



STATE OF NEW JERSEY  
DEPARTMENT OF LABOR & INDUSTRY  
Percy A. Miller, Jr., *Commissioner*

*RULES AND REGULATIONS*

*governing the*

**PREVENTION OF SILICOSIS**

*in*

*Industry*

BUREAU OF ENGINEERING AND SAFETY  
C. George Krueger, *Deputy Director*  
*Division of Labor*

TRENTON, NEW JERSEY

February 27, 1952

*Effective Date December 27, 1948*

NJ/KA8  
L1/S1  
1952c  
c.1

## CONTENTS

SECTION		PAGE
	Foreword	
	Extracts of the Labor and Compensation Laws	1
1	Purpose and Scope	2
2	Definitions	2
3	General Requirements for Dust Control	3
	1. <i>Compliance</i>	3
	2. <i>Maximum Allowable Concentration Limits</i>	3
	3. <i>Methods of Dust Control</i>	4
	1. ISOLATION AND ENCLOSURE	4
	2. LOCAL EXHAUST VENTILATION	4
	3. WET METHOD OF CONTROL	5
	4. GENERAL VENTILATION & MINIMUM AIR SPACE	5
	5. RESPIRATORS AND PROTECTIVE EQUIPMENT	5
	6. OTHER METHODS OF CONTROL	6
	4. <i>Standard Specifications for Construction and Installation of Exhaust Systems</i>	6
4	Additional Requirements	7
5	Plan Examination & Approval for Exhaust System	9
6	Approval	10

## FOREWORD

SILICOSIS is a disease of the lungs caused by the inhalation of free silica dust. Disabling silicosis is found in many occupations because of the high silica content of the various raw materials used in these trades or occupations. Silica is found in sand, sandstone, granite and many other kinds of rock. Whenever such rock is drilled, ground, polished or processed, or wherever sand containing free silica is used in a manufacturing process, hazardous amounts of free silica dust may escape into the air.

Under C-34:15-35.1 of the 1945 Supplement of the Workmen's Compensation Law, Revised Statutes of 1937; when the employer and employee accept the provisions of the act, the employee shall be entitled to workmens compensation benefits provided for total disability or death as the result of silicosis.

It is further provided that the Commissioner of Labor shall promulgate effective means for the control and prevention of Occupational Diseases.

These rules and regulations have been prepared following a study of nationally recognized standards and have been modified to meet conditions in New Jersey.

The standard procedure for the study and analysis of this material provides for its review by the industry. The New Jersey Industrial Safety Committee, through its sub-committee on Codes, Rules and Regulations, has investigated the content and provisions of these rules and regulations to the satisfaction of the Commissioner.

## EXTRACT OF LABOR AND COMPENSATION LAWS

### *R.S. 34:6-48 Duty of Employer in General:*

Every employer shall, without cost to his employees, provide reasonably effective devices, means and methods to prevent the contraction by them of any illness or disease incident to the work or process in which they are engaged.

### *R.S. 34:15-31 Willful self-exposure to occupational diseases shall include:*

1. Failure or omission to observe such rules and regulations as may be promulgated by the Department of Labor and posted in the plant by the employer, tending to the prevention of occupational diseases.

2. Failure or omission to truthfully state to the best of the employee's knowledge, in answer to inquiry, made by the employer, the location, duration and nature of previous employment of the employee in which he was exposed to any occupational disease as herein listed.

### *R.S. 34:6-58 Maintenance of Blowers:*

All employers conducting a manufacturing business and using emery wheels or emery belts of any description, either solid emery, leather, leather covered, felt, canvas, linen, paper, cotton or wheels or belts rolled or coated with emery or corundum or cotton wheels used as buffs, shall provide the same with blowers or similar apparatus so placed as to protect the operators from particles of dust thrown off and to carry such dust directly to the outside of the building or to some receptacle placed to receive and confine such dust.

### *R.S. 34:1-37 Safety and Sanitation in Industry:*

The deputy commissioner in charge of the Bureau of Hygiene, Sanitation and Mine Inspection shall perform, under the supervision and control of the commissioner, the duties devolving upon the department or the commissioner with relation to the elimination of dust, fumes and excessive heat in industrial operation, the investigation of occupational diseases, the ventilation and sanitation of factories, mills, bakeries, workshops and places where goods are manufactured, the inspection of mines, quarries, tunnels and caissons, the direction of industrial safety education, and, such additional correlated duties as the commissioner shall direct.

### *R.S. 34:1-20*

The commissioner may make and publish rules and regulations not inconsistent with law as he shall deem necessary to enforce the provisions of this title.

Whenever any condition is found to exist in contravention of any provision of this title, the commissioner may by written order signed by him specifying the things to be done and the time for compliance, require such conditions to be corrected.

### *R.S. 34:6-61 Ventilation; order; penalty*

The owner, agent or lessee of any factory, workshop, mill or place where the manufacture of goods is carried on shall provide in each workroom proper and sufficient ventilation and means of ventilation which shall so far as practicable render harmless any excessive heat, and any steam, gases, vapors, dust or other impurities injurious to health that may be generated in any manufacturing process.

In the event of insufficient ventilation, the commissioner shall order adequate means of ventilation to be provided, whenever dust, gas vapors or other impurities are generated by any process in such manner as to be inhaled by employees to an injurious extent and it appears to the commissioner that such condition could be substantially improved by a fan or other mechanical means he may order the installation of such fan or mechanical means of proper construction.

Any owner, agent or lessee failing to comply with an order of the commissioner, shall be subject to a penalty of ten dollars for each day such failure continues after the expiration of twenty days from the day of service of the written order on him.

## SECTION 1 - PURPOSE AND SCOPE

### 1.1 Purpose

1.1.1 The purpose of these rules and regulations is to carry out the intent and requirements of the law and to provide rules and regulations governing the installation, maintenance and operation of reasonably effective controls by which silicosis may be prevented.

### 1.2 Scope

1.2.1 These rules and regulations are mandatory and shall apply to operations or occupations where free silicon dioxide is released directly or indirectly into the breathing zone of the worker. A list of typical occupations may be found in Sec. 2, Part E, Group 2 on "Occupations which offer exposure to inorganic dust containing free silica," in the Department of Labor Industrial Hygiene Bulletin entitled "Occupational Hazards".

1.2.2 These rules shall apply to all rock drilling, stone crushing and stone cutting and finishing where silica bearing material is handled and shall be applicable unless otherwise prescribed by law.

1.2.3 The scope shall also include operations or process using grinding, and crushing machinery, drying equipment, screening equipment, mechanical shakers, mixing and bagging operations, packaging and conveying equipment, elevators and storage bins and any such instances where free silicon dioxide may be liberated.

## SECTION 2 - DEFINITIONS

### 2.1 Definitions

2.1.1 Silicosis means a disease of the lungs characterized anatomically by generalized fibrotic changes in the lungs, with a development of miliary nodulation, demonstrable by X-ray examination or autopsy, resulting from any process or occupation involving the inhalation of free silicon dioxide ( $\text{SiO}_2$ ) dust.

2.1.2 Silica-bearing material means any rock, ore, sand or similar material containing free silicon dioxide ( $\text{SiO}_2$ ) as a component part.

2.1.3 Disability means the state of an employee being actually incapacitated, because of silicosis, from performing his work in the last occupation in which he was injuriously exposed to the hazards of such disease. The word "disablement" means the event of being so incapacitated.

2.1.4 Air contaminant or dusts means solid particles generated by handling, crushing, grinding, rapid impact, deterioration or decrepitation of silicon bearing materials.

## 2.2 General Definitions

Approved: shall mean approved by the Commissioner of Labor or his authorized representatives.

Commissioner: shall mean the Commissioner of Labor of the New Jersey Department of Labor.

Department: shall mean the New Jersey Department of Labor

Director: shall mean the Director of the Division of Engineering & Safety of the Department.

Division: shall mean the Division of Engineering & Safety of the Department.

Effective date: shall mean the date on which these rules and regulations become effective,

Existing: shall mean in existence prior to the effective date.

Shall: shall mean a mandatory requirement

Should: shall mean an advisory recommendation.

Adequately, Effective and Securely: shall mean conditions subject to determination by the Commissioner.

Words in the singular and plural shall have the same meaning in the plural and singular respectively.

Substantial: shall mean construction of such strength and workmanship that the assembly shall under normal or reasonably foreseen conditions or circumstances resist, usage, wear, shock and deterioration.

## SECTION 3 - GENERAL REQUIREMENTS FOR DUST CONTROL

### 3.1 Compliance

3.1.1 All operations coming within the scope of these rules and regulations shall be so conducted and the general condition of plant structure, equipment and working area shall be so maintained as to prevent the dissemination of dust in the breathing zone of workers in excess of the concentration set forth in Section 3.2, *Maximum Allowable Concentrations*. All protective measures employed to control dust shall be in accordance with these rules and regulations.

3.1.2 When strict compliance with all of the provisions of these regulations would involve undue hardship, the Commissioner may, upon application in writing, permit modification of the requirements when protection equally effective as that required by these regulations has been provided. The application for the modification of any of these regulations in any particular case shall be accompanied by a full statement of the existing conditions and the reasons for requesting such modification. Any modification granted under the provisions of this paragraph shall be limited to the particular case covered by the application for such modification.

### 3.2 Maximum Allowable Concentrations

Dusts - millions of particles per cubic feet at 25° C. and 750 mm pressure - M.P.P.C.F.. The free silicon content shall be the percent of free silica in the fraction of the air-borne dust in the breathing zone of the worker that is smaller than 5 microns in maximum diameter. For all other dust determinations, millions of dust particles per cubic foot of air by the light field microscope counting technique shall include all microscopically visible particles up to 10 microns in size.

SUBSTANCE	M.P.C.F.	SUBSTANCE	M.P.C.F.
Silicon Dioxide - free silica over 40%	5	Pottery - free silica over 40%	5
Silicon Dioxide - free silica 20% to 40%	10	Pottery - free silica 20% to 40%	10
Silicon Dioxide - free silica 10% to 20%	20	Pottery - free silica 10% to 20%	20

The maximum allowable average concentrations for an exposure not to exceed eight hours daily are shown in the above table.

Dust counts shall be made by the method set forth in Sec. 6.1 of these rules.

### 3.3 Methods of Dust Control

Control of atmospheric dust shall be required by an approved method of control consisting of one or a combination of the following:

1. Isolation or enclosure of operation or process
2. Local exhaust ventilation
3. Wet method of control
4. General ventilation
5. Respirators and protective equipment
6. Any other method, or methods, approved by the Commissioner
  - i. e. Substitution of materials.

#### 3.3.1 Isolation or enclosure of operation or process

1. Operations involving the liberation of silicon dioxide should be completely enclosed during all or part of the process.
2. A negative pressure within the enclosure should be created by a suitable exhaust to prevent leaks.
3. Loading and removing the contents should be mechanical or automatic wherever possible.
4. Processes which may endanger workers other than those directly concerned should be isolated in a separate building or sealed area. Specialized protective equipment must be provided as required in Section 3.3.5
5. Should isolation or enclosure be the sole method of control, then the Commissioner may require compliance with Sec. 3.3.1.1 to 3.3.1.4 inclusive as mandatory provisions.

#### 3.3.2 Local exhaust ventilation

1. Every exhaust system shall be designed and constructed in a substantial and workman-like manner.
2. The system shall include hoods or enclosures of suitable design located at points of dust generation and connected by means of suitable exhaust piping to air cleaning and exhaust equipment.
3. The capacity of the system shall be determined on the basis of all hoods connected unless interlocks are provided for restrictive use of the system and shall provide sufficient air flow to control the dust.
4. All exhaust hoods or enclosures shall be located and placed so that the air borne dust particles will fall or be projected or drawn into the hoods in the direction of the air flow and shall enclose the zone of dust generation completely so far as is consistent with the operation.
5. Exhaust fans should be located beyond the air cleaning equipment except for approved wet type systems. The fan shall be driven by an adequate power source at a speed sufficient to create the required rate of air flow when operating against the total pressure loss of the exhaust system.
6. The discharge from an exhaust system shall be through a dust collector to the outer air and should extend at least six feet above the roof and shall be so located as to preclude the possibility of dust laden air reentering the work area through adjacent openings.

7. Dust separators shall be provided in order to prevent the discharge of contaminated air. While it is not practicable to specify any particular dust separator, it is necessary to warn against installing a separator of too small a capacity as the resistance against which the fan must operate increases the amount of horsepower required if the necessary suction at the hood is to be maintained.

8. Means shall be provided for the removal and disposal of collected materials at regular intervals. The removal and disposal of collected material shall be so conducted as to prevent the dissemination of dust in any working area.

9. All exhaust piping shall be arranged and located so that a minimum length and a minimum number of bends or elbows are necessary. Pipes shall be arranged and installed with attention to accessibility for inspection, maintenance and protection against damage due to accidental contact.

### 3.3.3 Wet method of control

1. The wet method of dust control shall direct an adequate spray of water to the process at the point of dust generation and may include pre-wetting before processing of the material. The use of proper water spray fogging methods will also be approved.

2. Any excess water or sludge shall be removed from the area of operation by an effective drainage system.

3. The operator shall be protected if necessary from wetting from the spray when using this method of dust control by means of protective baffles, clothing or protective devices. Such baffles, protective clothing or device shall be furnished by the employer. The application of the water spray shall be so applied that it will effectively control the concentration of atmospheric dusts, and at the same time shall not create a health or safety hazard to the operator or other employees.

4. The use of wetting agents is recommended as a reasonable safeguard against the use of too much liquid. Wet drilling is a recommended substitute for dry drilling in typical quarrying, mining and allied operations.

### 3.3.4 General ventilation and minimum air space

1. Operations may be such as to make the use of local exhaust impracticable or which may permit the escape of dust from well designed local controls. Therefore, general forced ventilation providing a supply of fresh air is often necessary.

2. Space requirements shall be not less than 50 square feet per worker with a minimum ceiling height of ten feet.

3. When general ventilation is applied as the air contaminant control due to such factors as cost, simplicity, flexibility, interference with process or substantiated reason and when all other provisions of these regulations are complied the minimum ventilation rate shall be 30 cubic feet per minute per person or 12 air changes per hour whichever is greater.

4. General ventilation shall not be employed as the principal method of dust control, except where the material processed contains less than 10% by weight of free silica. However, where the operations are such as not to require the constant attendance and exposure of the operator or where the operations are outside in the open air or under a protective weather roof.

5. Where necessary, general ventilation in buildings shall include mechanical ventilation of suitable and adequate capacity - properly located to the dust sources, and include fresh air inlets to insure circulation of clean make up air.

### 3.3.5 Respirators and protective equipment

1. Respiratory protective equipment shall be used only as a secondary means of protection in contaminated areas of dust concentrations.

2. Respirator, air supplied, cartridge type, filter type or other device shall be for use and for protection from silica bearing material as approved by the Department.

3. The employee shall exercise proper care in utilizing all protective equipment or devices provided by the employer to safeguard the employees health and safety Reference R. S. 34:15-31.

4. The employer shall provide without cost to each workman requiring the use of personal respiratory protective equipment with not less than one (1) new or antiseptically clean protective device of an approved type for adequate protection from properly identified atmospheric contaminants. The employer shall provide facilities for storage, inspection, sterilizing and repair of such protective devices and shall require such devices to be used.

5. Every employer shall require the employee to sign a card stating that he has been given a respirator and has been instructed to wear it at all times on the job. All such cards shall be kept on file for inspection.

3.3.6 Other methods of control

1. Other methods of dust control shall be submitted to the Department, in accordance with Sec. 3.1.2, provided that such methods eliminates the hazardous dust concentration or will effect a control in compliance with Rule 3.2 "Maximum Permissible Concentration Limits".

3.4 Standard Specifications for Construction and Installation of Exhaust Systems

3.4.1 Materials shall be galvanized sheet metal or other material of equivalent strength or suitability. Flexible rubber, metal or composition hose of a substantial character may be used for connections between hoods and piping where movement of the hood is required.

3.4.2 Piping of galvanized sheet metal shall be not less than the following U. S. Standard Gauge:

<u>Diameter</u>	<u>U. S. Std. Gauge</u>
8" or less .....	No. 22
9" to 16" .....	No. 20
17" to 24" .....	No. 18
25" up .....	No. 16

(The Division shall be consulted for gauges of materials other than galvanized sheet metal).

3.4.3 All bends and fittings shall be two gauges heavier than runs of corresponding diameter.

3.4.4 All elbows shall be made on a radius in the throat of not less than 2 times the diameter of the elbow. No internal crimped edges shall be used. Rectangular elbows or bends, venturi shaped elbows or other bends of low resistance design may be used in place of the long radius elbow.

3.4.5 All joints shall have at least a one (1) inch lap placed in the direction of air flow. All joints and seams shall be soldered, welded, rivetted or otherwise to be rigidly connected and made air tight. All straight seams shall be riveted with tinned rivets placed on not more than 3 inch centers unless welded or made by means of a "groove or lock seam". All around seams shall, if riveted, be not less than the following table:

<u>Diameter</u>	<u>No. of rivets</u>
8" or less .....	4
9" to 12" .....	5
13" to 18" .....	6
19" to 24" .....	7
25" up .....	9 inches on centers

3.4.6 All pipe collars and branch pipes should enter on the top or sides of the main pipes at an angle not exceeding 45 degrees. Not more than one (1) branch pipe should enter the main pipe at the same point of intersection.

3.4.7 All telescopic slip joints shall be made with a wire edge or band iron. Slip should be two gauges heavier than the outside pipes, and provided with a fastener to hold same in position. The inside pipe shall extend into the outside pipe not less than six (6) inches when the joint is fully extended.

3.4.8 At the point where the piping connects with the suction side of the exhaust fan, there shall be a detachable sleeve.

3.4.9 All piping shall be braced and supported in a substantial manner, at least every 10 feet. Horizontal runs must not sag and vertical runs shall not be subject to lateral movement. Dust separators shall be set in structural steel frames and all piping suspended or supported with iron braces.

3.4.10 Whenever piping passes through a fire wall or more than one floor, or from one building to another, an automatic fire damper shall be placed in the duct at the wall with blade of damper pointed toward the line of suction, and shall be so hung on a fusible link that in case of fire the damper will close the pipe.

3.4.11 Clean-out openings should be in the lower side of the pipe and provided with removable caps of sufficient size to permit access to interior. They shall be located at the bottom of all vertical runs of pipe and 20 foot intervals in horizontal runs or wherever dust settlement is likely to occur.

3.4.12 Chip traps may be installed in the exhaust pipe to collect large particles of material provided the trap discharges into an enclosed container which shall be readily removable for disposal.

3.4.13 Transition pieces should be six (6) times the diameter of the inlet pipe and should maintain a straight run on the bottom of all horizontal ducts.

#### SECTION 4 - ADDITIONAL REQUIREMENTS

4.1 When local exhaust is the indicated method of control, then the following additional requirements shall be met for the equipment specified. Recognizing that the minimum ventilation requirements for effective dust control will vary with the particular conditions of operations and use of equipment in different industries, rates of ventilation higher than those specified below may be required or lower rates may be accepted, provided the requirements of Sec. 3.2.1 are met.

##### 4.1.1. Screens

Every screen shall be enclosed as completely as possible. Flat deck screens shall be provided with ventilation at a rate of not less than fifty (50) cubic feet per minute per square foot of screen area, and the air velocity through openings shall be not less than two hundred (200) linear feet per minute. Cylindrical screens shall be provided with ventilation at a rate of not less than one hundred (100) cubic feet per minute per sq. ft. of screen cross section.

##### 4.1.2. Crushing and Grinding Mills

Crushing and grinding mills shall be enclosed as completely as possible and shall be ventilated so as to maintain a negative pressure within the enclosure. The air velocity through all openings shall be not less than two hundred (200) linear feet per minute.

##### 4.1.3 Storage bins

Storage bins shall be enclosed and shall be ventilated so as to maintain a negative pressure within the enclosure; provided, the number of dust particles in the surrounding atmosphere exceed the Maximum Permissible Concentrations Limits. The indraft should be 150 f.p.m.

##### 4.1.4 Mixers

Mixers shall be enclosed and shall be ventilated at a rate of not less than one hundred and fifty (150) cubic feet per square foot of open area in the enclosure, including all loading and inspection openings. The minimum velocity at such openings shall be 150 linear feet per minute.

#### 4.1.5 Loading Hoppers

Loading hoppers shall be enclosed as completely as possible and shall be ventilated so as to maintain an inward flow of air during the loading operation and in no case shall the rate of ventilation be less than 100 linear feet per minute.

#### 4.1.6 Bucket elevators

Bucket elevators shall be enclosed and shall be ventilated so as to maintain negative pressure within the enclosure.

#### 4.1.7 Conveyors

Conveyors which by their operation contribute to the contamination of the breathing zone of the worker shall be enclosed as completely as possible and shall be ventilated so as to maintain a negative pressure within the enclosure.

Exhaust hoods over loading and discharge points on conveyors belts shall be ventilated at a rate of not less than three hundred and fifty (350) cubic feet per minute per foot of belt width and the air velocity through the net open area of the hood shall be not less than two hundred (200) linear feet per minute. If an appreciable amount of dust is generated on the conveyor belt at a point other than the loading and discharge points, effective measures shall be provided to prevent dissemination of such dust into a working area.

#### 4.1.8 Pneumatic Hand Tools

The air velocity at the tool in a direction toward the hood shall be not less than two hundred (200) linear feet per minute. A ventilating booth may be employed in place of local exhaust ventilation for pneumatic hand tools provided the ventilating air is maintained at a temperature of not less than fifty-six degrees (56°) Fahrenheit and provided further that substantially uniform air flow is maintained through the booth at a velocity of not less than two hundred (200) linear feet per minute.

#### 4.1.9 Material Chutes

Material chutes shall be enclosed as completely as possible and shall be ventilated so as to maintain a negative pressure within the enclosure.

#### 4.1.10 Bagging machines

Bagging machines shall be enclosed as completely as possible and shall be ventilated at a rate of not less than one hundred (100) cubic feet per square foot of open area in the enclosure for paper bag filling; and two hundred (200) cubic feet per square foot of open area in the enclosure for cloth bag filling. Collecting hoppers shall be arranged in such a manner to catch any spilled material.

#### 4.1.11 Filling of Barrels and Containers

The filling of barrels and other containers, except as provided for in Rule "Bagging Machines" shall be performed in a space enclosed as completely as possible. Such space shall be so ventilated as to maintain an inward flow of air into the ventilating system during the filling operation. The rate of this flow shall be not less than one hundred (100) cubic feet per minute per square foot of open area between the hood or enclosure and the container which is being filled. This provides for a 100 linear feet per minute velocity at the periphery of the container.

#### 4.1.12 Surfacing Machines

The rate of ventilation through the exhaust hood shall be not less than five hundred (500) cubic feet per minute for surfacing machines having a piston diameter of not more than two and three eighths ( $2 \frac{3}{8}$ ) inches, and one thousand (1000) cubic feet per minute for machines having a piston diameter of more than two and three eighths ( $2 \frac{3}{8}$ ) inches but not more than two and seven eighths ( $2 \frac{7}{8}$ ) inches. The rate of ventilation shall be increased proportionately for machines having piston diameters exceeding two and seven eighths ( $2 \frac{7}{8}$ ) inches. The hood for every surfacing machine shall enclose the cutting tool as completely as possible.

#### 4.1.13 Abrasive Blasting

1. Abrasive blasting shall be performed in (1) ventilated blasting rooms in which the operator must wear the personal respiratory protective equipment as provided in Rule 3.8 of this code, (2) ventilated cabinets in which the operator stands outside the booth and manages the work inside and or (3) automatic sand blast machines which do not require an operator.
2. Sandblast room ventilation shall be not less than 80 cubic feet of air per minute per square foot of floor area per operator when the air movement is downward from air supply openings at the ceiling. In long tunnel type chambers the ventilation rate shall be not less than 80 cubic feet a minute per square foot of vertical cross section for horizontal flow.
3. Air should be exhausted through floor grating or rectangular openings formed by false walls or ducts which extend to within 1 foot of the floor. This duct should limit the air velocity to between 500 and 1000 F.P.M.
4. Sandblast rooms shall be tightly closed during operations and the doors shall be dust tight when closed. Air inlet ports or louvers shall be located at the top of the room and must be baffled to prevent direct discharge of the abrasive material through such inlets. All such openings shall have an inward velocity of not less than three hundred (300) linear feet per minute.
5. Where the room includes a recovery hopper below floor level all connections, cleanout covers, conveyor and elevator housing must be air tight.
6. Sand blast cabinets shall be exhausted at a rate not less than 400 cu. ft. per minute with not less than 500 F.P.M. through all openings. Where slit curtains are employed for nozzle or work conveyor, two thirds of the full open area should be used in calculating ventilation rate.
7. Sand blasting barrels, blast mills, etc. must be under negative pressure and should be exhausted at a rate of 20 times the volume of the barrel per minute. Should a mill require additional control due to leakage it must be surrounded by a booth having a single face opening exhausted to give a face velocity of at least 100 F.P.M.

4.2 In order to discover cases of early involvement it is recommended that an X-ray and physical examination be made routinely under proper medical direction and supervision.

### SECTION 5 - PLAN EXAMINATION & APPROVAL FOR EXHAUST SYSTEM

#### 5.1 Requirements for filing of plans and specifications

1. The minimum requirements governing all matters pertaining to the filing of exhaust systems plans are expressed in the following rules and regulations.
2. No applications for approval will be considered unless there is complete compliance with the minimum requirements of applicable regulations. All persons required by law to apply for such plan approval shall be deemed to have violated the law if there is not complete compliance with the minimum requirements.
3. Application forms BSI-10 shall be submitted in triplicate and shall be accompanied by a filing fee of two dollars per thousand dollars or fraction thereof of the valuation based on the installation and applicable equipment costs up to \$20,000. Fifty cents (\$.50) is payable on each thousand dollars (\$1,000) valuation thereafter. Checks or money orders are to be made payable to the Commissioner of Labor.
4. Plans and specifications when the latter are required shall be submitted in triplicate. All prints shall be signed and sealed by a professional engineer licensed to practice in the State of New Jersey.
5. Copies of original drawings must be of uniform size if more than one drawing is used to illustrate the work.

6. Drawings title shall appear on each copy and shall show the following information:
  - (a) Designation of system, such as ventilating, exhausting, and dust collecting plus air conditioning.
  - (b) Name of party for whom system is being installed, and full location of premises where installed.
  - (c) Name of Professional Engineer or Contractor by whom design was prepared.
  - (d) Date, scale and number of sheet to be on each drawing.
7. System design details to be shown on the drawings, shall include: pipe size, kind of duct materials and thickness, longitudinal pipe dimensions, radius of bends, angle of entry, piping clean-out, exhaust stack and cap, anticipated future additions, minimum velocity at hood outlet, total system air volume, make, kind and rating of fan. *Note:* When deemed necessary, complete design computations for the system may be requested before plan approval is given.
8. Complete plan view of the system with full design information drawn to scale to be shown with the walls and columns of the building in which the system is installed. Where the system does not extend beyond the wall limits of a room only the room layout need be shown. If the system is confined to a portion of the floor area of a large building or room only that portion of the building or room in which the system is installed need be shown on the drawings.
9. An elevation view drawn to scale shall be submitted with each system. The plan view shall be marked at the point at which the elevation view is taken.
10. Complete details for supporting all parts and equipment of the system shall be submitted on the drawings. Where existing roof and floor construction is used for carrying the equipment sufficient detail must be given to properly analyze the loading conditions and vibrations set up by the proposed installation.
11. Separators and filter systems are to be shown on scale with proper dimensions indicated. The inlet and discharge sizes are to be shown. Complete information indicating the sizes and capacity of the separators and filters with inlet and discharge velocities noted. Both cloth and viscous filter specifications shall include the C.F.M. per sq. ft. of filter area. Standard manufactured equipment must be identified with the full ratings and model as classified by the manufacturer. Assembly units not classified as standard units must be submitted with complete structural details as well as the complete design information for determining its capacity as a separator or filter.
12. All hoods must be shown with complete dimensions. The outline of the equipment and apparatus served by the hood is to be drawn in scale to determine the suitability and practicability of the shape and size of the hood.
13. The proper identification of the dusts, fumes and vapors should be given on the applications. When the chemical composition of the dust, fumes and vapors cannot be identified definitely, the source from which these dusts, fumes and vapors emanate must be stated on the applications.
14. Full details of the construction of all fire walls, floors and roofs pierced by any part of the system are to be indicated on the plans.
15. All correspondence relating to plans is to be addressed to *Plan Examining Section, New Jersey Department of Labor, Division of Engineering and Safety, 1 Exchange Place, Jersey City, New Jersey.*

## SECTION 6 - APPROVAL

### 6.1 Sampling and Evaluation of Dust Exposures.

1. Following plan approval and installation and prior to granting final approval for any method or methods of dust control, a study may be made by representatives of the Department to determine the atmospheric dust concentration in the area of exposure of the workers.
2. Such atmospheric dust counts shall be made at various points representative of the exposure of the workers except that when several workers are engaged in the same operations which are provided with the same kind of control measures, tests may be made at a single exposure which is representative of the group.
3. The free silica dioxide content of stone or other material will be determined from composite samples of dust used in dust sampling and from settled dust specimens taken from plane surfaces coinciding with average breathing levels. When different kinds of stone or raw material are handled or processed separately each shall be sampled and classified separately.

4. Atmospheric dust sampling shall consist of not less than three (3) dust samples of at least ten (10) minutes duration, spaced at intervals to yield a fair average measurement of exposure over the entire cycle of operations. This sample shall be collected in the normal breathing zone on the premises by a standard type impinger, or other approved method. The atmospheric dust concentration shall be deemed to be the average concentration as determined from the samples by the use of the light-field, low-power technic count or its equivalent.

5. All tests for the final approval of dust control methods shall be made when all machines and other processes to which the control methods being tested apply, are in normal operation.

### 6.2 Variation

1. The Commissioner may modify the whole or any part of the requirements of these rules and regulations if satisfied that injury to health is adequately prevented by other appliances or any other conditions than those prescribed by these rules and regulations.

2. If there shall be practical difficulties or unnecessary hardship in carrying out provisions of these rules and regulations effecting the construction or alteration of buildings, exits therefrom, the installation of fixtures and apparatus or the safeguarding of machinery and prevention of accidents, the Commissioner may make a variation from such requirements if the spirit of the provision or rule shall be observed and public safety secured.

### 6.3 Notification and Approval Certificate

1. The owner, tenant or authorized agent upon completion of any installation shall notify the Bureau of Hygiene and Sanitation, and if upon inspection and test it appears the system has been installed in accordance with approved plans and the controls effected comply with the standards, it shall be accepted as satisfactory.

2. A certificate of approval of each installation will be issued when an inspection indicates that work is completed in a manner which is satisfactory to the Division.