

SEM Imaging of the Subject samples

A Tescan VEGA 3 LMU SEM was used to image stub-mounted grains of the subject samples. The National Minerals Testing laboratory (NMTL) SEM has a resolution of 3.5 nm at 30 kV / 2.5 nm and has magnification capabilities of 2x – 1,000,000x. It has a maximum field of view of 24 mm at a WD of 30 mm and an accelerating voltage of 200 V to 30 kV. The probe current operates at 1 pico-Ampere (pA) to 2 micron-Ampere (μ A) and has a scan speed of 20 nanoseconds to 10 milliseconds per pixel adjustable in steps or continuously. The samples were scanned at 20.0 kV, in Back Scatter Electron (BSE) mode at a scan speed of "5", with the stub set at a "Z" of 10 mm. Working Distance (WD) changes slightly with the topography of the specimen. Working Distance (WD) is how the image is brought into focus. All stubs were viewed at a minimum of 4000x.

A quick review of the 8 samples submitted shows that Samples 001, 002, 003, 004, 006, and 007 do not display any acicular crystals indicative of erionite in any of the images created from the scans. There is evidence of clay minerals in these samples. Since erionite is the mineral of interest, these samples do not merit further discussion, as the x-ray diffraction did not indicate erionite as present, either.

Sample 005 does have acicular crystals in it, visible at the magnifications used of 4800X-5100X. The acicular crystals are indicative of erionite. The percent erionite in sample 005 is visually estimated to be <2% over all based on the visual under SEM analysis. Erionite is present in such a minute percent of the sample that it does not appear in an x-ray diffraction analysis.

Sample 008 has abundant erionite, with a visual of approximately 98% of the sample. The x-ray diffraction shows erionite and clinoptilolite.

Sample representative images with brief discussion follow.

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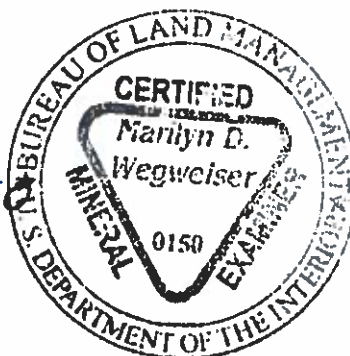


Image SCave 001-3: Magnification 4810X, no Erionite present.

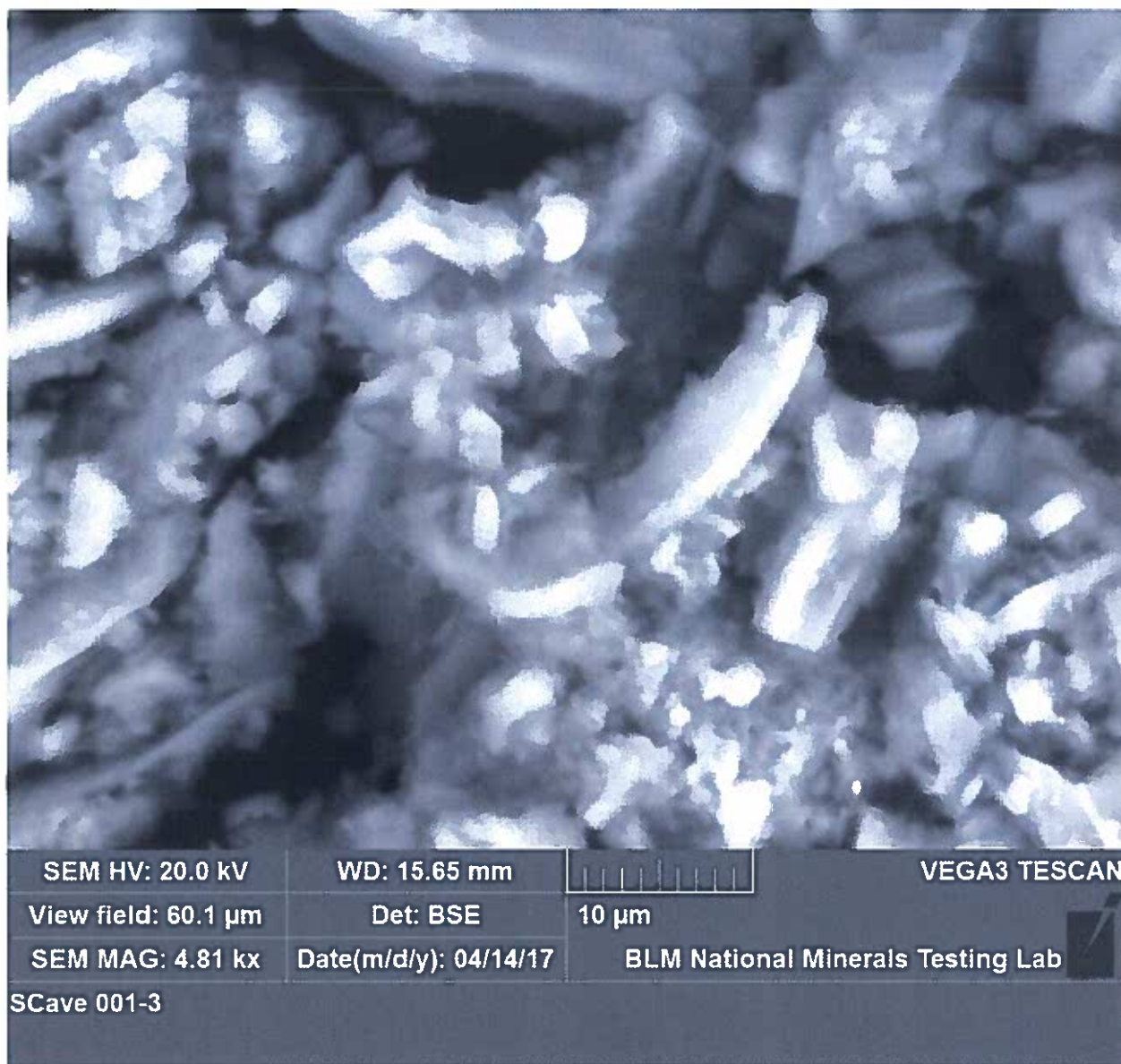


Image SCave 002-2: Magnification 4860X; no Erionite present.



Image SCave 003-1: Magnification 4840X; no Erionite present.

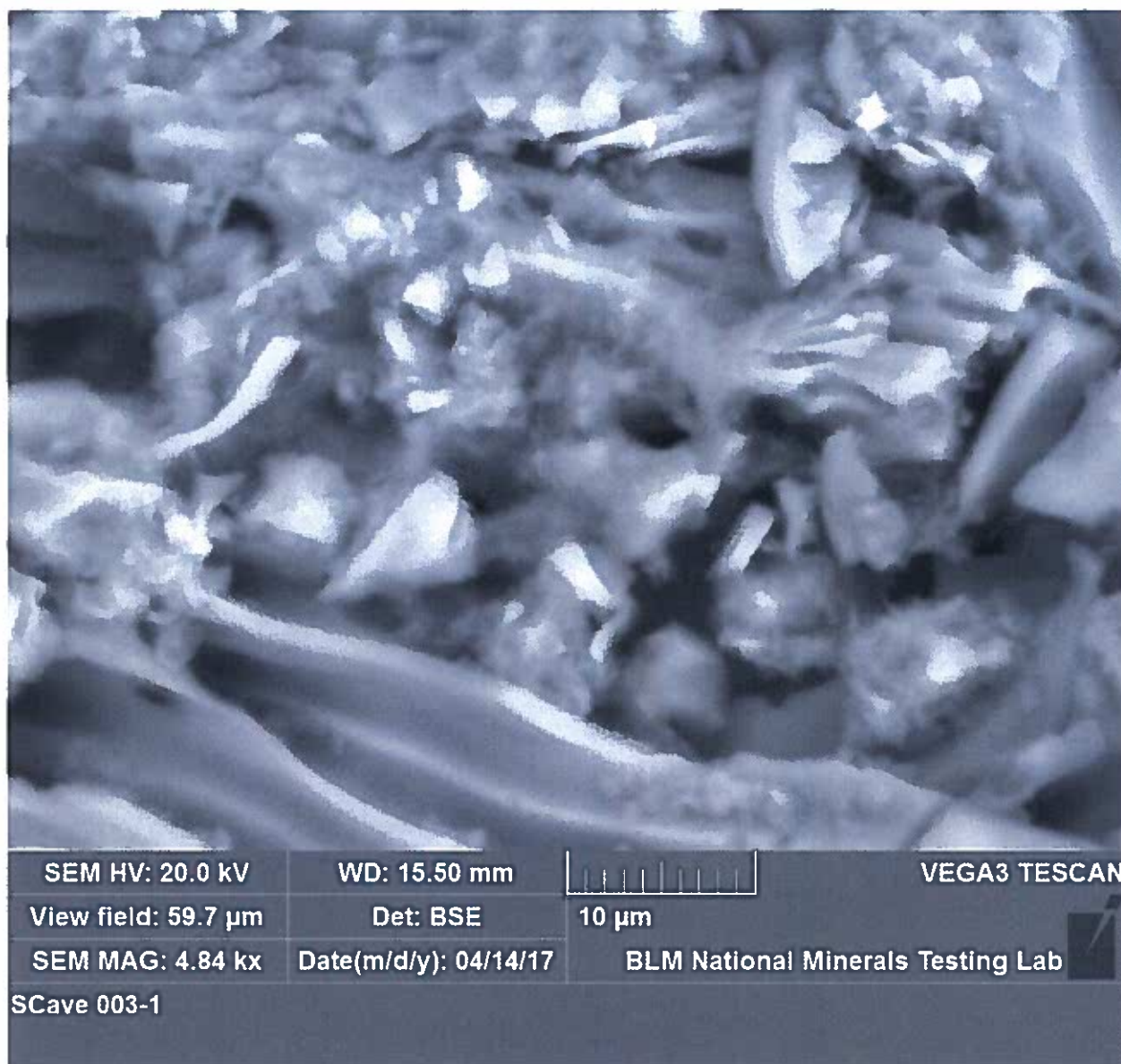


Image SCave 003-2: Magnification 4860X; a different perspective, note the clay particle (circled). No Erionite present.



Image SCave 004-2: Magnification 5005X; no Erionite present.

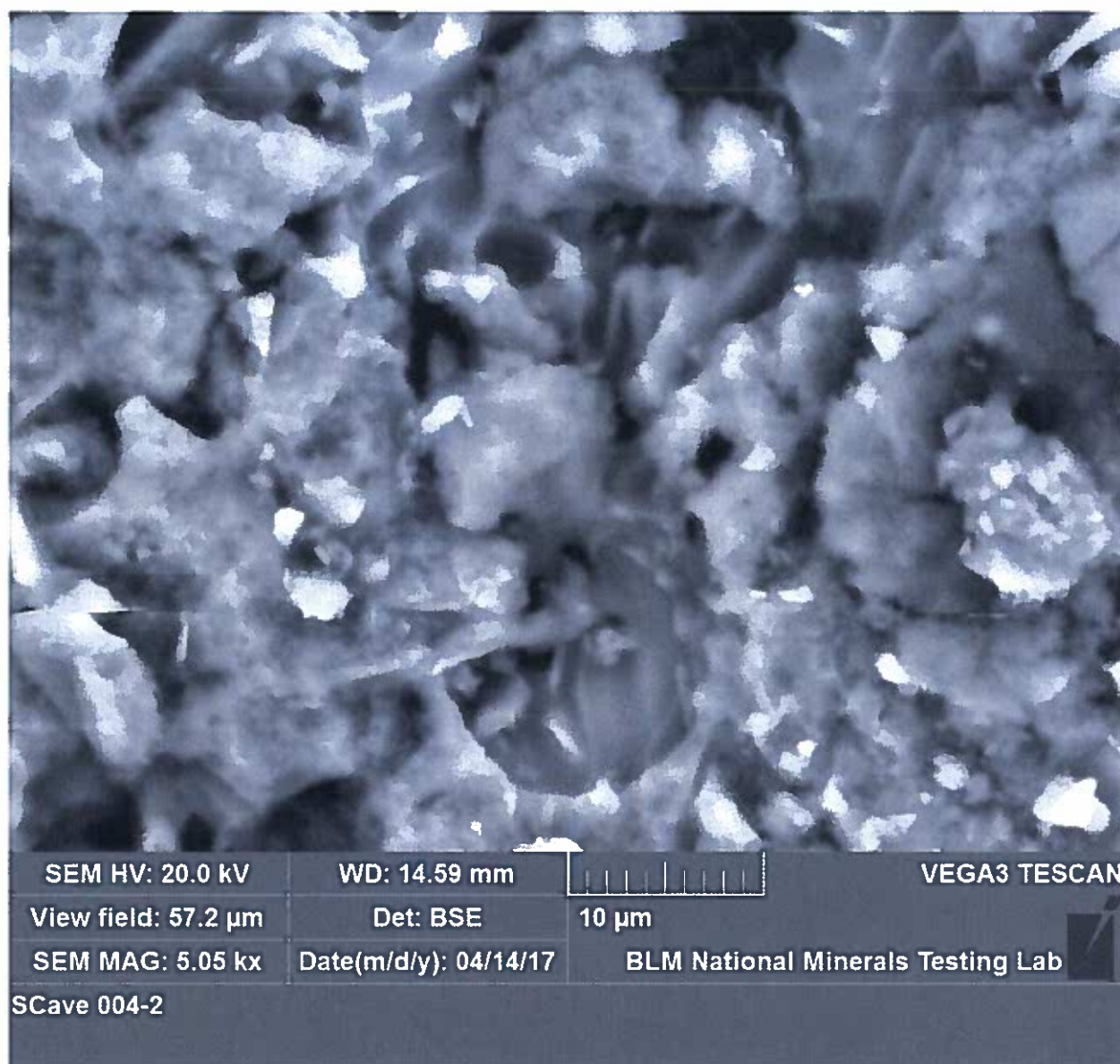


Image SCave 005-1 Magnification 4780X; about 2% Erionite present Note acicular needles (circled)

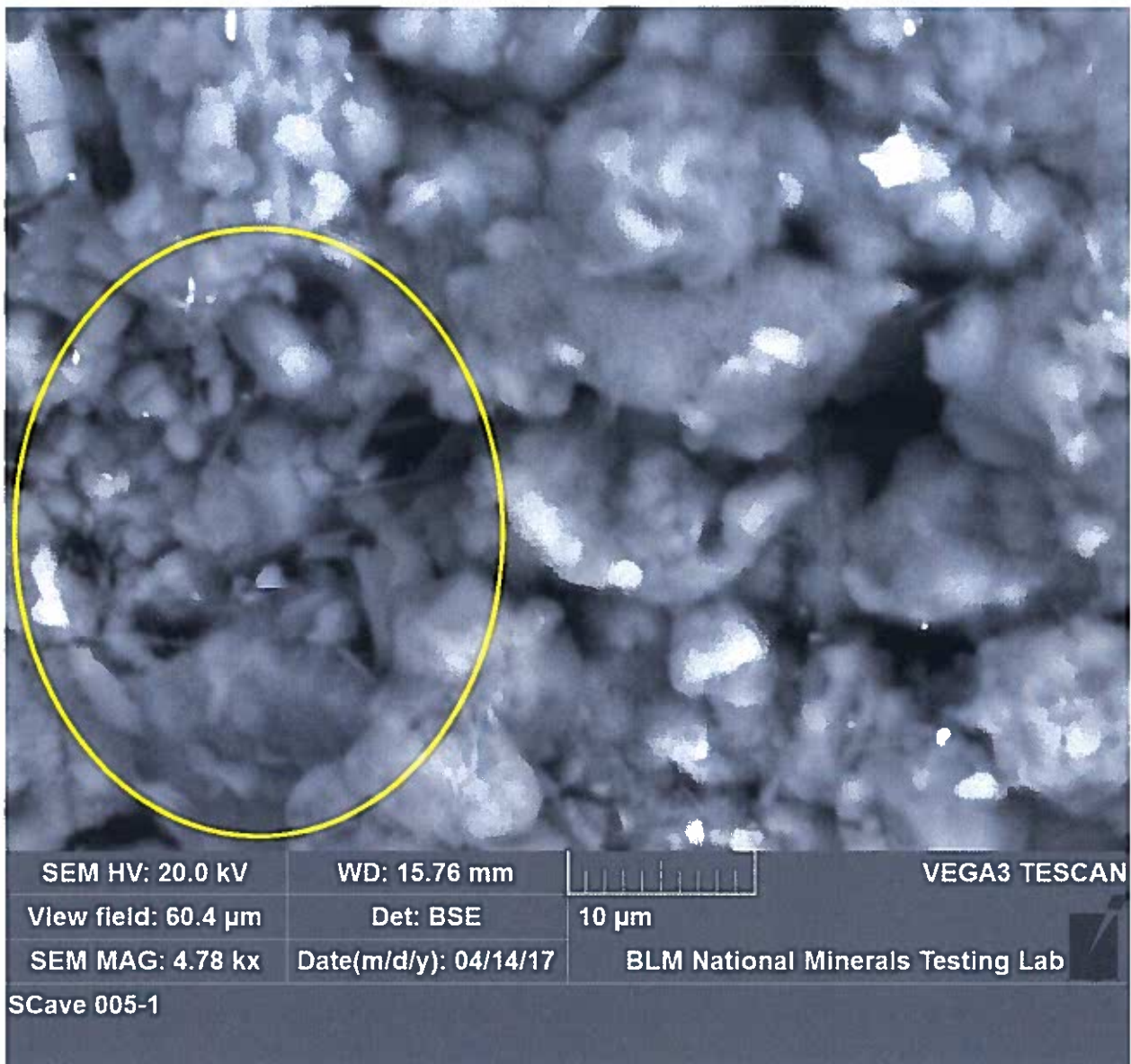


Image SCave 005-2: Magnification 4780X; less than 2% Erionite present. Note acicular needles (circled).

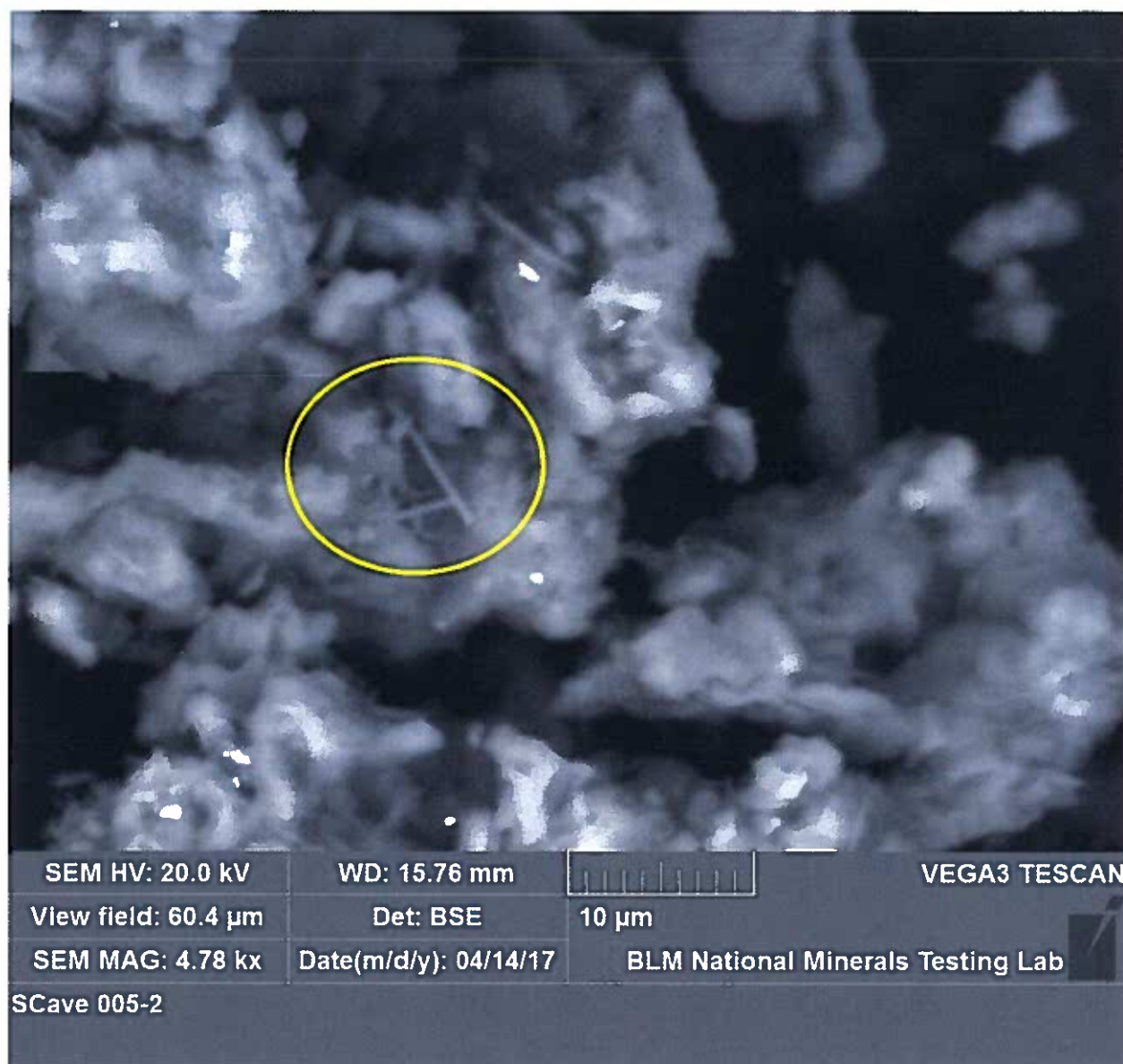


Image SCave 005-3: magnification 4800X; one Erionite acicular crystal present.

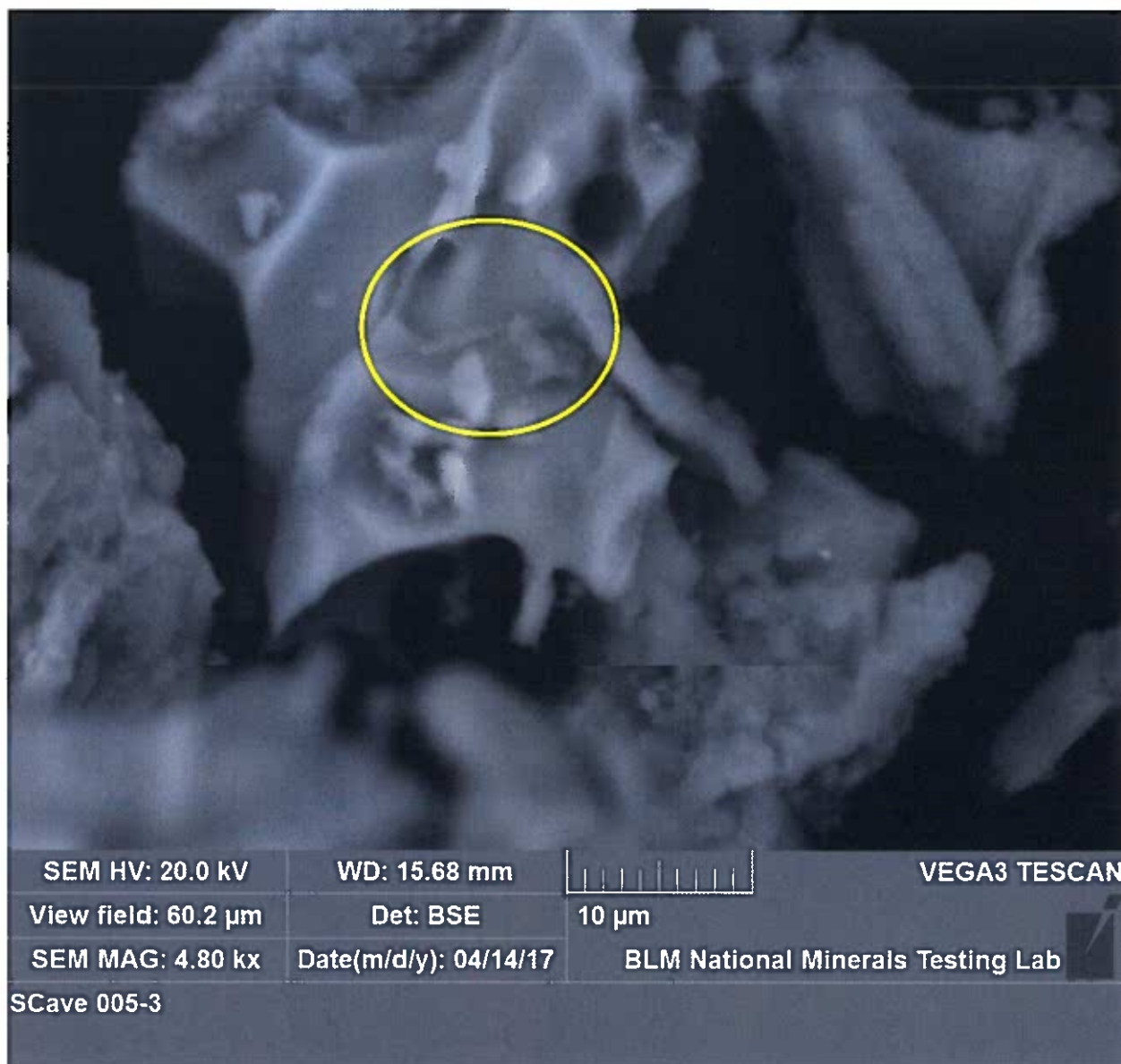


Image Scave 006-1: Magnification 4870X; no Erionite present

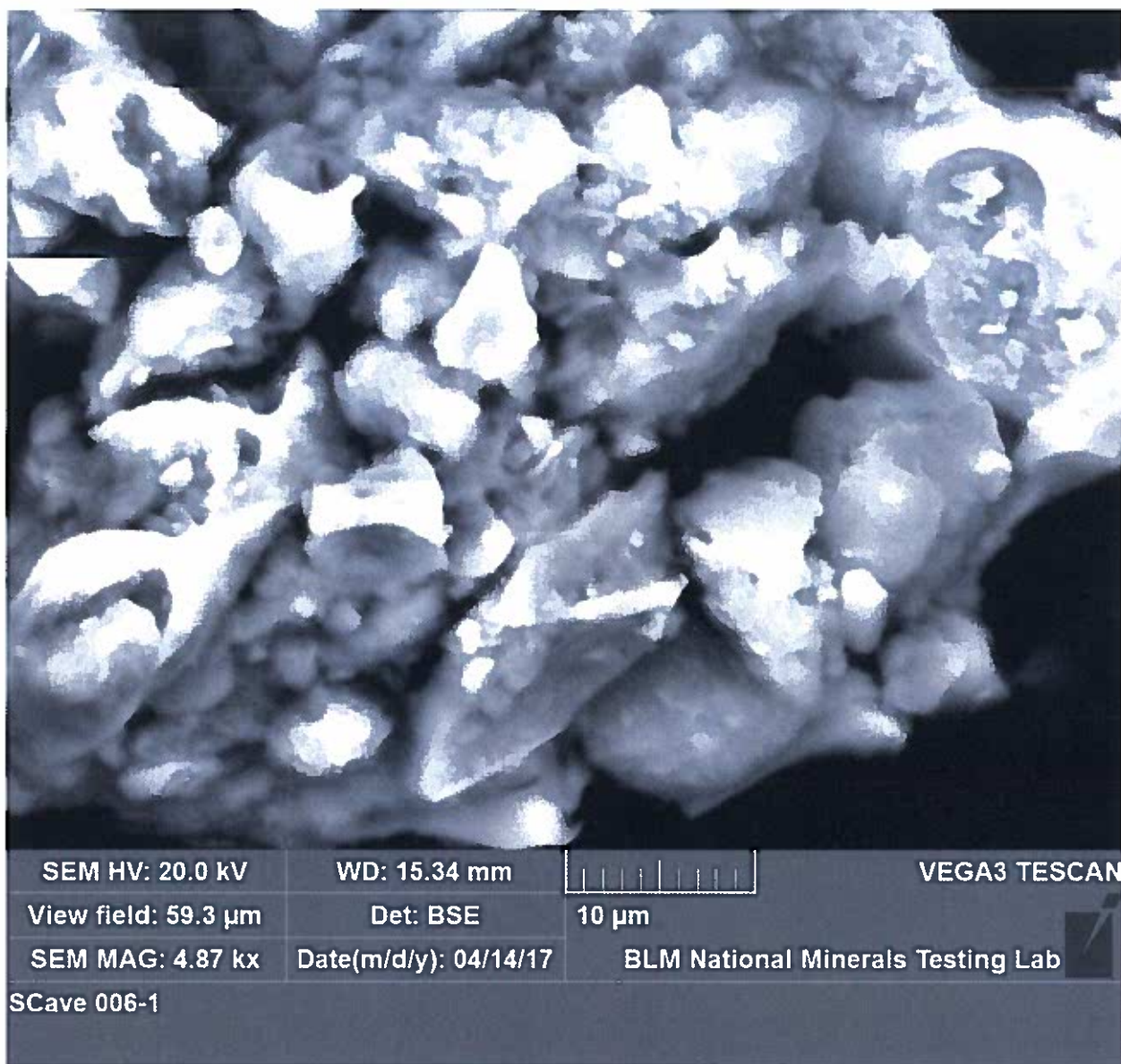
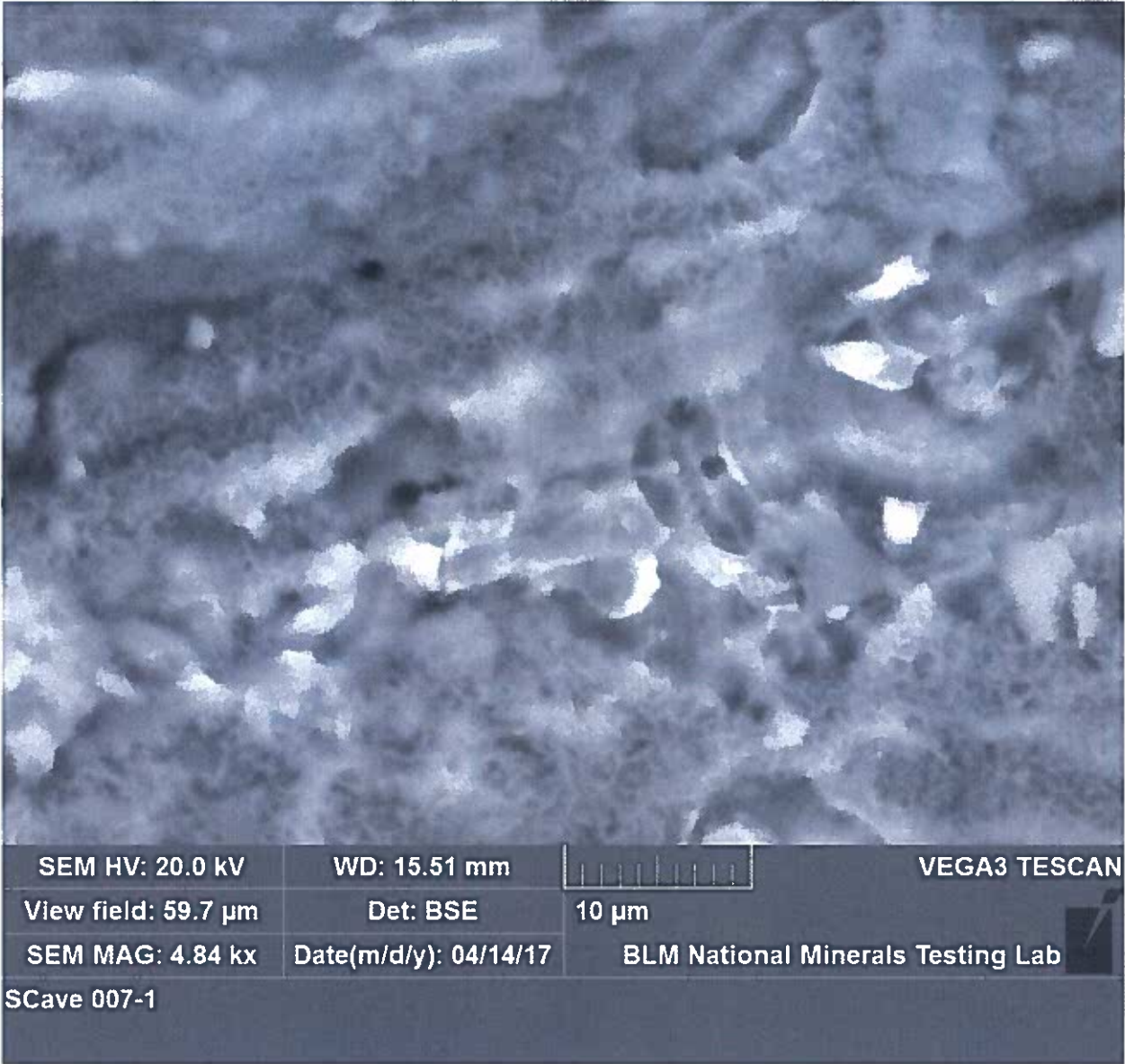


Image SCave 007-1: Magnification 4840X; no Erionite present.



SEM HV: 20.0 kV	WD: 15.51 mm		VEGA3 TESCAN
View field: 59.7 µm	Det: BSE	10 µm	
SEM MAG: 4.84 kx	Date(m/d/y): 04/14/17	BLM National Minerals Testing Lab	

SCave 007-1

Image SCave 008-1: Magnification 4880X; abundant Erionite present.

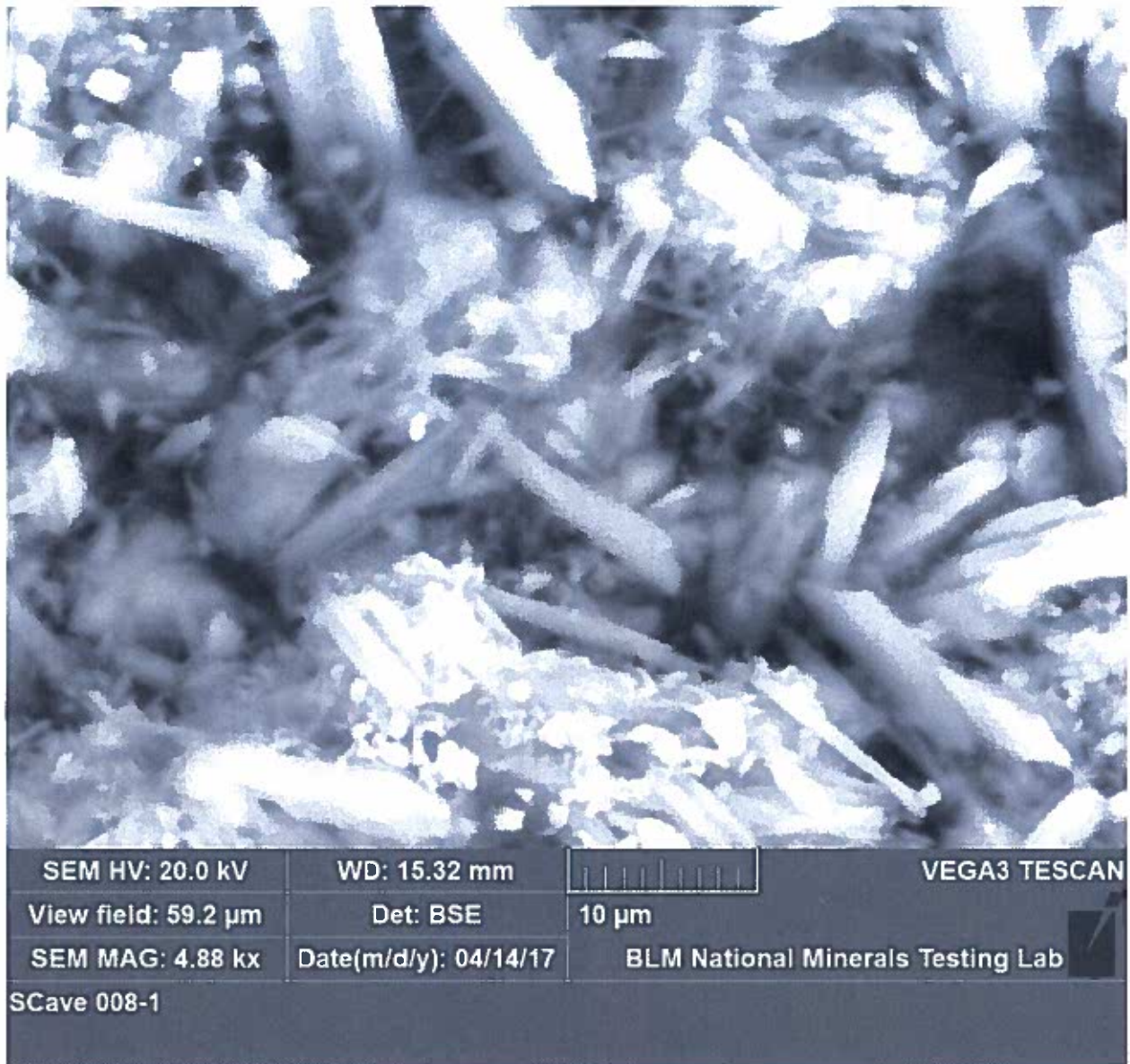


Image SCave 008-2: Magnification 4840X; abundant Erionite present.

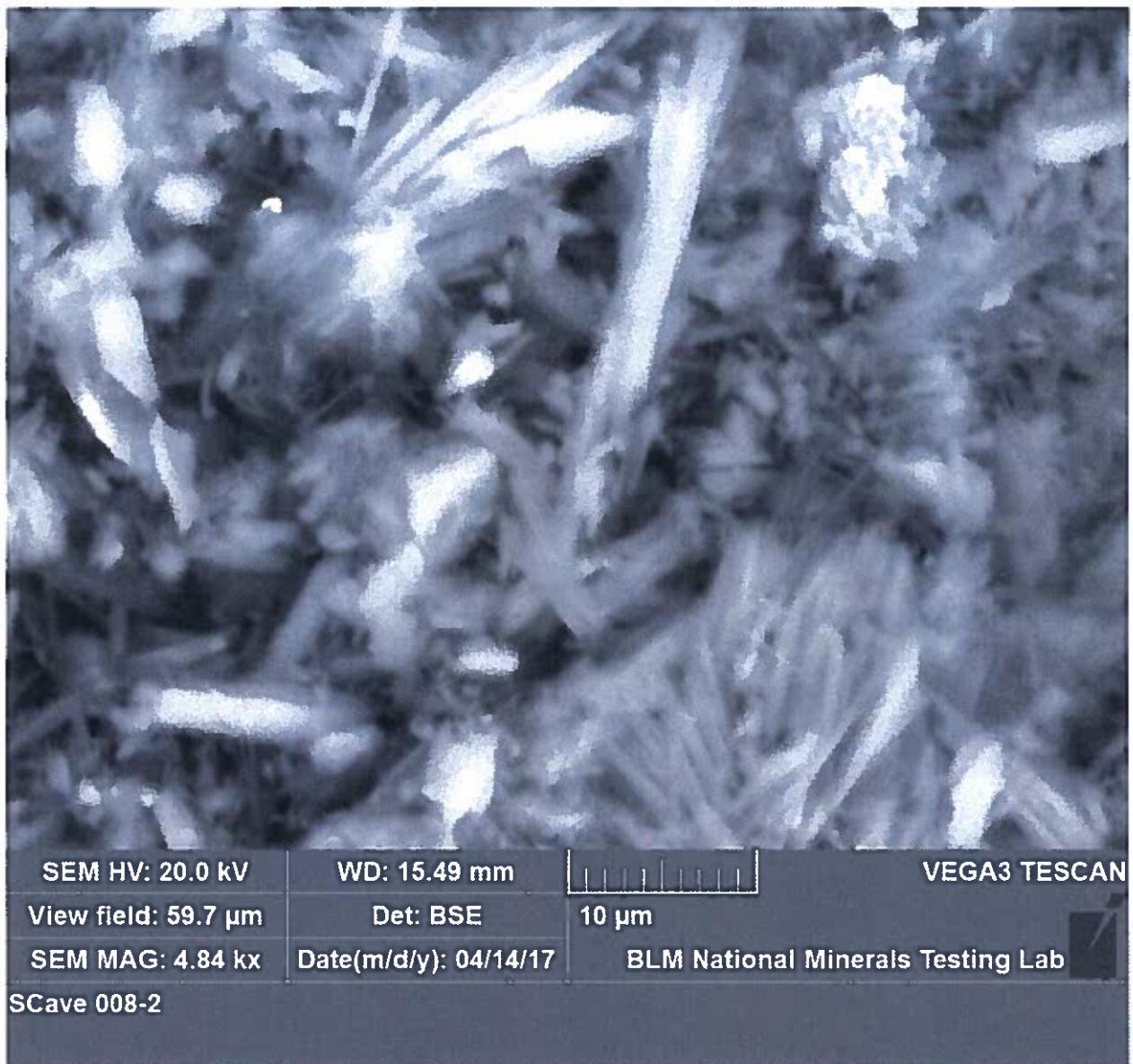


Image SCave 008-3: Magnification 4860X; abundant Erionite present.

