rate by a flow controller in the pump so that, as the filter becomes dirtier and more restrictive, the pump works harder to maintain a constant air flow. These pumps must be calibrated so that the reading of the flow meter on the pump is known to correspond to a specific flow rate, in liters per minute.

When background air monitoring is needed, such as validating that a cleaned area is asbestos free, higher flow rate pumps are often used. Then, large volumes of air can be drawn through a filter in a few hours of sampling. These pumps are *not* battery operated and pull air through a filter at a flow rate of 10 to 20 l/m. Large volume pumps do not have flow controllers and the pump flow meter should be checked several times during the sampling period so that constant flow rate can be maintained.

Analysis of the Filter...

Filters are analyzed for asbestos fibers using microscopy. Today, most analyses are by optical microscopy but the use of transmission electron microscopy (TEM) is growing. This latter technique can positively identify each fiber to confirm that it is asbestos whereas optical microscopy can only separate asbestos like fibers from fibrous glass. However, the cost of TEM is 20 to 30 times that of optical microscopy. Also, all OSHA compliance monitoring is by optical microscopy.

"Both systems (for asbestos monitoring) contain a cellulose filter and allow 'open faced' sampling."

When analyzing using optical microscopy only a portion of the whole filter is used. The remnant can be stored away indefinitely for future re-testing if desired. Since only a portion is analyzed and only a small percentage of the portion is actually examined at 400 power under the microscope, it is essential that dust distribution over the filter face be uniform. In the calculation of the amount of asbestos, the measured amount per unit filter area is multiplied by the entire area to get total asbestos collected. This is why open faced sampling is necessary.

There is a minimum amount of asbestos that can be accurately counted with the technique. Generally, laboratories and agencies choose a minimum of 10 fibers observed in 100 magnified fields of view of the filter to set the lower limit of accurate quantification. This calculates to approximately 20,000 total fibers collected on the whole filter.

Airborne asbestos is generally measured in fibers per cubic centimeter of air (f/cc). To calculate the average air concentration during a