

APPENDIX A-1

EPIDEMIOLOGIC REFERENCES

Antimony

1. Brieger, H.; et al. 1954. *Ind. Med. Surg.* 23:521.
2. Cooper, D. A.; et al. 1968. *Am. J. Roentgenol. Radium Ther. Nucl. Med.* 103:495.
3. Renes, L. E. 1953. *Arch. Ind. Hyg.* 7:99.
4. McCallum, R. I. 1963. *Ann. Occupat. Hyg.* 6:60.
5. McCallum, R. I. 1965. *Lancet.* 2:882.
6. McCallum, R. I. 1967. *Trans. Soc. Occup. Med.* 17:134.
7. Karajovic, D. 1957. Proc. 12th Internat. Congress Occupational Health, Helsinki. 370.
8. Taylor, P. J. 1966. *Brit. J. Industr. Med.* 23:318.
9. Rodier, J., and Souchere, G. 1955. *Bull. Inst. Hyg. Maroc* 15:93.
10. Gallina, R., and Luvoni, R. 1958. *Rass. Med. Ind.* 27:28.

Inorganic Arsenic

11. Pinto, S. S.; et al. 1976. *J. Occup. Med.* 18:677.
12. NIOSH. 1975. *Criteria for a Recommended Standard - Occupational Exposure to Inorganic Arsenic* (HEW Publication No. 75-149). Cincinnati: NIOSH.
13. Butzengeiger, K. H. 1940. *Klin. Wochenscher.* 19:523. German.
14. Butzengeiger, K. H. 1949. *Dtsch. Arch. Klin. Med.* 194:1. German.
15. Lee, A. M.; and Fraumeni, J. R. 1969. *J. Natl. Cancer Inst.* 42:1045.
16. Perry, K.; et al. 1948. *Brit. J. Industr. Med.* 5:6.
17. Birmingham, D. J.; et al. 1965. *Arch. Derm.* 91:457.
18. Milham, S., Jr.; and Strong, T. 1974. *Environ. Res.* 7:176.

Asbestos

19. Enterline, P.; et al. *A Study of the Dose-Response Relationship Asbestos Dust and Lung Cancer.* Unpublished manuscript.
20. NIOSH. 1972. *Criteria for a Recommended Standard - Occupational Exposure to Asbestos.* Cincinnati: NIOSH.

21. Murphy, R. L. H.; et al. 1971. *N. Eng. J. Med.* 285:1271.
22. Pennsylvania Dept. of Public Health. Unpublished Communication.
23. Selikoff, I. J.; et al. 1968. *JAMA.* 204:106.
24. Selikoff, I. J.; et al. 1964. *JAMA.* 188:22.

Benzene

25. NIOSH. 1974. *Criteria for a Recommended Exposure to Benzene* (HEW Publication No. 74-137). Cincinnati: NIOSH.
26. Aksoy, M.; et al. 1971. *Brit. J. Industr. Med.* 28:296.
27. Aksoy, M.; et al. 1976. *Acta haemat.* 55:65.
28. Forni, A. M.; et al. 1971. *Arch. Environ. Health.* 23:385.
29. Hartwick, G.; and Schwanitz, G. 1972. *Dtsch. Med. Wochenechr.* 97:45. German.
30. Greenberg, L. 1926. *Public Health Reports.* 41:1526.
31. Hardy, H. L.; and Elkins, H. B. 1948. *J. Ind. Hyg. Toxicol.* 30:196.
32. Juzwiak, I. 1969. *Med. Przemysłowa.* 20:67. Polish.
33. Pagnotto, L. D.; et al. 1961. *AIHA J.* 22:417.
34. Sherwood, R. J. 1972. *Am. Occup. Hyg.* 15:409.

Carbon Monoxide

35. NIOSH. 1972. *Criteria for a Recommended Standard-Occupational Exposure to Carbon Monoxide.* Cincinnati: NIOSH.
36. Sayers, R. R.; et al. 1929. *USPHS Bull.* 186. Washington: GPO.
37. McFarland, R. A. 1944. *J. Aviation Med.* 15:381.
38. Halperin, M. H.; et al. 1959. *J. Physiol.* 146:583.
39. Horvath, S. M. 1972. *Arch. Env. Health.* 23:343.
40. Schulte, J. H. 1963. *Arch. Env. Health.* 7:524.
41. Beard, R. R.; and Wertheim, G. 1967. *Am. J. Pub. Health.* 57:2012.
42. Beard, R. R.; and Grandstaff, N. W. 1970. *Proc. Ann. Conf. Env. Toxic.* 1:93.
43. Trouton, D.; and Eysewck, H. J. 1961. *Handbook of Abnormal Psychology.* New York: Basic Books.
44. NIOSH. 1972. *Criteria for a Recommended Standard-Occupational Exposure to Carbon Monoxide.* Cincinnati: NIOSH.

Coke Oven Emissions

45. NIOSH. 1973. *Criteria for a Recommended Standard - Occupational Exposure to Coke Oven Emissions*. (Publication No. HSM-11016). NIOSH: Cincinnati.
46. Doll, R. 1952. *Brit. J. Industr. Med.* 9:180.
47. Lloyd, J. W. 1971. *J. Occup. Med.* 13:53.
48. Redmond, C. K.; et al. 1972. *J. Occup. Med.* 14:621.
49. Henry, S. A.; et al. 1931. *J. Hyg.* 31:126.
50. Final Occupational Safety and Health Standard for Exposure to Coke Oven Emissions, Part III. October 22, 1976. *Federal Register*.

Cotton Dust

51. Martin, C. F.; and Higgins, J. E. 1976. *J. Occup. Med.* 18:455.
52. Shilling, R. S. F.; et al. 1955. *Brit. J. Industr. Med.* 12:217.
53. Shilling, R. S. F. 1956. *Lancet.* 2:261.
54. Zuskin, E.; et al. 1969. *Arch. Environ. Health.* 19:666.
55. Schrag, P. E.; and Gullett, A. D. 1970. *Am. Rev. Resp. Disease.* 101:497.
56. Molyneux, M. K. B.; and Tombleson, J. B. L. 1970. *Brit. J. Industr. Med.* 27:225.
57. Imbus, H. R.; and Suh, M. W. 1973. *Arch. Environ. Health.* 26:183.
58. Merchant, J. A.; et al. 1972. *Ann. Int. Med.* 76:423.

Inorganic Lead

59. Feldman, R. G.; et al. 1977. *Lancet.* 1:89. Published Communication.
60. NIOSH. 1972. *Criteria for a Recommended Standard - Occupational Exposure to Inorganic Lead*. Cincinnati: NIOSH.
61. Elkins, H. D. 1959. *The Chemistry of Industrial Toxicology*. 2nd ed. New York: John Wiley.
62. Dreeson, W. C.; et al. 1941. Public Health Bulletin 262. Washington: GPO.
63. National Academy of Sciences, Division of Medical Sciences, Committee on Biological Effects of Atmospheric Pollutants. 1971. *Airborne Lead in Perspective*.
64. Tola, S.; and Nordman, C. H. 1977. *Environ. Res.* 13:250.

65. Sakurai, H.; et al. 1974. *Arch. Environ. Health*. 29:157.
66. Lancranjan, I.; et al. 1975. *Arch. Environ. Health*. 30:396.
67. Cooper, W. C.; and Gaffey, W. R. 1975. *J. Occup. Med.* 17:100.

Inorganic Mercury

68. Miller, J. M.; et al. 1975. *AIHA J.* 36:725.
69. Shandar, A.; and Simson, R. E. 1971. *Med. J. Aust.* 2:1005.
70. Rentos, P. G.; and Seligman, E. J. 1968. *Arch. Environ. Health*. 16:794.
71. Turrian, H.; et al. 1956. *Schweiz. Med. Wchenschr.* 86:1091. German.
72. NIOSH. 1973. *Criteria for a Recommended Standard - Occupational Exposure to Inorganic Mercury* (Publication No. HSM 73-11024). Cincinnati:NIOSH.
73. McGill, C. M.; et al. 1964. *J. Occup. Med.* 6:335.
74. Smith, R. G.; et al. 1970. *AIHA J.* 31:687.
75. Baldi, G.; et al. 1953. *Med. Lav.* 44:161. Italian.

Nitrogen Dioxide

76. NIOSH. 1976. *Criteria for a Recommended Standard - Occupational Exposure to the Oxides of Nitrogen (Nitrogen Dioxide and Nitric Oxide)*. Cincinnati: NIOSH.
77. Muller, B. 1969. *Respiration*. 26:249.
78. Kosmider, S.; et al. 1972. *Zentralbl Arbeitsmed.* 22:362. German.
79. Tse, R. L.; and Bockman, A. A. 1970. *JAMA*. 212:1344.
80. Emergency Exposure Limits. 1964. *AIHA J.* 25:580.
81. Lowry, T.; and Schuman, L. M. 1956. *JAMA*. 162:153.

Noise

82. NIOSH. 1972. *Criteria for a Recommended Standard - Occupational Exposure to Noise*. Cincinnati: NIOSH.
83. Coles and Knight. 1960. *Ann. Occ. Hyg.* 2:267.
84. Yaffe and Jones. 1961. U. S. Public Health Service Publication 850. Washington: GPO.
85. Schneider et al. 1961. *AIHA J.* 22:245.
86. Brohm and Zlamal. 1962. *Cas. Lek. Ces.* 101:300. Czech.
87. Mancini and Stancari. 1962. *Rass. Med. Ind.* 31:239. Italian.

88. Chadwick. 1963. *J. Laryngol.* 77:467.
89. Filin. 1963. *Gog. Tr. Prof. Zabol.* 7:3. Russian.
90. Weston. 1963. *J. Aus. Inst. Agr. Sci.* 29:15.
91. Cohen et al. 1970. *Arch. Env. Health.* 20:614.
92. Burns and Robinson. 1970. *Hearing and Noise in Industry.* London: Her Majesty's Stationery Office.
93. Stone et al. 1971. *AIHA J.* 32:123.

Crystalline Silica

94. Musk, A. W.; et al. 1977. *Am. Rev. Respir. Dis.* 115:769.
95. Dreessen, W. C.; et al. 1942. Public Health Bulletin 277. Washington: GPO.
96. Flinn, R. H.; et al. 1939. Public Health Bulletin 244. Washington: GPO.
97. NIOSH. 1974. *Criteria for a Recommended Standard - Occupational Exposure to Crystalline Silica* (HEW Publication No. 75-120). Cincinnati: NIOSH.
98. Rajhans, G. S.; and Budlovsky, J. 1972. *AIHA J.* 33:258.
99. Keatinge, G. F.; and Potter, N. M. 1949. *Brit. J. Industr. Med.* 1:31.
100. Theriault, G. P.; et al. 1974. *Arch. Environ. Health.* 28:12.
101. Theriault, G. P.; et al. 1974. *Arch. Environ. Health.* 28:18.
102. Theriault, G. P.; et al. 1974. *Arch. Environ. Health.* 28:23.
103. UICC/Cincinnati classification of the radiographic appearances of pneumoconioses. 1970. *Chest.* 58:57.
104. Cooper, W. C.; and Cralley, L. J. 1958. Public Health Bulletin 601. Washington: GPO.

Sulfur Dioxide

105. NIOSH. 1974. *Criteria for a Recommended Standard - Occupational Exposure to Sulfur Dioxide* (HEW Publication No. 74-11). Cincinnati: NIOSH.
106. Smith, T. J.; et al. 1977. *Am. Rev. Respir. Dis.* 116:31.
107. Kehoe, R. A.; et al. 1932. *J. Industr. Hyg.* 14:159.
108. Skalpe, I. O. 1964. *Brit. J. Industr. Med.* 21:69.
109. Lee, A. M.; and Fraumeni, J. F. 1969. *J. Nat. Cancer Inst.* 42:1045.

Toluene Diisocyanate

110. NIOSH. 1973. *Criteria for a Recommended Standard - Occupational Exposure to Toluene Diisocyanate*. Cincinnati: NIOSH.
111. Walworth, H. T.; and Virchow, W. E. 1959. *AIHA J.* 20:205.
112. Elkins, H. B.; et al. 1962. *AIHA J.* 23:265.
113. Glass, W. I.; and Thom, N. G. 1964. *M. Z. Med. J.* 63:642.
114. Williamson, K. S. 1964. *Trans. Assoc. Ind. Med. Off.* 14:81.
115. Maxon, F. C. 1964. *Arch. Env. Health.* 8:755.
116. Bruckner, H. C.; et al. 1968. *Arch. Env. Health.* 16:619.
117. Peters, J. M.; et al. 1968. *Arch. Env. Health.* 16:642.

APPENDIX A-2 BIBLIOGRAPHY

Antimony

- Allison, A. C.; and Patton, G. R. 1972. *Mutation Res.* 16:332.
- Bromberger-Barnea, B.; and Stephens, N. L. 1965. *AIHA J.* 26:404.
- Browning, E. 1969. *Toxicology of Industrial Metals.* 2nd ed. London: Butterworth.
- Daum, S. M.; and Stellman, J. M. 1963. *Work is Dangerous to Your Health.* New York: Random House.
- Elkins, H. B. 1959. *The Chemistry of Industrial Toxicology.* 2nd ed. New York: John Wiley & Sons.
- Hunter, D. 1975. *The Diseases of Occupations.* 5th ed. Boston: Little, Brown.
- Hygiene Guide Series.* Akron: American Industrial Hygiene Association.
- Key, M. M.; et al. eds. 1977. *Occupational Diseases—A Guide to Their Recognition.* Washington: U.S. Government Printing Office.
- NIOSH. 1977. *Manual of Sampling Data Sheets, S2* (DHEW Publication No. 77-159). Cincinnati: NIOSH.
- OS&HR.* June 16, 1977. Washington: Bureau of National Affairs, Inc.
- Patty, F. A. ed. 1963. *Industrial Hygiene and Toxicology.* 2nd ed. New York: John Wiley & Sons.
- Plunkett, E. R. 1976. *Handbook of Industrial Toxicology.* New York: Chemical Publishing Co., Inc.
- Sax, N. I. 1975. *Dangerous Properties of Industrial Materials.* 4th ed. New York: Reinhold Publishing Corporation.
- Schroeder, H. A. 1974. *The Poisons Around Us.* Bloomington: Indiana University Press.

Inorganic Arsenic

Daum, S. M.; and Stellman, J. M. 1973. *Work is Dangerous to Your Health*. New York: Random House.

Dinman, B. D. 1960. *J. Occup. Med.* 2:137.

Foreman, H. 1962. *Ann. Rev. Pharm.* 2:341.

Hunter, D. 1975. *The Diseases of Occupations*. 5th ed. Boston: Little, Brown.

Hygiene Guide Series. Akron: American Industrial Hygiene Association.

Jackson, R. 1975. *CMAJ*. 113:396.

Key, M. M.; et al. eds. 1977. *Occupational Diseases— A Guide to Their Recognition*. Washington: U.S. Government Printing Office.

NIOSH. 1977. *Manual of Sampling Data Sheets*, S309 (DHEW Publication No. 77-159). Cincinnati: NIOSH.

OS&HR. June 16, 1977. Washington: Bureau of National Affairs, Inc.

Patty, F. A. ed. 1963. *Industrial Hygiene and Toxicology*. 2nd ed. New York: John Wiley & Sons.

Pinto, S. 1976. *J. Occup. Med.* 18:677.

Plunkett, E. R. 1976. *Handbook of Industrial Toxicology*. New York: Chemical Publishing Co., Inc.

Sax, N. I. 1975. *Dangerous Properties of Industrial Materials*. 4th ed. New York: Reinhold Publishing Corporation.

Schroeder, H. A. 1974. *The Poisons Around Us*. Bloomington: Indiana University Press.

Asbestos

Arena, J. M. 1970. *Poisoning, Toxicology, Symptoms, Treatments*. Springfield: Charles C. Thomas.

Council on Occupational Health. 1963. *Arch. Env. Health*. 7:130.

Hamilton, A.; and Hardy, H. L. 1974. *Industrial Toxicology*. 3rd ed. Acton: Publishing Sciences Group.

Morgan, W. K. C.; and Seaton, A. 1975. *Occupational Lung Diseases*. Philadelphia: W. B. Saunders.

Advisory Committee on Asbestos Cancers. 1972. *The Biological Effects of Asbestos*. Delivered to World Health Organization, Lyon, Oct. 5-6.

NIOSH. 1972. *Criteria for a Recommended Standard—Occupational Exposure to Asbestos*. Cincinnati: NIOSH.

Yater, W. M.; and Oliver, W. F. 1961. *Symptom Diagnosis*. 5th ed. New York: Appleton-Century-Croft.

Benzene

Aksoy, M. 1975. *Blut*. 30:255.

Aksoy, M.; et al. 1974. *Blut*. 28:293.

Daum, S. M.; and Stellman, J. M. 1973. *Work is Dangerous to Your Health*. New York: Random House.

Deichmann, W. 1963. *Tox. App. Pharm.* 5:201.

Elkins, H. B. 1959. *The Chemistry of Industrial Toxicology*. 2nd ed. New York: John Wiley & Sons.

Key, M. M.; et al. eds. 1977. *Occupational Diseases— A Guide to Their Recognition*. Washington: U.S. Government Printing Office.

Gerardi, H. W. 1960. *Toxicology and Biochemistry of Aromatic Hydrocarbons*. New York: Elsevier Publishing Co.

Hunter, D. 1975. *The Diseases of Occupations*. 5th ed. Boston: Little, Brown.

Hygiene Guide Series. Akron: American Industrial Hygiene Association.

NIOSH. 1977. *Manual of Sampling Data Sheets, S311* (DHEW Publication No. 77-159). Cincinnati: NIOSH.

OS&HR. June 6, 1977. Washington: Bureau of National Affairs, Inc.

Patty, F. A., ed. 1963. *Industrial Hygiene and Toxicology*. 2nd ed. New York: John Wiley & Sons.

Plunkett, E. R. 1976. *Handbook of Industrial Toxicology*. New York: Chemical Publishing Co., Inc.

Sax, N. I. 1975. *Dangerous Properties of Industrial Materials*. 4th ed. New York: Reinhold Publishing Corporation.

Thorpe, J. J. 1974. *J. Occup. Med.* 16:375.

Vigliana, E. C. 1976. *Environ. Res.* 11:122.

Carbon Monoxide

NIOSH. 1973. *Criteria for a Recommended Standard—Occupational Exposure to Carbon Monoxide*. Cincinnati: NIOSH.

Gafafer, W. M. 1966. *Occupational Diseases—A Guide to Their Recognition*. Washington: U.S. Government Printing Office.

Breaker, W.; and Mossman, A. L. 1970. *Toxic Gases: First Aid and Medical Treatment*. Rutherford: Matheson Gas Products.

Hunter, D. 1969. *The Diseases of Occupations*. 4th ed. Boston: Little, Brown.

Arena, J. M. 1970. *Poisoning, Toxicology, Symptoms, Treatment*. Springfield: Charles C. Thomas.

Plunkett, E. R. 1966. *Handbook of Industrial Toxicology*. New York: Chemical Publishing.

Coke Oven Emissions

Daum, S. M.; and Stellman, J. M. 1973. *Work is Dangerous to Your Health*. New York: Random House.

English, J. D. 1975. *Position of United Steelworkers of America on Proposed Coke Oven Regulations*.

Hygiene Guide Series. Akron: American Industrial Hygiene Association.

Jackson, J. O.; et al. 1974. *AIHA J.* 35:276.

Key, M. M.; et al. eds. 1977. *Occupational Diseases—A Guide to Their Recognition*. Washington: U.S. Government Printing Office.

Lloyd, J. W.; and Ciocco, A. 1969. *J. Occup. Med.* 11:299.

Mittman, C.; et al. 1974. *Am. J. Med.* 57:92.

NIOSH. 1977. *Manual of Sampling Data Sheets*, 8 (DHEW Publication No. 77-159). Cincinnati: NIOSH.

OS&HR. August 7, 1975. Washington: Bureau of National Affairs, Inc.

OS&HR. June 16, 1977. Washington: Bureau of National Affairs, Inc.

Patty, F. A. ed. 1963. *Industrial Hygiene and Toxicology*. 2nd ed. New York: John Wiley & Sons.

Plunkett, E. R. 1976. *Handbook of Industrial Toxicology*. New York: Chemical Publishing Co., Inc.

Radford, E. P. 1976. *Ann. N.Y. Acad. Sci.* 271:228.

Sax, N. I. 1975. *Dangerous Properties of Industrial Materials*. 4th ed. New York: Reinhold Publishing Corporation.

Second Coke Worker Conference. 1975. *Studies of Coke Plant Workers*.

Cotton Dust

Barnes, L; and Simpson, G. R. 1976. *J. Occup. Med.* 18:551.

Bouhuys, A.; et al. 1970. *Arch. Environ. health.* 21:475.

Bouhuys, A. 1971. *Arch. Environ. Health.* 23:405.

Cavagna, G.; et al. 1969. *Brit. J. Industr. Med.* 26:314.

Daum, S. M.; and Stellman, J. M. 1973. *Work is Dangerous to Your Health*. New York: Random House.

Hunter, D. 1975. *The Diseases of Occupations*. 5th ed. Boston: Little, Brown.

Hygiene Guide Series. Akron: American Industrial Hygiene Association.

Key, M. M; et al. eds. 1977. *Occupational Diseases—A Guide to Their Recognition*. Washington: U.S. Government Printing Office.

Martin, C. F.; and Higgins, J. E. 1976. *J. Occup. Med.* 18:455.
Merchant, J. A.; et al. 1972. *Ann. Int. Med.* 76:423.

Morgan, W. K. C.; and Seaton, A. 1975. *Occupational Lung Diseases*. Philadelphia: W. B. Sounder's Company.

Musk, A. W.; et al. 1977. *Am. Rev. Respir. Dis.* 115:769.

NIOSH. 1977. *Manual of Sampling Data Sheets*, 50 (DHEW Publication No. 77-159). Cincinnati: NIOSH.

OS&HR. June 16, 1977. Washington: Bureau of National Affairs, Inc.

Plunkett, E. R. 1976. *handbook of Industrial Toxicology*. New York: Chemical Publishing Co., Inc.

Sax, N. I. 1975. *Dangerous Properties of Industrial Materials*. 4th ed. New York: Reinhold Publishing Corporation.

Taylor, G.; et al. 1971. *Brit. J. Industr. Med.* 28:143.

Tuma, J.; et al. 1973. *J. Occup. Med.* 15:409.

Inorganic Lead

Benson, G. I.; et al. 1976. *Brit. J. Industr. Med.* 33:29.

Browning, E. 1969. *Toxicity of Industrial Metals*. 2nd ed. New York: Appleton-Century-Crofts.

Casarett, L. J.; and Doull, J. eds. 1975. *The Basic Science of Poisons*. New York: MacMillan Publishing Co., Inc.

Goldwater, L. J.; and Hoover, A. W. 1967. *Arch. Environ. Health.* 15:60.

Hammond, P. B. 1969. *Essays Toxicol.* 1:116.

Hunter, D. 1975. *The Diseases of Occupations*. 5th ed. Boston: Little, Brown.

Hygiene Guide Series. Akron: American Industrial Hygiene Association.

Key, M. M.; et al. eds. 1977. *Occupational Diseases—A Guide to Their Recognition*. Washington: U.S. Government Printing Office.

NIOSH. 1972. *Criteria for a Recommended Standard—Occupational Exposure to Inorganic Lead*. Cincinnati: NIOSH.

NIOSH. 1977. *Manual of Sampling Data Sheets, S341* (DHEW Publication No. 77-159). Cincinnati: NIOSH.

OS&HR. June 16, 1977. Washington: Bureau of National Affairs, Inc.

Plunkett, E. R. 1976. *Handbook of Industrial Toxicology*. New York: Chemical Publishing Co., Inc.

Sax, N. I. 1975. *Dangerous Properties of Industrial Materials*. 4th ed. New York: Reinhold Publishing Corporation.

Schroeder, H. A. 1974. *The Poisons Around Us*. Bloomington: Indiana University Press.

Inorganic Mercury

Clarkson, T. W. 1972. *Crit. Rev. Toxicol.* 1:203.

Daum, S. M.; and Stellman, J. M. 1973. *Work is Dangerous to Your Health*. New York: Random House.

Elkins, H. B. 1959. *The Chemistry of Industrial Toxicology*. 2nd ed. New York: John Wiley & Sons.

Hunter, D. 1975. *The Diseases of Occupations*. 5th ed. Boston: Little, Brown.

Hygiene Guide Series. Akron: American Industrial Hygiene Association.

Key, M. M.; et al. eds. 1977. *Occupational Diseases—A Guide to Their Recognition*. Washington: U.S. Government Printing Office.

Lee, S. D. ed. 1977. *Biochemical Effects of Environmental Pollutants*. Ann Harbor: Ann Harbor Science Publishers, Inc.

Magos, L. 1975. *Brit. Med. Bull.* 31:241.

Nadi, N. A.; and Yassin, A. K. 1974. *J. Top. Med. Hyg.* 77:128.

NIOSH. 1977. *Manual of Sampling Data Sheets*, 20 (DHEW Publication No. 77-159). Cincinnati: NIOSH.

OS&HR. June 16, 1977. Washington: Bureau of National Affairs, Inc.

Patty, F. A. ed. 1963. *Industrial Hygiene and Toxicology*. 2nd ed. New York: John Wiley & Sons.

Plunkett, E. R. 1976. *Handbook of Industrial Toxicology*. New York: Chemical Publishing Co., Inc.

Sax, N. I. 1975. *Dangerous Properties of Industrial Materials*. 4th ed. New York: Reinhold Publishing Corporation.

Schroeder, H. A. 1974. *The Poisons Around Us*. Bloomington: Indiana University Press.

Selikoff, I. J. ed. 1971. *Environ. Res.* 4:1.

Nitrogen Dioxide

Daum, S. M.; and Stellman, J. M. 1973. *Work Is Dangerous to Your Health*. New York: Random House.

Dowell, A. R.; et al. 1971. *Arch. Intern. Med.* 128:74.

Ehrlich, R.; and Henry, M. C. 1968. *Arch. Environ. Health.* 17:860.

Freeman, G.; et al. 1974. *Arch. Environ. Health.* 29:203.

Key, M. M.; et al. eds. 1977. *Occupational Diseases—A Guide to Their Recognition*. Washington: U.S. Government Printing Office.

Hunter, D. 1975. *The Diseases of Occupations*. 5th ed. Boston: Little, Brown.

Hygiene Guide Series. Akron: American Industrial Hygiene Association.

Lee, S. D. ed. 1977. *Biochemical Effects of Environmental Pollutants*. Ann Harbor: Ann Harbor Science Publishers, Inc.

NIOSH. 1977. *Manual of Sampling Data Sheets*, 32 (DHEW Publication No. 77-159). Cincinnati: NIOSH.

Oreshek, J.; et al. 1976. *J. Clin. Investig.* 57:301.

OS&HR. June 16, 1977. Washington: Bureau of National Affairs, Inc.

Plunkett, E. R. 1976. *Handbook of Industrial Toxicology*. New York: Chemical Publishing Co., Inc.

Ramirez-R. J.; and Dowell, A. R. 1971. *Ann. Inter. Med.* 74:569.

Sax, N. I. 1975. *Dangerous Properties of Industrial Materials*. 4th ed. New York: Reinhold Publishing Corporation.

Scott, E. G.; and Hunt, Jr., W. B. 1973. *Chest*. 63:701.

Noise

American Medical Association. 1955. *J.A.M.A.* 157:1408.

Sataloff, J.; and Michael, P. 1973. *Hearing Conservation*. Springfield: Charles C. Thomas.

Robinson, D. W.; and Burns, W. 1970. *Hearing and Noise In Industry*. London: Her Majesty's Stationery Office.

Kryter, K. D. 1970. *The Effects of Noise on Man*. New York: Academic Press.

American Academy of Ophthalmology and Otolaryngology. 1961. *Guide for the Evaluation of Hearing Impairment*.

Gafafer, W. M. 1966. *Occupational Diseases—A Guide to their Recognition*. Washington: U.S. Government Printing Office.

Crystalline Silica

Daum, S. M.; and Stellman, J. M. 1973. *Work Is Dangerous to Your Health*. New York: Random House.

- Heppleston, A. G. 1968. *Brit. Med. Bull.* 25:282.
- Hunter, D. 1975. *The Diseases of Occupations*. 5th ed. Boston: Little, Brown.
- Hygiene Guide Series*. Akron: American Industrial Hygiene Association.
- Jacobson, G.; and Lainhart, W. S., eds. 1972. *Med. Radiogr. Photogr.* 48:65.
- Key, M. M.; et al. eds. 1977. *Occupational Diseases—A Guide to Their Recognition*. Washington: U.S. Government Printing Office.
- Montgomery, C. H.; and Synder, H. B. 1975. *J. Occup. Med.* 17:523.
- Morgan, W. K. C.; and Seaton, A. 1975. *Occupational Lung Diseases*. Philadelphia: W. A. Saunders Company.
- NIOSH. 1977. *Manual of Sampling Data Sheets*, S315 (DHEW Publication No. 77-159). Cincinnati: NIOSH.
- OS&HR. June 16, 1977. Washington: Bureau of National Affairs, Inc.
- Patty, F. A. ed. 1963. *Industrial Hygiene and Toxicology*. 2nd ed. New York: John Wiley & Sons.
- Pintar, K.; et al. 1976. *Arch. Pathol. Lab. Med.* 100:535.
- Plunkett, E. R. 1976. *Handbook of Industrial Toxicology*. New York: Chemical Publishing Co., Inc.
- Sax, N. I. 1975. *Dangerous Properties of Industrial Materials*. 4th ed. New York: Reinhold Publishing Corporation.
- Suratt, P. M.; et al. 1977. *Am. Rev. Respir. Dis.* 115:521.
- Vitums, V. D.; et al. 1977. *Arch. Environ. Health.* 34:62.

Sulfur Dioxide

- Amdur, M. O.; et al. 1953. *Lancet.* 265:758.
- Andersen, I.; et al. 1974. *Arch. Environ. Health.* 28:31.
- Anderson, A. 1950. *Brit. J. Industr. Med.* 7:82.
- Daum, S. M.; and Stellman, J. M. 1973. *Work Is Dangerous to Your Health*. New York: Random House.
- Hunter, D. 1975. *The Diseases of Occupations*. 5th ed. Boston: Little, Brown.

Hygiene Guide Series. Akron: American Industrial Hygiene Association.

Key, M. M.; et al. eds. 1977. *Occupational Diseases—A Guide to Their Recognition*. Washington: U.S. Government Printing Office.

Lee, S. D. ed. 1977. *Biochemical Effects of Environmental Pollutants*. Ann Harbor: Ann Harbor Science Publishers, Inc.

NIOSH. 1977. *Manual of Sampling Data Sheets*, 19 (DHEW Publication No. 77-159). Cincinnati: NIOSH.

OS&HR. June 16, 1977. Washington: Bureau of National Affairs, Inc.

Plunkett, E. R. 1976. *Handbook of Industrial Toxicology*. New York: Chemical Publishing Co., Inc.

Sax, N. I. 1975. *Dangerous Properties of Industrial Materials*. 4th ed. New York: Reinhold Publishing Corporation.

Skalpe, I. O. 1964. *Brit. J. Industr. Med.* 21:69.

Smith, T. J.; et al. 1977. *Am. Rev. Respir. Dis.* 116:31.

Speizer, F. E.; and Frank, N. R. 1966. *Arch. Environ. Health.* 12:725.

Wolff, R. K.; et al. 1975. *Arch. Environ. Health.* 30:521.

Toluene Diisocyanate

NIOSH. 1974. *Criteria for a Recommended Standard—Occupational Exposure to Toluene Diisocyanate*. Cincinnati: NIOSH.

Gafafer, W. M. 1966. *Occupational Diseases—A Guide to Their Recognition*. Washington: U.S. Government Printing Office.

Johnstone, R. T.; and Miller, S. E. 1960. *Occupational Diseases and Industrial Medicine*. Philadelphia: W. B. Saunders.

Malten, K. E.; and Zielhuis, R. L. 1964. *Industrial Toxicology and Dermatology in the Production and Processing of Plastics*. New York: Elsevier.

APPENDIX B

CASE HISTORIES

This section contains two detailed examples of investigations of occupational disease claims, illustrating the application of the decision-making process. To illustrate the types of situations which may arise, the following brief examples are offered:

1. *An obvious occupational disease—*
A disease which occurs commonly in the workplace and a confirmed history of exposure to an agent causing the disease. Medical examination, X-ray, and lung function tests indicate probable silicosis, a disease of the lungs caused by inhalation of dust containing the mineral silica. The worker's past and present job: hard-rock miner. Evidence is presented showing dust exposures in the mine in which he works and at his job are in excess of current standards. There is no question that this is an occupational disease.
2. *An obvious nonoccupation disease—*
A disease occurring commonly in the general population with no occupational agent exposure. Medical examination and laboratory tests diagnose tuberculosis. The worker's past and present job: filing clerk. Investigation shows no other cases of tuberculosis in the office where the worker is employed. This is clearly a nonoccupational disease.
3. *A possible occupational disease and an unknown exposure*
A worker has an anemia and is employed as a spray painter. If the anemia is an *aplastic* anemia, it could be caused by exposure to benzene, a solvent that may be present in some paints. Both the exact type of anemia and the chemical content of the paints used must be investigated to make a decision.

To illustrate this type of situation, where decision-making is more difficult, the following two case histories are offered:

Occupational Disease Case History

Complaint: Malaise, increasing fatigue, and "pins and needles" sensation in the feet.

Medical Evaluation

Evaluation of complaint: Past few days noticed a "pins and needles" sensation in his feet and some weakness of the lower legs. For several weeks or longer he has generally felt weak and tired and not himself. In general he has not been feeling well for quite some time. He has had some weight loss but has not been eating well because of lack of appetite. For a time he has had intermittent periods of nausea and vomiting, but they "come and go." Insomnia and rather frequent headaches have been occurring. Remaining systemic review is negative.

Medical History

General health has always been good. Tonsils and adenoids removed as a child; usual childhood diseases; occasional colds but nothing serious.

Personal History

Age 36, white male, married with children, boy 13 and girl 11. Drinks 8 to 10 ounces of alcohol a day and smokes one pack of cigarettes a day. Lived all his life in Brooklyn, New York. Graduated from high school at age 18. Mother and father and two siblings living and well—mother has diabetes. As a hobby he gardens and has many house plants, but does not use insecticides.

Occupational History

Present occupation: Handyman—works with five other people in a small shop where arts and crafts are made. The work entails mixing pigments and dyes used in printing textiles and for coloring enamels and glazes; generally keeps the shop clean and in order.

Previous occupations: Took two courses of arts and crafts, pottery-making and glazing in high school. Worked part-time as a grocery clerk while in school. After graduation worked for five years as a ship cutter; exposed to lead, asbestos and iron oxide.

Building superintendent, two years. No known exposures to agents but perhaps some polishes, detergents and disinfectants.

Painter, four years. Exposed to pigments found in paint such as lead, chromium and arsenic.

Gardener, three years. Exposed to insecticides and weed killers. Knows that some had pyrethrums, arsenic and parathion-like substances in them.

Present job, four years. Some of the pigments he mixes contain nickel, lead, arsenic, iron and other chemicals. He cleans with a vacuum cleaner, wears no protection and there is some dust.

He has no secondary job.

Clinical Evaluation

The examination revealed a well developed male who appeared tired. His face was pale and the skin over the trunk appeared somewhat pigmented. Examination of the head, eyes, ears and throat showed them to be normal. The nasal septum was inflamed. No adenopathy. The thyroid was normal. Chest expanded symmetrically and percussion and auscultation were normal.

The pulse was 78 and regular, the blood pressure was 128/82. Heart sounds were normal and no evidence of enlargement. There was slight tenderness on palpation of the right upper quadrant but the liver edge was not palpable.

External genitalia was normal. Peripheral circulation was normal. On examination of the extremities a hyperkeratosis of the palms of the hands and soles of the feet were found. There was decreased sensation to touch and vibration in the feet. Patella and ankle reflexes were decreased; those of the wrist and elbow were normal.

Laboratory Evaluation

CBC and Differential:	RBC 4.0 million/cubic mm
	Hb. 12 g/100 ml
	Hct. 40 percent
	WBC 4,000 per cubic mm
Chest X-Ray: 14" x 17"	Normal
Electrocardiogram:	Normal
SMA-12:	Normal

Urinalysis:	Normal
Thyroid function tests:	Normal
Blood Lead:	0.03 mg/100 gms
Urinary Arsenic:	0.9 mg/liter

Epidemiologic Findings

The workplace was surveyed (see Table 1). It was found that the atmosphere contained levels of arsenic in excess of the Occupational Safety and Health Act (OSHA) standards. At breathing level, where the patient worked at mixing the pigments, arsenic levels often were much too high. Dust on the floor and walls contained arsenic and when cleaning, larger than recommended amounts of airborne arsenic were found. Even though pigment containing arsenic was not mixed daily, there was cumulative exposure.

The literature contains ample evidence to indicate that such exposure to arsenic dust could produce arsenic intoxication.

TABLE 1

***ATMOSPHERIC METAL DUST AND
FUME CONCENTRATIONS***
October 1, 1975
ABC ARTS & CRAFTS
ANYTOWN, U.S.A.

SAMPLE NUMBER	LOCATION	TIME START/ STOP	RESULTS IN MILLIGRAMS PER CUBIC METER OF AIR			
			Arsenic	Nickel	Lead	Chrom- ium
OSHA Allowable Limits			0.5	1	0.2	0.5
<i>Operator's Breathing Zone:</i>						
1	John Doe-General Work in stockroom weighing pigments.	0700/ 1900	0.47	<0.001	<0.001	<0.001

2 John Doe-Weighing and mixing pigments.	0900/ 1100	1.33	<0.001	0.021	0.007
3 John Doe-Mixing and packaging pigments; 30 minute lunch.	1100/ 1300	1.21	<0.001	0.050	0.042
4 John Doe-Plant cleanup	1300/ 1500	0.75	<0.001	0.027	0.003
Time-Weighted Average Exposures:		0.94	<0.001	0.025	0.013

<Denotes less than.

It can be clearly seen from Table I that the employee's exposure to arsenic was the only exposure evaluated which exceeded the allowable limit (in this case nearly twice the permitted exposure). Exposures to nickel, lead, and chromium were well within the eight hour time-weighted average limits and continued exposure at the levels evaluated should not result in any health hazards.

Contaminants in the Work Environment

Hyperpigmentation has been reported among employees exposed to arsenic concentrations ranging from 0.110-4.038 milligrams per cubic meter of air (0.562 milligrams per cubic meter was the mean exposure). (Dinman, B.D. 1960. *J. Occ. Med.* 2:137.) This would conform with the clinical evaluation in this specific case where the average exposure to arsenic was 0.94 milligrams per cubic meter of air and hyperpigmentation was observed.

Laboratory findings indicated absorption of arsenic by urinary arsenic levels of 0.9 milligrams per liter. Toxicological data would also imply increased urinary arsenic levels at the atmospheric concentrations evaluated as indicated by the report of an average urinary arsenic level of 0.23 milligrams per liter in workers exposed to mean air concentrations of 0.562 milligrams arsenic per cubic meter.

Conclusion

The differential diagnosis would include lead poisoning, hypothyroidism, anemia and chronic arsenic poisoning; the laboratory findings rule out lead poisoning and hypothyroidism and indicate an absorption of arsenic. Anemia would not account for all of the symptoms and could be part of the pathology of arsenic intoxication.

This history of the complaint, the symptoms and signs along with the laboratory information and the abnormal exposure to arsenic in the workplace, and no evidence of nonoccupational exposure make the diagnosis of chronic arsenic intoxication, occupational in origin.

Nonoccupational Disease Case History

Complaint: Cough of five years duration and shortness of breath.

Medical Evaluation

Evaluation of complaint: About five years ago started to notice a cough that seems to occur during sleeping and at work. He may awaken and raise a mouthful of white, clear sputum. There is no cough on arising in the morning but during the course of the day may bring up 1 or 2 mouthfuls of white sputum—never colored or blood streaked.

He has no dyspnea but states that he does become aware of shortness of breath after climbing 7 or 8 stairs. He can walk 2 or 3 flights slowly but without stopping.

He sleeps without a pillow and has no swelling of the ankles. There is no chest pain or wheezing. He has no history of allergy and there are no other symptoms. The rest of the systemic review is noncontributory. He has never sought medical attention for the cough or shortness of breath during the five years that he has been aware of it.

Medical History

General health always has been good. Tonsillectomy and adenoidectomy at age 7. Usual childhood diseases, no accidents or serious illnesses. He received \$2,000.00 from a

previous employer for dermatitis of the hands (Workers Compensation Insurance). The cause of the dermatitis was never determined nor has it recurred.

Personal History

Age 40, white male, married with one son age 20. Lived in Pennsylvania all his life except while in the Navy when he was stationed in New York. Drinks an occasional beer, never smoked in any form. He quit high school at age 15 after two years. Mother age 62, father age 63, and a brother age 42; all living and well.

Occupational History

Present occupation: Foreman in a warehouse; warehouse adjacent to operation where paper towels, napkins and toilet tissue are printed. Duties consist of general supervision of the warehouse. Exposure to paper dust and ink and oil mist as well as exhaust from trucks at shipping platform.

Previous occupations: Age 14-16, sold newspapers (1949-1951).

Age 16-19, worked as a printer in a printing shop; in contact with paper dust and ink (1951-1954).

Age 19-21, Navy—stationed in New York and worked as a cook. No contact with any hazardous materials except some smoke from cooking (1954-1956).

Age 21-30, warehouseman in charge of ticketing—directing correct merchandise to proper retail stores. In contact with dust and some exhaust from trucks (1956-1965).

Age 30-40, present job—foreman in warehouse operation. The company makes and prints paper towels, napkins, toilet tissue, etc. Warehouse is adjacent to printing operation. There is some paper dust, ink and oil mist as well as exhaust from trucks.

He has no secondary occupation.

Clinical Evaluation

Examination revealed a white male, somewhat overweight, in no acute distress. Skin and hair appear normal. Neck veins not prominent, no cervical adenopathy. No abnormalities of ears, eyes and throat. Nasal septum deviated to the right. Chest is clear to percussion and auscultation. No murmurs or enlargement—A2 = P2. Blood pressure 180/120 right arm; 170/110 left arm. PMI within midclavicular line. Abdomen—no masses or organs palpable. Slight tenderness in left lower quadrant on deep palpation. Right testicle not palpable, inguinal rings firm. No clubbing of the fingers. Small varicosities on left lower leg. No ankle edema. Axillary and inguinal nodes not enlarged. Rectal examination reveals a normal prostate, no masses or other abnormalities palpable. Height 5'9"; Weight 180 lbs.

Laboratory Evaluation

Chest X-ray:	Heart size within normal limits; lung fields clear.
	Negative.
FVC and FEV:	(Repeated 3 times) within normal limits.
SMA-12:	All chemistries normal.
CBC and Differential:	Normal

Epidemiologic Data

There is no evidence in the scientific literature to indicate that working in this environment is hazardous. Others in the work area have occasional coughs—some with clear sputum production. These men all have negative clinical and laboratory findings. Epidemiologic evidence does exist to show that over 20 percent of the male and 9 percent of the female working population over 25 years of age in the United States have a chronic bronchitis (1970. *N.E.J. Med.* 270:894).

Contaminants in the Work Environment

The workplace was surveyed in 1973 (Table 2, a, b, c). Potential exposures are well within the allowable OSHA limits. The toxicity of carbon monoxide is well known, however, the levels of exposure in this case are far below toxic limits. Oil and ink mist have not been demonstrated to cause specific disease

entities. With very high concentrations animals have developed a chemical pneumonitis. Paper dust has not been found to be toxic, and is considered a nuisance dust.

TABLE 2 (a)
ATMOSPHERIC OIL MIST
PARTICULATE CONCENTRATIONS

October 10, 1973
XYZ VARIETY STORES
SOMETOWN, NY

SAMPLE NUMBER	LOCATION	TIME START/ STOP	RESULTS AS MILLIGRAMS PER CUBIC METER OF AIR
OSHA ALLOWABLE LIMIT			5.0
<i>Operator's Breathing Zone:</i>			
1	Jack White — performing normal duties.	0500/1000	0.25
2	Jack White — performing normal duties.	1000/1200	0.10
3	Jack White — performing normal duties.	1200/1400	1.2
4	Jack White — performing normal duties.	1400/1600	0.55
Time-Weighted Average Exposure			0.52

TABLE 2 (b)**ATMOSPHERIC PAPER DUST CONCENTRATIONS**

October 10, 1973
XYZ VARIETY STORES
SOMETOWN, NY

SAMPLE NUMBER	LOCATION	TIME START/ STOP	RESULTS AS MILLIGRAMS PER CUBIC METER OF AIR
OSHA ALLOWABLE LIMIT (Nuisance Particulates)			15
<i>Operator's Breathing Zone:</i>			
1	Jack White — performing normal duties.	0800/1200	2
2	Jack White — performing normal duties.	1200/1600	1.5
Time-Weighted Average Exposure			1.75

TABLE 2(c)

ATMOSPHERIC CARBON MONOXIDE CONCENTRATIONS

October 10, 1973

XYZ VARIETY STORES
SOMETOWN, NY

SAMPLE NUMBER	LOCATION	TIME START/STOP	RESULTS AS PARTS PER MILLION
OSHA ALLOWABLE LIMIT			50
<i>Operator's Breathing Zone:</i>			
1	Jack White - Paperwork at desk.	0810/0817	5
2	Jack White - Operating LPG Fueled Lift Truck.	0842/0849	20
3	Jack White - Loading platform (all docks filled with trucks).	0955/1002	10
4	Jack White - Same as 3	1131/1138	5
5	Jack White - Working approx. center of whse.	1159/1206	5
6	Jack White - Paperwork at desk.	1310/1317	< 5
7	Jack White - Approx. center of Printing Dept.	1418/1425	<5
8	Jack White - Operating LPG Fueled Lift Truck.	1430/1437	40

9 Jack White - Same as 8	1501/1508	25
10 Jack White - Working approx. center of whse.	1547/1554	<u>10</u>
Approximate Time-Weighted Average Exposure		13

< Denotes less than.

Conclusion

In the face of normal X-ray and pulmonary function studies with no abnormal lung findings on clinical examination, normal blood count and blood chemistries, no adverse epidemiologic or toxicologic evidence and the ambient work environment well below the recommended levels, this case must be considered nonoccupational in origin. There is no evidence to indicate that the worker's symptoms are occupational in origin.

He does, however, have hypertension. Sleeping flat and awakening to expectorate may signify a very early stage of hypertensive heart disease, and some orthopnea would be expected. Having symptoms for five years without ever seeking medical attention seems unusual. The conclusion in this case is that the disease is not bronchitis, but hypertension, and is nonoccupational.