Index

A

Actinolite
Carcinogenicity, 120
Composition, 122, 142, 160
Presence in vermiculite, 125

Amosite
Composition, 122, 142–145
Definition, 107
Origin of term, 121
Epidemiology, 12, 94

Amphibole (see also Actinolite, Amosite, Anthophyllite, Crocidolite, Cummingtonite, Grunerite, Riebeckite, Tremolite), 121–122, 142–145
Composition, 121–122, 142–145
Definition, 121, 142–145
Identification of, 123
Mineral classification, 121–122
Occurrence, 167

Anthophyllite
Characterization, 9, 122
Composition, 122, 142–145
Epidemiology, 74–75, 94

Asbestiform, definition of, 8

Asbestos
Actinolite (see Actinolite)
Amosite (see Amosite)
Analysis techniques (see Methods)
Anthophyllite (see Anthophyllite)
Aspect ratio (see Aspect ratio)
Blue (see Crocidolite)
Brown (see Amosite)

Asbestos cont.
Carcinogenic potential, 119
Chemical attack, 123
Chrysotile (see Chrysotile)
Crocidolite (see Crocidolite)
Definitions, 121–122, 139–145, 176, 177
Generic term, 8
Description, 121, 141–145
Discharge into the environment, sources of, 120
Dust standards, 12
Epidemiology (see Asbestosis, Cancer, Mesothelioma)

Exposure
Defining hazardous conditions, 30, 31
Dose-response relationships, 20–24
Environmental, 31
Evaluation by midget impinger, 7
In schools, 30–31
Lung defense mechanisms, 24–26
Lung clearance, 26–28
Nonoccupational, 120
Zero level concept, 30

Fibers (see also Fiber)
Carcinogenic potential (see also Asbestosis, Cancer, Mesothelioma), 119
Identification, 126–132
Geographic distribution, 6, 42, 53–54
Asbestos cont.
Grunerite (see Grunerite)
Health effects (see also Asbestosis, Cancer, Mesothelioma), 7, 56–100, 118–120
On immunological system, 25
Health hazards (see also Asbestosis, Cancer, Mesothelioma), 7, 56–100, 118–120
In households of exposed workers, 84
Nonoccupational exposure, 120
History of usage, 53–54
Lung burden, 26–28
Lung defense mechanisms, 24–26
Minerals
Characterization, 9, 54–56, 121–123, 140–145
Chemical formulas, 54–56, 121–122, 140–145
Geological distribution, 56
Production, 54–55
Sources, 53–55
Uses, 52, 58
Mining and quarrying operations, 28–29
Nonoccupational exposure, 120
Occupational exposure, permissible levels, 43
Pipe, 20
Production, 91
Properties of, 6
Related mortality (see also Asbestosis, Cancer, Mesothelioma), 60–97
Comparisons between miners/millers and trades workers, 72–77
Miners and millers, 61, 70, 72–80
Trades workers, 58–80
Riebeckite (see Riebeckite)
Risk assessment, 23–24
Standards (see Standards)
Substitutes, 98
Asbestos cont.
Threshold limit value (TLV), American Conference of Governmental Industrial Hygienists (ACGIH) (see Standards)
Tremolite (see Tremolite)
Varieties, 121–122
White (see Chrysotile)
Asbestosis, 10–13, 56–98, 118
Cause (asbestos exposure), 12
Definition, 118
Dose-response (see Dose-response relationship)
Fiber concentrations, criteria for standards
American Conference of Industrial Hygienists (ACGIH), 10
British Occupational Hygiene Society (BOHS), 11
Dreessen’s standard, 10
Pennsylvania studies, 12
Aspect ratio, fiber, 8, 34–36, 107–109, 119, 125, 146
Asbestos, 8, 34, 36, 108–109, 119, 146
Definition of a fiber, 35, 105–107, 125
Fibers extracted postmortem from human lungs, 32, 108–109
Inhalation by humans, 36
Standards, 35
U.S. government definitions, 106–107

B

BOHS standard (see Standards)

C

Califano, Joseph, on occupational disease, 84, 86
Cancer (see also Mesothelioma), 52, 56–97
Bronchogenic (see also Cancer, lung), 13–16, 56–57
Smoking and asbestos-related cancer, 39–40, 61
Homestake, South Dakota, miners, 15
In the insulation industry, 13, 62–69, 88, 119
In the Quebec asbestos industry, 12, 13–14, 18, 82–86
Miners, 6, 14, 18, 70, 74–77, 82, 85
Textile workers, 12, 13, 82
Lung, 13–16, 56–97, 119
Gastrointestinal, 20, 57, 62–69, 74–77, 78, 84–88, 93
Gold miners, 15
Mortality data, 60–97
Mortality rates, 85–86
Five-nation study, 78
Seventh Day Adventists, 16
Chatfield, Eric J., 118–138
Chrysotile
Composition and structure, 9, 121–122, 140–141
Epidemiology (see also Asbestosis, Cancer, Mesothe-
lioma), 12, 14, 91–95
Identification by transmission electron microscopy (TEM), 128
In serpentine rock, 120
In unpaved roads, 120
Solubility and thermal stability, 123
Cigarette smoking, effect on asbestos-related disease, 39–40, 43, 60–61, 119
Cleavage fragments
Carcinogenicity, 123
Counted by NIOSH method, 110
Clifton, Robert A., 139–147, 158–174
Cossette, Marcel, 5–50
Crocidolite
Composition, 121–122, 142–145
Electron microscopy analysis, 124
Epidemiology (see also Asbestosis, Cancer, Mesothe-
lioma), 13, 79, 92
Imported from South Africa, 59
Cummingtonite-grunerite
Composition, 9
Epidemiology, 123–125

D
Dose-response relationships, 20–24, 31
Dunnom, Donald D., 188–192

E
Ellis, Wayne P., 201–205
Epidemiological studies (see also Asbestos, Asbestosis, Cancer, Mesothe-
lioma), 7–20, 56–97
Comparative, 91–96
Mortality rates (see Mortality data)
Exposure measurement, criteria for, 119

F
Fiber
Aggregates, effect on fiber counting, 34
Asbestos
Counting method, National Institute for Occupational Safety and Health (NIOSH), 106–107, 111
Cleavage fragments, 107, 110
Effect of particle length and width, 111–113
Problems with, 115
Definition (identification) by electron and optical microscopy, 125–129
Fiber cont.
Asbestos cont.
Discharged into the atmosphere, 120
In mines, mills, and urban areas, 36–37
Microscopy (see also Methods), 133
Standard fiber, 107
Carcinogenicity, 110, 119
Pott model, 120
Classification protocol, 129
Definition
Aspect ratio (see also Aspect ratio), 35
Diameter and length, 34–35
Standards, nongovernment
Asbestosis Research Council of Great Britain (ARC), 34–35
ASTM, 35
International Labor Office, 34
Johannesburg Convention, 34
Standards, U.S. government regulatory
Occupational Safety and Health Administration (OSHA), 34–35
Mining Enforcement and Safety Administration (MESA), 34
National Institute for Occupational Safety and Health (NIOSH), 35, 105–110
Dimensions and carcinogenicity, 110
Minimum size of interest, 120
Monitoring
By optical microscopy, 113
By X-ray diffraction, 181–182
Effect of mineralogy on, 113
Effect of mineral habit on, 114
Effect of processing on, 115
U.S. Bureau of Mines, 165
Fiber cont.
Naturally occurring inorganic fiber, 8
Standard fiber, 106
Visibility, 36
Fibers, airborne
Aerodynamic behavior, 36
Extracted from human lungs, aspect ratio of, 32
Minimum concentration of concern, 121
Nonasbestos, in air, survey program, 185–187
Tumor-inducing, 132
Fibril, definition, 8
Fibrosis, 118
Filter pads, asbestos-bearing, 73, 78
Fragments, cleavage, 107
G
Glossary, for health-related silicates, 201–205
Grunerite
Composition, 142–145
H
Hazards, health (of exposure to asbestos) (see also Asbestosis, Cancer, Mesothe-lioma), 7
Hemenway, David R., 151–157
Homestake, South Dakota, gold miners, lung cancer, 15
I
Impinger, midget, for measurement of airborne particles, 7
K
Knight, Geoffrey, 184–187
Kuntze, Richard A., 139–147
INDEX
211

L
Levadie, Benjamin, editor, 1–2
Lizardite, 123
Lung cancer, 13–16, 56–97, 119

M
Membrane filter method (see Methods)
Mesothelioma (see also Cancer), 17–20, 56–97, 119
In animals, 17
In Canada, 17–20, 57–86, 91–97
In England, 62–69, 73, 96
In Finland, 74, 78, 94
In South Africa, 61, 79–82, 92–95, 97
In Switzerland, 70, 73
In Turkey, 20, 120, 184
In the United States, 17–20, 57–78, 81, 84–97
In Western Australia, 76–77, 80–81, 92, 94–95
Materials, producing, 17
Zeolites, as a cause, 20, 120, 184
Methods, 33
Membrane filter
Limitations, 119
Problems with, 115
Useful in, 139
Microscopy, electron, 33, 115, 127–135
Scanning, 127–134
Preferred for measuring asbestos concentrations, 115
Resolving power, 127
Transmission, 127–134
Comparison with phase contrast microscopy, 112
For asbestos fiber identification, 123
Resolving power, 128

Methods cont.
Microscopy, optical, 33, 126
Fibers visible by, 113
Phase contrast, 39, 126, 132–134
Polarized light, 33
Resolving power, 112
Selected area electron diffraction (SAED), 128–133
X-ray diffraction, 33, 37, 39, 127–131, 152, 182
Mortality data, (see also Asbestosis, Cancer, Mesothelioma), 60–97

N
NIOSH fiber
Definition, 106–107
Discussion of, 107–115, 176–178

O
OSHA monitoring procedures for talc, views
National Bureau of Standards, 166
U.S. Bureau of Mines, 166

P
Particle counting
Correlation of optical and electron microscopy methods, 37
Limitations of microscopy, 37
Particle identification
Techniques, 33
Instrumentation, 37–39
Particles, airborne, aerodynamic diameter, 31–32, 34–36
Particulates, defining for monitoring, 8, 31–36
Pneumoconiosis, 10
Potstone, 159
Pott’s model (of carcinogenic potency), 120–121, 134, 135
Q
Quartz analysis, by X-ray diffraction, 152

R
Regulations
Anticipated thrust of, 183
Effects of
On industries, 175–176, 178–179
On mining, 175–176, 178–179
Reserve Mining Co., 28, 72, 99
Riebeckite
Composition, 142–145
Ross, Malcolm, 51–104, 139–147, 193–197

S
School asbestos exposure, 30–31, 42, 90
Selikoff, I., epidemiological studies, 15–16, 86–88, 120
Serpentine, 9, 166
Composition, 121–122, 140–141
Chrysotile in, 120
Seventh Day Adventists, mortality from cancer, 16
Silica minerals
Definition, 188–192
Mortality from, 89
Silicon dioxide
Common forms, 151–152
Crystalline polymorphs, 152–153
Definitions, 152–156
Silicosis, hard rock mining, 15
Smoking, (see Cigarette smoking)
Soapstone, 159
Standards
Asbestosis Research Council of Great Britain (ARC), 34–35
Aspect ratio, fiber, 35

Standards cont.
American Conference of Industrial Hygienists (ACGIH), 10
ASTM, 35
British Occupational Hygiene Society (BOHS), 11, 12
Dreessen, 7, 9, 10
International Labor Office, 34
Johannesburg Convention, 34
McDonald, 30
Mining Enforcement and Safety Administration (MESA), 34
National Institute for Occupational Safety and Health (NIOSH), 35, 105–110
Occupational Safety and Health Administration (OSHA), 34–35
Pennsylvania studies, 12
Quebec asbestos mining industry, 14
Threshold limit value (ACGIH), 10
Steatite, 159
Synergism, cigarette smoking and asbestos, 40

T
Talc
Asbestos in, 165, 166
Definitions of, 159
What talc is not, 164
Fiber content and sources, 164
French chalk, 161
Minerals occurring in, 159–160
Mining, comparative studies, 181
Natural production of, 159
Steatite, 161
Talcum, 161
Tremolitic talc, 167–171
Uses of, 161, 163–164
World production of, 161
Terminology, mineral, 158, 201–205
Thompson, C. Sheldon, 175–183
Tremolite
Composition, 122, 142-145
Occurrence of, 165-166
In asbestos, 166, 170
In rock, 169
In talc (see also Talc), 160
Turkey, environmental asbestos exposure, 20, 184
Tridymite, definition, 152

W
Water and asbestos-related disease, 83

X
X-ray diffraction (see Methods)

Z
Zeolites, and mesothelioma, 20, 120, 184