Field Sampling

The laboratory shall document that all sampling equipment, containers and media used or relinquished by the laboratory meet required test method criteria. Procedures for field equipment decontamination shall be developed and their use documented. The laboratory shall have a documented program for the calibration and verification of sampling equipment such as pumps, meter boxes, critical orifices, flow measurement devices and continuous analyzers.

Training

Laboratory personnel involved in sample collection shall have a combination of experience and education to adequately demonstrate a specific knowledge of the sampling procedures used and their advantages and disadvantages, quality assurance/quality control and sample records management. Training courses and workshops on the use, maintenance, and repair of specific sampling and analytical equipment shall be documented. The laboratory shall establish criteria for an initial demonstration of analyst proficiency and document the proficiency of each analyst. All individuals performing airborne fiber analysis shall have taken the NIOSH 582 fiber counting course for sampling and evaluating airborne asbestos dust or an equivalent course.

Barometer

Aneroid barometers shall be calibrated with a NIST traceable barometer before initial use and annually thereafter. NIST traceability may be achieved using a primary standard (i.e., mercury barometer or piston gauge) or through the use of an external calibration service.

> **Record**: Date, calibration readings, correction factor and analyst's signature in a bound notebook.

Working barometers may be calibrated on-site against a NIST traceable barometer. Each working barometer should be uniquely identified by a number and calibrated at the points of interest prior to being placed into service and annually thereafter.

> **Record**: Date, barometer number, correction factor or correction made and analyst's signature in a bound notebook.

Bomb Calorimeter

Bomb calorimeters shall be calibrated after servicing or twice per year using benzoic acid to calculate energy equivalent factor of each bomb used.

> **Record**: Date, bomb ID, grams of benzoic acid, net corrected temperature rise, acid titration data, fuse wire correction, sulfur correction, calculation of energy equivalent factor and analyst's signature in a bound notebook.

Dry Gas Meter

The dry gas meter used as a calibration standard for volume measurements shall be calibrated before initial use and annually or every 200 hours of operation, whichever is more frequent. Dry gas meters shall be calibrated with a wet test meter or spirometer.

> **Record**: Date, calibration readings, correction factor or calibration curve and analyst's signature in a bound notebook.

Rotameter

Rotameters shall be calibrated against a primary standard such as an NBS traceable, factory certified bubble meter or a wet test meter before initial use and every three months thereafter.

> **Record**: Date, calibration readings, correction factor or calibration curve and analyst's signature in a bound notebook.

Phase Contrast Microscopy (PCM)

The checks listed below for PCM are to be done per analyst per scope.

The phase-ring alignment shall be checked ***daily or next use***, whichever is less frequent, with an ocular phase-ring centering telescope.

> **Record**: Date, alignment, action taken (if any), analyst's signature, and scope used (if more than one available) in a bound notebook.

A ***monthly*** check of the phase-shift detection limit shall be performed with a phase shift (i.e., HSE/NPL) test slide.

> **Record**: Date, detection limit, action taken (if any), analyst's signature, and scope used (if more than one available) in a bound notebook.

A ***monthly*** check of the field diameter of the Walton-Beckett graticle with a stage micrometer shall be performed. If the diameter is less the 98μm or greater than 102μm, have the microscope adjusted by someone qualified to service the microscope, or the graticule must be replaced by one meeting the diameter specifications of 100 +/- 2μm. The calibrated diameter must be used in calculating results.

> **Record**: Date, diameter, calculated area (mm^2), action taken (if any), analyst's signature, and scope used (if more than one available) in a bound notebook.

Each analyst shall count a reference slide each day on which counts are performed and calculate relative standard deviation. The reference slide shall be selected from a reference slide library containing slides with fiber densities covering the entire range routinely analyzed (including 5-20, 21-50, and 51-100 fibers/100 fields).

> **Record**: Date, result (F/mm^2), control limits, analyst's signature, and scope used (if more than one available) in a bound notebook. Analyst Data shall be posted for each slide and the standard deviation and corresponding limits of acceptability.

At least 10% of all samples must be "blindly" reanalyzed. A second person must re-label original slide so that the analyst is not aware of its identity. The two sets of results shall be compared according to NIOSH 7400 criteria for acceptance/rejection.

> **Record**: Date, sample ID, both results, accept/reject results, analyst's initials, and scope used (if more than one available).

Cassettes with filters are required to be kept in a retrievable fashion for a minimum of 60 days after the report has been sent to the client. During this time the cassette may be returned to the client at the client's request.

> **Record**: Date, sample ID, date of report, date and method of disposal, in a bound notebook.

Field blanks shall be prepared and counted. The number of field blanks required is 2 per batch of samples or 10% of the total number of samples collected in the batch, which ever is greater. A record of analysis shall be maintained.

Reports to clients must include the laboratory's relative standard deviation (from analyses of reference slides) appropriate for the range of results (F/mm^2) and the results reported in F/mm^2 and F/cc. The relative standard deviation is to be updated monthly for inexperienced analysts (< 1 year of experience) and semi-annually for experienced analysts (> 1 year of experience). Additionally, if the laboratory did <u>not</u> collect the samples, then a disclaimer must be added to client's report that states that the verifiability of the laboratory's results are limited to the reported F/mm^2.

Sealing Cover Slips with Lacquer

NIOSH Method 7400, Issue 3, Sample Preparation, C. C3. describes the method for sealing the edges of cover slips with lacquer or nail polish when mounting with triacetin. This sealing is required for any slide that is stored for 24 hours or longer following preparation.

Recording Analytical Data

NIOSH Method 7400, Issue 3, Measurement, Note 4 states, "Counts are to be recorded on a paper or electronic data sheet that provides, as a minimum, record of the counts for each field, filter identification number, ..." Recognizing that many laboratories are currently using clickers for tracking fiber counts, ELAP will require only that a 100-field sheet be utilized for each of the Quality Control blind recounts performed as specified in Calibration and Quality Control, Section 13. Laboratories which choose to use clickers for routine analysis, rather than the 100-field count sheets, must calibrate the clickers at least once per month and maintain documentation of that calibration.

Analyst Sample Load

NIOSH Method 7400, Issue 3, Measurement, Note 1 specifies a minimum counting time of 15 seconds per field, which equals 1500 seconds (25 minutes) of microscope time per 100-field sample. The method also makes it clear in Section 14 that analyst alertness is critical to quality analysis, and that appropriate rest periods be granted to analysts. ELAP recognizes that factors such as client requests for rush turnaround times and high volumes of low background slides may contribute to a analysis rate of greater than the two (2) slides per hour recommended by the method.

Therefore, if a laboratory intends to exceed the two (2) slides per hour recommended by NIOSH 7400, a performance-based Demonstration of Capability (DOC) must be established for each associated analyst. The DOC will establish the number of samples that can be accurately read per hour/ per analyst. Initial DOC's (iDOC) must be forwarded to ELAP for review and approval.

For new employees, and following ELAP approval of the iDOC, each analyst's continued DOC must be challenged quarterly (i.e., four times a year) by laboratory management, and all records must be maintained at the laboratory for review during on-site assessment during the first year of employment at the approved laboratory. After the first year of employment, each analyst must perform a continued DOC and be challenged semi-annually (i.e., two times a year) by laboratory management, and all records must be maintained at the laboratory for review during the on-site assessment. The DOC does not replace the routine QC that is to be performed by the lab throughout the rest of the year.

In an effort to accurately document the number of slides analyzed per analyst per each day, a record of the analysis date and time shall be recorded for each sample on bench

sheets. If the laboratory's analyst is found to be in exceedance of such demonstrated capability, a formal investigation of the laboratory's performance will result.

Sampling Train

1. Probe nozzles shall be calibrated before initial use. Each nozzle shall be uniquely identified by number. Using a micrometer, measure the inside diameter of the nozzle to the nearest 1.025 mm (0.001 in.) in three separate measurements using different diameters 120º apart. The difference between measured diameters shall not exceed 0.1 mm (0.004 in.). Check calibration after each field use.

   Record: Date, nozzle number, three micrometer measurements and analyst's signature in a bound notebook.

2. Pitot tubes shall be calibrated before initial use. Each pitot tube shall be uniquely identified by number. Check alignment of face openings to verify that the tubes are within reference method specifications. Check calibration after each field use.

   Record: Date, pitot tube number, required calibration measurements, baseline coefficient value and analyst's signature in a bound notebook.

3. Metering systems shall be leak-checked before calibration and prior to initial use. The leak rate shall not exceed 0.00057 m^3/min (0.02 cfm). Calibrate with a wet test meter or spirometer. Check calibration of metering system after each field use.

   Record: Date, leak rate, calibration factors from triplicate calibration checks, average calibration factor and analyst's signature in a bound notebook.

4. Probe heating systems shall be calibrated before each use. Calibration curves may be used where applicable. The system must include a calibrated temperature gauge capable of measuring temperature to within 3^0C (5.4^0F).

   Record: Date, calibration data, and analyst's signature in a bound notebook.

Sulfur Analyzer (LECO Indication Furnace)

Sulfur analyzers shall be calibrated each working day using NBS standards to determine percent sulfur recovery.

Record: grams of standard, % sulfur content of standard, burette reading, % sulfur recovered from standard, % recovery and analyst's signature in a bound notebook.

Vacuum Gauge

Vacuum gauges used to ensure the proper evacuation of sampling apparatus shall be

calibrated against a NIST traceable barometer before initial use and annually thereafter. See Barometers section. Alternatively, vacuum gauges may be calibrated in a pressure controller and calibration system or by external service.

> **Record**: Date, equipment identifications, calibration readings, correction factor or calibration curve and analyst's signature in a bound notebook.

Wet Test Meter

Wet test meters shall be calibrated against a spirometer or liquid displacement meter before initial use and every three months thereafter.

> **Record**: Date, calibration readings, correction factor or calibration curve and analyst's signature in a bound notebook.