

**SAMPLING DATA SHEETS FOR HEALTH HAZARDS
PREPARED BY THE OCCUPATIONAL SAFETY
AND HEALTH ADMINISTRATION**

OSHA SAMPLING DATA SHEET NO. 1**Substance:**

Carbon monoxide.

Standard: 29 CFR 1910.95(b) Table G-1, of August 13, 19718-hour time-weighted average, 50 ppm (55 mg/m³)**Sampling Equipment:**

(1) CO meter (Portable, Hopcalite reagent type) -- Follow directions (Primary Method)

(2) Certified or NIOSH approved detector tubes and a hand operated pump (not squeeze bulb) may be used for compliance purposes (Secondary Method)

Analytical Procedure:(1) Direct reading instrument based on measurement of heat of reaction produced by oxidation of CO to CO₂. Follow instructions.

(2) Detector tubes are read for length of stain, strokes of pump are noted and appropriate corrections made for pressure (or altitude) above 5000 feet (1500 m). The tubes are not to be used when below 0 degree F (-18 C) or above 125 degrees F (52 C).

Sampling Period:

(1) Hopcalite, maximum feasible number of readings should be averaged to determine average exposure. Time required dependent on variability and cyclical nature of exposures.

(2) Detector tubes: direct reading, length-of-stain detector tubes (certified or NIOSH approved) may be used for compliance purposes, if at least one sample per hour is taken per exposed worker or close group of workers. In an 8-hour day more frequent samplings per hour are preferred, especially for exposures over 50 ppm. Eight different samplings (one per hour is considered the minimum acceptable number).

Imminent Danger Situations:

Concentrations above 500 ppm (10 x TLV) for any length of time are considered to be an imminent danger.

Serious Violation:

Concentrations above 150 ppm (3 x TLV) for a total of 1 hour or more in an 8-hour workday are considered serious.

Nonserious Violation:

Concentrations above 50 ppm, but below 150 ppm for an 8-hour time-weighted average are considered nonserious violations.

De Minimis Violation:

Not applicable.

Standard: 29 CFR 1910.95(a) of December 7, 1971

8-hour time-weighted average*: 5 fibers per milliliter greater than 5 microns in length.

Excursion limit*: 10 fibers per milliliter, up to 15 minutes in an hour for up to 5 hours per 8-hour day.

*Unprotected or improperly protected worker exposures.

Analytical Method:

Fibers counted at 400-450 magnification, using phase contrast illumination, with sample mounted in high viscosity solution of membrane filter material.

Sampling Equipment:

Personal sampling pump plus Millipore type AA filter (37 mm, 0.8 micron pore size). Face cap is removed and filter used open face during sampling. Sampling rate: 2 l/m.

Sample Size:

Minimum period of 15 minutes for evaluation of excursion limit. Several samples of up to 4 hours for evaluation of 8-hour average. Samples with a visible deposit may be too heavy to count. Compare with a clean filter. Heavy concentrations of visible dust in the air (100 to 500 fibers/ml) may require short sampling periods of only 5 minutes, or less.

Blanks:

With each batch of samples submit two filters which are subjected to exactly the same handling as for the samples except that no air is drawn through them. Label these as blanks.

Shipping:

The cassettes in which the samples are collected should be shipped in a suitable container, designed to prevent damage in transit.

Imminent Danger Situations:

Generally not applicable.

Serious Violation:

5.1 or more fibers per ml, greater than 5 microns in length, for an unprotected or improperly protected worker, for an 8-hour time-weighted average, except for certain proven excursions as noted in the emergency standard, which may raise the 8-hour time-weighted average to 5.8 fibers per ml.

Nonserious Violation:

Not applicable.

De Minimis Violation:

Not applicable.

PLAINTIFF'S EXHIBIT

MBL-74

OSHA SAMPLING DATA SHEET NO. 2**Substance:**

Asbestos.

OSHA SAMPLING DATA SHEET NO. 3**Substance:**

Crystalline silica.

18-0000669

Standard: 29 CFR 1910.93(b), Table G-3 of December 7, 1971

Form $\frac{10 \text{ mg/m}^3}{\% \text{SiO}_2 + 2}$

Quartz (respirable).

Cristobalite: One-half the value for quartz

Tridymite: One-half the value for quartz

Analytical Method:

Gravimetric personal samples for worker exposure should be tared and reweighed by DOL on a Cahn balance. The percent of free silica is determined by NIOSH on the fixed location sample using a colorimetric wet chemical method, minimum detectable amount: 0.01 mg/filter.

Sampling Equipment:

For worker exposure. Personal sampling pump plus preweighed MSA type FWS-B or Gelman type VM-1 filter, using 2-piece filter cassette and 10 mm nylon cyclone. Two filters should be subjected to the same handling as the samples except that no air is drawn through them, and these should be used as blanks. Sampling rate: 1.8 l/m.

For determining % quartz: Collect at fixed locations near workers, using NIOSH preweighed MSA type FWS-B filters in 3-piece cassettes plus Gast 1531 pump with 9 l/m critical orifice and 1/2 inch steel cyclone. The vacuum release valve should be adjusted to 10-15 in. Hg suction. Two blanks of the same filter type should be submitted with the sample. Sampling rate: 9 l/m.

Sample Size:

Minimum: 4 hours. Maximum: 8 hours.

Shipping:

The cassettes in which the samples for determining % quartz are collected should be shipped to NIOSH in a suitable container, designed to prevent damage in transit.

Imminent Danger Situations:

Generally not applicable.

Serious Violation:

Any 8-hour time-weighted average greater than 4 x stated TLV value.

Nonserious Violation:

Any 8-hour time-weighted average between the stated TLV and 4 x that value.

De Minimis Violation:

Not applicable.

OSHA SAMPLING DATA SHEET NO. 4

Substance:

Lead and its inorganic compounds (except lead arsenate).

Standard: 29 CFR 1910.93(b), Table G-2 of August 13, 1971 & ANSI Z37.11-1969

8-hour time-weighted average: 0.2 mg/m³

Analytical Method:

Atomic absorption.

Detection Limit: 0.0003 mg/filter.

Sampling Equipment:

Personal sampling pump plus unweighted 37 mm Millipore type HA filter. Either 2- or 3-piece filter cassette

may be used. Sampling rate: 1.5 l/m.

Sample Size:

A minimum sampling period of 60 minutes is recommended, and longer periods, up to full shift, are preferable. Care must be taken to prevent material from falling off heavily loaded filters during shipment. This may be done by placing another filter on top of the one with the sample, exercising care not to dislodge any of the sample in the process.

Blanks:

With each batch of samples, submit two filters which are subjected to exactly the same handling as for the samples except that no air is drawn through them. Label these as blanks.

Shipping:

The cassettes in which the samples are collected should be shipped in a suitable container, designed to prevent damage in transit.

Imminent Danger Situations:

Generally not applicable.

Serious Violation:

Anything above 0.6 mg/m³ for an 8-hour time-weighted average.

Nonserious Violation:

Anything above 0.2 mg/m³ and less than 0.6 mg/m³ for an 8-hour time-weighted average.

De Minimis Violation:

Not applicable.

OSHA SAMPLING DATA SHEET NO. 5

Substance:

Cotton dust (raw).

Standard: 29 CFR 1910.93(b), Table G-1 of August 13, 1971

8-hour time-weighted average: 1 mg/m³

Analytical Method:

Net weight of gross airborne dust, using balance with sensitivity of 0.01 mg.

Sampling Equipment - Personal Samplers:

Cotton is to be determined primarily with the personal sampler attached to the workman's clothing with the face of the filter pointing down. The filter should not be covered. Our experience is that at least a 4- and preferably a 6-hour sample (at 1.5 l/m) is required in a textile plant opening or carding area to obtain reliable results. A preweighed filter (0.01 mg) should be used and reweighed to the same accuracy.

There is no ceiling or any limit on excursions.

Because of the nature of both the sampling method and the development of byssinosis, it is neither desirable nor possible to get grab samples.

Sampling Equipment - General Work Area:

Prewashed Gelman VM-1 or MSA type FWS-B 5 micron pore size filter in 3-piece cassette, located in the general work area with the cap removed and the filter facing down. Suction provided by Gast 1531 pump with a 7.4 l/m critical orifice. The vacuum relief valve should be

adjusted to maintain 10-15 in. Hg suction. Sampling rate, 7.4 l/min for recommended minimum of 60 minutes. Longer period samples up to full shift are preferable. Filters should not be so heavily loaded that the sample is dislodged in transit.

Blanks:

With each batch of samples collected, two additional filters should be subjected to exactly the same handling except that no air is drawn through them. These should be used as blanks.

Shipping:

The cassettes in which samples are collected should be

stuffed in a suitable container, designed to prevent damage in transit.

Imminent Danger Situations:

Generally not applicable.

Serious Hazard:

An 8-hour time-weighted average above 3 mg/m^3 for identified worker, $3 \times \text{TLV}$.

Nonserious Hazard:

An 8-hour time-weighted average above 1 mg/m^3 and below 3 mg/m^3 for an identified worker.

De Minimis Violation:

Not applicable.

RECOMMENDATIONS INCLUDED IN THE NIOSH CRITERIA DOCUMENT: RECOMMENDATIONS FOR AN OCCUPATIONAL EXPOSURE STANDARD FOR ASBESTOS

The National Institute for Occupational Safety and Health (NIOSH) recommends that worker exposure to asbestos dust in the workplace be controlled by requiring compliance with the following sections. Control of worker exposure to the limits stated will prevent asbestosis and more adequately guard against asbestos-induced neoplasms. The standard is amenable to techniques that are valid, reproducible, and available to industry and governmental agencies. It will be subject to review and will be revised as necessary.

Section 1 - *Environmental* (work place air)

(a) Concentration

Occupational exposure to airborne asbestos dust shall be controlled so that no worker shall be exposed to more than 2.0 asbestos fibers per cubic centimeter (cc) of air based on a count of fibers greater than 5 micrometers (>5 micrograms) in length ((determined by the membrane filter method at 400-450X magnification (4 millimeter objective) phase contrast illumination, as described in Appendix I)), determined as a time-weighted average (TWA) exposure for an 8-hour work day, and no peak concentration of asbestos to which workers are exposed shall exceed 10.0 fibers/cc >5 micrograms as determined by a minimum sampling time of fifteen minutes.

(b) Sampling

Procedures for sampling, calibration of equipment, and analysis of asbestos samples shall be as provided in Appendix I.

(c) It is recommended that this Section 1 become effective two years after promulgation as a standard, and that until the date of publication, the existing environmental workroom emergency standard (29 CFR 1910.93a) shall be in effect. This period is believed necessary to permit installation of necessary engineering controls.

Section 2 - *Medical*

Medical surveillance is required, except where a variance from the medical requirements of this proposed standard have been granted, for all workers who are

exposed to asbestos as part of their work environment. For purposes of this requirement the term "exposed to asbestos" will be interpreted as referring to time-weighted average exposures above 1 fiber/cc or peak exposures above 5 fibers/cc. The major objective of such surveillance will be to ensure proper medical management of individuals who show evidence of reaction to past dust exposures either due to excessive exposures or unusual susceptibility. Medical management may range from recommendations as to job placement, improved work practices, cessation of smoking, to specific therapy for asbestos-related disease or its complications. Medical surveillance cannot be a guide to adequacy of current controls when environmental data and medical examinations only cover recent work experience because of the prolonged latent period required for the development of asbestosis and neoplasms.

Required components of a medical surveillance program include periodic measurements of pulmonary function (forced vital capacity (FVC)), and forced expiratory volume for one second (FEV_1), and periodic chest roentgenograms (postero-anterior 14 x 17 inches). Additional medical requirement components include a history to describe smoking habits and details on past exposures to asbestos and other dusts and to determine presence or absence of pulmonary, cardiovascular, and gastrointestinal symptoms, and a physical examination, with special attention to pulmonary rales, clubbing of fingers, and other signs related to cardiopulmonary systems.

Chest roentgenograms and pulmonary function tests will be performed at the employer's expense, at least every 2 years on all employees exposed to asbestos. These tests will be made annually to individuals, (1) who have a history of 10 or more years of employment involving exposure to asbestos or, (2) who show roentgenographic findings (such as small opacities, pleural plaques, pleural thickening, pleural calcification) which suggest or indicate pneumoconiosis or other reactions to asbestos, or (3) who have changes in pulmonary function which indicate restrictive or obstructive lung disease.

Preplacement and medical examinations on the termination of employment of asbestos-exposed workers are also required.

Section 3 -- Labeling

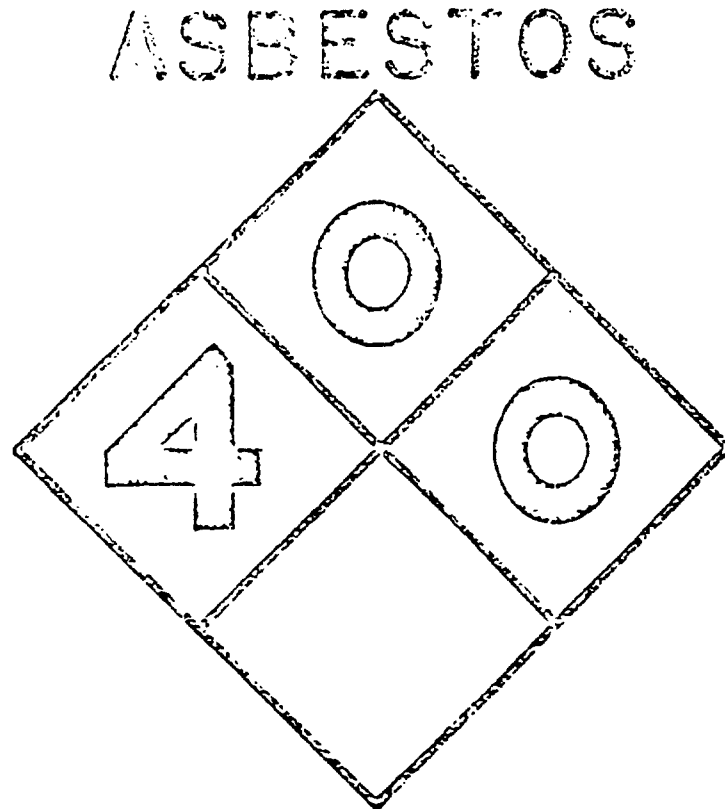
(a) A warning label for asbestos as shown in Figure 1 shall be used.

(b) Numerical designations indicate the following:

(i) 4 = Health Hazard (color code, blue). Inhalation may cause asbestosis, pleural or peritoneal mesothelioma, or lung cancer.

(ii) 0 = Fire Hazard (color code, red). Asbestos is non-flammable and has negligible vapor pressure, volatility, flash point, and explosive limits.

(c) The details of the numerical hazard rating system are found in Appendix II.



HARMFUL: May Cause Delayed Lung Injury
(Asbestosis, Lung Cancer).

DO NOT BREATHE DUST

Use only with adequate ventilation and
approved respiratory protective devices.

Section 4 -- Personal Protective Equipment and Clothing

This section shall apply whenever a variance from the standard set in Section 1 is granted under provisions of the Occupational Safety and Health Act.* Use of respirators can be decided on the basis of time-weighted average

*Variance procedures for respirator protection will not be required for emergency and occasional short-term exposure in excess of the standard. The use of respirator equipment will be required, however, under these conditions.

or peak concentration. When the limits of exposure to asbestos dust prescribed in paragraph (a) of Section 1 cannot be met by limiting the concentration of asbestos dust in the work environment, an employer must utilize as provided in subsections (a) and (b) of this Section a program of respiratory protection and furnishing of protective clothing to effect the required protection of every worker exposed.

(a) Respiratory Protection

(i) For the purpose of determining the class of respirator to be used, the employer shall measure the atmospheric concentration of airborne asbestos in the workplace when the initial application for variance is made and thereafter whenever process, worksite, climate or control changes occur which are likely to affect the asbestos concentration. The employer shall test for respirator fit and/or make asbestos measurements within the respiratory inlet covering to insure that no worker is being exposed to asbestos in excess of the standard either because of improper respirator selection or fit.

(ii) As noted above, the use of respirators and protective clothing can be decided on the basis of either time-weighted average or peak concentrations. For determining usage or compliance, the peak concentration of 10 fibers/cc is preferable.

(iii) For an atmosphere containing not more than 10 fibers/cc greater than 5 micrograms in length over an 8-hour average or more than 50 fibers/cc over any 15 minute period, a reusable or single use filter-type air-purifying respirator, operating with a negative pressure during the inhalation phase of breathing, approved under the provisions of 30 CFR 14 (Bureau of Mines Schedule 21B) or valveless respirators providing equivalent protection shall be used.

(iv) For an atmosphere containing not more than 100 fibers/cc greater than 5 micrograms in length over an 8-hour average or more than 500 fibers/cc over any 15 minute period, a powered air-purifying positive-pressure respirator approved under the provisions of 30 CFR 14 (Bureau of Mines Schedule 21B) shall be used.

(v) For an atmosphere containing more than 100 fibers/cc greater than 5 micromillimeters in length over an 8-hour average or over 500 fibers/cc for any period in excess of 15 minutes, a type C positive-pressure supplied air respirator approved under the provisions of 30 CFR 12 (Bureau of Mines Schedule 19B) shall be used.

(vi) The employer shall establish a respirator program in accordance with the requirements of the American National Standard for Respiratory Protection Z88.2 - 1969.

(b) Protective Clothing

(i) The employer shall provide each employee subject to exposure in a variance area with coveralls or similar full body protective clothing and hat, which shall be worn during the working hours in areas where there is exposure to asbestos dust.

(ii) The employer shall provide for maintenance and laundering of the soiled protective clothing, which shall be stored, transported and disposed of in sealed non-reusable containers marked "Asbestos-Contaminated Clothing" in easy-to-read letters.

(iii) Protective clothing shall be vacuumed before removal. Clothes shall not be cleaned by blowing dust from the clothing or shaking.

(iv) If laundering is to be done by a private contractor the employer shall inform the contractor of the potentially harmful effects of exposure to asbestos dust and of safe practices required in the laundering of the asbestos-soiled work clothes.

(v) Resin-impregnated paper or similar protective clothing can be substituted for fabric type of clothing.

(vi) It is recommended that in highly contaminated operations (such as insulation and textiles) provisions be made for separate change rooms.

Section 5 - Appraisal of Employees of Hazards from Asbestos

Each employee exposed to asbestos shall be apprised of all hazards, relevant symptoms, and proper conditions and precautions concerning use or exposure. Each exposed worker shall be informed of the information which is applicable to a specific product or material containing 5% or more asbestos (see Appendix III for details of information required). The information shall be kept on file and readily accessible to the worker at all places of employment where asbestos materials are manufactured or used in unit processes and operations. It is recommended, but not required, that this information be provided for asbestos processes and operations where the asbestos content is less than 5%.

Information as specified in Appendix III shall be recorded on U.S. Department of Labor Form OSHA-20, "Material Safety Data Sheet", (see page X-3 and X-4), or a similar form approved by the Occupational Safety and Health Administration, U.S. Department of Labor.

Section 6 - Work Practices

(a) Asbestos cement, mortar, coatings, grout, and plaster shall be mixed in closed bags or other containers.

(b) Asbestos waste and scrap shall be collected and disposed of in sealed bags or other containers.

(c) All cleanup of asbestos dust shall be performed by vacuum cleaners or wet cleaning methods. No dry sweeping shall be performed.

Section 7 - Monitoring and Recordkeeping Requirements

Employers will be required** to maintain records of environmental exposure to asbestos based upon the following environmental sampling and recordkeeping schedule. Personal exposure samples will be collected at least annually by specific maximum-risk work operations from a number of employees. The first sampling period will be completed within 180 days of the date of this standard. These selected samples will be collected and evaluated as both time-weighted and peak concentration values. The personal sampling regime shall be on a quarterly basis for maximum-risk work areas under the following conditions:

(a) The environmental levels are in excess of the standard.

(b) There are other conditions existing that necessitate the requesting of a variance from the Department of Labor.

Records of the type of respiratory protection in use during the quarterly sampling schedule must also be maintained. Quarterly sampling, monitoring and recordkeeping will be required only until environmental levels comply with the standard.

**Except where a variance for monitoring and recordkeeping has been granted.