

Building Air Quality

A Guide for Building Owners and Facility Managers



U.S. Environmental Protection Agency

Office of Air and Radiation

Office of Atmospheric and Indoor Air Programs

Indoor Air Division

U.S. Department of Health and Human Services

Public Health Service

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National Institute for Occupational Safety and Health



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DISCLAIMER

This document has been reviewed in accordance with policies at the U.S. Environmental Protection Agency and the National Institute for Occupational Safety and Health. Information provided is based upon current scientific and technical understanding of the issues presented. Following the advice given will not necessarily provide complete protection in all situations or against all health hazards that may be caused by indoor air pollution. Mention of any trade names or commercial products does not constitute endorsement or recommendation for use.

Appendix D: Asbestos

"Asbestos" describes six naturally occurring fibrous minerals found in certain types of rock formations. When mined and processed, asbestos is typically separated into very thin fibers that are normally invisible to the naked eye. They may remain in the air for many hours if released from asbestos-containing material (ACM) and may be inhaled during this time. Three specific diseases — asbestosis (a fibrous scarring of the lungs), lung cancer, and mesothelioma (a cancer of the lining of the chest or abdominal cavity) — have been linked to asbestos exposure. It may be 20 years or more after exposure before symptoms of these diseases appear; however, high levels of exposure can result in respiratory diseases within a shorter period of time.

Most of the health problems resulting from asbestos exposure have been experienced by workers whose jobs exposed them to asbestos in the air over a prolonged period without the worker protection that is now required. Asbestos fibers can be found nearly everywhere in our environment, usually at very low levels. While the risk to occupants is likely to be small, health concerns remain, particularly for the custodial and maintenance workers in a building. Their jobs are likely to bring them into proximity to ACM and may sometimes require them to disturb the ACM in the performance of maintenance activities.

EPA estimates that "friable" (easily crumbled) ACM can be found in an estimated 700,000 public and commercial buildings. About 500,000 of those buildings are believed to contain at least some damaged asbestos. Significantly damaged ACM is found primarily in building areas

not generally accessible to the public, such as boiler and mechanical rooms, where asbestos exposures generally would be limited to service and maintenance workers. However, if friable ACM is present in air plenums, it can be distributed throughout the building, thereby possibly exposing building occupants.

When is asbestos a problem? **Intact and undisturbed asbestos materials do not pose a health risk.** The mere presence of asbestos in a building does not mean that the health of building occupants is endangered. ACM which is in good condition, and is not damaged or disturbed, is not likely to release asbestos fibers into the air. When ACM is properly managed, release of asbestos fibers into the air is reduced, and the risk of asbestos-related disease is thereby correspondingly reduced.

There are a number of guidelines and regulations that govern asbestos exposure. Occupational standards for preventing asbestos-related diseases are recommended by NIOSH and promulgated by OSHA. NIOSH guidance contains Recommended Exposure Limits (RELs) and OSHA standards set Permissible Exposure Limits (PELs). The standards also contain many other measures, such as surveillance, medical screening, analytical methods, and methods of control. OSHA regulations and the EPA Worker Protection Rule also provide guidance on day-to-day activities that may bring workers in contact with ACM. EPA National Emission Standards for Hazardous Air Pollutants (NESHAP) define acceptable practices for renovation and demolition activities that involve asbestos-containing materials. In addition, many States have set exposure standards and other regulations concerning asbestos.

EPA and NIOSH recommend a practical approach that protects public health by emphasizing that ACM in buildings should be identified and appropriately managed, and that those workers who might disturb it should be properly trained and protected.

EPA AND NIOSH POSITIONS ON ASBESTOS

In an effort to calm unwarranted fears that a number of people seem to have about the mere presence of asbestos in their buildings and to discourage the decisions by some building owners to remove all ACM regardless of its condition, the EPA Administrator issued an *Advisory to the Public on Asbestos in Buildings* in 1991. This advisory summarized EPA's policies for asbestos control in the presentation of the following "five facts":

- Although asbestos is hazardous, the risk of asbestos-related disease depends upon exposure to airborne asbestos fibers.
- Based upon available data, the average airborne asbestos levels in buildings seem to be very low. Accordingly, the health risk to most building occupants also appears to be very low.
- Removal is often not a building owner's

OSHA requires that signs be posted around areas where work is being done that involves damaged asbestos-containing materials. These signs must communicate specific types of information.



DANGER

Asbestos

**Cancer and Lung Disease Hazard
Authorized Personnel Only
Respirators and Protective
Clothing Are Required in This Area**

best course of action to reduce asbestos exposure. In fact, an improper removal can create a dangerous situation where none previously existed.

- EPA only requires asbestos removal in order to prevent significant public exposure to airborne asbestos fibers during building demolition or renovation activities.
- EPA does recommend a pro-active, in-place management program whenever asbestos-containing material is discovered.

NIOSH's position on asbestos exposure has been expressed in NIOSH policy statements and internal reports and at OSHA public hearings:

- NIOSH recommends the goal of eliminating asbestos exposure in the workplace. Where exposures cannot be eliminated, exposures should be limited to the lowest concentration possible.
- NIOSH contends that there is no safe airborne fiber concentration for asbestos. NIOSH therefore believes that any detectable concentration of asbestos in the workplace warrants further evaluation and, if necessary, the implementation of measures to reduce exposures.
- NIOSH contends that there is no scientific basis to support differentiating health risks between types of asbestos fibers for regulatory purposes.

Copies of the EPA and NIOSH policy statements and public advisories are available, respectively, from those agencies. See the last section in this appendix and *Appendix G* for information on how to obtain them.

PROGRAMS FOR MANAGING ASBESTOS IN-PLACE

In some cases, an asbestos operations and maintenance program is more appropriate than other asbestos control strategies, including removal. Proper asbestos management is neither to rip it all out in a panic nor to ignore the problem under the false presumption that asbestos is "risk free." Health concerns remain, particularly for custodial and maintenance workers.

In-place management does not mean "do nothing." It means having a program to ensure that the day-to-day management of the building is carried out in a manner that minimizes release of asbestos fibers into the air, and that ensures that when asbestos fibers are released, either accidentally or intentionally, proper control and clean-up procedures are implemented. Such a program may be all that is necessary to control the release of asbestos fibers until the asbestos-containing material in a building is scheduled to be disturbed by renovation or demolition activities.

The first responsibility of a building owner or manager is to identify asbestos-containing materials, through a building-wide inventory or on a case-by-case basis, before suspect materials are disturbed by renovations or other actions. The Asbestos Hazard Emergency Response Act (AHERA) program requires that in schools an inventory of asbestos materials be done by properly accredited individuals. Starting in late 1991 or 1992, there will also be a requirement that if an inventory of asbestos materials is done in public and commercial buildings, the inventory must be done by properly accredited individuals. In public and commercial buildings facing major renovations or demolition, inspections for the presence of ACM are required, according to the 1990 revision of the EPA Asbestos NESHAP. A carefully designed air monitoring program can be used as an adjunct to visual and physical evaluations of the asbestos-containing materials.

After the material is identified, the building management and staff can then institute controls to ensure that the day-to-day management of the building is carried out in a manner that prevents or minimizes the release of asbestos fibers into the air.

These controls will ensure that when asbestos fibers are released, either accidentally or intentionally, proper management and clean-up procedures are implemented.

Another concern of EPA, NIOSH, and other Federal, State, and local agencies that are concerned with asbestos and public health is to ensure proper worker training and protection. In the course of their daily activities, maintenance and service workers in buildings may disturb materials and thereby elevate asbestos fiber levels and asbestos exposure, especially for themselves, if they are not properly trained and protected. For these persons, risk may be significantly higher than for other building occupants. Proper worker training and protection, as part of an active in-place management program, can reduce any unnecessary asbestos exposure for these workers and others. AHERA requires this training for school employees whose job activities may result in asbestos disturbances.

In addition to the steps outlined above, an in-place management program will usually include notification to workers and occupants of the existence of asbestos in their building, periodic surveillance of the material, and proper recordkeeping. EPA requires all of these activities for schools and strongly recommends that other building owners also establish comprehensive asbestos management programs. Without such programs, asbestos materials could be damaged or could deteriorate, which might result in elevated levels of airborne asbestos fibers. While the management costs of all the above activities will depend upon the amount, condition, and location of the materials, such a program need not be expensive.

WHERE TO GO FOR ADDITIONAL INFORMATION

For guidance on asbestos, building owners and managers are urged to become familiar with two EPA documents: *Managing Asbestos in Place* (published in 1990 and also known as the "Green Book") and *Guidance for Controlling Asbestos-Containing Materials in Buildings* (published in 1985 and also known as the "Purple Book").

To obtain copies of the guidance publications and other materials mentioned above, or to get additional information on technical issues, call or write:

Environmental Assistance Division
Office of Toxic Substances
U.S. EPA (TS-799)
401 M Street SW
Washington, DC 20460
Telephone (TSCA Information Hotline):
202-554-1404

**National Institute for Occupational
Safety and Health**
Technical Information Branch
4676 Columbia Parkway
Cincinnati, OH 45226
Telephone: 1-800-35-NIOSH or
1-800-356-4674

Contact State air pollution control or health agencies for information on pertinent State activities and regulations. To find an asbestos contact in State agencies, consult the EPA Directory of State Indoor Air Contacts. For a more complete listing of publications concerning asbestos, refer to *Appendix G*.

DANGEROUS asbestos

Working on brakes? Think about this:

- Asbestos can cause fatal diseases years after exposure.
- Asbestos is used in clutches and brakes.
- Anyone working on brakes needs protection from asbestos.

We can't see it, smell it, taste it, or feel it, but we know that asbestos can cause debilitating and often fatal diseases. We also know that these diseases take as long as 20 years to develop. What we *don't* know is how much—or how little—exposure to asbestos can cause them.

There is *no known safe level of exposure*. Anyone who works with any quantity of asbestos for any length of time risks developing serious disease later in life. And that person puts *others* at risk. Invisible asbestos fibers cling to clothes, hair, and skin. When they become airborne, as they do in natural movement, anyone near that person can inhale them.

Since asbestos is used in clutches and brakes, you may be exposing yourself and your loved ones to that risk. Yet protection from asbestos exposure can be simple and inexpensive. This bulletin will give you the facts about asbestos and how to take care of yourself when working with it.

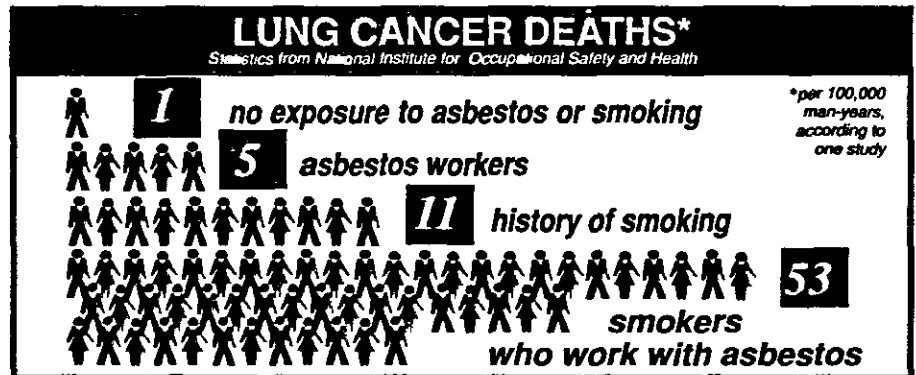
What is asbestos?

Asbestos is a mined mineral. It is a needle-like fiber that is very resistant to pressure and heat, which is why it is used in brakes and clutches.

It is very brittle, and it fractures lengthwise, creating smaller and smaller fibers with sharp, needle-like edges.

You can't see these fibers in the air—some asbestos particles are so small that nearly 200 of them would have to be bundled together to equal the diameter of one human hair.

These invisible particles are in brake dust and you can inhale them right through unapproved protective dust masks. They can then travel through the respiratory system and lodge in the lungs, where they become permanently embedded in lung tissue.



How dangerous is asbestos exposure?

Asbestos fibers are often found at tumor sites in the lung, and exposure to asbestos causes deadly lung diseases. Among these are:

• **Lung cancer:** About 95% of lung cancer victims die quickly — by the time the disease is detectable by x-ray, it is often widespread. Lung cancer accounts for the largest number of deaths attributed to asbestos exposure, and asbestos is almost as deadly as smoking as a cause of this disease. In fact, a smoker who works with asbestos is 10 times more likely

to contract and die from lung cancer than than a non-smoker who works with asbestos.

• **Mesothelioma:** This deadly cancer is *100% fatal*, usually within one year of diagnosis — and asbestos is the major cause of this disease. No one knows how little it takes. Even *indirect* exposure is deadly. Wives, children, and pets of people who work with asbestos have died just from exposure to the clothes of the worker. This disease damages the lining of the chest and abdominal cavities.

Dangers continued on side 2

Doing a Brake Job? It's Easy to Do It Right!

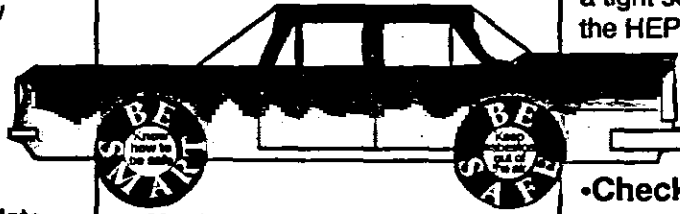
If you can recognize hazards and know how to control them, you are better equipped to protect yourself. Therefore, the National Institute for Occupational Safety and Health (NIOSH) recommends a few basic rules for doing brake jobs. They include:

•Don't Blow It! Asbestos dust that doesn't get into the air will never get into your lungs. So *never* use an air hose, dry brush, rag, or ordinary shop-vac. They *all* stir up deadly dust. And for the same reason, don't grind brake linings. Slow lathe-turning will reduce dust significantly.

•Keep It Clean! Clean spills by vacuuming with HEPA (High Efficiency Particulate Air) systems or wet mopping immediately. (Dry sweeping and air hoses will blow dust into the air, and into your lungs.) Dispose of waste in sealed, labelled containers. And if you use a HEPA vacuum system, vacuum each component as you remove it.

Remember:

- Keep brake dust out of the air!**
- Keep work areas free of food and drink.**
- Dispose of all spills, contaminated solutions, and rags in accordance with state and local regulations.**
- Keep work clothing separate from street clothing—and launder work clothing after each shift.**
- Wash hands after working, but never with the same rags used to clean brakes.**



•Masks do not filter asbestos fibers. Respirators equipped with HEPA filters are the only approved protection.

•New substitute friction materials have not been tested for safety over time. Use these safety precautions even when you believe the brake shoes do not contain asbestos.

•Wet It Down! When using a wet brush, thoroughly wet the wheel hub and back of the assembly first. After removing the drum, wash all components with the brush. If using aerosol spray, remember to keep the nozzle far enough away from the surface to keep fibers from splashing back at you in the liquid. Also, if you must hammer drums, place a pan with water beneath the wheel to catch the dust.

•Seal It Tight! Enclosure systems should fit completely around the brake drum backing plate and should provide a tight seal around the axle. Turn on the HEPA vacuum before positioning enclosure over wheel, and leave it on while removing the enclosure.

•Check It Out! Make sure you have enough light to see and space to work. Respect the hazards and know how to control them. And if you have questions about safety practices, call:

The Ohio Industrial Commission
1-800-282-3045 or
The National Institute for Occupational Safety and Health
1-800-35-NIOSH

Dangers, continued

•Other Cancers: Cancer of the voice box has been linked to asbestos exposure. Asbestos also appears to cause cancers of the stomach and large intestine.

•Asbestosis: When microscopic asbestos fibers get caught in lung tissue, they cause scars. When this scarring spreads, the lungs can't expand and contract as easily as they should — and the victim finds it harder and harder to breathe. The condition is permanent, and studies suggest that if you work with asbestos for many years without protecting yourself, you stand about a 50-50 chance of developing this debilitating disease.

How do you know you have asbestos-related disease?

Unfortunately, you probably won't. Asbestos, like radiation, seems harmless — and no one has ever itched, sneezed, wheezed, or scratched because of it, even after asbestos particles have penetrated the lungs.

The victim often feels fine for years and may no longer even be working with asbestos when symptoms begin.

Usually symptoms take between 15 and 30 years to become troublesome. By that time, as we have seen, disease can suddenly make it impossible to work. And in the case of lung cancer and mesothelioma, which are not curable, actually threaten life. The danger is deadly serious.

This bulletin was produced at the Ohio State University office of the Ohio Technology Transfer Organization (OSU/OTTO) under a cooperative agreement with the National Institute for Occupational Safety and Health, Centers for Disease Control.

Sources for some of the information include:

- National Institute for Occupational Safety and Health
- United States Environmental Protection Agency
- Ohio Industrial Commission
- Ohio Department of Education
- Ohio Automotive Wholesalers Association
- Ohio Automotive Service Association
- Clayton Associates
- The Ohio State University

For more information about the Ohio Technology Transfer Organization, call 614-466-4286

PART II

NIOSH BIBLIOGRAPHY ON ASBESTOS

A. NIOSH-AUTHORED DOCUMENTS

1. NUMBERED PUBLICATIONS

NIOSH numbered publications document the results of NIOSH research. Included in this category are Criteria Documents, Current Intelligence Bulletins, Alerts, Health and Safety Guides, technical reports of scientific investigations, compilations of data, work-related booklets, symposium and conference proceedings, and NIOSH administrative and management reports. The following publications on asbestos are listed alphabetically by title.

Building Air Quality. A Guide for Building Owners and Facility Managers, 1991. (Joint NIOSH-EPA Publication)

NIOSH PUB NO: 91-114. 253 pp.

GPO NO: 055-000-00390-4 \$25.00

(A copy of the section on asbestos is contained in Part I of this Bibliography.)

Control of Asbestos Exposure During Brake Drum Service, 1989.

NIOSH PUB NO: 89-121. 79 pp.

NTIS NO: PB90-168501 \$31.50

Criteria for a Recommended Standard: Occupational Exposure to Asbestos, 1972. (Revised: See next entry.)

NIOSH PUB NO: 72-10267. 129 pp.

NTIS NO: PB-209510 \$39.00

Criteria for a Recommended Standard: Occupational Exposure to Asbestos (Revised), 1976.

NIOSH PUB NO: 77-169. 100 pp.

NTIS NO: PB-273965 \$31.50

(An abstract of this recommended standard is contained in Part I one of this Bibliography.)

Current Intelligence Bulletin 5 - Asbestos Exposure During Servicing of Motor Vehicle Brake and Clutch Assemblies, 1975.

NIOSH PUB NO: 78-127. 125 pp. (This publication is a compendium of Current Intelligence Bulletins 1-18.)

NTIS NO: PB83-105080 \$35.00

Estimates of Pulmonary and Gastrointestinal Deposition for Occupational Fiber Exposures, 1979.

NIOSH PUB NO: 79-135. 84 pp.

NTIS NO: PB80-149644 \$31.50

An Evaluation of Glove Bag Containment in Asbestos Removal, 1990.

NIOSH PUB NO: 90-119. 131 pp.

Available from NIOSH No Charge

NTIS NO: PB91-188995 \$39.00

An Evaluation of Vacuum Equipment for Collection of Asbestos Waste, 1980.

NIOSH PUB NO: 80-137. 77 pp.

NTIS NO: PB82-150236 \$31.50

A Guide to Respiratory Protection for the Asbestos Abatement Industry, 1986. (Joint NIOSH-EPA Publication)

EPA PUB NO: 560-OPTS-86-001. 173 pp.

NTIS NO: PB87-157574 \$44.00

Good Practices Manual for Insulation Installers, 1977.

NIOSH PUB NO: 77-188. 40 pp.

NTIS NO: PB83-178822 \$27.00

Laboratory Evaluations and Performance Reports for the Proficiency Analytical Testing (PAT) and Environmental Lead Proficiency Analytical Testing (ELPAT) Programs, 1994.

NIOSH PUB NO: 95-104. 34 pp.

Available from NIOSH No Charge

NTIS NO: PB95-219515 \$27.00

Laboratory Reports and Rating Criteria for the Proficiency Analytical Testing Program (PAT), 1990.

NIOSH PUB NO: 91-102. 31 pp.

NTIS NO: PB91-227553 \$27.00

NIOSH Guide to Industrial Respiratory Protection, 1987.

NIOSH PUB NO: 87-116

Available from NIOSH No Charge

NTIS NO: PB88-188347 \$61.50

NIOSH Manual of Analytical Methods - Fourth Edition, 1994, and Supplement, 1996.

NIOSH PUB NO: 94-113. 1373 pp.

NIOSH PUB NO: 96-135. 362 pp. (Supplement)

Available from NIOSH No Charge

GPO NO: 917-011-00000-1

(Subscription) \$56.00

NTIS NO: PB95-154191 (Fourth Ed.) \$126.00

NTIS NO: PB97-146138 (Supplement) \$71.50

(Copies of the current NIOSH analytical methods for asbestos are contained in Part I of this Bibliography.)

Occupational Diseases: A Guide to Their Recognition (Revised), 1977.

NIOSH PUB NO: 77-181. 619 pp.

NTIS NO: PB83-129528 \$106.00

Occupational Exposure to Talc Containing Asbestos, 1980.

NIOSH PUB NO: 80-115. 117 pp.

NTIS NO: PB80-193352 \$35.00

Occupational Respiratory Diseases, 1986.

NIOSH PUB NO: 86-102. 825 pp.

NTIS NO: PB87-205662 \$125.00

(A copy of the sections on asbestos-related disease is contained in Part I of this Bibliography.)

Occupational Safety and Health Guidelines for Chemical Hazards, 1981, and Supplement I, 1988.

NIOSH PUB NO: 81-123. 1565 pp.

NIOSH PUB NO: 88-118. 214 pp. (Supplement I)

NTIS NO: PB83-154609 \$193.00

NTIS NO: PB89-203129 (Suppl. I) \$47.50

(A copy of the revised Guideline for asbestos is contained in Part I of this Bibliography.)

Proceedings of a Roundtable Discussion on Thermal Analysis Techniques, 1976.

NIOSH PUB NO: 76-173. 260 pp.

NTIS NO: PB-266511 \$59.00

Proceedings of the VIIth International Pneumoconioses Conference, Part I and Part II, Pittsburgh, PA, August 23-26, 1988.

NIOSH PUB NO: 90-108. 1608 pp.

NTIS NO: PB91-188821 (Part I) \$125.00

NTIS NO: PB91-188839 (Part II) \$115.00

(This Proceedings includes 75 papers on asbestos.)

Proceedings of the 9th International Symposium on Epidemiology in Occupational Health, September 1994.

NIOSH PUB NO: 94-112. 718 pp.

NTIS NO: PB95-173001 \$92.00

(This Proceedings includes 9 papers on asbestos.)

Protect Your Family. Reduce Contamination at Home, 1997.

NIOSH PUB NO: 97-125. 16 pp.

Available from NIOSH No Charge

Recommended Industrial Ventilation Guidelines, 1976.

NIOSH PUB NO: 76-162. 333 pp.

NTIS NO: PB-266227 \$61.50

Report to Congress on Workers' Home Contamination Study Conducted Under the Workers' Family Protection Act (29 U.S.C. 671a), 1995.

NIOSH PUB NO: 95-123. 304 pp.

Available from NIOSH No Charge

NTIS NO: PB96-192000 \$61.50

Results from the National Occupational Health Survey of Mining (NOHSM), 1996.

NIOSH PUB NO: 96-136. 223 pp.

Available from NIOSH No Charge

NTIS NO: PB97-124473 \$44.00

Review and Evaluation of Analytical Methods for Environmental Studies of Fibrous Particulate Exposures, 1977.

NIOSH PUB NO: 77-204. 73 pp.

NTIS NO: PB-274750 \$27.00

To B or not to B . . . a NIOSH B Reader, 1997.

NIOSH PUB NO: 97-104. 2 pp.

Available from NIOSH No Charge

The Use of Light Scattering for the Detection of Filter Samples of Fibrous Aerosols, 1978.

NIOSH PUB NO: 78-105. 59 pp.

NTIS NO: PB80-176977 \$27.00

USPHS/NIOSH Membrane Filter Method for Evaluating Airborne Asbestos Fibers, 1979.

NIOSH PUB NO: 79-127. 89 pp.

NTIS NO: PB-297731 \$31.50

Work-Related Lung Disease Surveillance Report, 1991.

NIOSH PUB NO: 91-113. 84 pp.

NTIS NO: PB92-136266 \$31.50

Work-Related Lung Disease Surveillance Report, Supplement, 1992.

NIOSH PUB NO: 91-113s. 43 pp.

NTIS NO: PB93-145969 \$27.00

Work-Related Lung Disease Surveillance Report, 1994.

NIOSH PUB NO: 94-120. 162 pp.

NTIS NO: PB95-181988 \$44.00

Work-Related Lung Disease Surveillance Report, 1996.

NIOSH PUB NO: 96-134. 484 pp.

Available from NIOSH No Charge

NTIS NO: PB97-128607 \$57.00

(Excerpts from this report are contained in Part I of this Bibliography.)

Workplace Exposure to Asbestos, Review and Recommendations, 1980.
NIOSH PUB NO: 81-103. 39 pp.
NTIS NO: PB83-176677 \$27.00
(Excerpts from this publication are contained in Part I of this Bibliography.)

2. TESTIMONY

NIOSH testimony consists of both written comments and oral testimony presented before Congressional committees and at hearings convened by regulatory agencies. The following list of NIOSH testimony on asbestos is arranged in reverse chronological order.

NIOSH [1993]. Comments by R.W. Niemeier to the Coast Guard on their advanced notice of proposed rulemaking on controlling the marine asbestos hazard. 9 pp.
NTIS NO: PB93-215127 \$10.00

NIOSH [1993]. Supplemental comments to the Department of Labor on the Occupational Safety and Health Administration proposed rule on occupational exposure to asbestos, tremolite, anthophyllite, and actinolite. 7 pp.
NTIS NO: PB93-215119 \$10.00

NIOSH [1991]. Post-hearing comments to the Department of Labor on the Occupational Safety and Health Administration proposed rule on occupational exposure to asbestos, tremolite, anthophyllite, and actinolite. 6 pp.
NTIS NO: PB92-136043 \$10.00

NIOSH [1991]. Testimony by R.A. Lemen to the Department of Labor on the Occupational Safety and Health Administration proposed rule on occupational exposure to asbestos, tremolite, anthophyllite, and actinolite. 16 pp.
NTIS NO: PB92-139088 \$19.50

NIOSH [1990]. Post-hearing comments to the Department of Labor on the Occupational Safety and Health Administration proposed rule on occupational exposure to asbestos, tremolite, anthophyllite, and actinolite. 22 pp.
NTIS NO: PB91-212514 \$19.50

NIOSH [1990]. Testimony by R.A. Lemen to the Department of Labor on the Occupational Safety and Health Administration notice of proposed rulemaking on occupational exposure to asbestos, tremolite, anthophyllite, and actinolite. 17 pp.
NTIS NO: PB91-152439 \$19.50

NIOSH [1990]. Statement by R.A. Lemen before the Subcommittee on Toxic Substances, Environmental Oversight, Research and Development, Committee on Environment and Public Works. 6 pp.
NTIS NO: PB91-132852 \$10.00
(A copy of this statement is contained in Part I of this Bibliography.)

NIOSH [1990]. Comments by R.A. Lemen to the Department of Labor on the Occupational Safety and Health Administration notice of proposed rulemaking on occupational exposure to asbestos, tremolite, anthophyllite, and actinolite. 15 pp.
NTIS NO: PB91-152413 \$19.50

NIOSH [1989]. Comments by R.W. Niemeier to the Environmental Protection Agency on their notice of proposed rule revision, including disposal of asbestos containing materials removed from schools. 6 pp.
NTIS NO: PB90-129404 \$10.00

NIOSH [1987]. Comments by J.D. Millar to the Department of Labor on the Occupational Safety and Health Administration final rule on occupational exposure to asbestos, tremolite, anthophyllite, and actinolite. 6 pp.
NTIS NO: PB90-129370 \$10.00

NIOSH [1987]. Comments by R.A. Lemen to the Environmental Protection Agency on their proposed rule on asbestos-containing materials in schools. 6 pp.
NTIS NO: PB91-169003 \$10.00

NIOSH [1986]. Comments by J.D. Millar to the Department of Labor on the Occupational Safety and Health Administration final rule on occupational exposure to asbestos, tremolite, anthophyllite, and actinolite. 2 pp.
NTIS NO: PB90-130048 \$6.50

NIOSH [1985]. Comments by J.D. Millar to the Environmental Protection Agency on their proposed rule: asbestos abatement projects. 15 pp.
NTIS NO: PB91-152777 \$19.50

NIOSH [1984]. Testimony by R.A. Lemen before the Subcommittee on Public Buildings and Grounds, House Committee on Public Works and Transportation. 11 pp.
NTIS NO: PB90-179128 \$19.50

NIOSH [1984]. Testimony by R.A. Lemen before the Department of Labor, public hearing on occupational exposure to asbestos. 16 pp.
NTIS NO: PB87-222642 \$19.50

NIOSH [1980]. Remarks by A. Robbins on the need for a new asbestos standard. 6 pp.
NTIS NO: PB90-180753 \$10.00

NIOSH [1980]. Statement by R.A. Lemen before the Subcommittee on Coast Guard and Navigation, House Committee on Merchant Marine and Fisheries. 11 pp.
NTIS NO: PB90-192964 \$19.50

NIOSH [1979]. Statement by A. Robbins before the Subcommittee on Labor Standards, House Committee on Education and Labor. 16 pp.
NTIS NO: PB90-130063 \$19.50

NIOSH [1979]. Statement by P. Landrigan on the jewelry industry before the Subcommittee on Labor Standards, House Committee on Education and Labor. 8 pp.
NTIS NO: PB90-192972 \$10.00

3. JOURNAL ARTICLES, BOOK CHAPTERS, and PROCEEDINGS

Journal articles, book chapters, and proceedings by NIOSH authors may appear in either U.S. or foreign journals or symposia. The following list, which is in alphabetical order by author, includes the bibliographic information to permit retrieval of the references from public or university libraries.

Abell M [1988]. Quality audit samples and the asbestos analyst registry. *Applied Industrial Hygiene* 3(6):R4-R5.

Abell M, Doemeny L [1991]. Monitoring the performance of occupational health laboratories. *American Industrial Hygiene Association Journal* 52(8):336-339.

Abell M, Schulman S, Baron P [1989]. The quality of fiber count data. *Applied Industrial Hygiene* 4(11):273-285.

Althouse R, Castellan R, Wagner G [1992]. Pneumoconioses in the United States: highlights of surveillance data from NIOSH and other federal sources. *Occupational Medicine: State of the Art Reviews* 7(2):197-208.

Amandus H, Wheeler R, Jankovic J, Tucker J [1987]. The morbidity and mortality of vermiculite miners and millers exposed to tremolite-actinolite: part I. Exposure estimates. *American Journal of Industrial Medicine* 11(1):1-14.

Amandus H, Wheeler R [1987]. The morbidity and mortality of vermiculite miners and millers exposed to tremolite-actinolite: part II. Mortality. *American Journal of Industrial Medicine* 11(1):15-26.

Amandus H, Althouse R, Morgan W, Sargent E, Jones R [1987]. The morbidity and mortality of vermiculite miners and millers exposed to tremolite-actinolite: part III. Radiographic findings. *American Journal of Industrial Medicine* 11(1):27-37.

Bang K [1996]. Epidemiology of occupational cancer. *Occupational Medicine: State of the Art Reviews* 11(3):467-485.

Baron P [1987]. Asbestos analysis—NIOSH method 7400. *Applied Industrial Hygiene* 2(6):R8-R10.

Baron P [1989]. Asbestos measurement and quality control. In: *Proceedings of the Asbestos International Association (AIA) 6th International Colloquium on Dust Measurement Technique and Strategy*, Jersey, Channel Islands, November 28-30, pp. 142-151.

Baron P [1993]. Exposure to airborne asbestos associated with simulated cable installation above a suspended ceiling [letter to the editor]. *American Industrial Hygiene Association Journal* 54(3):A87-A89.

Baron P [1987]. Overloading and electrostatic effects in asbestos fiber sampling. *American Industrial Hygiene Association Journal* 48(11):A709-A710.

Baron P [1991]. Phase contrast microscope asbestos fiber counting. *Applied Occupational and Environmental Hygiene* 6(3):182.

Baron P, Chen CC, Hemenway D, O'Shaughnessy P [1994]. Nonuniform air flow in inlets: the effect on filter deposits in the fiber sampling cassette. *American Industrial Hygiene Association Journal* 55(8):722-732.

- Baron P, Deye G [1990]. Electrostatic effects in asbestos sampling I: experimental measurements. *American Industrial Hygiene Association Journal* 51(2):51-62.
- Baron P, Deye G [1990]. Electrostatic effects in asbestos sampling II: comparison of theory and experiment. *American Industrial Hygiene Association Journal* 51(2):63-69.
- Baron P, Deye G [1987]. Generation of replicate asbestos aerosol samples for quality assurance. *Applied Industrial Hygiene* 2(3):114-118.
- Baron P, Deye G, Fernback J [1994]. Length separation of fibers. *Aerosol Science and Technology* 21(2):179-192.
- Baron P, Pickford G [1986]. An asbestos sample filter clearing procedure. *Applied Industrial Hygiene* 1(4):169-171.
- Baron P, Platek S [1990]. NIOSH method 7402—asbestos fibers (revision #1)—low-temperature ashing of filter samples. *American Industrial Hygiene Association Journal* 51(11):A730-A731.
- Baron P, Shulman S [1987]. Evaluation of the Magiscan image analyzer for asbestos fiber counting. *American Industrial Hygiene Association Journal* 48(1):39-46.
- Bernstein R, Kuempel E, Lemen R [1988]. Environmental exposures to asbestos: a guide for physicians, toxicologists, and public health officials. In: *Proceedings Asia-Pacific Symposium on Environmental and Occupational Toxicology*, Singapore, October 4-7, 1987, Environmental and Occupational Chemical Hazards, No. 8, pp. 63-78.
- Brodkin C, Barnhart S, Checkoway H, Balmes J, Omenn G, Rosenstock L [1996]. Longitudinal pattern of reported respiratory symptoms and accelerated ventilatory loss in asbestos-exposed workers. *Chest* 109(1):120-126.
- Brown D, Dement J, Okun A [1994]. Mortality patterns among female and male chrysotile asbestos textile workers. *Journal of Occupational Medicine* 36(8):882-888.
- Brown D, Dement J, Wagoner J [1979]. Mortality patterns among miners and millers occupationally exposed to asbestiform talc. In: Lemen R, Dement J, eds. *Dusts and Disease, Proceedings of the Conference on Occupational Exposures to Fibrous and Particulate Dust and Their Extension into the Environment*. Park Forest South, IL: Pathotox Publisher, Inc., pp. 317-324.
- Burkhart G, Schulte P, Robinson C, Sieber W, Vossenas P, Ringen K [1993]. Job tasks, potential exposures, and health risks of laborers employed in the construction industry. *American Journal of Industrial Medicine* 24(4):413-425.
- Busch K, Hornung R, Smith R, Leidel N [1979]. Unbiased estimates of coefficients of variation for asbestos counting determined from Johns-Manville data. In: Lemen R, Dement J, eds. *Dusts and Disease, Proceedings of the Conference on Occupational Exposures to Fibrous and Particulate Dust and Their Extension into the Environment*. Park Forest South, IL: Pathotox Publisher, Inc., pp. 185-197.
- Castranova V, Pailes W, Judy D, Schwegler-Berry D, Jones W [1994]. Comparative cytotoxic effects of crocidolite and its non-asbestiform polymorph on rat alveolar macrophages. *Inhaled Particles VII, The Annals of Occupational Hygiene* 38(Suppl. 1):665-673.
- Costello J, Castellan R, Swecker G, Kullman G [1995]. Mortality of a cohort of U.S. workers employed in the crushed stone industry, 1940-1980. *American Journal of Industrial Medicine* 27(5):625-640.
- Craighead J, Abraham J, Churg A, Green F, Kleinerman J, Pratt P, Seemayer T, Vallyathan V, Weill H [1982]. Asbestos-associated diseases, special issue. The pathology of asbestos-associated diseases of the lungs and pleural cavities: diagnostic criteria and proposed grading schema. *Archives of Pathology and Laboratory Medicine* 106(11):541-596.
- Cralley L [1971]. Electromotive phenomenon in metal and mineral particulate exposures: relevance to exposure to asbestos and occurrence of cancer. *American Industrial Hygiene Association Journal* 32(10):653-661.
- Cralley L, Lainhart W [1973]. Are trace metals associated with asbestos fibers responsible for the biologic effects attributed to asbestos? *Journal of Occupational Medicine* 15(3):262-266.
- Curtis R, Bierbaum P [1975]. Technological feasibility of the 2 fibers/cc asbestos standard in asbestos textile facilities. *American Industrial Hygiene Association Journal* 36(2):115-125.

- Dement J, Brown D, Okun A [1994]. Follow-up study of chrysotile asbestos textile workers: cohort mortality and case-control analyses. *American Journal of Industrial Medicine* 26(4):431-447.
- Dement J, Harris R, Symons M, Shy C [1982]. Estimates of dose-response for respiratory cancer among chrysotile asbestos textile workers. *Annals of Occupational Hygiene* 26(1-4):869-887.
- Dement J, Wallingford K [1990]. Comparison of phase contrast and electron microscopic methods for evaluation of occupational asbestos exposures. *Applied Occupational and Environmental Hygiene* 5(4):242-247.
- Dement J, Zumwalde R [1979]. Occupational exposures to talcs containing asbestiform minerals. In: Lemen R, Dement J, eds. *Dusts and Disease, Proceedings of the Conference on Occupational Exposures to Fibrous and Particulate Dust and Their Extension into the Environment*. Park Forest South, IL: Pathotox Publisher, Inc., pp. 287-305.
- Dement J, Zumwalde R, Wallingford K [1976]. Discussion paper: asbestos fiber exposures in a hard rock gold mine. *Annals of the New York Academy of Sciences* 271:345-352.
- Esche C, Groff J [1997]. Proficiency analytical testing (PAT) program: background and current status. *Applied Occupational and Environmental Hygiene* 12(7):456-457.
- Fleeger A [1989]. Methylene chloride—minimizing the danger. *Asbestos Issues '89*, March, pp. 36-37, 125-126.
- Fleeger A, Lee J [1988]. Characterization of worker exposures to methylene chloride resulting from application of aerosol glue in the asbestos abatement industry. *Applied Industrial Hygiene* 3(9):245-250.
- Froehlich P [1992]. Analysis of PCM asbestos air monitoring results for a major abatement project [letter to the editor]. *Applied Occupational and Environmental Hygiene* 7(5):288-289.
- Froehlich P [1993]. Evaluation of two negative-air glove bag techniques for asbestos removal. *Applied Occupational and Environmental Hygiene* 8(10):871-882.
- Froehlich P, Hollett B [1993]. Evaluation of glove bag containment and asbestos abatement clearance: methodologies for asbestos removal. *Applied Occupational and Environmental Hygiene* 8(11):937-944.
- Gillam J, Dement J, Lemen R, Wagoner J, Archer V, Blejer H [1976]. Mortality patterns among hard rock gold miners exposed to an asbestiform mineral. *Annals of the New York Academy of Sciences* 271:336-344.
- Gorski C, Stettler L [1974]. The surface energetics of asbestos minerals. *American Industrial Hygiene Association Journal* 35(6):345-353.
- Gorski C, Stettler L, Lempert B [1976]. The porosity of amosite and chrysotile asbestos. *American Industrial Hygiene Association Journal* 37(2):117-122.
- Green F, Attfield M [1983]. Pathology standards for asbestosis. *Scandinavian Journal of Work, Environment and Health* 9(2):162-168.
- Greenland S, Salvan A, Wegman D, Hallock M, Smith T [1994]. A case-control study of cancer mortality at a transformer-assembly facility. *International Archives of Occupational and Environmental Health* 66(1):49-54.
- Haartz J, Lange B, Draftz R, Scholl R [1978]. Selection and characterization of fibrous and nonfibrous amphiboles for analytical methods development. In: *Proceedings of the Workshop on Asbestos: Definitions and Measurement Methods*, National Bureau of Standards (NBS), Gaithersburg, MD, July 18-20, 1977, pp. 295-312.
- Hahon N, Booth J [1986]. Coinhibition of viral interferon induction by benzo[a]pyrene and chrysotile asbestos. *Environmental Research* 40(1):103-109.
- Hahon N, Booth J, Eckert H [1977]. Antagonistic activity of poly(4-vinylpyridine-N-oxide) to the inhibition of viral interferon induction by asbestos fibres. *British Journal of Industrial Medicine* 34(2):119-125.
- Hahon N, Booth J, Flowers L [1990]. Coinhibition of viral interferon induction by benzo[a]pyrene in association with occupation-related particles. *Environmental Research* 52(1):83-98.
- Henderson D, Rantanen J, Barnhart S, Dement J, De Vuyst P, Hillerdal G, Huuskonen M, Kivisaari L, Kusaka Y, Lahdensuo A, Langard S, Mowe G, Okubo T, Parker J, Roggli V [1997]. Asbestos, asbestosis, and cancer: the Helsinki criteria for diagnosis and attribution. *Scandinavian Journal of Work, Environment and Health* 23(4):311-316.
- Hodous T [1990]. ILO "A" and "B" reader classification [letter to the editor]. *Journal of Occupational Medicine* 32(3):267.

- Ing R, Falk H, Lemen R, Carson G, Kelter A, Sarn J, Gray M [1981]. Community asbestos exposure in Globe, Arizona. *Journal of Pediatrics* 99(3):409-411.
- Jankovic J [1985]. Industrial hygiene forum: asbestos bulk sampling procedure. *American Industrial Hygiene Association Journal* 46(2):B8-B10.
- Jankovic J, Jones W, Clere J [1986]. Field technique for clearing cellulose esters filters used in asbestos sampling. *Applied Industrial Hygiene* 1(3):145-147.
- Johnson W, Lemen R, Hurst G, Spiegel R, Lui F [1982]. Respiratory morbidity among workers in an amosite asbestos insulation plant. *Journal of Occupational Medicine* 24(12):994-999.
- Kang S, Burnett C, Freund E, Walker J, Lulich N, Sestito J [1996]. Gastrointestinal cancer mortality of workers in occupations with high asbestos exposure. *American Journal of Industrial Medicine* 31(6):713-718.
- Kelley J [1993]. Mastic removal—an educational experience. *Applied Occupational and Environmental Hygiene* 8(7):607-608.
- Kullman G, Greife A, Costello J, Hearl F [1995]. Occupational exposures to fibers and quartz at 19 crushed stone mining and milling operations. *American Journal of Industrial Medicine* 27(5):641-660.
- Lange B, Haartz J [1979]. Determination of microgram quantities of asbestos by x-ray diffraction: chrysotile in thin dust layers of matrix material. *Analytical Chemistry* 51(4):520-525.
- Lemen R, Bingham E [1994]. A case study in avoiding a deadly legacy in developing countries. *Toxicology and Industrial Health* 10(1/2):59-87.
- Lemen R, Dement J, Wagoner J [1980]. Epidemiology of asbestos-related diseases. *Environmental Health Perspectives* 34:1-11.
- Lemen R, Meinhardt T, Becking G, Cantor K, Cherner J, Cordle F, Groth D, Keller C, Lybarger J, McConnell E, Millette J, Patel Y, Sonich-Mullin C, Tollefson L [1987]. Report on cancer risks associated with the ingestion of asbestos. *Environmental Health Perspectives* 72:253-265.
- Lu J, Keane M, Ong T, Wallace W [1994]. In vitro genotoxicity studies of chrysotile asbestos fibers dispersed in simulated pulmonary surfactant. *Mutation Research* 320(4):253-259.
- Lynch J [1971]. Environmental sampling and analysis of particulate matter: asbestos. In: Transactions of the 35th Annual Meeting of Industrial Health Foundation, Inc., October 13-14, 1970, Chatham Center, Pittsburgh, Pennsylvania, Transactions Bulletin No. 44, Industrial Hygiene Foundation of America, Inc., Pittsburgh, Pennsylvania, pp. 81-86.
- McCammon C, Lee S [1991]. Asbestos exposure during low-income housing weatherization. *Applied Occupational and Environmental Hygiene* 6(5):347-348.
- Morgan A, Cralley L [1973]. Chemical characteristics of asbestos and associated trace elements. In: Biological Effects of Asbestos, IARC Scientific Publication No. 8. Geneva: World Health Organization, International Agency for Research on Cancer, pp. 113-118.
- Nevitt C, Daniell W, Rosenstock L [1994]. Workers' compensation for nonmalignant asbestos-related lung disease. *American Journal of Industrial Medicine* 26(6):820-830.
- Pailes W, Judy D, Resnick H, Castranova V [1984]. Relative effects of asbestos and wollastonite on alveolar macrophages. *Journal of Toxicology and Environmental Health* 14(4):497-510.
- Petsonk E [1996]. Electric power generation. In: Harber P, Schenker M, Balmes J, eds. Occupational and Environmental Respiratory Disease. St. Louis: Mosby-Year Book Inc., pp. 697-703.
- Platek S, Groth D, Ulrich C [1985]. Chronic inhalation of short asbestos fibers. *Fundamental and Applied Toxicology* 5(2):327-340.
- Platek S, Riley R, Simon S [1992]. The classification of asbestos fibres by scanning electron microscopy and computer-digitizing tablet. *The Annals of Occupational Hygiene* 36(2):155-171.
- Reger R, Ames R, Merchant J, Polakoff P, Sargent E, Silbiger M, Whittlesey P [1982]. The detection of thoracic abnormalities using posterior-anterior (pa) vs pa and oblique roentgenograms. *Chest* 81(3):290-295.
- Rinsky R, Melius J, Murray W, Hornung R, Zumwalde R, Waxweiler R, Landrigan P, Bierbaum P [1988]. Case-control study of lung cancer in civilian employees at the Portsmouth Naval Shipyard, Kittery, Maine. *American Journal of Epidemiology* 127(1):55-64.

Robinson C, Burnett C [1994]. Mortality patterns of US female construction workers by race, 1979-1990. *Journal of Occupational Medicine* 36(11):1228-1233.

Robinson C, Lemen R, Wagoner J [1979]. Mortality patterns, 1940-1975 among workers employed in an asbestos textile friction and packing products manufacturing facility. In: Lemen R, Dement J, eds. *Dusts and Disease, Proceedings of the Conference on Occupational Exposures to Fibrous and Particulate Dust and Their Extension in the Environment*. Park Forest South, IL: Pathotox Publisher, Inc., pp. 131-143.

Robinson C, Stern F, Halperin W, Venable H, Petersen M, Frazier T, Burnett C, Lalich N, Salg J, Sestito J, Fingerhut M [1995]. Assessment of mortality in the construction industry in the United States, 1984-1986. *American Journal of Industrial Medicine* 28(1):49-70.

Ryan G, Buchan R, Keefe T, McCammon C [1996]. A longitudinal study of an American public building following asbestos removal. *Applied Occupational and Environmental Hygiene* 11(12):1417-1423.

Schlecht P, Shulman S [1986]. Performance of asbestos fiber counting laboratories in the NIOSH Proficiency Analytical Testing (PAT) program. *American Industrial Hygiene Association Journal* 47(5):259-269.

Schlecht P, Shulman S [1995]. Phase contrast microscopy asbestos fiber counting performance in the proficiency analytical testing program. *American Industrial Hygiene Association Journal* 56(5):480-489.

Schulte P, Halperin W, Herrick M, Connally B [1987]. The current focus of biological monitoring. In: Foa V, Emmett E, Maroni M, Colombi A, eds. *Occupational and Environmental Chemical Hazards: Cellular and Biochemical Indices for Monitoring Toxicity*. Chichester, UK: Ellis Horwood Limited, pp. 50-60.

Seitz T, Kinnes G [1991]. Workplace exposures at a waste-to-energy facility. *Applied Occupational and Environmental Hygiene* 6(7):573-574.

Selikoff I, Stokinger H [1973]. Cancer risk to allergy patients from syringes with asbestos-wound plunger. *Journal of the American Medical Association* 225(4):423.

Sepulveda M, Merchant J [1983]. Roentgenographic evidence of asbestos exposure in a select population of railroad workers. *American Journal of Industrial Medicine* 4(5):631-639.

Sheehy J, Cooper T, O'Brien D [1989]. Control of asbestos exposure during brake drum service. *Applied Industrial Hygiene* 4(12):313-319.

Short S, Petsonk E [1993]. Respiratory health risks among nonmetal miners. *Occupational Medicine: State of the Art Reviews* 8(1):57-70.

Simeonova P, Luster M [1996]. Asbestos induction of nuclear transcription factors and interleukin 8 gene regulation. *American Journal of Respiratory Cell and Molecular Biology* 15:787-795.

Sinks T, Goodman M, Kolonel K, Anderson B [1994]. A case-control study of mesothelioma and employment in the Hawaii sugarcane industry. *Epidemiology* 5(4):466-468.

Sinks T, Hartle R, Boeniger M, Mannino D, Boyd J, Fernback J, Hawkins M, Grimes G, Watkins K, Dill P, Anderson B [1994]. Exposure to biogenic silica fibers and respiratory health in Hawaii sugarcane workers. *Journal of Occupational Medicine* 36(12):1329-1334.

Stayner L, Dankovic D, Lemen R [1996]. Occupational exposure to chrysotile asbestos and cancer risk: a review of the amphibole hypothesis. *American Journal of Public Health* 86(2):179-186. (A copy of this article is included in Part I of this Bibliography.)

Stayner L, Dankovic D, Lemen R [1997]. Asbestos-related cancer and the amphibole hypothesis [reply to letters to the editor]. *American Journal of Public Health* 87(4):687-691.

Stayner L, Kuempel E, Rice F, Prince M, Althouse R [1996]. Approaches for assessing the efficacy of occupational health and safety standards. *American Journal of Industrial Medicine* 29(4):353-357.

Stayner L, Smith R, Bailer J, Gilbert S, Steenland K, Dement J, Brown D, Lemen R [1997]. Exposure-response analysis of risk of respiratory disease associated with occupational exposure to chrysotile asbestos. *Occupational and Environmental Medicine* 54:646-652.

Steenland K, Loomis D, Shy C, Simonsen N [1996]. Occupational causes of lung cancer. In: Harbor P, Schenker M, Balmes J, eds. *Occupational and Environmental Respiratory Disease*. St. Louis: Mosby-Year Book, Inc., pp. 589-607.

Steenland K, Loomis D, Shy C, Simonsen N [1996]. Review of occupational lung carcinogens. *American Journal of Industrial Medicine* 29(5):474-490.

Stern F, Schulte P, Haring Sweeney M, Fingerhut M, Vossen P, Burkhardt G, Kornak M [1995]. Proportionate mortality among construction laborers. *American Journal of Industrial Medicine* 27(4):485-509.

Sullivan P, Bang K, Hearl F, Wagner G [1995]. Respiratory disease risks in the construction industry. *Occupational Medicine: State of the Art Reviews* 10(2):313-334.

Taylor D, Baron P, Shulman S, Carter J [1984]. Identification and counting asbestos fibers. *American Industrial Hygiene Association Journal* 45(2):84-88.

Tillett S, Ringen K, Schulte P, McDougall V, Miller K, Samuels S [1986]. Interventions in high-risk occupational cohorts: a cross-sectional demonstration project. *Journal of Occupational Medicine* 28(8):719-727.

Vallyathan V [1994]. Oxygen radical generation by asbestos and its correlation to cytotoxicity. In: Davis J and Jaurand M, eds. *Cellular and Molecular Effects of Mineral and Synthetic Dusts and Fibres*. Berlin: Springer-Verlag, NATO ASI Series, Volume H 85, pp. 9-21.

Vallyathan V, Green F [1985]. The role of analytical techniques in the diagnosis of asbestos-associated disease. *CRC Critical Reviews in Clinical Laboratory Sciences* 22(1):1-42.

Vallyathan V, Hahon N, Booth J, Schwegler D, Sepulveda M [1985]. Cytotoxicity of native- and surface-modified asbestos. In: Beck E, Bignon J, eds. *In Vitro Effects of Mineral Dusts*. Third International Workshop. Berlin: Springer-Verlag, pp. 159-165.

Vallyathan V, Mega J, Shi X, Dalal N [1992]. Enhanced generation of free radicals from phagocytes induced by mineral dusts. *American Journal of Respiratory Cell and Molecular Biology* 6(4):404-413.

Wagner G [1997]. Asbestosis and silicosis. *The Lancet* 349(9061):1311-1315.

Wagner G [1994]. Mineral dusts. In: Rosenstock L, Cullen M, eds. *Textbook of Clinical Occupational and Environmental Medicine*. Philadelphia: W.B. Saunders Company, pp. 825-837.

Wagner G, Attfield M, Parker J [1993]. Chest radiography in dust-exposed miners: promise and problems, potential and imperfections. *Occupational Medicine: State of the Art Reviews* 8(1):127-141.

Waxweiler R, Robinson C [1983]. Asbestos and non-Hodgkin's lymphoma. *The Lancet* 1(8317):189-190.

Weidner R, Ayer H [1972]. Dust exposure in asbestos processing. In: *Transactions of the 34th Annual Meeting of the American Conference of Governmental Industrial Hygienists*, San Francisco, CA, May 14-19, 1972, pp. 103-124.

White M, Hodous T, Hudnall J [1989]. Physiological and subjective responses to working in disposable protective coveralls and respirators commonly used by the asbestos abatement industry. *American Industrial Hygiene Association Journal* 50(6):313-319.

4. MISCELLANEOUS REPORTS

Miscellaneous reports include all other NIOSH-authored documents not included in the previous three sections. In addition to the reports listed below, NIOSH also has produced Health Hazard Evaluation (HHE) reports, Industrywide Study (IWS) reports, and Control Technology (CT) reports related to asbestos that are not listed in this bibliography. These three types of reports examine conditions at specific worksites. HHE reports are the results of requests from employees, employee representatives, or employers to NIOSH to determine if a hazard exists in the workplace. IWS reports document information obtained during brief 1- to 2-day walk-through surveys at plant sites and represent the results of industrial hygiene field studies that assess whether specific occupational exposures of particular workers are associated with adverse health effects. CT reports represent the results of field study surveys that evaluate health hazard control systems at individual worksites. A list of HHE, IWS, and CT reports on asbestos, along with ordering information, is available from NIOSH at the address shown on page ii.

Anonymous [1973]. Caution: asbestos dust . . . is hazardous to your health. 16 pp.
NTIS NO: PB88-204649 \$19.50

Anonymous [1979]. Mining surveillance: potentially toxic occupational exposures. 24 pp.
NTIS NO: PB298973 \$19.50

Anonymous [1988]. National occupational health survey of mining, asbestos report. 82 pp.
NTIS NO: PB90-163676 \$25.00

Anonymous [1984]. A review of the scientific basis for EPA's school asbestos hazard program with recommendations to state health officials. 24 pp.
NTIS NO: PB85-221448 \$19.50

Anonymous [1979]. Sampling and evaluating airborne asbestos dust - NIOSH Course 582. 66 pp.
NTIS NO: PB85-246023 \$21.50

Ayer H, Zumwalde R [1979]. Physical and chemical characteristics of airborne fibers. 41 pp.
NTIS NO: PB87-234662 \$21.50

Baron P, Crouch K [1982]. Report on testing of the automated fiber counter. 16 pp.
NTIS NO: PB83-192997 \$19.50

Conroy C, Smith D, Bender T [1988]. Fatal accident circumstances and epidemiology (FACE) report 88-28, asbestos worker electrocuted. 7 pp.
NTIS NO: PB89-187827 \$10.00

Dement J [1981]. Epidemiology of asbestos related diseases. 49 pp.
NTIS NO: PB90-155904 \$21.50

Dye G, Baron P [1990]. Application of neural network technology to fiber image analysis, final report: analytical methods for asbestos fibers. 46 pp.
NTIS NO: PB91-169367 \$21.50

Geraci C, Baron P, Carter J, Smith D [1979]. Testing of hair dryers for asbestos emissions, NIOSH/CPSC Interagency Agreement (IA) 79-29. 61 pp.
NTIS NO: PB89-165237 \$21.50

Hankinson J, Stettler L, Baron P, Lewis D, Zumwalde R, Brown D, Noonan G, Haag W, Okun A, Wagner G, Lemen R [1993]. NIOSH occupational fiber exposures and lung disease research strategy (version 7.4). 23 pp.
NTIS NO: PB94-173739 \$19.50

Leidel N, Busch K [1974]. An evaluation of phase contrast microscopes for asbestos counting. 12 pp.
NTIS NO: PB90-130022 \$19.50

Lemen R, Selikoff I, Hurst G, Wagoner J [1971]. Asbestos related disease - a community epidemic in the making. 7 pp.
NTIS NO: PB90-155896 \$10.00

Pailes W, Judy D, Resnick H, Castranova V [1983]. Cellular toxicity of mineral dusts. 23 pp.
NTIS NO: PB83-232264 \$19.50

Wallingford K [1978]. Chrysotile asbestos in industry. 22 pp.
NTIS NO: PB90-155953 \$19.50

B. NIOSH-FUNDED DOCUMENTS

1. GRANT and COOPERATIVE AGREEMENT REPORTS

Grant and cooperative agreement (CA) reports are generated primarily from an agreement between NIOSH and a non-governmental organization. They typically describe scientific research conducted by that organization and funded by NIOSH. Grant and CA reports, listed below in alphabetical order by author, may be published either as final reports available from NTIS or as journal articles. For the former, NTIS ordering information is shown; for the latter, bibliographic information is provided to permit retrieval from public or university libraries.

Allen M [1971]. Dissolution and cation exchange properties of some asbestos minerals in aqueous media, minerals research progress report.
GRANT NO: R01-OH-00332. 96 pp.
NTIS NO: PB88-247838 \$25.00

Allen M [1973]. Dissolution of asbestos minerals in neutral salt solutions, minerals research progress report no. 2.
GRANT NO: R01-OH-00332. 52 pp.
NTIS NO: PB88-237748 \$21.50

Anderson H, Hanrahan L, Higgins D, Sarow P [1992]. A radiographic survey of public school building maintenance and custodial employees. *Environmental Research* 59(1):159-166.
CA NO: U50/CCU-502661

Anderson H, Hanrahan L, Schirmer J, Higgins D, Sarow P [1991]. Mesothelioma among employees with likely contact with in-place asbestos-containing building materials. *Annals of the New York Academy of Sciences* 643:550-572.
CA NO: U53/CCU-500801 and U60/CCU-502984

Ayer H, Burg J [1975]. Cumulative asbestos exposure and forced vital capacity.
GRANT NO: T01-OH-00028. 21 pp.
NTIS NO: PB90-153552 \$19.50

Baldwin C, Beaulieu H, Buchan R, Johnson H [1982]. Asbestos in Colorado schools. *Public Health Reports* 97(4):325-331.
GRANT NO: R18-OH-01053

Barker R [1981]. Asbestos substitute fabrics for safety clothing, final progress report.
GRANT NO: R01-OH-00910. 10 pp.
NTIS NO: PB84-238385 \$10.00

Brandt-Rauf P, Smith S, Hemminki K, Koskinen H, Vainio H, Niman H, Ford J [1992]. Serum oncoproteins and growth factors in asbestosis and silicosis patients. *International Journal of Cancer* 50(6):881-885.
GRANT NO: K01-OH-00076

Broderick A, Fuortes L, Merchant J, Galvin J, Schwartz D [1992]. Pleural determinants of restrictive lung function and respiratory symptoms in an asbestos-exposed population. *Chest* 101(3):684-691.
GRANT NO: K01-OH-00093

Brousseau L, Ellenbecker M, Evans J [1990]. Collection of silica and asbestos aerosols by respirators at steady and cyclic flow. *American Industrial Hygiene Association Journal* 51(8):420-426
GRANT NO: R01-OH-02154 and T15-OH-07096

Brousseau L, Evans J, Ellenbecker M [1993]. An empirical model for estimating the collection efficiency of dust-mist respirators. *Annals of Occupational Hygiene* 37(2):135-150.
GRANT NO: R01-OH-02154 and T15-OH-07096

Buchan R [1982]. The safe asbestos treatment program, project report.
GRANT NO: R18-OH-01053. 148 pp.
NTIS NO: PB84-238351 \$31.00

Buchan R, Richardson D, Beaulieu H, Keefe T [1984]. Development of a mathematical model for predicting concentrations of small asbestos fibers. *Environmental Research* 33(2):296-299.
GRANT NO: T01-OH-07039

Bunn W, Hunninghake G, Broderick A, Wilson J, Galvin J, Merchant J, Watt J, Dayton C, Schwartz D [forthcoming]. The clinical relevance of dyspnea in workers exposed to asbestos.
GRANT NO: K01-OH-00093

Burns P, Swanson G [1991]. The occupational cancer incidence surveillance study (OCISS): risk of lung cancer by usual occupation and industry in the Detroit metropolitan area. *American Journal of Industrial Medicine* 19(5):655-671.
GRANT NO: R01-OH-02067

Burrell R [1974]. Immunological reflections on asbestos. *Environmental Health Perspectives* 9:297-298.
GRANT NO: R01-OH-00360

Cheng Y, Fan B, Holmes T, Yeh H [1996]. Evaluation of respirator filters for asbestos fibers, final performance report.

GRANT NO: R01-OH-02922. 56 pp.
NTIS NO: PB97-105209 \$21.50

Choi I, Smith R [1972]. Kinetic study of dissolution of asbestos fibers in water. *Journal of Colloid Interface Science* 40(2):253-262.

GRANT NO: R01-OH-00332

Cicioni C, London S, Garabrant D, Bernstein L, Phillips K, Peters J [1991]. Occupational asbestos exposure and mesothelioma risk in Los Angeles County: application of an occupational hazard survey job-exposure matrix.

American Journal of Industrial Medicine 20(3):371-379.
GRANT NO: T15-OH-07214

Craighead J, Mossman B, Bradley B [1980]. Comparative studies on the cytotoxicity of amphibole and serpentine asbestos. *Environmental Health Perspectives* 34:37-46.

GRANT NO: R01-OH-00653

Cullen M, Merrill W, Marenberg M [1994]. A model for staging asbestos-related lung effects after cessation of exposure based on clinical demographic and bronchoscopic data. In: Mehlman M, Upton A, eds.

The Identification and Control of Environmental and Occupational Diseases: Asbestos and Cancers, Advances in Modern Environmental Toxicology, Volume XXII. Princeton: Princeton Scientific Publishing Company, Inc., pp. 287-303.

GRANT NO: R01-OH-02114

Davis H, Reeves A [1971]. Collagen biosynthesis in rat lungs during exposure to asbestos. *American Industrial Hygiene Association Journal* 32(9):599-602.

GRANT NO: R01-OH-00323.

Demers R, Burns P, Swanson G [1994]. Construction occupations, asbestos exposure, and cancer of the colon and rectum. *Journal of Occupational Medicine* 36(9):1027-1031.

GRANT NO: R01-OH-02067

Evans J, Brosseau L, Ellenbecker M [1989]. Asbestos fiber collection by NIOSH-approved respirators, final performance report.

GRANT NO: R01-OH-02154. 7 pp.
NTIS NO: PB90-153545 \$10.00

Ferin J, Leach L [1976]. The effect of amosite and chrysotile asbestos on the clearance of TiO₂ particles from the lung. *Environmental Research* 12(2):250-254.
GRANT NO: R01-OH-00334

Ghio A, Crumbliss A [1991]. Surface complexation of Fe³⁺ by silica and silicate dusts increases in vitro oxidant generation but diminishes in vitro cytotoxicity.

GRANT NO: R01-OH-02264. 24 pp.
NTIS NO: PB92-136357 \$19.50

Gross P [1972]. Dose-effect relationship of asbestos dust, final technical report.

GRANT NO: R01-OH-00354. 17 pp.
NTIS NO: PB90-129859 \$19.50

Gross P, Harley R [1972]. Asbestos dust: a study on the pathogenetic mechanism.

GRANT NO: R01-OH-00326. 22 pp.
NTIS NO: PB90-129396 \$19.50

Gross P, Harley R [1972]. Asbestos-induced intrathoracic tissue reactions.

GRANT NO: R01-OH-00326. 20 pp.
NTIS NO: PB88-248380 \$19.50

Hammond E, Selikoff I [1972]. Relation of cigarette smoking to risk of death of asbestos-associated disease among insulation workers in the United States.

GRANT NO: R01-OH-00305. 13 pp.
NTIS NO: PB90-103433 \$19.50

Hammond C, Selikoff I, Churg J [1972]. Carcinogenicity of amosite asbestos. *Archives of Environmental Health* 25:183-186.

GRANT NO: R01-OH-00305

Harkin T, McGuinness G, Goldring R, Cohen H, Parker J, Crane M, Naidich D, Rom W [1996]. Differentiation of the ILO boundary chest roentgenograph (0/1 to 1/0) in asbestosis by high-resolution computed tomography scan, alveolitis, and respiratory impairment. *Journal of Occupational and Environmental Medicine* 38(1):46-52.
CA NO: U60/CCU-206153

Hartley P, Galvin J, Hunninghake G, Merchant J, Yagla S, Speakman S, Schwartz D [1994]. High-resolution CT-derived measures of lung density are a valid index of interstitial lung disease. *Journal of Applied Physiology* 76(1):271-277.

GRANT NO: K01-OH-00093

Hawaii Department of Health [1981]. School asbestos fund for removal activities, terminal progress report.

GRANT NO: R18-OH-01062. 105 pp.
NTIS NO: PB84-239474 \$28.00

- Homa D, Garabrant D, Gillespie B [1994]. A meta-analysis of colorectal cancer and asbestos exposure. *American Journal of Epidemiology* 139(12):1210-1222. GRANT NO: T15-OH-07207
- Kannerstein M, Churg J [1972]. Pathology of carcinoma of the lung associated with asbestos exposure. *Cancer* 30(1):14-21. GRANT NO: R01-OH-00305
- Kaselaan & D'Angelo Associates [1982]. Evaluation of a commercial vacuum system for asbestos removal, a safety and cost evaluation. GRANT NO: R18-OH-01072. 175 pp. NTIS NO: PB85-222982 \$35.00
- Kline J, Schwartz D, Monick M, Floerchinger C, Hunninghake G [1993]. Relative release of interleukin-1 beta and interleukin-1 receptor antagonist by alveolar macrophages. A study in asbestos-induced lung disease, sarcoidosis, and idiopathic pulmonary fibrosis. *Chest* 104(1):47-53. GRANT NO: K01-OH-00093
- Langer A, Hammond E, Selikoff I [1971]. Inorganic fibers, including chrysotile, in lungs at autopsy: preliminary report. *Inhaled Particles III, Proceedings of an International Symposium*. Surrey, UK: Unwin Brothers Ltd., Gresham Press, pp. 683-694. GRANT NO: R01-OH-00320
- Langer A, Rubin I, Selikoff I, Pooley F [1972]. Chemical characterization of uncoated asbestos fibers from the lungs of asbestos workers by electron microprobe analysis. *Journal of Histochemistry and Cytochemistry* 20(9):735-740. GRANT NO: R01-OH-00305
- Langer A, Selikoff I, Rosenberg C [1979]. Asbestos in brake worker's lungs: an exposure index. Defining new asbestos high risk groups (abstract). In: *Proceedings of International Conference on Critical Current Issues in Environmental Health Hazards*, Tel Aviv, Israel, March 4-7, p. 11. GRANT NO: OH-00734-01
- Langer A, Selikoff I, Sastre A [1971]. Chrysotile asbestos in the lungs of persons in New York City. *Archives of Environmental Health* 22:348-361. GRANT NO: R01-OH-00320
- Levin S [1994]. Abnormalities consistent with asbestos-related disease among long-term demolition workers. CA NO: U60/CCU-306169. 16 pp. NTIS NO: PB97-151757 \$19.50
- Luo J, Zehab R, Antilla S, Ridanpaa M, Husgafvel-Pursiainen K, Vainio H, Carney W, DeVivo I, Milling C, Brandt-Rauf P [1994]. Detection of serum p53 protein in lung cancer patients. *Journal of Occupational Medicine* 36(2):155-160. GRANT NO: K01-OH-00076
- Martin B [1981]. Asbestos removal or treatment in Oklahoma schools, terminal progress report. GRANT NO: R18-OH-01049. 6 pp. NTIS NO: PB88-248422 \$10.00
- Martin B, Hodges J, Hallett P, Myers R [1981]. Bidding documents for asbestos abatement in Oklahoma public buildings. GRANT NO: R18-OH-01049. 59 pp. NTIS NO: PB88-248430 \$21.50
- Merrill W, Cullen M, Carter D, Horwitz R, Matthey R, Gee J [1991]. Epithelial surface proteins: markers of cancer risk. GRANT NO: R01-OH-02114. 49 pp. NTIS NO: PB92-115674 \$21.50
- Miller A, Langer A, Teirstein A, Selikoff I [1975]. "Nonspecific" interstitial pulmonary fibrosis - association with asbestos fiber detected by electron microscopy. *New England Journal of Medicine* 292(2):91-93. GRANT NO: R01-OH-00320
- Mossman B, Craighead J [1982]. Comparative cocarcinogenic effects of crocidolite asbestos, hematite, kaolin and carbon in implanted tracheal organ cultures. *Inhaled Particles V, The Annals of Occupational Hygiene* 26(1-4):553-567. GRANT NO: R01-OH-00888
- Mossman B, Craighead J [1983]. Mechanisms of asbestos and nonasbestiform particles and fibers in bronchogenic carcinoma. In: *Wagner W, Rom W, Merchant J, eds. Health Issues Related to Metal and Nonmetallic Mining*. Boston: Butterworth Publishers, pp. 123-134. GRANT NO: R01-OH-00888
- Mossman B, Craighead J, MacPherson B [1980]. Asbestos-induced epithelial changes in organ cultures of hamster trachea: inhibition by retinyl methyl ether. *Science* 207(4428):311-313. GRANT NO: R01-OH-00653
- Mossman B, Marsh J, Gilbert R, Shatos M, Doherty J, Cutroneo K [1986]. Cellular and molecular mechanisms of asbestosis. *Chest* 89(3):160S-161S. GRANT NO: R01-OH-00007

Mossman B, Marsh J, Hardwick D, Gilbert R, Hill S, Sesko A, Shatos M, Doherty J, Weller A, Bergeron M [1986]. Approaches to prevention of asbestos-induced lung disease using polyethylene glycol (peg)-conjugated catalase. *Journal of Free Radicals in Biology and Medicine* 2:335-338.
GRANT NO: R01-OH-00007

Mossman B, Marsh J, Shatos M [1986]. Alteration of superoxide dismutase activity in tracheal epithelial cells by asbestos and inhibition of cytotoxicity by antioxidants. *Laboratory Investigation* 54(2):204-212.
GRANT NO: R01-OH-00007

Murphy R, Ferris B, Burgess W, Worcester J, Gaensler E [1971]. Effects of low concentrations of asbestos - clinical, environmental, radiologic and epidemiologic observations in shipyard pipe coverers and controls. *New England Journal of Medicine* 285(23):1271-1278.
GRANT NO: R01-OH-00310

Nicholson W, Maggiore C, Selikoff I [1972]. Asbestos contamination of parenteral drugs. *Science* 177(4044): 171-173.
GRANT NO: R01-OH-00305

Ohio Technology Transfer Organization [1990]. Danger asbestos. Working on brakes? Think about this. (A copy of this bulletin, which was produced under a cooperative agreement with NIOSH, is included in Part I of this Bibliography.)

Partanen R, Hemminki K, Koskinen H, Luo J, Carney W, Brandt-Rauf P [1994]. The detection of increased amounts of the extracellular domain of the epidermal growth factor receptor in serum during carcinogenesis in asbestosis patients. *Journal of Occupational Medicine* 36(12):1324-1328.
GRANT NO: K01-OH-00076

Reeves A, Puro H, Smith R, Vorwald A [1971]. Experimental asbestos carcinogenesis. *Environmental Research* 4(6):496-511.
GRANT NO: R01-OH-00323

Reitze W, Nicholson W, Holaday D, Selikoff I [1972]. Application of sprayed inorganic fiber containing asbestos: occupational health hazards. *American Industrial Hygiene Association Journal* 33(1):178-191.
GRANT NO: R01-OH-00305

Schwartz D [1991]. The clinical relevance of asbestos-induced pleural fibrosis. *Annals of the New York Academy of Sciences* 643:169-177.
GRANT NO: K01-OH-00093

Schwartz D [1991]. New developments in asbestos-induced pleural disease. *Chest* 99(1):191-198.
GRANT NO: K01-OH-00093

Schwartz D, Davis C, Merchant J, Bunn W, Galvin J, Van Fossen D, Dayton C, Hunninghake G [1994]. Longitudinal changes in lung function among asbestos-exposed workers. *American Journal of Respiratory and Critical Care Medicine* 150(5):1243-1249.
GRANT NO: K01-OH-00093

Schwartz D, Fuortes L, Galvin J, Burmeister L, Schmidt L, Leistikow B, Lamarte F, Merchant J [1990]. Asbestos-induced pleural fibrosis and impaired lung function. *American Review of Respiratory Disease* 141(2):321-326.
GRANT NO: K01-OH-00093

Schwartz D, Galvin J, Burmeister L, Merchant R, Dayton C, Merchant J, Hunninghake G [1991]. The clinical utility and reliability of asbestos bodies in bronchoalveolar fluid. *American Review of Respiratory Disease* 44(3):684-688.
GRANT NO: K01-OH-00093

Schwartz D, Galvin J, Dayton C, Stanford W, Merchant J, Hunninghake G [1990]. Determinants of restrictive lung function in asbestos-induced pleural fibrosis. *Journal of Applied Physiology* 68(5):1932-1937.
GRANT NO: K01-OH-00093

Schwartz D, Galvin J, Frees K, Dayton C, Burmeister L, Merchant J, Hunninghake G [1993]. Clinical relevance of cellular mediators of inflammation in workers exposed to asbestos. *American Review of Respiratory Disease* 148(1):68-74.
GRANT NO: K01-OH-00093

Schwartz D, Galvin J, Merchant R, Dayton C, Burmeister L, Merchant J, Hunninghake G [1992]. Influence of cigarette smoking on bronchoalveolar lavage cellularity in asbestos-induced lung disease. *American Review of Respiratory Disease* 145(2):400-405.
GRANT NO: K01-OH-00093

Schwartz D, Galvin J, Yagla S, Speakman S, Merchant J, Hunninghake G [1993]. Restrictive lung function and asbestos-induced pleural fibrosis. A quantitative approach. *Journal of Clinical Investigation* 91(6):2685-2692.
GRANT NO: K01-OH-00093

Selikoff I [1974]. Asbestos criteria document highlights. *American Society of Safety Engineers Journal* 19(3):26-33.
GRANT NO: R01-OH-00320

- Selikoff I, Hammond E, Seidman H [1972]. Cancer risk of insulation workers in the United States. GRANT NO: R01-OH-00305. 25 pp. NTIS NO: PB90-103813 \$19.50
- Selikoff I, Hammond E, Seidman H [1979]. Mortality experience of insulation workers in the United States and Canada, 1943-1976. *Annals of the New York Academy of Sciences* 330:91-116. GRANT NO: R01-OH-00320
- Selikoff I, Nicholson W, Langer A [1972]. Asbestos air pollution. *Archives of Environmental Health* 25:1-13. GRANT NO: R01-OH-00305
- Shatos M, Doherty J, Marsh J, Mossman B [1987]. Prevention of asbestos-induced cell death in rat lung fibroblasts and alveolar macrophages by scavengers of active oxygen species. *Environmental Research* 44(1):103-116. GRANT NO: K01-OH-00007
- Shih J, Hunninghake G, Goeken N, Galvin, J, Merchant J, Schwartz D [1993]. The relationship between HLA-A, B, DQ, and DR antigens and asbestos-induced lung disease. *Chest* 104(1):26-31. GRANT NO: K01-OH-00093
- Shih J, Wilson J, Broderick A, Watt J, Galvin J, Merchant J, Schwartz D [1994]. Asbestos-induced pleural fibrosis and impaired exercise physiology. *Chest* 105(5):1370-1376. GRANT NO: K01-OH-00093
- Smith R [1973]. Aqueous surface chemistry of asbestos minerals, final progress report. GRANT NO: R01-OH-00332. 21 pp. NTIS NO: PB90-100942 \$19.50
- Smith R, Choi I [1984]. The behavior in aqueous solutions of transition metals associated with asbestos minerals and its implication in tumor initiation in the lung. *Speculations in Science and Technology* 7(1):27-36. GRANT NO: R01-OH-00332
- Smith C, Kelsey K, Wiencke J, Leyden K, Levin S, Christiani D [1994]. Inherited glutathione-s-transferase deficiency is a risk factor for pulmonary asbestosis. *Cancer Epidemiology, Biomarkers and Prevention* 3(6):471-477. GRANT NO: K01-OH-00110
- Stolwijk J [1980]. Continuous optical monitoring of asbestos in air. GRANT NO: R01-OH-00647. 8 pp. NTIS NO: PB88-247598 \$10.00
- Swanson G [1995]. Occupational cancer surveillance: new approaches, final performance report. GRANT NO: R01-OH-02067. 25 pp. NTIS NO: PB95-269890 \$19.50
- Swift D [1986]. Fiber deposition in human upper airway model, final performance report. GRANT NO: R01-OH-01605. 4 pp. NTIS NO: PB89-130728 \$6.50
- Timblin C, Janssen Y, Mossman B [1995]. Transcriptional activation of the proto-oncogene c-jun by asbestos and H₂O₂ is directly related to increased proliferation and transformation of tracheal epithelial cells. *Cancer Research* 55(13):2723-2726. GRANT NO: K01-OH-00146
- Treadwell M [1997]. Asbestos induced alteration in endothelial cell function. GRANT NO: R03-OH-03267. 8 pp. NTIS NO: PB97-206296 \$10.00
- Treadwell M, Fava R, Hunt J, Krieser R, Barchowsky A [1996]. Expression and activity of urokinase and its receptor in endothelial cells exposed to asbestos. GRANT NO: R03-OH-03267. 30 pp. NTIS NO: PB97-206304 \$19.50
- Treadwell M, Mossman B, Barchowsky [1996]. Increased neutrophil adherence to endothelial cells exposed to asbestos. *Toxicology and Applied Pharmacology* 139(1):62-70. GRANT NO: R03-OH-03267
- Treuting E, ed. [1979]. Occupational health nursing. GRANT NO: A14-OH-00010. 190 pp. NTIS NO: PB83-103580 \$38.00
- University of Missouri [1981]. Missouri workshops on asbestos treatment in schools. GRANT NO: R18-OH-01054. 9 pp. NTIS NO: PB84-240555 \$10.00
- Valic F, Beritic-Stahuljak D, Rossiter C, Skuric Z, Zuskin E [1983]. Early detection of health hazards due to asbestos exposure, final report. GRANT NO: PL-480-02-009-3. 215 pp. NTIS NO: PB83-244434 \$41.00

Valic F, Beritic-Stahuljak D, Rossiter C, Skuric Z, Zuskin E [1989]. Early detection of health hazards due to asbestos exposure, final report.
GRANT NO: PL-480-02-009-3. 47 pp.
NTIS NO: PB89-215669 \$21.50

Zhang Y, Lee T, Guillemin B, Yu M, Rom W [1993]. Enhanced IL-1beta and tumor necrosis factor-alpha release and messenger RNA expression in macrophages from idiopathic pulmonary fibrosis or after asbestos exposure. *Journal of Immunology* 150(9):4188-4196.
CA NO: U60/CCU-206153

2. CONTRACT REPORTS

Contract reports are generated primarily from a contractual agreement between NIOSH and a non-governmental organization. They typically describe scientific research conducted by that organization for NIOSH.

Chen C, Katt R, Kent M, Hamrick M, Perry W, Smith D, Spooner C, Moore E [1983]. Technological feasibility of controlling asbestos and silica at mines and mills, final report, volumes 1 and 2.
CONTRACT NO: 210-81-4104. 299 pp. (Vol. 1), 248 pp. (Vol. 2)
NTIS NO: PB83-244343 (Vol. 1) \$49.00
NTIS NO: PB83-244350 (Vol. 2) \$44.00

Cooper W, Black R, Pependorf W, Gaffey W [1975]. Study of sheet metal workers, final report.
CONTRACT NO: 099-71-0055. 41 pp.
NTIS NO: PB83-101220 \$21.50

Kaplan S, Gaffey W [1981]. Miners exposed to amphibole mineral, a retrospective cohort mortality study.
CONTRACT NO: 210-76-0200. 50 pp.
NTIS NO: PB87-163754 \$21.50

Nicholson W, Daum S, Lorimer W, Velez H, Lillis R, Selikoff I, Miller A, Anderson H, Fischbein S, Holstein E, Rom W, Rosenman K, Todaro J, Cheng W, Li V, Tarr D [1982]. Investigation of health hazards in brake lining repair and maintenance workers occupationally exposed to asbestos.
CONTRACT NO: 210-77-0119. 130 pp.
NTIS NO: PB83-220897 \$31.00

Polakoff P [1980]. Bay area asbestos surveillance project (BAASP), final report.
CONTRACT NO: 210-78-0113. 68 pp.
NTIS NO: PB87-105466 \$21.50

Sunderman F [1975]. Electromotive interactions of metals in asbestos carcinogenicity.
CONTRACT NO: 099-72-0024. 46 pp.
NTIS NO: PB82-152943 \$21.50

Wertheimer A, Trainer M [1979]. Development of an automated fiber counting instrument.
CONTRACT NO: 210-77-0067. 45 pp.
NTIS NO: PB83-113142 \$21.50

Whisnant R [1975]. Evaluation of image analysis equipment applied to asbestos fiber counting.
CONTRACT NO: 210-75-0080. 57 pp.
NTIS NO: PB83-109702 \$21.50

Wingert K [1973]. Asbestos - beryllium study, final report.
CONTRACT NO: 099-71-0017. 7 pp.
NTIS NO: PB82-230988 \$10.00