THE NEW YORK TIMES MAGAZINE JANUARY 21, 1973

PLAINTIFF'S EXHIBIT

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Asbestos, the saver of lives, has a deadly side

By Robert Sherrill

Shipyard work attracted about 4.5-million Americans into its ranks at one time or another during World War II, and an estimated 3.25-million of those people are still alive. If they think about the experience at all these days it is probably to again remind themselves with satisfaction that things could have been worse. Whether they went into the work simply for a paycheck, or as a kind of emancipation (at some shipyards nearly one-third of the workers were women), or as an alternative to the military draft, those who built and repaired America's ships took comfort in supposing that however dirty and boring the work sometimes became, at least it was safer than being in the front lines.

Now it appears they may have been wrong to think so. The fatality statistics are still too scattered and iffy to yield a solid conclusion, but there are some disquieting hypotheses to be drawn from such cases as that of the New York tire company executive we shall call Charles Armin because his family prefers to keep his real name out of this. Armin had never had a serious illness in his life. He was a 200-pound, robust, hearty fellow who looked much younger than his age, 60. He enjoyed sailing in his spare time and ran a taut ship on the job, too.

Then in December, 1971, he began getting sharp pains in his chest, enough to worry about, enough to send him to the doctor. Tests showed his heart was in fine shape, and the lung X-rays showed nothing wrong. Still, the pains persisted and grew worse, and in April the doctors decided to go in for a look.

They found that Mr. Armin was suffering from mesothelioma, a kind of cancer that has only come into the medical fraternity's conversation in recent years. Mesothelioma, which has been so rare that it is not separately categorized in international medical classifications, is cancer of the chest lining or of the abdominal lining. Everyone who gets it is going to die from it within a year because it covers the whole lung area from apex to base, or infuses the whole abdomen, and no surgeon can take out so much and leave a survivable patient. It is a painful disease and progressively so. The cavity lining fills with fluid, which must be drawn off periodically; when the disease strikes the chest area the patient slowly suffocates. None of the usual cancer palliatives do much good, and there is no known cure. Mr. Armin's mesothelioma was discovered in April. He was dead 14 weeks later.

The thing that makes his case—among a number of others—seem so ominous to some occupational health experts is that they know what caused it, and they know that the same cause has touched the lives of millions of other Americans. The cause was asbestos.

Now, asbestos can be credited with saving many lives: fireproof clothing, fireproof insulation in buildings, safer and more durable brake linings, etc. But now asbestos is beginning to reveal its other side, not only in the appearance of the comparatively rare mesothalioma, but, on a much broader scale, as a catalyst of just plain lung cancer, and of asbestosis, a crippling disease which scars the lungs and interferes with the passage of oxygen into the blood. Anyone with an advanced case of asbestosis will probably feel more comfortable climbing the stairs backward, so that he can sit down on each step. He also can be certain that because of the presence of the asbestosis he has as much chance of developing cancer as of escaping it. Heavy doses of asbestos in the lungs also encourage the carcinogenic effects of tobacco smoke to a remarkable degree; studies have shown that asbestos workers who smoke have a lung



Robert Sherrill is the Washington correspondent of The Nation.

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cancer rate 800 per cent higher than smokers in the general population.

Occupationally, probably five million or so Americans—insulation workers, construction workers, oil-refinery workers, etc.—breathe a significant amount of asbestos dust every day they go to work. The hazard also crops up in distinctly nonoccupational places, such as the Northside Elementary School in Lander, Wyo., which recently was closed by the state health department because asbestos which had been sprayed as an insulation on the ceiling was beginning to come loose and mix with the air in dangerous amounts. But wherever encountered, the hazard is especially insidious because it is like a long-term time bomb: For reasons doctors don't fully understand, the diseases related to asbestos do not explode for many years after the patient breathed it in.

Mr. Armin, for example, had had nothing to do with asbestos since World War II, when, from 1941 to 1943, he was a tinsmith in the Brooklyn Navy Yard. He helped install fiber glass in destroyers' refrigeration holds, and he also secured asbestos-covered pipes with hangers and straps. After 1943, he got a white-collar job away from the shipyard and never again worked with asbestos. His 29-year lag between contact and illness was not surprising; indeed, for asbestos disease, 25 to 30 years is the normal period between exposure and development of symptoms, which is why medical scientists who have specialized in the occurrence of asbestos-related industrial diseases believe that the first big wave of cancers from World War II shipyard exposure may be at hand.

Among those who think so are Drs. Irving J. Selikoff and E. Cuyler Hammond. Dr. Selikoff of Mount Sinai School of Medicine, City University of New York, is at least among the three or four top authorities on asbestos disease. Dr. Hammond is vice president of the American Cancer Society in charge of epidemiology and statistics, who already has gained a slice of immortality as the fellow most responsible for statistically demonstrating the relationship between smoking and cancer. To some high officials at the U.S. Department of Labor and to many high officials in the asbestos industry, these two doctors and their colleagues represent a kind of reform plague.

Indeed, Selikoff is seen by some leaders of the asbestos industry as a cruel showman. F. J. Solon Jr., vice-president for environmental affairs of Johns-Manville Corp., the nation's largest producer of asbestos, says, "To terrorize people who worked in shipyards 30 years ago, and now can't do a g.d. thing about it—that's something I couldn't square with my conscience."

Of the shipyard dangers, Selikoff says this: "We do know that there are a large number of mesotheliomas in Great Britain. Probably over 1,600 now, people who worked in British shipyards starting in 1935. They are five years ahead of us, so Britain casts its mesothelioma shadow over the United States. We know it's a large number, but what the count will actually be we do not know. Nor do we know the percentage of incidence in Britain; they don't have what we call a population base. But any percentage would be a *terrible* situation. The only data that we do have, that gives percentages, is a new paper just come out by Dr. D. Fletcher in Barrow, England, who followed a group of shipyard workers from 1963 to the present, and he compared those who had X-ray stigmata of asbestos exposure with the general male population in that area. He found a three-times increase of lung cancer among those who had X-ray evidence of asbestos exposure."

(Industry spokesmen note that the British experience may not be wholly comparable to the American, since in British yards asbestos was applied with a spray process not used in the U.S.)

The thing that is so alarming to Selikoff's group is that some risk applies not only to asbestos workers (only one-five-hundredth of the shipyard payroll), but to everybody who worked downwind or in the general vicinity of the asbestos jobs. In shipbuilding, this means anybody who has worked within the confines of the ship's structure: welders, shipfitters, machinists, pipefitters, electricians, carpenters, boilermakers—the whole gang.

"You don't have to work with asbestos for 30 years to develop mesothelioma or some other cancer or asbestosis from it," Selikoff explains. "Absolutely not. Because once you get it in your lungs, it stays there forever, and as the years go by your lung continues to be exposed even though you may be out in the Rockies. The nice air in the Grand Canyon won't protect you because you've already got it in your lungs."

In 1951, the lung X-rays of Robert Kerr looked normal. He was a little short of breath, and Dr. Selikoff couldn't understand why, but he put it down to all that dust Kerr was breathing at the quarry where he worked. X-rays in 1954 showed Kerr developing some lung scarring. It looked like asbestosis, and Selikoff asked Kerr if he had ever worked with asbestos. No, he said, never. He told Selikoff his whole employment history and asbestos work wasn't part of it. By 1958 the X-rays showed scarring in both lungs. Selikoff's suspicions increased: Was Kerr *certain* he had never worked with asbestos? Nope. Never. But as he talked to Selikoff, Kerr's wife interrupted: "Bob, do you remember when we first got married? In 1935, you worked in that brake-lining place." "Oh sure," said Kerr, "but I only worked there for six months as a weaver."

"And here's his film on June 7, 1972," says Selikoff. "You can see the white stuff all through the lungs. Bob's retired now, 50-odd-years old, living in Florida, unable to breathe, can't even do his own lawn. Six months in 1935! Came up from Florida to see me to make sure he had no cancer. He doesn't. He just can't breathe."

A number of asbestos-company officials and asbestos-union officials who rose through the ranks have found that they are no safer for having been away many years from the actual handling of asbestos. Raymond Rider entered the asbestos trade in 1947, but in the nineteen-sixties he became an official with New York Local 12 of the International Association of Heat and Frost Insulators and Asbestos Workers, and for 10 years he didn't touch the stuff. But he had breathed enough in his early career. X-rays taken in Jan., 1971, showed he was still in the clear, but by Feb., 1972, they showed mesothelioma. Since then he has had lung surgery, 24 cobalt treatments and extensive chemotherapy. His father, George Rider, also a union officer, died of the same disease.

The response of the industry and especially of the Federal bureaucracy has been strangely indifferent. The random breather may not care, even though asbestos can harm him too—if, for example, he inhales asbestos thrown into the air by the demolition of buildings. But the asbestos worker feels very lonely with his special demon. William G. Bernard, secretary-treasurer of the Asbestos Workers Union and himself a victim of lung-scarring, complains, "You know, we have damn near as many, or more, people who work with asbestos as there are coal miners in the country. But nobody cares about us, because we don't have any disasters. The miners have a disaster and their pictures show up on the front pages with dirty faces, and everybody feels sorry. So they put a black lung bill

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through Congress. We have a higher percentage of people dying of respiratory trouble, but nobody gives a damn about it."

ON Jan. 1, 1943, Locals 12 and 32 of the Asbestos Workers Union in New York and Newark, N. J. had 632 members. Dr. Selikoff and his colleagues have traced the 625 who matter here (seven died early, mostly of accidental causes). Given their age, 203 of those men would normally have been expected to die by the end of 1962. Instead, 255 had died —an excess over the normal death rate of more than 20 per cent. About seven should have died from lung cancer, but 45 died of it. Instead of the normal nine or 10 deaths from cancer of the stomach, colon or rectum, there were 29—"not so unexpected," as Selikoff points out, for "anybody who inhales dust also ingests it. Any worker is always spitting out the stuff you think he's only inhaling." And whereas *nobody* in the general population dies of asbestosis—scarred lungs—12 men in this study group died of it during the first 20 years, and 4 died of mesothelioma.

That left 370 of the group still alive on Jan. 1, 1963. Between then and the end of 1971, 78 of them should have died if they followed the pattern of the general population. Instead, 168 died. "And why? The same thing," says Selikoff. "There should have been four or five lung-cancer deaths in this group. There were 43. There should have been no deaths of mesothelioma—that doesn't occur in the general population. There were 23. There should have been three deaths of cancer of the stomach or rectum. There were 12. And of course there should have been no deaths from scarred lungs. There were 20.

"If we total up this one small group of workers from Jan. 1, 1943, to Dec. 31, 1971, almost 20 per cent died of lung cancer. Out of the 430 men who died, one out of every five asbestos workers died of lung cancer. Almost seven per cent died of mesothelioma. Almost 10 per cent died of cancer of the stomach, colon and rectum. Over seven per cent died of asbestosis."

Nor are these figures peculiar to the locals in question. Selikoff goes on to cite more extensive studies confirming that similar increased deaths "occur in every single group of asbestos workers that's been examined." And he concludes: "This is simply an occupational disaster without parallel in American history."

Such an alarming finding is just now beginning to penetrate the thinking of workers, which is rather odd, since asbestos industry officials and the U. S. Public Health Service and the U. S. Department of Labor have known for years that asbestos could be a serious hazard. For more than 60 years cases of asbestos disease have been positively diagnosed.

Deaths due to asbestosis were clearly defined at least as early as the nineteen-twenties. The association between lung cancer and occupational exposure to asbestos was proved in a paper published in 1955 by Sir Richard Doll, then chief statistician of the British Medical Research Council. In 105 consecutive autopsies at one asbestos plant in England, he found 18 deaths due to lung cancer. And in 1965 an equally conclusive connection was established between asbestos and mesothelioma in a paper published by Selikoff, Hammond and Dr. Jacob Churg in The New England Journal of Medicine. Since then, there has been an explosion of literature on the occupational hazards of asbestos, encouraged by symposia such as the one held recently in Lyons, France, by scientists from around the world.

The asbestos industry and the U. S. Department of Labor have not seemed exactly overjoyed to receive all this new data; indeed, their basic response has been a combination of defensiveness and hostility and furtiveness. In 1964, when Selikoff was organizing an international symposium, he received a letter from the law firm representing asbestos textile companies, informing him that the industry was aware of what he was up to and implying that if any derogatory remarks about asbestos that might harm its sales should emanate from the conference, he could expect to see them in court. The U. S. Public Health Service conducted air samplings in a couple of dozen asbestos plants in 1964, but it refused to disclose its findings to Selikoff, or, as he puts it, "apparently the key to the file cabinet was lost." Though workers in shipyards today are subjected to much the same asbestos hazards as in World War II, Navy medical officers generally refuse to talk about the problem or to discuss what they are doing, if anything, to protect workers in the yards under their command.

Selikoff's crowd has run into this wall since the beginning. In the early fifties, having recently won the American Public Health Association's Albert Lasker Award in Medicine for his part in developing a drug crucial to the control of tuberculosis, Dr. Selikoff opened a clinic in Paterson, N. J., to continue his research into pulmonary diseases. Among his first patients were 17 men who worked in the Union Asbestos and Rubber Company plant, which started production in Paterson in 1940 and closed in 1954. At that time, all 17 men were strong and working, and appeared likely to go on doing so for many years.

But within seven years, six were dead, and today, only two survive. Seven died of lung cancers, one of mesothelioma, one of stomach cancer, one of colon cancer, four of asbestosis, and one of "other" ailments. Something strange was developing, and Selikoff wanted to broaden the investigation to find out what had happened to all the men who worked in that plant from the time it opened. He needed money, and he asked the U. S. Public Health Service for a grant. It turned him down. When he asked the asbestos company's officials to let him look at their personnel records, they said they had lost them. But because the factory's output had been used in war production, all its employes had had to be cleared by the F.B.I., so a list of the workers on the factory's payroll during the war years 1941 to 1945 did exist, and by a process Selikoff prefers not to discuss, he got his hands on the names of the 933 workers of that era.

"That's all we needed," he recalls. "That and a lot of work, because we had to trace those 933 men. Surprisingly, we were able to find 877 by the end of 1971."

The effort proved revealing. According to Dr. Hammond's calculations, in a normal population group of that size, considering age and sex factors, 299 would have died by 1971. But in this group, 484 were dead. Normally 50 could have been expected to have died of some kind of cancer; in this group, 143 died of cancer. The group's lung cancer rate was nearly 700 per cent higher than the general population's; its stomach and colon cancer rates were twice as high. Seven men had died of mesothelioma.

In those war years, many of the workers had been employed for only brief periods at the plant. "Of those who worked for one week or less, when X-rayed 30 years later half of them had some scarring; nine had nothing and 10 had some scarring. *Less than one week*, and they had abnormal X-rays!" says Selikoff, who never ceases to be amazed by the statistics he and Hammond use. "So the problem is not only how much you work. Of course, the more you work, the worse it is. But even those who had very little exposure, if you live long enough you're going to have problems."

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Intrigued, and wanting to throw his net more widely, Selikoff went to Johns-Manville Corporation in Manville, N. J. He was not welcome. "Somehow," he says, "the company couldn't find itself able to cooperate." Nor could the Federal Government find funds for the research. But Joe Modrone, president of Local 800, United Papermakers and Paperworkers, which has jurisdiction at Manville, took Selikoff into the basement of the union's headquarters and scratched around and came up with the seniority list for Jan. 1, 1959. There were about 3,000 names on the list. Of these, 689 had worked at the plant for 20 years. Selikoff's men set out to track them down.

"Let's see now what happened to them—and mind, this is only the *beginning* of what will happen to them," says Selikoff. "Given their ages, there should have been 134 deaths among the 689. There were 199. And again, why did these people die who were not expected to die? Eight should have died of lung cancer; 27 actually did. And 15 died of *mesothelioma*." Two or three times as many died of cancer of the colon or cancer of the rectum or of the stomach as normally would be expected. Ten per cent died of asbestosis. "It was becoming monotonous—a hell of a monotony! So not only in the plant at Paterson but now in Manville, too, the same picture."

But while Selikoff and Hammond and their crowd did everything they could to uncover evidence of the disaster that was occurring in the asbestos industry, industry and Government remained unmoved.

The most impressive case of bureaucracy/industry indifference occurred at the Union Asbestos and Rubber Company factory in Tyler, Tex. This is the same outfit that had operated the factory in Paterson, N. J., before closing it in 1954. Union Asbestos later sold out to Pittsburgh Corning Corp. But under any name, the Tyler plant was still a foul place to work. Reputedly, in some areas of the plant the asbestos dust was so thick workers couldn't see across the room. Medical facilities consisted of two first-aid cabinets, one with a broken glass door admitting

Beyond the factory itself, asbestos waste was dumped in nearby fields, sometimes to a depth of three feet, that children sometimes used as a playground. Bags in which asbestos had been shipped to the plant and which were still coated with asbestos dust were sold to local nurserymen who do a tremendous business in roses.

It is futile to guess at the number of nurserymen and customers who breathed an injurious amount of asbestos dust from the sacks, but the factory workers can be counted. Personnel records microfilmed by the Public Health Service show that between 1954 and 1972 at least 895 persons were employed there. They were working under deadly conditions and the U. S. Department of Labor and the Public Health Service were aware of these conditions at least as early as 1967. But they kept quiet.

Inspectors from the old Bureau of Occupational Safety and Health (BOSH) took air samples in 1967 that showed that the count of asbestos fibers was in some parts of the plant 60 times higher than today's officially declared safe level of five fibers per cubic centimeter. These findings were withheld from the workers. In 1968, because the Tyler plant turned out asbestos insulation under a Navy contract, it was subjected to an inspection by the Labor Department under the Walsh-Healey Act. The company could have been heavily fined or even closed because of its health violations; instead, the Labor Department took no action at all.

That's the way things stood until 1970, when Congress passed the Occupational Safety and Health Act. With that act, BOSH was phased out and replaced by NIOSH — the National Institute of Safety and Health. With the change of initials came a change of bureaucrats and attitude, too. Among them were Dr. Joseph K. Wagoner, who became director of the Division of Field Studies and Clinical Investigations, and Dr. William M. Johnson, a recent product of the Harvard School of Public Health, who became Wagoner's assistant. They inherited a medical chaos, a burial ground of old statistical bones hastily covered up by their predecessors.

"We even inherited about 2,000 air samples that hadn't been counted," Johnson recalls, "because the previous inspectors had been out collecting data without ever coming to grips with what they were doing. They would just keep rescheduling surveys, sometimes a second or third time around at a plant without really giving any thought to what it was really showing from a health standpoint."

Buried deep in the files he found Tyler, Tex. Why had Public Health Service and Labor Department officials covered it up? "I could say they were stupid, or that it was criminal negligence, or bureaucracy, or I could say they were afraid that if they did start getting concerned about this that their right of entry would have been cut off," says Johnson, "but the fact is, I don't know." All he did know immediately from the records he uncovered was that "the plant had no business operating."

But still the higher bureaucracy balked. "We transmitted our sampling results to the Labor Department," says Johnson, "and also followed up with a comprehensive report." The report showed that of a sampling of 17 men who had worked in the plant 10 years, eight had asbestosis. "The Department of Labor

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would not honor our samples. They wanted to take their own for compliance. They went in—I don't remember the exact date; I believe it was November, 1971—and they took some samples and came up with citations. But they didn't mention asbestos in the citations and the citations only added up to $210 in non-serious violations."

So much public ridicule and bad publicity greeted that punishment that Labor felt obliged to reinspect the factory and levy a $6,990 fine. Two weeks later, claiming the fines were too great a burden to bear, Pittsburgh Corning decided to close the plant. Left behind were many Tyler residents who will eventually die of asbestos disease.

Are there other asbestos outfits still humming away in the same condition that filled the lungs of Tyler? Some are trying to shape up. At the Johns-Manville plant in New Jersey, for example, company officials claim—and union officials agree—that in 90 per cent of the factory the asbestos fiber count is already below the five-fibers per c.c. maximum set by Federal health standards. The dust is sucked up through hoods over the machines and captured in a central bag house. And at J.-M.'s asbestos mill in Asbestos, Que., the bagging of the mineral is done entirely by machines; everything is enclosed; human hands don't touch it, and the dust is reportedly carried away in 70,000 separate suction operations. Johns-Manville is also "considering" hiring only nonsmokers in some of its operations. "This corporation has a conscience 80 miles long," says J.-M.'s Vice President Solon. "We've sent out instructions to clean up or close down, but I won't tell you the whole industry takes that attitude."

Dr. Johnson, despite the fact that he has only a restricted view of the industry, says he knows of "about a half-dozen plants" in which the asbestos levels are four to eight times what the Labor Department concedes is the maximum safe level. But actually, nobody knows how widespread the hazard is. Federal funding for inspections is at a rock bottom minimum. And unions may be as lethargic as industry or Government when it comes to informing workers of the risk. Officials of the United Cement, Lime and Gypsum workers, which has jurisdiction at a plant where asbestos dust concentration is said to be over 100 times the safe level, say they haven't even bothered to get their workers X-rayed yet, though a U. S. Bureau of Mines report exposed the danger last March.

As for the enforcement of health standards established under the Occupational Safety and Health Act, Federal officials have conceded in testimony before Congress that if they were going to enforce health standards properly, they would need about one hygienist per 35,000 workers.

So far as can be determined, the Labor Department at present has 60 hygienists — or about 1 per 1.2 million workers—to enforce *all* health standards, not just those relating to asbestos hazards.

Since there seems to be no great rush to enforce any asbestos health standards, it hardly matters whether the standards are the proper ones. But the manner in which they were decided may give some further indication of what the laboring man can expect in the way of protection from the Federal agencies and the industry.

At issue was whether to set the standards at a maximum permissible air content of two asbestos fibers (each longer than 5 microns) per cubic centimeter or five asbestos fibers. In either case, that's quite a bit of dust. A cubic centimeter is about the size of a small thimble of air, and a workman will inhale about six to eight million of them in a typical day. So the issue was whether to require the companies to maintain conditions which would prevent a worker from having to inhale more than 12 million to 16 million fibers of a certain length, or 30 million to 40 million fibers. With a substance that the Labor Department concedes "is causally related to asbestosis and cancers," the multimillion differences were obviously no trivial matter.

With what appeared to be an effort to get the best answer, Labor Secretary James Hodgson early in 1972 appointed an outside Advisory Committee on Asbestos Dust made up of scientists and engineers and labor officials. He also had the assistance of an inside advisory group of medical men and scientists put together especially for this problem by NIOSH.

Also from the outside he hired Arthur D. Little, Inc., a consulting firm, to come up with some advice on the economic feasibility of requiring industry to get rid of its asbestos dust. Arthur D. Little's panel of experts was made up of 13 executives from the shipbuilding industry, 12 executives from the asbestos industry, and a health group of 11 doctors and technicians, all but two or three of whom reputedly have been "consultants" to the asbestos industry at some time in their careers.

The Advisory Committee on Asbestos Dust told Hodgson he should drop the standard to two fibers. NIOSH's panel agreed that two fibers was none too low. But Arthur D. Little concluded that five fibers was perfectly safe and that dropping the standard to two fibers would cost industry far too much money. In addition, four days of hearings were held at the Labor Department offices in Washington, with industry contending that Selikoff is right up to a point, but that he goes too far and interprets his findings too wildly. Matt Swetonic, Secretary of the Asbestos Information Service, a New York health data distribution center funded by the industry, says, "There has been considerable controversy with Selikoff not so much on the effects of asbestos, but on the best means to control it and what sort of levels are necessary to control various asbestos diseases." Industry people, says Swetonic, believe that the perils of the insulation workers—who face periodic massive doses of asbestos-laden air—are too often confused with what industry contends are the manageable low-level exposures of the asbestos manufacturing factories.

In the end, Hodgson, insisting that he had arrived at his decision by an independent appraisal of all evidence, rebuffed his own advisory group and said that a five-fiber standard would be in effect for the next four years. (Coincidentally, Johns-Manville Corporation the same day notified its stockholders that the ruling would not hurt their sales and earnings.)

Selikoff points out that this ruling was designed to set a safety level for asbestosis, not for cancer, and that in any case, qualified scientists simply cannot be sure enough about the nature of asbestos related disease to say where the level should be fixed. In this light, he argues, Hodgson's ruling was at best incautious. "There's a lot of published evidence that in two fibers per c.c. mesothelioma occurs, lung cancer occurs, asbestosis occurs. An industrial hygiene practice in our country has been that when there is a serious risk, you build in a big safety factor. But what

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Dr. Irving J. Selikoff, in his laboratory at Mount Sinai School of Medicine. Because of his efforts to expose the dangers of handling asbestos, some Government and industry officials consider Selikoff and his colleagues "a kind of reform plague."

the Labor Department has done is say, 'We don't know for sure what level will certainly cause cancer and without this knowledge there is no requirement for extra caution,' instead of saying, 'These are the lives of hundreds of thousands of American workers that we are responsible for and therefore let's set the most prudent level.'"

By continuing the five-fiber standard for another four years—a period that will probably see 100,000 or so new men enter asbestos-related industries—Selikoff predicts the Labor Department has doomed 20,000 to unnecessary lung-cancer deaths, 7,000 to unnecessary mesothelioma deaths, 7,000 to unnecessary asbestosis deaths as well as deaths of other cancers. And that's not counting combination effects—asbestos plus tobacco smoke, asbestos plus the coal-tar pitch workers like roofers must handle. All in all, Selikoff predicts that "by a stroke of the pen, 50,000 more lives were thrown down the drain."

The A.F.L.-C.I.O., agreeing with Selikoff, has sued the Department of Labor in the U. S. Court of Appeals, charging that Secretary Hodgson did not consider the evidence or act to protect workers as the law requires him to do, and demanding that he review the evidence again and set tougher standards. From the opposite direction, however, comes pressure to ease up further. The National Insulation Contractors Association has petitioned the Labor Department to give its member companies—who represent a large segment of the industry that hires asbestos workers—a year's deferment from monitoring requirements. The N.I.C.A. promises that if the asbestos workers will cross their fingers and hold their breath until the end of 1973, virtually all of the insulating companies by then will have switched to asbestos-free materials such as fiber glass.

Meanwhile, Selikoff's flying wedge continues relentlessly down the field. Not long ago, Selikoff was having some drywall construction work done in his office. He sat there watching the workmen and all of a sudden it occurred to him: "I said to myself, well, hell, if these guys have been putting up that stuff—watch them spackle it and sand it down so you can't see the joint—they're not immune. I had enough background knowledge to know that the taping compound has asbestos in it. So I got in touch with the painter's union, and their tapers came up to see me. To make a long story short, that week one of their men was operated on for lung cancer. So we cut the lung; the electron microscope showed it was loaded with asbestos. This is a new trade, began in 1946 or so, right after the war—everything became drywall—most of the guys in it for only 10, 15, 20 years. We just began a survey at the union's request. We've X-rayed our first 17 men, and nine of the 17 have asbestosis. These are the old-timers, with 25 years in the trade. Very mild, because these are early cases so far. But we know what's in their lungs." And so another group falls under Selikoff's cloud.

But of course, as in any scientific confrontation, there is always the possibility of miscalculation. Perhaps Selikoff and Hammond and their colleagues at Mt. Sinai Hospital and in the American Cancer Society shouldn't frighten shipyard workers and painters and pipefitters and insulation workers and the rest. Perhaps Assistant Labor Secretary George C. Guenther—who once defended the small fines levied against corporate health violators by saying that "we are not in the fund-raising business"—was correct to upbraid Selikoff for having chosen, as Guenther judged it, "to overdramatize the matter." It is not, however, an argument that evades resolution. Those who have worked around asbestos for any length of time will, sooner or later, find out who was right. ■

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The skin of the salamander

Asbestos, a name that embraces a number of fibrous mineral silicates, has been used by man for thousands of years, and for most of that time its qualities have produced confusion and mystery and myth. In the aggregate it is a rock with all of a typical rock's rigidity, but broken up it yields fibers that can be spun and woven as easily as flax or cotton. For centuries it was commonly assumed that asbestos was a vegetable rather than a mineral. There was something obviously strange and wonderful about fibers that seemed so gossamer and yet were as strong as steel wire; an ancient explanation of asbestos' most mysterious power was that the material came from the skin of the salamander, a mythical animal that could endure fire without harm—a notion that was useful to poets even as late as last century (Southey: "Fly, Salamanders, on Asbestos' wings, To Wanton in my Delia's fiery glance").

Asbestos remained primarily a curiosity until the 1870's when—because of its flexibility, its tensile strength, its invulnerabilty to heat and acids and alkalies—it was first commercially mined. In the intervening years it has become a prized ingredient in thousands of industrial products: floor tiles, filters in the manufacture of beer and other foodstuffs, electrical tape, paddings of all sorts, paper binding, paints, etc.

Nearly four million tons are mined annually throughout the world; the United States, though it contributes little to the total production, is the world's largest consumer of the mineral. The Bureau of Mines says we used 758,571 tons in 1971. U.S. use of asbestos has grown 1,000-fold in this century, compared to an 80-fold growth for petroleum. Ninety-five per cent of this is chrysotile asbestos from the open-pit mines of Quebec, Canada, probably still the world's most productive source, although Russia is beginning to challenge Canada's production lead. Amosite asbestos, most important for shipyard work, comes largely from South African mines. Rudolph Wild, the brilliant engineer whose work a generation ago persuaded the U.S. Navy that amosite asbestos was superior for shipyard insulation and should be written into Navy contract specifications, paid for his involvement with the magic mineral. He died of mesothelioma.—R. S.

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