1250 Connecticut Avenue NW Suite 700-5295 Washington, DC 20036 tel 240.343.1738 www.htiwcoalition.org

# Customer Self-Monitoring Program Overview for Airborne Fiber

This "Customer Self-Monitoring Program Overview for Airborne Fiber" is distributed solely to assist HTIW Coalition customers with obtaining fiber monitoring data that may be compatible with other fiber data collected for specific purposes under the HTIW Coalition Product Stewardship Program. The HTIW Coalition assumes no liability whatsoever with respect to collection, use or analysis of any self-monitoring data collected pursuant to this Overview. Any reference to a product or service (in text, photo or otherwise) is for illustrative purposes and should not be considered as an endorsement.

May 2012

The HTIW Coalition is an association of the leading North American. producers of refractory ceramic fiber (RCF), alkaline earth silicate wools (AES) and poly crystalline wool (PCW) – Morgan Thermal Ceramics, Unifrax I LLC, ANH Refractories Company, and Nutec Fibratec. The HTIW Coalition develops and promotes proper work practices and standards for the industry, conducts health research and disseminates information on the proper handling and use of high temperature insulation wools. For more information about the HTIW Coalition please visit www.HTIWCoalition.org

.

# Airborne Fiber Self-Monitoring Program Overview

**Prepared as a Service of the HTIW Coalition Product Stewardship Program**

**May 2012**

## Table of Contents

## 1. BASIC EQUIPMENT REQUIREMENTS:

The basic components required to begin airborne fiber sampling may include the following:

(1) Industrial hygiene sampling pumps (with charger),
(2) Flow Calibrator (primary standard),
(3) Tygon tubing,
(4) Filter cassettes,
(5) Data Collection and Chain of Custody forms.

(1) Industrial Hygiene (IH) Sampling Pumps:

IH sampling pumps can be purchased through a variety of manufacturers and suppliers. SKC, Gilian, and MSA are just three examples of IH pump manufacturers. For airborne fiber sampling, a pump should be able to maintain a flowrate generally in the range of 0.5 liters per minute (LPM) to 3 LPM. Most sampling will be performed using a flowrate of 1.0 to 2.5 LPM.

For routine airborne fiber sampling, relatively basic pumps are generally all that are required. The number of IH pumps required will be determined by how often and how many workers will be sampled. An appropriate charger should also be purchased for the number of pumps available.

(2) Flow Calibrator:

A means of calibrating the sample pumps before and after each use is a necessary step in the airborne fiber sampling process. Typically calibrators are a “bubble meter” type or the new “dry cell” type. The dry cell calibrators tend to cost more but are easier to use and do not require a “soap film” solution. One calibrator is all that is normally required and are often sold by the same firms manufacturing the sample pumps.

(3) Tygon Tubing:

Tygon tubing is a clear, flexible hose used to connect the sample pump to the filter cassette. This usually can be purchased from the sample pump manufacturers as well as some hardware stores. The tubing size generally used is ¼ inch ID (and 3/8 inch OD). It is suggested that the pump manufacturer be consulted to determine which tubing size is appropriate for its pump.

Some manufacturers of this sampling equipment also offer packages or kits that might include a few pumps with a charger, a calibrator, tubing and perhaps even a carrying case. In some cases, this may be the most economical means of obtaining all the necessary equipment.

(4) Filter Cassettes:

The filter cassette type used for airborne fiber sampling is a 25 millimeter, mixed cellulose ester (MCE), 0.8 micron pore size filter, with 50 mm extension cowl . In many cases, the laboratory to be used for analysis of the samples will supply filter cassettes “ready to use”.

(5) Data collection and Chain of Custody Forms:

A data collection form is the paperwork used to track information for each sample (person’s name, job function, start/stop times, calibration, etc.). A chain of custody form is the ”tracking” paperwork used to convey sample information to the laboratory. These forms are discussed in more detail later in this document.

**AIRBORNE FIBER SAMPLING GUIDELINES:**

(1) Operators of sampling equipment (pumps, calibrators, etc) should read the manufacturers' instructions and become familiar with proper operation of the equipment.

(2) Charge sample pumps & calibrator prior to use in accordance with manufacturers instructions.

(3) Turn on sample pumps and let run several minutes prior to PRE-calibration. It is best to let pumps warm up in same area or at the same temperature as the area which they will be used.

(4) Connect 1 small section of tubing to filter cassette outlet (remove little red/blue caps) and connect to sample pump.

(5) Connect 2nd small section of tubing to cassette inlet and appropriate port on calibrator.

(6) Turn on calibrator and note sample flow rate. If necessary, adjust flowrate (on sampling pump) to 1.0 to 2.5 liters per minute (lpm). See Figure 1 below.

FIGURE 1: Example of sample pump connected to calibrator


(7) Once flowrate is within 1.0 to 2.5 lpm range, record three consecutive readings on data collection sheet in PRE-CAL section. Also document date and time of PRE-calibration. Detach calibration tubing from sampling pump.

(8) After calibration, attach length of tubing (approx 34 inches +/-) with collar clip(s) to sampling pump.

(9) Open bottom "face" of filter cassette (leave small blue cap intact) and then attach top to sampling pump tubing after removing little red cap. Save caps and cassette face. The sample pump is typically attached to a person's belt with the tubing passing over the shoulder and connecting to the filter cassette near the lapel (within the worker's "breathing zone"). The sample cassette should be oriented approximately 45 degrees downward. See Figure 2.

FIGURE 2: Filter cassette attached within worker's breathing zone

(10) Record filter cassette ID # on sample data sheet as well as sample start time. Worker name or area, and additional support information, should also be recorded on the sample data sheet.

(11) Check samples periodically to ensure pumps are running and record work tasks and other pertinent information on sample data sheet (PPE, engineering controls, tools used, type of fiber handled, etc.).

(12) Filter cassettes should be changed based on how much fiber deposition there is on the filter. Rough estimate is approximately every 2 hours +/-. Record start/end times for filter cassettes on sample data sheet when changing filter cassettes. Used filter cassettes should be capped and sealed/wrapped end-to-end. Masking tape works well for wrapping cassettes end-to-end.

(13) Take two unopened/unused filter cassettes and open the face and top cap and then replace the face and cap on each cassette. These two cassettes will be considered field blanks and should also be sealed/wrapped end-to-end. Their ID #'s should be recorded on a sample data sheet with the air volume listed as zero (0) on the sample data sheet and when transcribed to the chain of custody form. Field blanks are a routine part of an analytical QA/QC check.

(14) Upon completion of sampling, record final stop time on sample data sheet, cap/tape cassette.

(15) POST calibrate each sampling pump (as in steps 3 to 5 above) and record 3 consecutive readings in appropriate space on sample data sheet.

(16) Package all used (and sealed/wrapped) cassettes in Ziploc type baggie.

(17) Calculate the average PRE-calibration flowrate (from 3 readings prior to sampling) and then calculate the POST-calibration flowrate (from 3 readings upon completion of sampling). Average the PRE & POST calibration flowrates together for an overall average flowrate (to 3 decimal places) and record in appropriate space on sample data sheet. (Pre-, post, and overall flowrate calculations should be to 3 decimal places.)

(18) Calculate minutes for each filter cassette used for sampling. Multiply "minutes" by the overall average flowrate to determine VOLUME for each filter cassette (rounded to nearest whole #) and record in appropriate space on the sample data sheet.

(19) On "chain-of custody" form, enter appropriate company information (date, address, phone, etc.). Transcribe all filter cassette ID #'s with corresponding sample volumes.

(20) Submit cassettes to laboratory, with chain-of custody, for analysis. Analysis should be noted as NIOSH 7400B (airborne fiber).

(21) Upon receipt of sample results, transcribe results (fibers/cc or f/cc) for each filter cassette onto sample data sheet.

(22) Calculate actual TWA (time weighted average) for each worker/area. See example below. Multiply minutes times results for each filter cassette.

| Field # | Minutes | Result (f/cc) | | "min x result" | |
|---|---|---|---|---|---|
| 001 | 118 | x | 0.05 | = | 5.9 |
| 002 | 115 | x | 0.10 | = | 11.5 |
| 003 | 122 | x | 0.25 | = | 30.5 |
| SUM = | 355 | | | SUM = | 47.9 |

Sum up the minutes column (= 355) and the "min x result" column (= 47.9).

Divide "min x result" sum by the minutes sum to get actual TWA:
47.9/355 = 0.135 f/cc = actual TWA.

(23) If the sample period is 480 minutes (and workers are working normal 8-hour shifts), the actual TWA will be equivalent to the 8-hour TWA. If the sample period is less than 480 minutes, an 8-hour TWA may be assumed to be equivalent to an actual TWA if the sampling period for the actual TWA is representative of normal exposures and routine operations over a worker's 8-hour shift.

(24) Notify workers of their respective airborne fiber monitoring results. Documentation of this notification is recommended. A recordkeeping system is suggested for all airborne fiber monitoring. This will be useful in tracking trends and conducting analysis of tasks and operations with regard to potential fiber exposures.

Please feel free to call an HTIW Coalition member company's Product Stewardship Program Hotline for specific questions:

| | |
|---|---|
| Morgan Thermal Ceramics: | 1-800-722-5681 |
| Unifrax I LLC: | 1-800-322-2293 |
| ANH Refractories | 1-800-237-6742 |
| Nutec Fibratec | 1-866-978-4715 |

References:

These basic instructions are adopted from the following sources:

Refractory Ceramic Fiber Coalition, PSP 2002 Quality Assurance Project Plan (QAPjP) prepared for U.S. Department of Labor, Occupational Safety and Health Administration (OSHA), June 2002.

National Institute for Occupational Safety and Health (NIOSH), Manual of Analytical Methods (NMAM®), Method 7400B obtained from http://www.cdc.gov/niosh/docs/2003-154/pdfs/7400.pdf

SKC Inc., SKC Publication #1366 "Calibrating a Pump with an Electronic Calibrator" from http://www.skcinc.com/instructions/1366.pdf

SKC Inc., SKC Publication #1166 "Sampling Train – Filters and Cyclones" from http://www.skcinc.com/instructions/1166.pdf

For a detailed description of workplace protection and product stewardship practices recommended by HTIW Coalition and endorsed by OSHA, see the HTIW Coalition publication "PSP-2012", which can be obtained from HTIW Coalition, an HTIW Coalition member company, or downloaded from the HTIW Coalition website at www.HTIWCoalition.org.

## 2. NIOSH 7400B SAMPLING METHOD:

The NIOSH 7400B sampling method, found on the following pages, describes the technical detail of the sample collection and analytical procedure for airborne fiber.

## 3. SAMPLE DATA COLLECTION FORM EXAMPLES:

The following page is an example of a sample data collection form used for each sample collected. Sample data collection forms may come in various layouts but generally collect pertinent information for each sample collected.

It is important that sample data collection forms be filled out completely and accurately for quality assurance and quality control purposes.

The next page after the “sample data collection form” example is a blank form for reference.

## 4. CHAIN of CUSTODY FORM EXAMPLES:

A chain of custody form (CoC) is a tracking and information form that is filled out and sent with the filter cassettes to the analytical laboratory. CoC forms should be requested from the laboratory to be used for analysis.

It is important that CoC forms be filled out completely and accurately for quality assurance and quality control purposes.

An example of a completed CoC is found on the following page. Each laboratory generally has their own CoC format but the basic information contained within each CoC form is generally the same.

## 5. AIRBORNE FIBER SAMPLING LABORATORY REPORT of RESULTS:

A copy of a laboratory report showing airborne fiber sampling results is shown on the following page. After receipt, the results from the laboratory report are transcribed to the appropriate spaces on the sample data collection forms to calculate TWAs.