

## INTEROFFICE CORRESPONDENCE

WESTERN REGION MEDICAL DEPARTMENT  
August 14, 1974

DATE

TO R. P. Medlin  
Beaumont Refinery

C.C.

D. E. Miller, New York  
R. H. Murray, Jr., New York  
W. J. Selfridge, Jr., New York  
Attn: W. T. Gregg  
H. A. Sinclair, M.D. New York  
Attn: E. K. Daniels

## INDUSTRIAL HYGIENE INVESTIGATION

WR-47-74

ASBESTOS REMOVAL  
POWER PLANT NO. 2  
BEAUMONT REFINERY  
JUNE 20, 1974

Attached you will find the results of sampling for asbestos fibers while old insulation was being removed. The results indicate that the operation, which we consider typical, had asbestos levels in compliance with current OSHA Standards. However, we believe that removal procedures could be improved upon to reduce the evolution of asbestos fibers.

If you have any questions or comments on this report, please feel free to contact this office.

  
Robert J. Potts, M.D.  
Regional Medical Director

RJP/acw  
Encl.

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MOBIL OIL CORPORATION  
WESTERN REGION MEDICAL DEPARTMENT  
DALLAS, TEXAS

HYGIENE AND TOXICOLOGY

WR-47-74

JUNE 20, 1974

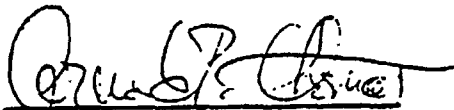
INDUSTRIAL HYGIENE INVESTIGATION

ASBESTOS REMOVAL

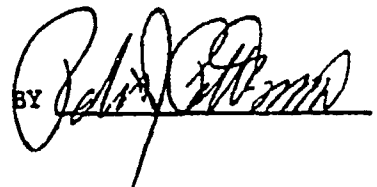
POWER PLANT NO. 2

BEAUMONT REFINERY

REPORT BY



APPROVED BY



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## I. INTRODUCTION

In order to comply with Section 1910.93 (a), Asbestos, of the Occupational Safety and Health Act of 1970, sampling for asbestos fibers was performed at the Beaumont Refinery Power Plant No. 2 by Armand P. Thomas and Russel L. Witzke, Industrial Hygienists for the Western Medical Region.

## II. SUMMARY AND RECOMMENDATIONS

1. Airborne levels of asbestos fibers were below the present Threshold Limit Value of 5 fibers/cc of air.
2. Improvements are needed in the methods of removing and disposing of old insulation.

## III. SURVEY

A typical section of pipe located 20 feet North of Heater No. 1 was chosen for the test. The pipe was approximately 12 feet long, and 2 feet from ground level. The pipe diameter was 6 inches and the asbestos insulation approximately 2 inches thick. The wind was blowing from the Southwest at 8-10 mph; the weather was clear and sunny, with a temperature of 87° F.

Four workers were involved in removing the insulation. Two were classified as insulators (A. T. Sterling and E. S. Burnett), and two were laborers. All wore Bureau of Mines approved respirators (Welsh Model 7165; BM 21B-129) and regular work clothes. Workers, through their foremen, were told to "remove the old insulation as they normally do, thus typifying the removal procedures.

Sampling for asbestos fibers was performed, using portable sampling pumps and MSA Type G sampling cassettes containing AA membrane filter paper. Personal samplers were worn by the two insulators and the points of the compass marked with four other samples. Samplers were operated for the duration of the asbestos removal. Sampling rate was 1 liter/min. and the sample time was seventeen minutes.

The filter papers were analyzed by an outside independent consultant using phase contract microscopy in accordance with NIOSH and OSHA requirements.

Results of the sampling are given in Table I.

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#### IV. RESULTS AND DISCUSSION

The Occupational Safety and Health Act of 1970 requires certain precautions be taken when asbestos is being used. These were published in the Federal Register, Vol. 37, No. 202, October 18, 1972, and are in Section 1910.93 (a) (attached). In a later document, entitled "Questions and Answers to Part 1910 of the OSHA General Standards," OSHA Publication 2095 (attached), an interpretation was given, stating that approved supplied air respirators and special clothing must be worn when asbestos insulation is being removed.

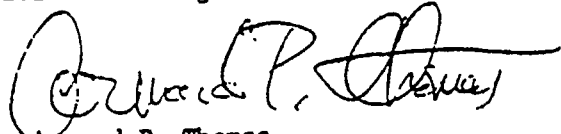
In response to our inquiry, the Occupational Safety and Health Administrator stated that if documentation could be provided, showing that concentrations of asbestos during a typical insulation removal were below the Threshold Limit Value of 5 fibers/cc of air, then supplied air respirators and special clothing would not be required. It is for this purpose that the sampling was done.

Results of our sampling, as shown in Table I, indicate that asbestos levels found on the two personal samples were well below the current OSHA limit of 5 fibers/cc of air (Time Weighted Average).

The other samples taken at the compass points as an indication of fiber travel also were below the 5 fiber limit, but fiber concentration could approach higher levels downwind of the source.

We noted that the insulators removed the old asbestos in a dry state, and the laborers then wetted the material down and shoveled it into plastic bags for disposal. In order to reduce overall dust levels the old insulation should be wetted down at intervals before, during, and after removal.

If this is not possible, or if larger pieces of insulation are being torn away, the local area to a practical distance (10-40 feet) should be designated as a dusty area, and all personnel in this area wear approved respirators while the insulation is being removed.



Armand P. Thomas  
Regional Industrial Hygienist

APT/acw  
Encl.

Russel L. Witzke  
Assistant Regional Industrial Hygienist

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TABLE I  
ASBESTOS SAMPLING  
BEAUMONT REFINERY  
POWER PLANT NO. 2  
JUNE 20, 1974

| <u>Ambient Sample Location</u> | <u>Fibers/cc of Air</u> |
|--------------------------------|-------------------------|
| 5 feet North                   | 1.07                    |
| 3 feet East                    | 1.95                    |
| 3 feet South                   | 0.07                    |
| 5 feet West                    | 0.31                    |

| <u>Personal Samples</u> | <u>Fibers/cc of Air</u> | <u>Time Weighted Avg. *</u> |
|-------------------------|-------------------------|-----------------------------|
|                         | 0.99                    | 0.03                        |
|                         | 1.65                    | 0.04                        |

All sample times were seventeen minutes.

The Threshold Limit Value (TLV) for asbestos is 5 fibers/cc of air; this value is based on an 8-hour work day to obtain the Time Weighted Average.

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# OCUPATIONAL HEALTH AND ENVIRONMENTAL CONTROL

## PART 1910, SUBPART G

1 Ventilation for Grinding Wheels (1910.93(b)(3)(ii)).

How does one compute the minimum exhaust volumes for grinding wheel operations where wheels are less than 9 inches in diameter are used?

The standards do give exhaust volume requirements for grinding wheels with diameters of less than 9 inches where the width of the wheel is at least 1 1/2 inches (Table G-4). For any wheel wider than wheel diameters shown in Table G-4, the exhaust volume is increased by the ratio of the new width to the width shown in Table G-4. For example, 5-inch diameter wheel with a width of 3 inches would require an exhaust volume of 440 feet per minute [3/1 1/2 = 2.4 = 440]. For wheels with widths of less than 1 1/2 inches, no good ventilation is usually sufficient unless the presence of toxic dusts requires augmented ventilation.

### Air Contaminants (1910.93(e))

What methods are permitted by OSHA to achieve compliance with air contaminant exposure levels specified in 29 CFR 1910.93, Air Contaminants?

special clothing is mandatory for these operations.

### G-4 Air Contaminants (1910.93)

Q. Which substances are going to be added to Tables G-1 and G-2 of 29 CFR 1910.93, Air Contaminants in the future?

A. No decision has been made on this. Reliable data must first be developed on which to base limitations. Then from the data, values must be established. Values currently in the tables were established by either the American Conference of Governmental Industrial Hygienists or the American National Standards Institute. The National Institute for Occupational Safety and Health provides OSHA with technical guidance.

### G-5 Noise Exposure (Measurement) (1910.95(a))

Q. General Industry standard 29 CFR 1910.95, Occupational Noise Exposure, allows sound levels to be measured through the A weighting network or via the octave band contours. Which sound level readings are to be considered valid where the two methods give different values?

A. The standard permits the determination of noise levels by means of either A weighted sound level readings or octave band analysis. Results from either method of measurement may be used for determining compliance or noncompliance with the standard. However, when both sets are available, the use of the A scale sound level meter reading is preferred.

### G-6 Noise Exposure (Protective Equipment) (1910.95(b))

Q. How may an employer comply with General Industry standard 29 CFR 1910.95, Occupational Noise Exposure? Can he use personal protective equipment?

A. Personal protective equipment is permitted only when feasible administrative and engineering controls fail to reduce the sound level to specified limits (29 CFR 1910.95(b)).

### G-7 Asbestos (Laundrying) (1910.93a(3)(4)(iii))

Q. The standard requires the laundrying of asbestos-contaminated work clothes. How often should laundrying be done?

A. Clothes should be laundryed at intervals frequent enough to prevent asbestos from accumulating on the clothing in sufficient amounts such that the release of the asbestos from the clothing could produce airborne asbestos in the air in excess of the permissible levels.

### G-8 Noise Exposure (1910.95) (Table G-16)

Q. What responsibility does OSHA have in the area of community noise pollution?

A. OSHA's responsibility is limited to noise in the work environment of its employees. OSHA does not have responsibility in the area of community noise pollution. This is the province of the Environmental Protection Agency.

## RULES AND REGULATIONS

**TABLE Q-1**

| Material                                     | 8-hour time weighted average | Acceptable ceiling concentration | Acceptable time-weighted average concentration | Maximum duration          |
|----------------------------------------------|------------------------------|----------------------------------|------------------------------------------------|---------------------------|
| Hydrogen chloride (237.1-1967)               | 10 p.p.m.                    | 26 p.p.m.                        | 51 p.p.m.                                      | 10 minutes                |
| Hydrogen and hydrogen compounds (237.1-1967) | 2 g./lit.                    | 8 g./lit.                        | 23 g./lit.                                     | 33 minutes                |
| Hydrogen fluoride (237.5-1967)               | 0.1 mg./lit.                 | 2 mg./lit.                       | 5 p.p.m.                                       | 10 minutes in any 4 hours |
| Hydrogen iodide (237.5-1967)                 | 0.2 mg./lit.                 | 5 mg./lit.                       | 10 p.p.m.                                      | 5 minutes in any 4 hours  |
| Hydrogen bromide (237.5-1967)                | 20 p.p.m.                    | 31 p.p.m.                        | 100 p.p.m.                                     | 5 minutes in any 3 hours  |
| Hydrogen cyanide (237.5-1967)                | 10 p.p.m.                    | 35 p.p.m.                        | 55 p.p.m.                                      | 30 minutes                |
| Hydrogen chloride (237.5-1967)               | 27 p.p.m.                    | 37 p.p.m.                        | 20 p.p.m.                                      | 5 minutes in any 4 hours  |
| Hydrogen chloride (237.5-1967)               | 20 p.p.m.                    | 100 p.p.m.                       | 2.0 p.p.m.                                     | 5 minutes in any 3 hours  |
| Hydrogen chloride (237.5-1967)               | 3 p.p.m.                     | 8 p.p.m.                         | 13 p.p.m.                                      | 30 minutes                |
| Hydrogen chloride (237.5-1967)               | do.                          | do.                              | do.                                            | do.                       |
| Hydrogen chloride (237.5-1967)               | 2 mg./lit.                   | do.                              | do.                                            | do.                       |
| Hydrogen chloride (237.5-1967)               | 0.2 mg./lit.                 | do.                              | do.                                            | do.                       |
| Hydrogen chloride (237.5-1967)               | 100 p.p.m.                   | 200 p.p.m.                       | 500 p.p.m.                                     | 5 minutes in any 4 hours  |
| Methylene chloride (237.5-1967)              | 500 p.p.m.                   | 1,000 p.p.m.                     | 2,000 p.p.m.                                   | 5 minutes in any 4 hours  |
| Carbon tetrachloride (237.5-1967)            | 0.01 mg./lit.                | 0.01 mg./lit.                    | 0.01 mg./lit.                                  | 5 minutes in any 4 hours  |
| Carbon tetrachloride (237.5-1967)            | 100 p.p.m.                   | 200 p.p.m.                       | 500 p.p.m.                                     | 5 minutes in any 4 hours  |
| Tetrachloroethylene (237.5-1967)             | do.                          | do.                              | 200 p.p.m.                                     | 5 minutes in any 4 hours  |
| Tetrachloroethylene (237.5-1967)             | do.                          | do.                              | do.                                            | 5 minutes in any 4 hours  |
| Toluene (237.5-1967)                         | 200 p.p.m.                   | 300 p.p.m.                       | 50 p.p.m.                                      | 10 minutes                |
| Hydrogen sulfide (237.5-1967)                | do.                          | 20 p.p.m.                        | 50 p.p.m.                                      | 10 minutes in any 4 hours |
| Mercury (237.5-1967)                         | do.                          | 1 mg./lit.                       | do.                                            | do.                       |
| Chlorine and chlorine compounds (237.7-1967) | do.                          | do.                              | do.                                            | do.                       |

TABLE 13-10 (continued)

[illegible]

NOTE: Conversion to time—

[illegible]

The two documents under this name refer to the use of  
 my A-13: document no. 11. If it is possible for them to be  
 identified, I would like to have a list of the documents  
 to that of 2.1.1974 in the table below would be 1.0.1.1974.

\$ 1910.93a 1.1.1974.

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

(3) "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, lower than 5 micrometers, per cubic centimeter of air, as determined by the method prescribed in paragraph (c) of this section.

(2) *Standard effective July 1, 1970*  
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 (c) of this section.

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

[illegible]

(d) *Local exhaust ventilation.* Local exhaust ventilation and distribution systems shall be designed, constructed, installed, and maintained in accordance with the American Institute of Standards Fundamental Criteria for Design and Operation of Local Exhaust Systems, ANSI Z9.2-1971, which is incorporated by reference herein.

(b) See § 1910.6 concerning the liability of ANSI Z0.2-1971, and maintenance of a historic file in connection therewith. The address of the American National Standards Institute, given in § 1910.100.

(iii) Particular tools. All hand-operated and power-operated tools which may produce or release substances in excess of the exposure limits prescribed in paragraph (b) of this section, such as, but not limited to, files, abrasive wheels, and drills, shall be provided with local exhaust ventilation systems in accordance with subcategory of this subparagraph.

(2) **Work practices**—(a) Not more than as practicable, manure shall be handled, mixed, applied, stored, or otherwise worked in a state sufficient to prevent the loss of airborne fibers in excess of the exposure limits prescribed in paragraph (b) of this section, unless the loss of the product would be avoided thereby.

(iii) Particular products and mixtures. No asbestos cement, plastering, grout, plaster, or similar material containing asbestos shall be removed from bags, cartons, or other containers in which they are shipped, without either wetting, or enclosing, or wrapping so as to prevent effectively the release of asbestos fibers in excess of the limits prescribed in paragraph (b) of this section.

(iii) *Spraying, demolition, or re*  
Employers engaged in the removal of  
asbestos, the removal, or demoli-  
pipes, structures, or equipment  
or insulated with asbestos, and  
removal or demolition of asbes-  
tulation or coverings shall be pro-  
with respiratory equipment in ac-  
cance with paragraph (d) (2) (iii)  
section and with special clothing  
accordance with paragraph (d) (3)  
section.

(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.

(1) During the time past to install the equipment to institute the work by paragraph (c) of this (b) In work situations not methods prescribed in

# RULES AND REGULATIONS

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are either technically not feasible or liable to an instant insult, or to reduce the airborne concentrations of asbestos fibers below the limits prescribed by paragraph (b) of this section; or

(1) Where both respirators and personal rotation are allowed by subdivisions (vi), (vii), or (viii) of this subparagraph, and both are practicable, personal 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. 6241, Mar. 25, 1972), and shall be used in accordance with subdivisions (i), (ii), (iii), and (iv) of this subparagraph.

(3) **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.

(4) **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.

(5) **Type "C" supplied-air respirators.** Continuous flow or pressure-demand respirators, or 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.

(6) **Establishment of a respirator program.** (a) The employer shall establish a respirator program in accordance with the recommendations of the American National Standards Practices for Respiratory Protection, ANSI Z98.2-1969, which is approved by reference herein.

(b) The 1910.10 concerning the availability of ANSI Z98.2-1969 and the maintenance of a historical file in connection with the subjects of the American National Standards Institute is given in 1910.10.10.

(7) An employee shall be assigned to work 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 employees 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 laundrying 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 (e) of this section.

(d) **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.

(5) **Monitoring.** (i) **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.** (i) Samples shall be collected from within the

breathing zone of the employee, on membrane filters of 0.8 micron by 2.5 inch 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 pattern.** After the initial determinations required by subparagraph (1) of this paragraph, samples shall be of such frequency and pattern as to represent with reasonable accuracy the levels of exposure of employees. In no case shall the sampling be done at intervals greater than 6 months for employees whose exposure to asbestos may reasonably be foreseen to exceed the limits prescribed by paragraph (b) of this section.

(3) **Environmental monitoring.** (i) 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 microneter 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 pattern.** After the initial determinations required by subparagraph (1) of this paragraph, samples shall be of such frequency and pattern as to represent with reasonable accuracy the levels of exposure of the employees. In no case shall sampling be at intervals greater than 6 months for employees whose exposure 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.

(5) **Caution signs and labels.** (i) **Caution signs.** (A) **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 sign and take necessary protective steps before entering the area marked by the signs. Signs shall be posted at all approaches to areas containing possible concentrations of airborne asbestos fibers.

(ii) **Sign specifications.** The warning signs required by subdivision (1) of this subparagraph shall conform to the requirements of 29 CFR 1910.115(d)(1), as to this subdivision. The signs shall display the following legend in the lower panel, with letter size and color of visibility at least equal to that specified in this subdivision.

## RULES AND REGULATIONS

| Legend                             | Notation                           |
|------------------------------------|------------------------------------|
| 1" Sans Serif, Gothic or Block     | 1" Sans Serif, Gothic or Block     |
| 1 1/2" Sans Serif, Gothic or Block | 1 1/2" Sans Serif, Gothic or Block |
| 2" Sans Serif, Gothic or Block     | 2" Sans Serif, Gothic or Block     |
| 3" Sans Serif, Gothic or Block     | 3" Sans Serif, Gothic or Block     |
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Spacing between lines shall be at least equal to the height of the upper of any two lines.

(2) **Caution labels.**—(a) **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.

(b) **Label specifications.** The caution labels required by subdivision (a) of this paragraph 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

(c) **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, considered 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 labor.

(2) **Employee records.** Every employee shall have access to the records of the

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.

(4) **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 asbestos 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<sub>1</sub>).

(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. Each 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<sub>1</sub>).

(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<sub>1</sub>).

(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.

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

to the Assistant Secretary of Labor for Occupational Safety and Health, the Director of NIOSH, to authorized representatives of labor, and, upon the request of 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.

#### § 1910.94 Ventilation.

(a) **Abrasive blasting.**—(1) **Definitions applicable to this paragraph.**—(i) **Abrasive.** A solid substance used in an abrasive blasting operation.

(ii) **Abrasive-blasting respirator.** A continuous flow air-line respirator constructed so that it will cover the wearer's head, neck, and shoulders to protect him from rebounding abrasive.

(iii) **Dust cleaning barrel.** A complete enclosure which rotates on an axis, or which has an internal moving flange to tumble the parts, in order to expose various surfaces of the parts to the action of an automatic blast spray.

(iv) **Dust cleaning room.** A complete enclosure in which blasting operations are performed and where the operator works inside of the room to operate the blasting nozzle and direct the flow of the abrasive material.

(v) **Blasting cabinet.** An enclosure where the operator stands outside and operates the blasting nozzle through an opening or openings in the enclosure.

(vi) **Clean air.** Air of such purity that it will not cause harm or discomfort to an individual if it is inhaled for extended periods of time.

(vii) **Dust collector.** A device or combination of devices for separating dust from the air handled by an exhaust ventilation system.

(viii) **Exhaust ventilation system.** A system for removing contaminated air from a space, comprising two or more of the following elements: (a) enclosure, or hood, (b) duct work, (c) dust-collecting equipment, (d) exhaust, and (e) discharge stack.

(ix) **Portionlets-Air respirator.** A air purifying respirator, commonly referred to as a dust or a fume respirator which removes most of the dust or fume from the air passing through the device.

(x) **Respirable dust.** Airborne dust sizes capable of passing through the upper respiratory system to reach the lower lung passages.

(xi) **Rotary blast cleaning table.** An enclosure where the pieces to be cleaned are positioned on a rotating table and passed automatically through a blast dust spray.

(xii) **Abrasive blasting.** The application of an abrasive to a surface by pneumatic pressure, hydraulic pressure, or centrifugal force.

(2) **Dust hazards from abrasives.**—(i) **Abrasive.** A solid substance used in an abrasive blasting operation.