Wall Street Journal
February 18, 1987

Widening Horizons

Lawyers Lead Hunt For New Groups Of Asbestos Victims

With Offers of Free X-Rays, Attorneys Solicit Seamen, Tire Workers and Others

Just Chasing Ambulances?

By BILL RICHARDS and BARRY MEIER
Staff Reporters of THE WALL STREET JOURNAL

Among the bills and throwaways stuffed in his mailbox one day last June, Joseph Abela found a letter about asbestos. "You may be in danger of death," it warned.

Mr. Abela, a 60-year-old former merchant seaman in Detroit, says the idea of dying from asbestos poisoning hadn't crossed his mind up to then. Nor had the prospect—also prominently mentioned in the letter—of a damage award "in the six- to seven-figure range." Following the letter's instructions, Mr. Abela joined other veteran seamen at a local medical clinic for free chest examinations. Within weeks, the clinic informed him his lungs showed asbestos damage.

"It was a big word they used to say what I got," Mr. Abela says, struggling to pronounce "asbestosis," a disease that can disable and kill. In any event, he adds, "They told me my case is in the hands of the lawyers now."

In fact, Mr. Abela's recruitment into the ranks of asbestos litigants was engineered from the start by lawyers, not doctors. His case and thousands of similar lawsuits filed recently mark what legal and medical experts say is a major shift in product-liability tactics.

'New-Product Development'

For the first time, lawyers are replacing research scientists at the head of the hunt for new asbestos victims. With tactics ranging from dragnet medical screenings to direct-mail solicitations, they are sweeping new groups of workers and companies into the asbestos fray and swamping court dockets, just as the 10-year flood of asbestos litigation seemed to be ebbing.

"This is new-product development for asbestos litigators," says Calvert Crary, a litigation analyst for Bear, Stearns & Co. With asbestos court awards and settlements averaging around $70,000, Mr. Crary says, asbestos lawyers "are naturally looking to widen their sphere."

The lawyers say they hold out hope of treatment and legal redress to thousands of workers whose asbestos exposure has long been ignored by employers, government agencies and unions. But as the attorneys cross the line between law and medicine, their tactics are generating controversy as well as lawsuits. Critics say the screenings are nothing more than a sophisticated version of old-fashioned ambulance-chasing. Some medical experts also raise questions about the accuracy of the tests.

New Suits

Nevertheless, the tactics are having a broad impact. "There's no question we're concerned," says Floyd H. Knowlton, the vice president for casualty claims at Travelers Insurance Co. Mr. Knowlton says that until about six months ago, most of Travelers' asbestos claims came from shipyard workers who had worked directly with asbestos. "Now," he says, "they're coming from all over."

Two West Coast lawyers, for example, started a screening program last year that dispatched three rented vans equipped with mobile X-ray units to test tire workers at 72 union locals around the U.S. The result: nearly 1,000 new asbestos lawsuits with thousands more being readied. In another instance, lawyers were posted at a Seattle clinic where sheet-metal workers were being screened for asbestos problems. Unions representing steelworkers, machinists and school janitors are setting up similar screening programs.

Asbestos hazards, of course, have been known for decades. In the late 1920s, British researchers blamed the fibrous mineral for lung cancers and other respiratory diseases among textile workers who wove asbestos and inhaled its dust. Asbestos is now considered the leading cause of workplace-related cancer deaths, says William Nicholson, an epidemiologist at Mount Sinai School of Medicine in New York. And despite recent regulatory action sharply limiting asbestos use, the AFL-CIO estimates 2.5 million U.S. workers are still exposed to the deadly material.

Spotty Epidemiology

Yet much of the asbestos epidemiology—the scientific effort to identify groups at risk—has been spotty. Medical investigators have aimed their efforts at presumed high-risk workers—those who fabricated asbestos or installed it as insulation in ships and buildings. Most of the some 40,000 workers who have filed asbestos claims to date have been members of those groups.

"In the past, a researcher might decide to study a certain occupational group or a guy in that group might decide to go see his local doctor," says Edward J. Carlough, the head of the Sheet Metal Workers International Association, which recently hired a South Carolina law firm to direct asbestos screenings for 33,000 sheet-metal workers. "If the doctor was trained to spot asbestos problems, the worker might end up going to his lawyer."

The lawyers' new tactics seek to shorten that process. For example, Mr. Abela and other merchant seamen are now being tested by the Maritime Asbestos Le-

Please Turn to Page 21, Column 1

Widening Horizons: Lawyers Seek New Groups of Asbestos Victims

Continued From First Page

gal Clinic, run by Detroit-based maritime lawyer Leonard Jaques. Mr. Jaques believes the sailors face special risks because they spend weeks at a time cooped up on ships filled with asbestos insulation.

Since September, Mr. Jaques has filed asbestos claims on behalf of more than 1,500 seamen in federal district court in Cleveland—three times the number of asbestos cases filed in that court in the past three years. He plans to test 20,000 more seamen for asbestos damage.

Gordon Stemple, a Los Angeles-based plaintiffs' lawyer, stumbled on asbestos problems among tire workers in 1985. He says he was looking into allegations of chemical contamination of groundwater around a former Firestone Tire & Rubber Co. plant in Salinas, Calif., at the time. Tire making hadn't previously been linked to asbestos, but X-rays of former tire workers who lived near the plant showed 54 of 84 workers had asbestos-like lung damage, Mr. Stemple says.

The lawyer believes the problem stemmed from industrial talc, a floury material used to make tires. Some talcs contain tremolite and anthophyllite, two fibrous minerals that can cause lung damage similar to asbestos.

X-rays for Tire Workers

Mr. Stemple quickly sent vans offering free chest X-rays to tire-worker union halls in 25 states. Should a worker's X-ray indicate lung damage, the lawyer urges him to sue. If workers use another lawyer, Mr. Stemple charges them $250 for the test. Most choose Mr. Stemple.

Richard L. Brown, a 41-year-old tire worker, was examined last June, after Mr. Stemple's van set up shop opposite Firestone's tire plant in Des Moines, Iowa. Technicians X-rayed Mr. Brown's chest from three directions and checked his lung capacity during the 30-minute exam. The test results came back four months later. Mr. Brown's wife, Sharon, opened the envelope. The diagnosis: asbestosis.

"She was really shook up," recalls Mr. Brown, who is also a local union president. "She kept saying, 'How come you never told me working in the plant was dangerous

What's more, at the behest of some shipowners, the U.S. Coast Guard recently asked legal-ethics boards in the District of Columbia, Michigan and Pennsylvania to investigate the lawyers' links to direct-mail solicitations of seamen. Many letters feature an appeal from a retired Coast Guard admiral for seamen to seek free X-rays and legal help but don't mention Mr. Jaques's involvement. The Coast Guard regulates merchant shipping. The ethics boards declined to comment.

Maritime-union officials, meanwhile, complain that Mr. Jaques's mailings are laced with questionable claims. One letter, for example, attributes the 1980 cancer death of actor Steve McQueen to asbestos. Mr. McQueen was a merchant seaman for several years prior to his Hollywood career. "We know what happened to Steve is happening to seamen of all waters," the letter warns. Although Mr. McQueen's relatives blamed asbestos for the actor's death, doctors said cigarette smoking and chemical exposure may have also played a role.

Mr. Jaques makes no apologies. He says his tactics are designed to counter efforts by shipowners and others to undermine his work. "We're trying to ring a warning bell to seamen and we're going to ring it as loud as possible," he says.

Indeed, one of Mr. Jaques's allies is Irving Selikoff, a world-renowned researcher who first linked asbestos to lung cancer among U.S. workers. Recent research by Dr. Selikoff, financed by Mr. Jaques, found signs of asbestos-related disease in about 35% of some 2,300 former U.S. seamen tested.

Ethical Questions

Yet several attorneys, after reviewing Mr. Jaques's mailings, say the lawyer's enthusiasm may be carrying him overboard. In particular, they say, Mr. Jaques, by offering asbestos claimants visions of "six- to seven-figure" awards, might be violating the American Bar Association's model code of ethics, which bars lawyers from, among other things, creating "unjustified expectations about the results a lawyer can achieve." Mr. Jaques rejects any suggestion of impropriety and maintains that large awards have been granted to as-

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cut from paper

February 24, 1970

Mr. H. J. Tibbits, President
Spokane National Mines, Inc.
424 Hutton Building
Spokane, Washington 99204

Dear Mr. Tibbits:

We are pleased to send you ten copies of our March 1965 ORE BIN article on "Oregon's Asbestos Potential". We are also sending you a copy of our October 1963 ORE BIN entitled "Coast Asbestos Company Operations, Grant County, Oregon".

We are most interested in your experiments with serpentine or asbestos as a coating on wood and I hope that you will visit our office if you are down this way. I would particularly like to have you meet Mr. Len Ramp in our Grants Pass field office if you have the opportunity sometime later this spring.

If you have any further questions, please feel free to write me here in Portland or Mr. Len Ramp in Grants Pass. His address is P.O. Box 417.

Sincerely yours,

Raymond E. Corcoran
State Geologist

REC:jr
Encl.
cc Len Ramp

SPOKANE NATIONAL MINES, INC.
424 HUTTON BUILDING
SPOKANE, WASHINGTON 99204

February 18, 1970

Oregon Department of Geology and Mineral Industries
Capital Building
Salem, Oregon

Gentlemen:

Please send us 10 copies of Ore Bin Volume 27, No. 3, March, 1965, "Oregons Asbestos Potential". We would appreciate two copies each of any other bulletins or reports on Oregon's Asbestos deposits.

We are experimenting with a coating using serpentine, and therefore short fibre is most desirable. We are particularly interested in deposits in the Grants Pass and Roseburg areas.

Any help you can give us on the potential minable, tonnages will be greatly appreciated.

Very Truly Yours,

SPOKANE NATIONAL MINES, INC.

H.J. Tibbits, President

HJT/lm

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STATE DEPT. OF GEOLOGY & MINERAL INDUS.

State Department of Geology and Mineral Industries

702 Woodlark Building
Portland, Oregon

Hellgate Claims

Economics and remarks: This occurrence of asbestos is too limited to be of any commercial interest, however the area appears to have some merit. A careful check of the serpentine-metavolcanic contacts here undoubtedly would disclose additional asbestos occurrences and conceivably might turn up something of commercial interest.

CONFIDENTIAL

Oregonian 1/8/91

Bankruptcy filing delays asbestos settlements

☐ Eagle-Picher Industries of Cincinnati faces 70,000 personal injury claims

By JOE McDONALD
The Associated Press

CINCINNATI — Eagle-Picher Industries Inc. filed for bankruptcy court protection from creditors Monday, shattering hopes for the first comprehensive nationwide settlement of asbestos disease lawsuits against a company.

Eagle-Picher, which was trying to resolve more than 70,000 personal injury claims in a New York court, said it had to file for reorganization after a deal collapsed to sell a unit to finance asbestos payments.

Eagle-Picher, which makes batteries, auto parts and other industrial products, has spent about $540 million to settle 65,000 asbestos claims. The lawsuits stem from exposure to an asbestos-based pipe sealant the company made from 1934 to 1971.

Asbestos is blamed for causing lung cancer and other severe and often fatal respiratory ailments. The mineral was used widely in construction and other industries for decades, and thousands of new claims are still filed annually.

Asbestos claims against Eagle-Picher, including $45 million for cases already settled, are suspended during the reorganization. Spokesman J. Rodman Nall said the company could remain under court protection for two to six years. The company said asbestos claimants probably would be treated like other creditors in a reorganization. Lawyers for victims estimated that the payout could exceed $1 billion over 20 years.

The Chapter 11 filing quashes the most advanced bid to date to create a universal method of resolving lawsuits by American workers and their families against companies that made products containing asbestos.

U.S. District Judge Jack B. Weinstein last month consolidated all claims against Eagle-Picher in a class action and scheduled hearings on a plan to pay at least $505 million.

Employment records reveal the detail of asbestos danger

Ian Anderson, Melbourne

ABOUT A QUARTER of the people who worked in an asbestos mine in Western Australia between 1943 and the closure of the pit in 1966 are already suffering from diseases related to their exposure to the mineral, or may do in the future. This is the estimate of researchers who say that the mine's employment records have enabled them to carry out one of the most thorough studies ever of the long-term health effects of exposure to asbestos fibre.

The team, based at the University of Western Australia and the Sir Charles Gairdner Hospital in Perth, says that its is the only study in which a well defined group of people has been exposed to a single form of asbestos over a specified period.

Of the 6502 men and 410 women who worked at the mine, almost 2000 have developed or will develop cancer and other diseases related to asbestos. The Asbestos Diseases Society of Australia, a group formed to help people exposed to asbestos, claims that 300 former workers have already died of diseases that are asbestos-related.

The people, mostly migrant labourers from Europe, worked in an asbestos mine and mill at Wittenoom, a town in the Hamersley Range, about 1600 kilometres north of Perth. Wittenoom, once the home for 4000 people, is now virtually deserted. The state government cut essential services to the town last year. Blue asbestos, or crocidolite, was mined there.

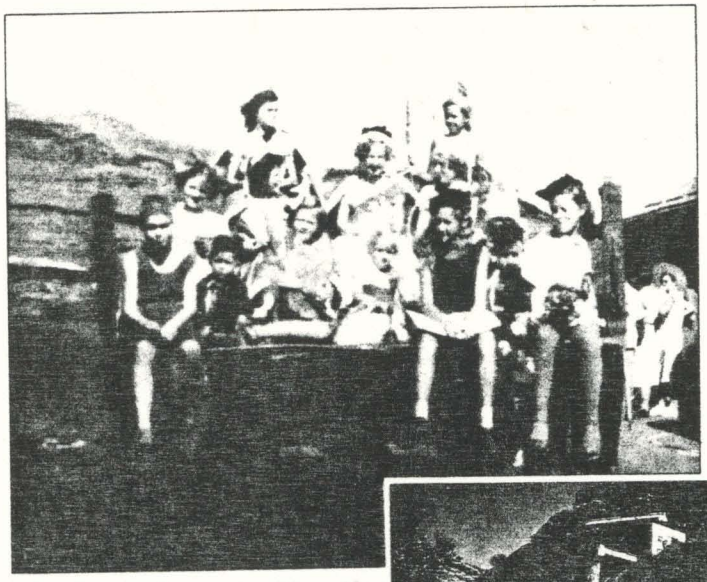
The researchers were able to determine how much asbestos the workers were exposed to by making calculations based on readings of dust that were taken at various times during the mine's operation. The most extensive exposure to asbestos occurred in the mill where ore was ground down and the fibre extracted.

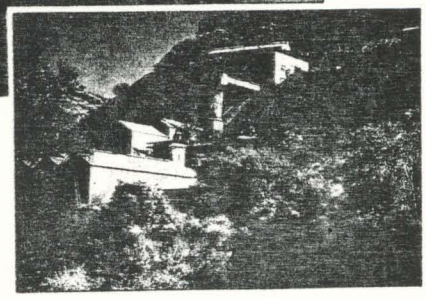
The Australian study was published last month in the *Medical Journal of Australia*. Other records of exposure to blue asbestos—such as those from South Africa—have not been as useful to researchers as the data from Wittenoom, says William Musk, from the University of Western Australia.

Blue asbestos fibres are very thin, straight and small—about 0·1 micrometres in diameter. As a result, they are more likely to enter the lungs than other types of asbestos fibres. They are also the least likely to adhere to and be intercepted by the protective mucus in the airways.

Scientists have associated the fibres mined at Wittenoom with three types of disease: malignant mesothelioma, lung cancer and asbestosis, a scarring of the lung. Most of the workers were at the mine for only short periods—months, rather than years. The diseases may take up to 40 years to develop.

The records until 1986 show 94 cases of mesothelioma, 141 lung cancers, and 356 cases of asbestosis among the Wittenoom workers. In the general population, mesothelioma, a cancer of the outer covering of the lung, is rare, occurring at the rate of less than one per million people each year. The scientists say that exposure to asbestos can account for about 40 per cent of the cases of lung cancer at Wittenoom; the remainder were caused by the effects of smoking.





L. C. Pillar

Above: six of these 13 miners' children have died of asbestos-related diseases since this picture was taken 40 years ago
Right: Wittenoom mine

Over the next 30 years, there will be a sevenfold increase in the number of cases of mesothelioma, according to the researchers' estimates. There will be as many as 25 cases of the disease a year by the year 2010. The team predicts that between 1987 and 2020, a total of 692 new cases of mesothelioma will occur. Most will be in the lung (pleural mesothelioma), but some will be in the abdomen (peritoneal mesothelioma). Cases of lung cancer and asbestosis among the workers will reach a peak by about 2000, with a total of 183 and 482 respectively by the year 2020.

The Asbestos Diseases Society claims that the problem will not be confined to the former workers. About 6000 of the 14 000 wives and children of workers at Wittenoom will also suffer from asbestos-related disease, according to the society. "Forty-one people in their late 30s or 40s who were children at Wittenoom have died of mesothelioma," according to Robert Vojakovic, the president of the society. He obtained the statistics from death certificates. The university study only examined the records of workers.

Last year, after a legal battle lasting 13 years, CSR, the mining company whose subsidiary, Australian Blue Asbestos, operated the plant, agreed in an out-of-court settlement to pay compensation to former miners and residents of Wittenoom. By 5 December, 350 people and their families had received compensation totalling A$42 million. The State Government Insurance Commission will share the costs of compensation based on exposure to asbestos at Wittenoom after 1959. The payments, part of the largest industrial settlement in Australian history, will range in size between A$30 000 and A$600 000.

However, Western Australia has another problem. The red gorges within the Hamersley Range, including the Wittenoom Gorge, have become a tourist attraction. The millions of tonnes of asbestos tailings that still litter the area are regarded as a health hazard, especially to children who might be tempted to play on the piles. Camping is forbidden in the Wittenoom Gorge.

The state government is considering burying the tailings or putting them under water. Both solutions will be expensive. The asbestos society is trying to obtain funds from Lang Hancock, the mining magnate who opened the mine in the late 1930s, and CSR, to help restore Wittenoom Gorge, which it says could be made into a major tourist attraction. It also wants the town to be relocated within the gorge. □

New AIDS drug to go on trial in Britain

PEOPLE with AIDS who can no longer tolerate zidovudine, the only drug licensed in Britain for the treatment of this disease, may soon be able to try another drug instead. The Medical Research Council is trying to set up a large trial to test the effectiveness of a relative of zidovudine, called dideoxyinosine, or DDI.

Geoffrey Schild, director of the MRC's directed programme on AIDS, says the details of the trial are not yet finalised. He hopes that European doctors and patients will also take part.

Anthony Pinching, reader in clinical immunology at St Mary's Hospital in Paddington, west London, says up to 40 per cent of patients who have been taking zidovudine for as long as 18 months suffer either anaemia or damage to muscles severe enough for them to stop taking the drug.

Apart from offering DDI to patients who cannot tolerate zidovudine, doctors may be able to use it to help other patients, such as those who have been taking zidovudine for some time but who believe it is no longer working. Doctors may also offer patients who are beginning to fall ill with AIDS a choice of either DDI or zidovudine, allowing comparison of the two groups.

DDI, like zidovudine, inhibits the viral enzyme reverse transcriptase, without which HIV cannot replicate itself. □

ASBESTOS

Take it out or leave it alone?

Debate rages over dangers of in-place asbestos and what should be done about it

By JOSEPH HOOPER

Irving J. Selikoff is America's most prominent researcher in the field of asbestos disease.

In the 1960s, he and his colleagues at Mount Sinai Medical School in New York City documented asbestos-related lung disease and cancer among industrial workers.

Their findings prompted the Occupational Safety and Health Administration to impose regulations in the '70s limiting worker exposure to asbestos fiber; in the '80s the Environmental Protection Agency banned asbestos production altogether.

Today Selikoff, 75, former director of Mount Sinai's Environmental and Occupational Health Division, continues the research that has taken him to most of America's industrial regions, searching out workers who have been exposed to asbestos and analyzing what now must number hundreds of thousands of chest X-rays. He is a detective of sorts, following a trail of industrial mortality.

Selikoff says: "There is no issue, no debate about asbestos."

If only it were so.

A fierce controversy has gathered around the question of "in-place" asbestos — the millions of tons of asbestos pipe insulation, fireproofing, floor and ceiling tiles and acoustical plaster that lie embedded in 733,000, or one-fifth, of America's public and commercial buildings.

For most of the last decade the work of Selikoff and his colleagues pointed to a seemingly unassailable conclusion: Asbestos, a tragedy for industrial workers, also posed a grave threat to the general public.

But in the last year and a half, the old certainties have gone out the window. In June 1989, The New England Journal of Medicine published a comprehensive review of recent asbestos research, including a number of Canadian and European studies from the past five years that challenge the conventional thinking about asbestos.

The studies undercut the argument that chrysotile asbestos, which accounts for more than 90 percent of all the U.S. asbestos, is a potent environmental carcinogen. Seven months later a similar article appeared in Science.

The principal author of both articles was Dr. Brooke T. Mossman, 43, a research pathologist at the University of Vermont. She and four co-authors argued that the health threat posed by in-place chrysotile asbestos has been grossly overstated.

They argued that the usual solution — ripping and scraping the asbestos out — is probably more dangerous than the problem itself.

Asbestos fibers are harmless unless breathed; even good removal jobs temporarily raise fiber levels in the air, placing removal workers and, to a lesser extent, building occupants at risk.

Asbestos fibers are harmless unless breathed; even good removal jobs temporarily raise fiber levels in the air, placing removal workers and, to a lesser extent, building occupants at risk.

Mainstream publications found Mossman's revisionist theory irresistible. Spin-off articles appeared in magazines as diverse as Forbes and Reader's Digest.

In a kind of trickle-down effect, the scholarship eventually reached The National Examiner, a supermarket tabloid, which announced its interpretation of the findings in a screaming headline: "After spending billions taking it out of our schools, experts discover ... ASBESTOS IS SAFE!"

Asbestos is not safe. But not all types, it now appears, are equally unsafe. And yet this distinction might not have been front-page news except for the money involved. Far-reaching federal legislation enacted over the past 20 years has stimulated an asbestos-removal industry with annual revenues of about $3 billion — even though, according to Mossman, "we have no proof that removing asbestos ever saved a life."

The public now has good reason to be confused. Does a single asbestos fiber floating in the basement air mean cancer 20 years down the road — and a $30,000 abatement job next week? Or does it pose less of a threat than cigarette smoke drifting over from the next table?

Government officials are also perplexed. Will tough inspection laws protect the public or simply make matters worse by promoting unnecessary removals?

Joseph Hooper has written on public health for "7 Days" and "Inc." as well as the New York Times Magazine, from which this article was excerpted.

Oregonian file photo

At the mention of the Mossman articles Selikoff looked both hurt and accusatory. "Do you have the right to decide how much risk someone else should be exposed to?" he asked sharply. The notion is that perhaps society cannot afford to guarantee complete safety for everybody.

"Then say it!" Selikoff exploded. "Don't say to those who are exposed to asbestos, 'You are going to be safe.' Say, 'I can't help you because I don't have the money.' "

Asbestos commonly refers to six distinct types of silicate minerals, one of which, chrysotile, belongs to the serpentine family, meaning its fibers are curly and pliable; the others, known as amphiboles, all have needlelike fibers.

Epidemiological studies, notably those of Selikoff, had established by the 1960s that certain groups of workers — asbestos textile weavers, pipe insulators, shipyard workers — were suffering unusually high rates of cancers. They usually contracted lung cancer or mesothelioma, a cancer of the lining of the lung or the abdominal cavity that was virtually unknown before the turn of the century.

In the 1970s and '80s, the government took action to control the use of asbestos through OSHA and the EPA. The new regulations were not an issue. Industry bore the cost, and most people regarded the measures as humane and overdue.

The seeds of the current turmoil were planted when Mount Sinai scientists decided the evidence warranted an assault on the asbestos already in place.

In the early 1980s, Selikoff testified several times before a congressional subcommittee that in-place asbestos posed an intolerable health threat to the nation's 15 million schoolchildren.

Gregory Lawler, then the subcommittee's chief counsel, recalled: "Half the experts said we needed to do something, half said we didn't."

Does a single asbestos fiber floating in the basement air mean cancer 20 years down the road — and a $30,000 abatement job next week? Or does it pose less of a threat than cigarette smoke drifting over from the next table?

With expert opinion split, Selikoff and Mount Sinai carried the day: In 1986 the Asbestos Hazard Emergency Response Act was passed with only token opposition. The government directed the EPA to compel every school district in the country to inspect for asbestos and, if any was found in deteriorating condition, to draw up plans for remedying the situation.

But the remedy may be shown to be prohibitively expensive. Based on the initial burst of removals, the National School Boards Association has estimated it will cost $6 billion to carry out the full asbestos act program.

In the meantime, critics complain the EPA left school districts to the mercy of hired consultants. All too often the result has been unnecessary removals. Consequently, the EPA is now reviewing the entire program.

Even its staunchest advocates will admit that the asbestos act has had problems, but they contend that doing nothing would result in hundreds, perhaps thousands, of future cancer cases — specifically mesothelioma, a fatal tumor that can crush the lungs or push its way out of the torso like some gruesome cinematic special effect.

In 1960, mesothelioma was killing an estimated two dozen Americans every year; by the '80s the figure was 1,000 to 3,000 (the estimates vary, because the disease is difficult to diagnose). Some experts were predicting mesothelioma would overtake lung cancer as a mass killer by the end of the century.

But so far it hasn't happened.

Rates have risen almost exclusively among older men who suffered occupational exposure to asbestos in the days before regulation. But among women, whose asbestos exposure has primarily been environmental, the mesothelioma rate has been flat for the past 20 years. The cancer remains, relatively speaking, rare.

Mossman and her colleagues say they think they know why: Recent European studies have convinced them chrysotile is not very good at causing mesothelioma, even at the highest industrial concentrations. The lungs wash the fibers out before they can cause serious harm.

Only the amphiboles, they say, have been shown to be so highly carcinogenic that we need to worry about them at low-level, environmental concentrations.

Most public-health advocates object to the Mossman articles not because they find the arguments unreasonable, but out of fear they will be used as an excuse to ignore the problem of in-place asbestos. They often use the term "human experimentation" to describe a policy of doing nothing.

In truth, there are several choices that fall between doing nothing and decreeing a national emergency.

Ten months before Congress passed the Asbestos Hazard Emergency Response Act,

Please turn to ASBESTOS, Page B4

Asbestos: Article stirs up industry

■Continued from Page B1

New York City enacted the nation's most stringent asbestos regulation, Local Law 76, which mandated removal of asbestos from buildings facing renovation or demolition. Most experts would agree these abatements are justified — releasing great clouds of asbestos dust during a demolition is no one's idea of public health.

Currently, the city is considering further legislation that would require an asbestos inspection for every building in the five boroughs. This is a dicier proposition because it envisions more inspections, which critics assume will trigger a host of removals, rarely the safest course.

The majority of industrial hygienists now believe most in-place asbestos can be maintained or encapsulated in a bonding material or enclosed in an airtight chamber, so that fibers do not reach the air.

But building owners generally opt for removal anyway to defend themselves from lawsuits or to shore up the market value of their property.

In her two articles, Mossman was less interested in sorting out the policy options than in exposing the absurdity of spending billions on removal.

She argues the nation would get more bang for its public-health buck if it concentrated on such health risks as the passive inhalation of cigarette smoke, which by some estimates is 200 to 400 times more lethal than low-level asbestos exposure.

If the Mossman articles enraged the scientists at Mount Sinai, they did not go down well, either, with the people and companies who make their living from asbestos.

The abatement companies felt threatened, but no more so than plaintiff attorneys who represent injured workers and building owners in lawsuits against former asbestos manufacturers.

Last February, addressing a legal seminar, Selikoff played hardball, casting doubt on the integrity of Mossman and her colleagues. "You should know," he said, "that most of them have been involved with the asbestos manufacturers as medical advisers or consultants or in some similar capacity."

'Industry apologists'

The same month Selikoff's successor at Mount Sinai, Dr. Philip Landrigan, gave a speech at the New York Academy of Sciences that referred to "industry apologists" and "a very highly orchestrated campaign of what the spies would call disinformation."

Given the history of U.S. asbestos manufacturing, terms such as "industry consultant" and "apologist" suggest, however loosely, behavior that borders on the criminal.

It was scientists sponsored by the industry who, from the 1930s through the '50s, permitted the companies to suppress the results of asbestos experiments. At the Saranac Laboratories in upstate New York, 30 years' worth of industry-funded animal studies disappeared from any scientific or corporate record.

studies disappeared from the
corporate record.

In fact, only two of the five authors of the offending articles have any significant connection to the asbestos industry. Dr. Bernard Gee, a professor of medicine at Yale University, and Morton Corn, currently director of the Division of Environmental Health Engineering at Johns Hopkins University, have appeared as paid witnesses in asbestos trials, usually for the defense, but sometimes for the plaintiff.

This sideline is not unusual in asbestos-research circles, although some scientists stay out of the courtroom to avoid any appearance of compromising their objectivity.

For the record, Mossman, who has made her reputation with a steady flow of highly regarded papers on toxicology, has lectured to lawyers on both sides; she has also done some consulting on the toxicology of man-made fibers for two former asbestos manufacturers.

Mossman sounds genuinely bewildered that her motives should be impugned. "When I came into this field 15 years ago, Selikoff was like God," she said. "Now my whole perception has changed. I am in an adversary position, and I don't have the political savvy of a Selikoff."

Science has always been subject to differing interpretations of data; moreover, emotional conviction, ego and turf war are not unknown to it.

But today it is no longer useful or accurate to divide asbestos researchers into saviors of labor or lackeys of industry. What is needed is a scientific consensus that would provide a blueprint for the asbestos policy of the future.

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NASPD warned about steel pipe containing asbestos

But risks can be minimized through careful inspection: expert

By JAMES G. REGAN

HOUSTON—Dealing in used steel pipe that contains asbestos can prove costly—and even fatal—and distributors should avoid pipe that contains as little as 1 percent of the deadly substance to safeguard themselves.

This warning was delivered to members of the National Association of Steel Pipe Distributors, many of whom regularly purchase used pipe for resale.

Lamar Kelly, an expert on asbestos in the workplace, told distributors meeting here that risks of liability and exposure can be minimized through careful inspection. A certain degree of risk remains for businesses that continue to stock used pipe, he said.

"You are not playing with something you can just shut your eyes to," he said.

Besides the health risks associated with asbestos, which has been strongly linked to lung cancer and other diseases, careless handling of products that contain asbestos can result in stiff fines or even criminal charges, Kelly said.

Fines can run as high as $25,000 for a first offense and $100,000 for a second offense.

Moreover, violators face misdemeanor and felony charges that could send them to prison.

With many local, state and federal regulations concerning handling of asbestos already on the books, Kelly said that most pipe distributors are included in the first of a three-phase program under way to ban the substance from the workplace in the next decade.

"Any material that is coated on pipe that has 1 percent of asbestos is considered a regulated item by federal authorities," he explained.

Kelly said the following steps should be considered when dealing with asbestos:

- Identify all insulation. Assume insulation that can't be identified contains asbestos.
- Use only licensed and qualified asbestos abatement companies.
- Asbestos is owned from the "cradle to the grave." Don't think it can be passed on and forgotten.
- Initiate proper training programs for employees who might come in contact with asbestos.

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DEPT OF GEOLOGY
& MIN. INDUS.

ROBERT W. STRAUB
GOVERNOR

Department of Geology and Mineral Industries
ADMINISTRATIVE OFFICE
1069 STATE OFFICE BLDG., PORTLAND, OREGON 97201 PHONE (503) 229-5580

NEWS RELEASE

Contact: Jerry Gray
1129 S. E. Santiam Road
Albany, Oregon 97321
Phone: (503) 967-2039

FOR RELEASE: WEEK OF NOVEMBER 13, 1978

ASBESTIFORM MINERAL INVENTORY RELEASED

The Oregon Department of Geology and Mineral Industries has prepared an Open File Report O-78-5, entitled "Reconnaissance Study of Oregon's Stone Quarries and Asbestiform Mineral Occurrences Within Ten Miles of Serpentinite." Price for the 40-page environmental report is $2.50.

In the eastern part of the nation, serpentinite containing asbestiform minerals has been quarried for road surfacing. Airborne asbestiform minerals may constitute a health hazard. Therefore, as part of a nationwide study, the Department of Geology and Mineral Industries was requested and financed by the U. S. Environmental Protection Agency to make an office survey of Oregon's stone quarries within 10 miles of serpentinite.

Department data, published and unpublished, shows that 650 known mining sites lie within 10 miles of serpentinite. In the report the sites are plotted on two maps, northeast Oregon and southwest Oregon. These are the only two sections of Oregon that have known serpentinite.

The sites are also listed in a table showing location, identifying number, rock type and status. A total of 507 sites out of the total of 650 are in rock types where asbestiform minerals would be very unlikely

(more)

to be found. A total of 24 sites are in rock types for which there is a good chance that asbestiform minerals may be found. A total of 29 more sites are in rock types which may possibly contain asbestiform minerals. Asbestiform minerals are reported from 12 sites.

No sites were field checked, also the data base, geology maps, mined land reclamation records, and other sources, are more complete for some counties than for others.

ROBERT W. STRAUB
GOVERNOR

Department of Geology and Mineral Industries
ADMINISTRATIVE OFFICE
1069 STATE OFFICE BLDG., PORTLAND, OREGON 97201 PHONE (503) 229-5580

October 18, 1977

Mr. Don R. Goodwin, Director
Emission Standards and Engineering Division
U.S. Environmental Protection Agency
Research Triangle Park, North Carolina 27711

Dear Mr. Goodwin:

Thank you for your letter of October 13, 1977, regarding asbestos emissions and serpentinite, quarries.

Procedures for locating potential serpentinite crushed stone operations as outlined appear adequate for developing general conclusions. They are inadequate for comprehensive sampling owing to the possibilities of errors and oversights in small-scale base maps and data bases.

We have no comment on the validity and viability of the dust and rock sampling methodology and suggest you contact:

Olav Merilo
Occupational Health Laboratory
1073 State Office Building
Portland, Oregon 97201

To my immediate knowledge there are no quarries in serpentinite in the State operating at the present time, although several blueschist quarries are in existence.

Future issues which may arise include:

(1) Field assessment of quarries identified as serpentinite in the small-scale evaluation.

(2) Inventorying of quarries not tabulated in BOM records.

(3) Sampling.

We are available to perform these services on a contract basis.

Sincerely,

John D. Beaulieu

John D. Beaulieu
Deputy State Geologist

JDB:lk

12/9/77

ROBERT W. STRAUB
GOVERNOR

Department of Geology and Mineral Industries
ADMINISTRATIVE OFFICE
1069 STATE OFFICE BLDG., PORTLAND, OREGON 97201 PHONE (503) 229-5580

December 5, 1977

Mr. Don R. Goodwin, Director
Emission Standards and Engineering Division
U.S. Environmental Protection Agency
Research Triangle Park, North Carolina 27711

Dear Mr. Goodwin:

Thank you for your previous correspondence regarding asbestos emissions and serpentinite quarries.

In an earlier response to your office (October 18, 1977) we provided general answers to some of your questions and indicated briefly that we are available for contract services regarding the inventorying of serpentinite operations.

We are presently contracting with Josephine County (Oregon) to inventory the mineral resources of that county. For relatively low cost we can probably develop some of the serpentinite information needed by your agency. Josephine County is one of the serpentine-rich areas of the state.

Field work for the Josephine County study is scheduled for completion around January 1, 1979. After that date we will still be available to assist you on a jointly funded basis for a statewide inventory, but at relatively higher cost.

Sincerely,

John D. Beaulieu

John D. Beaulieu
Deputy State Geologist

JDB:lk

Washington letter

Supreme Court tackles inspection legality

The Supreme Court has begun hearings on the constitutionality of Federal agency inspections without warrants. The question was brought to light in the well-publicized incident in which a small Pocatello, Idaho, plumbing and heating contractor (with a faultless safety record, incidentally) barred entrance to an OSHA inspector. A panel of judges has called such warrantless searches unconstitutional. However, innumerable regulatory agencies at all levels make use of them, as spelled out in legislation. The Federal government has been joined by several states --with backing from the AFL-CIO and some environmentalist groups--in a counterattack based on the premises that privacy of the workplace does not exist, and that unannounced inspections are essential to uncover all hazards.

Transportation legislation--workable compromise?

The recent administration-proposed transportation legislation is somewhat more favorable to road-building interests than previous measures, although funding levels--reaching $8.23 billion in 1982--are lower than many had hoped for. The Highway Trust Fund would be extended for four years and pressures brought on states for Interstate system completion. Total funds suggested for 1979-82 amount to $14.9 billion for Interstate (including repair), $6.25 billion for primary systems, $3.3 billion for rural roads, $2.9 billion for urban roads, and $1.9 billion for bridges. Safety spending was allotted $2.05 billion, with $756 million designated miscellaneous. There are only minor fluctuations among the four fiscal years.

EPA proposes modified asbestos sampling approach

Accused by the National Crushed Stone Association and four besieged Maryland quarries of vagueness, imprecision, and illegal action in its proposals to sample quarry dust for asbestos fibers, the Environmental Protection Agency has modified its plans (see Newscope for September 1977, Washington Letter for November 1977). The agency now intends to geologically inspect all crushed stone operations within 10 miles of a serpentinite deposit. If asbestos is discovered, the quarry operator will be required to sample weekly an end-use product off the belt for 12 weeks. Laboratories selected by EPA to analyze the samples are to follow methodology prescribed by Illinois Institute of Technology Research Institute for transmission electron microscopy and selected area electron diffraction.

Jerry, this material came from Qui as per my request for full background data

ROUTING AND TRANSMITTAL SLIP		ACTION
1 TO (Name, office symbol or location) Mr. AUSMUS	INITIALS	CIRCULATE
	DATE	COORDINATION
2 Jerry	INITIALS	FILE
	DATE	INFORMATION
3 RECEIVED MAR 14 1978	INITIALS	NOTE AND RETURN
	DATE	PER CONVERSATION
4 DEPT OF GEOLOGY & MINERAL INDUS.	INITIALS	SEE ME
	DATE	SIGNATURE

REMARKS

Dear Sir

I have enclosed a copy of the letter we sent to State Geologist to inform them of our serpentinite project. This is essentially the same letter as the one we sent to Mr. Mason.

Also enclosed are two answers from your Department of Geology.

Yours sincerely

J.L. Vo Van Qui

Do NOT use this form as a RECORD of approvals, concurrences, disapprovals, clearances, and similar actions.

FROM (Name, office symbol or location)	DATE
J. L. Vo VAN QUI, ISB, OAQPS, EPA	3-7-78
Mail Drop 13, Research Triangle Park NC 27711	PHONE (919) 541 5295

OPTIONAL FORM 41
AUGUST 1967
GSA FPMR (41CFR) 100-11.206

GPO 043—16—81418-1 419-015 5041-101

The Environmental Protection Agency (EPA) is undertaking a study of the crushed stone industry to determine the extent to which quarrying operations are being conducted in the areas containing serpentinite rock deposits and to determine the asbestos content of the rock being quarried. This letter requests your comments on EPA's study plans and some specific information concerning the locations of serpentinite crushed stone operations.

Serpentinite rock from a quarry located in Rockville, Maryland, has been found to contain significant quantities of asbestos, and the use of unbound (without a coating or binding agent) crushed stone produced from this rock on roads has been shown to result in high concentrations of asbestos in the area near these roads. EPA has published in the Federal Register on Thursday, November 10, 1977, an Advance Notice of Proposed Rulemaking to request that all interested persons submit factual information concerning crushed stone produced from serpentinite rock, particularly information on its production, sale, and use in various applications; its asbestos content; and ambient air asbestos emissions resulting from its use in various applications. A copy of the Advance Notice is enclosed. It is expected that the requested information will assist EPA in determining whether to formulate any regulations.

EPA must develop a complete record of the assessment of the problem. Therefore, it is important that we include a written record of the assessment of the situation in your State, including negative as well as positive findings. The United States Bureau of Mines (BOM) has prepared maps of the quarry locations in each State on the East and West Coasts. Using the BOM maps and United States Geological Survey maps which show serpentinite rock locations, EPA will tabulate a list of quarries located with ten miles of serpentinite rock deposits. Your comments on using this procedure to

locate potential serpentinite crushed stone operations would be appreciated. Also, assessments you have already made or can make within the next three weeks would help assess the validity of our procedure and may avoid a redundant effort by the Agency. Your assessments may include quarry name and precise location, type of rock quarried, quarry inspection reports, petrographic analyses of the rock, and other information.

Enclosed is a draft outline of EPA's work plan for development of data needed for national emission standards under Section 112 of the Clean Air Act for asbestos emissions from the production of serpentinite crushed stone. We would particularly appreciate your comments on the validity and viability of the dust and rock sampling methodology (Section III of the enclosed work plan) for investigating suspect serpentinite crushed stone quarries.

We need your assessment and comments as soon as possible. We will send you the draft list of quarries located within ten miles of serpentinite rock deposits. However, the draft list will not be ready for two or three weeks because EPA must compare the Bureau of Mines quarry maps and the Geological Survey maps and compile the list. In the meantime, your comments and assessments may expedite our assessment. If you have any questions regarding this request or if you are unable to provide a response by December 16, 1977, please contact either Gilbert Wood or Michael Davenport of my staff at (919) 541-5301 or (919) 541-5295, respectively.

Thank you for your assistance.

Sincerely yours,

Don R. Goodwin
Director
Emission Standards and
Engineering Division

2 Enclosures

cc: Region IX
B. J. Steigerwald, OAQPS

OAQPS:ESED:ISB:SSS:GHWood:MDavenport:taa:rm763:NCMU:x5301:11/24/77

WORK PLAN FOR DEVELOPMENT OF

NATIONAL EMISSION STANDARDS FOR ASBESTOS

Production and Use of Crushed Stone: Serpentinite

I. Immediate Statements of Intent

A. Advanced Notice of Proposed Rulemaking - State intentions to gather data to determine if there is a national problem and to develop a standard if warranted. State that we support Maryland's efforts. Ask interested parties to submit data.

B. Letters to Governors - Apprise them of general and specific (serpentinite) problems. Indicate that we are studying serpentinite on first priority. Do not ask the Governors for anything other than assistance of State agency to visit quarries.

C. Letter to Department of Interior - State intentions to gather data and ask for assistance in obtaining data; e.g., United States Geological Survey (USGS), Mining Enforcement and Safety Administration (MESA), and Bureau of Mines (BOM).

II. Preliminary Identification of Quarries Containing Serpentinite

A. Battelle Incidental Sources Report - Indicates general trend of serpentinite belts: East Coast and West Coast.

B. United States Geological Survey maps - Indicate serpentinite deposits on East Coast (would like for USGS to assimilate maps for West Coast).

C. Quarry Locations

1. Bureau of Mines - preparing mylars from maps obtained from State crushed stone associations

2. State Crushed Stone Associations - obtain maps directly (will not have mylars)

3. Environmental Protection Agency - obtain longitude/latitude coordinates from computer print-out of crushed stone plants in National Emissions Data System (NEDS)

4. State Geologists - obtain maps from State Department of Natural and Economic Resources (DNER).

D. Identification of Suspect Quarries

1. Bureau of Mines mylars over United States Geological Survey maps

2. Estimate location from crushed stone association maps and compare with United States Geological Survey maps.

3. Use Environmental Protection Agency longitude/latitude coordinates to plot quarries on United States Geological Survey maps.

4. Use Department of Natural and Economic Resources maps to estimate quarry locations on United States Geological Survey maps.

E. Phase I, Screening of Suspect Quarries

1. State Geologists - telephone calls/visits to geologists to discuss previous inspections/samples/analyses.

2. State Air Pollution Control Agencies - telephone calls/visits to State agencies to discuss previous inspections/samples/analyses.

3. Mining Enforcement and Safety Administration - results of ongoing area sampling study not expected to significantly benefit the immediate project to investigate serpentinite rock quarries.

III. Development of Sampling Methodology

A. Sample Collection - EPA/Contractor with discussions with State agency - develop methodology for inspection of each suspect crushed stone plant (note general control status) and obtaining representative samples of quarry. The following general procedure is recommended:

1. Quarry settled dust samples - Using a container (plastic bottle, etc.), obtain two field samples of a specific, known volume (approximately 100 ml) of settled dust (inclusion of some rock chips is okay) each 100 feet along the benches in the quarry. Each field sample shall be of the same volume.

a. Label each sample with sample number, time and date of collection, name of collector, quarry name, location in quarry, and note any unusual circumstances. The location should be plotted on an approximate plan view of the quarry.

b. The first sample for all locations will be composited in order to obtain one sample representative of the entire circumference of the quarry. For convenience, the first sample may be composited as collected in the quarry.

c. The second sample for each location will remain separate to allow possible analysis of dust representing specific areas of the quarry.

2. Quarry Rock Samples - Obtain three loose rocks (approximately two or three-inch size) each 100 feet along the benches in the quarry (i.e., near the settled dust samples). If a different colored rock section exists between the 100-foot sampling points, collect a rock sample of that section also.

   a. Place each set of three rocks in a plastic bag and label each sample with sample number, time and date of collection, name of collector, quarry name, and location in quarry.

   b. Plot the sample location on an approximate plan view of the quarry.

3. Baghouse Catch - Obtain two samples (approximately 100 ml each) of dust from the collection hopper of the baghouse used to control emissions from the crushing or screening operations. If no baghouse is used, obtain two samples of the settled dust near the screens.

B. Sample Preparation - EPA/Contractor with discussions with State agencies - develop methodology for preparation of samples for subsequent analysis. The following general procedure is recommended:

1. Quarry settled dust samples

   a. First sample at each location in quarry - Combine the first sample at each location. Mix the sample to achieve a relatively good mixture. The sample may have to be ground if numerous rock chips are included. Use riffle splitters to prepare a 100 ml laboratory sample. Grind the 100 ml laboratory sample to minus 500 mesh. Draw and quarter the ground sample to prepare a 5 gram sample for subsequent asbestos analysis.

   b. Second sample at each location in quarry - Store for possible future use if first sample (composite) indicates asbestos. The results of petrographic analysis of the rock samples will indicate which dust samples should be analyzed.

2. Quarry Rock Samples - If analyses of the dust samples indicate the presence of asbestos, thin sections of the rock samples will be prepared for petrographic analyses to indicate rock types and, potentially, the presence of asbestos.

3. Baghouse Catch Samples - Prepare similar to quarry settled dust samples.

IV. Asbestos Analytical Method

A standard method for asbestos analysis by electron microscope is being prepared by the Illinois Institute of Technology's Research Institute (IITRI) for Dr. Jack Wagman, Environmental Sciences Research Laboratory (ESRL). Final comments have been sent to IITRI, and the final version of the method manual should be available immediately.

V. Determination of Asbestos in Quarries

A. Sample Collection - EPA/State agencies visit quarries as soon as possible after suspect quarries are identified.

B. Sample Preparation - Contractor

C. Sample Analysis - Contractor

D. Asbestos Content - Emission Standards and Engineering Division (ESED) will assess the results of the asbestos analyses to determine the range, mean, and median. It is expected that the results for some quarries will be extremely low and should not cause great concern although the results may not be zero.

VI. Collection of Data to Support Proposed Standard Regarding Future Use of Asbestos-Containing Crushed Stone

A. Complete analyses of samples in protocol. Compare values of higher potential sites.

B. Assist the Montgomery County Agency by analyzing some of the lower potential sites which Montgomery County is planning to begin sampling soon. Compare values to determine if some unbound uses of asbestos-containing stone are significant emission sources.

C. Conduct air quality monitoring system around unbound uses of crushed stone from two or three quarries other than Rockville Crushed Stone, Incorporated, in order to determine how the asbestos levels in the air are correlated to the asbestos content of the crushed stone. The use of crushed stone with lower asbestos content may not result in significant levels of asbestos in the air.

VII. Impact Studies

A. Cost of controls - Paving, etc.

B. Loss of business

C. Impacts on crushed stone plants, road construction, and State and county governments

VIII. Write Standards Support and Environmental Impact Statement (SSEIS)

50-01]

[40 CFR Part 61]

[FRL 788-2]

NATIONAL EMISSION STANDARDS FOR HAZARDOUS AIR POLLUTANTS

evelopment of Asbestos Standard for the Production and Use of Crushed Stone

GENCY: Environmental Protection gency.

CTION: Advance notice of proposed ulemaking.

UMARY: The Environmental Protecon Agency (EPA) is undertaking a tudy of the crushed stone industry to etermine the extent to which quarrying perations are being conducted in areas ontaining serpentinite rock deposits, to etermine the asbestos content of the ock being mined, and to determine hether the public is being exposed to sbestos from various uses of the rock. erpentinite rock from a quarry location n Rockville, Maryland, has been found o contain significant quantities of sbestos, and the use of unbound (without a coating or binding agent) crushed tone produced from this rock on crushed tone roads has been shown to result in igh concentrations of asbestos in the ir near these roads. If EPA determines hat the production and use of asbestosontaining serpentinite rock is causing sbestos emissions proximate to the ublic in a number of locations, standrds will be proposed in the FEDERAL REGISTER under Section 12 of the Clean Air Act.

DATE: The information requested in this notice must be submitted on or before January 10, 1977.

ADDRESSEE: Information in response o this Advance Notice of Proposed Rulenaking should be submitted to the Emision Standards and Engineering Division (MD-13), Environmental Protection Agency, Research Triangle Park, N.C. 27711, Attention: Mr. Ron R. Goodwin.

FOR FURTHER INFORMATION CONTACT:

Mr. Don R. Goodwin, Director, Emission Standards and Engineering Division (MD-13), Environmental Protection Agency, Research Triangle Park, N.C. 27711, 919-541-5271.

SUPPLEMENTARY INFORMATION: It s well documented that airborne asbesos fibers are related to human disease, pecifically pulmonary fibrosis, carcinona, and pleural mesothelioma. The uantification of the health risk associated with specific airborne concentrations, fiber dimensions, and chemical omposition of the fibers, however, is inxact. The problem of estimating the nagnitude of this risk to human health s further complicated by the 20- to 40-ear latency period between the onset of xposure and the appearance of disease. n addition, cancer-causing agents appear to be "non-threshold" pollutants o that no level can be set which is enirely safe from cancer risk. Consequently, EPA believes that exposure to airborne asbestos should be reduced to the greatest extent feasible. A hazardous emission standard currently exists for several sources of asbestos. See 40 CFR, Part 61, Subpart B.

In early 1977, EPA tests indicated that dust from the crushed stone produced by a Rockville, Maryland, rock quarry contained from 0.25 to 0.70 weight percent chrysotile asbestos. Analyses of air samples taken by EPA and Mt. Sinai School of Medicine near several sites in Montgomery County, Maryland, where unbound crushed stone from this quarry was in use, revealed ambient air concentrations of chrysotile asbestos as high as 17 million fibers per cubic meter and as high as 6400 nanograms per cubic meter, depending on distance from the road and prevailing traffic conditions. These concentrations are as much as 1000 times higher than those usually found in urban and metropolitan areas.

It is clear from the air monitoring data that several uses of unbound crushed stone from the Rockville, Maryland, quarry can cause elevated concentrations of asbestos in the air. The Maryland State Bureau of Air Quality and Noise Control, the Montgomery County Department of Environmental Protection, and the Montgomery County Department of Transportation are taking measures to control asbestos emissions from roads and other public areas which were surfaced with crushed stone from the Rockville quarry. Warning signs have been posted in parks and schoolyards where asbestos-containing crushed stone is in use and in many cases the rock has been removed. Dust suppressants and liquid asphalt has been applied to the roads where the most severe dust problems existed. The Montgomery County Department of Transportation has issued a moratorium on the use of crushed stone from the Rockville quarry and has notified all public users of the rock and the largest private users that the crushed stone they have used is from the Rockville quarry and may contain asbestos. Maryland has also found that the rock in several other quarries in the State contains asbestos and, as a result, is developing regulations to restrict the future use of crushed stone containing asbestos in certain applications and to control emissions from certain areas which have been surfaced with asbestos-containing crushed stone in an unbound form.

An analysis of geological survey maps prepared by the United States Geological Survey indicates that the Rockville, Maryland, rock quarry and a number of other rock quarries in the United States, produce crushed stone from serpentinite rock deposits. Geologists agree that most serpentinite rock deposits contain at least a small percentage of chrysotile asbestos. This leads EPA to believe that a number of crushed stone plants in the United States may be producing asbestos-containing crushed stone similar to that produced by the Rockville, Maryland, rock quarry. Other types of rock deposits may also contain asbestos; however, the correlation between other rock types and th presence of asbestos is not as clear.

EPA is therefore beginning a study t determine the extent of the problem o asbestos emissions that may exist fron the use of crushed stone produced fron serpentinite rock. This study is bein conducted in response to requests fron officials of Montgomery County, Maryland; two Congressmen from the State o Maryland; and the Environmental Defense Fund. The purpose of this study i to determine whether EPA should develop a Federal standard to limit asbesto emissions from this source. In this study EPA will identify serpentinite rock quarries within the United States, collect an analyze rock samples from these quarries, determine whether elevated level of asbestos in the air are occurring du to the use of crushed stone containin various asbestos contents, and determin how widespread the problem appears t be.

Currently both the State and loca agencies have indicated their intentio to take appropriate measures to contro this problem in Maryland. If EPA's stud determines that this problem does no warrant work on proposal of a Federa standard, EPA assistance will be avail able to local agencies on a case-by-cas basis to deal with this problem.

EPA is requesting that all intereste persons submit factual information concerning crushed stone produced fron serpentinite rock, particularly informa tion on its production, sale, and use i various applications; its asbestos content; and public exposure to ambient ai asbestos emissions resulting from its us in various applications. It is expecte that such information will assist EPA i determining whether to formulate an regulations.

Dated: November 3, 1977.

DOUGLAS M. COSTLE,
Administrator.

[FR Doc.77-32666 Filed 11-9-77;8:45 am

STATE DEPARTMENT OF GEOLOGY AND
MINERAL INDUSTRIES
702 WOODLARK BUILDING
PORTLAND, OREGON

Liberty Asbestos

Mrs. F. "insenberg
Azalea, Oregon
March 7, 1947

Douglas Co.

H. M. Dole
State Dept. of Geology
702 Woodlark Bldg.
Portland 5, Oregon

Dear Mr. Dole:

Your letter of January 7, 1947, before me, and wish to report at this time.

My delay in doing so was becaus the Seattle men, Mr. Atkens and Weibert, were delinquent in their monthly minimum payments to me, there for I expected to cancil the lease, which I give them a year ago.

But now they have just about cleared the slate so I expect them to be in operation before long,

However the mines have been closed down through the winter, we are looking forward to a very buisy spring and summer.

There was some developing work done last year and a good bit of assesment work done.

The rodes are almost beyond traveling yet, but by May they should be in good condition, that is most of it.

There is a 2½ mile stretch which is forest road, and if we can get them to fix this strip this spring and we do not have to much rain, we should be traveling back and fourth to my home which is twelve miles down cow creek from the mines,

However the road as it has been the last two years has been a great handy cap.

I hold title to the section 36T 32-R.4W.W.M. Jackson County, and I leased 3/4 of the section to C. W. Atkins and E. W. Weibert of Seattle Wash. and if they have changed the name, I do not know, But the property will continue to stand under the old name, The Liberty Asbestos mines,

There was no asbestos sold last year as far as I know just developing work, and somthing like a thousand lbs. shiped for tests and samples, I truly hope they get down to buisness on the asbestos this year the asbestos is abundent and the quality as fine a grade of tremolite as gotten any where in the states, I would not have leased the property but I did not have the capital to develop it and my son was in the service and I could not handel the managing of it a lone, You are welcome to come up when the wether is better.

Sincerely yours Mrs. Flora Winsenberg, Azalea, Oregon

COPY

State Department of Geology and Mineral Industries

702 Woodlark Building
Portland, Oregon

Report by: N. S. W.
Date: April 22, 1946

Pine Creek Asbestos Claims

Upper Burnt River District
Baker County

John Wyant of the Pine Creek Placers advises the writer that Larson and a previous owner hauled a considerable amount of asbestos from Cow Creek occurrences to their Pine Creek property where they added it to the meager amounts on the dumps taken from the test holes on that property. Wyant further states that these men always demanded a substantial "down payment" from prospective purchasers.

The writer does know that in late 1944 Louis de Pourtales made Larson a bona fide of 10¢ per lb. F. O. B. for 3 tons of asbestos for trial run purposes in filtering of commercial acids. All Larson would have had to have done was to gather such from the dumps and pick small amounts from the large lenses supposedly existant in the various prospect pits and his failure and utter indifference towards doing so has always been a source of mystification, especially so since a subsidy for continued production was in the offing depending on the results of the trial batch. This does tie in with the report and thus the rumor is incorporated in the Department's records in the form of this report.

CONFIDENTIAL

Where is Cow Creek occurrence?
Cow Cr. tributary to Pine Cr.

RECEIVED
APR 29 1946
STATE DEPT OF GEOLOGY
& MINERAL INDS.

State Department of Geology and Mineral Industries

702 Woodlark Building
Portland, Oregon

SHYRITE MINE

Agness Area

"Shyrite" is a nickname that the owners have applied to asbestos in general.

Lucas used some of the asbestos to cover his hot water tank. He washed the fiber, to remove as much talc as possible. The fiber and remaining talc swelled considerably so that 3 double handfuls will swell to fill a washtub. A portion of the water was squeezed out and the damp mass put on the tank. It hardened just like commercial "asbestos" covering and is extremely efficient.

Some one has been feeding Lucas a bunch of wild stories about the value of asbestos, up to $400 a ton for ordinary grades. Also on uses and pecularities of the fiber. This is unfortunate as Lucas is a very sincere individual.

The property is worthy of some investigation and I hope to visit it in the near future.

CONFIDENTIAL

Ray C. Treasher
Field Geologist
July 1, 1942.

MEI - CHARLTON, INC.

2233 S.W. CANYON ROAD
PORTLAND, OR 97201-2499
503/228-9663

ENGINEERS AND SCIENTISTS solving problems through APPLIED RESEARCH, CONSULTING ENGINEERING AND CHEMISTRY

Jerry - FYI Bev

FOR IMMEDIATE RELEASE

Contact: Don Valley, P.E.
(503) 228-9663

MEI-CHARLTON ACCREDITED FOR ASBESTOS ANALYSIS

(Portland, Ore.)--MEI-Charlton, Inc. has received notice of accreditation by the United States Environmental Protection Agency for the analysis of bulk samples for asbestos, according to Don Valley, P.E., president.

The EPA awards accreditation to laboratories who successfully classify four bulk samples as either asbestos-containing or nonasbestos-containing. The laboratories are also given numerical scores which reflect their performance in determining the quantity and type of asbestos in the asbestos-containing samples. MEI-C's laboratory score was 100 percent.

MEI-Charlton, Inc. is an independent consulting engineering and scientific laboratory providing problem-solving capabilities to clients throughout the United States.

-- 30 --

PR-739/5308

0.1.1/5213

STATE OF OREGON INTEROFFICE MEMO

TO: Staff

DATE: July 28, 1978

FROM: John Beaulieu

SUBJECT: Asbestos

Asbestos from natural and man made sources is becoming an increasing concern in terms of public safety.

To address the geologic aspects of the problem the Department has contracted with EPA to conduct an inventory of possible problem quarry operations in the state.

From the health standpoint it is not the charge of our agency to identify with certainty samples brought to our offices. We should restrict ourselves to the use of the term "asbestiform minerals," recognizing that certain identification of asbestos requires x-ray equipment. This also will avoid any potential litigative entanglements.

JDB:mw

ROBERT W. STRAUB
GOVERNOR

Department of Geology and Mineral Industries

1129 S.E. SANTIAM ROAD, ALBANY, OREGON 97321 PHONE (503) 967-2039

January 11, 1979

Dr. M. B. Ranade
Energy and Environmental Research Division
Research Triangle Institute
P. O. Box 12194
Research Triangle Park, North Carolina 27709

Dear Dr. Ranade:

As our Open-File Report O-78-5 entitled "Reconnaissance Study of Oregon's Stone Quarries and Asbestiform Minerals Occurrences Within Ten Miles of Serpentinite" stressed, no field visits were made in preparing that report. We used data from our data bank. That bank was not built with your needs in mind. Oregon has from 12,000 to 15,000 pits and quarries. Our Mined Land Reclamation files contain 1,500 sites, of these 600 are fee-paying sites. Because of the way the Mined Land Reclamation law is written the nonfee paying sites are exempt from the law. The Mined Land Reclamation Division has a staff of two secretaries and two professional field persons. These people are quite busy with the 600 fee sites and don't have much time to improve the data base for the rest of the sites.

The following is all we have in the way of addresses for the sites of interest to you. If more detail is needed, it will have to be obtained through a field visit to the local county courthouses.

NORTHEASTERN OREGON

#44 Department has no more data

#46 " " "

#51 Baker County Road Dept.
Baker County Courthouse
Baker, Oregon 97814

#59 Department has no more data.

#64 " " "

#65 J. A. Henning
317 S. Canyon Blvd.
John Day, Oregon 97545

#69 Department has no more data.

#74 " " "

#82 " " "

#90 " " "

SOUTHWESTERN OREGON

#30 Department has no more data.

#31 Department has no more data.

#44 " " "

#55 " " "

#78 Arlin D. Herman
Box 119
Broadbent, OR 97414

#96 Bob Angell, Inc.
P. O. Box 4318
Eastside, OR 97420

#98 Department has no more data.

#101 Georgia-Pacific Corp.
P. O. Box 610
Coquille, OR 97423

#107 Bureau of Land Management
Coos Bay Dist. Office
P. O. Box 1139
Coos Bay, OR 97420

#115 Department has no more data.

#120 Raymond J. Griffith
Star Route, Box 70
~~Portland~~, Oregon 97465
Port Orford

#139 Department has no more data.

#139a Samuel A. Morgan
P. O. Box 604
Sweet Home, Oregon 97396

#195 U. S. Forest Service
1225 South Ellensburg
Gold Beach, Oregon 97444

#232, 248, 248a Bureau of Land Management
310 West 6th St.
Medford, OR 97501

#250 Department has no more data.

#279 Oregon State Highway Division
Region 3 Office
1523 SE Cobb St.
Roseburg, Oregon 97470

#305, 306, 309 U. S. Forest Service
1225 South Ellensburg
Gold Beach, OR 97444

#327 Department has no more data

#329 " " "

#358 Agnew Timber Products
P. O. Box 939
Brookings, Oregon 97415

#365, 366, 369 U. S. Forest Service
1225 South Ellensburg
Gold Beach, OR 97444

#377 Department has no more data.

#407 U. S. Forest Service
1225 South Ellensburg
Gold Beach, Oregon 97444

#408 Department has no more data.

#409 " " "

#411a Bureau of Land Management
310 West 6th St.
Medford, Oregon 97501

#418 John H. Pugh
2891 Elk Lane
Grants Pass, Oregon 97526

#433 Oregon State Highway Division
Region 3 Office
1523 SE Cobb St.
Roseburg, OR 97470

#441 Department has no more data.

#442 Agnew Timber Products
P. O. Box 939
Brookings, OR 97415

#450a Department has no more data.

#469 U. S. Forest Service
Federal Building
Medford, Oregon 97501

#475 Oregon State Highway Division
Region 3 Office
1523 SE Cobb St.
Roseburg, Oregon 97470

#477a South Coast Lumber Co.
P. O. Box 670
Brookings, Oregon 97415

#516 Department has no more data.

#532 John H. Pugh
2891 Elk Lane
Grants Pass, Oregon 97526

Sincerely,

Jerry J. Gray

Jerry J. Gray
Economic Geologist

JJG/bjd

RECEIVED
JAN - 8 1979
DEPT OF GEOLOGY
& MINERAL INDUS.

Jerry:

Using available MLR records provide the requested information if available for the sites enumerated. State in a cover letter that we can do no more than this. Also, funding does not allow MLR to keep good inactive files for uses such as this.

John B

P.S. Contractual commitments were a bit hazy on this matter.

RESEARCH TRIANGLE INSTITUTE
POST OFFICE BOX 12194
RESEARCH TRIANGLE PARK, NORTH CAROLINA 27709

ENERGY AND ENVIRONMENTAL RESEARCH DIVISION

December 29, 1978

Dr. John D. Beaulieu
Deputy State Geologist
Department of Geology and
Mineral Industries
1069 State Office Bldg.
Portland, Oregon 97201

Dear Dr. Beaulieu,

As per our phone conversation of December 27, we need more information regarding the current ownership and names and addresses of individuals in charge of the quarries suspected of containing asbestiform minerals. In Table 3 of your report, active quarries numbered 51, 248, 248a, 418, 532, 78, 96, 98, 107, 120, and 195 are of primary interest. Information on the unknown sites regarding activity and ownership is also necessary. Information on the inactive quarries is requested where possible.

We hope that this information could be gathered under the current purchase order without additional cost. If additional costs are involved, please advise us. When the information is available, please send it to me or to Gil Wood, Industrial Studies Branch (MD3) Emission Standards and Engineering Division, U.S. Environmental Protection Agency, Research Triangle Park, North Carolina 27711.

Thank you very much. Happy New Year.

Sincerely,

MBRanade

M.B. Ranade, Ph.D.

MBR/raf

Northwest

The Sunday Oregonian Magazine, November 14, 1982

Inside:
OREGON HOME
REMODELING TAB

By Lauren Kessler and Tom Hager

Their shift starts at 8 a.m. By 7:45 in the gray drizzle of a winter dawn, they begin streaming through the main gate: carpenters, mechanics, metal workers, painters, welders, plumbers, electricians — the thousands of men and women needed to build and outfit ships.

On this December morning in 1943 a dozen ships are under construction at Kaiser's Vancouver shipyards, vessels contracted under the Maritime Commission for the U.S. Navy. Kaiser, like the other Portland-Vancouver shipyards, is going full-bore. Night and day. Three eight-hour shifts. Seven hulls under construction in the yard. Five watertight hulls launched and waiting for finish work on the outfitting docks. This month, in the area's 10 major shipyards, 125,000 workers are helping to construct hundreds of ships.

At the Vancouver yards that skirt the Columbia about a mile east of the Interstate Bridge, the throngs file past time clocks, punch in and then disperse. Knots of workers carrying toolboxes and paint cans, equipment picked up from the sheds inside the yard, walk out on the docks, scramble up wet gangplanks and onto the floating hulls. Then they descend into a maelstrom of construction activity.

Inside a 6-foot-wide passageway deep in the hull of one of the ships, teams of asbestos mechanics begin work. Every pipe in the ship must be "lagged" — covered with preformed tubes of asbestos, wired securely, slathered with "mud," coated with Fiberglas and then painted with glue. Asbestos — the "miracle mineral" — is fireproof and everything that can be covered with it, is.

All along the passageway, the workers cut lengths of asbestos tube with hand saws. By the end of the day the floor will be carpeted with a fine powder, the air will be thick with dust and the workers will be coated with asbestos fibers.

A young kid, maybe 17, dashes through the passageway carrying a box of asbestos scrap. He empties it onto the heads of two painters working a few yards from the mechanics. It looks like a snowstorm. Everyone laughs. The kid's just fooling around.

Later, when the mechanics are finished, a government inspector comes through. He doesn't like the asbestos on one section of pipe. The surface isn't smooth enough. A mechanic is called back, and he uses an electric grinding wheel to cut off the old insulation. Six feet away, two painters are slapping coats of gray paint on finished pipes. The dust flies again.

When they worked with asbestos in the holds and boiler rooms of locally made ships, tens of thousands of Portland-Vancouver shipyard laborers were working to save lives. The asbestos insulation they wrapped around the pipes, the blocking they laid around the engines, the raw asbestos they packed into every cranny of the ship; it all was designed to reduce the chance that sailors would burn to death.

Now it's the asbestos workers who are dying.

More of them will die in the next seven years from diseases caused or aggravated by asbestos than died in the Navy during World War II, according to a conservative estimate.

Asbestos-related cancers will kill as many as 10,000 Americans each year until the end of this century, says Dr. Irving Selikoff, an expert in asbestos-related diseases at New York's Mount Sinai Hospital. The predictions of a 1978 report by the National Institute for National Safety and Health are even more pessimistic. The agency's researchers expect more than 2 million asbestos-related cancer deaths in the next three decades and predict that asbestos-related cancers will account for 15 percent of all cancers in the foreseeable future. No one knows how many millions will contract asbestosis, a scarring of the lung tissue caused by inhaling asbestos fibers, or other non-fatal lung and respiratory diseases.

An estimated 9 million workers still alive today were exposed to asbestos during the last 40 years, according to a Department of Labor report. Because asbestos was used not only in shipbuilding, but in myriad manufacturing and construction in-

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LAUREN KESSLER is a member of the faculty at the University of Oregon School of Journalism. Tom Hager is a staff writer for a group pharmaceutical trade magazines located in Springfield and served as a journalistic intern at the National Cancer Institute. Photographs are by Randy L. Rasmussen, staff photographer for Northwest Magazine, as well as from The Oregon Historical Society and wire service sources. Illustration by Werner Bittner.

dustries — the mineral is part of more than 3,000 products — perhaps as many as 27 million Americans have breathed in hazardous amounts of asbestos dust since 1940.

The epidemic is just beginning. So is another epidemic: a plague of lawsuits against asbestos manufacturers.

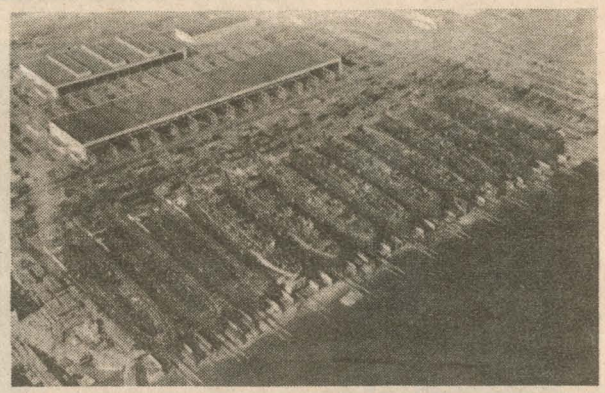
Nationally, some 16,000 damage suits already have been filed against these companies, and new cases are piling up at a rate of more than 450 a month. Two asbestos manufacturers, including the giant Manville Corp. (the former Johns-Manville), recently filed for bankruptcy protection against asbestos-related claims.

In the Northwest, the litigation is just starting. On the day Manville filed for bankruptcy, a Seattle court awarded $1.5 million in damages to a local asbestos worker, including $500,000 in punitive damages against three asbestos manufacturers.

"And that's just the tip of the iceberg," says Jeff Mutnick, the Portland lawyer who represented the asbestos worker who won the Seattle case. Mutnick's firm also is handling 60 asbestos-related claims in Oregon, and he estimates that there are 700 claims and lawsuits pending in Washington.

This spring, the widow of asbestos worker James Fossum — a victim of asbestos-caused cancer — was awarded Oregon Workers' Compensation benefits after a four-year battle that ended in the state's Supreme Court. Allen T. Murphy, Fossum's attorney, believes there will be "hundreds more" cases in Oregon. Officials at the state's Workers' Compensation Department are more conservative in their estimates. But the fact is that nobody knows how many Northwest workers will file claims or initiate lawsuits based on their wartime exposure to asbestos.

Part of the difficulty is accurately assessing the number of men and women — perhaps as many as 300,000 — who worked in local shipyards. Another problem is that there are many types of exposure, many kinds of asbestos-related diseases and many estimates of disease risk.



Above, from top, ships at Vancouver, Wash., yard during World War II; Workers in training and during a lunch break.

□

Scientists don't know yet how asbestos causes asbestosis and cancer — only that it does.

It begins with asbestos in the air. Down in the ships, "It was like a dust storm," recalls Portland shipyard worker Chet Howell. While much of the dust was caught by the mucous lining of the nose and air passages and moved out of the body, millions of microscopic fibers were breathed deep into the lung. (Today, workers in asbestos-related jobs are encouraged to wear protective masks to filter out harmful asbestos fibers.)

There are several kinds of asbestos, some more dangerous than others. The most heavily used asbestos during World War II belonged to a family called the amphiboles — the most hazardous asbestos known.

When magnified, single fibers of this type of asbestos look like long, thin rods.

Physicians describe them as "needle-like." Once in the lung, they tend to settle in the lower lobes, where air passages branch and narrow. Much of this asbestos is cleared by an escalator-like action that moves mucus up from the lungs to be spit out or swallowed. Within a month the lungs can clear about three-fourths of any dust that way.

But many fibers remain trapped — billions of fibers in workers exposed to heavy amounts of dust. Once caught in the lungs, the fibers remain for life. Asbestos is a mineral that the body cannot break down. As Selikoff says, "Asbestos has a half-life of infinity."

If too many of these fibers remain in the lungs, the lung tissue can begin scarring and hardening. The result is asbestosis, a chronic, debilitating disease that may not become evident until many years after exposure to the dust. Asbestosis is common in

Ships under construction form the backdrop to some of the thousands of wartime Kaiser shipyard employees as they leave work.

workers exposed to high concentrations of the mineral for a period of years. Now it's also turning up in workers exposed for no more than a few months during wartime shipyard service.

Asbestos exposure also increases the chance of lung cancer. Career asbestos workers who don't smoke have about four times more risk of contracting this difficult-to-treat cancer than workers in other professions. For smokers, the risk is far greater.

Asbestos and cigarettes multiply each other's effects. Asbestos workers who smoke more than a pack a day get lung cancer at a rate of 60 to 80 times higher than non-smokers in other professions, and 10 times more often than non-smoking asbestos workers. It has been estimated that asbestos is involved in one out of every 20 cases of lung cancer in the United States — and lung cancer is the most-common, most-deadly form of cancer.

That fatal aftermath — disastrous as it is — would be the extent of asbestos damage if the mineral stayed in the lung. But it doesn't.

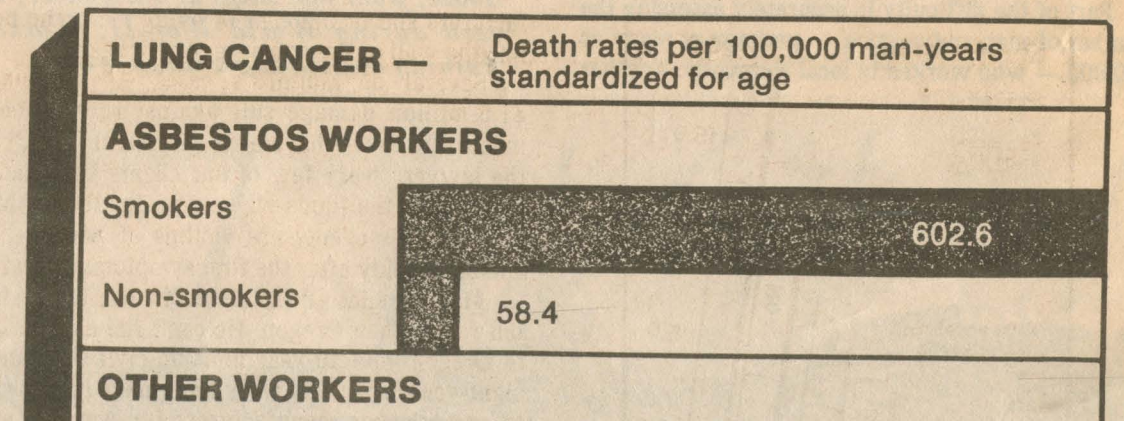
Tiny needles of asbestos can migrate through the wall of the lung and into the space between the lungs and the rib cage. The space is lined by a sheet of cells called the mesothelium. When asbestos comes in contact with those cells, it can trigger a rare type of cancer called mesothelioma. Normally the cancer affects no more than one person in several hundred thousand in the United States. But heavily exposed, long-term asbestos workers have been estimated to die of mesothelioma at rates up to one in 10.

Unlike lung cancer, which can be caused by a variety of factors, mesothelioma has only one known cause in the United States — asbestos. And mesothelioma has been found to occur in persons with only short-term exposure to the mineral. There is no known treatment for the disease.

Because it takes as much as 40 to 50 years from the time of exposure to the time mesosthelioma occurs, some researchers predict that we are just beginning to see what could be a cancer epidemic resulting from the asbestos exposure of millions of World War II workers.

Cancers of the digestive tract, kidney, larynx and pharynx also have been linked to asbestos exposure. It appears that the fibers can travel to virtually every organ in the body, increasing the chance of cancer as they go. But scientific data on these less-common, asbestos-related cancers are

Dr. Irving Selikoff on "short-term" asbestos exposure: "There is no such thing."



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Cancers of the digestive tract, kidney, larynx and pharynx also have been linked to asbestos exposure. It appears that the fibers can travel to virtually every organ in the body, increasing the chance of cancer as they go. But scientific data on these less-common, asbestos-related cancers are still sketchy, and the number of cases is too small for drawing any conclusions about the dangers they pose to workers.

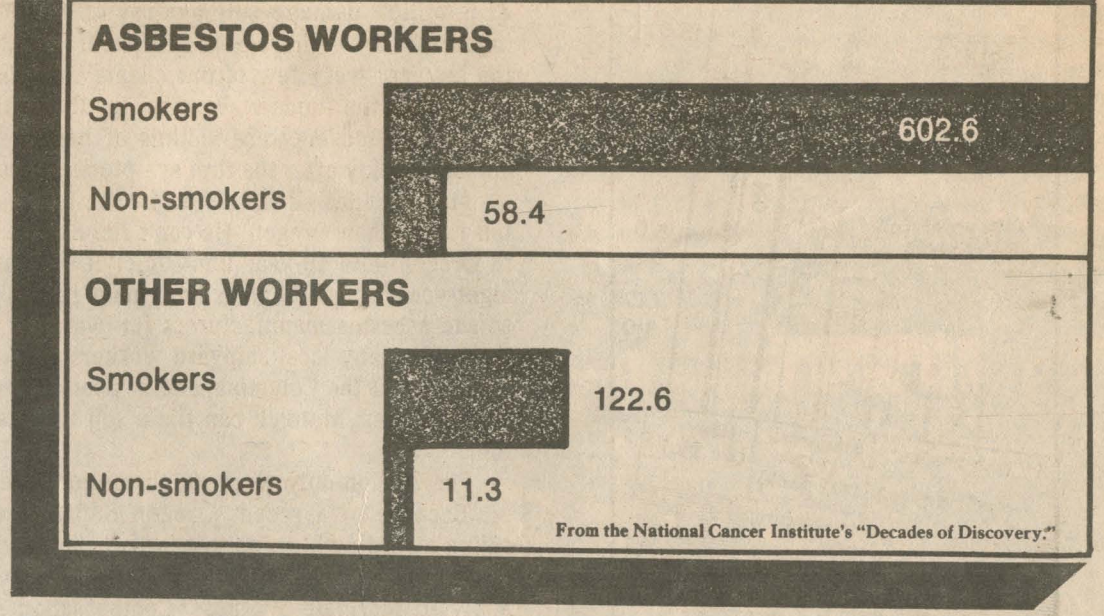
□

Most of the information available on the health hazards of asbestos comes from studies of lifelong asbestos workers. But what are the risks for an asbestos worker employed in the Portland-Vancouver shipyards for only a year or two? And what are the risks for the shipyard worker not directly involved in asbestos work?

Mount Sinai's Selikoff says, "The question of short-term exposure is a misnomer. There's no such thing." Once in the body asbestos fibers do not break down. Wartime workers are still "exposed" to the fibers they breathed in 40 years ago.

The danger is not limited to workers directly involved with asbestos. Almost every shipyard worker — including many who had no direct contact with asbestos — has an increased risk of contracting an asbestos-related disease.

A National Cancer Institute study of World War II shipyard workers in Georgia found that temporary shipyard workers had a 1.6 times-greater risk of contracting lung cancer than non-shipyard workers in the same area.



From the National Cancer Institute's "Decades of Discovery."

Smoking worsened the picture. The Georgia study showed that heavy smokers employed temporarily in the shipyards had almost 20 times the chance of contracting lung cancer as did non-smokers outside the yards.

NCI followed the Georgia study with an examination of shipyard workers in Tidewater, Va. There researchers found not only the expected increase in lung cancer, but a 15-fold higher risk of mesothelioma among shipyard workers. The risk occurred even among workers employed only temporarily during World War II.

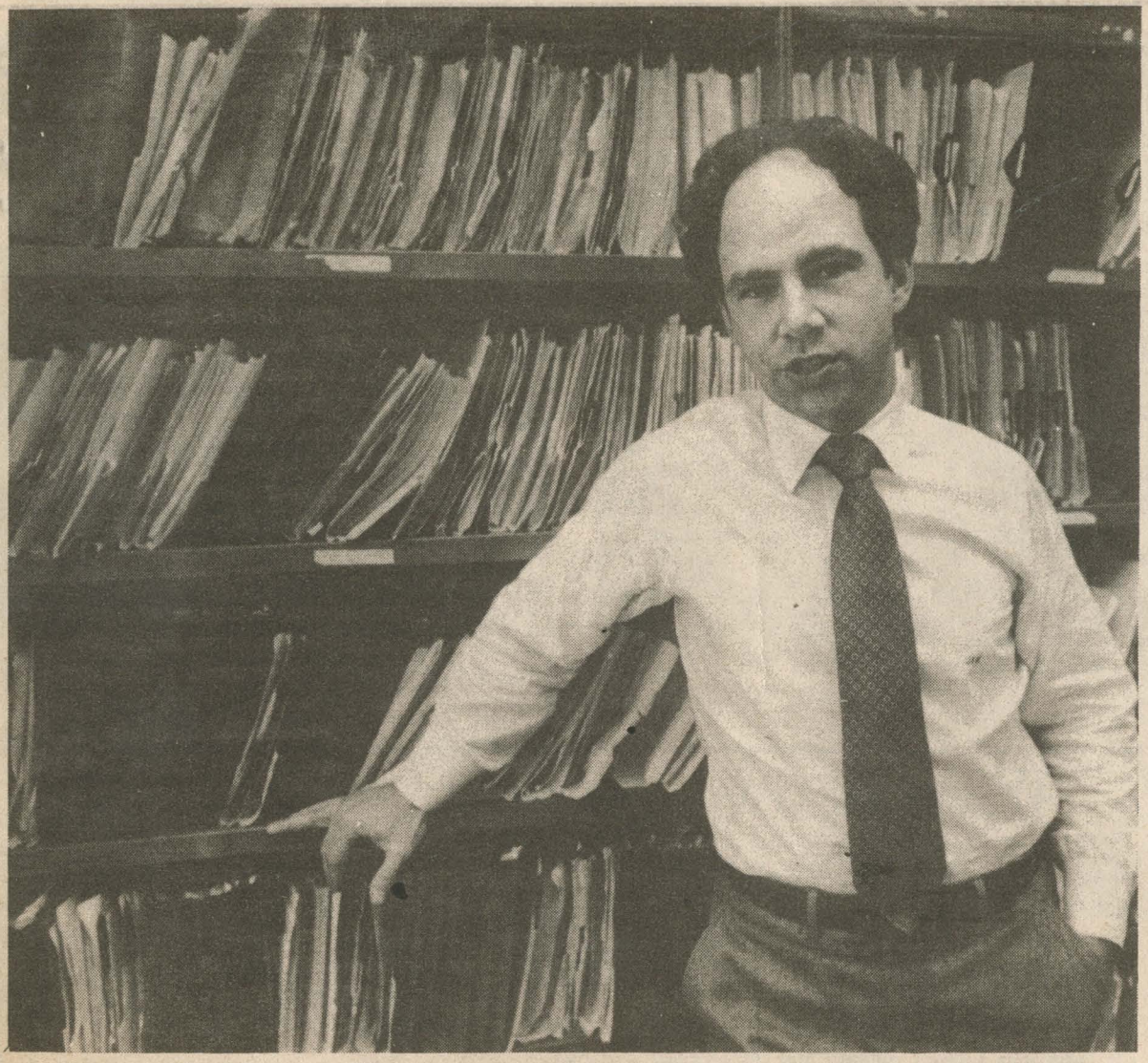
The specific hazards asbestos poses for each individual are impossible to determine. A host of individual factors must be considered along with the amount and duration of exposure and smoking habits.

"In some it will cause no harm. In others, the same exposure will cause debilitating disease or death," Selikoff says.

□

While scientists are gathering more data on asbestos-related diseases, insurance companies, asbestos manufacturers and lawyers are battling it out in court.

One of the major combatants is Jeff Mutnick, a cherub-faced Portland lawyer in his late 30s. Intense, energetic and outspoken, Mutnick devotes most of his time to asbestos-related cases. He and his assistant, Peter Preston, have amassed boxes of evidence that include everything from epidemiological studies and 40-year-old photographs to decades-old correspondence between asbestos manu-



Attorney Jeff Mutnick: "Oregon is one of the most difficult states" for asbestos cases.

facturers and testimonies of dying men. The boxes

"We insure employers and we owe them an obligation," replies Daryl Nelson, an attorney for SAIF. "We'd be remiss if we didn't fight for our employers. We'd put ourselves in the position of malpractice."

Nelson says that SAIF is no tougher on asbestos claims than any other occupational disease cases. "Any kind of disease claim gives rise to difficult burdens-of-proof problems," Nelson says. "Sometimes the cause of the disease is not clear or there may be many potential causes."

At any rate, SAIF's involvement in shipyard-related asbestos cases may be on the wane. The federal government recently included shipyard workers in a national compensation act designed for longshoremen, and local lawyers prefer filing claims under this act to going through the state compensation system.

"It's easier to get compensation and the benefits can be far greater," says Allen T. Murphy, the lawyer who successfully argued the Fossum case.

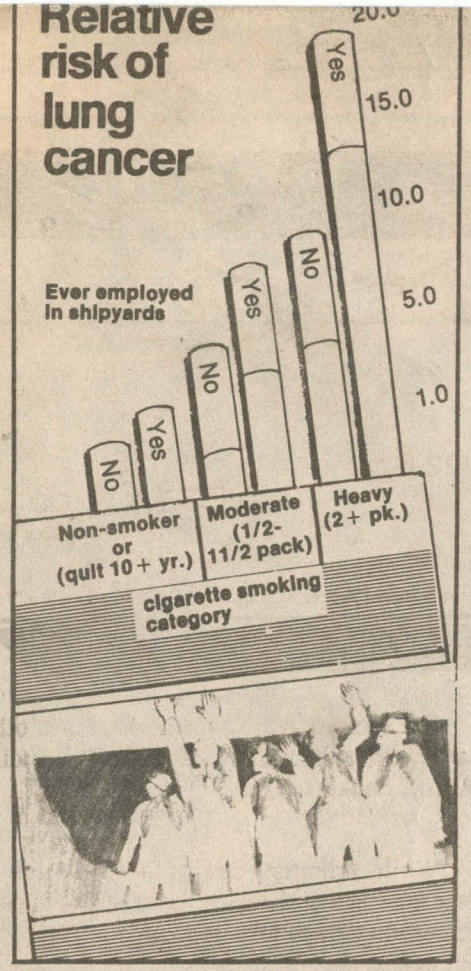
Fossum's widow is receiving less than $500 a month in state workers' compensation. Under the longshoremen's compensation act, she could have received up to $2,000 a month.

□

The big money is in civil suits against asbestos manufacturers.

The stakes are high — Manville estimates the cost of their asbestos suits will be $2 billion — and the legal opponents are well-organized. More than 150 lawyers representing asbestos-related disease sufferers have formed a national network called the Asbestos Litigation Group to share legal briefs, testimony and other information.

On the industry side, the major asbestos manufacturers are backing a proposed federal "white lung" act that would prevent disease sufferers from suing for damages. The bill, known as the



From New England Journal of Medicine Sept. 21, 1978 (vol. 299, No. 12).

Chart shows combined effects of smoking and asbestos exposure on incidence of lung cancer. Heavy smokers who worked in shipyards are nearly 20 times more likely to be stricken than non-smokers who did not.

line the wall of Preston's small office.

Several of Mutnick's cases — including a $1.5-million damage suit against three asbestos manufacturers — have been successful. "But," says the lawyer, "very few of our clients have had the pleasure of the funds we've won for them." Many of Mutnick's clients are victims of mesothelioma and die quickly after the first symptoms appear.

Mutnick files all the claims he can in Washington rather than Oregon. He can't file damage suits in Oregon — a 10-year limit on civil suits and an eight-year product liability limit make it impossible to sue asbestos manufacturers for wartime exposure. But many local shipyard workers worked on both sides of the Columbia, and if a person worked in Vancouver, Mutnick can file a suit in Washington.

For Oregon-only workers, the options are fewer. Because of a recent Oregon Supreme Court ruling awarding benefits to a mesothelioma victim, those who worked in Oregon shipyards now can apply to the state Workers' Compensation Board for benefits. Until last year, the statute of limitations for occupational diseases was five years, and claims based on asbestos exposure during the war years were disallowed. But the Fossum case extended the limitation to 40 years for asbestos-related diseases, and now some two dozen sufferers (or their surviving dependents) are receiving benefits.

"But," says Mutnick, "Oregon is one of the most difficult states to get compensation in for asbestos-related diseases."

One of the problems, says Mutnick, is the State Accident Insurance Fund. SAIF is liable for all claims made by wartime shipyard workers because it was the only workers' compensation insurer before 1965. And SAIF, says Mutnick, fights asbestos-related disease claims "every step of the way."

Asbestos Health Hazards Manufacturing Act, was introduced last spring by Sen. Gary Hart, whose home state of Colorado is corporate headquarters for Manville, a major supporter of the legislation. Under the provisions of the bill, still pending in the Senate, victims would be thrown back on workers' compensation systems with the federal government helping to foot the bill.

In the meantime, the manufacturers have specially trained teams of lawyers to handle the litigation. In Seattle, 22 law firms representing asbestos manufacturers have formed the Washington Asbestos Defense Association. WADA is involved in almost 500 damage suits.

Although the method of compensation may differ, the result is the same, asbestos manufacturers pass on their legal costs to customers and stockholders. The federal government passes on the cost of compensation to taxpayers. Insurance companies pass on their costs to policyholders. We all pay for the damage asbestos has done. But no one pays more than the former shipyard workers.

□

Clarence Cutsinger was 20 years old when he worked as a painter at Kaiser's Vancouver and Swan Island shipyards. He inherited the profession from his father who, at 60, also was working in the yards.

"Heck, I was just trying to make a buck and keep out of trouble," says Cutsinger, now retired and living in Salem.

Last winter he went in for a general physical. His doctor didn't like the looks of the chest X-ray. Now, almost 40 years after his only exposure to asbestos — he painted pipes in the hulls of ships — Cutsinger has asbestosis. His lungs are scarred and hardened. His voice is gravelly; his cough is persist-

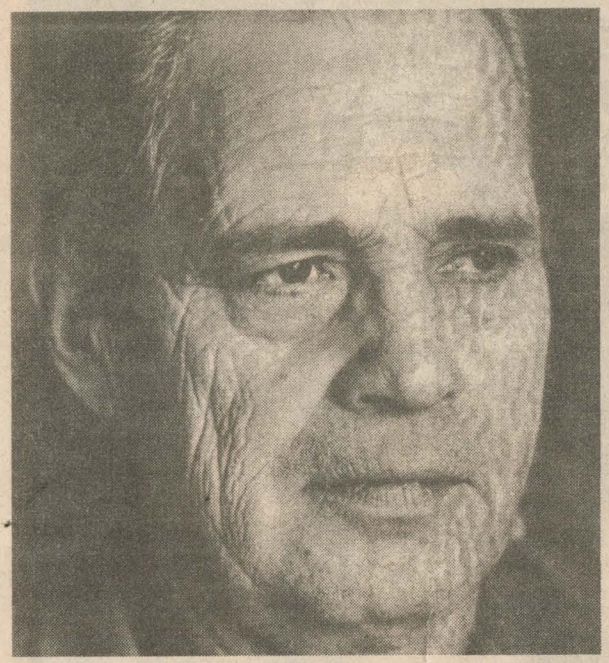
ent; his breathing is labored.

"I don't have much wind. I don't have the stamina I used to," he says.

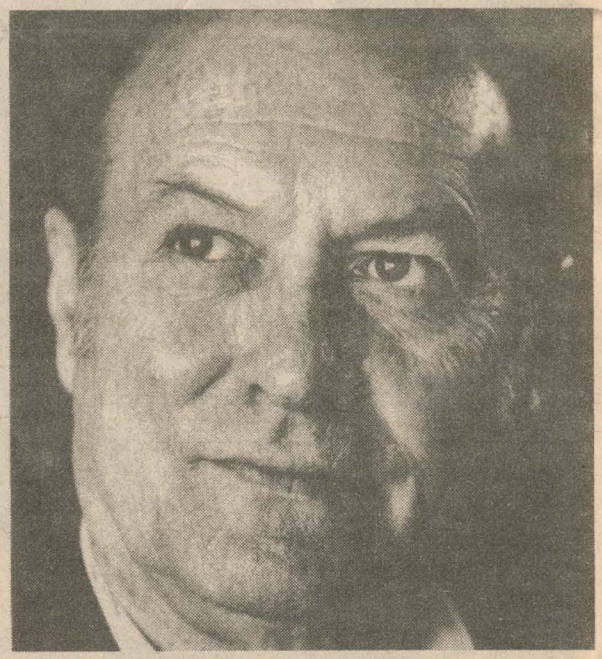
Bill Burnside, now 62, was an asbestos mechanic at the Vancouver yards. His job was to cover the ship's pipes with asbestos. Seven years ago, Burnside's respiratory problems began. He couldn't catch his breath. His chronic bronchitis worsened. He chalked it up to aging.

Then, in 1979, Burnside broke a rib and had to have a chest X-ray. His doctor looked at the pictures and immediately sent him to a local lung specialist. That doctor, says Burnside, "took one look at the X-rays and said, 'I can tell exactly where you worked — the shipyards.'" Burnside has asbestosis.

James Fossum can't tell his story. Neither can five other local World War II shipyard workers whose cases have gone to court recently. They all are dead, casualties of mesothelioma, the fast-acting cancer that has only one known cause — asbestos. ■



CLARENCE CUTSINGER



BILL BURNSIDE

What to do

You worked in the shipyards. You may have been exposed to asbestos. What can you do now to reduce your risk of disease?

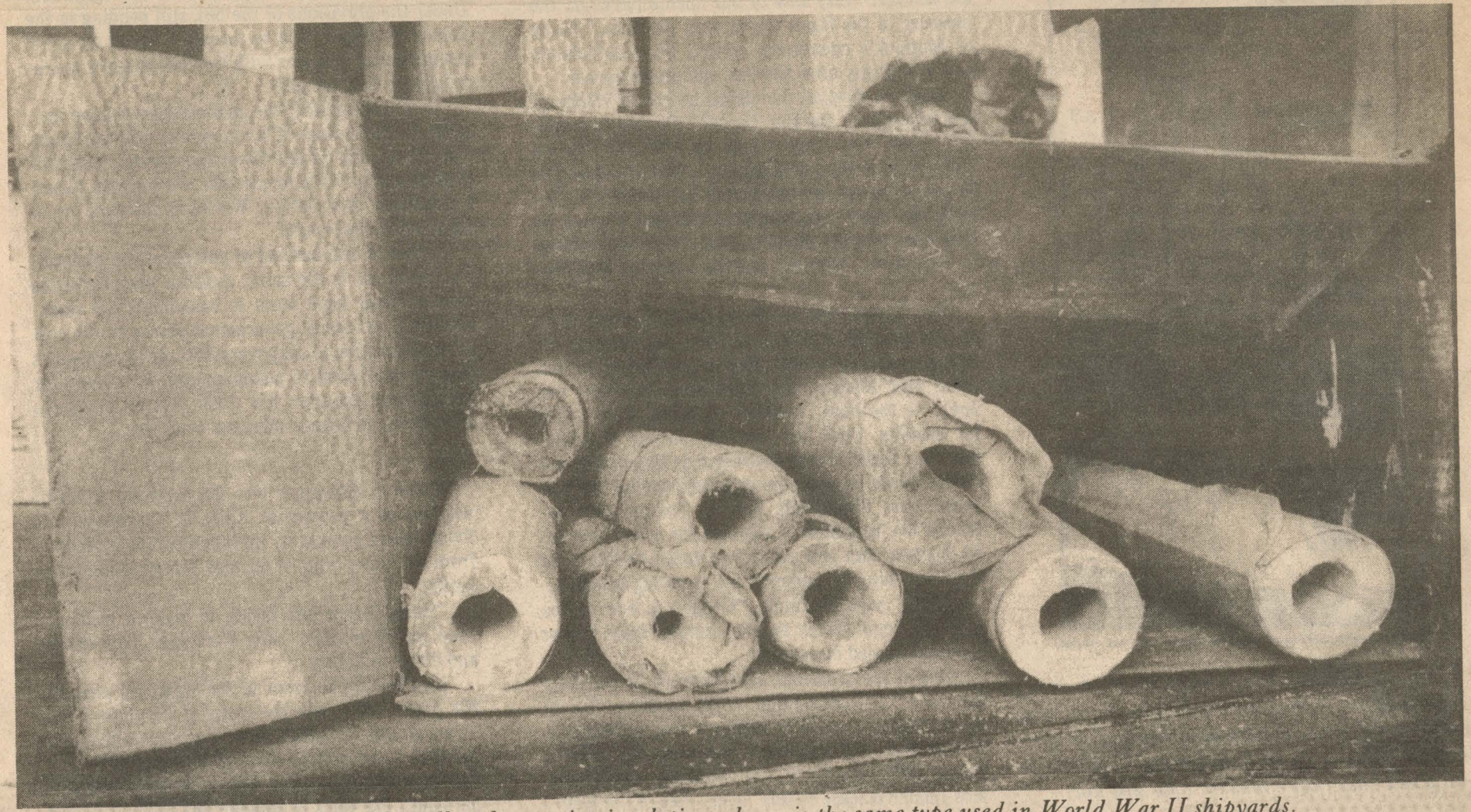
Dr. Irving Selikoff, who has spent the past 40 years studying the hazards of asbestos exposure, offers the following advice to World War II shipyard workers:

"First and foremost, if you're a smoker, stop immediately." With exposure to asbestos, your chances of contracting lung cancer are 4 times greater than persons not exposed to asbestos; asbestos exposure combined with smoking increases that risk to 60 to 80 times that of the non-smoking general population. Smoking also aggravates the "tight lung" feeling of asbestosis, and makes it harder for the lungs to clear foreign matter. Free information on quitting smoking is available from the American Cancer Society and the Oregon Lung Association.

"Next — and this is quite important — place yourself under the care of a physician and inform him of your previous employment and asbestos exposure."

A doctor who knows your shipyard history can initiate tests for early detection of the most-common types of asbestos-related cancers. Early detection is absolutely essential if you hope to survive any form of lung cancer, including asbestos-induced lung cancer.

The great majority of World War II shipyard workers will never contract a disease related to asbestos exposure, but you should know that your risks are increased by wartime service. ■



Pre-1960 Johns-Manville asbestos pipe insulation, above, is the same type used in World War II shipyards.

11/19/78 Oregonian

Asbestos threatens students

By BILL RICHARDS
LA Times-Washington Post

WASHINGTON — Concern is growing among public and private health experts that hundreds and perhaps as many as 1,000 school buildings constructed across the nation during the 1950s and 1960s contain hazardous amounts of the potential carcinogen asbestos.

Until it was outlawed by the Environmental Protection Agency in 1973 because it posed a cancer threat, asbestos was widely used to fireproof and soundproof schools and other public buildings.

Now inspectors who have looked at schools say they are finding asbestos everywhere.

In New York City this month school officials shut down two Harlem grade schools and transferred more than 300 pupils after an inspection team found asbestos flaking from ceilings and elsewhere. The city is now looking at the rest of its system and officials said last week they have uncovered 127 more schools where they suspect asbestos is present.

An unpublished draft survey of the asbestos situation in schools nationwide which has been compiled by the EPA shows that several hundred schools around the country have been identified as containing asbestos in the handful of states where inspections are under way.

Threat ignored

The survey notes that while a few states have been active in looking into the asbestos problem in schools, many others, particularly in the South and West, have ignored warnings or deliberately shunted them aside because of objections over federal intrusion in what are looked on as local affairs. In Idaho, for example, the report notes "very conservatve state. No program expected."

warnings or deliberately shunted them aside because of objections over federal intrusion in what are looked on as local affairs. In Idaho, for example, the report notes "very conservatve state. No program expected."

In August, Health, Education and Welfare Secretary Joseph A. Califano Jr. sent a carefully worded letter to all state governors warning that asbestos had been found in New Jersey schools and that the U.S. Public Health Service had warned that "any exposure probably carries some risk of disease." Califano noted that it was still not possible to identify the risk for schoolchildren in buildings containing asbestos.

In another study done this year on the problem, Dr. Robert N. Sawyer, a Yale Univesity occupational health expert and asbestos consultant, warned that schoolchildren run particular problems with asbestos because cancer caused by the fiberous mineral usually takes 20 to 30 years to develop. Children, said Sawyer, have a longer period in which it may develop than those exposed in middle age or later.

In addition, Sawyer said the concentration of children in schools and classrooms is likely to increase the exposure to asbestos in contaminated buildings.

Other asbestos researchers place less emphasis on the immediate risk of exposure to the mineral by children. But asbestos experts such as Dr. Irving Selikoff, who heads a team of researchers from Mt. Sinai Hospital's Environmental Sciences Laboratory in New York City, warn that the problem of asbestos exposure in children can greatly compound that cancer risk from smoking habits they pick up later on.

Selikoff and his coresearchers have also warned that asbestos in schools poses a danger for teachers who smoke.

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Department of Transportation

HIGHWAY DIVISION
TRANSPORTATION BUILDING, SALEM, OREGON 97310

In Reply Refer to
File No.:

April 17, 1980

INT 7

Mr. Noel Klein
Senior Staff Associate
League of Oregon Cities
Post Office Box 928
Salem, OR 97301

Mr. William Penhollow
Executive Assistant
Association of Oregon Counties
Post Office Box 2051
Salem, OR 97308

Gentlemen:

Attached is a letter received from the United States Environmental Protection Agency concerning the use of chrysotile on Oregon's highways.

I am asking that you circulate this information to the various road departments of counties and cities in the state with the request that it be posted in an appropriate place.

Sincerely,

RECEIVED
APR 28 1980
DEPT OF GEOLOGY
& MINERAL INDUS.

H. S. Coulter
State Highway Engineer

LWR:ia

Att.

cc Governor Victor Atiyeh
Donald A. Hull, State Geologist

RECEIVED-PTLD
APR 18 1980
DEPT OF GEOLOGY
& MINERAL INDUS.

6807

DOT

UNITED STATES ENVIRONMENTAL PROTECTION AGENCY
Office of Air Quality Planning and Standards
Research Triangle Park, North Carolina 27711

APR 7 1980

RECEIVED
APR 10 1980
Governor's Office

Honorable Victor Atiyeh
Governor of Oregon
Salem, Oregon 97310

PLEASE RETURN ORIGINAL LETTER

Dear Governor Atiyeh:

Crushed stone used on public roads in several States contains small quantitites of chrysotile, a form of asbestos. Inhalation of dust from these roads may present a health risk to persons frequently subjected to these emissions. There are no known public roads surfaced with crushed stone containing chrysotile in Oregon, but serpentinite rock formations which commonly contain chrysotile are present. The purpose of this letter is to request that the State of Oregon take appropriate action to ensure that chrysotile-containing crushed stone will not be used on public roads in the future.

A quantitative health risk assessment for inhalation of asbestos fibers is not presently available, but inhalation of asbestos fibers has been directly related to increased incidence of asbestosis, carcinoma of the respiratory system, and mesothelioma. There appears to be a dose-response relationship between asbestos exposure and carcinoma; that is, the possibility of carcinoma increases as the exposure to asbestos emissions increases. Although no lower limit of exposure is known below which asbestos-induced carcinoma will not occur, there may be exposure levels at which the probability of carcinoma is extremely low.

The Environmental Protection Agency (EPA) is presently conducting studies of asbestos emissions from unpaved roads. These studies have shown that vehicular traffic over crushed stone surfaces containing chrysotile may result in emissions significantly higher than background levels. Other common uses of crushed stone produce substantially lower emissions.

A comprehensive study of quarries producing crushed stone containing chrysotile used for surfacing public roads has been conducted. The results of this study show that the use of chrysotile-containing crushed stone is a localized problem, that emission levels and the need for controls vary greatly with location and time, and that measures to prudently control these emissions are available. Therefore, EPA concludes that State or local action is more appropriate than Federal regulation.

STATE HWY ENGR
APR 16 '80
REFER TO
FOR
Info | Inves | R/D | D/R | Sign | Act | File

RECEIVED DOT DIRECTOR
APR 15 '80
REFER TO
FOR
Info | Inves | R/D | D/R | Sign | Act | File

A document is being prepared by EPA to advise State and Federal agencies of locations where emissions occur, probable severity of emissions, applicable control measures, and costs of emission reduction. Copies of the document will be available later this year and will be forwarded to your office upon publication. EPA suggests that the State of Oregon:

1. Inform appropriate county and local governments of this potential problem; and

2. Avoid use of crushed stone containing chrysotile for surfacing unpaved roads; this may be accomplished by modifying crushed stone specifications to exclude serpentinite.

An asbestos information summary including a map of probable serpentinite occurrences, which may aid in answering questions directed to your office, is enclosed. My staff contact on this project, Mr. Gilbert Wood, is available to provide further information. He can be reached at (919) 541-5296.

Sincerely yours,

Walter C. Barber

Walter C. Barber
Director
Office of Air Quality Planning
and Standards

Enclosure

ASBESTOS EMISSIONS FROM THE USE OF CRUSHED STONE

Information Summary

1. Asbestos is a generic term used for several fibrous forms of hydrated silicates.

2. Asbestos occurs in two distinct mineralogical groups, the amphiboles and serpentinite. The present study emphasizes control of serpentinite emissions; varieties of amphiboles will be the subject of a subsequent EPA study. Serpentinite occurs in both fibrous and nonfibrous forms. Chrysotile is the fibrous form of serpentinite. Nonfibrous forms of serpentinite are: antigorite, lizardite, bowenite, williamsite, et al. The chemical composition of serpentinite is $Mg_6(OH)_8(Si_4O_{10})$.

3. Serpentinite occurs in two major regions of the United States: the Appalachian Mountains and foothills and the Rocky Mountain cordillera.

4. Inhalation of asbestos fibers is directly related to increased incidence of asbestosis and carcinoma of the respiratory system.

5. Respirable fibers which are retained in the body range in length from approximately 0.5 to 6 micrometers.

6. A 10- to 40-year latency period often occurs between asbestos inhalation and onset of symptoms.

7. There is no known threshold, or lower limit, for exposure to asbestos below which carcinoma will not occur.

8. There appears to be a dose-response relationship between asbestos exposure and carcinoma; that is, the higher the exposure level and the longer the duration of exposure, the greater the possibility of carcinoma.

9. A quantitative assessment of health effects related to inhalation of asbestos fibers is not currently available. Asbestos emission rates from chrysotile-containing road surfaces and the distribution of particle sizes in those emissions are presently being determined. However, it is prudent to reduce human exposure to asbestos emissions as much as practicable.

10. The use of chrysotile-containing crushed stone in Montgomery County, Maryland, was first brought to public attention in 1976. Following EPA's recommendation, Montgomery County effectively controlled chrysotile emissions from roads by the fall of 1977.

11. A survey conducted by EPA indicates that quarries producing chrysotile-containing crushed stone and the use of that stone on public roads are localized.

12. Population densities along these roads are variable but generally low.

13. When used to surface heavily traveled roads, crushed stone with a chrysotile content as low as 0.5 to 1.5 percent may produce asbestos emissions significantly higher than background levels.

14. The severity of asbestos emissions from crushed stone surfaced roads is dependent upon: the chrysotile content of the crushed stone; traffic volume; weight and speed of vehicles; and meteorological conditions.

15. A number of options are available for reducing chrysotile emissions, including reducing speed limits, treating with dust suppressants, or hard-surfacing.

16. Individuals may take several actions to reduce exposure to asbestos emissions, for example:

    a. Residents living near these roads should keep windows closed during dusty conditions;

    b. Closely following another vehicle should be avoided;

    c. Walking along roads when dusty conditions exist should be avoided; and

    d. Children should be encouraged to play away from the roads.

17. A document which advises State and Federal agencies of locations where emissions occur, probable severity of emissions, applicable control measures, and costs of emission reduction is in preparation and will be available in 1980.

A useful general reference for asbestos is: Asbestos, An Information Resource, Department of Health, Education and Welfare, (NIH) 79-1681, May 1978, available from U.S. Department of Commerce, National Technical Information Service, Springfield, Va. 22161 ($9).

Commerical Quarries Known to Produce Crushed Stone
Containing Chrysotile

Quarry and location	Stone used on State- and county-maintained roads
Rockville Quarry Montgomery County, Maryland	No
Bluemont Quarry Baltimore County, Maryland	Used on 16 miles of roads in Baltimore County, Maryland*
Delight Quarry Baltimore County, Maryland	No
Cedar Hills Quarry Lancaster County, Pennsylvania	Used on 63 miles of road in Harford County, Maryland
Cardinal No. 2 Quarry Grayson County, Virginia	Used on 100 miles of road in Grayson County, Virginia, and on 218 miles of road in Alleghany County, North Carolina
Shadwell Quarry Albemarle County, Virginia	Used on approximately 140 miles of road in Albemarle County, Virginia
Azevedo Quarry Santa Clara County, California	No
Hillsdale Quarry Santa Clara County, California	No
Dunbarton Quarry Alameda County, California	No
Ghilotti Brothers Quarry Marin County, California	No

*Scheduled to be hard-surfaced by August 1980.

Continued

Commerical Quarries Known to Produce Crushed Stone
Containing Chrysotile (concluded)

Quarry and location	Stone used on State- and county-maintained roads
George Reid Quarry Tuolumne County, California	No
Woods Gulch Quarry Tuolumne County, California	Tuolumne County, California (minor amounts)
Six Bits Gulch Tuolumne, County, California	Tuolumne County, California (minor amounts)
Morris Pit Coos County, Oregon	No
Chancellor Pit Josephine County, Oregon	No

CHRYSOTILE-CONTAINING QUARRIES AND ROADS
LOCATED ON FEDERAL LANDS

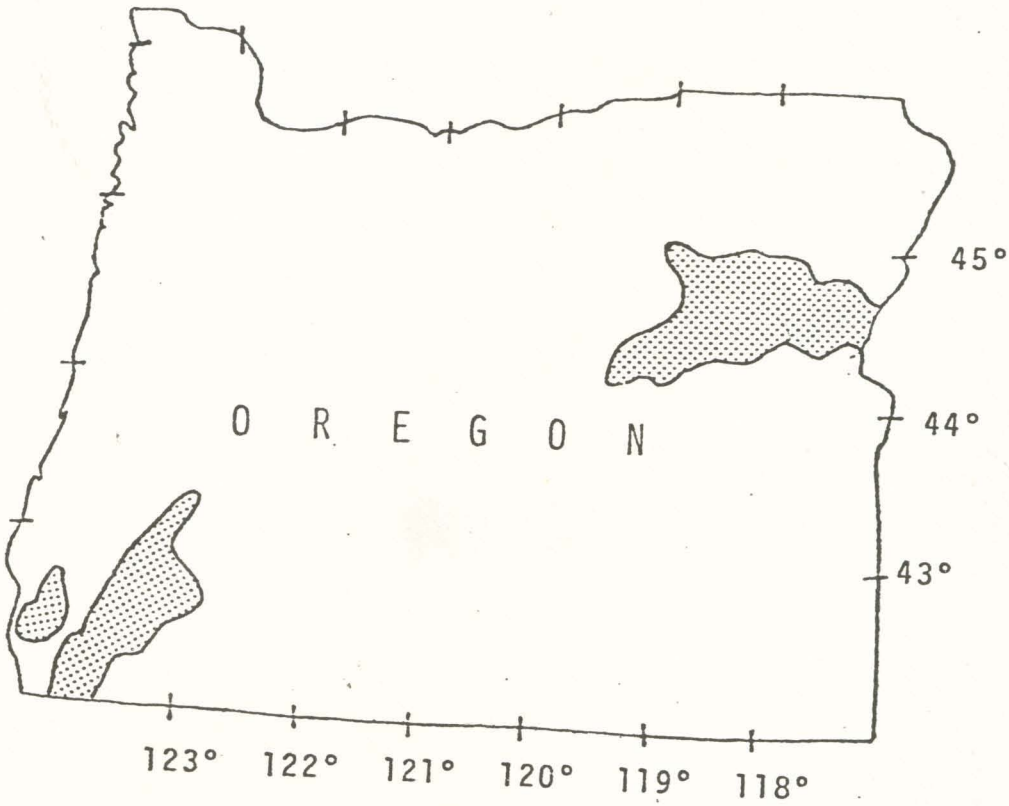
Location	Chrysotile-containing quarries on Federal land	Miles of road surfaced with stone containing chrysotile	Miles of road in serpentinite formations
Klamath National Forest (NF) California	3*	65	390
Six Rivers NF California	4	180	380
Shasta-Trinity NF California	2	28	0
Mendocino NF California	1	40	42
Tahoe NF California	1	0	0
Los Padres NF California	0	0	160
Plumas NF California	0	0	60

United States Bureau of Land Management (BLM), Clear Creek Recreation Area, California: Survey is being conducted to obtain further information on this area and on other BLM lands in California.

United States Forest Service, Oregon and Washington: Surveys are being conducted to obtain information.

Bureau of Land Management, Oregon and Washington: Surveys are being conducted to obtain information.

*Includes one private quarry which produces stone used on NF roads.



Approximate location of rock deposits which may contain serpentinite.

ROBERT W. STRAUB
GOVERNOR

Department of Environmental Quality
SOUTHWEST REGION
1937 W. HARVARD BLVD., ROSEBURG, OREGON 97470 PHONE (503) 672-8204

MEDFORD BRANCH OFFICE
SOUTHWEST REGION
201 W. Main St., Room 2D
Medford, OR 97501 – 776-6010

October 10, 1978

Commissioner Isabel Sickels
Jackson County Courthouse
Medford, Oregon 97501

RE: AQC - Jackson County
Sykes Creek Road Dust

Dear Commissioner Sickels:

I have enclosed the laboratory results for Sykes Creek Road rock samples. Ken McDonald found a small, but significant, percentage of asbestos contaminant material in the Timber Products Quarry sample. This quarry material was used for the rock base on a portion of Sykes Creek Road. A smaller amount of asbestos material was found in the roadway surface rock sample.

I discussed this with Ed Adams and Pat Bodoh of the Mining Safety and Health Administration (MSHA) on October 10th. They monitor rock crushers to protect workers. Exposure to airborne asbestos fibers has been linked to human diseases such as cancer. If MSHA detects <u>any</u> asbestos fibers near a crushing operation, it is considered significant and could ultimately result in closure of a quarry. MSHA does not have authority over the use or disposal of previously crushed material, however.

Safe levels of cancer-causing substances have not been established. Therefore, the proper policy should be to act to minimize emissions of such substances.

I inspected Sykes Creek Road on October 6. Road base material was exposed on a few road curves on the stretch between 2267 Sykes Creek Road and East Evans Creek Road. Otherwise, the road surface appeared in good shape. Based on the enclosed laboratory results, I recommend that:

1. Oil or other dust suppression, sealing or binding agents be applied to the portions of Sykes Creek Road that contain Timber Products Quarry rock.

2. Periodic grading be performed to minimize the exposure of road base material.

3. Use of the Timber Products Quarry be discontinued until MSHA is able to evaluate removal practices.

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Q/RO-601

A few clarifying details may be helpful. Several mineral silicates classified as actinolite, amosite, anthophyllite, chrysotile and tremolite are all considered asbestos materials. All are potentially hazardous. All are regulated by Oregon's emission standards for hazardous air contaminants. A copy of these standards is enclosed.

Jerry Gray, Department of Geology and Mineral Industries, is preparing an inventory of quarries in Southwestern Oregon which may contain asbestos bearing rock. He has two active quarries listed. One is the Timber Products Quarry in Section 24, Township 34 South, Range 4 West, W.M. The other is located in Section 11.

Please call me (776-6010) if I can assist you. I have included phone numbers and addresses in the carbon copy list in case the County wants to contact any of the persons directly.

Sincerely,

Merlyn Hough

Merlyn Hough
Environmental Specialist

MH:fs
encls.

cc: Jim Broad, Air Quality Division (229-5508)
P. O. Box 1760, Portland, 97207

Ken McDonald, Laboratory (229-5983)
1712 S.W. Fifth Avenue, Portland, 97201

Ed Adams, Pat Bodoh, Mining Safety and Health Admin. (967-5825)
P. O. Box 70, Albany, 97321

Jerry Gray, Dept. of Geology and Mineral Industries (967-2039)
1129 South Santiam Road, Albany, 97321

Bob Carstenson, Dick Finnell, Jackson County Public Works Dept.
200 Antelope Road, White City, 97501 (826-3122)

STATE OF OREGON

INTEROFFICE MEMO

Laboratories & Applied Research 229-5983
DEPT. TELEPHONE

TO: Merlyn Hough
Medford Branch Office

DATE: September 25, 1978

FROM: Kenneth C. McDonald KCM.

SUBJECT: Base Rock Material from Sykes Creek Road, Jackson County.

On receiving these samples, I dried them completely in an oven and then made a gross preliminary examination of the material before preparation of slides for microscopy. The most significant observation was that the three samples from the roadway were of much different composition than the quarry source sample. All of the road materials were gravelly sand with most of the rock material worn smooth like river gravel--very little which could be freshly crushed. The quarry sample was of flaky, decomposing, soft material; much with a fibrous appearance; in a matrix of fine sticky clay. It would be very unlikely that the roadway materials I received came from the same source as the quarry sample unless they were from adjacent but dissimilar geological formations.

The materials examined microscopically were the fines through a 200 mesh sieve (below 75 microns) and were quite similar for the three roadway samples except that no. 3 (2552 Sykes Creek Road) had a noticeably higher iron content (limonite). The minerals were quartz, horn blende, feldspars, some serpentine, talc, muscovite, a few calcite. Rodlike particles of the tremolite-actinolite series make up much less than 1 percent of the total.

The fines from the quarry sample are mostly antigorite (serpentine), hornblende, mica, much talc, some quartz. Fibrous asbestoslike particles are about 10 to 15 percent of the fraction below 5 μ. In the coarse portion from this sample were found several bundles of fibrous material which proved to be pure anthophyllite asbestos. There are also larger quantities of rodlike anthophyllite which may or may not be considered asbestiform depending on definition.

The fifth sample - the rock chunk - was mostly of talc-tremolite material with a thin layer of muscovite mica running across it.

Information from the Portland office of the Department of Geology and Mineral Industries indicates that tremolite is not considered necessarily to be an asbestos mineral but does alter to asbestos and may be associated with asbestos as are all the amphibole minerals. There is apparently some dispute as to a descriptive definition of the minerals called asbestos. One school of thought is that rods or blades more than three times as long as their width would be classified as asbestos. This would include most tremolite along with a wide variety of other minerals. More conservative definitions limit asbestos to fine threadlike fibers usually submicron in thickness and much longer. It would probably be worthwhile to derive a working definition for our purposes.

The anthophyllite that I found in the quarry sample is closely related to tremolite, possibly derived from it, and is also commonly associated with

talc. Serpentine asbestos usually takes the form of crysotile, the common commercial asbestos.

I was referred to Jerry Gray of Department of Geology and Mineral Industries in Albany who is apparently now engaged in a study of the quarries in Southern Oregon which may contain asbestos bearing rock. He was not aware that the Timber Products Quarry contained any such material but will look into it. He has indicated a willingness to help with the problem and seems very informative on the topic. I gained considerable information from our conversation. His phone is 967-2039.

I would be glad to attempt a more quantitative microscopic analysis if necessary but would prefer that we better define asbestos and perhaps get more information on the significance and toxicity of the related minerals such as were found here.

KCM:rk
cc: Jim Broad

INTEROFFICE MEMORANDUM - JACKSON COUNTY

AQC - Jackson Co.
NESHAPS

TO: Isabel Sickels

FROM: Richard H. Finnell

DATE: September 7, 1978

BJECT: Sykes Creek Road - Wimer

efer to interoffice memo date 8-31-78 regarding a complaint of base rock materials n Sykes Creek Road relative to toxicity and test results from Dept. of Geology in rants Pass, Oregon.

n 9-6-78 the writer, assisted by Lon Varner, area foreman for Jackson County and for he Sykes Creek Road area, took 4 samples.

#1. Sample was of road material from center of road at 2144 Sykes Cr. Rd. Wimer, at mp 2.

#2. Sample was of road material at Dolly Olympius residence (the complainant) at 2267 Sykes Creek Road - Wimer from the center of the roadway.

#3. Sample was of road material taken from middle of roadway at G. M. Vincent residence at 2552 Sykes Creek Road - Wimer.

#4. Sample was taken of quarry belonging to Timber Products Lumber Co. 4 mi. North of E. Evans Creek Road on Sykes Creek Road - Wimer. Rock from this quarry was used from this limited use quarry which is on B. L. M. road at Twp. 34, R. 4 W., Sec. 24.

he only other materials used on this road came from the Wimer Stockpile on E. Evans Cr. oad at Twp. 35, R. 4 W, Sec. 15. This rock was taken directly from Evans Creek and as subsequently been exhausted. No samples available from this site.

he above mentioned samples taken from Sykes Creek Road and from the Sykes Creek Road uarry have been given to Merlyn Hough, D.E.Q., Environmental Specialist for this area d he will forward these samples to the Portland Laboratory for the D.E.Q. analysis d the results will then be forwarded to this office.

Respectfully submitted,

Robert J. Carstensen
DIRECTOR OF PUBLIC WORKS

By: Richard H. Finnell
ADMIN. ASST., SOLID WASTE

RHF:mra
:✓ DEQ

State of Oregon
DEPARTMENT OF ENVIRONMENTAL QUALITY
RECEIVED
SEP 12 1978
MEDFORD BRANCH OFFICE

ROBERT W. STRAUB
GOVERNOR

Department of Geology and Mineral Industries
ADMINISTRATIVE OFFICE
1069 STATE OFFICE BLDG., PORTLAND, OREGON 97201 PHONE (503) 229-5580

Jerry

October 17, 1978

RECEIVED
OCT 20 1978
DEPT OF GEOLOGY
& MINERAL INDUS.

Ms. Isabel Sickles
Jackson County Board of Commissioners
County Courthouse
Medford, Oregon

Dear Ms. Sickles:

Mr. Robert Doty has relayed to this Department your request for information on the distribution of asbestiform minerals in rock quarries in Jackson County.

We currently are preparing for publication our Open File Report O-78-5 summarizing the results of this statewide investigation and expect that report to be available within one month. In the meantime we have extracted the following information which may be of value to you in the interim.

Enclosed is a crude copy of our map showing the quarries investigated (triangles), areas outlined in green which contain ultramafic rocks, and possible occurrences of asbestiform minerals and known occurrences of such minerals (hexagonal symbol). It appears that only two of these are active or reasonably active quarries (map numbers 532 and 139) and contain these minerals.

Please note that the data are preliminary, have not been field checked, and are being sent to you ahead of formal release of our report.

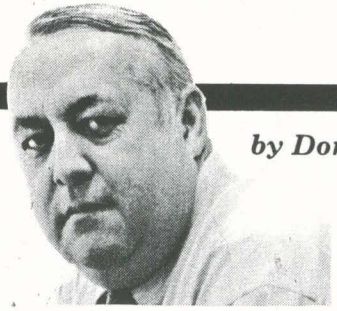
Please feel free to contact Mr. Jerry J. Gray, the author of this report, should you require additional information. He can be reached at 1129 S.E. Santiam Road, Albany, Oregon 97321 - telephone: 967-2039.

Sincerely,

Donald A. Hull
State Geologist

DAH:jr
Encl.
cc Robert W. Doty
cc Jerry J. Gray

Editorial



by Don Michard

OSHA surprise threatens hard rock aggregate producers

On June 20, 1986, the Occupational Safety and Health Administration surprised the crushed stone industry by issuing a standard entitled "Occupational Exposure to Tremolite and Actinolite." This standard, scheduled to become effective July 21, 1986, would regulate tremolite and actinolite as stringently as asbestos.

Those substances are present, in trace amounts, in hard rock deposits, such as granite and trap rock. These represent nearly 25% of the domestic crushed stone production, and are the predominant aggregate materials found in most of the eastern seaboard states, Minnesota, and Wisconsin.

In a letter to Asst. Secretary of Labor John Pendergrass, Robert Bartlett, President of the National Stone Assn., said: "Trace amounts of tremolite and actinolite, in their nonasbestiform state, are ubiquitous in hard rock deposits. This fact will be of concern to vast numbers of construction firms whose projects involve work with construction aggregates. Some construction firms will be subject to the new OSHA exposure standards for tremolite and actinolite, and they will be able to comply only by conducting expensive, time consuming monitoring (which presently may not be technologically feasible) or by obtaining appropriate certificates from construction aggregates producers. . . . The new exposure hazard has the unintended effect of impeding the use of crushed granite and crushed traprock as construction aggregates."

Reacting quickly, the National Stone Assn. requested that OSHA stay the application of the standard, and also filed an affidavit with the Second Circuit Court of Appeals, requesting a stay.

These developments took place as this edition of Pit & Quarry was in final production stages, before the matter was resolved. At this time, we cannot report whether the standard has been suspended. However, readers should take note of the fact that OSHA committed two errors, in our opinion, in its handling of this new standard. (OSHA does not directly regulate crushed stone producers, however, it does regulate the activities of contractors, ready-mixed concrete producers, and others who buy industry products. A regulation that affects the customer also affects the producer.)

First, the suspect materials—tremolite and actinolite—need not be regulated as stringently as asbestos, based on current evidence. And second, OSHA did not offer the opportunity for public comment before releasing the proposed standard.

OSHA did not look into the feasibility of compliance by those who use crushed stone materials affected. Furthermore, OSHA's rulemaking record does not contain evidence justifying the imposition of a 0.2 fiber/cc standard for nonasbestiform tremolite and actinolite in the crushed stone and user industries. There is no reason to suspect that employees face a significant health risk as a result of exposure to trace amounts of nonasbestiform tremolite and actinolite that occur in certain types of stone.

The crushed stone industry was unaware that such a standard was forthcoming. In fact, two years ago, OSHA publicly stated its intention to eliminate nonasbestiform materials from its asbestos related standard, which was being drafted at the time. As a result, the National Stone Assn., and other affected groups, did not file public comments on the 1984 OSHA proposal to revise the asbestos standard. Quite properly, they believed there was no need to comment, and turned their attention to other matters.

Now, two years later, OSHA has changed its tune, by including the non-hazardous materials in the standard, and threatening a large percentage of domestic aggregate production with an unwieldy, expensive regulation. Enforcement of the standard could prove disruptive to the use of graded hard rock as a raw material in many commercial applications, in addition to construction.

Part of President Bartlett's letter to the Labor Department states: "Given that OSHA did not announce that it intended to regulate nonasbestiform tremolite, antophyllite, and actinolite, the National Stone Association (and others adversely affected by the expansion of the regulation) should have the right to be heard by OSHA on this matter of major concern and impact to the industry."

Since its formation about 15 years ago, OSHA has been the subject of many a controversy. Still, its overall impact has been a positive one and the American workplace has become safer as a result of the properly motivated efforts of OSHA. However, there have also been abuses—represented by the tremolite/actinolite exposure standard.

Today a major segment of the crushed stone industry faces severe problems because of an ill-conceived OSHA standard, that was dropped into the industry's lap like a bombshell.

Hopefully, by the time this edition is circulated, the standard will be suspended, and OSHA can develop a more realistic occupational exposure standard that covers genuine hazardous substances, and does not disrupt businesses that rely on the availability of crushed stone products.

Relationship between the growth habit of asbestos and the dimensions of asbestos fibers

A.G. Wylie

Abstract — *The dimensions and shape of both airborne and bulk amphibole-asbestos fibers are different from those of both airborne and bulk of cleavage fragments of the amphiboles. These differences are related to the mineralogical properties unique to the habit of asbestos, including the fibrillar structure, small fibril widths and distinctive crystallographic faces of fibrils. Criteria for distinguishing amphibole cleavage fragments from amphibole-asbestos include mineralogical properties observable in bulk samples and the dimensions of particles collected on air filters. It would be very helpful to the mining and mineral industry if these properties were recognized in the regulation of asbestos.*

Introduction

Asbestos is a term applied to a group of highly fibrous silicate minerals that readily separate into long, thin, strong fibers of sufficient flexibility to be woven, are heat resistant and chemically inert, and possess a high electrical insulation and, therefore, are suitable for uses where incombustible, nonconducting or chemically resistant material is required (Gary et al., 1974).

Heat resistance, chemical inertia and high electrical insulation are properties of almost all silicates. Therefore, they are not unique to asbestos. However, long, thin, strong flexible fibers are limited almost exclusively to asbestos and are the properties that made the use of asbestos in building materials so widespread.

Nonetheless, in the regulation of asbestos, the federal government, and many state and local governments following the federal government's lead, define asbestos as anyone of six minerals: chrysotile, crocidolite (riebeckite), amosite (grunerite or cummingtonite), tremolite, actinolite, and anthophyllite. Further, asbestos is regulated on the exposure to or content of particles that are longer than 5 μm and have aspect ratios (length:width) of 3:1 or greater. This has the effect of making cleavage fragments of any of these minerals into asbestos fibers.

This paper will describe the mineralogical characteristics of asbestos and the shape of both airborne and bulk asbestos particles. The properties and dimensions relate to the habit of asbestos, distinguish asbestos from the more common varieties of the same silicate minerals, and could provide a basis for the regulation of asbestos without the inclusion of cleavage fragments for which no carcinogenic potential has been established.

A.G. Wylie is associate professor, Department of Geology, College Park Campus, University of Maryland, College Park, MD. SME preprint 88-85, SME-AIME Annual Meeting, Phoenix, AZ. Manuscript October 1987. Discussion of this paper must be submitted, in duplicate, prior to Feb. 28, 1989.

Mineralogical properties of asbestos

Chemical composition and atomic structure

In modern times, only four minerals have been mined as asbestos on a large scale: anthophyllite-asbestos ($Mg_7Si_8O_{22}(OH)_2$); grunerite-asbestos (amosite) ($(Fe,Mg)_7Si_8O_{22}(OH)_2$)); riebeckite-asbestos (crocidolite) ($Na_2Fe_5Si_8O_{22}(OH)_2$; and chrysotile ($Mg_3Si_2O_5(OH)_4$). In earlier times, actinolite-asbestos ($Ca_2(Fe,Mg)_5Si_8O_{22}(OH)_2$) and tremolite-asbestos ($Ca_2(Mg,Fe)_5Si_8O_{22}(OH)_2$) have been used locally. Other minerals, including arfvedsonite (Deer et al., 1962), potassian winchite (Wylie and Huggins, 1980) and richterite (Malyshonok et al., 1986), talc, and erionite, may occasionally occur in an asbestiform habit.

All of the major types of asbestos, except chrysotile, have essentially the same atomic structure and, because of it, are known as amphiboles. Amphiboles have a double chain of SiO_4-4 tetrahedra as their basic building block. Amphibole asbestos fibers are elongated parallel to the double chain. Chrysotile is a sheet silicate, so-called because its basic structural unit is a sheet of connected SiO_4-4 tetrahedra. Rolling up of the sheet forms its fibers.

Fibrillar structure

Asbestos of all types is composed of bundles of individual fibrils. These fibrils vary in size among the different asbestos types and occurrences. South African and Australian crocidolite have fibrils that range in width from about 500 to 2000 A. Grunerite-asbestos (amosite) from South Africa ranges from about 2000-6000 A and chrysotile fibrils from most localities range from about 200 to 500 A in width.

These fibrils share a common axis of elongation but are randomly oriented with respect to the other crystallographic directions. There have been reports of other minerals forming between these fibrils (talc, brucite), but generally asbestos fibers are monomineralic. The fibrils are held together by weak bonds and are easily separated by gentle pressure of the hand. Separation of the fibrils in this manner is not cleavage; no structural bonds are broken.

The fibrillar structure of asbestos hinders the use of single crystal X-ray techniques to study it. Instead of producing a pattern of spots, which can be interpreted to determine symmetry and structure, an asbestos fiber with a diameter of about 0.1 mm (0.004 in.) will produce a pattern consisting of lines derived from spot patterns of thousands of individual fibrils that share only one crystallographic axis in common. For many years, the inability to study asbestos by classical X-ray techniques left the determination of symmetry to the optical properties (which also are affected by the fibrillar structure)

and the common amphibole-asbestoses crocidolite and amosite were thought to be orthorhombic rather than monoclinic, which they are now known to be.

Monoclinic amphiboles exhibit the property of oblique extinction when viewed under the petrographic microscope. This property arises because the principal optic directions (X, Y, and Z) are not parallel to the principal crystallographic axes (a, b, and c). It is found in minerals that belong to the monoclinic and triclinic crystal systems, but is lacking in minerals that are orthorhombic, hexagonal, or tetragonal.

Minerals of the latter group exhibit parallel extinction. However, all types of asbestos exhibit parallel extinction, regardless of the crystal system to which they belong. This is because the individual fibrils are generally smaller than the resolution of the light microscope and their properties cannot be examined individually. Instead, a group is always observed.

In some samples of asbestos, some individual fibrils approach 1 μm in width. These fibrils are individually resolvable by light microscopy and should show the properties characteristic of the crystal system to which they belong. In some specimens they do, but in others, they do not. Amosite, for example, has fibrils that approach 5000A. These are large enough to be seen optically. However, they always exhibit anomalous parallel extinction. {100} twinning is very common in amphibole asbestos, and if pervasive, could account for this anomalous behavior (Wylie, 1979).

The parallel extinction of chrysotile arises because of the tubular structure of the fibrils. While chrysotile also occurs in fiber bundles, even if the fibrils were singular and large enough to be viewed optically, this structure would preclude oblique extinction even though chrysotile is monoclinic.

Tensile strength

The high tensile strength of asbestos is clearly related to the fibrillar structure. Asbestos has a 10- to 30-fold increase in tensile strength over nonasbestos forms of the same mineral. In the case of the amphiboles, the tensile strength varies inversely with the size of the fibril cross section (Zoltai, 1984; Sinclair, 1959). This means that the tensile strength of South African crocidolite is greater than that of the South African amosite, which, in turn has a tensile strength greater than Finnish anthophyllite.

Zoltai (1984) suggested that the high tensile strength is related to the surface structure of the fibrils as well as to their size. Under the scanning electron microscope, the surface of asbestos fibers are very smooth (Dorling and Zussman, 1987). They lack cracks and other imperfection that contribute to a decrease in the ideal tensile strength.

By contrast, cleaved fragments of the same mineral always have rough, irregular surfaces. While direct comparisons of tensile strength between cleavage fragments and fibers of the same width have never been made, the surface structure theory of tensile strength predicts higher tensile strength for smooth-surfaced fibers.

Crystal forms

Cleavage in amphiboles takes place along the {110} surfaces ({210} in the orthoamphiboles). Therefore, most amphibole particles that have been cleaved are bounded by these surfaces. However, some amphiboles may also exhibit parting along {100} and/or {010}. Parting in common amphiboles is not usually well developed. So, amphibole cleavage fragments are bounded by parting surfaces only rarely.

By contrast, amphibole asbestos fibrils are frequently bounded by {100} and {010} in addition to {110} faces with {100} being the most well developed (Harlow et al., 1984). These are dominantly crystal faces formed during the growth of the fibers, not cleavage surfaces, although parting developed along {100} twinning surfaces may contribute to the dominance of the {100} surface in some samples.

In amphiboles, the {110} surfaces meet at 120° angles. Furthermore, all {110} surfaces are equally likely to develop. Therefore, particles bounded by {110} cleavage planes will have cross sections that approximate a diamond shape: a parallelogram with internal angles of 120° and 60°.

By contrast, {100} and {010} surfaces are not equivalent in the amphiboles. The {100} surfaces are generally larger, and the cross sectional shape of amphibole particles bounded by {100} and {010} will be rectangles with a width to thickness ratio of between two and three (Wylie et al., 1982).

Size and shape of asbestos fibers

Bulk samples

Length, width, and aspect ratio distributions of populations of bulk samples of many types of asbestos have been determined (Campbell et al., 1980; Siegrist and Wylie, 1980; Shedd, 1985; Stanton et al., 1981). To some extent, the dimensional characteristics of these populations depend on the sample preparation techniques, primarily the degree of grinding. However, except under the most extreme conditions, when grinding has been so prolonged that the particles are reduced to nearly equidimensional masses, certain characteristics of asbestos are retained.

Sample preparation disaggregates asbestos fibers and, to a greater or lesser degree, separates individual fibrils. Because the cross sectional dimension of a fibril is established during the formation of asbestos, it cannot be easily altered. However, width distributions of asbestos are affected by the instrumentation used to measure this dimension (width is defined as the size of the fiber perpendicular to the direction of elongation). Studies done on TEM emphasize the distribution of the smaller fibrils, while studies based on scanning electron microscopy (SEM) often overlook the smallest fibrils. Studies done on the same instrument, however, produce width distribution that are comparable.

Another dimensional characteristic that is normally unaffected by sample preparation is the relationship between width and length. The width of an asbestos fiber is essential independent of its length (Siegrist and Wylie, 1980). Small widths are characteristic of both long and short fibers. This behavior contrasts sharply with that of cleavage fragments. For populations of cleavage fragments, as the length of a particle increases, so does its width.

Aspect ratio (length/width) has been used frequently to characterize asbestos. However, to be used effectively, aspect ratio comparisons must be restricted to particular ranges in length. For example, Table 1 gives the mean aspect ratio for particles with a length of 5 μm and 10 μm . The samples used in this and other tables were prepared or collected in a variety of different ways. The details of collection and preparation are provided in the references.

Despite the differences in sample preparation and collection, the contrast between all samples of asbestos and cleavage fragments is striking. For both, the aspect ratio is greater for 10 μm particles than for 5 μm particles, but the effect is much

more pronounced in asbestos populations. This is because there is very little difference between the width of 10 μm fibers and 5 μm fibers because the width of asbestos is established during growth, and the width is independent of the length. Therefore, there is a marked increase in aspect ratio as length increases. For cleavage fragments, on the other hand, longer particles have wider widths so the increase in aspect ratio is minimal.

Table 1 — Mean Aspect Ratios of 5 μm and 10 μm Asbestos Fibers and Amphibole Cleavage Fragments

	Mean Aspect Ratio Length	
	5 μm	10 μm
Asbestos		
amosite - Transvaal South Africa[1]	13	24
crocidolite - Kurman Hills South Africa[1]	24	40
crocidolite - Cape Province South Africa[2]	42	66
crocidolite - Australia[2]	35	56
actinolite-asbestos - South Africa[3]	13	27
tremolite-asbestos - India[3]	8	13
Cleavage Fragments		
tremolite - New York[1]	3	5
actinolite - Virginia[4]	4	5
riebeckite - Colorado[3]	4	5
grunerite - Minnesota[4]	5	6
cummingtonite - South Dakota[4]	4	7

Collection, preparation and characterization are described in the following:
[1]Campbell et al., 1980 (bulk samples)
[2]Shedd, 1986 (bulk samples)
[3]Wylie and Schweitzer, 1982 (bulk samples)
[4]Wylie et al., 1985 (airborne particles)

Table 2 presents dimensional data from bulk samples of asbestos and cleavage fragments. Two of the four cleavage fragment populations are not amphibole and would not be regulated as asbestos, although wollastonite is occasionally marketed as asbestos substitute. The high proportion of asbestos fibers with widths less than 0.5 μm reflects the growth of fibrils with the lower percentages found in samples with larger average fibril width. Among these samples, chrysotile has the smallest fibril and amosite and tremolite-asbestos the largest. Due to their small widths, virtually all of the asbestos particles have aspect ratios in excess of 10:1 (fibers longer than 5 μm). While there are some high aspect ratio cleavage fragments, most have aspect ratios less than 10:1, and less than 6% of any population of cleavage fragments have both aspect ratios in excess of 10:1 and widths less than 0.5 μm.

Airborne samples

Dimensions have been used as the basis for identifying and counting asbestos collected on air filters in occupational settings for many years. However, the dimensions that have been used (longer than 5 μm with aspect ratios greater than or equal to three to one) have very little relevance to the actual dimensions and shape of asbestos fibers. In certain occupational settings (the asbestos textile industry), this presents no problem to the accurate assessment of the quantity of asbestos in the air. In the mining and mineral industries (other than asbestos mining), however, mineral particulates can be mistakenly classified as asbestos under this definition. The problem is particularly acute when minerals that can occur as asbestos in some localities are also found in forms other than asbestos, e.g., the amphiboles.

The dimensions of airborne fibers of asbestos differ very little from the dimensions of bulk samples. There is a slightly narrower range in the width of the fibers and the extremely long fibers (greater than 500 μm) rarely become airborne. However, comparison with airborne particles of ordinary amphiboles, airborne asbestos fibers are quite distinctive. The longest particles reported from airborne amphibole cleavage fragment populations are generally less than 20 μm, while fibers of greater than 100 μm may be routinely found in airborne asbestos populations. However, the distinction between asbestos and cleavage fragments is most obvious when aspect ratio distributions are compared.

Two comprehensive studies examine in detail the size distributions of airborne asbestos. They are studies of Gibbs and Hwang (1980) and Pooley and Clarke (1980). Table 3 presents their data in terms of aspect ratio distributions. All 5μm particles have aspect ratios in excess 10:1 and greater than 50% have aspect ratios greater than 20:1 Similar data from published studies of the size distributions of airborne cleavage fragments are presented in Table 4. Among this population, 20:1 particles are extremely rare.

Table 5 presents the aspect ratio distribution of airborne asbestos fibers and airborne cleavage fragments that are longer than 5 μm and have widths greater than or equal to 0.25 μm. These are particles that should be visible by the phase contrast method for analyzing air filters (Leidel et al., 1979). While a small proportion of the total asbestos fiber is visible using optical microscopy rather than electron microscopy (column (a) in Table 6 vs. column (a) in Table 3), the prevalence of high aspect ratio remains unchanged. For airborne cleavage fragments longer than 5 μm, the additional constraint of widths greater than or equal to 0.25 μm has no effect on the aspect ratio distribution or in the proportion of airborne fiber included in this category. Essentially all airborne cleavage fragments longer than 5 μm have widths greater than 0.25 μm and are visible by optical microscopy.

Table 2 — SEM Characterization of Bulk Samples of Asbestos and Cleavage Fragments

	(a) % longer than 5 μm	(b) % of (a) with widths < 1.0 μm	(c) % of (a) with widths < 0.5 μm	(d) % of (a) with aspect ratio greater than 3:1	(e) % of (a) with aspect ratio greater than 10:1	(f) % of (a) with aspect ratio greater than 15:1	(g) % of (a) with aspect ratio greater than 20:1
A. Asbestos							
crocidolite - South Africa[1]	48	98	85	100	99	95	89
amosite - South Africa[1]	73	91	50	100	98	84	75
chrysotile - Quebec[1]	38	99	94	100	100	98	96
chrysotile - California[1]	54	98	94	100	99	97	94
actinolite-asbestos - South Africa[2]	10	96	70	100	86	70	52
tremolite-asbestos - Libby, MT[3]	43	87	54	100	88	70	52
B. Cleavage Fragments							
tremolite - New York[1]	30	7	1	47	3	2	2
riebeckite - California[2]	50	27	5	78	35	21	12
antigorite and talc - New York[1]	15	0	0	32	4	0	0
Wollastonite - New York[2]	22	22	6	82	20	9	4

Collection, Preparation and Characterization of the Samples are Described in the Following:
[1]Campbell, et al., 1980
[2]Wylie and Schweitzer, 1982
[3]Atkinson et al., 1982

Table 3 — Aspect Ratio Distributions of Airborne Asbestos Fiber, All Widths

	(a) % of total airborne fiber longer than 5 μm	(b) % of (a) with aspect ratio >3:1	(c) % of (a) with aspect ratio >10:1	(d) $ of (a) with aspect ratio >15:1	(e) % of (a) with aspect ratio >20:1
crocidolite[1]					
mining	4.1	100	100	98	93
bagging	7.1	100	100	99	96
amosite[1]					
mining	12.7	100	100	92	70
bagging	24.6	100	100	93	73
chrysotile[1]					
mining	1.3	100	100	90	62
bagging	4.2	100	100	95	79
crocidolite[2, 3]	10.60	100	100	96	89
amosite[2, 3]	25.20	100	100	88	75
Asbestos in lung tissue					
crocidolite[2, 3]		100	100	98	95
amosite[2, 3]		100	100	93	75
chrysotile[2, 3]		100	100	100	97

[1]Gibbs and Hwang, 1980
[2]Pooley and Clark, 1980
[3]Maximum width assumed to be ≤ 0.5 μm. This is based on the data of Gibbs and Hwang (1980)

Table 4 — Aspect Ratio Distributions of Airborne Cleavage Fragments, All Widths.

	(a) % of total airborne fiber longer than 5 μm	(b) % of (a) with aspect ratio ≥3:1	(c) % of (a) with aspect ratio ≥10:1	(d) $ of (a) with aspect ratio ≥15:1	(e) % of (a) with aspect ratio ≥20:1
cummingtonite South Dakota[1]	42	67	16	7	4
cummingtonite South Dakota[2]	44	28	9	2	1
Actinolite Virginia[1]	39	75	11	3	2
Grunerite and actinolite Minnesota[3]	17	12	1	0	0

[1]Wylie, et al., 1985. Collected on location by MSHA.
[2]Eckert, 1981. Collected on location by Homestake Mining Company.

Table 5 — Airborne Asbestos Fibers and Cleavage Fragments With Widths Greater Than or Equal to 0.25 μm

Total Airborne Particles	(a) % longer than 5 μm	(b) % of (a) with aspect ratio >3:1	(c) % of (a) with aspect ratio >10:1	(d) $ of (a) with aspect ratio >15:1	(e) % of (a) with aspect ratio >20:1
Cleavage Fragments					
cummingtonite South Dakota[1]	42	67	16	7	4
cummingtonite South Dakota[2]	44	28	9	2	1
actinolite Virginia[1]	39	75	11	3	2
grunerite and actinolite Minnesota[1]	17	12	1	0	0
Asbestos					
crocidolite[3]					
mining	0.69	100	100	90	57
bagging	1.20	100	100	93	72
amosite[3]					
mining	8.32	100	100	88	54
bagging	17.79	100	100	91	62
chrysotile[3]					
mining	0.82	100	100	84	25
bagging	1.72	100	100	88	49
crocidolite[4]	3.36	100	100	86	65
amosite[4]	14.58	100	100	91	69

[1]Wylie et al., 1985. Collected on location by MSHA.
[2]Eckert, 1981. Collected on location by Homestake Mining Company.
[3]Gibbs and Hwang, 1980.
[4]Pooley and Clark, 1980.

Conclusions

The dimensions of asbestos fibers are unique in the mineral world. The fibers are characterized by extremely small and uniform widths and very high aspect ratios. These properties are characteristic of both bulk and airborne samples, whether they are characterized by optical or electron microscopy. They are retained under all but the most extreme conditions because they arise from the mineralogical properties of asbestos.

Asbestos fibers attain their shape by growth, not cleavage. They are easily separated but their extremely high tensile strength makes any other manipulation extremely difficult. Their surfaces are bounded by unequal crystallographic planes making their cross sectional shape rectangular. It would be extremely helpful to the mining and mineral industries if these properties were recognized in the regulation of asbestos. Using a three to one aspect ratio for the definition of an asbestos fiber has no mineralogical justification and is not supported by any studies on the carcinogenicity of mineral fibers. ♦

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Towards a creative design process in mining

Z. T. Bieniawski

Abstract — *After many significant advances in mining, including development of sophisticated methods for strata characterization and numerical modeling analyses, the engineering design process in mining strata control is as primitive as it was two decades ago. Yet, major advances in design methodologies have occurred in other branches of engineering. Is creative design in mining a myth only? Are we deluding ourselves when we talk about innovative mining design of today? Did you know that most design experts are often unaware of their own decision-making processes? This paper explores the methodology of creative engineering design as a new recognized discipline.*

Introduction

Although mining has impressive achievements to its credit, innovation in mining has not proceeded as rapidly as innovation in other engineering branches. This became evident from a review of strata control progress in the United States (Corwin, 1977) presented as a national report at the Sixth International Congress on Strata Control.

It was noted, for example, that rock bolting represented the last technological revolution in strata control. And, while enormously successful since its introduction around the 1940s, even today rock bolt parameters and layout are specified primarily on the basis of empirical procedures and practical experience.

Similarly, a conference on rock bursts (Brown, 1985) showed that scientific knowledge existed more than 10 years ago for controlling and reducing rock burst hazards. In addition, the very word "design" is not widely used in mining. It is replaced by "engineering" to distinguish the design and planning functions from "production."

If mining is to emerge from its present decline and be ready for the challenges of the 21st century, it is important that creativity and innovation be integrated into mining strata control through better observation of the principles of engineering design. Moreover, the emphasis on design innovation is important, not only for the benefit of the mining industry, but also for the benefit of mineral engineering education. In fact, some engineering educators are themselves at fault for not placing enough emphasis on engineering design in their undergraduate and graduate courses so that graduating students are subsequently not paying enough attention to engineering design in their practice.

This aspect is particularly important in America where the social standing of an engineer is not as high as that in Europe. This, combined with the poor image of the mining industry, results in fewer young people entering the ranks of mining engineers.

Definition of engineering design

Various definitions of engineering design have been given. In essence, engineering design may be defined as that social-economic activity by which scientific, engineering, and behavioral principles, together with technical information and experience, are applied with skill, imagination, and judgment in the creation of functional, economical, aesthetically pleasing, and environmentally acceptable devices, processes, or systems for the benefit of the society.

The design process embraces all those activities and events that occur between the recognition of a social need or opportunity and the detailed specification of an acceptable solution. The designers' responsibilities continue throughout the designed life of their creation, even beyond it.

The Engineers' Council for Professional Development (ECPD) made this definition (Wilde, 1978):

"Engineering design is the process of devising a system, component, or process to meet desired needs. It is a decision-making process (often iterative) in which the basic sciences, mathematics, and engineering sciences are applied to convert resources optimally to meet a stated objective. Among the fundamental elements of the design process are the establishment of objectives and criteria, analysis, synthesis, construction, testing, and evaluation. Central to the process are the essential and complementary roles of analysis and synthesis. In addition, sociological, economic, aesthetic, legal, and ethical considerations need to be included in the design process."

It is clear from the above definition that the solution to any real engineering problem is never merely technological.

Do mining engineers perform engineering design in the course of their activities in accordance with the above definition? Do mining engineers display creativity and innovation in their design activities?

It is believed that, while mining engineers are certainly capable of creativity and innovation, they do not make full use of their talents in mine design. So-called "mine design" is a process based on empiricism and practical experience that does not qualify as engineering design in terms of the ECPD

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Injuries claimed

Oregonian 5/26/80

Ex-workers sue over asbestos

SEATTLE (AP) — Nine former shipyard workers and their spouses have filed suit in King County Superior Court against 20 asbestos companies, contending the workers became disabled after working with the material.

The suit, filed Friday, alleges that 20 companies conspired with unnamed producers and distributors of the material to supress knowledge of the dangers of exposure to asbestos and continued to expose their workers to the danger.

Unspecified damages were asked for the men. Additional damages were requested for the wives, who allegedly lost the normal support and services of their husbands.

The suit is the second in two months to be filed by shipyard workers. In March, 23 persons sued the companies, charging they had suffered health problems when they had worked various jobs for the companies from 1930 to 1978.

The nine shipyard workers in Friday's suit contend their health was damaged between 1940 and 1979.

Eight of the workers were by the Puget Sound Naval Shipyard in Bremerton and the ninth at Kaiser Shipyards in Vancouver, Wash., all during World War II. The men worked as welders, electricians, riggers, pipe fitters and asbestos insulators.

The suit contends the injuries were the result of inhaling asbestos dust and fibers.

The defendants named are AC&S Inc., American Asbestos Textile Corp., Carey Canada Inc., Armstrong Cork Inc., The Celotex Corp., Eagle-Picher Industries Inc., Fibreboard Corp., Forty-Eight Insulation Inc., GAF Corp., Garlock Inc., HK Porter Co. Inc., Johns-Manville Sales Corp., Keene Corp., Nicolet Industries Inc., Owens-Corning Fiberglas Corp., Owens-Illinois Corp., Pittsburgh Corninng Corp., Raybestos-Manhattan Inc., Standard Asbestos and Insulation Co. and Union Asbestos and Rubber Co.

Plaintiffs are Robert and Gladys Barnhill, Jack and Doris Fisher, Howard and Ingerna Moore, Thomas and Melba Mullin, Donald and Barbara Myers, Maynard and Elida Nielson, John and Victory Passinetti, Joe and Sharon Tyler and Marcus and Dorothy Windell.

Oregon School Employees Association

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Asbestos Removal Urged

John Brown, President of the 200,000 member American Association of Classified School Employees has urged Congress to provide funds for the removal of friable asbestos in the nation's public schools.

In letters to House Speaker, Thomas P. (Tip) O'Neal, D-Mass., and Senate Majority leader, Howard Baker, R-Tenn., Brown summarized the problem:

"Recent studies by the Department of Education reveal that an alarmingly high number of school districts throughout the country have schools with exposed asbestos in them. This is a time bomb and if the asbestos is not removed, it will adversely affect the lives of our children and classified school employees who come in contact with the material on a daily basis. Time is of the essence," stated Brown.

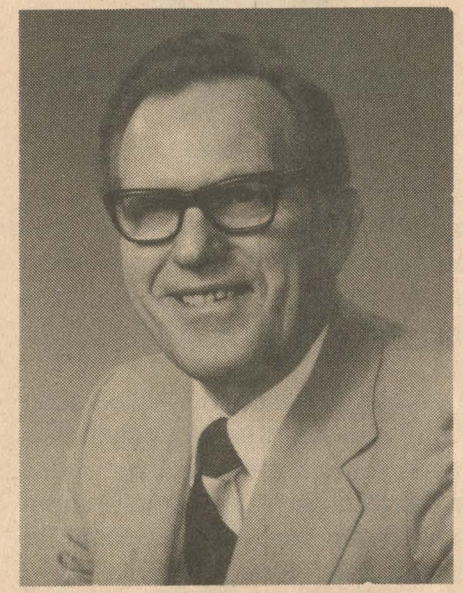
It is estimated that it will cost $1.4 billion to clean up the Nation's schools. Last year an attempt to pass legislation to fund an interest-free loan program for $50 million had failed to win support in the U.S. Senate.

Brown hopes that the Congress will act quickly and provide funding early in the session. He has instructed AACSE Executive Director, Craig J. Rancourt, to give the funding program his highest priority when congress reconvenes.

(See related article, Page 8)

In deepest sympathy . . .

It is with deep sorrow that we note the deaths of two members of Lebanon Chapter 63; Lee Edwards and Rosie McPherson.



John Brown

OSEA wins in Salem

Salem District classified employees cast an overwhelming majority vote in February to retain OSEA as their bargaining agent. The Association was challenged by the American Federation of Teachers (AFL-CIO).

OSEA received 448 of the 721 votes cast. Forty-two votes were not counted for various reasons, while 23 employees voted for no representation.

OSEA Salem Chapter 7 has represented the classified employees since 1954. The group successfully withstood a challenge by the Teamsters Union in 1975.

PERS handbooks available

The Oregon Public Employes Retirement System (PERS) has completed

Danger: for workers and for children

When asbestos fibers are inhaled into the lungs, they stay there forever, causing cancer and many other diseases. And there is mounting evidence that the microscopic particles can find their way into the body through the mouth, nose, eyes, and even skin.

Teachers and administrative personnel in schools are in danger because medical experts agree that there is no safe level of exposure to asbestos.

Children may be especially vulnerable to the deadly fibers because they breathe in and out more often than adults. And because many of the diseases caused by asbestos take 10 to 40 years to occur, children may be the chief victims.

But the biggest of all dangers may be to blue-collar school workers, especially maintenance personnel.

It is these school employees who work regularly in places where deteriorating asbestos may be present – in boiler rooms, in and around piping and ducts and in crawl spaces where insulation is present.

It is school workers who are called upon to do maintenance, construction or demolition work which may disturb asbestos materials.

And, all too often, it is school maintenance personnel who are called upon to help inspect for the presence of dangerous asbestos materials or to remove or cover up materials which have been discovered.

It is during detection or removal procedures when asbestos is most dangerous, when millions of fibers may be released into the air.

And since there are no adequate laws or enforced standards to protect school employees, school workers must know how to protect

- Boiler rooms
- Storerooms
- Auditoriums
- Lunchrooms
- Fan and machinery rooms
- Janitor sinks and closets
- Music rooms
- Swimming pool areas

Asbestos acoustic plaster is a material which usually has been applied by trowel for soundproofing purposes. It also varies in color from white to gray and it, too, becomes dangerous when it is crumbled or crushed.

Acoustic plaster is most often found in:

- Corridors
- Lunchrooms
- Offices
- Auditoriums
- Music rooms
- Sound control and projection rooms

Asbestos wrapping materials are used for the insulating of ducts, hot and cold water pipes, hot water reservoirs, pressure tanks, water meters and boilers.

Insulating materials of this kind are covered with a protective jacket made of sheet metal or fabric.

When this jacket is opened, or when it is disturbed or cut, the asbestos is exposed and may release fibers into the air.

Cement asbestos has been widely used in schools for treatment of walls, ceilings and storm drainage pipes. It is generally installed behind perforated panels for acoustical purposes.

These panels, called "transite panels," are most often found in auditoriums, lobbies and music rooms. The asbestos material is firmly bound, but it breaks upon impact and when the material is shattered, punched or broken, asbestos fibers can often be seen on the jagged

The sample can be a small portion of wallboard or plaster, a corner broken off a ceiling tile, a tuft of insulation collected with tweezers, a sliver cut from pipe covering, or dust from a deteriorating surface structure.

CAUTION: PROTECT YOURSELF. Air test samples should be taken only by experts. If you are asked to assist in the process, demand that you be given the protection of a full-face respirator mask and do not accept a paper mask. If you are required to perform normal work in a building where bulk samples have revealed the presence of asbestos and air samples are being taken, you should also wear this mask.

Air tests.

If bulk testing reveals that asbestos-containing materials are present, then air tests must be taken to analyze the actual atmosphere in a building or in a possibly contaminated site.

Air tests must be administered by trained personnel or qualified firms.

Special equipment is used to draw air from a building space through a special filter which catches even the smallest asbestos fibers.

The filter is then analyzed by a laboratory and if fibers are present, it means the building's air is contaminated.

Removing or covering up asbestos must be done safely . . .

- The work area must be completely sealed off with heavy plastic sheeting.
- Air movement must be controlled so air flows into the work area, with no escaping except through filters.
- Any power tools used on the job must have special exhaust systems to capture asbestos fibers.
- All personnel in the work area must be equipped with a full protective body suit and face mask, preferably a full-face respirator.
- Asbestos material must be wetted thoroughly before it is removed.
- Access to the work area must be restricted to people wearing protective clothing and respirators.
- Monitoring must be performed regularly around the outside of the work area to make sure no asbestos is escaping.
- School buildings should be completely evacuated until removal has taken place and air-testing confirms safety.

CAUTION: PROTECT YOURSELF. Asbestos abatement procedures should be performed by trained personnel, preferably by outside firms and not by school workers. If you are asked to perform the

may be released into the air.

And since there are no adequate laws or enforced standards to protect school employees, school workers must know how to protect themselves.

CAUTION: ENCLOSURE AND ENCAPSULATION ARE NOT GOOD REMEDIES. While standards established by the Environmental Protection Agency and other government agencies recommend encapsulation as a solution for asbestos contamination, most medical authorities agree the only safe solution is total removal of all asbestos materials.

Where is asbestos found? What does it look like?

Different types of asbestos are found in different locations and in different forms.

Sprayed-on materials for fireproofing, soundproofing and insulation are soft, fairly fluffy and cottony. They vary in color from white to dark gray.

If these materials harden, they become crusty and easily crumbled or crushed – and more dangerous.

Sprayed-on materials usually have been applied to structural steel members, ceilings and walls in these locations:

bound, but it breaks upon impact and when the material is shattered, punched or broken, asbestos fibers can often be seen on the jagged edge of the material.

Is it asbestos? Is it dangerous?

Unless you are an expert, you can't tell by looking at material whether it is asbestos or not. And, even if you know it's asbestos, you cannot tell if it is releasing dangerous fibers into the air.

If asbestos contamination is suspected, two types of scientific tests are required.

Bulk tests.

Bulk tests are done initially to determine if asbestos is actually present.

A small sample of the suspected material is simply removed from the building and taken to a laboratory for analysis.

CAUTION: PROTECT YOURSELF. The taking of bulk test samples should be done by trained experts and school maintenance workers should not engage in taking samples. If you are ordered to do so and feel you must comply, then demand the protection of at least a full-face respirator mask. No matter what ANYONE tells you, a paper mask WILL NOT protect you from asbestos fibers that may already be in the air or which may be released because of the sampling process.

If asbestos material in your school can release asbestos fibers, it must be removed or covered up.

If *bulk testing* has determined there are asbestos materials in your school and if *air tests* have determined it can or is releasing asbestos fibers into the air, it must be removed entirely or covered up properly.

This work should be done by highly-trained specialists following strict work procedures because during such procedures the material becomes the most dangerous.

If such procedures, commonly called "abatement procedures," are not undertaken, school workers as well as students, teachers and administrative personnel are *all* being exposed to deadly fibers.

There are three ways asbestos contaminants may be "abated."

1. The asbestos materials may be hidden (enclosed) by a drop ceiling, wallboard, or other "front."
2. The asbestos material may be covered up (encapsulated) with other building materials or with a coating that seals in the fibers; or
3. The material may be removed completely.

formed by trained personnel, preferably by outside firms and not by school workers. If you are asked to perform the tasks or to help, make sure you have the proper protective clothing and that these procedures are followed.

. . . and the job must be finished properly.

- Everyone leaving the restricted area must leave behind their protective clothing for disposal and shower in a special area before changing back into street clothes.
- All asbestos waste must leave the area in sealed containers with warning labels.
- When the work is completed, the plastic enclosure must be discarded along with protective clothing and other items as asbestos-contaminated wastes, again with warning labels.
- Final cleanup must be done with wet mops and a special HEPA (High Efficiency Particulate Air) vacuum cleaner (any other type of cleaner will *not* do).
- Air tests must be taken after cleanup and the work area certified asbestos-free before any maintenance personnel return or children, teachers or administrative personnel are allowed to enter the building.

Information Source: Service Employees International Union.

ASBESTOS

November 19, 1969

Mr. Frank Sharp
Route 1, Box 103
Halfway, Oregon

Dear Mr. Sharp:

The sample you sent in for a gold, silver and platinum assay is a mixture of asbestos and magnetite. The assayer will report the results of the assay directly to you.

I am writing because I believe your sample might have some value as asbestos. Asbestos comes in many types and grades and its price varies widely. This that you have is one of the lower grades as it seems quite harsh, however it is worth doing some further sampling on.

As asbestos is a very specialized field we are not equipped to do any more than just identify it. If you plan on following up on this your next step should be to write to a potential buyer to find out if they would be interested in evaluating a test shipment. One of the most active firms seeking asbestos in the area is represented by the following:

Mr. James H. Bright
Western Exploration Division
Norandex Inc.
P.O. Box 7176
Reno, Nevada 89502

Mr. Bright is no longer with Norandex but a letter to him would be forwarded to his present address as he is still in Reno.

If you are not able to make contact with him I am enclosing a list of other potential buyers.

Sincerely yours,

R. G. Bowen
Geologist

RGB:lk
Encl.

Service Employe

iu Employees nal Union. O, CLC

MAY 1983 Vol. 42, No. 9

Abatement worker strips asbestos insulation from air duct.

Death stalks the schools

Two generations of scho children, teachers, and employees have been exp to deadly asbestos. As a consequence many will di painful death in the decad come.

But the Reagan Adminis and the asbestos manufac are walking away from the problem.

They've left it up to us. get going. But they must p the mess they've left us in

From the Secretary-Treasurer

by Richard Cordtz

The asbestos scandal

Industry must pay for the contamination it has left us with

In this issue of *Service Employee* we document the frightening scandal of asbestos in the schools. What is so maddening about the deaths now facing two generations of school children, teachers, and school workers is that they need never have happened.

According to testimony given to Congress by asbestos expert Barry Castleman, the U.S. Department of Labor Statistics called for an investigation of asbestos hazards as early as 1918. By 1933, British government studies had thoroughly documented asbestos—the fatal lung disease.

When asbestos fatalities began being reported in the U.S. in the '30s, American manufacturers already knew how deadly the substance could be. Their own survey had estimated that more than half of asbestos workers had contracted the disease.

But they concealed the report. Their immediate concern was that the State of New Jersey might otherwise recognize asbestosis as an industrial disease whose victims and their survivors had the right to compensation.

KILLER

This kind of coverup became the pattern for nearly half a century, during which time millions of tons of asbestos were pressed, baked, and sprayed into hundreds of everyday objects. Particularly after World War II asbestos products were widely built into the nation's schools.

While publicly maintaining that asbestos was a miracle fiber, the industry privately commissioned study after study that again and again proved it was a ruthless, brutal, painful killer. But it kept those studies secret.

In the '50s, one company boasted that its asbestos insulation was "non-toxic"—despite five years of its own testing that showed it produced extensive asbestosis in animals.

Of course, the motive was profit, pure and simple. Castleman turned up notes from a management committee at Johns-Manville's huge New Jersey asbestos plant from the late '50s. It routinely reviewed the health reports of asbestos victims. When the plant nurse asks, "Should these men be advised?" the plant engineer responds that it could put them out of business.

THICK

Remarks another executive, "Mrs. Blanik is working with no complaints. Taking her off the job will not change things. The damage has been done."

The damage continued to be done. Surviving Manville workers say that at the New Jersey plant the asbestos dust was so thick you couldn't see across the room. The factory covered the town with asbestos dust—and asbestosis.

Manville and other asbestos manufacturers covered the whole country with asbestos after WWII—schools and hospitals, factories and offices. Now these companies are abandoning asbestos and the workers and communities they contaminated with it. Asbestos substitutes are already being manufactured—by the same companies. Though it is highly profitable, Manville has filed for bankruptcy—apparently to avoid its asbestos liability.

We can't let them get away with it! Their concealment of the medical evidence was no less than *criminal*. The resulting and totally unnecessary death of thousands of Americans, which will continue year in and year out for decades, makes them no better than mass murderers.

And yet they want us to clean up their mess and pay for it, too!

No, Corporate America must take the blame and bear the costs. Asbestos contamination is only one of the horrors the corporations have visited on us in the name of profits.

Making us whole again should be the price of their continuing to do business in our society.

Asbestos abatement workers wire brush ceiling after removal of the deadly fiber.

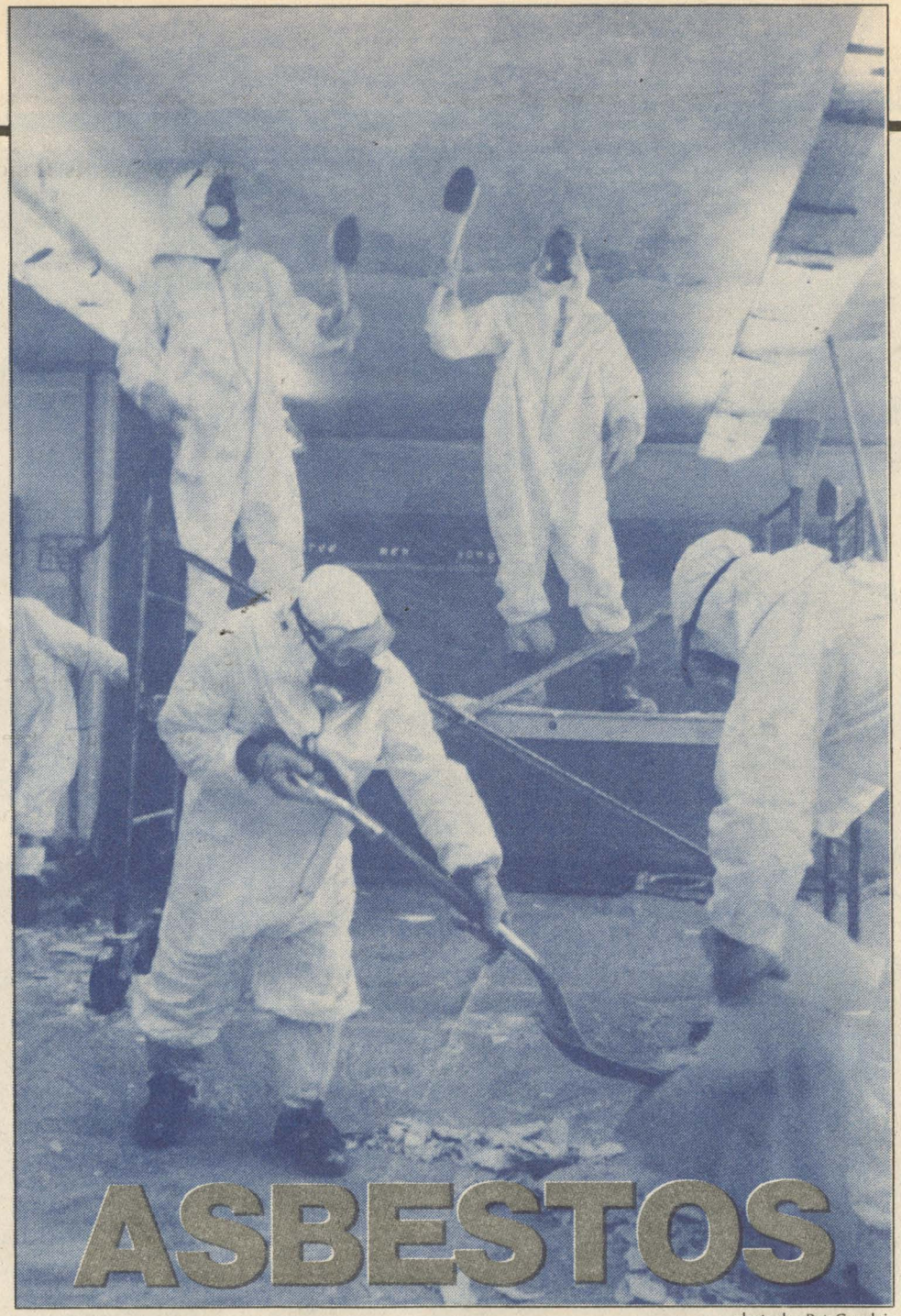


photo by Pat Goudvis

Kids, workers abandoned to painful killer

Local 99 Secretary-Treasurer Howard Friedman was quick to put two and two together when veteran maintenance worker Walter Fox called him to tell him he had cancer.

"Did you ever have reason to work in that crawl space under your building?" Friedman asked.

"Yes, I had to go in there all the time after stray cats and dogs," Fox answered.

Friedman had just read the OSHA citation against the Los Angeles Unified School District for asbestos dust in the crawl space. He believes that Walter Fox's cancer was caused by his exposure to asbestos. So does Fox's widow. Fox died only five months later—eaten up by cancer of the lungs, liver, and abdomen. He was 55.

VICTIMS

Fox was only one of the many millions of school children, teachers, and school employees potentially exposed to asbestos since it began being widely used in school construction after World War II. And he is only one of the many thousands who will die a painful death because of that exposure.

Few of the asbestos-caused cancers

'She said that there wasn't no cure'

"CBS Evening News with Dan Rather" reported on asbestos in the schools Monday, April 11. An eloquent section of the segment follows:

Susan Spencer: Using asbestos materials in schools seemed like such a good idea at the time. But as the schools have aged, so has the asbestos; and as it crumbles, asbestos fibers float into the classroom air. Mary Alice Shubert sat in just such a classroom all through elementary school. She is 19 now, and she has asbestosis.

Mary Alice Shubert: On my test it showed that I could breath in real well. But breathing out is what's—my trouble is right there.

Spencer: What did they tell was going to happen?

Shubert: Nothing. She said that it'd just get worse as the years progress and that there wasn't no cure for it.

Spencer: Mary Alice's old school has since taken care of its problems, just what Congress had in mind in 1980 when it set up a $175-million asbestos control program. But the program was never funded. At the Department of Education, its director is a one-man band with no staff and little to do. The task force on asbestos hasn't even met for two years.

photo by Pat Goudvis

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Death stalks the schools

Few of the asbestos-caused cancers of the respiratory and digestive systems of the body can be cured. There is no treatment at all for asbestosis, a progressive scarring of the lungs by the tiny metallic fibers that make up asbestos. And since asbestos in the body may lie dormant for 20 to 40 years, the trail of victims from deteriorating asbestos insulation, flooring, or acoustic tiles will lead well into the next century.

Manufacturers knew asbestos was deadly as long ago as the '30s. (See editorial, page 2.) But its use in school construction wasn't banned until the '70s. Only last year did the Environmental Protection Agency (EPA) require that all schools be inspected for asbestos and that all workers and parents be notified of the results.

Legally, that process is supposed to be completed by the end of this month. But whether the schools will actually be inspected—and whether they will do anything about the asbestos contamination they find—is anybody's guess. Under the Reagan Administration, the EPA avoided setting up any way to enforce the inspection requirement. And it has abandoned attempts to draw up cleanup regulations.

EXPOSURE

This is despite EPA estimates that more than 8,600 schools nationwide may currently be contaminated with "friable" (flaking) asbestos, exposing more than three million school children, teachers, and school workers.

Local 99's Friedman says that the Los Angeles inspection program has revealed asbestos contamination at most schools and that the school district has ordered corrective work at more than 200 of them. In conjunction with the White Lung Association, the union has trained stewards about asbestos, and Friedman has demanded that the school district give medical tests to all school workers.

"The more we look into it, the more we find asbestos-related diseases," Friedman worries. The asbestos situation in the schools is "a nightmare," he says. "It just gets worse and worse. It's going to be a very long haul."

Other SEIU locals have also run into problems with asbestos. Ordered to remove it—an extremely hazardout job without proper training and equipment—Local 454 school custodians in Newton, Mass., flatly refused.

FAMILIES

And not just maintenance workers are affected. Local 400 demanded that letters be placed in the files of all clericals exposed to deteriorating asbestos insulation after San Francisco City College complied with an order to remove it. Such letters will aid them in getting compensation should they become victims.

While *all* asbestos in the schools may someday be a danger, only the asbestos that has deteriorated is currently dangerous. And not all of those exposed to it are stricken with asbestosis or asbestos-caused cancers. Conservative estimates of yearly deaths due to asbestos in the schools are 300 a year.

But no level of exposure is safe, as victims among the families of asbestos workers can testify. And since the amount of asbestos they were exposed to—dust that came home on work clothes—is similar to the amount of exposure in contaminated schools, the 40 percent lung abnormalities among the families of asbestos workers may be a better indicator of the clear and present danger.

The Los Angeles schools have been mandated to "identify and render safe" all asbestos hazards. But ensuring that they do so is taking a lot of pushing and pulling. Besides the Local 99 program, the White Lung Association has formed volunteer "asbestos committees" in individual schools. Parents, teachers, and school workers have banded together to educate themselves and to monitor the cleanup.

POLITICAL WILL

In an article in its magazine, the National PTA has urged that local PTAs use the EPA-required inspections "as a means to demand corrective measures from schools."

Concerned that prohibitive costs may deter many school systems from getting rid of their asbestos, the PTA asserts that "there is no logical reason to put the costs of inspection and cleanup on the taxpayers when there are viable legal ways to recover the costs from the manufacturers."

In 1981, the U.S. Department of Justice recommended that school districts do just that—file suit against asbestos companies to recover costs. But within a year one of the biggest asbestos manufacturers, Manville, a highly profitable company, declared bankruptcy rather than pay the liability claims of its workers—let alone the school districts it has victimized.

Warns Local 99's Friedman, there is "no escaping" asbestos once a school is contaminated. Adds the White Lung Association's Marilyn Hunter, a school teacher herself, all the asbestos could be ripped out of the L.A. schools for what the Defense Department pays for four Abrams tanks.

But whether the schools are freed of the asbestos danger—and the victims and their survivors are compensated—will ultimately depend on the political will of American workers. That will may be felt at the polls in 1984, and in federal legislation that follows. But then, and now, political muscle will also have to be asserted locally, through the kinds of coalitions SEIU locals have used so effectively in other matters of public policy.

Here's what we do!

SEIU represents school workers from Boston to Los Angeles, Washington to Seattle. In coming months, they and their local unions can play an important part in assuring that the schools where they work are free of asbestos contamination.

- By May 27, your school should have been inspected and the results reported to parents, teachers, and school workers. If that hasn't happened, help your local union leaders make sure that it does.

- Your local union may need your support to be assured that cleanup is undertaken seriously and promptly and that it is monitored closely. The International union will provide educational brochures, training sessions, and technical expertise to local unions on request.

- Warning: asbestos abatement is extremely hazardous, and you should not perform it or be around it without training and equipment. If you are asked to, inform your local union.

- Membership in the White Lung Association is on an individual basis and costs only $5 a year. Comprised of asbestos victims and their families and supporters, the WLA has chapters throughout the country. Contact it at 1114 Cathedral St., Baltimore, Md. 21201.

March 20, 1951

Mr. W. W. Oughtred, Exploration Manager
Asbestos Corporation Limited
Thetford Mines, Quebec
Canada

Dear Mr. Oughtred:

Thank you very much for your letter of March 15 enclosing Mr. Preboy's report on the Mt. Vernon prospect. I am very glad to have this report for our records.

You may be sure that we shall keep our eyes open when we are in peridotite or serpentine areas both of northeastern and southwestern Oregon to see if we can turn up something that would be worthwhile from an asbestos standpoint.

With very best regards,

Sincerely yours,

Director

FWL:jr

Have rept to Library a-27-51

REG. CABLE ADDRESS "AMASCOLIM"

CODES A.B.C. 6TH & 7TH BENTLEY'S; BENTLEY'S SECOND; ACME

ASBESTOS

ASBESTOS CORPORATION LIMITED

A. L. PENHALE, PRESIDENT & MANAGING DIRECTOR
C. W. COLBY, PH.D., VICE-PRESIDENT
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GENERAL OFFICE
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CANADA

GEO. F. JENKINS, GENERAL MANAGER
J. A. D. MARCOTTE, GEN'L SALES MANAGER & SECRETARY
P. PAYEUR, TREASURER

March 15th, 1951.

Mr. F. W. Libbey,
Director,
State Department of Geology and
Mineral Industries,
702 Woodlark Building,
Portland 5, Oregon.

Dear Mr. Libbey:

Preboy has finally completed his report on the Mount Vernon prospect and I am enclosing one copy for your file.

You will note that the percentages of fibres were all extremely low and can see no possibilities for the property at all. However, we still have hopes that either you or your staff will find some new prospects for us.

Regards to all.

Yours sincerely,
ASBESTOS CORPORATION LIMITED

W. W. Oughtred,
Exploration Manager.

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ASBESTOS FIBRE DIVISION

TEL. UNIVERSITY 6-9701

970 SUN LIFE BLDG. · MONTREAL, QUE.

April 13, 1954.

Mr. F. W. Libbey
Director
Department of Geology and Mineral Industries
1069 State Office Building
Portland 1, Oregon.

Dear Mr. Libbey:

With further reference to my letter to you of February 19, I have attached a geological plan and section, together with the diamond drill logs from the drilling of the Foster asbestos property located in Josephine County and north of Kerby.

In addition I have attached a geological plan of the Stithem asbestos property located in Grant County and near Bates, together with the diamond drill logs of the four holes completed.

I trust that this information will prove to be of some value to you.

Yours very truly,

N. W. Hendry,
Exploration Manager.

Attachments.

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970 SUN LIFE BLDG. • MONTREAL, QUE.

February 19, 1954.

Mr. F. W. Libbey
Director
Department of Geology and Mineral Industries
1069 State Office Building
Portland 1, Oregon.

Dear Mr. Libbey:

Your letter of February 8th to Mr. John Gill of our staff has been referred to my attention.

I will have prepared, plans of the Bates and Kirby asbestos prospects drilled by us, showing the various drill holes put down. Also the geological logs of these holes will be forwarded to you.

The excellent cooperation received from your Department while we were working in Oregon is very much appreciated and I am hopeful that we will find something more of interest in the State in the not too distant future.

Very truly yours,

N. W. Hendry,
Exploration Manager.

Sent copy to Wagner 2-25-54

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FEB 24 1954
STATE DEPT. OF GEOLOGY
& MINERAL INDS.

February 8, 1954

Mr. John Gill
Canadian Johns-Manville Co., Ltd.
P.O. Box 1500
Asbestos, Quebec

Dear John:

Receipt is acknowledged of your letter dated February 4 ordering four copies of the geologic map of the Kerby quadrangle.

Since the price of the map alone is 80¢ and the price of the map plus the bulletin is 85¢, I am sending you the bulletin and map. The four copies are going forward to you in a separate package and I am enclosing bill.

We were glad to be of such assistance as we were able and hope that you will return to Oregon sometime in the not too distant future, with more success. It seems to me that you told Wagner that you would give us, for our records, the results of your drilling and sampling. If you can do this both for central Oregon and southern Oregon, we would appreciate it very much.

Sincerely yours,

F. W. Libbey
Director

FWL:jr
Encl.

CANADIAN Johns-Manville CO., LIMITED

ASBESTOS FIBRE DIVISION

TEL. 100

P.O. BOX 1500
ASBESTOS, QUEBEC

AIRMAIL

February 4, 1954.

Mr. F. W. Libbey,
Director,
State Department of Geology and Mineral Industries,
Portland, Oregon.

Dear Mr. Libbey:

Would you please send me at your earliest convenience, (4) copies of the following map:

Preliminary Geologic Map of the Kerby
Quadrangle, Oregon scale 1: 96,000

I realize that this map accompanies a report which we do not require but which may have to come along with the maps so I don't know what they will cost, but I shall see that the amount is immediately remitted to you.

I take this opportunity of thanking you and all members of your Department for your cooperation in our program, and I hope that justification will be found for renewing our West Coast operations again someday.

Sincerely,

John Gill

John Gill

JCG:ML

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& MINERAL INDS.

Asbestos

September 8, 1953

Mr. Jack C. Gill
Bates, Oregon

Dear Jack:

Thanks for your letter of September 5.

Glad that you are still nosing around and have found a few properties to interest you. Here's hoping they develop into something.

Enclosed is a copy of my letter to Mr. Foster. I really think that if he tries to enter this field he will have quite a long dry spell. However, I will try and make a point of calling on him and talking to him when next I am in that area.

Best wishes to you and Mrs. Gill.

Sincerely,

Hollis M. Dole
Geologist

HMD:lk
Encl.

Bates, Oregon.
September 5, 1953.

Dear Hollis:

I regret that we passed through Portland last time at too early an hour to contact you, but I hope other opportunities will occur. I hope also that you and Mr. Libbey are winding up a successful summer.

I have been spending a lot of time in Grants Pass area lately, not finding much but enough to keep some hopes alive anyway. I think we are going to drill one of these prospects not far from Kerby, so I have made several trips between Bates and that place.

There is a young fellow down here, Donald Foster of Kerby who may be very useful to geologists both in govt and industry who need polished and thin sections. He is already a skilled lapidary worker and could easily learn how to make sections, I am sure, if he could find any demand out here in the West. War service has damaged his health so that this kind of thing ~~would~~ may be ideal for him, either full time or as a sideline and I really think he has the flair for it. He has a diamond saw and many other tools for it, also.

If you can supply him with any information, for or against this notion he would appreciate it. (address Box 152, Kerby, Ore.)

With best regards

Jack Gill

- Asbestos

April 1, 1953

Mr. J. C. Gill
Canadian Johns-Manville Co., Ltd.
P.O. Box 1500
Asbestos, Quebec

Dear Mr. Gill:

This is in reply to your letter dated March 27.

I was glad to learn that you will be in Oregon again this summer and I trust you will find sufficient encouragement in your exploration work to continue your examination of possibilities in this State.

I have looked up the reference you mentioned in Vol. II, No. 2 of the Mineral Resources of Oregon by Butler and Mitchell and the reference is so indefinite that I cannot determine what the geographical location may be.

Chrysotile asbestos has been reported from the area near Carpenterville south of Gold Beach in Curry County but so far we have not been able to pin-point the occurrence. This is a serpentine area and asbestos does occur in it but it has not been determined that it occurs in sufficient quantity to provide an economic deposit. It seems to me that it might be to your advantage to make a reconnaissance of this area and it might be that one of our geologists could accompany you for a time at least to show you where the area is.

With best regards,

Sincerely yours,

F. W. Libbey
Director

FWL:jr

CANADIAN Johns-Manville CO., LIMITED

ASBESTOS FIBRE DIVISION

TEL. 100

P.O. BOX 1500
ASBESTOS, QUEBEC

March 27, 1953.

Director,
State Department of Geology and Mineral Industries,
702 Woodlark Bldg.,
Portland 5, Oregon.

Dear Mr. Libby:

According to present information I shall again be in charge of western operations this season, and would appreciate any further information you may have about Oregon asbestos deposits.

I have in mind, particularly, a deposit near Gold Beach, Curry County. According to your list of published geologic maps, there was a preliminary report in 1916 by Butler, G.M. in Mineral Resources of Oregon vol. 2 no. 2 and I would like to get a copy if possible and the names and addresses of present owners. I am also looking up the Illinois river deposits again and hope to get a larger scale base map than the geologic map of Kerby quadrangle affords (1: 96,000).

Trusting we will meet this summer I am,

Sincerely,

J.C. Gill
Per mh.

J. C. Gill

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& MINERAL INDS.

Asbestos

November 21, 1952

Mr. J. C. Gill
Canadian Johns-Manville Co., Ltd.
Bates, Oregon

Dear Mr. Gill:

In your recent letter you will remember that you mentioned a record of an asbestos claim on Starveout Creek located by a Mr. Curtis.

I wrote to Mr. Curtis in regard to asbestos on his claims and he replied as follows:

> "In regards to asbestos on my mining claims on Starveout a very small amount of asbestos, very short fibers. One chrome claim has short fibers of asbestos. However I haven't noticed any cross fiber asbestos. However a friend of mine on Graves Creek has asbestos: Mr. Glen Booth, Sunny Valley, Oregon."

I shall write to our Mr. David White at Grants Pass and ask him to run down, if possible, the asbestos owned by Mr. Glen Booth as reported by Mr. Curtis.

Very truly yours,

Director

FWL:jr

Asbestos

November 12, 1952

Mr. J. C. Gill
Canadian Johns-Manville Co., Ltd.
Bates, Oregon

Dear Mr. Gill:

I wish to reply to your letter dated November 8 in which you inquire about certain reported asbestos occurrences in the State.

We have nothing bearing on Oliver Bowles' reported occurrence of chrysotile in Malheur County in his Bureau of Mines Bulletin 403. I am not too familiar with the surface geology of Malheur County but I should guess that any serpentine in the county would be in the extreme northern part. I know of none in the county south of the Malheur River to the California line. I am sending a copy of this letter to Mr. Wagner and if he can throw any light on the matter he will get in touch with you. I am sorry that we do not have a report of the locality on which the Montbestos Company reportedly did the work in Malheur County in 1934.

The Starveout Creek area in Douglas County is north of the Evans Creek drainage and would be considered in the Cow Creek drainage. There is a fairly wide belt of serpentine trending northeasterly which goes through the country there. Chromite occurrences are reported at the head of Starveout Creek and the claims on which the chrome occurs correspond with our file reports on a gold property in serpentine located by the Curtis brothers whom you mention as having located asbestos claims. We have no information on asbestos on the Curtis brothers' ground but, of course, it would be entirely possible that some was found there. I have in mind writing to these people in an attempt to find out whether or not they have ever observed any asbestos on their claims. Incidentally many of Stafford's localities were secondhanded reports and the information contained in his paper is not always reliable.

We know of asbestos in the extreme northern part of Jackson County but it is amphibole and would not be of interest to you. We have a report of talc occurrences near Canyonville but no asbestos was reported in the area visited by our men. There is an occurrence of amphibole asbestos near Evans Creek in about the central part of the Evans Creek drainage but it is amphibole.

It has always seemed to me that there would be a good chance of finding chrysotile in the serpentine or peridotite rocks of western Curry County. I have seen specimens from there but we have never been able to spend sufficient time prospecting to run any of them down. Sometimes I think it might pay the State to hire a prospector to run down some of these reported occurrences. However, so far it has not seemed feasible to attempt such a project.

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P.O. BOX 1500
ASBESTOS, QUEBEC

Bates, Oregon.
Nov. 8, 1952.

Mr. F. W. Libbey
Director
State Dept of Geology
702 Woodlark Building
Portland 5, Oregon.

Dear Mr. Libbey:

Could you please give me some assistance in locating the following asbestos deposits in this state. I should like to investigate these this season or early next year:

(1) Malheur County = Bowles' report on Asbestos.
U.S.B.M. Bulletin #403 mentions chrysotile was prospected somewhere by Montbestos Co. formerly United Asbestos Products Corp in 1934

Dwg 2
Sec 8

(2) Douglas County - Evans Creek in the Starveout Creek Area. (Riddle district, southwest part of county)
O. F. Stafford in 1903 listed several occurrences

Gr
W½ sec 5
T 33 S
R 4W

Lge Serp area NE-SW goes thru head of Starveout Cr

Curtis Mine (Au) lead of slaves out Cr - W½ sec 5
Au in talc seams in black serp. Morrison 1939
33S
4W

CANADIAN **Johns-Manville** CO., LIMITED

ASBESTOS FIBRE DIVISION

Talc - Chas Lidja Canyonville

TEL. 100

P.O. BOX 1500
ASBESTOS, QUEBEC

of asbestos in this county. The Curtis Brothers staked three claims on Evans Creek in that year. Stafford also mentioned other locales, eg Canyonville, Perdue and Cow creek but didnt say what types of asbestos were found.

Our company is solely interested in cross-fibre types of asbestos of which chrysotile seems to be the only mineral here in the West. This fact may eliminate some of the above-named occurrences. If you havent more information about them, perhaps you could direct me where to enquire.

I shall be here at Bates until our drilling program is completed or the weather becomes too severe for the latter. Mr. De Witt sends his regards.

Thanking you for your attention

I am

Yours truly.

J. C. Gill

State of Oregon
DEPARTMENT OF GEOLOGY AND MINERAL INDUSTRIES
702 Woodlark Building
Portland, Oregon

Mineral Occurrence

Chrysotile Asbestos
Reported by W. W. Blackwell, 1617 Valley Ave., Baker Ore.

Location:—
At Junction, (and just above) of Willow Cr. and Warman Basin Cr., about 6-8 miles up Willow Creek above Brogan, Ore. Asbestos said to be visible in rocks right in creek banks of Willow Cr. at and just above jct.

E.K.N.

ASBESTOS

(Abstracts from letters culled from the old Oreg. Bureau of Mines and Geology Files)

Mr. Will B. Bell, Jacksonville, Oreg. June 18, 1918.
The sample -----I find to be a very good grade of asbestos.. If you can develop a considerable tonnage of this material it should have a rezdy sale. (Director)

Mr. J. Ballweg, Baker, Oregon. Aug. 30, 1917.
Your specimens of asbestos are of the amphibole variety, actinolite. --- The two larger specimens are practically pure actinolite. The smaller specimen contains as well a considerable quantity of quartz. ----- it would probably be of commercial value.

Mr. C. B. Handy, 201 Stock Exchange Bldg., Portland, Oreg. Oct. 24, 1916
The sample has been analyzed qualitatively and proves to be serpentine asbestos, a hydrated magnesium silicate containing small percentages of aluminum and iron.

Mr. Chas. M. Faulkner, Burns, Oreg. Sept. 27, 1916.
Answer to a letter requesting information about asbestos. Claims to "have found a ledge which seems full of asbestos and when the ore is pulverized, the asbestos can be gathered with the hands from the rock."

Mr. R. W. Allen, Hood River, Oreg. Aug. 11, 1915.
Allen says "While in Grant County recently I run across an asbestos prospect which has considerable of the enclosed material in a soft rock. This particular piece shows fiber of about ½ the average length that is to be found in that locality."

Mr. H. H. Fawbush, R. F. D. # 2, Box 124, Hood River, Oreg. Feb. 18, 1916
"where it is found in a small vein (8 or 10 inches thick)"

Mr. C. W. Brown, Canyon City, Oregon. Aug. 3, 1916.
"I have mailed to you to-day under separate cover a sample of asbestos ore. I would like to know whether this grade or kind has any connercial value, if so how much per ton." Upon examination -- proves to be amphibole asbestos.

Mr. H. L. Watson, Secry., Dalles-Wasco County Chamber of Commerce, The Dalles, Oregon. Oct. 13, 1922.
"Enclosed find a smalll sample of rock formation which has been pulled into the present condition. Will you please inform us if this is asbestos." It was.

Mr. J. F. Phy, Mgr., Security Land & Savings Co., La Grande, Oreg.
April 19, 1922.

"We have a small sample (of asbestos) that has been handed to us, and it is perfectly clean and white, and we understand there is a considerable quantity of it."

State Chamber of Commerce, Oregon Bldg., City. March 21, 1922.

"The sample of asbestos which is submitted with your letter is of the amphibole variety."

Mr. W. J. Book, Baker, Oregon March 6, 1914.

"Am sending you another sample of asbestos". .... is an excellent specimen of amphibole asbestos.

Wall Street Journal
February 18, 1987

Widening Horizons

Lawyers Lead Hunt For New Groups Of Asbestos Victims

With Offers of Free X-Rays, Attorneys Solicit Seamen, Tire Workers and Others

Just Chasing Ambulances?

By BILL RICHARDS and BARRY MEIER
Staff Reporters of THE WALL STREET JOURNAL

Among the bills and throwaways stuffed in his mailbox one day last June, Joseph Abela found a letter about asbestos. "You may be in danger of death," it warned.

Mr. Abela, a 60-year-old former merchant seaman in Detroit, says the idea of dying from asbestos poisoning hadn't crossed his mind up to then. Nor had the prospect—also prominently mentioned in the letter—of a damage award "in the six- to seven-figure range." Following the letter's instructions, Mr. Abela joined other veteran seamen at a local medical clinic for free chest examinations. Within weeks, the clinic informed him his lungs showed asbestos damage.

"It was a big word they used to say what I got," Mr. Abela says, struggling to pronounce "asbestosis," a disease that can disable and kill. In any event, he adds, "They told me my case is in the hands of the lawyers now."

In fact, Mr. Abela's recruitment into the ranks of asbestos litigants was engineered from the start by lawyers, not doctors. His case and thousands of similar lawsuits filed recently mark what legal and medical experts say is a major shift in product-liability tactics.

'New-Product Development'

For the first time, lawyers are replacing research scientists at the head of the hunt for new asbestos victims. With tactics ranging from dragnet medical screenings to direct-mail solicitations, they are sweeping new groups of workers and companies into the asbestos fray and swamping court dockets, just as the 10-year flood of asbestos litigation seemed to be ebbing.

"This is new-product development for asbestos litigators," says Calvert Crary, a litigation analyst for Bear, Stearns & Co. With asbestos court awards and settlements averaging around $70,000, Mr. Crary says, asbestos lawyers "are naturally looking to widen their sphere."

The lawyers say they hold out hope of treatment and legal redress to thousands of workers whose asbestos exposure has long been ignored by employers, government agencies and unions. But as the attorneys cross the line between law and medicine, their tactics are generating controversy as well as lawsuits. Critics say the screenings are nothing more than a sophisticated version of old-fashioned ambulance-chasing. Some medical experts also raise questions about the accuracy of the tests.

New Suits

Nevertheless, the tactics are having a broad impact. "There's no question we're concerned," says Floyd H. Knowlton, the vice president for casualty claims at Travelers Insurance Co. Mr. Knowlton says that until about six months ago, most of Travelers' asbestos claims came from shipyard workers who had worked directly with asbestos. "Now," he says, "they're coming from all over."

Two West Coast lawyers, for example, started a screening program last year that dispatched three rented vans equipped with mobile X-ray units to test tire workers at 72 union locals around the U.S. The result: nearly 1,000 new asbestos lawsuits with thousands more being readied. In another instance, lawyers were posted at a Seattle clinic where sheet-metal workers were being screened for asbestos problems. Unions representing steelworkers, machinists and school janitors are setting up similar screening programs.

Asbestos hazards, of course, have been known for decades. In the late 1920s, British researchers blamed the fibrous mineral for lung cancers and other respiratory diseases among textile workers who wove asbestos and inhaled its dust. Asbestos is now considered the leading cause of workplace-related cancer deaths, says William Nicholson, an epidemiologist at Mount Sinai School of Medicine in New York. And despite recent regulatory action sharply limiting asbestos use, the AFL-CIO estimates 2.5 million U.S. workers are still exposed to the deadly material.

Spotty Epidemiology

Yet much of the asbestos epidemiology—the scientific effort to identify groups at risk—has been spotty. Medical investigators have aimed their efforts at presumed high-risk workers—those who fabricated asbestos or installed it as insulation in ships and buildings. Most of the some 40,000 workers who have filed asbestos claims to date have been members of those groups.

"In the past, a researcher might decide to study a certain occupational group or a guy in that group might decide to go see his local doctor," says Edward J. Carlough, the head of the Sheet Metal Workers International Association, which recently hired a South Carolina law firm to direct asbestos screenings for 33,000 sheet-metal workers. "If the doctor was trained to spot asbestos problems, the worker might end up going to his lawyer."

The lawyers' new tactics seek to shorten that process. For example, Mr. Abela and other merchant seamen are now being tested by the Maritime Asbestos Le-

Please Turn to Page 21, Column 1

Widening Horizons: Lawyers Seek New Groups of Asbestos Victims

Continued From First Page

gal Clinic, run by Detroit-based maritime lawyer Leonard Jaques. Mr. Jaques believes the sailors face special risks because they spend weeks at a time cooped up on ships filled with asbestos insulation.

Since September, Mr. Jaques has filed asbestos claims on behalf of more than 1,500 seamen in federal district court in Cleveland—three times the number of asbestos cases filed in that court in the past three years. He plans to test 20,000 more seamen for asbestos damage.

Gordon Stemple, a Los Angeles-based plaintiffs' lawyer, stumbled on asbestos problems among tire workers in 1985. He says he was looking into allegations of chemical contamination of groundwater around a former Firestone Tire & Rubber Co. plant in Salinas, Calif., at the time. Tire making hadn't previously been linked to asbestos, but X-rays of former tire workers who lived near the plant showed 54 of 84 workers had asbestos-like lung damage, Mr. Stemple says.

The lawyer believes the problem stemmed from industrial talc, a floury material used to make tires. Some talcs contain tremolite and anthophyllite, two fibrous minerals that can cause lung damage similar to asbestos.

X-rays for Tire Workers

Mr. Stemple quickly sent vans offering free chest X-rays to tire-worker union halls in 25 states. Should a worker's X-ray indicate lung damage, the lawyer urges him to sue. If workers use another lawyer, Mr. Stemple charges them $250 for the test. Most choose Mr. Stemple.

Richard L. Brown, a 41-year-old tire worker, was examined last June, after Mr. Stemple's van set up shop opposite Firestone's tire plant in Des Moines, Iowa. Technicians X-rayed Mr. Brown's chest from three directions and checked his lung capacity during the 30-minute exam. The test results came back four months later. Mr. Brown's wife, Sharon, opened the envelope. The diagnosis: asbestosis.

"She was really shook up," recalls Mr. Brown, who is also a local union president. "She kept saying, 'How come you never told me working in the plant was dangerous

What's more, at the behest of some shipowners, the U.S. Coast Guard recently asked legal-ethics boards in the District of Columbia, Michigan and Pennsylvania to investigate the lawyers' links to direct-mail solicitations of seamen. Many letters feature an appeal from a retired Coast Guard admiral for seamen to seek free X-rays and legal help but don't mention Mr. Jaques's involvement. The Coast Guard regulates merchant shipping. The ethics boards declined to comment.

Maritime-union officials, meanwhile, complain that Mr. Jaques's mailings are laced with questionable claims. One letter, for example, attributes the 1980 cancer death of actor Steve McQueen to asbestos. Mr. McQueen was a merchant seaman for several years prior to his Hollywood career. "We know what happened to Steve is happening to seamen of all waters," the letter warns. Although Mr. McQueen's relatives blamed asbestos for the actor's death, doctors said cigarette smoking and chemical exposure may have also played a role.

Mr. Jaques makes no apologies. He says his tactics are designed to counter efforts by shipowners and others to undermine his work. "We're trying to ring a warning bell to seamen and we're going to ring it as loud as possible," he says.

Indeed, one of Mr. Jaques's allies is Irving Selikoff, a world-renowned researcher who first linked asbestos to lung cancer among U.S. workers. Recent research by Dr. Selikoff, financed by Mr. Jaques, found signs of asbestos-related disease in about 35% of some 2,300 former U.S. seamen tested.

Ethical Questions

Yet several attorneys, after reviewing Mr. Jaques's mailings, say the lawyer's enthusiasm may be carrying him overboard. In particular, they say, Mr. Jaques, by offering asbestos claimants visions of "six- to seven-figure" awards, might be violating the American Bar Association's model code of ethics, which bars lawyers from, among other things, creating "unjustified expectations about the results a lawyer can achieve." Mr. Jaques rejects any suggestion of impropriety and maintains that large awards have been granted to as-

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cut from paper

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John A. Knebel
President

MEMORANDUM

February 20, 1987

RECEIVED-PTLD
MAR 0 2 1987
DEPT. OF GEOLOGY
& MINERAL INDUS

TO: State Mining Associations
State Mining Departments

FROM: Michael F. Duffy, Senior Counsel

RE: Potential OSHA Regulation of Nonasbestiform Minerals

The Occupational Safety and Health Administration is presently engaged in a rulemaking proceeding that could adversely affect significant segments of the U.S. mining industry. State and local initiatives to regulate these same segments of the industry have also been reported. This memo is to update you on this issue in the event you may not be fully alert to its ramifications.

BACKGROUND:

On June 20, 1986, OSHA issued a final rule to regulate asbestos. Among extensive monitoring and control requirements, the standard sets an exposure level for asbestos at 0.2 fibers/cubic centimeter. The scope of the standard goes on, however, to apply the same restrictions on nonasbestiform tremolite, actinolite, and anthophyllite. These three non-fibrous minerals, particularly actinolite and tremolite, occur widely throughout U.S. mining districts. In response to challenges filed by the R.T. Vanderbilt Company and the National Stone Association, OSHA elected to stay the standard until April 21, 1987, as it applied to the three nonasbestiform minerals.

On October 17, 1986, OSHA formally stayed the new asbestos standard (as applied to nonasbestiform minerals) but at the same time decided to apply the prior (1972) OSHA asbestos standard to the three nonasbestiform minerals (Exhibit 1). AMC and others strongly objected to this action and argued that the 1972 standard was not intended to cover nonasbestiform minerals (Exhibit 2).

The essence of the mining industry's objection to OSHA's position is that the agency has not clearly distinguished between asbestiform and nonasbestiform varieties of minerals. Indeed prior OSHA definitions referred to tremolite, actinolite and anthophyllite without distinguishing between their asbestiform and nonasbestiform habits, which are mineralogically different (Exhibit 3).

In its most recent asbestos standard, OSHA has somewhat improved its mineralogical definition but has still decided to

regulate the three nonasbestiform minerals as though they were asbestos. As support for its decision, the agency cites certain health studies that have been called into serious question and are now being re-evaluated by the National Institute for Occupational Safety and Health.

Furthermore, OSHA characterizes as asbestos "fibers" any particle that has an aspect ratio of 3:1, that is, anything 3 times longer than it is wide. This characterization makes it extremely difficult to distinguish between actual "fibers" and so-called "cleavage fragments" derived from nonasbestiform minerals.

AMC pointed out these serious scientific deficiences to OSHA in comments filed in response to the agency's proposed asbestos standard issued in 1984 and that formed the basis for the final standard issued in July 1986 (Exhibit 4).

Of concern to the mining industry in both OSHA plan and non-plan states is that precipitous regulatory action will be taken by state and local governments without a full awareness of the partial stay of the federal standard and without knowledge of the basic mineralogical and health disputes relating to the potential regulation of nonasbestiform minerals. AMC, therefore, urges that you review the enclosed materials and, in turn, urge state and local governments to consider the adverse impacts on mining that would arise through inappropriate regulation of nonasbestiform minerals.

Attachments

Exhibit 1

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John A. Knebel
President

MEMORANDUM

October 20, 1986

TO: Occupational Health Committee
Noncoal Mine Safety Committee
Coal Mine Safety Committee
Health and Safety Contacts
Task Group on OSHA Rulemaking for Nonasbestiform Minerals

FROM: Michael F. Duffy, Senior Counsel

RE: OSHA's Administrative Stay of Its Asbestos Standard Respecting Nonasbestiform Tremolite, Actinolite and Anthophyllite

By Federal Register notice of October 17, 1986, the Occupational Safety and Health Administration (OSHA) has officially stayed its asbestos standard with respect to nonasbestiform tremolite, actinolite and anthophyllite. The stay will be in effect for nine months as of July 21, 1986.

In announcing the stay, however, OSHA also indicated that it will apply its 1972 asbestos standard (redesignated 29 CFR 1926.1101) to those nonasbestiform minerals. The interim standard sets a limit of two fibers per cubic centimeter for tremolite, actinolite and anthopyllite fibers of five micrometers or longer.

The agency also announced that it will reopen the rulemaking record shortly for the purpose of receiving evidence on whether these three nonasbestiform minerals should be regulated as though they were asbestos or whether they should be treated differently.

AMC has contracted with Dr. Brian Boelecke of the University of North Carolina medical school to review the medical data in the OSHA record regarding nonasbestiform minerals. Dr. Boelecke's report will be reviewed by the AMC Occupational Health Committee and the Task Group on OSHA Rulemaking and will be used to prepare comments and testimony once the rulemaking record is reopened.

Enclosure

. . . distributed as another membership service by the American Mining Congress

DEPARTMENT OF LABOR

Occupational Safety and Health Administration

29 CFR Parts 1910 and 1926

[Docket No. H-033D]

Occupational Exposure to Asbestos, Tremolite, Anthophyllite, and Actinolite

AGENCY: Occupational Safety and Health Administration, Labor.

ACTION: Partial administrative stay of final rules; redesignation and amendment of final rule.

SUMMARY: OSHA's revised final standards for occupational exposure to asbestos, tremolite, anthophyllite and actinolite for general industry (§ 1910.1001) and construction (§ 1926.58) promulgated on June 17, 1986, were published in the **Federal Register** on June 20, 1986, and became effective on July 21, 1986 (51 FR 22612). This document gives notice of a 9-month administrative stay of the revised standards insofar as they apply to occupational exposure to non-asbestiform tremolite, anthophyllite and actinolite. This stay is granted for the purpose of reopening the record, reviewing new submissions, and conducting supplemental rulemaking limited to the issue of whether non-asbestiform tremolite, anthophyllite and actinolite should continue to be regulated in the same standards and to the same extent as asbestos, or should be treated in some other way.

This stay applies only to the application of the revised standards to non-asbestiform tremolite, anthophyllite and actinolite. In all other respects, the revised standards will take effect as previously scheduled. In addition, during the period of the stay, the provisions of the 1972 standard governing occupational exposure to asbestos will remain in effect with respect to regulation of non-asbestiform tremolite, anthophyllite and actinolite.

To provide notice of the application of the 1972 standard to non-asbestiform tremolite, anthophyllite and actinolite, OSHA is republishing and redesignating the 1972 standard as 29 CFR 1910.1101 and is making several technical changes to that standard.

The 1972 standard is redesignated as 29 CFR 1910.1101 to distinguish it from the revised standard for general industry which is designated as 29 CFR 1910.1001. The provisions in the prior standard which constituted the Emergency Temporary Standard for Asbestos issued in November 1983, are being deleted. Also a note is added to clarify the scope and application of the redesignated § 1910.1101.

DATE: The partial stay of 1910.1001 and 1926.58 was effective July 21, 1986 and will expire April 21, 1987. Revisions to the 1972 standard republished as 1910.1101 and all other amendments in this rule are effective October 17, 1986.

FOR FURTHER INFORMATION CONTACT: Mr. James F. Foster, Director, Office of Information and Consumer Affairs, OSHA, U.S. Department of Labor, Room N 3637, 200 Constitution Avenue, NW., Washington, DC 20210. Telephone (202) 523-8151.

SUPPLEMENTARY INFORMATION: On June 17, 1986, OSHA issued revised standards governing occupational exposure to asbestos, tremolite, anthophyllite and actinolite for general industry and construction. They were published in the **Federal Register** on June 20, 1986 (51 FR 22612) and will be codified at 29 CFR 1910.1001 and 1926.58. Their effective date is July 21, 1986. The revised standards amend OSHA's previous asbestos standard

issued in 1972 and codified at 29 CFR 1910.1001 and 29 CFR 1926.55(c).

OSHA's 1972 asbestos standard defined "asbestos" as including "chrysotile, amosite, crocidolite, tremolite, anthophyllite and actinolite,". In recognition of the fact that tremolite, anthophyllite, and actinolite appear as both asbestiform and non-asbestiform minerals, the revised standards redefined the term "asbestos" to include only the asbestiform varieties of these substances (as well as chrysotile, amosite and crocidolite). The title of the standards were changed, however, to apply not only to "asbestos" as redefined, but also to non-asbestiform tremolite, actinolite and anthophyllite. 29 CFR 1910.1001 (b) and 1926.58(b) (1986). OSHA made these changes to conform to mineralogical terminology, as reflected by the evidence in its rulemaking record. Thus while a change in nomenclature was made, the Agency noted that the 1972 standard and the revised standards regulate precisely the same substances (51 FR 22612, 22679).

Since the issuance of the revised standards on June 17, 1986, OSHA has received letters and petitions from rulemaking participants and non-participants which contain additional comments, assertions, and information which the rulemaking record may not fully reflect. These letters and petitions concern the appropriateness of regulating non-asbestiform tremolite, anthophyllite and actinolite as presenting the same health risk as asbestos.

For the reasons indicated below, a temporary stay of 9 months of the effective date of the revised standards has been granted insofar as the standards apply to occupational exposure to non-asbestiform tremolite, anthophyllite and actinolite.

OSHA granted this temporary stay in part to enable the Agency to review a July 17, 1986 letter from the Director of the National Institute for Occupational Safety and Health (NIOSH) and certain related NIOSH staff memoranda which have recently been brought to OSHA's attention, as well as submissions by the R.T. Vanderbilt Co. and various trade associations concerning the appropriateness of regulating non-asbestiform tremolite, anthophyllite and actinolite in the revised asbestos standards. These documents and, in particular, the documents generated by NIOSH, raise serious questions about the nature and extent of the hazards posed by these non-asbestiform minerals. This temporary stay was granted also to allow sufficient time for OSHA to reopen the rulemaking record and conduct supplemental rulemaking proceedings on the issue of whether and how to regulate occupational exposure to non-asbestiform tremolite, anthophyllite and actinolite.

OSHA's decision to reopen the record is consistent with the Agency's determination that it provided adequate notice to the public that the recent asbestos rulemaking would address whether the Agency should amend the 1972 definition of asbestos, and whether the revised standards should apply to the three non-asbestiform minerals. Nevertheless, OSHA acknowledges that letters and petitions which contain additional comments, as described above, have been received since the issuance of the revised standards. These letters and petitions contain information which the rulemaking record may not fully reflect, and request an opportunity to submit further information. To assure that these submissions are fully considered by OSHA, to allow public comment on these additional submissions, and to invite additional comment and evidence on all issues relevant to regulation of non-asbestiform tremolite, anthophyllite and actinolite, OSHA will shortly reopen the rulemaking record, by notice in the **Federal Register**, to consider the limited issue of whether non-asbestiform tremolite, anthophyllite and actinolite should continue to be regulated as presenting the same health risk as asbestos, or whether they should be treated in some other way.

When that notice is published, all submissions to OSHA concerning the regulation of these minerals which have been received since the rulemaking record was closed on September 26, 1985, will be placed in the record and made available for public review and comment.

It should be noted that during the period of the stay, the provisions of the 1972 standard governing occupational exposure to asbestos (now redesignated 29 CFR 1910.1101) will remain in effect with respect to regulation of non-asbestiform tremolite, anthophyllite and actinolite.

The continued applicability of the 1972 standard was provided in the preamble to the revised standard in order not to leave "gaps in coverage and so that the existing provisions not terminate unless the new provisions are in effect." 51 FR 22704, 22732. Therefore, OSHA stated that if the amended provisions (of the revised standards) are not in effect because of stays or judicial action, then the unamended provisions (of the 1972 standard) will remain in effect" *Ibid.*

To provide notice of the continued applicability of the 1972 standard, OSHA believes it is appropriate to republish the 1972 standard to ensure continued protection for employees exposed to non-asbestiform tremolite, anthophyllite and actinolite as well as in the event that other administrative stays or judicial actions render provisions of the revised standards unenforceable.

In such case the parallel provisions of the 1972 standard would come into effect and would be immediately enforceable by OSHA. Without this automatic reversion to the older standard, employees would be denied the protection which they have long been assured. Given the very serious nature of the asbestos hazard, OSHA regards such denial as inconsistent with the Agency's mandate under the Occupational Safety and Health Act of 1970.

Several technical revisions to the 1972 standard are being made to facilitate this "back-up" function. First, the 1972 standard is being redesignated as 29 CFR 1910.1101 to distinguish it from the revised general industry standard which is codified as 29 CFR 1910.1001. OSHA is also adding a "note" to the 1972 standard to describe the intended application of the standard.

In addition, OSHA is deleting paragraph (k) of the 1972 standard, because that paragraph constituted the requirements of the emergency temporary standard issued by OSHA in November 1983 and was invalidated by the 5th Circuit Court of Appeal's decision in *Asbestos Information Ass'n v. OSHA*, 727 F.2d 415. Finally, OSHA is deleting an outdated provision which set the permissible exposure limit from July 7, 1972 to July 1, 1976.

OSHA is also amending the references to the 1972 asbestos standard which are found in the revised standards to reflect the redesignation of the 1972 standard as 29 CFR 1910.1101.

With respect to the temporary stay which has been granted, OSHA finds that advance notice and opportunity for comment are impracticable and unnecessary within the meaning of 5 U.S.C. 553, in view of (a) the limited duration of the stay; (b) the need to provide the relief requested before the standard went into effect; and (c) the continued applicability of the 1972 standard to non-asbestiform tremolite, anthophyllite and actinolite during the period of the stay.

Similarly, OSHA is making the technical amendments to 1910.1101 without advance notice and opportunity for comment pursuant to the authority of 5 U.S.C. 553(b). OSHA finds such process unnecessary and impractical due to the fact that these revisions (1)

implement a policy already determined after full rulemaking to continue to enforce parallel provisions of the 1972 standard where a stay or judicial action renders provisions of the 1972 standard unenforceable (see 51 FR 22704, 22732) and (2) delete provisions which are no longer effective. In neither case is an evidentiary issue involved.

List of Subjects

29 CFR Part 1910

Asbestos, Cancer, Health, Labeling, Occupational safety and health, Protective equipment, Respiratory protection, Signs and symbols.

29 CFR Part 1926

Asbestos, Cancer, Construction industry, Hazardous materials, Health, Labeling, Occupational safety and health, Protective equipment, Respiratory protection, Signs and symbols.

Authority and Signature

This document was prepared under the direction of John A. Pendergrass, Assistant Secretary of Labor for Occupational Safety and Health, U.S. Department of Labor, 200 Constitution Avenue NW., Washington, DC, 20210.

It is issued pursuant to sections 4, 6(b), 8(c) and 8(g) of the Occupational Safety and Health Act of 1970 (29 U.S.C. 653, 655, 657), section 107 of the Contract Work Hours and Safety Standards Act (Construction Safety Act) (40 U.S.C. 333), the Longshoremen's and Harbor Workers' Compensation Act (33 U.S.C. 941), 29 CFR Part 1911 and Secretary of Labor's Order No. 9-83 (48 FR 35736), and 5 U.S.C. 551 et seq.

Signed at Washington, D.C., this 10th day of October, 1986.

John A. Pendergrass,

Assistant Secretary for Occupational Safety and Health.

Amended Standards

PART 1910—[AMENDED]

PART 1926—[AMENDED]

Part 1910 of Title 29 of the Code of Federal Regulations is hereby amended as follows:

1. The authority citation for Subpart B of Part 1910 continues to read as follows:

Authority: Secs. 4, 6, and 8 of the Occupational Safety and Health Act, 29 U.S.C. 653, 655, 657; Walsh-Health Act, 41 U.S.C. 35 et seq.; Service Contract Act of 1965, 41 U.S.C. 351 et seq.; Pub. L. 91-54, 40 U.S.C. 333; Pub. L. 85-742, 33 U.S.C. 941; National Foundation on Arts and Humanities Act, 20 U.S.C. 951 et seq; Secretary of Labor's Orders 12-71 (36 FR 8754), 8-76 (41 FR 25059), or 9-83 (48 FR 35736); and 29 CFR Part 1911.

2. Paragraph (a) of § 1910.19 is hereby revised to read as follows:

§ 1910.19 Special provisions for air contaminants.

(a) Asbestos, tremolite, anthophyllite, and actinolite dust. Section 1910.1001 or 1910.1101 shall apply to the exposure of every employee to asbestos, tremolite, anthophyllite, and actinolite dust in every employment and place of employment covered by §§ 1919.13, 1910.14, 1910.15 or 1910.16, in lieu of any different standard on exposure to asbestos, tremolite, anthophyllite, and actinolite dust which would otherwise be applicable by virtue of any of those sections.

* * * * *

Subpart Z—[Amended]

3. The authority citation for Subpart Z of Part 1910 continues to read as follows:

Authority: Sec. 6 and 8, Occupational Safety and Health Act, 29 U.S.C. 655, 657; Secretary of Labor's Orders Nos. 12-71 (36 FR 8754), 8-76 (41 FR 25059), or 9-83 (48 FR 35736), as applicable; and 29 CFR Part 1911.

Section 1910.1000 Tables Z-1, Z-2, Z-3 also issued under 5 U.S.C. 553.

Section 1910.1000 not issued under 29 CFR Part 1911, except for "Arsenic" and "Cotton Dust" listings in Table Z-1.

Section 1910.1002 not issued under 29 U.S.C., 655 or 29 CFR Part 1911; also issued under 5 U.S.C. 553.

Section 1910.1003 through 1910.1018 also issued under 29 U.S.C. 653.

Section 1910.1025 also issued under 29 U.S.C. 653 and 5 U.S.C. 556.

Section 1910.1043 also issued under 5 U.S.C. 551 et seq.

Sections 1910.1045 and 1970.1047 also issued under 29 U.S.C. 653.

Section 1910.1499 and 1910.1500 also issued under 5 U.S.C. 553.

§ 1910.1001 [Amended]

§ 1926.58 [Amended]

4. Sections 1910.1001 and 1926.58 are hereby amended by adding the following note after Appendix H to § 1910.1001 and Appendix I to 1926.58.

Note.—Pursuant to a 9-month administrative stay effective July 21, 1986 (Insert citation from this **Federal Register** document), enforcement of this section is stayed as it applies to non-asbestiform tremolite, anthophyllite and actinolite. During the period of this stay the provisions of the 1972 standard governing occupational exposure to asbestos (redesignated as 29 CFR 1910.1101) will remain in effect with respect to regulation of non-asbestiform tremolite, anthophyllite and actinolite.

5. Paragraph (o)(1) of § 1910.1001 is hereby revised to read as follows:

§ 1910.1001 Asbestos.

* * * * *

(o) *Dates—Effective date.*

This standard shall become effective July 21, 1986. The requirements of the asbestos standard issued in June 1972 (37 FR 11318), as amended, and published in 29 CFR 1910.1101 remain in effect until compliance is achieved with the parallel provisions of this standard.

6. Paragraph (o)(1) § 1926.58 is hereby revised to read as follows:

§ 1926.58 Asbestos, tremolite, anthophyllite, and actinolite.

* * * * *

(o) *Dates—Effective date.*

This section shall become effective July 21, 1986. The requirements of the asbestos standard issued in June 1972 (37 FR 11318), as amended, and published in 29 CFR 1910.1101 remain in effect until compliance is achieved with the parallel provisions of this standard.

7. Section 1910.1101 is hereby added to read as follows:

§ 1910.1101 Asbestos.

Note.—This section applies to occupational exposure to non-asbestiform tremolite, anthophyllite and actinolite during the pendency of the stay of the revised standards (29 CFR 1910.1001; 29 CFR 1926.58).

(See [Insert citation from this **Federal Register** document] for a description of the stay).

This section also applies whenever all or part of the revised standards are rendered unenforceable because of a stay or judicial action. In such a case, to preclude a gap in coverage, parallel provisions of this section will take effect. OSHA will publish an appropriate notice in the **Federal Register** announcing each such application of this section. This section also applies pursuant to the requirements of 29 CFR 1910.1001(O) and 29 CFR 1926.58(O).

(a) *Definitions.* For the purpose of this section, (1) "Asbestos" includes chrysotile, amosite, crocidolite, tremolite, anthophyllite, and actinolite. (2) "Asbestos fibers" means asbestos fibers longer than 5 micrometers.

(b) *Permissible exposure to airborne concentrations of asbestos fibers.*

(1) The 8-hour time-weighted average airborne concentrations of asbestos fibers to which any employment may be exposed shall not exceed two fibers, longer than 5 micrometers, per cubic centimeter of air, as determined by the

method prescribed in paragraph (e) of this section.

(2) *Ceiling concentration.* No employee shall be exposed at any time to airborne concentration of asbestos fibers in excess of 10 fibers, longer than 5 micrometers, per cubic centimeter of air, as determined by the method prescribed in paragraph (e) of this section.

(c) *Methods of compliance*—(1) *Engineering methods.* (i) *Engineerings controls.* Engineering controls, such as, but not limited to, isolation, enclosure, exhaust ventilation, and dust collection, shall be used to meet exposure limits prescribed in paragraph (b) of this section.

(ii) *Local exhaust ventilation.* (A) local exhaust ventilation and dust collection systems shall be designed, constructed, installed, and maintained in accordance with the American National Standards Fundamentals Governing the Design and Operation of Local Exhaust Systems, ANSI Z9.2–1971, which is incorporated by reference herein. (B) See § 1910.6 concerning the availability of ANSI Z90.2–1971, and the maintenance of a historic file in connection therewith. The address of the American National Standards Instituted is given in § 1910.100.

(iii) *Particular tools.* All hand-operated and power-operated tools which may produce or release asbestos fibers in excess of the exposure limits prescribed in paragraph (b) of this section, such as, but not limited to, saws, scorers, abrasive wheels, and drills, shall be provided with local exhasuet ventilation systems in accordance with paragraph (c)(1)(ii) of this section.

(2) *Work practices*—(i) *Wet methods.* Insofar as practicable, asbestos shall be handled, mixed, applied, removed, cut, scored, or otherwise worked in a wet state sufficient to prevent the emission of airborn fibers in excess of the exposure limits prescribed in paragraph (b) of this section, unless the usefulness of the product would be dimished thereby.

(ii) *Particular products and operations.* No asbestos cement, mortor, coating, grout, plaster, or similar material containing asbestos shall be removed from bags, cartons, or other containers in which they are shipped without being either wetted, or enclosed, or ventilated so as to prevent effectively the release of airborne asbestos fibers in excess of the limits prescribed in paragraph (b) of this section.

(iii) *Spraying, demolition, or removal.* Employees engaged in the spraying of asbestos, the removal, or demolition of pipes structures, or equipment covered or insultated with asbestos, and in the removal of demolition of asbestos insulation or coverings shall be provided with respiratory equipment in accordance with paragraph (d)(2)(iii) of this section and with special clothing in accordance with paragraph (d)(3) of this section.

(d) *Personal protective equipment*—(1) Compliance with the exposure limits prescribed by paragraph (b) of this section may not be achieved by the use of respirators of shift rotation of employees, except:

(i) During the time period necessary to install the engineering controls and to institute the work practices required by paragraph (c) of this section;

(ii) In work situations in which the methods prescribed in paragraph (c) of this section are either technically not feasible or feasible to an extent insufficient to reduce the airborne concentrations of asbestos fibers below the limits prescribed by paragraph (b) of this section: or

(iii) In emergencies.

(iv) Where both respirators and personnel rotation are allowed by paragraphs (d)(1) (i), (ii) or (iii) of this section, and both are practicable, personnel rotation shall be preferred and used.

(2) Where a respirator is permitted by paragraph (d)(1) of this section, it shall be selected from among those approved by the Bureau of Mines, Department of the Interior, or the National Institute for Occupational Safety and Health, Department of Health, Education, and Welfare, under the provisions of 30 CFR Part 11 (37 FR 6244, Mar. 25, 1972), and shall be used in accordance with paragraph (d)(1) (i), (ii), (iii), and (iv) of this section.

(i) *Air purifying respirators.* A reusable or single use air purifying respirator, or a respirator described in paragraph (d)(2) (ii) or (iii) of this section, shall be used to reduce the concentrations of airborne asbestos fibers in the respirator below the exposure limits prescribed in paragraph (b) of this section, when the ceiling or the 8-hour time-weighted average concentrations of asbestos fibers are reasonably expected to exceed no more than 10 times those limits.

(ii) Powered air purifying respirators. A full facepiece powered air purifying respirator, or a powered air purifying respirator, or a respirator described in paragraph (d)(2)(iii) of this section, shall be used to reduce the concentrations of airborne asbestos fibers in the respirator below the exposure limits prescribed in paragraph (b) of this section, when the ceiling or the 8-hour time-weighted average concentrations of asbestos fibers are reasonably expected to exceed 10 times, but not 100 times, those limits.

(iii) Type "C" supplied-air respirators, continuous flow or pressure-demand class. A type "C" continuous flow or pressure-demand, supplied-air respirator shall be used to reduce the concentrations of airborne asbestos fibers in the respirator below the exposure limits prescribed in paragraph (b) of this section, when the ceiling or the 8-hour time-weighted average airborne concentrations of asbestos fibers are reasonably expected to exceed 100 times those limits.

(iv) *Establishment of a respirator program.* (A) The employer shall establish a respirator program in accordance with the requirements of the American National Standards Practices for Respiratory Protection, ANSI Z88.2–1969, which is incorporated by reference herein.

(B) See § 1910.6 concerning the availability of ANSI Z88.2–1969 and the maintenance of a historic file in connection therewith. The address of the American National Standards Institute is given in § 1910.100.

(C) No employee shall be assigned to tasks requiring the use of respirators if, based upon his most recent examination, an examining physician determines that the employee will be unable to function normally wearing a respirator, or that the safety or health of the employee or other employee will be impaired by his use of a respirator. Such employee shall be rotated to another job or given the opportunity to transfer to a different position whose duties he is able to perform with the same employer, in the same geographical area and with the same seniority, status, and rate of pay he had just prior to such transfer, if such different position is available.

(3) Special clothing: The employer shall provide, and require the use of, special clothing, such as coveralls or similar whole body clothing, head coverings, gloves, and foot coverings for any employee exposed to airborne concentrations of asbestos fibers, which exceed the ceiling level prescribed in paragraph (b) of this section.

(4) Change rooms: (i) At any fixed place of employment exposed to airborne concentrations of asbestos fibers in excess of the exposure limits prescribed in paragraph (b) of this section, the employer shall provide change rooms for employees working regularly at the place.

(ii) Clothes lockers: The employer shall provide two separate lockers or containers for each employee, so separated or isolated as to prevent

contamination of the employee's street clothes from his work clothes.

(iii) Laundering: (A) Laundering of asbestos contaminated clothing shall be done so as to prevent the release of airborne asbestos fibers in excess of the exposure limits prescribed in paragraph (b) of this section.

(B) Any employer who gives asbestos-contaminated clothing to another person for laundering shall inform such person of the requirement in paragraph (d)(4)(iii)(A) of this section to effectively prevent the release of airborne asbestos fibers in excess of the exposure limits prescribed in paragraph (b) of this section.

(C) Contaminated clothing shall be transported in sealed impermeable bags, or other closed, impermeable containers, and labeled in accordance with paragraph (g) of this section.

(e) *Method of measurement.* All determinations of airborne concentration of asbestos fibers shall be made by the membrane filter method at 400–450 X (magnification) (4 millimeter objective) with phase contrast illumination.

(f) *Monitoring*—(1) *Initial determinations.* Within 6 months of the publication of this section, every employer shall cause every place of employment where asbestos fibers are released to be monitored in such a way as to determine whether every employee's exposure to asbestos fibers is below the limits prescribed in paragraph (b) of this section. If the limits are exceeded, the employer shall immediately undertake a compliance program in accordance with paragraph (c) of this section.

(2) *Personal monitoring*—(i) Samples shall be collected from within the breathing zone of the employees, on membrane filters of 0.8 micrometer porosity mounted in an open-face filter holder. Samples shall be taken for the determination of the 8-hour time-weighted average airborne concentrations and of the ceiling concentrations of asbestos fibers.

(ii) *Sampling frequency and patterns.* After the initial determinations required by paragraph (f)(1) of this section, samples shall be of such frequency and pattern as to represent with reasonable accuracy the levels of exposure of employees. In no case shall the sampling be done at intervals greater than 6 months for employees whose exposure to asbestos may reasonably be foreseen to exceed the limits prescribed by paragraph (b) of this section.

(3) *Environmental monitoring.* (i) Samples shall be collected from areas of a work environment which are representative of the airborne concentrations of asbestos fibers which may reach the breathing zone of employees. Samples shall be collected on a membrane filter of 0.8 micrometer porosity mounted in an open-face filter holder. Samples shall be taken for the determination of the 8-hour time-weighted average airborne concentrations and of the ceiling concentrations of asbestos fibers.

(ii) Sampling frequencey and patterns. After the initial determinations required by paragraph (f)(1) of this section, samples shall be of such frequency and pattern as to represent with reasonable accuracy the levels of exposure of the employees. In no case shall sampling be at intervals greater than 6 months for employees whose exposures to asbestos may reasonably be foreseen to exceed the exposure limits prescribed in paragraph (b) of this section.

(4) *Employee observation of monitoring.* Affected employees, or their representatives, shall be given a reasonable opportunity to observe any monitoring required by this paragraph and shall have access to the records thereof.

(g) *Caution signs and labels*—(1) *Caution signs*—(i) *Posting.* Caution signs shall be provided and displayed at each location where airborne concentrations of asbestos fibers may be in excess of the exposure limits prescribed in paragraph (b) of this section. Signs shall be posted at such a distance from such a location so that an employee may read the signs and take necessary protective steps before entering the area marked by the signs. Signs shall be posted at all approaches to areas containing excessive concentrations of airborne asbestos fibers.

(ii) *Sign specifications.* The warning signs required by paragraph (g)(1)(i) of this section shall conform to the requirements of 20"x14" vertical format signs specified in § 1910.145(d)(4), and to this subdivision. The signs shall display the following legend in the lower panel, with letter sizes and styles of a visibility at least equal to that specified in this subdivision.

Legend	Notation
Asbestos	1" Sans Serif, Gothic or Block.
Dust Hazard	¾" Sans Serif, Gothic or Block.
Avoid Breathing Dust	¼" Gothic.
Wear Assigned Protective Equipment.	¼" Gothic.
Do Not Remain In Area Unless Your Work Requires It.	¼" Gothic.
Breathing Asbestos Dust May Be Hazardous To Your Health.	14 point Gothic.

Spacing between lines shall be at least equal to the height of the upper of any two lines.

(2) *Caution labels*—(i) *Labeling.* Caution labels shall be affixed to all raw materials, mixtures, scrap, waste, debris, and other products containing asbestos fibers, or to their containers, except that no label is required where asbestos fibers have modified by a bonding agent, coating, binder, or other material so that during any reasonably foreseeable use, handling, storage disposal, processing, or transportation, no airborne concentrations of asbestos fibers in excess of the exposure limits prescribed in paragraph (b) of this section will be released.

(ii) *Label specifications.* The caution labels requied by paragraph (g)(2)(i) of this section shall be printed in letters of sufficient size and contrast as to be readily visible and legible. The label shall state:

Caution—Contains Asbestos Fibers, Avoid Creating Dust, Breathing Asbestos Dust May Cause Serious Bodily Harm

(h) *Housekeeping*—(1) *Cleaning.* All external surfaces in any place of employment shall be maintained free of accumulations of asbestos fibers if, with their dispersion, there would be an excessive concentration.

(2) *Waste disposal.* Asbestos waste, scrap, debris, bags, containers, equipment, and asbestos-contaminated clothing, consigned for disposal, which may produce in any reasonably foreseeable use, handling, storage, processing, disposal, or transportation airborne concentrations of asbestos fibers in excess of the exposure limits prescribed in paragraph (b) of this section shall be collected and disposed of in sealed impermeable bags, or other closed, impermeable containers.

(i) *Recordkeeping*—(1) *Exposure records.* Every employer shall maintain records of any personal or environmental monitoring required by this section. Records shall be maintained for a period of at least 20 years and shall be made available upon request to the Assistant Secretary of Labor for Occupational Safety and Health, the Director of the National Institute for Occupational Safety and Health, and to authorized representatives of either.

(2) *Access.* Employee exposure records required by this paragraph shall be provided upon request to employees, designated representatives, and the Assistant Secretary in accordance with 29 CFR 1910.20 (a)–(e) and (g)–(l).

(3) *Employee notification.* Any employee found to have been exposed at any time to airborne concentration of asbestos fibers in excess of the limits

prescribed in paragraph (b) of this section shall be notified in writing of the exposure as soon as practicable but not later than 5 days of the finding. The employee shall also be timely notified of the corrective action being taken.

(j) *Medical examinations*—(1) *General.* The employer shall provide or make available at his cost, medical examinations relative to exposure to asbestos required by this paragraph.

(2) *Preplacement.* The employer shall provide or make available to each of his employees, within 30 calendar days following his first employment in an occupation exposed to airborne concentrations of asbestos fiber, a comprehensive medical examination, which shall include, as a minimum a chest roentgenogram (posterior-anterior 14x17 inches), a history to elicit symptomatology of respiratory disease, and pulmonary function tests to include forced vital capacity (FVC) and forced expiratory volume at 1 second ($FEV_{1.0}$).

(3) *Annual examinations.* On or before January 31, 1973, and at least annually thereafter, every employer shall provide, or make available, comprehensive medical examinations to each of his employees engaged in occupations exposed to airborne concentrations of asbestos fibers. Such annual examination shall include, as minimum, a chest roentgenogram (posterior-anterior 14x17 inches), a history to elicit symptomatology of respiratory disease, and pulmonary function tests to include forced vital capacity (FVC) and forced expiratory volume at 1 second ($FEV_{1.0}$).

(4) *Termination of employment.* The employer shall provide or make available, within 30 calendar days before or after the termination of employment of any employee engaged in an occupation exposed to airborne concentration of asbestos fibers, a comprehensive medical examination which shall include, as a minimum, a chest roentgenogram (posterior-anterior 14x17 inches), a history to elicit symptomatology of respiratory disease, and pulmonary function tests to include forced vital capacity (FVC) and forced expiratory volume at 1 second ($FEV_{1.0}$).

(5) *Recent examinations.* No medical examination is required of any employee, if adequate records show that the employee has been examined in accordance with this paragraph within the past 1-year period.

(6) *Medical records*—(i) *Maintenance.* Employers of employees examined pursuant to this paragraph shall cause to be maintained complete and accurate records of all such medical examinations. Records shall be retained by employers for at least 20 years.

(ii) *Access.* Records of the medical examinations required by this paragraph shall provide upon request to employees, designated representatives, and the Assistant Secretary in accordance with 29 CFR 1910.20 (a)–(e) and (g)–(l). These records shall also be provided upon the request to the Director of NIOSH. Any physician who conducts a medical examination required by this paragraph shall furnish to the employer of the examined employee all the information specifically required by this paragraph, and any other medical information related to occupational exposure to asbestos fibers.

TABLE 1.—RESPIRATOR PROTECTION FOR AIRBORNE CONCENTRATIONS OF ASBESTOS

Airborne concentration of asbestos (TWA)	Required respirator [1]
Not in excess of 5 f/cc (10 x PEL).	Reusable or single use air purifying respirator.
Not in excess of 50 f/cc (100 x PEL).	Full facepiece air purifying respirator, or a powered air purifying respirator.
Greater than 50 f/cc	A type "C" continuous flow or pressure demand, supplied air respirator.

[1] Respirators specified for high concentrations may be used at lower concentrations of asbestos.

(Approved by the Office of Management and Budget under control number 12180010)

8. The authority citation for Subpart D of Part 1926, continues to read as follows:

Authority: Secs. 4, 5, 6, 8 Occupational Safety and Health Act of 1970, 29 U.S.C. 653, 655, 657; Sec. 107, Contract Work Hours and Safety Standards Act (Construction Safety Act), 40 U.S.C. 333, and Secretary of Labor's Orders 12–71 (36 FR 8754), 8–76 (41 FR 25059), or 9–83 (48 FR 35736), as applicable. Sections 1926.55(c) and 1926.58 also issued under 29 CFR Part 1911.

9. Paragraph (c) of § 1926.55 is hereby revised to read as follows:

§ 1926.55 Gases, vapors, fumes, dusts, and mists

* * * * *

(c) Paragraphs (a) and (b) of this section do not apply to the exposure of employees to airborne asbestos, tremolite, anthophyllite, or actinolite dust. Whenever any employee is exposed to airborne asbestos, tremolite, anthophyllite, or actinolite dust, the requirements of § 1910.1101 or § 1926.58 of this title shall apply.

[FR Doc. 86–23402 Filed 10–16–86; 8:45 am]

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Exhibit 2

AMERICAN MINING CONGRESS

FOUNDED 1897

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December 1, 1986

The Honorable John A. Pendergrass
Assistant Secretary of Labor for
Occupational Safety and Health
U.S. Department of Labor
200 Constitution Avenue, N.W.
Washington, D.C. 20210

Dear Mr. Secretary:

The American Mining Congress (AMC) -- an industry association representing the producers of most of the nation's coal, metals, and agricultural and industrial minerals -- objects to the method by which OSHA has stayed the application of its asbestos standard to nonasbestiform tremolite, actinolite and anthophyllite.

By its October 17, 1986, Federal Register notice, OSHA has retroactively applied its 1972 asbestos standard to these three nonasbestiform minerals by means of several editorial notes grafted onto the 1972 standard. The agency intends to maintain this regulatory posture until a reopened rulemaking proceeding determines whether and how these minerals ought to be regulated.

AMC seriously questions the propriety of this approach on the following grounds:

- OSHA's "Stay" Improperly Categorizes Nonasbestiform Minerals as Asbestos.

The October 17, 1986, Federal Register notice gratuitously amends the 1972 asbestos standard to include all nonasbestiform varieties of tremolite, actinolite and anthophyllite. This action contradicts persuasive mineralogical authority in OSHA's own record, as well as that followed by other federal agencies such as EPA and MSHA.

Indeed, in OSHA's preamble to its proposed asbestos rule (49 F.R. 14122), OSHA indicated that it would adopt a mineralogically-based distinction between asbestiform and nonasbestiform varieties of the minerals in question.

Continued. . .

Likewise, despite OSHA's decision to include nonasbestiform minerals in its asbestos standard issued June 20, 1986, the agency did acknowledge mineralogical differences between asbestiform tremolite, actinolite, anthophyllite and their nonasbestiform counterparts.

The October 17, 1986, notice once again blurs these significant and fundamental distinctions. AMC wishes to stress that in urging correct mineralogical standards on OSHA, we are not engaging in definitional hairsplitting. It is our firm belief that establishing a correct mineralogical distinction between the two varieties of minerals is a crucial starting point for determining differences in health effects and, ultimately, in determining appropriate differences in the regulatory treatment of asbestiform and nonasbestiform minerals.

- Contrary to OSHA's Assertions, the "Stay" Does Not Restore the Status Quo Pending Further Rulemaking.

OSHA intimates that nonasbestiform minerals have been continuously regulated by the 1972 asbestos standard. Thus, the agency argues that the October 17, 1986, "stay" merely restores the status quo regarding these minerals vis-a-vis the revised asbestos standard issued June 20, 1986. AMC disputes this reading of the regulatory history.

For instance, as shown by OSHA Field Memorandum #74-92 (enclosed), the agency's position in 1974 was that the 1972 standard applied only to asbestiform minerals and that nonasbestiform tremolite was specifically excluded. That Field Memorandum was later rescinded on January 19, 1977, on the basis of the same medical data that have been called into serious question under the present rulemaking. Nevertheless, the memorandum evinces a less than consistent regulatory policy with respect to nonasbestiform minerals.

Furthermore, the OSHA record for the 1972 standard was based solely on evidence of occupational exposures to asbestiform minerals, not nonasbestiform minerals.

In sum, OSHA's insistence that it has regulated nonasbestiform minerals as though they were asbestos since 1972 is debatable and not borne out by the agency's own records.

- The OSHA "Stay" Circumvents the Administrative Procedures Act and OSHA's Own Rulemaking Procedures.

OSHA argues that its "stay" is simply a repromulgation of the 1972 standard for purposes of regulating nonasbestiform minerals and is, therefore, not subject to APA procedures for notice and comment. The agency goes on to assert that no "evidentiary issue" is involved in its application of the 1972 standard to nonasbestiform minerals.

AMC asserts that the factual issues set forth in our two objections, discussed above, constitute essential evidentiary issues that have been ignored by the agency in issuing its "stay". The gratuitous editorial expansion of the 1972 standard (characterized in the October 17, 1986, document as "Notes") imposes new regulatory requirements on the producers, handlers and users of nonasbestiform minerals without the opportunity for comment. This contravenes the notice and comment requirements of the 1970 Occupational Safety and Health Act and the APA, thus constituting a denial of due process.

- The OSHA "Stay" Seriously Prejudices Basic Issues to be Considered When the Rulemaking Proceeding is Reopened.

The October 17, 1986, notice not only lacks sufficient scientific and legal bases, it also stakes out a biased regulatory position for OSHA in advance of the agency's reopening of the rulemaking.

In the preamble to the notice of stay, OSHA acknowledges that crucial evidence submitted since the issuance of the asbestos standard on June 20, 1986, is of sufficient importance to justify revisiting the whole issue of whether nonasbestiform minerals should be regulated as though they were asbestos or "whether they should be treated in some other way." (51 F.R. 37003)

Despite this acknowledgement, the agency goes on to treat these minerals as though they were asbestos by means of editorial notes scattered through the repromulgated 1972 standard.

Such an action lacks the objectivity required of the agency if the pending rulemaking is to be both fair and productive.

This perception of agency bias is compounded by recent public statements attributed to Mr. John Martonik, OSHA's deputy director of health standards programs. In the November 1986 issue of "Occupational Hazards" (copy enclosed), Mr. Martonik is quoted as stating that "the health effects are the same" for asbestiform and nonasbestiform minerals. The article further states that Mr. Martonik predicts that OSHA may not require nonasbestiform minerals to be labelled as asbestos, but "we will regulate them."

If correctly reported, these statements by an OSHA official intimately involved in the reopened rulemaking severely compromise the agency's obligation to dispassionately weigh the evidence and then decide on the most appropriate regulatory approach regarding the nonasbestiform minerals at issue.

In summary, AMC has consistently taken the position that the nonasbestiform minerals at issue should not be regulated as asbestos. This position is based on both sound mineralogical

principles and on the lack of asbestos-related health effects associated with those nonasbestiform minerals.

Furthermore, we have been actively engaged in this rulemaking procedure to dispell the impression that OSHA's regulatory activity with respect to this matter adversely affects only a small segment of American industry. Nonasbestiform tremolite and actinolite, for instance, can be found throughout the major mining districts of the U.S. The adverse regulatory and litigation potential arising from the mischaracterization of nonasbestiform minerals is immense and must be avoided.

We are prepared to move forward in the course of the reopening of the rulemaking proceeding to establish these positions. That proceeding is ill-served, however, by the so-called notice of partial stay issued October 17, 1986, and by prejudicial public statements made before the evidence is placed before the agency.

In the interests of sound science and objective standards development, we urge OSHA to eliminate the editorial notes from the October 17 notice. As I am confident that you are anxious to ensure the fairness and objectivity of future rulemaking in this matter, we recommend that you urge Mr. Martonik to recuse himself from further participation in this matter.

Sincerely,

John A. Knebel
President

cc: Hon. William E. Brock III
Hon. David A. Zegeer

Enclosure

Exhibit 3

Authorized Reprint from
Special Technical Publication 834
Copyright
American Society for Testing and Materials
1916 Race Street, Philadelphia, PA 19103
1984

Malcolm Ross,[1] *Richard A. Kuntze,*[2] *and Robert A. Clifton*[3]

A Definition for Asbestos*

REFERENCE: Ross, M., Kuntze, R. A., and Clifton, R. A., "**A Definition for Asbestos,**" *Definitions for Asbestos and Other Health-Related Silicates, ASTM STP 834*, Benjamin Levadie, Ed., American Society for Testing and Materials, Philadelphia, 1984, pp. 139–147.

ABSTRACT: The authors present a definition for asbestos, based in part on discussions held during a workshop on this subject.

KEY WORDS: health-related silicates, asbestos

Preface

The name asbestos, a Greek word mistakenly thought to mean incombustible,[4] was given to fibrous minerals hundreds of years before the science of mineralogy evolved. It did not then, nor does it now, have scientific validity as a complete term in itself. As a collective term applying to members of two distinct silicate mineral groups, it cannot be simply defined mineralogically; the only common characteristic of these minerals is their asbestiform habit. The term asbestos, however, has both commercial and health significance. It is in designating a commercial group of minerals that the term has validity. Very little documented human health hazard has been observed for some of the commercially available asbestos minerals, and extrapolation of data for some forms of asbestos to all asbestos is not scientifically valid. Extrapolation of such data to all "fibrous" mineral particles is particularly unjustified.

The British-devised membrane filter method of monitoring airborne fibers in asbestos factories was and is useful in environments where it is logical to assume that the vast majority of elongate particles present are indeed asbestos. The

* The definition for asbestos presented here is based on discussions held during a workshop on defining asbestos, arranged as part of the symposium on which this publication is based. There was no final consensus in the workshop discussions, and, therefore, a task group of three, composed of the authors of this definition, was assigned to write a definition based on the workshop deliberations and on the task group's best judgment.

[1] Research mineralogist, U.S. Geological Survey, MS959, Reston, Va. 22092.

[2] Vice president for research, Ontario Research Foundation, Mississauga, Ontario, Canada L5K 1B3.

[3] Physical scientist, U.S. Bureau of Mines, Washington, D.C. 20241.

[4] The Greek word actually means unquenchable, inextinguishable—*not* incombustible. This is according to the *Oxford English Dictionary*, which is the recognized final authority on the etymology and history of words in the English language.

method is nonspecific, unfortunately calls anything having a 3:1 aspect ratio a fiber, and, in spite of refinements, remains too subjective for scientific accuracy. Its good points are that it is rapid, inexpensive, and requires little sophistication in instrumentation or personnel.

The only fully acceptable definition of asbestos would exclude the collective term asbestos and substitute the definitions of the individual minerals. If the term asbestos must be used, a definition is needed that is mineralogically correct, yet of sufficient simplicity to be understood by specialists and nonspecialists alike. It must exclude all materials that never were commercial asbestos, include all that were, exclude rock particles and cleavage fragments, and, if possible, permit usage (with slight modification) of the present monitoring system.

Definition

The authors believe the following definition fulfills these needs:

asbestos—a term applied to six naturally occurring minerals exploited commercially for their desirable physical properties, which are in part derived from their asbestiform habit. The six minerals are the serpentine mineral chrysotile and the amphibole minerals grunerite asbestos (also referred to as amosite), riebeckite asbestos (also referred to as crocidolite), anthophyllite asbestos, tremolite asbestos, and actinolite asbestos. [These minerals are defined in the sections that follow.] Individual mineral particles, however processed and regardless of their mineral name, are not demonstrated to be asbestos if the length-to-width ratio is less than 20:1.[5]

Mineralogical Definitions of the Commercial Asbestos Minerals

The six asbestos minerals are defined under two mineral groups: the serpentine group and the amphibole group.

Serpentine Asbestos

Chrysotile, the only commercial asbestos mineral belonging to the serpentine group, has an ideal chemical composition of $Mg_3Si_2O_5(OH)_4$. Moderate amounts of aluminum may substitute for silicon and moderate amounts of iron may substitute for magnesium. Small amounts of manganous oxide (MnO), calcium oxide (CaO), potassium monoxide (K_2O), and sodium monoxide (Na_2O) are also reported in the chemical analyses. Chemical analyses and ion compositions for chrysotile asbestos from four important mines are given in Tables 1*a* and 1*b* [*1*].[6]

[5] See the Appendix attached.
[6] The italic numbers in brackets refer to the list of references appended to this paper.

TABLE 1*a*—*Chemical composition of commercial chrysotile asbestos, weight percent* [1].

Component	King Beaver Mine, Thetford Mines, Quebec Province, Canada	Asbest, Ural Mountains, U.S.S.R.	Shabani Mines, Zimbabwe	Havelock Mine, Swaziland
SiO_2	38.75	39.00	39.70	39.93
Al_2O_3	3.09	4.66	3.17	3.92
Fe_2O_3	1.59	0.54	0.27	0.10
FeO	2.03	1.53	0.70	0.45
MnO	0.08	0.11	0.26	0.05
MgO	39.78	38.22	40.30	40.25
CaO	0.89	2.03	1.08	1.02
K_2O	0.18	0.07	0.05	0.09
Na_2O	0.10	0.07	0.04	0.09
H_2O^+	12.22	11.37	12.17	12.36
H_2O^-	0.60	0.77	0.64	0.92
CO_2	0.48	1.83	2.13	1.04
Total	99.79	100.20	100.51	100.22

The crystal structure of chrysotile asbestos consists of double layers, each consisting of a layer of linked SiO_4 tetrahedra coordinated to a second layer of linked $MgO_2(OH)_4$ octahedra through a sharing of oxygen atoms; the composite double layer rolls up, like a window shade, to form long hollow tubes. The diameters of the individual tubes are on the order of 25 nm, and the length-to-diameter ratio can vary from 10:1 to well over 10 000:1.

Chrysotile is characterized by a combination of (1) a distinctive shape, (2) a chemical composition close to $Mg_3Si_2O_5(OH)_4$, and (3) characteristic X-ray and electron diffraction patterns [*2–5*].

TABLE 1*b*—*Ion composition of commercial chrysotile asbestos, number of ions on the basis of oxygen = 5, OH = 4* [1].

Ion	King Beaver Mine, Thetford Mines, Quebec Province, Canada		Asbest, Ural Mountains, U.S.S.R.		Shabani Mines, Zimbabwe		Havelock Mine, Swaziland	
Si	1.845	2.000	1.851	2.000	1.885	2.000	1.882	2.000
Al	0.155		0.149		0.115		0.118	
Al	0.018	3.047	0.112	3.013	0.062	3.025	0.100	3.016
Fe^{3+}	0.057		0.019		0.010		0.004	
Fe^{2+}	0.081		0.061		0.028		0.018	
Mn	0.003		0.004		0.010		0.002	
Mg	2.823		2.704		2.853		2.827	
Ca	0.045		0.103		0.055		0.052	
K	0.011		0.004		0.003		0.005	
Na	0.009		0.006		0.004		0.008	

Amphibole Asbestos

Five of the six commercial asbestos minerals belong to the amphibole mineral group. These, with their ideal chemical formulas, are grunerite asbestos, $Fe_7Si_8O_{22}(OH)_2$ (usually but improperly referred to by the acronym amosite); riebeckite asbestos, $Na_2Fe_3^{2+}Fe_2^{3+}Si_8O_{22}(OH)_2$ (usually referred to by the varietal name crocidolite); anthophyllite asbestos, $Mg_7Si_8O_{22}(OH)_2$; tremolite asbestos, $Ca_2Mg_5Si_8O_{22}(OH)_2$; and actinolite asbestos, $Ca_2(Mg,Fe^{2+})_5Si_8O_{22}(OH)_2$ [6].[7] A considerable amount of substitution of other elements for Fe^{2+}, Fe^{3+}, silicon, sodium, calcium, and magnesium can take place in these minerals, as can be seen in Tables 2*a* and 2*b*, which give representative chemical analyses of amphibole asbestos from nine localities.

The crystal structures of the amphibole minerals, including the asbestiform varieties, are composed of strips or ribbons of linked polyhedra, which join together to form the three-dimensional crystal. The individual strips are composed of three elements: these are two double chains of linked $(Si,Al)O_4$ tetrahedra and a strip of linked MgO_6, FeO_6, or AlO_6 octahedra. The structural relationship between the upper double tetrahedral chain and the octahedral part of the strip is shown in Fig. 1. The three-dimensional arrangements of these strips ("I-beams") in orthoamphibole (anthophyllite asbestos) and in clinoamphibole (tremolite, actinolite, grunerite, and riebeckite asbestos) are shown in Fig. 2 [7].

Amphibole asbestos minerals are characterized by a combination of (1) a distinctive crystal habit with length-to-width ratios often of 20:1 or greater, (2) the typical chemical composition for that mineral, and (3) characteristic X-ray powder diffraction patterns [8] or electron diffraction patterns [3,4].

APPENDIX

With a method in current use for monitoring asbestos in the workplace that is totally nonspecific and uses only physical parameters to describe a fiber (asbestos), physical limits must be established that will minimize the inclusion of extraneous particles that are called asbestos only because of a superficial physical similarity. The object of monitoring is to get a true representative count of the asbestos present in the workplace air.

Serpentine rock is chemically identical to chrysotile asbestos and has the same crystal structure. Serpentine is a material that is commercially useful both crushed and as dimension stone and that cannot be removed from the ground and processed without creating many particles with aspect ratios of 3:1 or larger. To call these particles asbestos and to ascribe to them the health effects observed elsewhere from exposure to asbestos is invalid.

It is just as invalid to call these particles in the asbestos mines and mills asbestos when serpentine has to be crushed to liberate the chrysotile fibers. The lack of validity also

[7] The minerals tremolite and actinolite compose a continuous solid solution series. The name tremolite is given arbitrarily if the ratio of magnesium to magnesium plus Fe^{2+} is greater than or equal to 0.9; the name actinolite is given if the ratio is less than 0.9 and greater than or equal to 0.5 [6].

TABLE 2*a*—*Chemical composition of amphibole asbestos, weight percent* [1].[a]

Component	Grunerite Asbestos (Amosite)		Riebeckite Asbestos (Crocidolite)					Anthophyllite Asbestos, H	Tremolite Asbestos, I
	A	B	C	D	E	F	G		
SiO_2	49.70	51.30	50.90	50.70	52.00	55.65	52.85	57.20	55.10
Al_2O_3	0.40	nil	nil	0.70	nil	4.00	0.18	...	1.14
Fe_2O_3	0.03	0.90	16.85	18.30	16.05	13.01	18.55	0.13	0.32
FeO	39.70	35.50	20.50	17.50	17.65	3.84	14.94	10.12	2.00
MnO	0.22	1.76	0.05	0.06	trace	trace	trace	...	0.10
MgO	6.44	6.90	1.06	3.05	4.28	13.09	4.64	29.21	25.65
CaO	1.04	0.95	1.45	1.30	1.20	1.45	1.07	1.02	11.45
K_2O	0.63	0.51	0.20	trace	0.06	0.39	0.05	...	0.29
Na_2O	0.09	0.05	6.20	5.30	6.21	6.91	5.97	...	0.14
H_2O^+	1.83	2.31	2.37	2.53	2.43	1.78	2.77	2.18	3.52
H_2O^-	0.09	0.05	0.22	0.29	0.26	trace	0.22	0.28	0.16
CO_2	0.09	0.25	0.20	0.45	0.09	trace	0.23	...	0.06
Total	100.26	100.48	100.00	100.18	100.23	100.12	101.47	100.14	99.93

[a]Key to symbols for locations:
A = Penge, Transvaal Province, South Africa.
B = Weltevreden, Transvaal Province, South Africa.
C = Koegs, Cape Province, South Africa.
D = Kuruman, Cape Province, South Africa.
E = Pomfret, Cape Province, South Africa.
F = Cochabamba, Bolivia.
G = Hammersley Range, Western Australia.
H = Paakkila, Finland.
I = Pakistan.

TABLE 2b—*Ion composition of amphibole asbestos, number of ions on the basis of oxygen = 22, OH = 2 [1].*[a]

Ion	Grunerite Asbestos (Amosite) A		Grunerite Asbestos (Amosite) B		Riebeckite Asbestos (Crocidolite) C		Riebeckite Asbestos (Crocidolite) D		Riebeckite Asbestos (Crocidolite) E		Riebeckite Asbestos (Crocidolite) F		Riebeckite Asbestos (Crocidolite) G		Anthophyllite Asbestos, H		Tremolite Asbestos, I	
Si	7.898	7.973	8.055	8.055	7.949	7.949	7.823	7.950	7.942	7.942	7.791	8.000	7.927	7.959	7.848	7.848	7.674	7.861
Al	0.075		...		...		0.127		...		0.209		0.032		...		0.187	
Al	...	7.165	...	6.894	...	7.072	...	6.893	...	7.119	0.451	7.166	...	6.923	...	7.296	...	7.404
Fe^{3+}	0.004		0.106		1.980		2.125		1.844		1.371		2.094		0.013		0.034	
Fe^{2+}	5.277		4.662		2.678		2.259		2.254		0.450		1.874		1.161		0.233	
Mn	0.030		0.234		0.007		0.008		...		...		...		...		0.012	
Mg	1.525		1.615		0.247		0.701		0.974		2.731		1.037		5.972		5.326	
Ca	0.177		0.160		0.243		0.215		0.196		0.218		0.172		0.150		1.709	
K	0.128		0.102		0.040		...		0.012		0.070		0.010		...		0.052	
Na	0.028		0.015		1.877		1.585		1.839		1.875		1.736		...		0.038	

[a]Key to symbols for locations:
A = Penge, Transvaal Province, South Africa.
B = Weltevreden, Transvaal Province, South Africa.
C = Koegs, Cape Province, South Africa.
D = Kuruman, Cape Province, South Africa.
E = Pomfret, Cape Province, South Africa.
F = Cochabamba, Bolivia.
G = Hammersley Range, Western Australia.
H = Paakkila, Finland.
I = Pakistan.

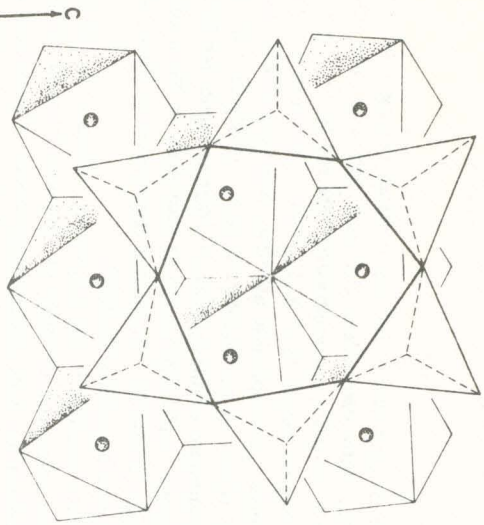

FIG. 1—*Structural relationship between the upper double chain of linked* $(Si,Al)O_4$ *tetrahedra and the octahedra part of the amphibole strip ("I-beam"). The circles represent magnesium, iron, or aluminum atoms in octahedral coordination; at the apices of the polyhedra are oxygen atoms. The tetrahedral silicon and aluminum atoms are not shown. The I-beams extend infinitely in a direction parallel to the c-axis (the fiber axis). The width of the I-beam in the b-axis direction is three octahedra. The figure is modified from one in Papike and Ross [7].*

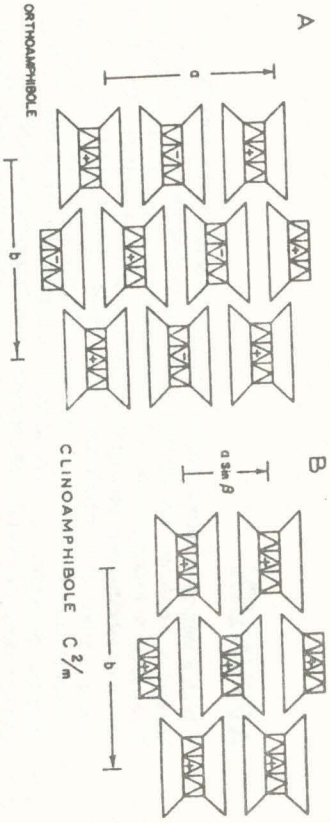

FIG. 2—*Arrangement of the amphibole strips or I-beams in* (left) *orthoamphibole (Space Group Pnma) and* (right) *clinoamphibole (Space Group C2/m). The I-beams are viewed end-on (parallel to the fiber c-axis). The central portion of the I-beam is composed of* $(Mg,Fe,Al)O_6$ *octahedra; the upper and lower portions are composed of double chains of* (Si,AlO_4) *tetrahedra. The I-beams are stacked in two ways: (1) + + + . . . (clinoamphibole) and (2) + − + − . . . (orthoamphibole). The figure is modified from one in Papike and Ross [7].*

TABLE 3—*Aspect ratio distribution of asbestos particles in an NIEHS study.*

	Chrysotile			Amosite	Crocidolite	Total Asbestos	Nonfibrous Tremolite[a]
	COF-25	Plastibest	Total Chrysotile				
Total particles, No.	1058	1389	2447	1023	1040	4510	615
Particles ≥3:1							
No.	963	1380	2343	1016	1032	4391	125
%	91	99	96	99	99	97	20
Particles ≥20:1							
No.	858	689	1547	469	523	2539	6
%	81	50	63	46	50	56	1

[a]Tremolite, serpentine, talc, and other minerals (only tremolite particles counted).

holds when serpentine is a minor constituent of another ore such as talc, which must be mined and processed for use.

An illustration of the invalidity of calling every particle having a 3:1 aspect ratio asbestos is apparent in data presented by the U.S. Bureau of Mines characterizing the materials used for an animal feeding study.[8] This was a National Institutes of Health study administered by the National Institute of Environmental Safety and Health (NIEHS) to ascertain the carcinogenicity of ingested asbestos. Two commercial chrysotile specimens of different origins were purchased, as were specimens of amosite and crocidolite. All these asbestos specimens were air-jet milled to reduce their fiber lengths to lengths that could be tableted in the food of the test animals. Air-jet milling is a much more rigorous kind of processing than that ordinarily used for asbestos. To achieve the desired end of length reduction this way, one must also reduce the length-to-width ratio. A fifth specimen was nonfibrous tremolite selected from a tremolitic talc mine and ground to minus 325 mesh. This specimen contained approximately 25% serpentine plus minor amounts of talc and other minerals. The aspect ratios of the ground asbestos specimens are shown in Table 3. (This table is derived from Tables A-2, A-6, A-9, A-12, and A-14 of the reference document.[8]) The data were gathered using a scanning electron microscope (SEM).

There are several significant details in the data:

1. Nearly all of the asbestos fibers had aspect ratios ≥3:1.
2. A significant 20% of the ground nonfibrous tremolite did also. This means, of course, that under the present system, these particles would be called asbestos and included in the count.
3. The use of an aspect ratio ≥20:1 would include only 1% of the nonfibrous tremolite particles erroneously counted as asbestos, but would include a majority (56%) of the total asbestos fibers (63 and 50% of chrysotile and crocidolite, respectively).

When added to Wylie's recommendation[9] of an aspect ratio of ≥20:1 as the minimum one for chrysotile and crocidolite (together comprising 98% of all asbestos in commercial use), these data present a reasonable case for this aspect ratio as a necessary limit.

References

[1] Hodgson, A. A. in *Asbestos*, Vol. 1, *Properties, Applications, and Hazards*, L. Michaels and S. S. Chissick, Eds., Wiley, New York, 1979, p. 79.

[2] Mumpton, F. A. and Thompson, C. S., *Clays and Clay Minerals*, Vol. 23, 1975, pp. 131–143.

[3] Champness, P. E., Lorimer, G. W., and Cliff, G., *Journal of Microscopy*, Vol. 109, 1976, pp. 231–249.

[4] Miller, J. L., *Norelco Reporter*, Vol. 25, No. 3, 1978, pp. 1–11.

[5] Wicks, F. J. in *Mineralogical Techniques of Asbestos Determination*, R. L. Ledoux, Ed., *Short Course Handbook*, Vol. 4, Mineralogical Association of Canada, Ottawa, Canada, 1979, pp. 35–78.

[6] Leake, B. E., *American Mineralogist*, Vol. 63, 1978, pp. 1023–1052.

[7] Papike, J. J. and Ross, M., *American Mineralogist*, Vol. 55, 1970, pp. 1945–1972.

[8] *Selected Powder Diffraction Data for Minerals*, L. G. Berry, Ed., Joint Committee on Powder Diffraction Standards, American Society for Testing and Materials, Philadelphia, 1974.

[8] Campbell, W. J., Huggins, C. W., and Wylie, A. G., "Chemical and Physical Characterization of Amosite, Chrysotile, Crocidolite, and Nonfibrous Tremolite for Oral Ingestion Studies by the National Institute of Environmental Health Sciences," U.S. Bureau of Mines R. I. 8452, Washington, D.C., 1980.

[9] Wylie, A. G., this publication, pp. 105–117.

Exhibit 4

AMERICAN MINING CONGRESS
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† Honorary

Copy

June 8, 1984

Docket Officer
Docket No. H-033
Room S6212
U.S. Department of Labor
3rd Street & Constitution Avenue, N.W.
Washington, D.C. 20210

Dear Sir:

Re: Notice of Proposed Rulemaking on Occupational Exposure to Asbestos -- 1970.1001, Federal Register Volume 49, No. 70, April 10, 1984

These comments are submitted in quadruplicate by the American Mining Congress in response to the proposed standard for occupational exposure to asbestos, published in the Federal Register (pages 14116-14145) by the Occupational Safety and Health Administration April 10, 1984.

The American Mining Congress is a trade association whose membership is composed of U.S. companies that produce most of the nation's metals, coal and industrial and agricultural minerals, and more than 240 companies that manufacture mining and mineral processing machinery and equipment.

OSHA's present definition in Section 1910.1001(a), "'Asbestos' includes chyrsotile, amosite, crocidolite, tremolite, anthophyllite and actinolite," is incorrect and inconsistent with the definitions of asbestos used by other federal agencies, which OSHA has noted on pages 14121 and 14122 of the Federal Register.

A Bureau of Mines study addressing this issue states in part:

> Amphibole minerals, and, to a lesser degree, serpentine minerals occur widely distributed in the earth's crust in many igneous and metamorphic rocks. . . Only a

Continued. . .

> very small quantity of the amphibole and serpentine minerals under particular geologic circumstances occur as the asbestiform variety of the mineral.1/

Thus, the insufficient and indiscriminate definitions of "asbestos" and "asbestos fiber" now applied by OSHA will result in confusion and misapplication of this standard to many mining and mineral-using industries even though studies of metal miners in those industries have not shown asbestos-related health effects.

The applicability of the standard should be limited to the asbestiform varieties of minerals, as suggested by OSHA at page 14122 of the Federal Register notice.

The American Mining Congress recommends that OSHA amend its definition of the term "asbestos" to include only asbestiform varieties of minerals and that the term "asbestiform" be defined in the standard. We recommend the following mineralogically based definition:

> Asbestiform -- Description of a special type of fibrous growth of minerals that have crystallized into long, strong flexible fibers which can be easily separated into thinner fibrils each of which is a single crystal.

On Federal Register page 14121, OSHA states that it is considering the addition to its definition of asbestos the following language, ". . . and every product containing any of these minerals." The inclusion of this broad and sweeping phrase in the definition is wholly unwarranted and impractical. It would include as asbestos those mined products that contain only trace amounts of any of the identified minerals.

Although OSHA further states that it would require that "only asbestos fibers be counted and assessed for determining worker exposure," OSHA should establish a practical minimum amount. Without such a minimum, the users of many minerals and mineral products would have to incur unnecessary expenses in monitoring for trace amounts of "asbestos fibers" even though such determinations are not feasible, or the fibers are below the detectible limit.

1/ Bureau of Mines Information Circular IC 8751, Selected Silicate Minerals and Their Asbestiform Varieties, 1977, p. 5.

AMC, therefore, recommends that some trace amount level of these substances be exempt from the standard. This trace amount exemption philosophy is consistent with time-proven standards adopted by government, consensus groups, and trade associations.

OSHA also states that it may amend the definition of "asbestos fiber" to "a particulate form of asbestos, 5 micrometers or longer, with a length-to-diameter ratio of at least 3 to 1, and with a maximum diameter of 5 micrometers." While we agree that only particles 5 micrometers or longer should be regulated, defining a fiber as being any particulate with a length-to-diameter ratio of at least 3 to 1 does not delineate the difference in the habit (crystal growth) of particles of the asbestiform and nonasbestiform varieties of the minerals in question. Flakes, chips, or crystals of nonasbestiform minerals could fall erroneously within this definition since it does not convey the well-recognized or normal meaning of the term "fiber".

Lastly, the phase-contrast method of asbestos analysis suggested by OSHA is inadequate for asbestos analysis in mining and milling operations except those in which it is known a priori that asbestos fibers predominate. This is clearly stated in the ASTM (D-4240) and AIA phase contrast methods. It is recommended that polarized light microscopy be used as a screening method for workplace atmospheres where mineral dusts of unknown composition exist, or where the asbestos content is only suspect or in trace quantities. If asbestos is found with aspect ratios of at least 3 to 1, then the sample shall be further analyzed utilizing an analytical procedure equivalent to that presently used by the Mine Safety and Health Administration. (See Exhibit A, attached). It is only by this method that mineral particulates can be identified optically.

We appreciate the opportunity to comment on the proposed standard.

Sincerely,

J. Allen Overton, Jr.

J. Allen Overton, Jr.
President

Attachment

Attachment 2

ASBESTIFORM MINERAL ANALYSIS
MSHA

Optical Microscopy (Phase Contrast)	2 Fibers/cm^3	OUT
2 Fibers/cm^3		
Optical Microscopy (Dispersion Staining)	Negative	OUT
Positive		
Electron Microscopy AEM		
Image Analyzer	Negative (less than 5 micrometers or less than 3:1 aspect ratio)	OUT
Positive		
EDS	Negative (Wrong composition or wrong ratio)	OUT
Positive		
SAED	Negative	OUT
Positive		
Asbestiform Mineral Present		

U.S. Department of Labor

Assistant Secretary for
Occupational Safety and Health
Washington, D.C. 20210

JAN 27 1987

JAN 1987

A.M.C.

Mr. John A. Knebel
President
American Mining Congress
Suite 300
1920 N Street, N.W.
Washington, D.C. 20036

Dear Mr. Knebel:

This is to acknowledge your letter of December 1, 1986, in which you expressed concern regarding the Occupational Safety and Health Administration's (OSHA) notice of stay of those portions of the revised asbestos standards pertaining to non-asbestiform tremolite, anthophyllite, and actinolite. Please accept our apology for the delay in responding to your letter.

In response to your concern regarding the renumbered section 1910.1101, OSHA's position stated in the October 17, 1986 stay is consistent with Agency policy. We do not intend to change it at this time, however, as indicated in the October 17, 1986 stay notice, we intend to reconsider this policy. In addition, we plan to publish a proposal that would reopen the public record and provide for reconsideration of the issues regarding whether non-asbestiform tremolite, anthophyllite and actinolite should continue to be regulated by the same standards, and to the same extent, as asbestos, or should be treated in some other way.

I assure you that this rulemaking will entail a thorough and impartial review of the issues presented, and any decision will be based on the complete public record. We have placed your letter into this public record and it will be considered during this rulemaking.

Your interest in this matter is appreciated.

Sincerely,

John A. Pendergrass

John A. Pendergrass
Assistant Secretary

Enclosures