

March 23, 2016

CH2M Hill PRC
Attn. Bruce Hey
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Subject: Scanning Electron Microscopy for Sample from Purex A-006 Air Filter, Rev. 1

This revision covers a follow up question on the potential origin of the holes in the filter and minor corrections.

One sample of a charred filter material was received on March 10, 2016 for Scanning Electron Microscopy. The sample was collected on March 7, 2016 and was assigned laboratory ID W603042. The sample was analyzed using Scanning Electron Microscopy with Energy Dispersive Spectrometry on 03/16/2016.

The results provided in this report relate only to the items tested. Samples were received in acceptable condition unless otherwise noted in the comments above.

I certify that this data package is in compliance with the SOW. Both technically and for completeness, including a full description of, explanation of, and corrective actions for, any and all deviations, from either the analyses requested or the case narrative requested. Release of the data contained in this hard copy data package has been authorized by the Laboratory Analytical Manager (or a designee) as verified by the signature on this report.



Laboratory Manager/Analyst, Dr. Heinz J. Huber

3/23/2016

Date

If you have any questions, contact Heinz Huber at 509-545-4989.

W603042 CHPRC Charred Filter



Figure 1. Quarter of the filter mounted on carbon tape.

The material received was made of an air filter, charred with visible holes. The filter was cut in half to be mountable on a 1" SEM stub. Carbon tape was used to mount the material and the stub was gold coated.

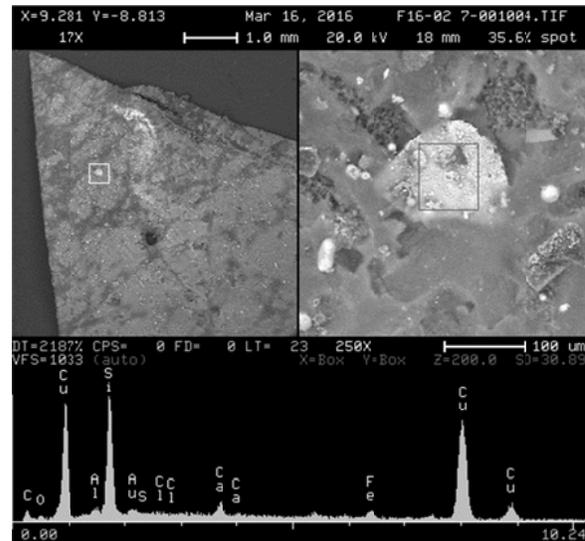
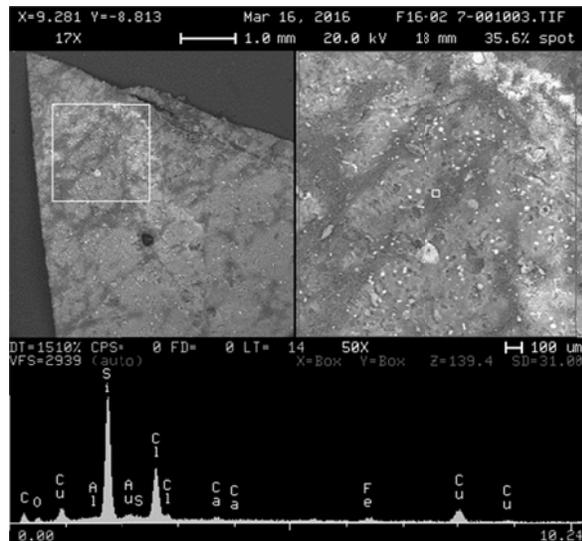
The compilation of spectra below shows two backscatter electron images and an energy dispersive spectrum for the spot indicated by a small square in the top right image. The top right image is a close up of the top left image.

The sample was analyzed with both spot analyses and scanning analyses. The aim was to identify the nature of the black charring and to cover the center as well as the rim of the filter. One hole was in particular investigated for any differences in composition. From the optical appearance and from the chemical analyses it seems that individual impacts of 0.1 to 1 mm melted in some instances to larger holes.

Investigation of center part:

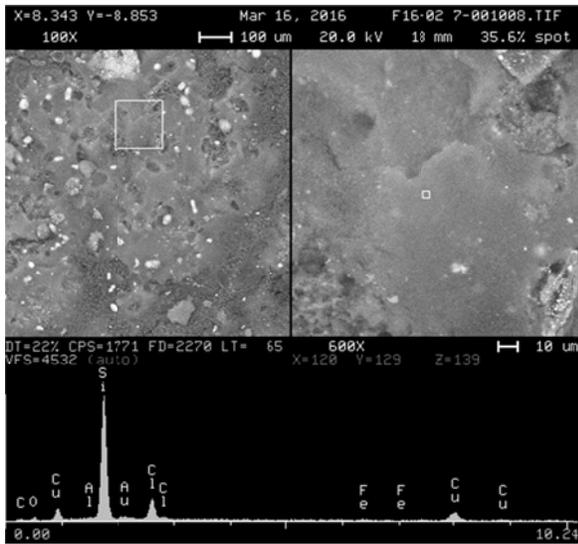
(left) Base material contains Si, Cl, minor Cu & Fe.

(right) Globule made of Si, Cu, minor Ca, Fe, Al.

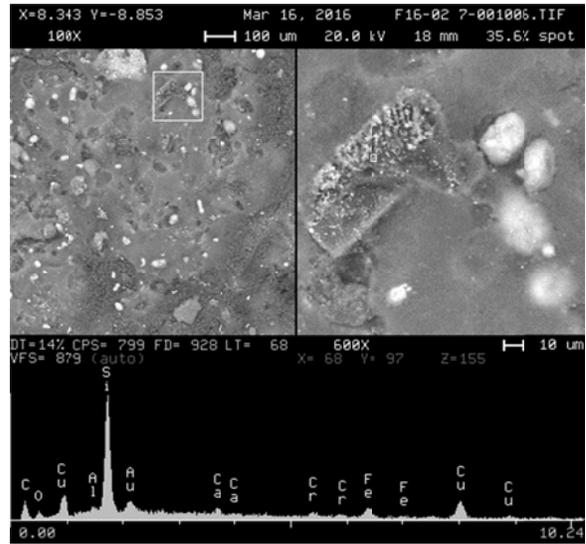


Investigation of middle part:

(left) Base material contains Si, Cl, minor Cu.



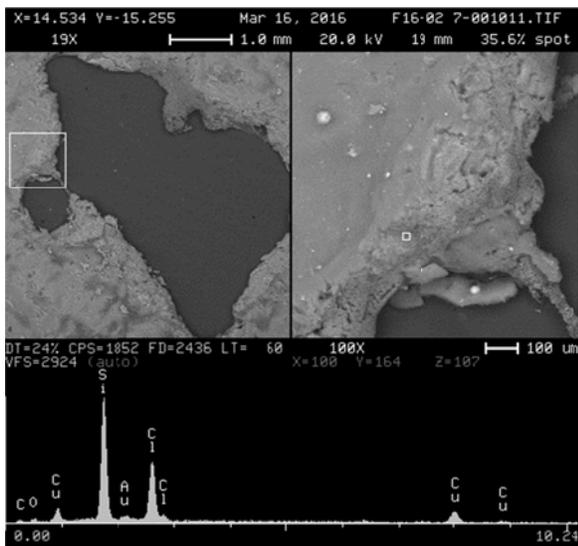
(right) Particle made of Si, Cu, minor Ca, Fe, Cr.



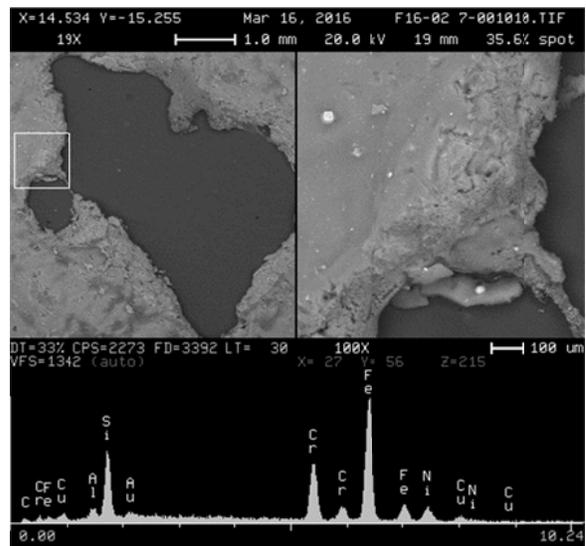
Note: spectrum above is aerial scanning over the whole region of the top right image.

Investigation of hole:

(left) Base material contains Si, Cl, minor Cu.

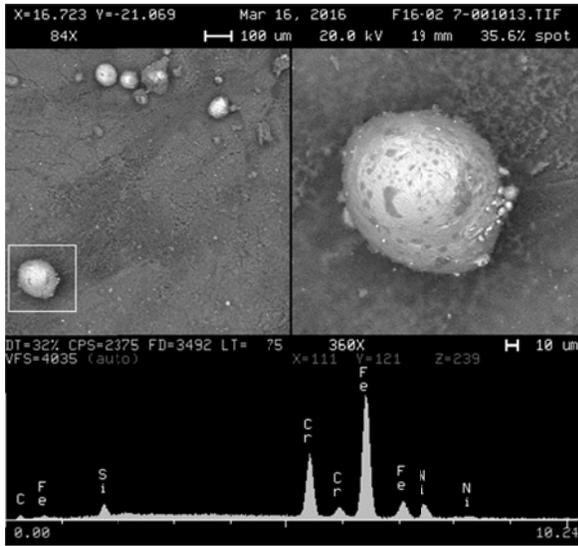


(right) Particle made of Fe, Si, Cr, minor Cu, Ni.

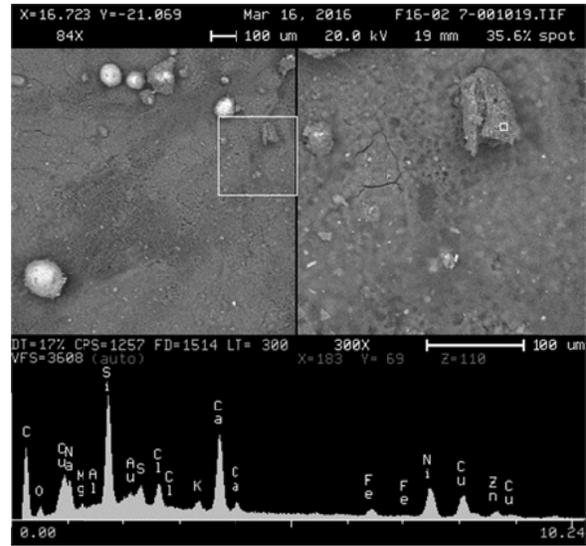


Investigation of globules/particles:

(left) Example of spherical particle.

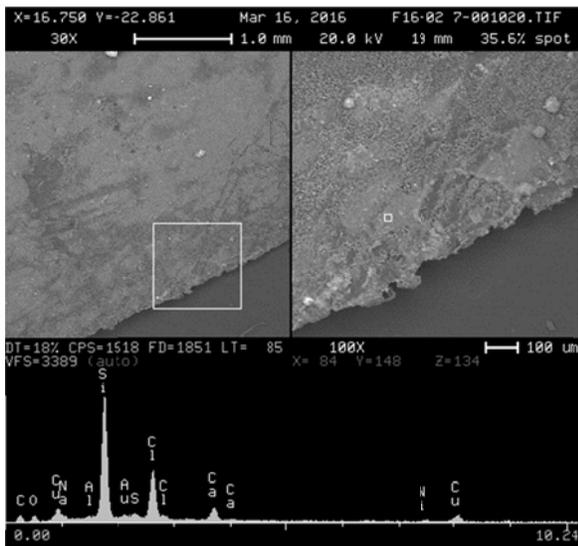


(right) Example of irregularly shaped particle.

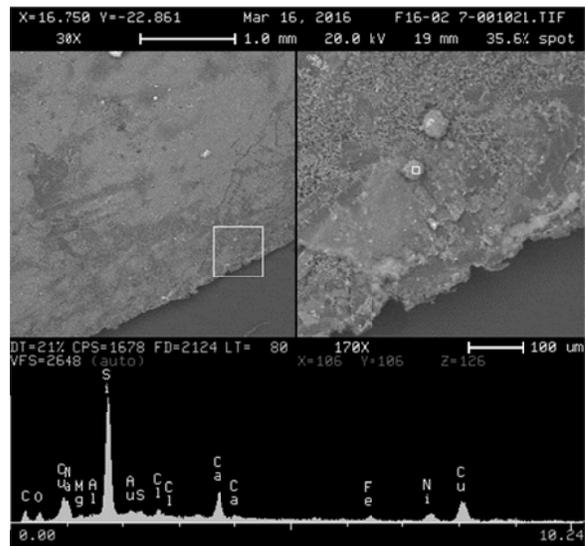


Investigation of rim area:

(left) Base material contains Si, Cl, minor Ca.

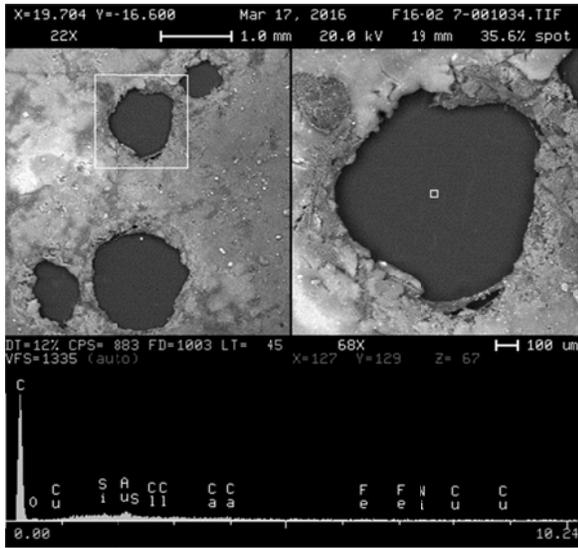


(right) Particle made of Si, Ca, minor Cu, Na.

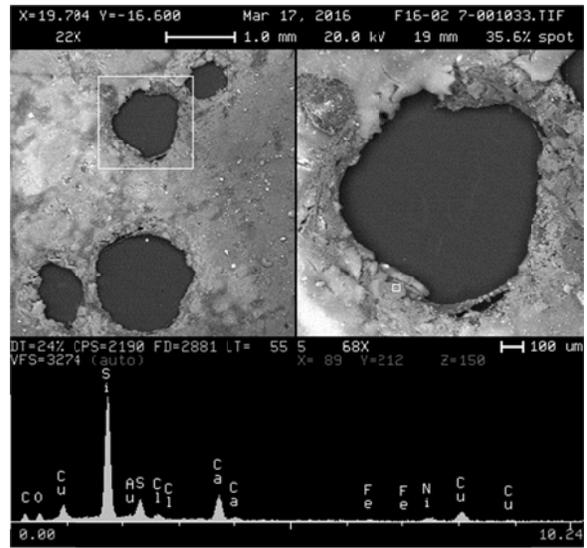


Investigation of carbon peak in “background”:

(left) Spectrum of carbon tape.

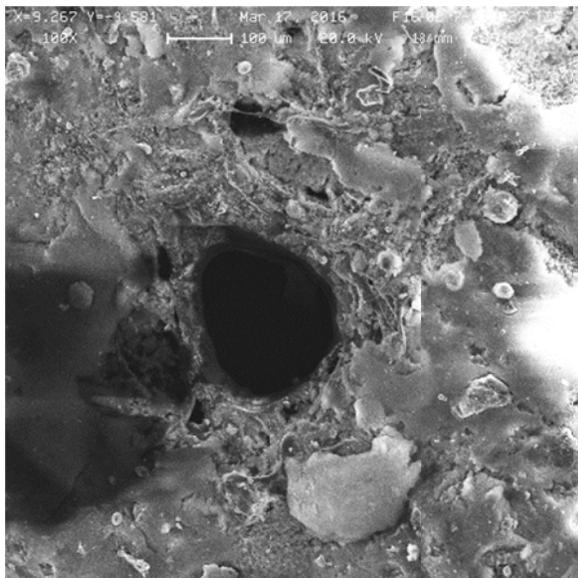


(right) Spectrum of background material.

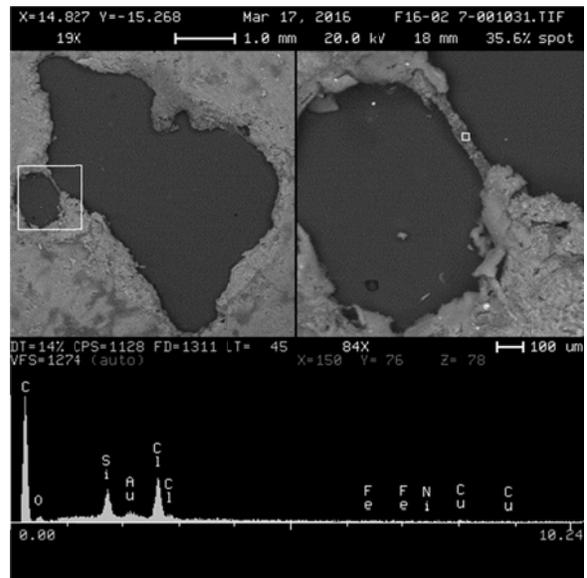


Investigation of different hole shapes:

(left) Overview of individual impact.



(right) Images and spectrum of irregular hole.



The right image implies that several individual impacts melted together to form the currently visible form.

(left) Deposited material made of Si, minor Cu, Cl.

(right) Rim around holes is made of Si and Cl.

