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14 June 2012

Mr. Benjamin Schmidt  
Air Quality Specialist  
Missoula City-County Health Dept.  
301 West Alder Street  
Missoula, MT 59802

**Subject: Analysis of Dust Samples**  
**Re: McCrone Associates Project MA53061**

Dear Mr. Schmidt:

We have completed our analysis of the above referenced samples. This analysis was performed under authorization of your purchase order number AIR45. The following report summarizes our methodology and the results.

**SAMPLE RECEIPT**

On 16 April 2012, McCrone Associates received by via UPS. The items were identified in the Sample Submission Form as follows:

- A. Tape Sample, 200 Block Rail Road Street, 65°F, Swirling 8 mph wind
- B. Cloth sample, 314 N 1<sup>st</sup> St. West
- C. Tape sample, 314 N 1<sup>st</sup> St. West
- D. Cloth Sample, Bike/Ped Bridge on North side of railroad track

You requested that the four samples be analyzed for coal dust particulates. You request that the approximate % of material that is coal dust be determined.

**ANALYSIS**

Sample A consisted of dust collected on a tap lift. The tape lift was received attached to a glass slide and examined as received. The particles were collected on frosted tape making examination of the particles difficult. A portion of the tape was removed and placed on a separate microscope slide with the adhesive side up for additional analysis. With the particles embedded in the adhesive of the tape it was not possible to confirm steel/steel corrosion particles with a magnet.

Mr. Benjamin Schmidt  
MA53061

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Sample B consisted of a cloth wipe supporting a pinkish black particle load. A portion of the dust was removed from the wipe and transferred to a microscope slide for analysis.

Sample C consisted of dust collected on a tap lift. The particle load on the tape was very sparse. Many of the particles appear to be metal/metal corrosion, pinkish colored paint flakes some mineral grains, coal dust particles. The particles were distributed in clumps on the tape making a determination of the percentage of the different particle types difficult. The particles were collected on frosted tape making examination of the particles difficult. A portion of the tape was removed and placed on a separate microscope slide with the adhesive side up for additional analysis. With the particles embedded in the adhesive of the tape it was not possible to confirm steel/steel corrosion particles with a magnet.

Sample D consisted of a cloth wipe supporting a greenish black particle load. A portion of the dust was removed from the wipe and transferred to a microscope slide for analysis.

Each sample was analyzed using a combination examination by stereomicroscope and polarized light microscopy (PLM) to determine the relative percentages of the different particle types. With polarized light microscopy (PLM) particles are identified by observing: transparency or opacity, texture (internal and surface), color (by transmitted and reflected light), pleochroism, size, shape, presence or absence and degree of birefringence, refractive indices relative to the mountant, cleavage, fracture, sign of elongation (if applicable), hardness, tendency to dissolve, magnetic susceptibility, and other features depending on the actual particle being observed. These observations coupled with experience generally enable the identification of more than 95% of the particles in a given dust sample. The relative quantity of each component in the dust is estimated by arriving at a volume percentage for each component by inspection of numerous fields of view. These estimates have an average precision of approximately  $\pm 10\%$ . The results our analyses are summarized in Table 1.

This testing was conducted in a Good Manufacturing Practices compliant laboratory.

Thank you for consulting McCrone Associates. Your samples will be retained for 30 days after the date on the final report and then discarded unless you direct otherwise. If you have any questions regarding this report, please contact me.

Sincerely,

Mark A. Bukantis  
Research Microscopist

MAB:  
Ref: MA53061; P.O. AIR45

Mr. Benjamin Schmidt  
MA53061

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**TABLE 1****Summary of Particle Analysis by PLM**

<b>Sample Number</b>	<b>Component</b>	<b>Relative abundance (Estimated % by volume)</b>
Sample A Tape Sample 200 Block Rail Road Street, 65°F, Swirling 8 mph wind	<ul style="list-style-type: none"> <li>• Miscellaneous mineral grains</li> <li>• Coal dust</li> <li>• Metal/metal corrosion</li> <li>• Pinkish paint flakes</li> <li>• Miscellaneous plant material</li> </ul>	<p>40-50</p> <p>1-5</p> <p>30-40</p> <p>5-10</p> <p>5-10</p>
Sample B Cloth sample 314 N 1 <sup>st</sup> St. West	<ul style="list-style-type: none"> <li>• Pinkish-red paint flakes</li> <li>• Miscellaneous mineral grains</li> <li>• Steel/steel corrosion</li> <li>• Welding spheres</li> <li>• Miscellaneous plant material</li> <li>• Tire rubber</li> <li>• Coal dust</li> </ul>	<p>10-20</p> <p>60-70</p> <p>5-10</p> <p>1 - 2</p> <p>2-5</p> <p>2-5</p> <p>1-5</p>
Sample C Tape sample 314 N 1 <sup>st</sup> St. West	<ul style="list-style-type: none"> <li>• Coal dust</li> <li>• Miscellaneous mineral grains</li> <li>• Pinkish paint flakes</li> <li>• Steel/steel corrosion</li> <li>• Miscellaneous plant material</li> </ul>	<p>Particles are too sparse to accurately estimate the concentration of different particle types</p>
Sample D Cloth Sample Bike/Ped Bridge on North side of railroad track	<ul style="list-style-type: none"> <li>• Green paint flakes</li> <li>• Colorless flakes</li> <li>• Miscellaneous plant material</li> <li>• Miscellaneous mineral grains</li> <li>• Steel/steel corrosion</li> <li>• Welding spheres</li> <li>• Coal</li> </ul>	<p>30-40</p> <p>2-5</p> <p>10</p> <p>40</p> <p>5-10</p> <p>1-2</p> <p>1-5</p>