

TABLE 2—MINERAL DATA

Substance	Mppp (%)	Mg/Ml
Alloys		
Crystalline		
Quartz (respirable).....	2.0	1 mg/Ml =
	$\frac{\% \text{SiO}_2}{8}$	$\frac{\% \text{SiO}_2}{2}$
Quartz (total dust).....		$\frac{\% \text{SiO}_2}{2}$
		$\frac{\% \text{SiO}_2}{2}$
Crystalline Use 1/2 the value calculated from the amount of free chromite for quartz		
Telluride Use 1/2 the value calculated from the free chromite for quartz		
Amorphous, including natural bituminous coal ash.....	30	5 mg/Ml
		$\frac{\% \text{SiO}_2}{2}$
Alloys less than 1% crystalline silica		
Misc.....	20	
Suspension.....	20	
Telluride (slag form).....	100	
Telluride Use asbestos limit		
Free chromite (slag, slrouss)		
Permissible content.....	10	
Crystalline (natural).....	10	
Coal dust (respirable fraction less than 5% SiO ₂).....		1.4 mg/Ml or 10 mg/Ml
For more than 5% SiO ₂		$\frac{\% \text{SiO}_2}{2} + 2$
Inert or Nuisance Dust:		
Respirable fraction.....	10	5 mg/Ml
Total dust.....	50	10 mg/Ml

NOTE. Conversion factors—
 1 mgppl X 34.3 = million particles per cubic meter
 1 particle per c.c.
 1 Million of particles per cubic foot of air, based on
 impalpable dusts, units by light-laden to index
 1. The percentage of crystalline silica in the formula
 is the amount determined from x-ray fluorescence, except
 in the instances in which other methods have been
 shown to be applicable
 2. As determined by the method of a filter method at
 100°C. in contrast to gravimetric
 3. If the percentage of percent quartz for the applica-
 tion of this limit are to be determined from the fraction
 passing a comparison with the following characteristics:
 • Containing < 1% quartz, if > 1% quartz, use quartz
 limit

Acetylenic diameter (unit density : spheres)	Percent passing sieve
2	99
7.5	77
15	70
50	25
100	1

The provisions under this note refer to the use of an APL (Artificially Produced Layer) of coal dust determined with a MHL. The figure corresponds to a dust content of 2.0 Mg Mn/m² (the value for dust is 4.0 Mg Mn/m²). 130 FR 23502, June 27, 1974. Redesignated and amended at 40 FR 22073, May 25, 1975.

§ 1910.1001 Asbestos.

(a) *Definition.* For the purpose of this section, (1) "Asbestos" includes chrysotile, amosite, crocidolite, tremolite, anthophyllite, and actinolite.

(2) "Asbestos fibers" means asbestos fibers longer than 5 micrometers.

(b) *Permissible exposure to airborne concentrations of asbestos fibers*—(1) *Standard effective July 7, 1972.* The 8-hour time-weighted average airborne concentrations of asbestos fibers to which any employee may be exposed shall not exceed five fibers, longer than 5 micrometers, per cubic centimeter of air, as determined by the method prescribed in paragraph (c) of this section.

(2) **Standard effective July 1, 1976.** The 8-hour time-weighted average airborne concentrations of asbestos fibers to which any employee may be exposed shall not exceed two fibers, longer than 5 micrometers, per cubic centimeter of air, as determined by the method prescribed in paragraph (e) of this section.

(3) **Ceiling concentration.** No employee shall be exposed at any time to airborne concentrations of asbestos fibers in excess of 10 fibers, longer than 5 micrometers, per cubic centimeter of air, as determined by the method prescribed in paragraph (e) of this section.

(c) *Methods of compliance*—(1) *Engineering methods*. (i) *Engineering controls*. Engineering controls, such as, but not limited to, isolation, enclosure, exhaust ventilation, and dust collection, shall be used to meet the exposure limits prescribed in paragraph (b) of this section.

(11) *Local exhaust ventilation.* (a) Local exhaust ventilation and dust collection systems shall be designed, constructed, installed, and maintained in accordance with the American National Standard Fundamentals Governing the Design and Operation of Local Exhaust Systems, ANSI Z9.2-1971, which is incorporated by reference herein.

(b) See § 1910.8 concerning the availability of ANSI Z39.2-1971, and the maintenance of a historic file in connection therewith. The address of the American National Standards Institute is given in § 1910.100.

(iii) Particular tools. All hand-operated and power-operated tools which may produce or release asbestos fibers in excess of the exposure limits pre-

scribed in
such as, l-
abrasive
vided with
tems in
of this st.

(2) IV
Insofar as
handled,
scored, &
state sup
of airbor
losure 1'
(b) of th.
of the 1-
therby.

(11) Provisions. No living group contains from bag in which either we so as to airborne limits p this sect:

(iii) If Employer asbestos, pipes, str or insula removal, sulation i with ree ance with: section at cordance section.

(1) Comm
prescrib
tion ma
respirator
employees,

(1) Do
to install
to install
by para.:

(11) In method-

this sec-
fensible o.
cient to r
tions of
prescribed

Section: 0
(11) 7
(12) 11

sonnel r'

scribed in paragraph (b) of this section, such as, but not limited to, maws, saws, power abrasive wheels, and drills, shall be provided with local exhaust ventilation systems in accordance with subdivision (ii) of this subparagraph.

(2) *Work practices*—(i) *Wet methods*. Insofar as practicable, asbestos shall be wetted, misted, applied, removed, cut, scored, or otherwise worked in a wet state sufficient to prevent the emission of airborne fibers in excess of the exposure limits prescribed in paragraph (b) of this section, unless the usefulness of the product would be diminished thereby.

(ii) *Particular products and operations*. No asbestos cement, mortar, coating, grout, plaster, or similar material containing asbestos shall be removed from bags, cartons, or other containers in which they are shipped, without being either wetted, or enclosed, or ventilated so as to prevent effectively the release of airborne asbestos fibers in excess of the limits prescribed in paragraph (b) of this section.

(iii) *Spraying, demolition, or removal*. Employees engaged in the spraying of asbestos, the removal, or demolition of pipes, structures, or equipment covered or insulated with asbestos, and in the removal or demolition of asbestos insulation or coverings shall be provided with respiratory equipment in accordance with paragraph (d)(2)(iii) of this section and with special clothing in accordance with paragraph (d)(3) of this section.

(iv) *Personal protective equipment*—(1) Compliance with the exposure limits prescribed by paragraph (b) of this section may not be achieved by the use of respirators or shift rotation of employees, except:

(i) During the time period necessary to install the engineering controls and to institute the work practices required by paragraph (c) of this section;

(ii) In work situations in which the methods prescribed in paragraph (c) of this section are either technically not feasible or feasible to an extent insufficient to reduce the airborne concentrations of asbestos fibers below the limits prescribed by paragraph (b) of this section; or

(iii) In emergencies.

(v) Where both respiratory and personnel rotation are allowed by subdivi-

sions (i), (ii), or (iii) of this subparagraph, and both are practicable, personnel rotation shall be preferred and used.

(2) Where a respirator is permitted by subparagraph (1) of this paragraph, it shall be selected from among those approved by the Bureau of Mines, Department of the Interior, or the National Institute for Occupational Safety and Health, Department of Health, Education, and Welfare, under the provisions of 30 CFR Part 11 (37 FR 6244, Mar. 25, 1972), and shall be used in accordance with subdivisions (i), (ii), (iii), and (iv) of this subparagraph.

(i) *Air purifying respirators*. A reusable or single use air purifying respirator, or a respirator described in subdivision (ii) or (iii) of this subparagraph, shall be used to reduce the concentrations of airborne asbestos fibers in the respirator below the exposure limits prescribed in paragraph (b) of this section, when the ceiling or the 8-hour time-weighted average airborne concentrations of asbestos fibers are reasonably expected to exceed no more than 10 times those limits.

(ii) *Powered air purifying respirators*. A full facepiece powered air purifying respirator, or a powered air purifying respirator, or a respirator described in subdivision (iii) of this subparagraph, shall be used to reduce the concentrations of airborne asbestos fibers in the respirator below the exposure limits prescribed in paragraph (b) of this section, when the ceiling or the 8-hour time-weighted average concentrations of asbestos fibers are reasonably expected to exceed 10 times, but not 100 times, those limits.

(iii) *Type "C" supplied-air respirators, continuous flow or pressure-demand*. A type "C" continuous flow or pressure-demand, supplied-air respirator shall be used to reduce the concentrations of airborne asbestos fibers in the respirator below the exposure limits prescribed in paragraph (b) of this section, when the ceiling or the 8-hour time-weighted average airborne concentrations of asbestos fibers are reasonably expected to exceed 100 times those limits.

(iv) *Establishment of a respirator program*. (a) The employer shall establish a respirator program in accordance with the requirements of the American National Standards Practices for Respiratory Protection, ANSI Z88.2-1969, which is incorporated by reference herein.

(a) See 1910.6 concerning the availability of ANSI Z88.2-1979 and the maintenance of an historical file in connection therewith. The address of the American National Standards Institute is 1140, 11th St., N.W., Washington, D.C. 20037.

(c) No employee shall be assigned to tasks requiring the use of respirators if, based upon his most recent examination, a examining physician determines that the employee will be unable to function normally wearing a respirator, or that the safety or health of the employee or other employees will be impaired by his use of a respirator. Such employee shall be rotated to another job or given the opportunity to transfer to a different position whose duties he is able to perform with the same employer, in the same geographical area and with the same seniority, status, and rate of pay he had just prior to such transfer, if such a different position is available.

(3) Special clothing: The employer shall provide and require the use of, special clothing, such as coveralls or similar whole body clothing, head coverings, gloves, and foot coverings for any employee exposed to airborne concentrations of asbestos fibers, which exceed the ceiling level prescribed in paragraph (b) of this section.

(4) Change rooms: (a) At any place of employment exposed to airborne concentrations of asbestos fibers in excess of the exposure limits prescribed in paragraph (b) of this section, the employer shall provide change rooms for employees working regularly at the place.

(b) Clothes lockers: The employer shall provide two separate lockers or containers for each employee, so separated or isolated as to prevent contamination of the employee's street clothes from his work clothes.

(c) Laundering: (a) Laundering of asbestos contaminated clothing shall be done so as to prevent the release of airborne asbestos fibers in excess of the exposure limits prescribed in paragraph (b) of this section.

(b) Any employer who gives asbestos contaminated clothing to another person for laundering shall inform such person of the requirement in (a) of this subdivision to effectively prevent the release of airborne asbestos fibers in excess of the exposure limit prescribed in paragraph (b) of this section.

(c) Contaminated clothing shall be transported in sealed impermeable bags or other closed impermeable containers

and labeled in accordance with paragraph (g) of this section.

(d) Method of measurement: (1) Determinations of airborne concentrations of asbestos fibers shall be made by the membrane filter method at 100-150 X (magnification) to millimeter, observed with phase contrast illumination.

(2) Monitoring—(a) Initial determinations: Within 6 months of the publication of this section, every employer shall cause every place of employment where asbestos fibers are released to be monitored in such a way as to determine whether every employee's exposure to asbestos fibers is below the limits prescribed in paragraph (b) of this section. If the limits are exceeded, the employer shall immediately undertake a compliance program in accordance with paragraph (e) of this section.

(b) Personal monitoring—(1) Samples shall be collected from within the breathing zone of the employees, on membrane filters of 0.8 micrometer porosity mounted in an open-face filter holder. Samples shall be taken for the determination of the 8-hour time-weighted average airborne concentrations and of the ceiling concentrations of asbestos fibers.

(2) Sampling frequency and pattern: After the initial determinations required by subparagraph (1) of this paragraph, samples shall be of such frequency and pattern as to represent with reasonable accuracy the levels of exposure of employees. In no case shall the sampling be done at intervals greater than 6 months for employees whose exposure to asbestos may reasonably be foreseen to exceed the limits prescribed by paragraph (b) of this section.

(3) Environmental monitoring—(a) Samples shall be collected from areas of a work environment which are representative of the airborne concentrations of asbestos fibers which may reach the breathing zone of employees. Samples shall be collected on a membrane filter of 0.8 micrometer porosity mounted in an open-face filter holder. Samples shall be taken for the determination of the 8-hour time-weighted average airborne concentrations and of the ceiling concentrations of asbestos fibers.

(b) Sampling frequency and pattern: After the initial determinations required by subparagraph (1) of this paragraph, samples shall be of such frequency and pattern as to represent with reasonable accuracy the levels of exposure of the

variance with paragraph (b).

Measurement. All airborne concentrations shall be made by the method at 400-450 X millimeter objective) Illumination.

(1) **Initial determination.** Within 30 days of the publication of this section, every employer of employees shall be required to determine whether the exposure to asbestos exceeds the limits prescribed in paragraph (b) of this section. If the exposure is found to exceed the limits, the employer shall immediately undertake a monitoring program in accordance with this section.

Monitoring.—(1) **Sampling.** Within the workplace, on employees, on a 0.2 micrometer position open-face filter shall be taken for the 8-hour time-weighted average airborne concentrations of

frequency and patterns. Determinations required of this paragraph, such frequency and not with reasonable exposure of employees. All the sampling before than 6 months exposure to asbestos foreseen to exceed by paragraph (b).

Monitoring.—(1) **Sampling.** Within the workplace, on employees, on a 0.2 micrometer position open-face filter shall be taken for the 8-hour time-weighted average airborne concentrations of

frequency and patterns. Determinations required of this paragraph, such frequency and not with reasonable exposure of the

employees. In no case shall sampling be at intervals greater than 6 months, for employees whose exposures to asbestos may reasonably be foreseen to exceed the exposure limits prescribed in paragraph (b) of this section.

(4) **Employee observation of monitoring.** Affected employees, or their representatives, shall be given a reasonable opportunity to observe any monitoring required by this paragraph and shall have access to the records thereof.

(g) **Caution signs and labels.** (1) **Caution signs.** (i) **Posting.** Caution signs shall be provided and displayed at each location where airborne concentrations of asbestos fibers may be in excess of the exposure limits prescribed in paragraph (b) of this section. Signs shall be posted at such a distance from such a location so that an employee may read the signs and take necessary protective steps before entering the area marked by the signs. Signs shall be posted at all approaches to areas containing excessive concentrations of airborne asbestos fibers.

(ii) **Sign specifications.** The warning signs required by subdivision (i) of this subparagraph shall conform to the requirements of 20" x 14" vertical format signs specified in § 1910.145(d)(4), and to this subdivision. The signs shall display the following legend in the lower panel, with letter sizes and styles of a visibility at least equal to that specified in this subdivision.

Legend	Notation
Asbestos	1" Sans Serif, Gothic or Block
Dust Hazard	3/4" Sans Serif, Gothic or Block
Avoid Breathing Dust...	1/2" Gothic
Wear Assigned Protective Equipment	1/2" Gothic
Do Not Remain In Area Unless Your Work Requires It	1/2" Gothic
Breathing Asbestos Dust May Be Hazardous To Your Health	14 point Gothic

Spacing between lines shall be at least equal to the height of the upper of any two lines.

(2) **Caution labels.**—(i) **Labeling.** Caution labels shall be affixed to all raw materials, mixtures, scrap, waste, debris, and other products containing asbestos fibers or to their container, except that no label is required where asbestos fibers have been modified by a bonding agent,

coating, binder, or other material so that during any reasonably foreseeable use, handling, storage, disposal, processing, or transportation, no airborne concentrations of asbestos fibers in excess of the exposure limits prescribed in paragraph (b) of this section will be released.

(ii) **Label specifications.** The caution labels required by subdivision (i) of this subparagraph shall be printed in letters of sufficient size and contrast as to be readily visible and legible. The label shall state:

CAUTION
Contains Asbestos Fibers
Avoid Creating Dust
Breathing Asbestos Dust May Cause
Serious Bodily Harm

(3) **Housekeeping.**—(i) **Cleaning.** All external surfaces in any place of employment shall be maintained free of accumulations of asbestos fibers if, with their dispersion, there would be an excessive concentration.

(2) **Waste disposal.** Asbestos waste, scrap, debris, bags, containers, equipment, and asbestos-contaminated clothing, confined for disposal, which may produce in any reasonably foreseeable use, handling, storage, processing, disposal, or transportation airborne concentrations of asbestos fibers in excess of the exposure limits prescribed in paragraph (b) of this section shall be collected and disposed of in sealed impermeable bags, or other closed, impermeable containers.

(3) **Recordkeeping.**—(i) **Exposure records.** Every employer shall maintain records of any personal or environmental monitoring required by this section. Records shall be maintained for a period of at least 3 years and shall be made available upon request to the Assistant Secretary of Labor for Occupational Safety and Health, the Director of the National Institute for Occupational Safety and Health, and to authorized representatives of either.

(2) **Employee access.** Every employee and former employee shall have reasonable access to any record required to be maintained by subparagraph (1) of this paragraph, which indicates the employee's own exposure to asbestos fibers.

(3) **Employee notification.** Any employee found to have been exposed at any time to airborne concentrations of asbestos fibers in excess of the limits prescribed in paragraph (b) of this section shall be notified in writing of the exposure as soon as practicable but not later

30 days of the finding, the employee shall also be fully notified of the corrective action being taken.

(1) *Medical examinations.* (i) *General.* The employer shall provide, or make available at his cost, medical examinations relating to exposure to asbestos required by this paragraph.

(ii) *Preplacement.* The employer shall provide or make available to each of his employees, within 30 calendar days following his first employment in an occupation exposed to airborne concentrations of asbestos fibers, a comprehensive medical examination which shall include, as a minimum, a chest roentgenogram (posterior-anterior 14 x 17 inches), a history to elicit symptomatology of respiratory disease, and pulmonary function tests to include forced vital capacity (FVC) and forced expiratory volume at 1 second (FEV₁).

(3) *Annual examinations.* On or before January 31, 1971, and at least annually thereafter, every employer shall provide, or make available, comprehensive medical examinations to each of his employees engaged in occupations exposed to airborne concentrations of asbestos fibers. Such annual examination shall include, as a minimum, a chest roentgenogram (posterior-anterior 14 x 17 inches), a history to elicit symptomatology of respiratory disease, and pulmonary function tests to include forced vital capacity (FVC) and forced expiratory volume at 1 second (FEV₁).

(4) *Termination of employment.* The employer shall provide, or make available, within 30 calendar days before or after the termination of employment of any employee engaged in an occupation exposed to airborne concentrations of asbestos fibers, a comprehensive medical examination which shall include, as a minimum, a chest roentgenogram (posterior-anterior 14 x 17 inches), a history to elicit symptomatology of respiratory disease, and pulmonary function tests to include forced vital capacity (FVC) and forced expiratory volume at 1 second (FEV₁).

(5) *Recent examinations.* No medical examination is required of any employee, if adequate records show that the employee has been examined in accordance with this paragraph within the past 1-year period.

(6) *Medical records.* (i) *Maintenance.* Employers of employees engaged pursuant to this paragraph shall cause to be maintained complete and accurate records of all such medical examina-

tions. Records shall be accessible to employers for a least 30 years.

(ii) *Access.* The content of the records of the medical examination required by this paragraph shall be made available, for inspection and copying, to the Assistant Secretary of Labor for Occupational Safety and Health, the Director of NIOSH, to authorized physicians and medical consultants of either of them, and, upon the request of an employee or former employee, to his physician. Any physician who conducts medical examination required by this paragraph shall furnish to the employer of the examined employee all the information specifically required by this paragraph, and any other medical information related to occupational exposure to asbestos fibers.

§ 1910.1002. *Contaminants (antigen interpretation of term).*

As used in § 1910.1009 (Table Z-1), coal tar pitch volatiles include the fused polycyclic hydrocarbons which volatilize from the distillation residues of coal, petroleum, wood, and other organic matter.

(See 41CFR 64 Stat 1600, 29 U.S.C. 357) [29 FR 23502, June 27, 1974; Redesignated and amended at 40 FR 23073, May 22, 1975]

§ 1910.1003. *4-Nitrophenyl.*

(a) *Scope and application.* (1) This section applies to any area in which 4-Nitrophenyl, Chemical Abstracts Service Registry Number 92933 is manufactured, processed, repackaged, released, handled, or stored, but shall not apply to trans-shipment in sealed containers, except for the labeling requirements under paragraphs (2) (2) (3), and (4) of this section.

(2) This section shall not apply to solid or liquid mixtures containing less than 0.1 percent by weight or volume of 4-Nitrophenyl.

(b) *Definitions.* For the purposes of this section: (1) "Absolute filter" is one capable of retaining 99.97 percent of a mono-disperse aerosol of 0.3 µm particles.

(2) "Authorized employee" means an employee whose duties require him to be in the regulated area and who has been specifically assigned by the employer.

(3) "Clean change room" means a room where employees put on or clean clothing and/or protective equipment in an environment free of 4-Nitrophenyl. The clean change room shall be continuous to and have an entry from a shower room when the shower room