VII. REFERENCES

1. Cotton, manmade fiber staple, and linters--Consumption and stocks, and spindle activity, October 1973 (preliminary), in Current Industrial Reports, Series:M22P(74)-3. US Dept Commerce, Social and Economic Statistics Admin, Bureau of the Census, 1973

2. The Target Health Hazards, OSHA 2051. US Dept Labor, Occupational Safety and Health Administration, 1972, vol 2

3. Hamby DS (ed): The American Cotton Handbook, ed 3. New York, Interscience Publishers, 1949

4. Kerr T: The cotton plant, in Hamby DS (ed): The American Cotton Handbook, ed 3. New York, Interscience Publishers, 1965, vol 1, chap 2

5. Graham CO Jr, Kingsbery EC, Rusca: Factors Influencing Dust Levels During Cotton Processing, in Transactions of the National Conference on Cotton Dust and Health held on May 2, 1970, Charlotte, NC. University North Carolina, School of Public Health, 1971

6. Martin WJ: Harvesting and ginning, in Hamby DS (ed): The American Cotton Handbook, ed 3. New York, Interscience Publishers, 1965, vol 1, chap 4

7. Griffin AC: Effects of Gin Machinery on Cotton Quality, in Handbook for Cotton Ginners, Ag Handbook 260. General Printing Office, 1964

8. Bouhuys A, Nicholls PJ: The effect of cotton dust on respiratory mechanics in man and in guinea pigs, in Davies CN (ed): Inhaled Particles and Vapours. New York, Pergamon Press, 1967, II, pp 75-85

9. ASTM Standards for Testing Materials: Standard Method of Test for Non-lint Content of Cotton (Shirley Analyser Method), ASTM Designation: D 145-67. Philadelphia, Pa, American Society for Testing and Materials, pp 345-50

10. Martin FH: Opening and picking, in Hamby DS (ed): The American Cotton Handbook, ed 3. New York, Interscience Publishers, 1965, vol 1, chap 7

11. Wood CH, Roach SA: Dust in card rooms--A continuing problem in the cotton-spinning industry. Br J Ind Med 21:180-86, 1964

12. Hance LH: Spinning, in Hamby DS (ed): The American Cotton Handbook, ed 3. New York, Interscience Publishers, 1965, vol 1, chap 10

13. Molyneux MKB, Tombleson JBL: An epidemiological study of respiratory symptoms in Lancashire mills, 1963-66. Br J Ind Med 27:225-34, 1970

14. Zuskin E, Wolfson RE, Harpel G, Welborn JW, Bouhuys A: Byssinosis in carding and spinning workers. Arch Environ Health 19:666-73, 1969

15. Schrag PE, Gullett AD: Byssinosis in cotton textile mills. Am Rev Resp Disease 101:497-503, 1970

16. Fox AJ, Tombleson JBL, Watt A, Wilkie AJ: A survey of respiratory diseases in cotton operations--Part I. Symptoms and ventilation test results. Br J Ind Med 30:42-47, 1973

17. Imbus HR, Suh MW: Byssinosis--A study of 10,133 textile workers. Arch Environ Health 26:183-91, 1973

18. Merchant JA, Lumsden JC, Kilburn KH, O'Fallon WM, Ujda JR, Germino VH Jr, Hamilton JD: Dose response studies in cotton textile workers. J Occup Med 15:222-30, 1973

19. Bouhuys, A: Byssinosis in a cotton weaving mill. Arch Env Health 6:165-168, 1963

20. Barbero A, Flores R: Dust disease in hemp workers. Arch Environ Health 14:529-32, 1967

21. Bouhuys A, Barbero A, Lindell SE, Roach SA, Schilling RSF,: Byssinosis in hemp workers. Arch Environ Health 14:533-44, 1967

22. Bouhuys A, van de Woestijne KP, Kane G, van Wayenburg J: Respiratory mechanics and dust exposure in byssinosis. J Clin Invest 49:106-18, 1970

23. Bouhuys A, Barbero A, Schilling RSF, van de Woestijne KP, Kalavsky S, Kane G, Toren M, van Wayenburg J: Chronic respiratory disease in hemp workers. Am J Med 46:526-37, 1969

24. Thackrah CT: The Effects of Arts, Trades, and Professions, and of Civic Status and Habits of Living on Health and Longevity--With Suggestions for the Removal of the Agents which Produce Disease and Shorten the Duration of Life. London, Longman, Rees, Orme, Brown, Green, and Longman, 1832, pp 144-49

25. Smiley JA: Background to byssinosis in Ulster. Br J Ind Med 18:1-9, 1961

26. Bouhuys A, van Duyn J, van Lennep HJ: Byssinosis in flax workers. Arch Environ Health 3:499-509, 1961

27. Byssinosis in Flax Workers. Br Med J (Lead Article) 1:1375, 1966

28. El Batawi MA, Hussein M: Endemic byssinosis in an Egyptian village. Br J Ind Med 21:231-34, 1964

29. Bouhuys AE, Hartogensis F, Korfage HJH: Byssinosis prevalence and flax processsing. Br J Ind Med 20:320-23, 1963

30. Ferris BG Jr, Anderson DO, Burgess WA: Prevalence of respiratory disease in a flax mill in the United States. Br J Ind Med 19:180-85, 1962

31. Gilson JC, Stott H, Hopwood BEC, Roach SA, McKerrow GB, Schilling RSF: Byssinosis--The acute effect on ventilatory capacity of dusts in cotton ginneries, cotton, sisal, and jute mills. Br J Ind Med 18:9-18, 1962

32. McKerrow CB, Gilson JC, Schilling RSF, Skidmore JW: Respiratory function and symptoms in rope makers. Br J Ind Med 22:204-09, 1965

33. Ramazzini B: Diseases of Workers, De Morbis Artificum of 1713, WC Wright (trans). New York, Hafner Publishing Co, 1964

34. Kay JP cited by Thackrah CT: The Effects of Arts, Trades and Professions and of Civic States and Habits of Living on Health and Longevity with Suggestions for Removal of Many of the Agents which Produce Disease, and Shorten the Duration of Life. London, Longman, Rees, Orme, Brown, Green, and Longman, 1832, p 147

35. Caminita BH, Baum WF, Neal PA, Scheiter P: A Review of the Literature Relating to Affections of the Respiratory Tract in Individuals Exposed to Cotton Dust, Public Health bulletin no 297. Federal Security Agency, US Public Health Service, 1947

36. Greenhow EH: Third Report of the Medical Officer of the Privy Council, 1860, London, App VI

37. Leach J: Surat cotton, as it bodily affects operatives in cotton mills. Lancet 2:648, 1863, as reprinted in Appendix I of Report of the Departmental Committee on Dust in Card Rooms in the Cotton Industry. London, Home Office, His Majesty's Stationery Office, 1932, p 63

38. Collis EL: Investigation into present Health of Card-Room Strippers and Grinders as cited in Appendix II (Copy of Dr. Collis' Report taken from the Annual Report of the Chief Inspector of Factories for 1908, pages 203-205. Report of the Departmental Committee on Dust in Card Rooms in the Cotton Industry. London, Home Office, His Majesty's Stationery Office, 1932, pp 65-68

39. Jackson J (Chairman): Report of the Departmental Committee on Dust in Card Rooms in the Cotton Industry. London, Home Office, HMSO, 1932

40. Hill AB: Sickness Amongst Operatives in Lancashire Cotton Spinning Mills (with Special Reference to the Card Room) report no 59. Industrial Health Research Board, Medical Research Council. London, His Majesty's Stationery Office, 1930

41. Prausnitz C: Investigations on Respiratory Dust Disease in Operatives in the Cotton Industry. London, Medical Research Council, His Majesty's Stationery Office, 1963 p 12

42. Schilling RSF, Goodman N: Cardiovascular disease in cotton workers--Part I. Br J Ind Med 8:77-90, 1951

43. Britten RH, Bloomfield JJ, Goddard JC: The Health of Workers in a Textile Plant, Public Health bull no 207. US Treasury Dept, Public Health Service, 1933, pp 225-26

44. Bloomfield JJ, Dreessen WC: Exposure to dust in a textile plant, in The Health of Workers in Dusty Trades--General Statement and Summary of Findings, Public Health bull no 208. US Treasury Dept, Public Health Service, 1933, Sect IV, pp 21-23

45. Middleton EL: Weavers' cough. J Ind Hyg 8:428-35, 1926

46. Schilling RSF, Hughes JPW, Dingwall-Fordyce I: Disagreement between observers in an epidemiological study of respiratory disease. Br Med J 1:65-68, 1955

47. Schilling RSF, Vigliani EC, Lammers B, Valic F, Gilson JC: A report on a conference on byssinosis, in Proceedings of the XIVth Int Congress Occup Health, Madrid. Amsterdam, Excerpta Medica, 1963, pp 137-45

48. Bouhuys A, Wolfson RL, Horner DW, Brain JD, Zuskin E: Byssinosis in cotton textile workers--Respiratory survey of a mill with rapid labor turnover. Ann Intern Med 71:257-69, 1969

49. Mekky S, Roach SA, Schilling RSF: Byssinosis among winders in the cotton industry. J Ind Med 24:123-32, 1967

50. Belin L, Bouhuys A, Hoekstra W, Johansson MB, Lindell SE, Pool J: Byssinosis in cardroom workers in Swedish cotton mills. Br J Ind Med 22:101-08, 1965

51. McKerrow CB, McDermott M, Gilson JC, Schilling RSF: Respiratory function during the day in cotton workers--A study in byssinosis. Br J Ind Med 15:75-83, 1958

52. McKerrow CB, Schilling RSF: A pilot enquiry into byssinosis in two cotton mills in the United States. JAMA 177:850-53, 1961

53. Walford J, Lammers B, Schilling RSF, Van den Hoven van Genderen D, Van der Veen YG: Diurnal variation in ventilatory capacity--An epidemiological study of cotton and other factory workers employed on shift work. Br J Ind Med 23:142-48, 1966

54. Guberan E, Williams MK, Walford J, Smith MM: Circadian variation of F.E.V. in shift workers. Br J Ind Med 26:121-25, 1969

55. Schilling RSF, Hughes JPW, Dingwall-Fordyce I, Gilson JC: An epidemiological study of byssinosis among Lancashire cotton workers. Br J Ind Med 12:217-27, 1955

56. Berry G, McKerrow CB, Molyneux MKB, Rossiter CE, Tombleson JBL: A study of the acute and chronic changes in ventilatory capacity of workers in Lancashire cotton mills. Br J Ind Med 30:25-36, 1973

57. Fraser DA, Battigelli MC (eds): Recommendations, in Transactions of the National Conference on Cotton Dust and Health, held on May 2, 1970, Charlotte, NC. University of North Carolina, School of Public Health, 1971, pp VIII-XI

58. Braun D, Jurgiel JA, Kaschak MC, Babyak MA: Prevalence of respiratory signs and symptoms among US cotton textile workers. J Occup Med 15:414-19, 1973

59. Medical Advisory Committee to the Social Security Administration (GW Wright, chmn): Disability Evaluation Under Social Security SSI-89. Baltimore, General Printing Office, 1969

60. Harris TR, Merchant JA, Kilburn KH, Hamilton JD: Byssinosis and respiratory diseases of cotton mill workers. J Occup Med 14:199-206, 1972

61. Ruttner JR, Spycher MA, Engeler ML: Pulmonary fibrosis induced by cotton fibre inhalation. Path Microbiol 32: 1-14, 1968

62. Merchant JA, Kilburn KH, O'Fallon WM, Hamilton JD, Lumsden JC: Byssinosis and chronic bronchitis among cotton textile workers. Ann Int Med 76:423-33, 1972

63. Elwood JC, Pemberton J, Merrett JD, Casey GCR, McAulay IR: Byssinosis and other respiratory symptoms in flax workers of Northern Ireland. Br J Ind Med 22:27-37, 1965

64. Schilling RSF: Byssinosis in cotton and other textile workers. Lancet 2:261-65, 319-25, 1956

65. Berry G, Molyneux MKB, Tombleson JBL: Relationship between dust level and byssinosis and bronchitis in Lancashire cotton mills. Br J Ind Med 31:18-27, 1974

66. Riter WL, Nussbaum MA: Occupational Illnesses in Cotton Industries--I. Cotton Fever. The Mississippi Doctor 22:96-104, 1944

67. Murray R, Dingwall-Fordyce J, Lane RT: An outbreak of weaver's cough associated with tamarind seed powder. Br J Ind Med 14:105-10, 1957

68. Spolyer LW: Respiratory disturbance from low-grade cotton dusts. Monthly Bull Indiana State Board of Health 44:135, 1941

69. Neal PA, Schneiter R, Caminita BH: Report on acute illness among rural mattress makers using low grade, stained cotton. JAMA 119:1074-82, 1942

70. Collis EL: Industrial Pneumonoconioses, with special reference to dust-phthisis. Melroy Lecture (1915). Reprinted from "Public Health", London, His Majesty's Stationery Office, 1919

71. Middleton EL: Dust in cotton card rooms. J Ind Hyg, 8:436-48, 1926

72. Cayton HR, Furness G, Maitland HB: Studies on cotton dust in relation to byssinosis--Part II: Skin tests for allergy with extracts of cotton dust. Br J Ind Med 9:186-96, 1952

73. Gernex-Rieux C, Voisin C, Jacob M, Corsin M, Corsin L, Lefevre J: Enquete allergologique chez 40 ouvriers de filature de coton souffrant de troubles dyspneiques au travail. Poumon Coeur 18:651, 1962

74. Massoud A, Taylor G: Byssinosis--Antibody to cotton antigens in normal subjects and in cotton card-room workers. Lancet 2:607-10, 1964

75. Cavagna G, Foa V, Vigliani EC: Effects in man and rabbits of inhalation of cotton dust or extracts and purified endotoxins. Br J Ind Med 26:314-21, 1969

76. Macdonald AD, Prausnitz C: The histamine problem, in Respiratory Dust Disease in Operatives in the Cotton Industry, Part II, Biological Investigations; A. Animal Experiments. London, His Majesty's Stationery Office, pp 26-38, 1936

77. Maitland HB, Heap H, Macdonald AD: The presence of histamine in cotton dust, in The Report of the Departmental Committee on Dust in Card Rooms in the Cotton Industry, Appendix VI. London, His Majesty's Stationery Office, 1932

78. Haworth E, Macdonald AD: On histamine in cotton dust, and in the blood of cotton workers. J Hyg 37:234-42, 1937

79. Antweiler H: Observations about a histamine liberating substance in cotton dust. Ann Occup Hyg 1:152-56, 1960

80. Bouhuys A, Lindell SE, Lundin G: Experimental studies on byssinosis. Br Med J 1:324-26, 1960

81. Bouhuys A, Lindell SE: Release of histamine by cotton dust extracts from human lung tissue in vitro. Sep Experientia 17:211-15, 1961

82. Bouhuys A: Response to inhaled histamine in bronchial asthma and in byssinosis. Am Rev Resp Dis 95:89-93, 1967

83. Bouhuys A: Prevention of Monday dysphea in byssinosis--A controlled trial with an antihistamine drug. Clin Pharmacol Ther 4: 311-14, 1963

84. Lemercier JP, Leledy: [Bronchial disorders due to cotton dust (byssinosis).] Bronches 21:499-503, 1972 (Fr)

85. Roach SA, Schilling RSF: A clinical and environmental study of byssinosis in the Lancashire cotton industry. Br J Ind Med 17:1-9, 1960

86. Noweir MH: Panel presentation on Current Status and Studies of the Problem, in Transactions of the National Conference on Cotton Dust and Health, held on May 2, 1970, Charlotte, NC. Chapel Hill, University of North Carolina, School of Public Health, 1971, pp 84-85

87. Valic F: Panel presentation on Current Status and Studies of the Problem, in Transactions of the National Conference on Cotton Dust and Health, held on May 2, 1970, Charlotte, NC. Chapel Hill, University of North Carolina, School of Public Health, pp 81-83, 1971

88. Nicholls PJ: Some pharmacological actions of cotton dust and other vegetable dusts. Br J Ind Med 19:33-41, 1962

89. Hitchcock M, Piscitelli DM, Bouhuys A: Histamine release from human lung by a component of cotton bracts. Fed Proc 30:682, 1971; (abst)

90. Taylor G, Massoud AAE, Lucas F: Studies on the aetiology of byssinosis. Br J Ind Med 28:143-51, 1971

91. Proteolytic Enzymes in Cotton Mill Dust--A Possible Cause of Byssinosis, Medical Series bull no 18-71. Pittsburgh, Pa, Industrial Health Foundation, 1971, 14 pp

92. Braun DC, Scheel LD, Tuma J, Parker L: Physiological response to enzymes in cotton dust--A preliminary report. J Occup Med 15:241-44, 1973

93. Tuma J, Parker L, Braun DC: The proteolytic enzymes and the prevalence of signs and symptoms in US cotton textile mills. J Occup Med 15:409-15, 1973

94. Merchant JA, Lumsden JC, Kilburn KH, Germino VH, Hamilton JD, Lynn WS, Byrd H, Baucom D: Preprocessing cotton to prevent byssinosis. Br J Ind Med 30:237, 1973

95. Goscicki J, Przylecka J, Spiechowicz E: [Studies upon presence in serum of textile workers of antibodies reacting with antigens of grampositive bacilli saprophyting of cotton.] Med Pracy 23:113-21, 1972 (Pol)

96. Hamilton JD, Halprin GM, Kilburn KH, Merchant JA, Ujda JR: Differential aerosol challenge studies in byssinosis. Arch Environ Health 26:120-24, 1973

97. Oehling A, de la Reguera G, Rueda JJV: A contribution to the allergic ethiopathology of byssinosis. Respiration 29:155-60, 1972

98. Lammers B, Schilling RSF, Walford J, Meadows S, Roach SA, Van den Hoven van Genderen D, Van der Veen YG, Wood CH: A study of byssinosis, chronic respiratory symptoms, and ventilatory capacity in English and Dutch cotton workers, with special reference to atmospheric pollution. Br J Ind Med 21:124-34, 1964

99. Air Quality Data from National Air Sampling Networks and Contributing State and Local Networks 1964-1965. Cincinnati, Ohio, US Dept Health, Education, and Welfare, Public Health Service, Division of Air Pollution, Robert A. Taft Sanitary Engineering Center, 1966

100. Smoking and Health--Report of the Advisory Committee to the Surgeon General of the Public Health Service, PHS publication no 1103. US Dept of Health, Education, and Welfare, Public Health Service, 1964

101. Bouhuys A, Schilling RSF, van de Woestijne KP: Cigarette smoking, occupational dust exposure, and ventilatory capacity. Arch Environ Health 19:793-97, 1969

102. Schilling RSF, Goodman N, O'Sullivan JG: Cardiovascular disease in cotton workers--Part II. A clinical study with special reference to hypertension. Br J Ind Med 9:146-56, 1952

103. Schilling RSF: The epidemiology of byssinosis--Adventure and misadventure. J Occup Med 1:33-38, 1959

104. Schilling RSF: Byssinosis in the British cotton textile industry. Br Med Bull 7:52-56, 1950

105. Tuypens E: Byssinosis among cotton workers in Belgium. Br J Ind Med 18:117-19, 1961

106. Dingwall-Fordyce I, O'Sullivan JG: Byssinosis in the waste cotton industry. Br J Ind Med 23:53-57, 1966

107. Gupta KC: Byssinosis in textile industry of Ahmedabad, in Proceedings of the Second Asian Conference on Occupational Health, Calcutta, India, 1958, pp 96-104

108. Maria C, Rema M: Respiratory symptoms and byssinosis among textile workers in Israel, in Proceedings of the XVth International Congress Occupational Medicine, Vienna, 1966, vol 3, pp 277-80

109. El Batawi MA: Byssinosis in the cotton industry of Egypt. J Ind Med 19:126-30, 1962

110. Merchant JA, Lumsden JC, Kilburn KH, O'Fallon WM, Ujda JR, Germino VH Jr, Hamilton JD: An industrial study of the biological effects of cotton dust and cigarette smoke exposure. J Occup Med 15:212-21, 1973

111. Khogali M: A population study in cotton ginnery workers in the Sudan. Br J Ind Med 26:308-13, 1969

112. Barnes R, Simpson GR: Ventilatory capacity changes on exposure to cotton dust. Med J Aust 1:897-900, 1968

113. Palmer A, Finnegan W, Herwitt P, Waxweiler R, Jones J: Prevalence of byssinosis in cotton gins in lower Rio-Grande Valley of Texas and Messila Valley of New Mexico. Cincinnati, Ohio, US Dept of Health, Education, and Welfare, Public Health Service, Center for Disease Control, National Institute for Occupational Safety and Health, 1974

114. Merchant JA, Lumsden JC, Kilburn KH, Baucom D, Currin P, Stilman J: Steaming intervention trial to prevent byssinosis in a cotton textile mill. Presented to the Society for Occupational and Environmental Health, Duke University Medical Center, March 29, 1973; abst

115. Davenport A, Paton WDM: The pharmacological activity of extracts of cotton dust. Br J Ind Med 19:19-32, 1962

116. Nicholls PJ, Nicholls GR, Bouhuys A: Histamine release by compound 48/80 and textile dusts from lung tissue in vitro, in Davies CN (ed): Inhaled Particles and Vapours. New York, Pergamon Press, 1967, II, pp 69-74

117. Lynn WS, Munoz S, Campbell J, Jeffs PW: Chemotaxis and cotton extracts. Ann New York Acad Sci 221:163-73, 1974

118. Kilburn KH: Acute bronchitis due to cotton dust polyphenols. Ann New York Acad Sci 221:38-48, 1974

119. El Samra GH, Solmera-Chipongian N, Montemayor EM, Jose FR: Respiratory diseases in cotton textile workers. Acta Med Philippina 8:55-60, 1972

120. Valic F, Zuskin E: Byssinosis--A follow-up study of workers exposed to fine grade cotton dust. Thorax 27:459-62, 1972

121. Zuskin E, Valic F: Respiratory symptoms and ventilatory function changes in relation to length of exposure to cotton dust. Thorax 27:454-58, 1972

122. Valic F, Zuskin E: Effects of different vegetable dust exposures. Br J Ind Med 29:293-97, 1972

123. Fox AJ, Tombleson JBL, Watt A, Wilkie AG: A survey of respiratory disease in cotton operatives--Part II. Symptoms, dust estimations, and the effect of smoking habit. Br J Ind Med 30:48-53, 1973

124. Lynch JR: Air sampling for cotton dust, in Transactions of the National Conference on Cotton Dust and Health, held on May 2, 1970, Charlotte, NC. Chapel Hill, University of North Carolina, School of Public Health, 1971, pp 33-43

125. Molyneux MK, Berry G: The correlation of cotton dust exposure with the prevalence of respiratory symptoms, in Proceedings, II International Conference on Respiratory Diseases in Textile Workers, Alicante, Spain, 1968, pp 177-83

126. British Occupational Hygiene Society Committee on Hygiene Standards (JR Glover, chmn), Sub-committee on Vegetable Textile Dusts (RSF Schilling, chmn): Hygiene Standards for Cotton Dust. Ann Occup Hyg 15:165-92, 1972

127. Barr HS, Hocutt RH, Smith JB: Cotton Dust Controls in Yarn Manufacturing. Cincinnati, Ohio, US Dept Health, Education, and Welfare, Public Health Service, Center for Disease Control, NIOSH, Div Laboratories and Criteria Development, 1974

128. Ayer HE: Byssinosis. CRC Crit Rev Environ Control 2:207-41, 1971

129. McKerrow CB, Roach SA, Gilson JC, Schilling RSF: The size of cotton dust particles causing byssinosis--An environmental and physiological study. Br J Ind Med 19:1-8, 1961

130. Hammad YY, Corn M: Hygienic assessment of airborne cotton dust in a textile manufacturing facility. Am Ind Hyg Assoc J 32:662-67, 1971

131. Merchant JA: Epidemiological studies of respiratory disease among cotton textile workers 1970-1973, doctoral dissertation: University of North Carolina at Chapel Hill, School of Public Health. Ann Arbor, Mich, University Microfilms, 1974, pp 64-65, 68

132. Curtis RA, Parnes W: An industrial hygiene and medical survey of the Stearns and Foster Company, Lockland, Ohio. Environ Med Invest Br, Div Field Studies and Clin Invest. Cincinnati, Ohio, US Dept Health, Education, and Welfare, Public Health Service, National Institute for Occupational Safety and Health, 1973

133. Hatcher JD, Lyons DW: A program to control the hazard of the dust from cotton, in Lyons DW, Hatcher JD (eds): The Engineering Control of Cotton Dust--A Proceeding of the conference held at Clemson University, Clemson, SC, July 26, 1972, pp 2-20

134. Anglin CM: Engineering control of cotton dust, in Lyons DW, Hatcher JD (eds): The Engineering Control of Cotton Dust--A Proceeding of

the conference held at Clemson University, Clemson, SC, July 26, 1972, pp 27-42

135. Silverman L: Air contamination in cotton textile processes. Textile Ind 111:84-86, 152, 1947

136. Robbins C: Use of SIC number list as a basis for initiating THHP inspections and information on raw cotton dust. Memorandum from Office of the Assistant Secretary, US Dept Labor, Occupational Safety and Health Administration, Mar 29, 1973

137. Lewis H: Cotton incorporated byssinosis research, in Lyons DW, Hatcher JD (eds): The Engineering Control of Cotton Dust--A proceeding of the conference held at Clemson University, Clemson, SC, July 26, 1972, pp 120-23

138. Davis RC: Diagnosis, brown lung; prognosis, misery. Textile World 122:38-43, 45-46,49-50, 52, 59-60, Oct. 1972

139. Kilburn KH: Final progress report--5 RO1 OH 00302-03. Durham, NC, Duke University, no date

140. Imbus HR, Suh MW: Steaming of cotton to prevent byssinosis--A plant study. Accepted for publication in Br J Ind Med

141. Hocutt RH: What is involved in designing cotton dust control systems to comply with OSHA standards? Paper prepared for Plant Engineers Meeting, West Point Pepperell, Lanett, Ala, September 6, 1973

142. Air quality criteria for particulate matter, AP-49. US Dept of Health, Education, and Welfare, Public Health Service, Environmental Health Service, National Air Pollution Control Administration, Jan 1969, p 11

143. Hatch TF, Gross P: Pulmonary Deposition and Retention of Inhaled Aerosols. New York, Academic Press, 1964

144. OSHA Sampling Data Sheet #5. US Dept of Labor, Occupational Safety and Health Administration, 1972

145. American National Standards Committee Z 37/71/22: Proposed American National Standard Z37.34, acceptable concentrations of vegetable textile fiber dusts. American Industrial Hygiene Association, Dec 1971

146. Lilienfeld P, Dulchines J: Portable instantaneous mass monitor for coal mine dust. Am Ind Hyg Assoc J 33:136-45, 1972

147. Neefus JD: Cotton dust sampling III--Short termed sampling. Presented at American Industrial Health Conference, Miami Beach, Fla, May 15, 1974

148. American Conference of Governmental Industrial Hygienists, Committee on Threshold Limits: Threshold Limit Values for 1964. Cincinnati, Ohio, ACGIH, 1964

149. American Conference of Governmental Industrial Hygienists, Committee on Threshold Limits: Threshold limit values for 1965. Cincinnati, Ohio, ACGIH, 1965

150. Elkins H (ed): Documentation of Threshold Limit Values. Cincinnati, American Conference of Governmental Industrial Hygienists, 1971

151. Bouhuys A: Presentation at 16th International Conference on Occupational Health, Tokyo, 1969

152. Bouhuys A, Gilson JC, Schilling RSF: Byssinosis in the textile industry--Research, prevention, and control. Arch Environ Health (edit) 21:475-78, 1970

153. Roach SA: Dust levels and disease, in Transactions of the National Conference on Cotton Dust and Health, held on May 2, 1970, Charlotte, NC . Chapel Hill, University of North Carolina, School of Public Health, 1972, pp 25-32

154. American Conference of Governmental Industrial Hygienists, Committee on Threshold Limits: Threshold limit values for 1972. Cincinnati, Ohio, ACGIH, 1972

155. American Conference of Governmental Industrial Hygienists, Committee on Threshold Limits: Threshold limits for chemical substances and physical agents in the workroom environment with intended changes for 1973. Cincinnati, Ohio, AGCIH, 1973

156. Silverman L, Viles FJ Jr: The determination of cotton textile dusts in air. Textile Res J 20:109-22, 1950

157. Anderson DP, Anglin MC, Ayer HE, Carson GA: Identification of the quality and quantity of (biologically significant) cotton mill dust. J Occup Med 15:302-05, 1973

158. Safety and Health Committee: Work practices standard for raw cotton dust. Charlotte, NC, American Textile Manufacturers Institute, Inc, 1973

159. Revoir WH: Respirators for the protection against cotton dust, in Lyons DW, Hatcher JD (eds): The Engineering Control of Cotton Dust--A Proceeding of the Conference held at Clemson University, Clemson, SC, July 26, 1972, pp 101-118

160. American National Standard Practices for Respiratory Protection Z88-2. New York, American National Standard Institute, 1969

161. Perkins HH Jr: Handling and weighing polyvinyl chloride filters in cotton dust measurements. Submitted for publication in Textile World, Nov 7, 1973

162. The status of byssinosis in the United States--A summary of the National Conference on Cotton Dust and Health and the recommendations of the organizing committee. Arch Environ Health (Edit) 23:230-34, 1971

VIII. APPENDIX I

AIR SAMPLING AND ANALYTICAL PROCEDURES FOR DETERMINING CONCENTRATIONS OF COTTON DUST

As discussed in Chapter IV, Environmental Sampling, the preferred index of cotton dust exposure is the concentration of dust in mg/cu m collected by the Lumsden-Lynch vertical elutriator cotton dust sampler, shown in Figure XII-2, operating at the prescribed flow rate. Any instrument shown to be equivalent in precision and accuracy to the method specified shall be acceptable.

Sampling Locations

The sampling procedure must be designed so that samples of the actual dust concentrations are collected accurately and consistently and reflect the concentrations of dust at the place and time of sampling. In order to collect an ideal sample representative of airborne dust which is likely to enter the worker's respiratory system, it is necessary to position a collection apparatus near the nose and mouth (breathing zone) of the worker. As discussed earlier, suitable instrumentation is not yet available which will permit reliable samples of lint-free dust to be collected with personal samplers. At least five 6-hour area samples in each distinct operational area of the plant should be collected at locations which provide representative samples of air to which the worker is exposed. Samples in each operating area should be gathered simultaneously during a normal operating period. The daily time-weighted

average (TWA) exposure of each worker can then be determined by using the following formula:

$$TWA = \frac{\text{Summation of hours spent in each location times the dust concentration in that location}}{\text{Total hours exposed}}$$

A time-weighted average concentration shall be computed for each worker and properly logged and maintained on file for review.

Sampling Equipment

(a) Sampler

The vertical elutriator (Figure XII-2) cotton dust sampler works on the principle of producing a slow laminar up-flow of air that equals the falling speed of dust particles at the upper end of the respiratory range. Particles with falling speed greater than this, such as cotton fly and lint fibers, and dust particles larger than 15 μm aerodynamic diameter and unit density will not be carried to the filter and thus will not be sampled. The sample collected will include all fine dust except lint and will approximate the sum of alveolar and bronchotracheal deposition. The flow rate is controlled at 7.4 ± 0.2 liters/minute by a critical orifice which requires that the vacuum be maintained above 14 inches of mercury.

In order to insure proper dust measurement, pumps have to be monitored and vacuums checked during sampling. It is important that the samplers be cleaned prior to sampling.

(b) Filter Holder

A three-piece cassette constructed of polystyrene designed to hold a 37-mm diameter filter such as that shown in Figure XII-3 shall be used. To insure that an adequate seal exists between elements of the cassette, an opaque cellulose shrink band shall be placed over the joint between the center and bottom parts of the cassette. Polystyrene is recommended as a construction material because polyvinyl chloride filters increase in weight when stored in cassettes made from cellulose acetate-butyrate, which are commonly used in cotton dust sampling. [161] It is thought that plasticizers and possibly butyric acid from the hydrolysis of ester linkages in this latter material are readily absorbed by the filter to alter its weight.

(c) Filters and Support Pads

The membrane filters used shall be polyvinyl chloride with a 5-μm pore size and 37-mm diameter. A support pad, commonly called a backup pad, must be used under the filter membrane in the field monitor cassette.

(d) Balance

A balance sensitive to 0.01 milligram should be used.

Instrument Calibration Procedure

The accuracy of an analysis can be no greater than the accuracy of the volume of air which is sampled. Therefore, accurate calibration of the sampler is essential. The frequency of calibration is dependent on the use, care, and handling to which the instrument is subjected. Samplers should be calibrated when first received from the factory, after repair, and after receiving any abuse. Ordinarily the samplers should be calibrated in the laboratory both before they are used in the field and

after receiving any abuse or after extensive use. The accuracy of calibration is dependent upon the type of instrument used as a reference. For laboratory testing, primary standards such as a spirometer or a wet test meter are recommended, although other standard calibrating instruments such as a large bubble meter or dry gas meter can be used. The setup will be the same for all instruments. Instructions for calibration with the wet test meter follow. If another calibration device is selected, equivalent procedures should be used.

The calibration setup for the limiting orifices with the sampling train system is shown in Figure XII-4. The procedure is as follows:

(a) Level wet test meter. Check the water level which should just touch the calibration point at the left side of the meter. If water level is low, add water 1-2 F warmer than room temperature to fill point. Run the meter for 30 minutes before calibration.

(b) Place the polyvinyl chloride membrane filter in the filter cassette.

(c) Assemble the calibration sampling train as shown in Figure XII-4.

(d) Connect the wet test meter to the train. The pointer on the meter should run clockwise and a pressure drop of not more than 1.0 inch of water indicated. If the pressure drop is greater than 1.0 disconnect and check the system.

(e) Operate the system for ten minutes before starting the calibration.

(f) Check the vacuum gauge on the pump to insure that the pressure drop across the orifice exceeds 14 inches of mercury.

(g) Record the following on calibration data sheets:

(1) Wet test meter reading, start and finish

(2) Elapsed time, start and finish (at least two minutes)

(3) Pressure drop at manometer

(4) Air temperature

(5) Barometric pressure

(6) Limiting orifice number

(h) Calculate the flow rate and compare against recommended flow of 7.4 ± 0.2 liters/minute. If flow is between these limits perform calibration again, average results, and record orifice number and flow rate. If flow is not within these limits discard or modify orifice and repeat procedure.

(i) Record the name of the person performing the calibration, the date, serial number of the wet test meter, and the number of the critical orifices being calibrated.

Sampling Procedure

(a) Sampling data sheets shall include a log of:

(1) The date of the sample collection

(2) The time of sampling

(3) The location of the sampler

(4) The sampler serial number

(5) The cassette number

(6) The time of starting and stopping the sampling and the duration of sampling

(7) The weight of the filter before and after sampling

(8) The weight of dust collected (corrected for controls)

(9) The dust concentration measured

(10) Other pertinent information

(11) Name of person taking sample

(b) Assembly of Filter Cassette (see Figure XII-3)

(1) Loosely assemble 3-piece cassette

(2) Number cassette, top and bottom

(3) Place absorbant pad in cassette

(4) Weigh filter to an accuracy of 0.01 mg

Although it has been common practice to desiccate the filters prior to weighing for periods up to 24 hours, [127,158,161] it has been demonstrated that when the specified highly hydrophobic polyvinyl chloride filters are used, less than 1/2% of the total weight could be attributed to the absorption of water by the dust or by the filter. [132] In another study, the highest observed variation between desiccated and nondesiccated dust weights was 2%. [161] When samples having a high rate of moisture regain are weighed directly after removing them from a desiccator, the elapsed time after removal becomes a significant factor. Under these conditions the best way to accurately weigh such samples could be in a conditioned atmosphere. [161] Because of these findings, desiccating prior to weighing the filters is not required.

(5) Place filter in cassette

(6) Record weight of filter in log, using cassette number for identification

(7) Fully assemble cassette, using pressure to force parts tightly together

(8) Install plugs top and bottom

(9) Put shrink band on cassette, covering joint between center and bottom parts of cassette

(10) Set cassette aside until shrink band dries thoroughly

(c) Sampling Collection

(1) Clean lint out of the motor and elutriator and clean the relief valve screen

(2) Install vertical elutriator in sampling locations specified above with inlet 4 1/2 to 5 1/2 feet from floor (breathing zone height)

(3) Remove top section of cassette

(4) Install cassette in ferrule of elutriator

(5) Tape cassette to ferrule with 1 in. wide masking tape or similar material for air-tight seal

(6) Remove bottom plug of cassette and attach hose containing critical orifice

(7) Start elutriator pump and check to see if gauge reads above 14 in. of Hg vacuum.

(8) Record starting time, cassette number, and sampler number

(9) At end of sampling period (a approximately 6 hours) stop pump and record time

(10) Controls

With each batch of samples collected, two additional filter cassettes should be subjected to exactly the same handling as the samples

except that they are not opened. These control filters are weighed the same as the sample filters. Any difference in weight in the control filters would indicate that the procedure for handling sample filters may not be adequate and should be evaluated to ascertain the cause of the difference, the necessary corrections made, and additional samples collected.

(c) Shipping

The cassette with samples are collected, along with the appropriate number of blanks, and shipped to the analytical laboratory in a suitable container to prevent damage in transit.

(d) Weighing Sample

(1) Remove shrink band

(2) Remove top section of cassette and bottom plug

(3) Remove filter from cassette and weigh to an accuracy of 0.01 mg

(4) Record weight in log against original weight

(e) Calculation of Volume of Air Sampled

(1) From starting and stopping times of sampling period, determine length of time in minutes of sampling period

(2) Multiply sampling time in minutes by flow rate of critical orifice in liters per minute and divide by 1000 to find air quantity in cubic meters

(f) Calculation of Dust Concentration

(1) Subtract weight of clean filter from dirty filter and apply control correction to find actual weight of sample. Record this weight (in mg) in log

(2) Divide mass of sample in mg by air volume in cubic meters to find dust concentration in mg/cu m. Record in log.

IX. APPENDIX II

MATERIAL SAFETY DATA SHEET

The following items of information which are applicable to the processing of cotton shall be provided in the appropriate section of the Material Safety Data Sheet or other approved form. If a specific item of information is inapplicable (eg, flash point), the initials "na" (not applicable) should be inserted.

(a) Section I. Source and Nomenclature.

(1) The name, address, and telephone number of the manufacturer or supplier of the product.

(2) The trade name and synonyms for a mixture of chemicals, a basic structural material, or for a process material; and the trade name and synonyms, chemical name and synonyms, chemical family, and formula for a single chemical.

(b) Section II. Hazardous Ingredients.

(1) Chemical or widely recognized common name of all hazardous ingredients.

(2) The approximate percentage by weight or volume (indicate basis) which each hazardous ingredient of the mixture bears to the whole mixture. This may be indicated as a range or maximum amount, eg, 10-20% V; 10% max. W.

(3) Basis for toxicity for each hazardous material such as an established standard, in appropriate units.

(c) Section III. Physical Data.

Physical properties of the total product including boiling point and melting point in degrees Fahrenheit; vapor pressure, in millimeters of mercury, vapor density of gas or vapor (air = 1), solubility in water in

parts per hundred parts of water by weight; specific gravity (water = 1); percent volatile, indicate if by weight or volume, at 70 Fahrenheit; evaporation rate for liquids (indicate whether butyl acetate or ether = 1); and appearance and odor.

(d) Section IV. Fire and Explosion Hazard Data.

Fire and explosion hazard data about a single chemical or a mixture of chemicals, including flash point, in degrees Fahrenheit; flammable limits, in percent by volume in air; suitable extinguishing media or agents; special fire fighting procedures; and unusual fire and explosion hazard information.

(e) Section V. Health Hazard Data.

Toxic level for total compound or mixture, effects of exposure, and emergency and first aid procedures.

(f) Section VI. Reactivity Data.

Chemical stability, incompatibility, hazardous decomposition products, and hazardous polymerization.

(g) Section VII. Spill or Leak Procedures.

Detailed procedures to be followed with emphasis on precautions to be taken in cleaning up and safe disposal of materials leaked or spilled. This includes proper labeling and disposal of containers containing residues, contaminated absorbants, etc.

(h) Section VIII. Special Protection Information.

Requirements for personal protective equipment, such as respirators, eye protection, and protective clothing, and ventilation such as local exhaust (at site of product use or application), general, or other special types.

(i) Section IX. Special Precautions.

Any other general precautionary information.

U.S. DEPARTMENT OF LABOR
Occupational Safety and Health Administration

Form Approved
OMB No. 44-R1387

MATERIAL SAFETY DATA SHEET

Required under USDL Safety and Health Regulations for Ship Repairing, Shipbuilding, and Shipbreaking (29 CFR 1915, 1916, 1917)

SECTION I

MANUFACTURER'S NAME	EMERGENCY TELEPHONE NO.
ADDRESS *(Number, Street, City, State, and ZIP Code)*	
CHEMICAL NAME AND SYNONYMS	TRADE NAME AND SYNONYMS
CHEMICAL FAMILY	FORMULA

SECTION II - HAZARDOUS INGREDIENTS

PAINTS, PRESERVATIVES, & SOLVENTS	%	TLV (Units)	ALLOYS AND METALLIC COATINGS	%	TLV (Units)
PIGMENTS			BASE METAL		
CATALYST			ALLOYS		
VEHICLE			METALLIC COATINGS		
SOLVENTS			FILLER METAL PLUS COATING OR CORE FLUX		
ADDITIVES			OTHERS		
OTHERS					

HAZARDOUS MIXTURES OF OTHER LIQUIDS, SOLIDS, OR GASES	%	TLV (Units)

SECTION III - PHYSICAL DATA

BOILING POINT (°F.)		SPECIFIC GRAVITY (H_2O=1)	
VAPOR PRESSURE (mm Hg.)		PERCENT, VOLATILE BY VOLUME (%)	
VAPOR DENSITY (AIR=1)		EVAPORATION RATE (_____ =1)	
SOLUBILITY IN WATER			
APPEARANCE AND ODOR			

SECTION IV - FIRE AND EXPLOSION HAZARD DATA

FLASH POINT (Method used)	FLAMMABLE LIMITS	Lel	Uel
EXTINGUISHING MEDIA			
SPECIAL FIRE FIGHTING PROCEDURES			
UNUSUAL FIRE AND EXPLOSION HAZARDS			

SECTION V - HEALTH HAZARD DATA

THRESHOLD LIMIT VALUE
EFFECTS OF OVEREXPOSURE
EMERGENCY AND FIRST AID PROCEDURES

SECTION VI - REACTIVITY DATA

STABILITY	UNSTABLE		CONDITIONS TO AVOID
	STABLE		
INCOMPATIBILITY *(Materials to avoid)*			
HAZARDOUS DECOMPOSITION PRODUCTS			
HAZARDOUS POLYMERIZATION	MAY OCCUR		CONDITIONS TO AVOID
	WILL NOT OCCUR		

SECTION VII - SPILL OR LEAK PROCEDURES

STEPS TO BE TAKEN IN CASE MATERIAL IS RELEASED OR SPILLED
WASTE DISPOSAL METHOD

SECTION VIII - SPECIAL PROTECTION INFORMATION

RESPIRATORY PROTECTION *(Specify type)*		
VENTILATION	LOCAL EXHAUST	SPECIAL
	MECHANICAL *(General)*	OTHER
PROTECTIVE GLOVES		EYE PROTECTION
OTHER PROTECTIVE EQUIPMENT		

SECTION IX - SPECIAL PRECAUTIONS

PRECAUTIONS TO BE TAKEN IN HANDLING AND STORING
OTHER PRECAUTIONS