

COTTON DUST:

Controlling an Occupational  
Health Hazard

# Cotton Dust

## Controlling an Occupational Health Hazard

**Joseph G. Montalvo, Jr.,** EDITOR

*United States Department of Agriculture  
Southern Regional Research Center*

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## PREFACE

**COTTON DUST IN THE WORKPLACE** is a major problem facing the cotton and textile industry. Workers breathing cotton dust may develop byssinosis, a disease that resembles chronic bronchitis and, in its later stages, emphysema. The agent believed to cause the disease is not actually cotton but microscopic foreign matter in the cotton that is released when bales are processed in the mills.

The industry, union, and government are interested in controlling cotton dust in the occupational environment. An OSHA standard is currently in effect limiting the allowable dust concentration in the textile mills and in certain allied industries. One way to reduce dust levels is through enclosed machinery and air filters. Such improvements are costly, however, and even as the mills modernize and reduce dust concentrations, problems concerning byssinosis remain unsolved. Questions concerning compensation for workers who contracted the disease before mills began to reduce dust levels, how smoking affects susceptibility, and what are the causative agent(s) remain unanswered.

Alternative short- and long-term solutions to the problem have been proposed. Washing cotton is a short-term means for reducing the hazard. Apparently the byssinogenic agent can be washed from cotton, but the fiber is rendered somewhat difficult to process into yarn. Long-range approaches to the problem are chemical treatment of raw cotton and prevention of initial contamination at pre-textile mill stages of operation, particularly ginning.

Byssinosis is characterized clinically by shortness of breath, cough, and chest tightness on the first day a worker returns to work after time off (the "Monday-morning" syndrome). The acute byssinotic response has been documented, but the prevalence of chronic respiratory effects in the current population of cotton textile workers is still being debated. The pathogenesis, etiology, and mechanisms of the disease are not readily understood. Bioassay techniques and the use of models closely akin to byssinosis should eventually lead to understanding the disease. A host of byssinogenic agents ranging from chemical species in plant parts such as leaf and bract to microorganisms and microbial products have been suggested. Continued research will undoubtedly provide the ultimate solution to the byssinosis problem.

This book is based on a symposium designed to assess the current perspective and future directions of research to regulate, control, measure, and solve the problem of cotton dust in the workplace. Specific topics discussed include the OSHA standard and court-related decisions, lint cleaning and dust in gins, washing cotton, dust generation in textile mills, measuring dust in the workplace, byssinosis mechanisms, epidemiology, and causative agent analysis. In this volume as in the symposium, the proceedings represent an attempt to present the scope and a balanced view of the occupational hazard due to cotton dust, and they are arranged into four sections: (1) OSHA standard, (2) engineering controls and measurements, (3) etiology and epidemiology, and (4) analysis.

I wish to acknowledge the contributions of the authors and reviewers. I would also like to thank the ACS Division of Chemical Health and Safety for the invitation to organize the symposium, and the Southern Regional Research Center, Agricultural Research Service, USDA, for the support of my participation in this activity.

**JOSEPH G. MONTALVO, JR.**  
Southern Regional Research Center  
New Orleans, La.

January 27, 1982

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**OSHA STANDARD**



# A Historical Perspective on Cotton Dust in the United States Textile Industry

JOHN G. TRITSCH

American Textile Manufacturers Institute, Inc., Washington, D.C. 20036

The American Textile Industry involvement with cotton dust as a workplace hazard began over ten years ago with industry studies to determine whether the industry had such an illness problem. Then followed major dust removal and ventilation efforts. The industry developed a work practices and medical surveillance program which was presented to OSHA. The Labor Department conducted lengthy hearings on numerous standard proposals for controlling cotton dust exposures resulting in the 1978 promulgation of the present OSHA standard. Industry doubts about need for that standard, its feasibility and its capability of solving the dust illness problem coupled with disagreement with claimed cotton dust illness dimensions led to challenge in the courts. Industry belief in ability of medical surveillance and administrative practices in support to reduce greatly or just about eliminate future byssinosis cases. Problems exist with diagnosis of cotton dust illness which complicate compensation awards. Causative agent arrives at the mill in the bale of cotton and industry supports aggressive research efforts to identify cause and seek its removal.

Prior to enactment of the Occupations Safety and Health Act in 1970, the U.S. textile industry had barely become aware of worker problems with cotton dust. There had been a limited awareness abroad in a few countries whose textile operations were older, well established and with visible and obvious high levels of dust featuring their operations. U.S. mill working environments improved considerably with the general advent of industrial air conditioning in the 1950's and the closing of the mills to the outside accompanied by improved air cleaning techniques. Both of these general activities accelerated in the 1960's and 1970's. Few people in the U.S. government or in industry had even heard of the word, "byssinosis", a term used to describe the ailment of sufferers of cotton dust problems.

### Industry Actions

Late in the 1960's, speculation about raw cotton dust respiratory problems in the U.S. mills was raised in medical journals stimulating investigation by the textile industry. The industry employed the Industrial Health Foundation, an affiliate of the Mellon Institute in Pittsburgh, to study the question in 1969. The study covered some twenty companies in four states and no other study either before or since that time covered so many companies(1). The results clearly indicated that there were some individuals who did suffer some adverse affects when exposed to cotton dust and the government was informed of these findings.

The industry then sought to find out what there was about cotton dust that created the problem. The search involved researchers at the Industrial Health Foundation, the Medical University of South Carolina, Tulane University and other institutions. Even staff members of the American Textile Manufacturers Institute became involved. It is unfortunate, but true, that identification of the cause or causes of byssinosis so far continues to elude all research efforts, including those of government, textile industry and cotton producers. Recognizing that the causative agent comes to textile mills in the bales of cotton received from growers, industry representatives, in cooperation with growers and others concerned with cotton, cannot overemphasize how important it is for the Department of Agriculture to expand and accelerate its research programs designed to identify and seek removal of the causative agents(2).

In further recognition of industry responsibilities, efforts were made through the American Textile Manufacturers Institute to develop a set of work practices for industry-wide application to diminish the exposure of individual employees to cotton dust hazards. The comprehensive and stringent series of work practices developed were consolidated into a printed booklet in 1973(3). This publication was distributed widely through the industry. In addition, an industry delegation called on the Secretary of Labor, urging that the recommended practices be established immediately as a mandatory OSHA standard(4). This was not done.

Related in part to these work practices developments, the mills also instituted medical surveillance programs designed to identify those few individuals with a cotton dust sensitivity so that they might be considered for assignment outside the yarn processing areas(3).

On still another front, the industry stepped up its installation of dust cleaning equipment. Expenditures for such installations amounted to hundreds of millions of dollars(5). All

these efforts were done by the industry internally and without government help. It may be said without hesitation that the U.S. textile industry today is the most modern, safest and cleanest of any textile industry in the world.

### Proposed Standard

While OSHA never accepted the work practices program proposed by the industry as a standard, the Agency issued a proposed rule in December 1976 to replace the original 1 milligram per cubic meter total dust standard for regulating cotton dust exposure(6). The proposal would have set a standard maximum allowable cotton dust level at 0.2 milligrams per cubic meter. During the hearings held in the months of April and May of 1977, numerous ATMI representatives participated. The industry and these witnesses proposed a standard maximum dust levels set at 0.5 milligrams (1.0 for weaving and slashing) backed up with the medical surveillance and work practices programs developed by the industry (5). OSHA again ignored industry recommendations.

### New Standard

The Federal Register for June 23, 1978, publicized the OSHA promulgation of the final rule to go into effect September of that year(7). The three level standard of 0.2 milligrams per cubic meter for opening through yarn manufacture, 0.75 milligrams per cubic meter for weaving and slashing and 0.5 milligrams per cubic meter for other operations represented only a minor variation from the 1976 proposal. The industry could not live with what appeared as an insurmountable and infeasible burden. When its request for reconsideration was rejected by the Agency, the industry had no choice but to appeal to the courts.

### Court Appeals

Court action was instigated by the industry in the U.S. Court of Appeals for the Fourth Circuit(8). Meanwhile, AFL-CIO also entered suit against the Department of Labor in the Court of Appeals for the District of Columbia Circuit, claiming that the final rule was too lax(9). All court actions eventually were consolidated in one case in the D.C. Circuit Court of Appeals (10).

A stay of the standard was granted effective October 12, 1978, temporarily reinstating the 10. milligrams per cubic meter of total cotton dust as the sole standard. The industry submitted oral arguments in eloquent briefs emphasizing the infeasibility of the standard, questioning its need and doubting its potential effectiveness, all to no avail. On September 24, 1979, the Court's decision upheld the OSHA standard(11). In a series of orders on January 11, 1980, the court rejected requests for a

re-hearing and set in motion the machinery for OSHA to make the standard effective March 27, 1980.

On March 4, 1980, attorneys for ATMI and related petitioners filed a petition with the Supreme Court for a writ of certiorari requesting a review of the action of the D.C. Circuit Court concerning the dust standard. This is the last avenue of relief available through the judicial system. The industry position raised four points: 1) There's a conflict among the circuits as to the showing OSHA must make to establish that its standards are economically feasible. 2) There's a conflict among the circuits whether OSHA must demonstrate the existence of a reasonable relationship between the cost of the standard and the benefits expected from it and as to whether OSHA must demonstrate a reasonable necessity for the standard. 3) This case presents the important question as to the proper role of the reviewing court under the substantial evidence standard of review. 4) The wage guarantee provision concerning respirators exceeds OSHA's statutory authority. In October the Supreme Court accepted the petition for review but declined to include point 3 on evidentiary standards<sup>(12)</sup>.

Briefs and replies were submitted by both sides and oral arguments were heard on January 21, 1981. Shortly after the oral arguments were heard an issue raised by one justice on the relationship of the Supreme Court benzene decision to cotton dust was given treatment in supplementary briefs by all concerned. We are now awaiting the court's decision.

#### Compliance and Defects in the Standard

Meanwhile, the Agency has been administering enforcement of the standard since March 27, 1980<sup>(13)</sup>. Textile mills have been attempting to meet the various transitional steps required by the standard under the watchful eyes of the OSHA regional administrators and state OSHA plan administrators. This enforcement experience has revealed shortcomings in the standard difficult, if not impossible, to enforce. These defects are itemized briefly below in two basic categories.

First of all, the standard is oriented excessively to exacting specifications rather than performance. Nowhere is this more evident than in the requirements for the measurement of dust levels and exposures and instrumentation to accomplish these measurements. The methods of compliance with the permissible exposure levels offer employers little in the way of options. Even such mundane matters as the signs to be posted, the keeping of records and the education and training of employees are tightly specified. Exacting respirator requirements make reconciliation with sensitive employee relations difficult if not impossible.

The other major category covers requirements defective in a technical or technological sense. Selection of the permissible

exposure limits in some cases goes beyond current technological capabilities. In this sense, the standard has been technology forcing. The standard includes within its coverage some operations where cotton dust exposure does not pose a significant risk to employees in those areas. The medical surveillance section even calls for the physician's report to include information that assumes a knowledge of the individual patient for beyond any need related to carrying out the cotton dust standard provisions. Lastly, and perhaps most significant of all, there is no provision for action levels or limits of application of the standard so that the standard has no clear beginning or end.

In closing, permit me to observe that the industry doubts that the cotton dust standard developed by OSHA with its all-encompassing provisions is the answer to a problem that has been grossly exaggerated. The standard has many defects and sooner or later the Agency must engage in supplementary rulemaking to rectify many of them. In view of the fact that the component of cotton dust causing the byssinosis problems comes to the mills already in the cotton bale, research efforts to isolate and remove the causative agent offer the best chance for ultimate solution. This underlines the importance of meetings like this one featuring the exchange of research information. Whatever the outcome, the U.S. textile industry will be certain to perform as a good citizen and to meet its obligations to provide a safe and healthful working place for its employees.

(Since this paper was prepared, two events have occurred which are certain to have significant impact on the cotton dust standard. On March 27, 1981, the Department of Labor began rulemaking procedures to give the standard regulatory reconsideration. On June 17, 1981, the Supreme Court rendered its decision upholding the standard as promulgated by OSHA).

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