
- 5 axis motorised fully eucentric stage, XYZ range 110x110x40mm
- Oxford AZtec EDS/EBSD system with
 - X-Max 80 SDD EDS, MnKa 125 eV resolution, elements B-U, large area hyperspectral mapping, standardless and standards-based quantification, feature analysis
 - HKL NordlysNano EBSD camera & forescatter detector system, HKL & Channel 5 software packages, Synergy EDS/EBSD integration, HKL, ICSD & American Mineralogist phase databases
- NEW June 2017: Gatan ChromaCL2 colour cathodoluminescence imaging system with integrated BSE detector, Digital Micrograph 3 software, automated mosaic acquisition, simultaneous acquisition of SE, iBSE and colour CL images.

Label:	am 179
Element List Type:	Current Spectrum
Processing Option:	All Elements
Specimen Coating:	On
Beam Calibration Element Coating:	Off
Coating Element:	Carbon
Coating Thickness:	20 nm
Coating Density:	2.25 g/cm ³
Automatic Line Selection:	Disabled
Normalization:	Enabled
Thresholding:	Sigma level = 1
Detector Window Correction:	Enabled
Deconvolution Elements:	None
Selected Standards:	Minerals_15kV_2017-10-20 [User]
Pulse Pile Up Correction:	Succeeded
Detector file:	X-Max 3
Efficiency:	File based