


criteria for a recommended standard

OCCUPATIONAL EXPOSURE TO

COTTON DUST



U. S. DEPARTMENT OF HEALTH, EDUCATION, AND WELFARE
Public Health Service
Center for Disease Control
National Institute for Occupational Safety and Health

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1974

HEW Publication No. (NIOSH) 75-118

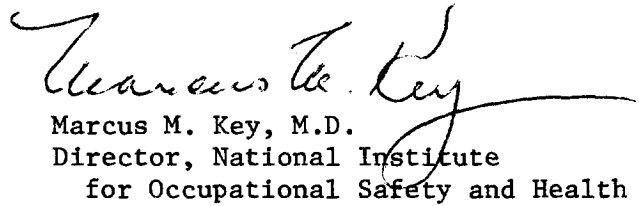
PREFACE

The Occupational Safety and Health Act of 1970 emphasizes the need for standards to protect the health and safety of workers exposed to an ever-increasing number of potential hazards at their workplace. The National Institute for Occupational Safety and Health has projected a formal system of research, with priorities determined on the basis of specified indices, to provide relevant data from which valid criteria for effective standards can be derived. Recommended standards for occupational exposure, which are the result of this work, are based on the health effects of exposure. The Secretary of Labor will weigh these recommendations along with other considerations such as feasibility and means of implementation in developing regulatory standards.

It is intended to present successive reports as research and epidemiologic studies are completed and sampling and analytical methods are developed. Criteria and standards will be reviewed periodically to ensure continuing protection of the worker.

I am pleased to acknowledge the contributions to this report on cotton dust by members of my staff and the valuable constructive comments by the Review Consultants on Cotton Dust, by Robert B. O'Connor, M.D., NIOSH consultant in occupational medicine, and by William A. Burgess, NIOSH consultant on respiratory protection. In addition, I would like to thank the American Textile Manufacturers Institute, Inc. for their contribution of recommended industrial work practices which has helped significantly in

developing the work practices section of this document. The NIOSH recommendations for standards are not necessarily a consensus of all the consultants that reviewed this criteria document on cotton dust. Lists of the NIOSH Review Committee members and of the Review Consultants appear on the following pages.



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CRITERIA DOCUMENT: RECOMMENDATIONS FOR AN
OCCUPATIONAL EXPOSURE STANDARD FOR COTTON DUST

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I. RECOMMENDATIONS FOR A COTTON DUST STANDARD

The National Institute for Occupational Safety and Health (NIOSH) recommends that occupational exposure to cotton dust in the workplace be controlled by compliance with the following sections. Although there are significant gaps in knowledge of the etiology of byssinosis, the standard is designed to compensate for this gap and to provide the greatest feasible degree of health protection for exposed workers over their working lifetime. The significant thrust of the standard for cotton dust is medical management and surveillance, administrative controls, and work practices. Since no definitive environmental level can assure complete health protection, none is recommended in this document. However, to ensure that effective engineering controls are implemented and dust concentrations reduced, an environmental standard should be fixed. The concentration should be set at the lowest level feasible, but in no case at an environmental concentration as high as 0.2 mg lint-free cotton dust/cu m, in order to reduce the prevalence and severity of byssinosis. The criteria and standard will be subject to review and revision as necessary.

"Exposure to cotton dust" includes any work with cotton that results in airborne cotton dust; "cotton dust" is defined as dust generated into the atmosphere as a result of the processing of cotton fibers combined with any naturally occurring materials such as stems, leaves, bracts, and inorganic matter which may have accumulated on the cotton fibers during the growing or harvesting period. Any dust generated from processing of cotton through the weaving of fabric in textile mills and dust generated in other operations or manufacturing processes using new or waste cotton fibers or cotton fiber byproducts from textile mills is considered cotton dust. The

recommended standard does not apply to dust generated from the handling or processing of woven materials.

Section 1 - Medical

(a) Medical Examinations

(1) Preplacement: A comprehensive physical examination shall be made available to include as a minimum: medical history, baseline forced vital capacity (FVC), and forced expiratory volume at one second (FEV 1). The history shall include administration of a questionnaire (see Appendix IV) designed to elicit information regarding symptoms of chronic bronchitis, byssinosis, and dyspnea.

If a positive personal history of respiratory allergy, chronic obstructive lung disease, or other diseases of the cardiopulmonary system are elicited, or where there is a positive history of smoking, the applicant shall be counseled on his increased risk from occupational exposure to cotton dust.

At the time of this examination, the advisability of the worker's using negative or positive pressure respirators shall be evaluated.

(2) Each newly employed person shall be retested for ventilatory capacity (FVC and FEV 1) within six weeks of employment. This retest shall be performed on the first day at work after at least 40 hours' absence from exposure to cotton dust and shall be performed before and after at least six hours of exposure on the same day.

(3) Periodic: Each current employee exposed to cotton dust shall be offered a medical examination within six months of the

publication of these regulations and at least yearly thereafter that shall include administration of a questionnaire (see Appendix IV) designed to elicit information regarding symptoms of chronic bronchitis, byssinosis, and dyspnea.

(4) Each current employee exposed to cotton dust shall have measurement of forced vital capacity (FVC) and of forced expiratory volume at one second (FEV 1). These tests of ventilatory function should be performed on the first day at work following at least 40 hours of absence from exposure to cotton dust, and shall be performed before and after at least six hours of exposure on the same day.

(5) Ideally, the judgment of the employee's pulmonary function should be based on preplacement values (values taken before exposure to cotton dust). When preplacement values are not available, then reference to standard pulmonary function value tables may be necessary. Note that these tables may not reflect normal values for different ethnic groups. For example, the average healthy black male may have an approximately 15% lower FVC than a caucasian male of the same body build (see Appendix III). A physician shall consider, in cases of significantly decreased pulmonary function, the impact of further exposure to cotton dust and evaluate the relative merits of a transfer to areas of less exposure or protective measures. A suggested plan (Table XII-12) for the management of cotton workers was proposed as a result of a conference on cotton workers' health.

(6) Medical records, including information on all required medical examinations, shall be maintained for persons employed in work involving exposure to cotton dust. Medical records with pertinent

supporting documents shall be maintained at least 20 years after the individual's termination of employment. These records shall be available to the medical representatives of the Secretary of Health, Education, and Welfare, of the Secretary of Labor, of the employee or former employee, and of the employer.

Section 2 - Posting

(a) The following warning shall be posted to be readily visible at or near entrances or accessways to work areas where there is potential exposure to cotton dust:

WARNING!

COTTON DUST WORK AREA

Unauthorized Persons Keep Out

(b) The following warning shall be posted in readily visible locations in any work area where there is potential exposure to cotton dust:

WARNING!

COTTON DUST WORK AREA

AVOID BREATHING DUST

May Cause Acute or Delayed Lung Injury (Byssinosis)

(c) The posting required under Sections 2(a) and 2(b) shall be printed both in English and in the predominant language of non-English-

speaking workers, unless they are otherwise trained and informed of the hazardous areas. All illiterate workers shall receive such training.

Section 3 - Personal Protective Equipment

Engineering controls shall be used wherever feasible to maintain cotton dust concentrations below the prescribed limit. Administrative controls can also be used to reduce exposure.

Respirators shall also be provided and used for nonroutine operations (occasional brief exposures above the environmental limit and for emergencies) and shall be considered for use by employees who have symptoms even when exposed to concentrations below the established environmental limit. Appropriate respirators as described in Table I-1 shall be used pursuant only to the following requirements:

(a) For the purpose of determining the type of respirator to be used, the employer shall initially measure the atmospheric concentration of cotton dust in the workplace and thereafter whenever process, worksite, climate, or control changes occur which are likely to alter the cotton dust concentration. This requirement shall not apply when only atmosphere-supplying positive pressure respirators are used. The employer shall ensure that all workers are supplied with respirators appropriate for the concentration of dust to which they are exposed.

(b) A respiratory protective program meeting the requirements of the Occupational Safety and Health Administration Standards, part 1910.134, shall be established and enforced by the employer (29 CFR, Part 1910.134 published in the Federal Register, volume 39, page 23671, dated June 24, 1974).

TABLE I-1
RESPIRATORS FOR USE IN COTTON DUST

Dust Concentration in Multiples of the Standard	Respirator Type
Less than or equal to 10X	<ul style="list-style-type: none"> (1) Air-purifying dust respirator with replaceable dust filter, quarter or half mask. (2) Type C supplied air respirator, demand type (negative pressure) with quarter or half mask. (3) Air-purifying, single use dust respirator with quarter or half mask.
Less than or equal to 100X	<ul style="list-style-type: none"> (1) Air-purifying full facepiece respirator with replaceable dust filter; chin, front, or back mounted filter. (2) Type C supplied air respirator, demand (negative pressure) with full facepiece. (3) Powered air-purifying respirator with quarter or half mask and replaceable dust filter.
Less than or equal to 200X	Powered air-purifying respirator with full facepiece and replaceable dust filter.
Greater than 200X	Type C supplied air respirator, pressure demand or continuous flow type with quarter or half masks, full facepiece, hood or helmet.

Section 4 - Informing Employees of Hazards from Cotton Dust

(a) Each employee, before being assigned to a cotton work area, shall be apprised of the hazards, relevant symptoms, appropriate emergency procedures, and proper conditions and precautions for safe use or exposure, and shall be instructed as to the availability of relevant information which shall be kept on file and shall be accessible to the worker at each place of employment where cotton is involved in unit processes and operations.

(b) Information as specified in Appendix II, to the extent appropriate to cotton dust, shall be recorded on US Department of Labor Form OSHA-20, "Material Safety Data Sheet," or on a similar form approved by the Occupational Safety and Health Administration, US Department of Labor.

Section 5 - Work Practices

(a) Exhaust Systems and Production Machinery

Local exhaust ventilation and air cleaning systems shall be designed and maintained to prevent the accumulation and recirculation of cotton lint and dust into the workroom. The total system shall be inspected periodically for effective performance. Production machinery shall also be properly maintained and kept at peak operating efficiency to prevent unnecessary dust emissions.

(b) General Housekeeping

(1) Cleaning by blowing with compressed air or dry sweeping shall be avoided and vacuum cleaning substituted wherever possible. Waste material shall be disposed of in closed containers and not

recycled into the process unless the lint-free dust (dust less than 15 μm aerodynamic diameters) has been removed.

(2) When "blow down" is necessary, it shall be conducted only in the absence of personnel not involved in the "blow down" operation, and those involved shall wear approved respirators. Dust shall be allowed to subside or be removed by ventilation before workers without respirators are permitted to reoccupy the workplace.

(3) Good housekeeping practices designed to prevent the resuspension of settled dust shall be developed and shall be followed at all times.

(c) Use of Respirators

Approved respirators shall be worn for those temporary or occasional tasks in which the dust concentration rises above safe levels such as when dry sweeping, "blowing down", removing chokes, manually collecting trash, and performing general cleanup operations (see Section 3).

(d) Specific Work Practices

Specific work practices shall be established and posted for all work positions where cotton dust is present. This includes but is not limited to positions in the waste house, opening, picking, carding, drawing, combing, roving, spinning, winding, twisting, weaving, and knitting areas. Practices such as keeping cotton away from the face, avoiding unnecessary creation of dust by shaking or throwing material, and avoiding localized high dust level areas wherever possible shall also be included. Creation of a positive attitude toward dust control on the part of management and employees is essential. Employees shall be trained in procedures which

will limit their exposure and shall be instructed to follow these work practices.

Section 6 - Environmental (Workplace Air)

(a) Concentration

Occupational exposure to lint-free cotton dust (dust less than 15 micrometers (15 μm) aerodynamic diameters) shall be controlled to the lowest feasible limit which shall be less than 0.2 mg lint-free cotton dust/cu m.

(b) Sampling, Collection, and Analysis

Procedures for collection and analysis of environmental samples shall be as provided in Appendix I or by any method shown to be equivalent in accuracy, precision, and sensitivity to the methods specified.

Section 7 - Monitoring and Recordkeeping Requirements

(a) Because personal monitoring for cotton dust is not presently feasible, each operational area shall be monitored in such a manner that individual workers' exposure can be constructed. Samples shall be collected using the vertical elutriator for a sufficient length of time to permit such determinations. Sampling shall be conducted in distinct operational areas (ie, opening, picking, carding, drawing, combining, etc). Each operational area shall have a minimum of 5 sampling locations representative of the area and in proximity to employee activities. For areas greater than 5,000 sq ft, another sampling site should be added for each additional 1,000 sq ft of floor space. Samples in each operational area shall be gathered simultaneously during a typical operating shift.

(b) Within 180 days of the effective date of a cotton dust standard, employers shall identify the locations of all processes or operations where employees may be exposed to cotton dust. Employers shall monitor cotton dust concentrations in these areas at least every 6 months, except as otherwise indicated by the judgment of a professional industrial hygienist. Whenever concentrations exceed the environmental limit, immediate steps shall be taken to reduce the environmental level to or below the limit. If one or more of the samples collected in a work area reveal that the environmental level exceeds the standard, area sampling shall be repeated every month. This increased frequency of monitoring shall be continued for at least 2 months after the last sampling that demonstrated that dust level does not exceed the environmental limit.

(c) Cotton dust concentrations shall be monitored within 30 days after any change of process or operation which could adversely affect the environmental dust level.

(d) Records shall be maintained for all sampling schedules. These records shall include the sampling method, sampler locations, analytical method, type of respiratory protection in use, if any, and the measured dust concentrations in each work area. Each employee shall be able to obtain information on his own environmental exposure.

(e) Medical records and exposure data shall be kept for at least 20 years following an employee's termination of employment.

II. INTRODUCTION

This report presents the criteria and the recommended standard based thereon which were prepared to meet the need for preventing occupational diseases arising from exposure to cotton dust. The criteria document fulfills the responsibility of the Secretary of Health, Education, and Welfare, under Section 20(a)(3) of the Occupational Safety and Health Act of 1970 to "...develop criteria dealing with toxic materials and harmful physical agents and substances ..."

The National Institute for Occupational Safety and Health (NIOSH), after a review of data and consultation with others, formalized a system for the development of criteria upon which standards can be established to protect the health of workers from exposure to hazardous dusts as well as chemical and physical agents. It should be pointed out that any recommended criteria for a standard should enable management and labor to develop better engineering controls resulting in more healthful work practices and should not be used as a final goal.

These criteria and recommended standard for cotton dust are in a continuing series of criteria developed by NIOSH. The proposed standard applies only to the processing, manufacture, and use of cotton as applicable under the Occupational Safety and Health Act of 1970.