As discussed in Chapter 3 (Section 3.3.2), the direct measurement of airborne asbestos fibers requires the use of electron microscopy (EM) and is both technically complex and expensive. However, the NIOSH recommended air monitoring method based on phase contrast microscopy (PCM) is a practical alternative to EM for this application. The detection limit of PCM can be used to establish that levels of total (asbestos and nonasbestos) fibers generated during an abatement action have been sufficiently reduced. Using the sampling specifications described below coupled with PCM measurement provides a practical air monitoring test to complement visual inspection as criteria for releasing abatement contractors.

The following sampling and analysis specifications are suggested for air monitoring after project completion and before containment barriers are dismantled:

- Sampling should begin after all surfaces at the worksite have dried but preferably within 48 hours after abatement work is finished.
- A total of approximately 1,000 liters or more of air should be sampled at a rate of no more than 2 liters per minute. (Thus, an 8-hour sampling period would produce a sample volume of 960 liters.)
- A minimum of three monitors per worksite and at least one per room should be used.

For a sample volume of approximately 1,000 liters of air, the lower detection limit for phase contrast microscopy is about 0.03 fibers per cubic centimeter.* It must be noted that the lower detection limit decreases as the volume of air sampled increases. Therefore, if the lower detection limit is used as a standard for releasing the contractor, the standard can be made more stringent (lower than 0.03 fibers per cubic centimeter) by increasing the volume of air sampled.

Table 3 shows calculated detection limits for various sampling volumes. As shown, a sampling volume of almost 3,000 liters will decrease the detection limit of PCM to 0.01 fibers per cubic centimeter. This table also can serve as a guide for determining whether levels of airborne fibers reported by air monitoring contractors are reliable for sampling volumes less than 1,000 liters, even though such low volumes are not recommended. More information on detection limits can be found in Appendix G.

Table 3. Total Airborne Fiber Detection Limits and Associatied Sampling Volumes (for the NIOSH P&CAM 239 Method)

Sampling time @ 2 liters per minute (hours)		Volume collected (liters)	Detection limit[a] (fibers per cubic centimeter)
2	Not	240	0.119
6	recommended	720	0.041
8		960	0.030
24		2,880	0.010

[a] Assumes a microscopic field area of 0.003 square millimeters. Some microscopes have field areas as large as 0.006 square millimeters, which would decrease the detection limits shown by half. See Appendix G for details.

*This determination is based on a minimum detection limit of 10 fibers per 100 microscopic fields for PCM reported in Leidel, et al 1979. See Appendix G for additional information on calculating detection limits.

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