

Guidance for Project Monitors

PCM Compliance with NIOSH 7400 Method

This guidance document is a summary of the key points of the NIOSH 7400 Method and is not intended to be all inclusive of the NIOSH 7400 Method or 454 CMR 28.00.

What is the “State of the Art” method for sample preparation?

When clearance air samples are analyzed by Phase Contrast Microscopy (PCM), either on site or in the laboratory, the sample collection, preparation and counting rules must comply with the NIOSH 7400 Method, Issue 3, dated June 14, 2019. This is the method taught by asbestos training providers in the NIOSH 582 course, which is a pre-requisite to obtaining a Massachusetts Asbestos Project Monitor license.

The standard preparation method taught in the NIOSH 582 course includes the use of reagent grade acetone and triacetin, and a “hot block” or similar flash vaporization technique outside the laboratory.

An overview of the sample preparation:

- A wedge cut from the sample filter is mounted on a clean glass slide. The “hot block” is heated to 70 degrees C, and the slide is inserted into the receiving slot at the bottom of the “hot block”. A flameless, spark free heat source is preferred due to the flammability of acetone.
- Acetone (250 microliters) is injected slowly with a micropipette into the inlet port of the “hot block”, using steady pressure.
- After waiting 3 to 5 seconds for the filter to clear, remove the micropipette and the glass slide.
- Triacetin (3-3.5 microliters) is immediately applied to the wedge, and a cover slip gently placed on top within 30 seconds. Angle the cover slip to avoid creating bubbles.
- Mark the outline of the filter segment on the bottom of the slide with a permanent marker to facilitate fiber counting.
- Seal the edges of the cover slip with clear nail polish.

Is the P&CAM 239 Method approved for PCM sample preparation?

This is a very early method (P&CAM 239 in Appendix F). The method is not taught in the NIOSH 582 course and is not consistent with “state of the art” work practices when analyzing clearance air samples by PCM.

P&CAM is not used for PCM analysis for the following reasons:

- The reagent DMF/glacial acetic acid is toxic by inhalation and absorption through the skin.
- P&CAM 239 used dimethyl phthalate and diethyl oxalate, and are not further discussed in the NIOSH 7400 method.
- The temperature cannot be controlled to the required temperature 60 degrees C (+2 or -5 degrees). The use of lighters or open flame are not recognized methods of warming slides.
- DMF solution must be made at least once per week and kept in a dark brown bottle. The bottle must indicate preparation date. It must be stored in a ventilated flammable storage cabinet.
- Requires the use of a drying oven or warming plate used under a fume hood.
- After adding acetic acid, the prepared slide mount must be warmed to approx. 60 degrees C for 30 minutes in a drying oven or a warming plate.
- After adding the Euparal, the slide must be warmed again to approx. 60 degrees C for one hour to polymerize the Euparal resin.
- Each step must be followed in the exact sequence listed.
- P&CAM 239 was initially published in 1977 and was rewritten and renamed NIOSH 7400 Method in 1984, incorporating newer technology and faster methods.

What is the overall laboratory QA/QC requirements for the P&CAM method?

Any Massachusetts licensed asbestos analytical service that uses this method must have it clearly specified in the laboratory's quality control program. The laboratory must show evidence that it is complying with its QA/QC program, including:

- the schedule for preparing reagents
- storage of reagents
- a set of proficiency slides of the required fiber loadings
- maintaining data on the standard deviations for each reference slide and each set of results
- maintaining data on each analyst accuracy and precision
- participate in inter-laboratory and intra-laboratory proficiency programs
- all other QA/QC controls listed in the method and in state/federal regulations

All laboratory reports issued must indicate when P&CAM is the method of PCM used for analysis. Since this method is not considered "state of the art", contracts that require clearance air sampling by PCM will be performed using the NIOSH 7400 standard method.

What are the microscopist quality control measures?

For analysis of air samples in the field, the analyst/project monitor must be an employee of the laboratory.

Sample collection pumps must also be calibrated prior to, and upon completion of the air sampling.

Submit at least 2 blanks with each set of samples (a field blank and laboratory blank). The sampling time can be adjusted to 1080 liters of air or more to achieve optimum fiber loading during clearance air sampling of a relatively clean environment.

Each analyst is responsible for microscope calibration and quality control measures. Some of the important duties include:

- At least once daily, align the phase rings so they are concentric.
- For each microscope, keep an electronic logbook to keep dates of microscope cleaning/service and a log book for microscope calibration.
- Check the phase shift detection limit periodically with the phase contrast test slide. If the number of visible lines does not match the accompanying certificate, the test slide resolution will be either too low or too high for fiber counting.
- Measure the diameter of the Walton-Becket graticule.
- Count a reference slide and a blank slide with each batch of samples analyzed, and record results on the chain of custody.
- Participate in laboratory QA/QC proficiency programs.
- Comply with any other requirements of the method and state/federal regulations.