# RJ Lee*Group*, Inc.

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**The Materials Characterization Specialists**


February 19, 2002

Mr. Mike Schwanz
Transport Workers Union Local 567
22050 Golden Triangle Drive
Fort Worth, TX 76177

RE: Characterization of Three Samples
RJ Lee Group Project No. ESW202023

Dear Mr. Schwanz:

This letter summarizes the results of the analyses performed on one bulk sample and two fibrous filter media samples, which we received on February 5, 2002 (reference your Request for Lab Analytical Services dated January 23, 2002). The samples were identified as follows:

| Transport Workers Union Sample ID | RJ Lee Group, Inc. Sample No. | Description |
|---|---|---|
| Peterson | 621231 | Central Clean 1/2/01 |
| Sample A | 621232 | Blade tip filter "A" 12/01- 1/3/02 |
| Sample B | 621233 | Blade tip filter "B" 1/3/02 - 1/15/02 |

The purpose of this investigation was to characterize the particle matter associated with the three samples. Optical light microscopy and manual scanning electron microscopy (MSEM) techniques were used.

Sample preparation involved sprinkling a portion of the bulk sample onto double sided tape mounted onto an SEM stub. For the two filter samples, a small portion of the filter material was directly mounted on an SEM stub using double sided tape. The samples were analyzed in the variable pressure mode of our Personal SEM.

**Peterson Sample**

An optical examination of the Peterson sample revealed a tan powder material with an abundance of glass fibers, frequently observed in long bundles. Sliver-like material, tan in color and large pieces of resin-like material, similar in appearance to a polyurethane were observed.

The MSEM analysis revealed that a major constituent on the sample was C-rich agglomerates with varying amounts of Mg/Si-rich, Si-rich, Ca-rich and Ti/rich particles attached or embedded, Figure 1. Figure 2 illustrates loose C-rich particles observed throughout this sample. The majority of the sliver-like material observed optically was determined to be elongated agglomerates of the same elemental make up as the above mentioned material, Figure 3. A moderate amount of silicon/aluminum/calcium-rich glass fibers was detected, Figure 4.

**Sample A**

An optical examination of the Sample A filter indicated a heavy loading of relatively fine tan particulate. No glass fibers were observed.

The MSEM analysis revealed a major amount of C-rich material with varying amounts of Mg, Si, Ca and Ti, Figure 5. Minor amounts of Fe/Ni/Cr-rich slivers, possible stainless steel, were observed in various shapes and sizes, Figure 6.

**Sample B**

An optical examination of the Sample B filter indicated a light particulate loading. No glass fibers were observed.

The MSEM analysis revealed that fine (<10 micrometer) C-rich, Mg/Si-rich and Ca-rich particulate was adhered to the fibers of the filter media, Figures 7 and 8. The C-rich particle appears to be the major particle type. However, due to the light particle loading, the small size of the particles, the interweaving of the filter media fibers and the overwhelming elemental make up of the filter media fibers, accurate elemental composition of the adhered particles was difficult. The filter media was composed of C-rich (cellulose fibers) coated with a non-continuous layer of Cl-rich material, possibly a polyvinyl chloride.

These results are submitted pursuant to RJ Lee Group's current terms and conditions of sale, including the company's standard warranty and limitation of liability provisions. No responsibility or liability is assumed for the manner in which the results are used or interpreted. Unless notified to return the samples covered by this report, RJ Lee Group will store them for a period of thirty (30) days before discarding.

Should you have any questions regarding this information, please do not hesitate to contact me.

Sincerely,

John C. Johns
Project Manager
Environmental Services

Stephen K. Kennedy, PhD, P.G.
Consulting Geologist

Attachments

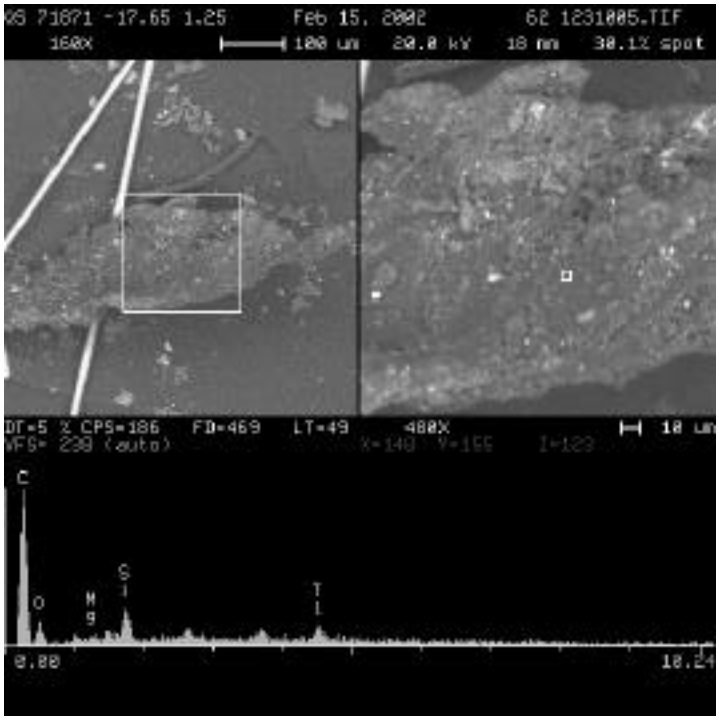


Figure 1. Example of a C-rich agglomerate observed on the Peterson sample.

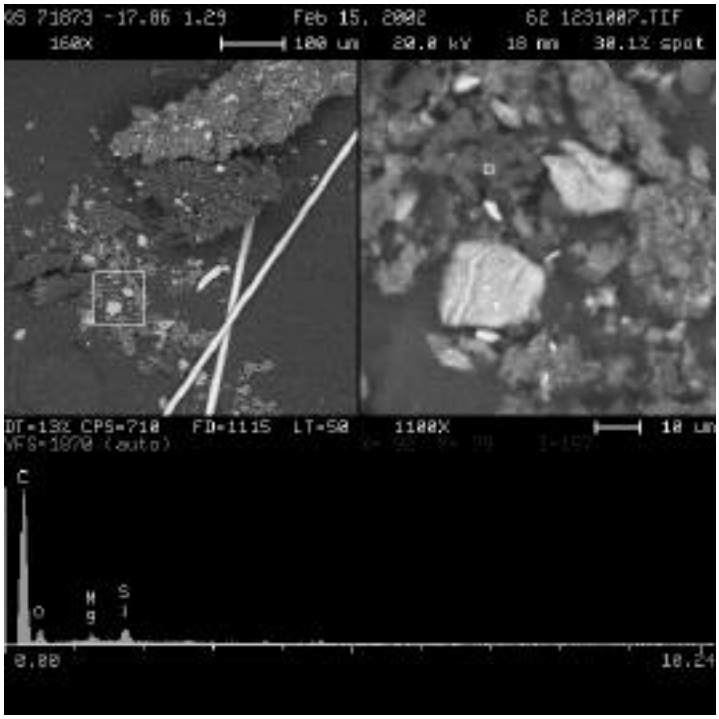


Figure 2. Example of loose C-rich material observed on the Peterson sample.

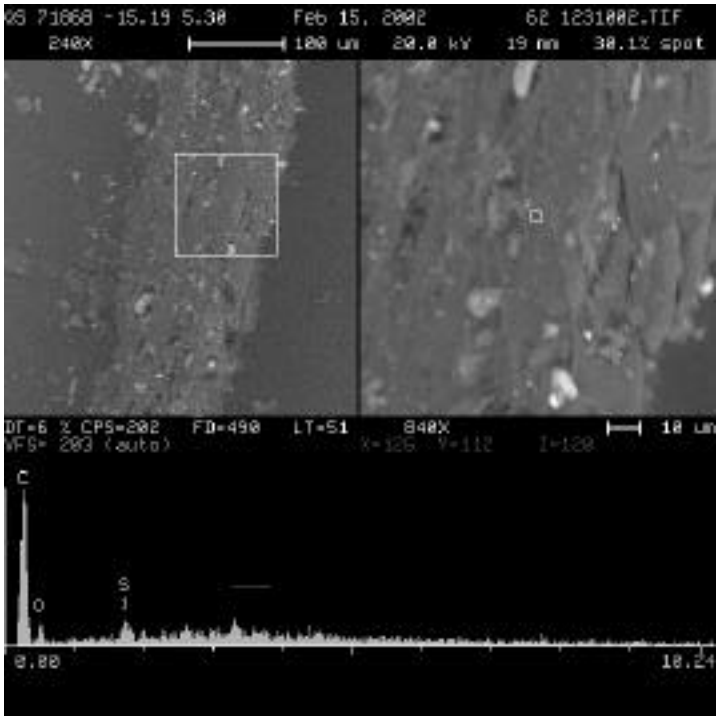


Figure 3. Example of an elongated C-rich agglomerate observed on the Peterson sample.

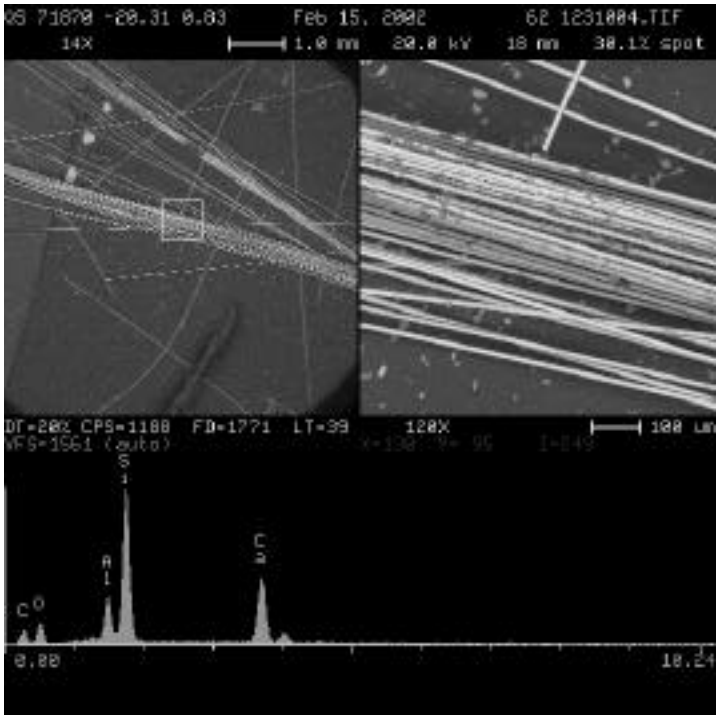


Figure 4. Example of glass fibers observed on the Peterson sample.

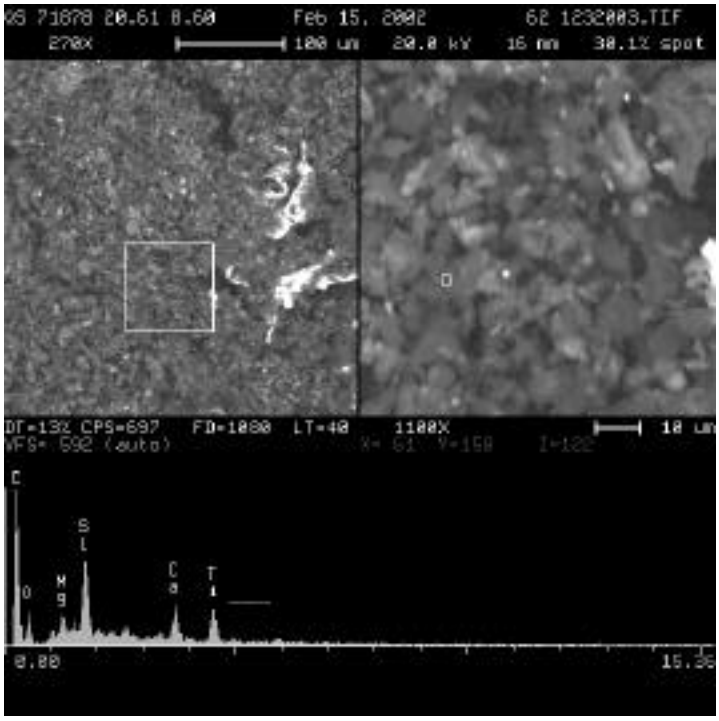


Figure 5. Example of C-rich particulate observed on the Sample A filter.

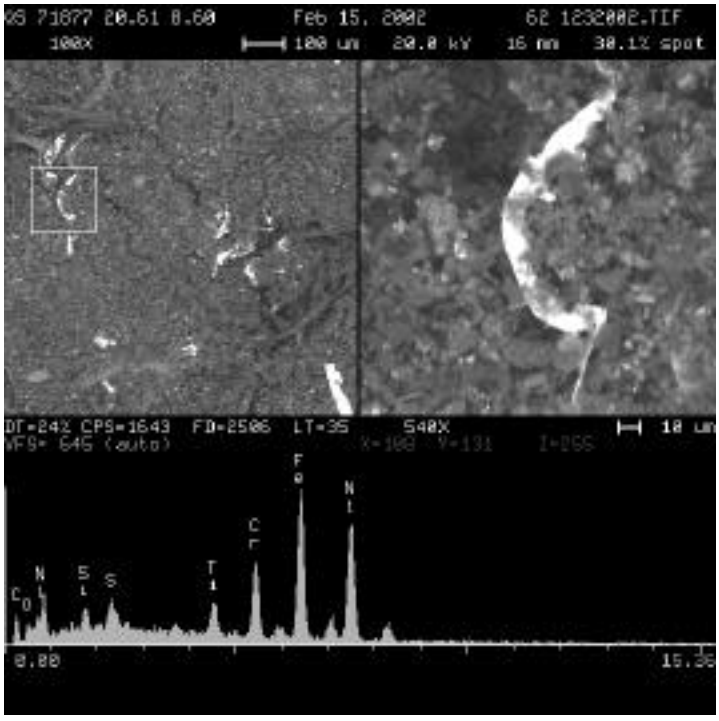


Figure 6. Example of possible stainless steel sliver observed on the Sample A filter.

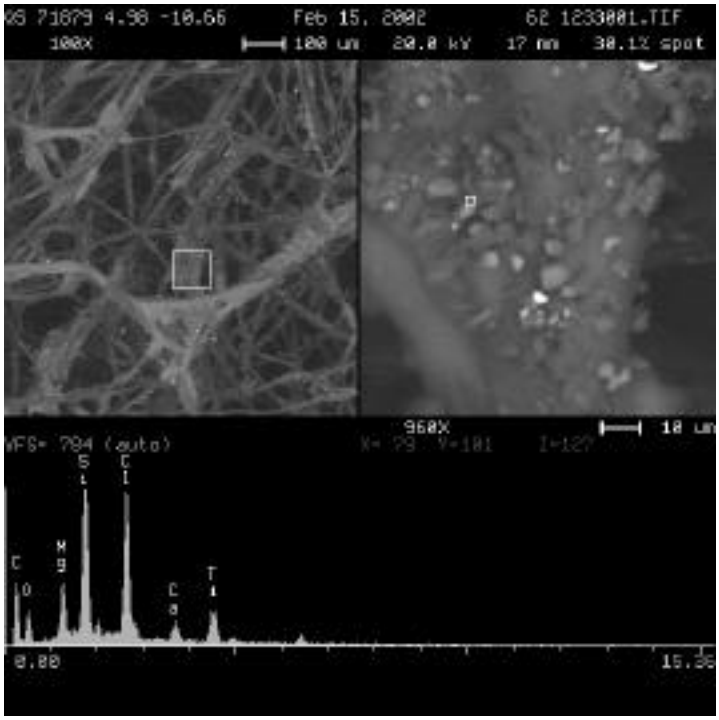


Figure 7. Example of adhered particulate observed on the Sample B filter.

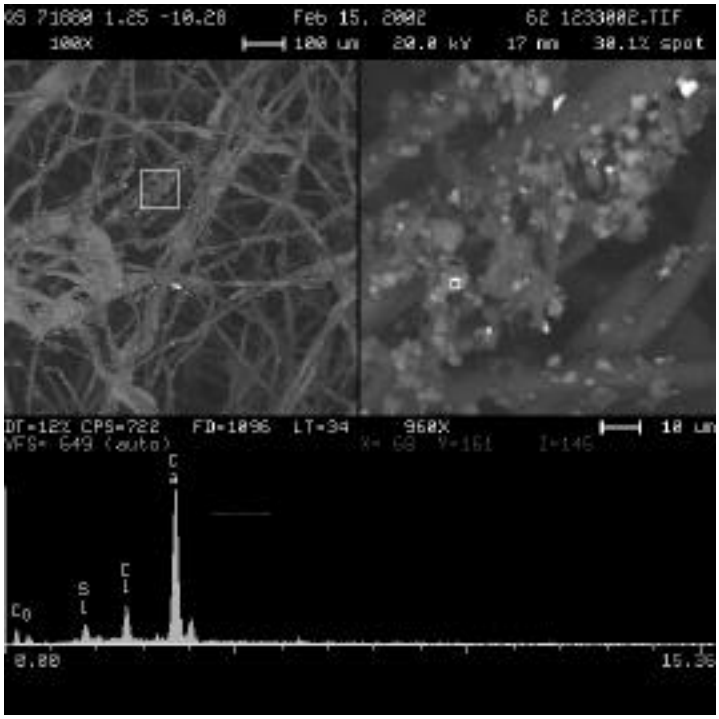


Figure 8. A second example of adhered particulate observed on the Sample B filter.