

# Asbestos PCM Air Sampling

## Air Sampling for PCM Analysis

Source: NIOSH 7400 and OSHA ID-160

Note: While this guide recommends common practices, other requirements might vary by state and/or agency.

### Objective

- To capture and quantify the amount of airborne asbestos and non-asbestos fibers present in the air.
- To assess whether the levels present suggest an elevated fiber concentration.

### Advantages and Disadvantages

- **Advantages**
  - The analysis is quick and inexpensive.
  - The analytical technique is specific for fibers. Phase contrast is a fiber counting technique that excludes non-fibrous particles from the analysis.
- **Disadvantages**
  - The analytical technique does not positively identify asbestos fibers. Other fibers that are not asbestos may be included in the count.
  - The smallest visible fibers detected by PCM usually are about 0.2  $\mu\text{m}$  in diameter while the finest asbestos fibers may be as small as 0.02  $\mu\text{m}$  in diameter. So for some exposures, substantially more fibers may be present than are actually counted.

### Equipment

- Sampler: field monitor, 25-mm, three-piece cassette with 50-mm electrically conductive extension cowl and cellulose ester filter, 0.45 to 1.2  $\mu\text{m}$  pore size and back up pad. (0.80  $\mu\text{m}$  pore size filters are recommended for PCM analysis and 0.45  $\mu\text{m}$  pore size filters are recommended for TEM analysis.)
- Personal sampling pump
- Wire, multi-stranded, 22-gauge; 1", hose clamp to attach wire to cassette
- Flexible tubing, 6-mm bore
- Tape, shrink- or adhesive
- Pump calibration: Stopwatch and bubble tube/burette, electronic meter, or rotameter. (Please note the use of a rotameter is an industry standard and not part of the NIOSH 7400 method.)

### Sampling Protocols

- Charge the pumps completely before beginning.
- To reduce contamination and to hold the cassette tightly together, seal the point where the base and cowl of each cassette meet, with a gel band or tape.
- Connect each pump to a calibration cassette with an appropriate length of 6-mm bore plastic tubing.
- Select an appropriate flow rate for the situation being monitored. The sampling flow rate must be between 0.5 and 5.0 L/min for personal sampling and is commonly set between 1 and 2 L/min. Always choose a flow rate that will not produce overloaded filters.

- Calibrate each sampling pump before and after sampling with a calibration cassette in-line (Note: This calibration cassette should be from the same lot of cassettes used for sampling). Use a primary standard (e.g. bubble burette) to calibrate each pump or a secondary standard such as a rotameter. If possible, calibrate at the sampling site.
- Connect each pump to the base of each sampling cassette with flexible tubing. Remove the end cap of each cassette and take each air sample open face. Assure that each sample cassette is held open side down in the employee's breathing zone during sampling. The distance from the nose/mouth of the employee to the cassette should be about 10 cm. Secure the cassette on the collar or lapel of the employee using spring clips or other similar devices.
- A suggested minimum air volume when sampling to determine TWA compliance is 25 L. For Excursion Limit (30 min sampling time) evaluations, a minimum air volume of 48 L is recommended.
- The most significant problem when sampling for asbestos is overloading the filter with non-asbestos dust. Suggested maximum air sample volumes for specific environments are:

Environment	Air Volume (L)
Asbestos removal operations (visible dust)	100
Asbestos removal operations (little dust)	240
Office environments	400 to 2,400

**Note:** Do not overload the filter with dust. High levels of non-fibrous dust particles may obscure fibers on the filter and lower the count or make counting impossible. If more than about 25 to 30% of the field area is obscured with dust, the result may be biased low. Smaller air volumes may be necessary when there is excessive non-asbestos dust in the air. While sampling, observe the filter with a small flashlight. If there is a visible layer of dust on the filter, stop sampling, remove and seal the cassette, and replace with a new sampling assembly. The total dust loading should not exceed 1 mg.

- Blank samples are used to determine if any contamination has occurred during sample handling. Prepare two blanks for the first 1 to 20 samples. For sets containing greater than 20 samples, prepare blanks as 10% of the samples. Handle blank samples in the same manner as air samples with one exception: Do not draw any air through the blank samples. Open the blank cassette in the place where the sample cassettes are mounted on the employee. Hold it open for about 30 seconds. Close and seal the cassette appropriately. Store blanks for shipment with the sample cassettes.
- Immediately after sampling, close and seal each cassette with the base and plastic plugs. Do not touch or puncture the filter membrane, as this will invalidate the analysis.
- Attach a seal around each cassette in such a way as to secure the end cap plug and base plug. Tape the ends of the seal together since the seal is not long enough to be wrapped end-to-end. Also wrap tape around the cassette at each joint to keep the seal secure.

## Shipping

- Ship samples with conductive cowl attached in a rigid container with packing material to prevent jostling or damage. Do not use untreated polystyrene foam in shipping container because electrostatic forces may cause fiber loss from sample filter.
- To avoid the possibility of sample contamination, always ship bulk samples in separate mailing containers.