

SHELL OIL COMPANY

10 SEE ATTACHED LIST

DATE FEBRUARY 3, 1976

FROM DEPARTMENT OF OCCUPATIONAL
SAFETY & HEALTHRECEIVED
OCCUPATIONAL SAFETY & HEALTH

FEB 3 1976

SUBJECT OSHA REVIEW COMMISSION CASE
OF GAF CORPORATION & UNITED
ENGINEERS & CONSTRUCTORS, INC.
CONCERNING AIRBORNE ASBESTOS

BWD

FMB/TIT

JFB CWS WAR GAV FILE

The OSHA Review Commission has ruled (see attached cases printed in CCH at pages 23976 through 23984) the present asbestos standard to mean if airborne asbestosis is present at all (and in theory the presence of any asbestos may become airborne at some time or other i.e. during installation, maintenance or removal) medical examinations on employees required under the present asbestos standard must be implemented, to wit:

1910.93a(j) has been reindexed to 1910.1001(j). Attached is a copy of this portion of the (old) 1910.93a asbestos standard and the complete (new) 1910.1001 asbestos standard.

If airborne asbestos is present at or above the present standard's TLV, you should already be conducting monitoring and providing physical examinations and the case does not present any new or additional problems.

However, for all the establishments that have asbestos present, i.e. on boilers, pipes or in construction etc. it opens possible questions by a compliance officer in the event of an inspection:

1. Is there any asbestos at this establishment?
2. Is it or can it be airborne?
3. Have you monitored?
4. Have you advised your employees of the hazard they are exposed to?
5. Are you providing your employees with medical examinations?
6. Where are your records?

On January 20, 1976 we discussed the status of this case with Mr. Smutherman of the Atlanta firm of McNeil Stokes representing GAF. He advised us that Notice of Appeal had been sent to the U.S. Court of Appeals in Washington, D.C. and that United Engineers & Constructors, Inc. were going to appeal to the 3rd Circuit in Philadelphia, PA. See attached copy of Attorney Brynn F. Aurelius memorandum to the undersigned, dated February 2, 1976.

PLAINTIFF'S EXHIBIT

SH-3650

ABS-012369

LAM 030314

The present asbestos standard is being revised by the U.S. Labor Department. However, the sections dealing with medical examinations and work place monitoring are unchanged.

We disagree with the decision of the Review Commission in the captioned cases and pending the outcome of the judicial appeals of these two cases we would not propose any changes in existing work practices.

The purpose of this memorandum is to alert you to a potentially very troublesome problem and the present activities that may or may not change the effect of this case. The Legal Department will follow this litigation and we will advise you of significant developments.

W. A. Roquet
W. A. Roquet

Attachment

DISTRIBUTION "A" LIST

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LAM 030316

Legend	Notation
Asbestos	1" Sans Serif, Gothic or Block.
Dust Hazard	3/4" Sans Serif, Gothic or Block.
Avoid Breathing Dust...	1/4" Gothic.
Wear Assigned Protective Equipment.	1/4" Gothic.
Do Not Remain In Area Unless Your Work Requires It.	1/4" 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 containers, 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

(b) **Housekeeping**—(1) **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, consigned 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**—(1) **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 than 5 days of the finding. The employee shall also be timely notified of the corrective action being taken.

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

(2) **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, 1973, 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 examined pursuant to this paragraph shall cause to be maintained complete and accurate records of all such medical examinations. Records shall be retained by employers for at least 20 years.

(ii) **Access.** The contents of the records of the medical examinations 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 a 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.

§ 1910.93b Coal tar pitch volatiles: interpretation of term.

As used in § 1910.93 (Table G-1), coal tar pitch volatiles include the fused polycyclic hydrocarbons which volatilize from the distillation residues of coal, petroleum, wood, and other organic matter.

(Sec. 8(g), 84 Stat. 1600, 29 U.S.C. 657) [37 FR 24749, Nov. 21, 1972]

§ 1910.93c 4-Nitrobiphenyl.

(a) **Scope and application.** (1) This section applies to any area in which 4-Nitrobiphenyl, 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 (e) (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-Nitrobiphenyl.

(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 clean clothing and/or protective equipment in an environment free of 4-Nitrobiphenyl. The clean change room shall be contiguous to and have an entry from a shower room, when the shower room facilities are otherwise required in this section.

(4) "Closed system" means an operation involving 4-Nitrobiphenyl where containment prevents the release of 4-Nitrobiphenyl into regulated areas, non-regulated areas, or the external environment.

(5) "Decontamination" means the inactivation of 4-Nitrobiphenyl or its safe disposal.

(6) "Director" means the Director, National Institute for Occupational Safety and Health, or any person directed by him or the Secretary of Health, Education, and Welfare to act for the Director.

(7) "Disposal" means the safe removal of 4-Nitrobiphenyl from the work environment.

(8) "Emergency" means an unforeseen circumstance or set of circumstances resulting in the release of 4-Nitrobiphenyl

OCCUPATIONAL SAFETY AND HEALTH STANDARDS SUBPART Z—TOXIC AND HAZARDOUS SUBSTANCES

(Code of Federal Regulations, Title 29, Chapter XVII, Section 1910.93 of Subpart G redesignated as 1910.1000 at 40 FR 23072, May 28, 1975)

Subpart Z—Toxic and Hazardous Substances	
Sec.:	
1910.1000	Air Contaminants.
1910.1001	Asbestos.
1910.1002	Coal tar pitch volatiles; interpretation of term.
1910.1003	4-Nitrobiphenyl.
1910.1004	alpha-Naphthylamine.
1910.1005	4,4'-Methylene bis (2-chloroaniline).
1910.1006	Methyl chloromethyl ether.
1910.1007	3,3'-Dichlorobenzidine (and its salts).
1910.1008	bis-Chloromethyl ether.
1910.1009	beta-Naphthylamine.
1910.1010	Benzidine.
1910.1011	4-Aminodiphenyl.
1910.1012	Ethyleneimine.
1910.1013	beta-Propiolactone.
1910.1014	2-Acetylaminofluorene.
1910.1015	4-Dimethylaminoazobenzene.
1910.1016	N-Nitrosodimethylamine.
1910.1017	Vinyl chloride.

§ 1910.1000 Air contaminants.

An employee's exposure to any material listed in table Z-1, Z-2, or Z-3 of this section shall be limited in accordance with the requirements of the following paragraphs of this section.

(a) Table Z-1:

(1) *Materials with names preceded by "C"—Ceiling Values.* An employee's exposure to any material in table Z-1, the name of which is preceded by a "C" (e.g., C Boron trifluoride), shall at no time exceed the ceiling value given for that material in the table.

(2) *Other materials—8-hour time weighted averages.* An employee's exposure to any material in table Z-1, the name of which is not preceded by "C", in any 8-hour work shift of a 40-hour work week, shall not exceed the 8-hour time weighted average given for that material in the table.

(b) Table Z-2:

(1) *8-hour time weighted averages.* An employee's exposure to any material listed in table Z-1, in any 8-hour work shift of a 40-hour work week, shall not exceed the 8-hour time weighted average limit given for that material in the table.

(2) *Acceptable ceiling concentrations.* An employee's exposure to a material listed in table Z-1 shall not exceed at any time during an 8-hour shift the acceptable ceiling concentration limit given for the material in the table, except for a time period, and up to a concentration not exceeding the maximum duration and concentration allowed in the column under "acceptable maximum peak above the acceptable ceiling concentration for an 8-hour shift".

(3) *Example.* During an 8-hour work shift, an employee may be exposed to a concentration of Benzene above 25 p.p.m. (but never above 50 p.p.m.) only for a maximum period of 10 minutes. Such exposure must be compensated by exposures to concentrations less than 10 p.p.m. so that the cumulative exposure for the entire 8-hour work shift does not exceed a weighted average of 10 p.p.m.

(c) Table Z-3: An employee's exposure to any material listed in table G-3, in any 8-hour work shift of a 40-hour work week, shall not exceed the 8-hour time weighted average limit given for that material in the table.

(d) Computation formulae:

(1) (i) The cumulative exposure for an 8-hour work shift shall be computed as follows:

$$E = \frac{C_1 \cdot T_1 + C_2 \cdot T_2 + \dots + C_n \cdot T_n}{8}$$

where:

E is the equivalent exposure for the working shift.

C is the concentration during any period of time T where the concentration remains constant.

T is the duration, in hours, of the exposure at the concentration C.

The value of E shall not exceed the 8-hour time weighted average limit in table

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Z-1, Z-2, or Z-3 for the material involved.

(ii) To illustrate the formula prescribed in subdivision (i) of this subparagraph, note that isoamyl acetate has an 8-hour time weighted average limit of 190 p.p.m. (table Z-1). Assume that an employee is subject to the following exposure:

Two hours exposure at 150 p.p.m.
Two hours exposure at 75 p.p.m.
Four hours exposure at 50 p.p.m.

Substituting this information in the formula, we have

$$\frac{2 \times 150 + 2 \times 75 + 4 \times 50}{8} = 81.25 \text{ p.p.m.}$$

Since 81.25 p.p.m. is less than 100 p.p.m., the 8-hour time weighted average limit, the exposure is acceptable.

(2) (i) In case of a mixture of air contaminants an employer shall compute the equivalent exposure as follows:

$$E_m = \frac{C_1}{L_1} + \frac{C_2}{L_2} + \dots + \frac{C_n}{L_n}$$

Where:

E_m is the equivalent exposure for the mixture.

C is the concentration of a particular contaminant.

L is the exposure limit for that contaminant, from table Z-1, Z-2, or Z-3.

The value of E_m shall not exceed unity (1).

(ii) To illustrate the formula prescribed in subdivision (i) of this subparagraph, consider the following exposures:

Material	Actual concentration of 8-hour exposure	8-hour time weighted average exposure limit
Acetone (Table Z-1)	500 p.p.m.	1,000 p.p.m.
2-Butanone (Table Z-1)	45 p.p.m.	200 p.p.m.
Toluene (Table Z-2)	40 p.p.m.	200 p.p.m.

Substituting in the formula, we have:

$$E_m = \frac{500}{1,000} + \frac{45}{200} + \frac{40}{200}$$

$$E_m = 0.500 + 0.225 + 0.200$$

$$E_m = 0.925$$

Since E_m is less than unity (1), the exposure combination is within acceptable limits.

(e) To achieve compliance with paragraph (a) through (d) of this section, administrative or engineering controls must first be determined and implemented whenever feasible. When such controls are not feasible to achieve full compliance, protective equipment or any other protective measures shall be used to keep the exposure of employees to air contaminants within the limits prescribed in this section. Any equipment and/or technical measures used for this purpose must be approved for each particular use by a competent industrial hygienist or other technically qualified person. Whenever respirators are used, their use shall comply with § 1910.134.

Table Z-1-

Substance	p.p.m.*	mg./M ³ *
Acetaldehyde	200	360
Acetic acid	10	25
Acetic anhydride	5	20
Acetone	1,000	2,400
Acetonitrile	40	70
Acetylene dichloride, see 1, 2-Dichloroethylene		
Acetylene tetrachloride	1	14
Acrolein	0.1	0.25
Acrylamide-Skin		0.3
Acrylonitrile-Skin	20	45
Aldrin-Skin		0.5
Allyl alcohol-Skin	2	5
Allyl chloride	1	3
*C-Allyl glycidyl ether (AGE)	10	45
Allyl propyl disulfide	2	12
2-Aminoethanol, see Ethanolamine		
2-Aminopyridine	0.5	2
**Ammonia	50	35
Ammonium sulfamate (Am-mate)		15
n-Amyl acetate	100	625
sec-Amyl acetate	125	650
Aniline-Skin	5	19
Anisidine (o, p-isomers)-Skin		0.5
Antimony and compounds (as Sb)		0.5
ANTU (alpha naphthylthiourea)		0.3
Arsenic and compounds (as As)		0.5
Arsine	0.05	0.2
Azinphos-methyl-Skin		0.2
Barium (soluble compounds)		0.5
p-Benzquinone, see Quinone		
Benzoyl peroxide		5
Benzyl chloride	1	8
Bisphenyl, see Diphenyl		
Bisphenol A, see Diglycidyl ether		
Boron oxide		15
C Boron trifluoride	1	3
Bromine	0.1	0.7
Bromoform-Skin		5
Butadiene (1, 3-butadiene)	1,000	2,200
Butanethiol, see Butyl mercaptan		
2-Butanone	200	600
2-Butoxy ethanol (Butyl Cellosolve)-Skin	50	240
Butyl acetate (n-butyl acetate)	150	710
sec-Butyl acetate	200	950
tert-Butyl acetate	200	950
Butyl alcohol	100	300
sec-Butyl alcohol	150	450
tert-Butyl alcohol	100	300
C Butylamine-Skin	5	15
C tert-Butyl chromate (as CrO ₃)-Skin		0.1
n-Butyl glycidyl ether (BGE)	50	270
*Butyl mercaptan	10	35
p-tert-Butyltoluene	10	60
Calcium arsenate		1
Calcium oxide		5
**Camphor	2	
Carbaryl (Sevin®)		5
Carbon black		3.5
Carbon dioxide	5,000	9,000
Carbon monoxide	50	55
Chlordane-Skin		0.5
Chlorinated camphene-Skin		0.5
Chlorinated diphenyl oxide		0.5
*Chlorine	1	3
Chlorine dioxide	0.1	0.3
C Chlorine trifluoride	0.1	0.4
C Chloroacetaldehyde	1	3
o-Chloroacetophenone (phenacylchloride)	0.05	0.3
Chlorobenzene (monochlorobenzene)	75	350
o-Chlorobenzylidene malononitrile (OCBM)	0.05	0.4
Chlorobromomethane	200	1,050
2-Chloro-1,3-butadiene, see Chloroprene		
Chlorodiphenyl (42 percent Chlorine)-Skin		1
Chlorodiphenyl (54 percent Chlorine)-Skin		0.5
1-Chloro-2,3-epoxypropane, see Epichlorohydrin		
2-Chloroethanol, see Ethylene chlorohydrin		
Chloroethylene, see Vinyl chloride		
C Chloroform (trichloromethane)	50	240
1-Chloro-1-nitropropane	20	100
Chloropicrin	0.1	0.7
Chloroprene (2-chloro-1,3-butadiene)-Skin	25	90

Table Z-1-Continued

Substance	p.p.m.*	mg./M ³ *
Chromium, sol. chromic, chromous salts as Cr		0.5
Metal and insol. salts		1
Coal tar pitch volatiles (benzene soluble fraction) anthracene, BaP, phenanthrene, acridine, chrysene, pyrene		0.2
Cobalt, metal fume and dust		0.1
Copper fume		0.1
Dusts and Mists		1
Cotton dust (raw)		1
Crag® herbicide		15
Cresol (all isomers)-Skin	5	22
Crotonaldehyde	2	6
Cumene-Skin	50	245
Cyanide (as CN)-Skin		5
Cyclohexane	300	1,600
Cyclohexanol	50	300
Cyclohexanone	50	300
Cyclohexene	300	1,015
Cyclopentadiene	75	240
2, 4-D		10
DDT-Skin		1
DDVP, see Dichlorvos		
Decaborane-Skin	0.05	0.3
Demeton®-Skin		0.1
Diacetone alcohol (4-hydroxy-4-methyl-2-pentanone)	50	240
1,2-diaminoethane, see Ethylenediamine		
Diazomethane	0.2	0.4
Diborane	0.1	0.1
Dibutylphthalate		5
C o-Dichlorobenzene	50	300
p-Dichlorobenzene	75	450
Dichlorodifluoromethane	1,000	4,950
1,3-Dichloro-5,5-dimethyl hydantoin		0.2
1,1-Dichloroethane	100	400
1,2-Dichloroethylene	200	740
C Dichloroethyl ether-Skin	15	90
Dichloromethane, see Methylenechloride		
Dichloromonoethoxymethane	1,000	4,200
C 1,1-Dichloro-1-nitroethane	10	60
1,2-Dichloropropane, see Propylenedichloride		
Dichlorotetrafluoroethane	1,000	7,000
Dichlorvos (DDVP)-Skin		1
Dieldrin-Skin		0.25
Diethylamine	25	75
Diethylamine ethanol-Skin	10	50
Diethylether, see Ethyl ether		
Difluorodibromomethane	100	960
C Diglycidyl ether (DGE)	0.5	2.8
Dihydroxybenzene, see Hydroquinone		
Disobutyl ketone	50	240
Disopropylamine-Skin	5	20
Dimethoxymethane, see Methylal		
Dimethyl acetamide-Skin	10	35
Dimethylamine	10	18
Dimethylaminobenzene, see Xylidene		
Dimethylaniline (N-dimethylaniline)-Skin	5	25
Dimethylbenzene, see Xylene		
Dimethyl 1,2-dibromo-2,2-dichloroethyl phosphate, (Dibrom)		3
Dimethylformamide-Skin	10	30
2,6-Dimethylheptanone, see Disobutyl ketone		
1,1-Dimethylhydrazine-Skin	0.5	1
Dimethylphthalate		5
Dimethylsulfate-Skin	1	5
Dinitrobenzene (all isomers)-Skin		1
Dinitro-o-cresol-Skin		0.2
Dinitrotoluene-Skin		1.5
Dioxane (Diethylene dioxide)-Skin	100	360
Diphenyl	0.2	1
Diphenylmethane diisocyanate (see Methylene bisphenyl isocyanate (MDI))		
Dipropylene glycol methyl ether-Skin	100	600
Di-sec, octyl phthalate (Di-2-ethylhexylphthalate)		5
Endrin-Skin		0.1
Epichlorohydrin-Skin	5	19
E1-N-Skin		0.5
1,2-Epoxypropane, see Propyleneoxide		
2,3-Epoxy-1-propanol, see Glycidol		

See footnotes at end of table.

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Table Z-1-Continued

Substance	p.p.m.*	mg./M ² *
Ethenethiol, see Ethylmercaptan		
Ethanoflaurine	3	6
2-Ethoxyethanol—Skin	200	740
2-Ethoxyethylacetate (Cellulose acetate)—Skin	100	540
Ethyl acetate	400	1,400
Ethyl acrylate—Skin	25	100
Ethyl alcohol (ethanol)	1,000	1,900
Ethylamine	10	18
Ethyl sec-amy ketone (3-methyl-3-heptanone)	25	150
Ethyl benzene	100	435
Ethyl bromide	200	830
Ethyl butyl ketone (3-Heptanone)	50	230
Ethyl chloride	1,000	2,600
Ethyl ether	400	1,200
Ethyl formate	100	300
C Ethyl mercaptan	10	28
Ethyl silicate	100	850
Ethylene chlorohydrin—Skin	5	16
Ethylene diamine	10	25
Ethylene dibromide, see 1,2-Dibromoethane		
Ethylene dichloride, see 1,2-Dichloroethane		
C Ethylene glycol dimethacrylate and/or Nitrocellulose—Skin	0.2	1
Ethylene glycol monomethyl ether acetate, see Methyl cellosolve acetate		
Ethyleneimine—Skin	0.5	1
Ethylene oxide	50	90
Ethylidene chloride, see 1,1-Dichloroethane		
N-Ethylmorpholine—Skin	20	94
Ferbam		15
Ferrocenium dust		1
Fluoride (as F)		2.5
Fluorine	0.1	0.2
Fluorotrichloromethane	1,000	5,600
Formic acid	5	9
Furfural—Skin	5	20
Furfuryl alcohol	50	200
Glycidol (2,3-Epoxy-1-propanol)	50	150
Glycol monoethyl ether, see 2-Ethoxyethanol		
Guthion ®, see Azinphos-methyl		
Hafnium		0.5
Heptachlor—Skin		0.5
Heptane (n-heptane)	500	2,000
Hexachloroethane—Skin	1	10
Hexachloronaphthalene—Skin		0.2
Hexane (n-hexane)	500	1,800
2-Hexanone	100	410
Hexone (Methyl isobutyl ketone)	100	410
sec-Hexyl acetate	50	300
Hydrazine—Skin	1	1.3
Hydrogen bromide	3	10
C Hydrogen chloride	5	7
Hydrogen cyanide—Skin	10	11
Hydrogen peroxide (90%)	1	1.4
Hydrogen selenide	0.05	0.2
Hydroquinone		2
C Iodine	0.1	1
Iron oxide fume		10
Isoamyl acetate	100	525
Isoamyl alcohol	100	360
Isobutyl acetate	150	700
Isobutyl alcohol	100	300
Isophorone	25	140
Isopropyl acetate	250	950
Isopropyl alcohol	400	980
Isopropylamine	5	12
Isopropylether	500	2,100
Isopropyl glycidyl ether (IGER)	50	240
Ketene	0.5	0.9
Lead arsenate		0.15
Lindane—Skin		0.5
Lithium hydride		0.025
L.P.G. (liquefied petroleum gas)	1,000	1,800
Magnesium oxide fume		15
Malathion—Skin		15
Maleic anhydride	0.25	1
C Manganese		5
Mesityl oxide	25	100
Methanethiol, see Methyl mercaptan		
Methoxychlor		15
2-Methoxyethanol, see Methyl cellosolve		
Methyl acetate	200	610
Methyl acetylene (propyne)	1,000	1,650
Methyl acetylene-propadiene mixture (MAPP)	1,000	1,800
Methyl acrylate—Skin	10	35
Methylal (dimethoxymethane)	1,000	2,100
Methyl alcohol (methanol)	200	280
Methylamine	10	12
Methyl amyl alcohol, see Methyl isobutyl carbinol		

Table Z-1-Continued

Substance	p.p.m.*	mg./M ² *
Methyl (n-amy) ketone (2-Heptanone)	100	405
C Methyl bromide—Skin	20	80
Methyl butyl ketone, see 2-Hexanone		
Methyl cellosolve—Skin	25	50
Methyl cellosolve acetate—Skin	25	120
Methyl chloroform	350	1,900
Methylcyclohexane	500	2,000
Methylcyclohexanol	100	470
o-Methylcyclohexanone—Skin	100	460
Methyl ethyl ketone (MEK), see 2-Butanone		
Methyl formate	100	250
Methyl iodide—Skin	5	28
Methyl isobutyl carbinol—Skin	25	100
Methyl isobutyl ketone, see Hexone		
Methyl isocyanate—Skin	0.02	0.05
C Methyl mercaptan	10	20
Methyl methacrylate	100	410
Methyl propyl ketone, see 2-Pentanone		
C α Methyl styrene	100	450
C Methylene bisphenyl isocyanate (MDI)	0.02	0.2
Molybdenum:		
Soluble compounds		5
Insoluble compounds		15
Monomethyl aniline—Skin	2	9
C Monomethyl hydrazine—Skin	0.2	0.35
Morpholine—Skin	20	70
Naphtha (coal tar)	100	400
Naphthalene	10	50
Nickel carbonyl	0.001	0.007
Nickel, metal and soluble cmpds, as Ni		1
Nicotine—Skin		0.5
Nitric acid	2	5
Nitric oxide	25	30
p-Nitroaniline—Skin	1	5
Nitrobenzene—Skin	1	5
p-Nitrochlorobenzene—Skin		1
Nitroethane	100	310
Nitrogen dioxide	5	9
Nitrogen trifluoride	10	29
Nitroglycerin—Skin	0.2	2
Nitromethane	100	250
1-Nitropropane	25	90
2-Nitropropane	25	90
Nitrotoluene—Skin	5	30
Nitrotrichloromethane, see Chlorotrichloromethane		
Octachloronaphthalene—Skin		0.1
*Octane	500	2,350
*Oil mist, mineral		5
Osmium tetroxide		0.002
Oxalic acid		1
Oxygen difluoride	0.05	0.1
Ozone	0.1	0.2
Paraquat—Skin		0.5
Parathion—Skin		0.1
Pentaborane	0.005	0.01
Pentachloronaphthalene—Skin		0.5
Pentachlorophenol—Skin		0.5
*Pentane	1,000	2,950
2-Pentanone	200	700
Perchloromethyl mercaptan	0.1	0.8
Perchloryl fluoride	3	13.5
Petroleum distillates (naphtha)	500	2,000
Phenol—Skin	5	19
p-Phenylenediamine—Skin		0.1
Phenyl ether (vapor)	1	7
Phenyl ether-biphenyl mixture (vapor)	1	7
Phenylthiophene, see Styrene		
Phenyl glycidyl ether (PGE)	10	60
Phenylhydrazine—Skin	5	22
Phosdrin (bifentophos ®)—Skin		0.1
Phosgene (carbonyl chloride)	0.1	0.4
Phosphine	0.3	0.4
Phosphoric acid		1
Phosphorus (yellow)		0.1
Phosphorus pentachloride		1
Phosphorus pentasulfide		1
Phosphorus trichloride	0.5	3
Phthalic anhydride	2	12
Picric acid—Skin		0.1
Pival ® (2-Pivalyl-1,3-indandione)		0.1
Platinum (Soluble Salts) as Pt		0.002
Propargyl alcohol—Skin	1	1,800
Propene	1,000	1,800
n-Propyl acetate	200	840
Propyl alcohol	200	500
n-Propyl nitrate	25	110
Propylene dichloride	75	380
Propyleneimine—Skin	2	8
Propylene oxide	100	240
Propyne, see Methylacetylene		
Pyrethrum		5
Pyridine	5	15
Quinone	0.1	0.4
RDX—Skin		1.5

Table Z-1-Continued

Substance	p.p.m.*	mg./M ² *
Rhodium, Metal fume and dusts, as Rh		0.1
Soluble salts		0.001
Ronnel		10
Rotenone (commercial)		0.2
Selenium compounds (as Se)	0.05	0.4
Selenium hexafluoride		0.01
Silver, metal and soluble compounds		0.01
Sodium fluoroacetate (ison—Skin)		0.05
Sodium hydroxide		2
Stibine	0.1	0.5
*Standard solvent	500	2,950
Styrene		0.15
Sulfur dioxide	5	13
Sulfur hexafluoride	1,000	6,000
Sulfuric acid		1
Sulfur monochloride	1	5
Sulfur pentafluoride	0.025	0.25
Sulfuryl fluoride	5	20
Systox, see Demeton ®		
2,4,5-T		10
Tantalum		5
TEBP—Skin		0.2
Tellurium		0.1
Tellurium hexafluoride	0.2	0.2
TEPP—Skin		0.05
C Terphenyls		1
1,1,1,2-Tetrachloro-2,2-difluoroethane	500	4,170
1,1,2,2-Tetrachloro-1,2-difluoroethane	500	4,170
1,1,2,2-Tetrachloroethane—Skin	5	35
Tetrachloroethylene, see Perchloroethylene		
Tetrachloromethane, see Carbon tetrachloride		
Tetrachloronaphthalene—Skin		2
Tetraethyl lead (as Pb)—Skin		0.075
Tetrahydrofuran	200	260
Tetramethyl lead (as Pb)—Skin		0.07
Tetramethyl succinonitrile—Skin	0.5	3
Tetranitromethane	1	8
Tetrayl (2,4,6-Trinitrophenyl-methyl)nitramine—Skin		1.5
Thallium (soluble compounds)—Skin as Tl		0.1
Thiram		5
Tin (inorganic cmpds, except oxides)		2
Tin (organic cmpds)		0.1
C Toluene-2,4-dithiocyanate	0.02	0.14
o-Toluidine—Skin	5	22
Toraphene, see Chlorinated camphene		
Triethyl phosphate		5
1,1,1-Trichloroethane see Methyl chloroform		
1,1,2-Trichloroethane—Skin	10	45
Titanium dioxide		15
Trichloromethane, see Chloroform		
Trichloronaphthalene—Skin		5
1,2,3-Trichloropropane	50	300
1,1,2-Trichloro-1,2,2-trifluoroethane	1,000	7,600
Trichloroamine	1,000	100
Trifluoromonomethoxymethane	1,000	6,100
2,4,6-Trinitrophenol, see Picric acid		
2,4,6-Trinitrophenylmethyl-nitramine, see Tetrayl		
Trinitrotoluene—Skin		1.5
Triorthocresyl phosphate		0.1
Triphenyl phosphite		3
Turpentine	100	590
Uranium (soluble compounds)		0.05
Uranium (insoluble compounds)		0.25
C Vanadium:		
V ₂ O ₅ dust		0.5
V ₂ O ₅ fume		0.1
Vinyl benzene, see Styrene		
Vinylcyanide, see Acrylonitrile		
Vinyl toluene	100	480
Warfarin		0.1
Xylene (xytol)	100	435
Xylidine—Skin	5	25
Xytrium		1
Zinc chloride fume		5
Zinc oxide fume		5
Zirconium compounds (as Zr)		5

*1970 Addition.

* Parts of vapor or gas per million parts of contaminated air by volume at 25° C. and 760 mm. Hg pressure.

* Approximate milligrams of particulate per cubic meter of air.

(No footnote "c" is used to avoid confusion with ceiling value notations.)

* An atmospheric concentration of not more than 0.02 p.p.m., or personal protection may be necessary to avoid headache.

* As sampled by method that does not collect vapor.

/ For control of general room air, biologic monitoring is essential for personnel control.

[Vinyl chloride deleted at 39 FR 12443 April 5, 1974]

Table Z-2

Material	8-hour time weighted average	Acceptable ceiling concentration	Acceptable maximum peak above the acceptable ceiling concentration for an 8-hour shift	
			Concentration	Maximum duration
Benzene (Z37.4-1969)	10 p.p.m.	25 p.p.m.	50 p.p.m.	10 minutes.
Beryllium and beryllium compounds (Z37.29-1970)	2 µg./M ³	5 µg./M ³	25 µg./M ³	30 minutes.
Cadmium fume (Z37.5-1970)	0.1 mg./M ³	3 mg./M ³		
Cadmium dust (Z37.5-1970)	0.2 mg./M ³	0.6 mg./M ³		
Carbon disulfide (Z37.3-1968)	20 p.p.m.	30 p.p.m.	100 p.p.m.	Do.
Carbon tetrachloride (Z37.17-1967)	10 p.p.m.	25 p.p.m.	200 p.p.m.	5 minutes in any 4 hours.
Ethylene dibromide (Z37.31-1970)	20 p.p.m.	30 p.p.m.	80 p.p.m.	5 minutes.
Ethylene dichloride (Z37.21-1969)	50 p.p.m.	100 p.p.m.	200 p.p.m.	5 minutes in any 8 hours.
Formaldehyde (Z37.16-1967)	3 p.p.m.	5 p.p.m.	10 p.p.m.	30 minutes.
Hydrogen fluoride (Z37.26-1969)	do.	do.	do.	do.
Fluoride as dust (Z37.26-1969)	2.5 mg./M ³			
Lead and its inorganic compounds (Z37.11-1969)	0.3 mg./M ³			
Methyl chloride (Z37.18-1969)	100 p.p.m.	200 p.p.m.	300 p.p.m.	5 minutes in any 3 hours.
Methylene Chloride (Z37.3-1969)	500 p.p.m.	1,000 p.p.m.	2,000 p.p.m.	5 minutes in any 2 hours.
Organic (alkyl) mercury (Z37.30-1969)	0.01 mg./M ³	0.04 mg./M ³		
Styrene (Z37.15-1969)	100 p.p.m.	200 p.p.m.	600 p.p.m.	5 minutes in any 3 hours.
Trichloroethylene (Z37.19-1967)	do.	do.	300 p.p.m.	5 minutes in any 2 hours.
Tetrachloroethylene (Z37.22-1967)	do.	do.	do.	5 minutes in any 3 hours.
Toluene (Z37.12-1967)	200 p.p.m.	300 p.p.m.	500 p.p.m.	10 minutes.
Hydrogen sulfide (Z37.2-1966)		20 p.p.m.	50 p.p.m.	10 minutes once only if no other measurable exposure occurs.
Mercury (Z37.8-1971)		1 mg./10M ³		
Chromic acid and chromates (Z37.7-1971)		do.		

TABLE G-3—MINERAL DUSTS

Substance	Mppcf *	Mg/M ³	Aerodynamic diameter (unit density sphere)	Percent passing selector
Silica:			2	90
Crystalline:			2.5	75
Quartz (respirable)	250 †	10mg/M ³ =	3.5	50
		%SiO ₂ +2	5.0	25
Quartz (total dust)		30mg/M ³	10	0
		%SiO ₂ +2		
Cristobalite: Use ½ the value calculated from the count or mass formulae for quartz.				
Tridymite: Use ½ the value calculated from the formulae for quartz.				
Amorphous, including natural diatomaceous earth	20	0.0mg/M ³		
		%SiO ₂		
Silicates (less than 1% crystalline silica):				
Mica	20			
Soapstone	20			
Talc (non-asbestos form)	20 ^a			
Talc (fibrous). Use asbestos limit.				
Tremolite (see talc, fibrous)				
Portland cement	50			
Graphite (natural)	15			
Coal dust (respirable fraction less than 5% SiO ₂)		2.4mg/M ³ or		
For more than 5% SiO ₂		10mg/M ³		
		%SiO ₂ +2		
Inert or Nuisance Dust:				
Respirable fraction	15	5mg/M ³		
Total dust	50	15mg/M ³		

NOTE: Conversion factors—
 mppcf×35.3 = million particles per cubic meter
 = particles per c.c.
 * Millions of particles per cubic foot of air, based on impinger samples counted by light-field techniques.
 † The percentage of crystalline silica in the formula is the amount determined from air-borne samples, except in those instances in which other methods have been shown to be applicable.
 ‡ As determined by the membrane filter method at 430× phase contrast magnification.
 § Both concentration and percent quartz for the application of this limit are to be determined from the fraction passing a size-selector with the following characteristics:
 • Containing < 1% quartz; if > 1% quartz, use quartz limit.

The measurements under this note refer to the use of an AEC instrument. If the respirable fraction of coal dust is determined with a MRE the figure corresponding to that of 2.4 Mg/M³ in the table for coal dust is 4.5 Mg/M³.

§ 1910.1001 Asbestos.

(a) *Definitions.* 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 (e) 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.

(ii) *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 § 1910.6 concerning the availability of ANSI Z9.2-1971, 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 prescribed in paragraph (b) of this section, such as, but not limited to, saws, scorers, abrasive wheels, and drills, shall be provided with local exhaust ventilation systems in accordance with subdivision (ii) of this subparagraph.

(2) *Work practices—(1) Wet methods.* Insofar as practicable, asbestos shall be handled, mixed, 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.

(d) *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

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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.

(iv) Where both respirators and personnel rotation are allowed by subdivisions (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 F.R. 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 class.* 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.

b. See § 1910.6 concerning the availability of ANSI Z88.2-1969 and the maintenance of an historic file in connection therewith. The address of the American National Standards Institute is given in § 1910.100.

(c) No employee shall be assigned to tasks requiring the use of respirators if, based upon his most recent examination, an 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:* (i) At any fixed 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.

(ii) *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.

(iii) *Laundrying:* (a) Laundrying 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 limits 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.

(e) *Method of measurement.* All determinations of airborne concentrations of asbestos fibers shall be made by the membrane filter method at 400-450 X (magnification) (4 millimeter objective) with phase contrast illumination.

(f) *Monitoring—(1) 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 (c) of this section.

(2) *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.

(ii) *Sampling frequency and patterns.* 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—(1) 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.

(ii) *Sampling frequency and patterns.* 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 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 (1) 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	1" Sans Serif, Gothic or Block
Avoid Breathing Dust ..	1" Gothic
Wear Assigned Protective Equipment.	1" Gothic
Do Not Remain In Area Unless Your Work Requires It.	1" Gothic

Legend
Breathing Asbestos Dust 14 point Gothic.
May Be Hazardous To
Your Health.

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 containers, 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

(h) **Housekeeping**—(1) **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, consigned 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.

(1) **Recordkeeping**—(1) **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 than 5 days of the finding. The employee shall also be timely notified of the corrective action being taken.

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

(2) **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 (FEV_{1.0}).

(3) **Annual examinations.** On or before January 31, 1973, 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 (FEV_{1.0}).

(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 (FEV_{1.0}).

(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**—(1) **Maintenance.** Employers of employees examined pursuant to this paragraph shall cause to be maintained complete and accurate records of all such medical examinations. Records shall be retained by employers for at least 20 years.

(ii) **Access.** The contents of the records of the medical examinations 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 a 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 Coal tar pitch volatiles; interpretation of term.

As used in Sec. 1910.1000 (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.

[37 FR 24749 Effective November 21, 1972]

[Editor's Note: For the following carcinogens' standards, medical examination provisions were remanded by the Third Circuit Court of Appeals. Provisions regarding research laboratories were vacated by the court.]

§ 1910.1003 4-Nitrobiphenyl.

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

(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 clean clothing and/or protective equipment in an environment free of 4-Nitrobiphenyl. The clean change room shall be contiguous to and have an entry from a shower room, when the shower room facilities are otherwise required in this section.

(4) "Closed system" means an operation involving 4-Nitrobiphenyl where containment prevents the release of 4-Nitrobiphenyl into regulated areas, non-regulated areas, or the external environment.

(5) "Decontamination" means the inactivation of 4-Nitrobiphenyl or its safe disposal.

(6) "Director" means the Director, National Institute for Occupational Safety and Health, or any person directed by him or the Secretary of Health, Education, and Welfare to act for the Director.

(7) "Disposal" means the safe removal of 4-Nitrobiphenyl from the work environment.

(8) "Emergency" means an unforeseen circumstance or set of circumstances resulting in the release of 4-Nitrobiphenyl which may result in exposure to or contact with 4-Nitrobiphenyl.

(9) "External environment" means any environment external to regulated and nonregulated areas.

(10) "Isolated system" means a fully enclosed structure other than the vessel of containment of 4-Nitrobiphenyl, which is impervious to the passage of 4-Nitrobiphenyl, and which would prevent

OSHRC Judge's decisions become final if review not directed within 30 days of filing. For further action, if any, see Case Table at ¶ 7995.

Discussion

The Board has previously held " * * * that Congress did not intend that * * * a civil penalty (be) assessed where compliance with a mandatory health or safety standard is impossible due to unavailability of equipment, materials, or qualified technicians." *Buffalo Mining Company*, 2 IBMA 226, 259, 80 I. D. 630, 644, 1973-1974 OSHD par. 16,618 (1973). This principle was applied in *Associated Drilling, Inc.*, 3 IBMA 164, 81 I. D. 285, 1973-1974 OSHD par. 17,813 (1974), and again in *Itmann Coal Company*, *supra* at 62, 82 I. D. 96 (1975). In each of these penalty cases, the record indicated that the required material was unavailable to the mining industry in general.

The Judge concluded in this case that the telephone instrument was unavailable based solely upon the fact that it was on order. There is a singular lack of evidence showing when it was ordered, general availability in the market, or any effort by the operator to obtain the instrument other than by placing the order. There is no evidence whatsoever in this record to support the finding that the operator had not received the equipment "because of factors beyond his control." As stated by MESA in its brief:

* * * To excuse an operator because required materials have been ordered but not delivered—where such materials are available—is to excuse an operator from its obligation to keep replacement materials on hand or to have them immediately available so as to maintain a continuance of the high degree of safety compliance which the law establishes. * * * (Brief, p. 3).

The defense of unavailability as set out in *Buffalo* is predicated upon a finding in the record of either the nonmanufacture of the equipment or its unavailability or scarcity in the market in general. This principle was applied in *Lucas Coal Company, et al.*,¹ 3 IBMA 258, 268, 81 I. D. 430, 1973-1974 OSHD par. 18,226 (1974), in which the record evidence did not show that adequate backup alarms were unavailable. There we ruled that the operator had not borne his

burden of proof and failed to show by a preponderance of the evidence that the alarms were unavailable on the market. In the instant proceeding, the record is devoid of any evidence which indicates at the time of the issuance of the Notice either the general unavailability on the market, or scarcity, of telephone instruments.

(1) Accordingly, we conclude that the fact that the telephone instrument was on order, standing alone, is insufficient evidence upon which to base a conclusion of unavailability.

Since Robbins was found to be in default, the Board assumes and finds that the subject violation did occur. 43 CFR 4.544(a).

In lieu of a remand, the Board may make the required findings of fact to coincide with the record evidence regarding any of the six criteria of section 109(a). *Buffalo Mining Company, supra* at 230. Accordingly, the Board finds that: (1) Robbins employs 20 persons with a production of 40 tons of coal daily and 8,000 tons annually; (2) the history of its previous violations is insubstantial; (3) its ability to stay in business will not be affected by the civil penalties assessed; and (4) it exhibited good faith in abating the violation. We further find that Robbins was not negligent as its knowledge and attempted abatement of the violation were manifest in its ordering the requisite telephone prior to the issuance of the Notice and that the violation was nonserious since the only working section affected thereby was located 5 minutes from the surface. Based upon the foregoing findings, we conclude that an appropriate penalty assessment for such violation is \$50.

Order

Wherefore, pursuant to the authority delegated to the Board by the Secretary of the Interior (43 CFR 4.1(4)), it is hereby ordered that the Judge's decision and order vacating Notice of Violation No. 3 FJ, October 30, 1973, in the above-captioned case is reversed; that said notice is reinstated; and that Robbins Coal Company pay a civil penalty in the amount of \$50 within 30 days from the date of this decision.

[¶ 20,163] GAF Corp. and United Engineers & Constructors, Inc.

Text of Review Commission's Decision dated November 14, 1975. OSHRC Docket Nos. 3203, 4008 and 7355. The Judge's Decisions at 3203 and 4008 appear at ¶ 18,289 and ¶ 18,318, 1973-1974 OSHD (GAF Corp.). The Decision at 7355 appears at ¶ 19,138, 1974-1975 OSHD (United Engineers & Constructors, Inc.).

¹ AD's sub nom. *Lucas Coal Company, et al.* v. Interior Board of Mine Operations Appeals, — F. 2d — (3rd Cir. August 29, 1975).

OSHRC Judge's decisions become final if review not directed within 30 days of filing. For further action, if any, see Case Table at ¶ 7995.

Asbestos Exposure—Medical Examination Requirements—When Applicable. Section 1910.93a(j) requires employers to furnish medical examinations for all employees engaged in occupations exposed to any airborne concentrations of asbestos fibers, a majority of the Review Commissioners held. The employers argued unsuccessfully that the examination requirements should not be triggered until the concentrations met or exceeded the permissible levels established by § 1910.93a(b). On the contrary, the Judges properly determined that there is no threshold exposure level in the standard's requirement for examination of employees exposed to the fibers. Since several of the provisions of § 1910.93a expressly refer back to the permissible level of § 1910.93a(b), if such a cross reference were intended for § 1910.93a(j) it would have been so worded. The employers maintained that NIOSH intended the examinations to be triggered only at a threshold level exposure. Although the proposed NIOSH standard contained a triggering level, it was TWA exposures above 1 fiber/cc or peak exposures above 5—half that of the Institute's recommended maximum permissible exposure level and not comparable to the final standard's § 1910.93a(b) permissible level of 5 fibers TWA. In any case, the NIOSH recommendation was merely advisory and the Secretary chose not to follow the threshold level suggestion with regard to examination. There is substantial uncertainty among scientific authorities as to exactly what levels of prolonged exposure to the carcinogen are fatally hazardous, lending force to the conclusion that the examination requirements were deliberately intended to cover employees exposed to asbestos in any degree at all.

Back reference: ¶ 7602.3.

Hugh P. Francis and McNeil Stokes for the employer. Marshall H. Harris, T. A. Housh, Jr. and Francis V. LaRuffa for the Secretary.

[Text of Review Commission's Decision]

Before BARNAKO, Chairman; MORAN and CLEARY, Commissioners.

CLEARY, Commissioner:

These consolidated cases involve a single common issue, the interpretation of the standard at 29 CFR § 1910.93a(j) [hereinafter referred to as § 1910.93a(j)].¹ Specifically, we are asked to decide whether § 1910.93a(j) requires respondents to furnish, or make available at their cost, medical examinations for all employees engaged in occupations exposed to any airborne concentrations of asbestos fibers or only for employees engaged in occupations exposed to concentrations that exceed the maximum permissible exposure levels set forth in 29 CFR § 1910.93a(b) [hereinafter § 1910.93a(b)].

I. Administrative Law Judges' decisions

A. GAF Corp., No. 3203

GAF Corporation, Floor Products Division (GAF-FPD), was issued a citation alleging an other than serious violation of section 5(a)(2) of the Occupational Safety and Health Act of 1970, 29 U. S. C. § 651 *et seq.*, [hereinafter referred to as "the Act"] for failing to comply with § 1910.93a(j)(1). A penalty of \$40 was proposed by the Secretary for this alleged violation. GAF-FPD timely contested the citation and notification of proposed penalty.

The citation and notification of proposed penalty were issued following an inspection

of GAF-FPD's Whitehall, Pennsylvania, plant on April 26, 1973, by authorized representatives of the Secretary. At the Whitehall plant, GAF-FPD employs approximately 456 production and maintenance employees who are represented by Local 691, United Paperworkers International Union, AFL-CIO. Local 691, the authorized employee representative, participated as a party in proceedings before the Commission.

In lieu of a hearing, the parties submitted a stipulation of facts and briefs to Judge Henry K. Osterman for a decision. On July 18, 1974, Judge Osterman issued his decision affirming the citation and proposed penalty. As to the construction of § 1910.93a(j),² the Judge concluded:

An employer who is engaged in commerce is required to comply with the provisions of 29 CFR § 1910.93a(j) with respect to its employees who are engaged in occupations exposed to airborne concentrations of asbestos fibers whether or not the concentration of airborne fibers meets or exceeds the permissible levels established by 29 CFR § 1910.93a(b).

GAF-FPD took exception to this construction and petitioned the full Commission for review of the decision.

The petition was granted and review of the decision was ordered on August 19, 1974, pursuant to section 12(j) of the Act on the issue of the Judge's construction of § 1910.93a(j).

¹ The text of this and other applicable standards is set forth in Section III, *infra*.

² Although the citation and complaint alleged a failure to comply with § 1910.93a(j)(1), they

were amended on motion of the Secretary to allege a failure to comply with § 1910.93a(j).

OSHRC Judge's decisions become final if review not directed within 30 days of filing.
For further action, if any, see Case Table at ¶ 7995.

B. GAF Corp. No. 4008

GAF Corporation, Building Products Division (GAF-BPD), was issued a citation alleging an other than serious violation for failing to comply with § 1910.93a(j)(3). No penalty was proposed for this alleged violation. Thereafter, pursuant to section 10(c) of the Act, GAF-BPD filed a timely notice of contest.

The citation was issued following an inspection conducted in GAF-BPD's St. Louis, Missouri, plant by an industrial hygienist serving as an authorized representative of the Secretary. At this plant approximately 170 production, maintenance, and cleanup employees were affected by the alleged violation.

In lieu of a hearing, a stipulation of facts and briefs was submitted to Judge Vernon Riehl for decision. On July 23, 1974, the Judge issued a decision affirming the citation. Judge Riehl ruled, as did Judge Osterman in the GAF-FPD case, that an employer must comply with § 1910.93(j)(3) regardless of whether the concentrations of airborne asbestos fibers to which employees are exposed exceed the permissible levels set forth in § 1910.93a(b).

Review of the Judge's decision was directed on August 21, 1974, when GAF-BPD's petition for discretionary review was granted. The sole issue on review, as in the GAF-FPD case, concerned § 1910.93a(j) medical examination requirements.

C. United Engineers & Constructors, Inc., No. 7355

The citation at issue in this case arose out of conditions allegedly existing during the construction of a nuclear power generating station in Salem County, New Jersey. Specifically, United Engineers & Constructors, Inc. (UE & C) was alleged to have violated the Act by failing to comply with subparagraphs (2), (3) and (4) of § 1910.93a(j) during its activities at the construction site. Employees of UE & C performing various functions at three specified work areas at the site were allegedly exposed to airborne concentrations of asbestos fibers and not provided with medical examinations as the standard requires.

A hearing was held before Judge John J. Morris following UE & C's filing of a notice of contest. Judge Morris found that employees in the three cited work areas were exposed to airborne concentrations of asbestos fibers that did not necessarily exceed the permissible levels set forth in § 1910.93a(b). Nevertheless, the Judge ruled

that the evidence established a failure to comply with § 1910.93a(j)(2), (3) and (4) at the three cited work areas. In so ruling, he held that concentrations of airborne asbestos fibers in excess of the § 1910.93a(b) levels were not prerequisites to the medical examination requirements of § 1910.93a(j). Rather, Judge Morris stated:

The correct rule of law is the test of a reasonable man. . . . Would a reasonable man recognize a hazard to its employees warranting the preventative medicine approach? On this record this must clearly be answered affirmatively. Respondent was advised April 1972 by its own monitoring laboratory that certain job processes were "a health hazard—per title 29 Labor—Part 1910—Occupational Safety and Health Standards."

Accordingly, in his decision dated December 11, 1974,¹ Judge Morris affirmed the citation and assessed no penalty.

Chairman Moran directed review of the Judge's decision on January 2, 1975. Submissions were invited on the following issue:

Whether the occupational safety and health standard published at 29 C. F. R. § 1910.93a(j) requiring medical examinations for employees engaged in occupations involving the possibility of exposure to concentrations of asbestos fibers, requires that such examinations be afforded employees exposed to

- (1) any trace of asbestos fibers at all, or
- (2) only a level of asbestos fibers approaching or exceeding the permissible exposure level specified in § 29 C. F. R. § 1910.93a(b).

II. Consolidations

On September 5, 1974, the Secretary moved to consolidate the GAF-FPD and GAF-BPD cases for review purposes, noting the identity of issue and parties. This motion was granted on September 16, 1974.

On January 7, 1975, UE & C moved for review purposes to consolidate its case with the already consolidated GAF cases and *Amoco Oil Co.*, No. 4804.² This motion was granted as to the GAF cases but denied as to the *Amoco Oil Co.* case.

¹ On December 18, 1974, Judge Morris filed an "errata sheet" correcting certain clerical errors in his December 11, 1974, decision.

² The Judge's decision in *Amoco Oil Co.* was

directed for review on June 17, 1974. While *Amoco Oil Co.* involved the interpretation of § 1910.93a(j), it also involved other provisions of the asbestos standard.

OSHRC Judge's decisions become final if review not directed within 30 days of filing.
For further action, if any, see Case Table at § 7995.

III. Relevant standards

§ 1910.93a Asbestos.

(a) *Definitions.* 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.

* * *

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

(2) *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, 1973, 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) (emphasis added).

IV. Discussion

In both the GAF-FPD case and the GAF-BPD case, the parties stipulated that, while all of the occupations referred to in the citations were exposed to some level of airborne concentrations of asbestos fibers, these levels did not equal or exceed the levels of permissible exposure set forth in § 1910.93a(b)(1). Moreover, respondents in both cases admitted that they did not provide medical examinations for their employees engaged in the cited occupations. Consequently, in both cases, the sole issue for determination is the interpretation of the phrase "exposed to airborne concentrations of asbestos fibers" as it appears in § 1910.93a(j)(2), (3) and (4).

After a hearing in the UE & C case, Judge Morris found that the three occupations referred to in the citation were exposed to airborne concentrations of asbestos fibers. He also found that the evidence did not establish that the levels of exposure exceeded those set forth in § 1910.93a(b)(1).⁶ Inasmuch as the Judge found that medical examinations were not provided, the issue to be resolved in that case is the same issue presented in the two GAF cases. We have reviewed the evidence in the UE & C case relating to exposure levels and the alleged absence of medical examinations and agree with the Judge's findings. Consequently, as in the GAF cases, the sole issue before the full Commission is the interpretation of § 1910.93a(j).

We have examined the arguments of the parties and have considered the entire record. For the reasons set forth below, we hold that § 1910.93a(j) requires an employer to provide, or make available at his cost, medical examinations to employees engaged in occupations that require exposure to concentrations of airborne asbestos even though the levels of exposure may not exceed those set forth in § 1910.93a(b)(1).

In enacting the Occupational Safety and Health Act of 1970, Congress expressed grave concern over the alarming number of work-related deaths, injuries, and illnesses occurring in all sectors of the economy. See e.g., Section 2(b) of the Act; S. Rep. No. 91-1282, 91st Cong., 2d Sess. 2 (1970). While concern was expressed over the general state of occupational safety and health, emphasis was placed on studies of safety and health in particular industries. Occu-

⁶ In his decision, Judge Morris refers to the permissible limits in 29 CFR § 1910.93a(2)(b).

It is clear from his discussion, however, that he was referring to § 1910.93a(b)(1).

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pational exposure to asbestos was recognized as an especially vexing problem. Indeed, it was noted that:

Asbestos is another material which continues to destroy the lives of workers. For 40 years it has been known that exposure to asbestos caused the severe lung scarring called asbestosis. Nevertheless, as an eminent physician and researcher, Dr. Irving J. Selikoff, testified during the hearings on this bill:

"It is depressing to report, in 1970 that the disease that we knew well 40 years ago is still with us just as if nothing was ever known."

It has also since been found that manufacturing and construction workers exposed to asbestos suffer disproportionately from pulmonary cancer and mesothelioma. Because nothing has been done about the hazards of asbestos, even after the association of asbestos and lung cancer was first reported in 1935, 20,000 out of the 50,000 workers who have since entered one asbestos trade alone—insulation work—are likely to die of asbestosis, lung cancer or mesothelioma. Nor is the potential hazard confined to these workers, since it is estimated that as many as 3.5 million workers are exposed to some extent to asbestos fibers, as are many more in the general population.

S. Rep. No. 91-1282, *supra* at 3.

It is in light of this legislative background that we construe the remedial rules before us. We note that it is of paramount importance that this Commission construe occupational safety and health standards so as to effectuate congressional objectives. *Brennan v. OSHRC & Gerosa, Inc.*, 491 F.2d 1340, 1343 (2d Cir. 1974). Occupational safety and health standards should be construed in favor of the workers whom the Act seeks to protect. *Princeton Mouldings, Inc.*, No. 1045 (November 11, 1974) (Cleary, Commissioner, concurring).

The thrust of respondents' primary contention is that the phrase "exposed to airborne concentrations of asbestos fibers" is ambiguous. They argue that the term "concentration" implies a quantitative limitation. Moreover, it is urged that, in absence of a specific quantitative limitation within § 1910.93a(j), the term "concentration" refers back to the permissible level of exposure set forth in § 1910.93a(b)(1).

We reject this contention for several reasons. Contrary to respondent's position, we note that the term "concentration" does

not necessarily imply a quantitative limitation. The term "concentration" may also denote a relative dispersion of particles in the air.¹ Moreover, it is a well settled principle in the construction of writings that a single phrase should not be read in isolation. Common sense requires that a particular phrase be read in the context of the entire writing. *Richards v. United States*, 369 U.S. 1, 11 (1962); *Mastro Plastics Corp. v. NLRB*, 350 U.S. 270, 285 (1956), *reh. denied*, 351 U.S. 980 (1956). Applying this principle to § 1910.93a, it is clear that the term "concentration" as it appears in § 1910.93a(j) is not ambiguous and does not refer back to § 1910.93a(b)(1).

Several of the provisions of § 1910.93a expressly refer back to the permissible level of exposure set forth in § 1910.93a(b). For example, paragraph (g)(1)(i) of § 1910.93a requires the posting of caution signs at locations "where airborne concentrations of asbestos fibers may be in excess of exposure limits prescribed in paragraph (b) of this section."² It is reasonably clear, therefore, that viewing the asbestos standard as a whole, the term "concentration" in § 1910.93a(j) does not refer back to § 1910.93a(b). Indeed, if such a cross reference were intended, it would likely be expressed as in the case of paragraph (g)(1)(i).

In support of their contentions regarding the term "concentration," respondents cite the findings and proposals of the National Institute for Occupational Safety and Health (NIOSH) regarding an asbestos standard. It is argued that NIOSH intended the medical examination requirements to be triggered only when a threshold level exposure was reached in a particular occupation. Respondents argue that this threshold value is that set forth in § 1910.93a(b). We disagree.

It is true that the NIOSH recommendation for a medical examination requirement contained a "triggering level" of exposure to concentrations of airborne asbestos. NIOSH recommended medical examinations in those occupations where there were "time-weighted average exposures above 1 fiber/cc or peak exposures above 5 fibers/cc."³ The NIOSH recommendation for maximum permissible exposure levels was, however, a time-weighted, average exposure of 2 fibers/cc or peak exposures above 10 fibers/cc.⁴ It is clear from these recommendations that different threshold exposure levels were attached to the maximum permissible exposure levels and medical examination requirements. Thus, respondents

¹ § 1910.93a(j)(2), (3) and (4).

² Webster's Third New International Dictionary 469 (unabr. ed. 1971).

³ For other examples, see paragraphs (g)(2)(i) and (h)(2) of § 1910.93a.

⁴ NIOSH, *Criteria for a Recommended Standard . . . Occupational Exposure to Asbestos* at I-3 (1972) [hereinafter referred to as "NIOSH Criteria Document"].

⁵ *Id.* at I-1.

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are incorrect when they contend that the NIOSH recommendation concerning medical examinations was intended to refer back to their recommendations concerning maximum permissible exposure levels.

Moreover, the fact that NIOSH recommended any threshold level of exposure does not necessarily mean that the standard as adopted by the Secretary of Labor incorporates a threshold value. On the contrary, NIOSH recommendations plainly have only advisory force. *Indus. Union Dep't, AFL-CIO v. Hodgson*, 499 F. 2d 467, 477 (D. C. Cir. 1974). They may or may not be followed by the Secretary of Labor. In the case of the medical examination requirements the Secretary obviously chose not to follow the recommendation regarding threshold levels of exposure. The recommended levels are absent from the text of § 1910.93a(j).¹¹

The concept that compliance with portions of the asbestos standard may be required regardless of whether impermissible concentrations have been detected is not novel to § 1910.93a(j). The Court of Appeals for the District of Columbia, in *Indus. Union Dep't, AFL-CIO v. Hodgson*, *supra* at 482-483, held that certain specific control measures within the asbestos standard are applicable even though violations of § 1910.93a(b) are not detected.

Respondents also argue that § 1910.93a(j), when construed in light of sections 6(b)(5) and 6(b)(7) of the Act, requires medical examinations only when a threshold level of exposure to airborne asbestos fibers is exceeded. These sections, in pertinent part, provide:

§ 6(b)(5)

The Secretary, in promulgating standards dealing with toxic materials or harmful physical agents under this subsection, shall set the standard which most adequately assures, to the extent feasible, on the basis of the best available evidence, that no employee will suffer material impairment of health or functional capacity even if such employee has regular exposure to the hazard dealt with by such standard for the period of his working life. . . .

§ 6(b)(7)

[W]here appropriate, any such standard shall prescribe the type and frequency of medical examinations or other tests which shall be made available, by the employer or at his cost, to em-

ployees exposed to such hazards in order to most effectively determine whether the health of such employees is adversely affected by such exposure. In the event such medical examinations are in the nature of research, as determined by the Secretary of Health, Education, and Welfare, such examinations may be furnished at the expense of the Secretary of Health, Education, and Welfare. The results of such examinations or tests shall be furnished only to the Secretary or the Secretary of Health, Education, and Welfare, and, at the request of the employee, to his physician. The Secretary, in consultation with the Secretary of Health, Education, and Welfare, may by rule promulgated pursuant to section 553 of title 5, United States Code, make appropriate modification in the foregoing requirements relating to the use of labels or other forms of warning, monitoring or measuring, and medical examinations, as may be warranted by experience, information, or medical or technological developments acquired subsequent to the promulgation of the relevant standard (emphasis added).

It is argued that a "hazard," within the meaning of these sections, exists only when levels of exposure exceed those set forth in § 1910.93a(b). Thus, respondents maintain that we must construe § 1910.93a(j) accordingly. We do not agree. The "hazard" is the exposure to harmful materials and the purpose of a medical examination is to ascertain any adverse effects from this exposure. There is no limitation restricting this to exposure at the level of the standard, and we imply none.

As noted above, NIOSH did not recommend the position urged by respondents in their briefs that medical examinations be required only when exposure levels equal or exceed recommended maximum permissible exposure levels. Rather, NIOSH recommended a "triggering level" for medical examinations that was less than the level recommended for maximum permissible employee exposure.

On whether a "hazard" exists warranting medical examinations in situations where employees are engaged in occupations exposed to any airborne concentrations of asbestos fibers, we note that there is substantial uncertainty among scientific authorities as to exactly what levels of prolonged exposure are detrimental to human life. This uncertainty is typified by NIOSH observations such as the following:

We do not consider this memorandum as dispositive of the issue before the Commission inasmuch as we have concluded that the Secretary has rejected this portion of the NIOSH recommendation.

¹¹ In support of their contention, respondents cite a memorandum directed to the former Assistant Secretary of Labor by Dr. Marcus Key, the Director of NIOSH. This memorandum supports respondents' position that there is a threshold triggering level incorporated in the medical examination requirements.

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Information is insufficient at this time to set an exposure standard (other than zero) which would assure prevention of mesothelioma in all workers, as the disease may occur following a very limited exposure 20-30 years earlier.¹³

Thus, the effect after several decades of a one-time acute dose of limited duration which overwhelms the clearing mechanisms, and is retained in the lungs, may be as harmful as the cumulative effect of lower daily doses of exposure over many years of work.¹⁴

There is a lack of data to define with any degree of precision the threshold of development of neoplasms resulting from exposure to asbestos and the relationship of the latent period between exposure and development of neoplasms.¹⁵

This uncertainty lends force to the conclusion that the Secretary promulgated § 1910.93a(j) without reference to any threshold levels so as "to most effectively determine whether the health of such employees is adversely affected by such exposure."¹⁶

Respondents contend that if the Secretary's interpretation of the standard is adopted, the medical examinations are in the nature of research and, therefore, must be furnished at the expense of the Secretary of Health, Education, and Welfare, pursuant to section 6(b)(7) of the Act. We disagree. We consider § 1910.93a(j) as a provision to monitor continually the health of employees who are exposed to asbestos fibers in order to determine if such employees show signs of asbestos related diseases. While such medical data may incidentally aid research purposes, it also serves to protect directly workers in asbestos-related occupations.

Respondents contend that the Secretary of Labor's approval of the California State Plan provides a binding interpretation of § 1910.93a(j) inasmuch as the State regulations contain a medical examination provision comporting with the NIOSH recommendation. It is enough to have to note that at the time of the Secretary of Labor's approval of the State's inchoate plan, the plan did not contain any asbestos standard corresponding to Subpart G of Part 1910, and we are aware of no subsequent express approval of any state regulation as being "at least as effective as" § 1910.93a.

Finally, GAF-FPD and GAF-BPD argue that to find a failure to comply with § 1910.93a(j) would violate due process. They argue that the standard as drafted did

not give them adequate notice of what conduct was required.¹⁷

Both employers stipulated that the occupations referred to in the respective citations were, by their nature, regularly exposed to airborne concentrations of asbestos fibers. By its plain wording § 1910.93a(j) appraises employers that they must provide medical examinations for all those employees engaged in occupations exposed to airborne concentrations of asbestos fibers. Respondents do not contend that the cited occupations were not exposed to such airborne concentrations. Rather, respondents argue that the standard might violate due process if applied to occupations other than those cited. Such an argument is purely speculative and not based on the concrete facts before this Commission. In short, we conclude on the records before us that respondents were apprised of the conduct required by § 1910.93a(j). Inasmuch as medical examinations were not provided to employees engaged in the cited occupations the citations must be affirmed.

In the UE & C case, Judge Morris found that the evidence clearly showed that the occupations referred to in the citation were regularly exposed to airborne concentrations of asbestos fibers. Nevertheless, in rejecting respondent's § 1910.93(b) argument, he stated that the proper test to be applied was whether a reasonable man would recognize a hazard warranting the preventive medicine approach. Application of this test was unnecessary. The evidence showed regular exposure to some concentrations of airborne asbestos in the cited occupations. The standard itself does not require the "reasonable man" or tort test used by the Judge. It clearly states that, if occupations are exposed to airborne concentrations of asbestos fibers, the employer is required to provide medical examinations for employees engaged in such occupations.

VI. Order

Accordingly, it is ordered that the Judges' orders in these consolidated cases are affirmed.

MORAN, Commissioner, Dissenting:

The rule of this case is that whenever employees are exposed to any trace of asbestos—no matter how temporary or insignificant—their employer must furnish (and employees must undergo)—annual physical examinations and tests as prescribed in § 1910.93a(j). This will apply to a rather significant proportion of the entire workforce of the United States. As noted by the United States Court of Appeals for the District of Columbia Circuit in *Industrial Union De-*

on the constitutional validity of standards promulgated pursuant to section 6 of the Act. United States Steel Corp., Nos. 2975 & 4349 (November 14, 1974) (concurring opinion).

¹³ NIOSH Criteria Document at III-9.

¹⁴ *Id.* at V-3.

¹⁵ *Id.* at V-17.

¹⁶ Section 6(b)(7) of the Act.

¹⁷ For my own part, I would add that this Commission does not have the authority to rule

OSHR Judge's decisions become final if review not directed within 30 days of filing. For further action, if any, see Case Table at ¶ 7985.

partment, *AFL-CIO v. Hodgson*, 499 F. 2d 467, 471 (D. C. Cir. 1974):

"[I]t is estimated that three to five million workers are exposed to some extent to asbestos fibers in the building construction and shipyard industries alone."

From this day forth, the Commission decision requires annual physicals for millions of employees who, this decision concedes, are not exposed to any hazard whatsoever. The consequences of this upon the employees and employers of America will be astonishing. Its impact upon the medical profession—and even the economy—could be considerable. In my view, such a construction of the standard is utopian and clearly unreasonable.

Nevertheless, the preposterous nature of this ruling is outweighed by the blatant omission of the majority to give any consideration at all to the validity of the regulation at issue in this case. In my view it was not subjected to public scrutiny and is, as a result, void because of improper promulgation. As promulgated on June 7, 1972, the relevant standards³⁷ provide for periodic medical examinations when employees are engaged in occupations which expose them "to airborne concentrations of asbestos fibers." However, these standards are considerably different from their forerunners which were published as proposed rules on January 12, 1972, and provided in pertinent part that:

"(a) *8-hour time-weighted average.* The 8-hour time-weighted average airborne concentration of asbestos dust to which employees are exposed shall not exceed 5 fibers longer than 5 microns per milliliter. . . . Concentrations above 5 fibers per milliliter, but not to exceed 10 fibers per milliliter, may be permitted up to a total of 15 minutes in an hour, but for not more than 5 hours in an 8-hour day."

"(g) *Medical examinations.* The employer shall provide, or make available at his cost, appropriate medical examinations on a periodic basis to any employee who is exposed to asbestos dust in excess of the limits specified in paragraph (a) of this section." (Emphasis added.)

37 Fed. Reg. 467 and 468 (1972).

It is immediately apparent that the rules as promulgated differ substantially from the

proposed rules. The major difference is that the proposed rules required medical examinations *only* for employees exposed to concentrations exceeding the levels prohibited in subparagraph (a) whereas the promulgated rules contain no such limitation. Additionally, the promulgated rules provide for examinations at particular times and specify what the examinations shall include, although the proposed rules did not contain these specifics. Furthermore, the provision in the proposed rules that permitted exposure to higher levels of concentrations for limited periods of time is not contained in the standards as promulgated.

When the Secretary of Labor promulgates a standard under 29 U. S. C. § 655(b) he is required to publish the "proposed rule . . . in the Federal Register"³⁸ (emphasis added) and to afford "interested persons" the opportunity to submit written objections thereto and to participate in a public hearing thereon.

Since the standards as promulgated differ substantially from those that were originally proposed, they have not been published as proposed rules as required by 29 U. S. C. § 655(b). Therefore, a new rulemaking proceeding is required before they can be enforced in their present form. See *Wagner Electric Corporation v. Volpe*, 466 F. 2d 1013 (3d Cir. 1972). Moreover, many employers who read the limitations of the proposed rule would have no reason to participate in the rulemaking process if their operations would be unaffected. These people were effectively eliminated from participation as a result of the "trojan horse" manner in which this portion of the regulation was pushed through. Due process requires that there be public scrutiny of the substance of the actual regulation under consideration. Nothing even approaching that was done here.

I therefore conclude that, contrary to congressional intent, "interested persons" have been denied the right of participating in the rulemaking process, and that the regulation adopted had never been exposed to public scrutiny.

It is my conclusion, therefore, that all citations for failure to observe this regulation should be vacated.

³⁷ 37 Fed. Reg. 11320 and 11322 (1972). The complete texts of these standards are quoted in the lead opinion.

³⁸ As contrasted with the Administrative Procedure Act which requires only a *general* notice of the content of a proposed rule. 5 U. S. C. § 553(b).