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Tahilton

If government allows workers to be exposed to the gas, some of them may die. If it eliminates all exposure, a valuable industry may disappear.

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ON THE HORNS OF THE VINYL CHLORIDE DILEMMA

by Paul H. Weaver

Not long ago, cancer and plastic were associated with each other only in the writings of Norman Mailer, where they serve as symbols of decadence and self-destructiveness in the high-technology society. Since January of this year a series of medical reports has shown this association to be a real scientific fact as well. It is now clear that vinyl chloride, a gas from which the second most widely used U.S. plastic is made, causes a fatal cancer of blood-vessel cells in the liver; the gas is also implicated in a host of additional diseases, ranging from gastrointestinal bleeding to chromosome damage.

These discoveries have touched off a flurry of regulatory activity. The Food and Drug Administration, the Environmental Protection Agency, and the Consumer Product Safety Commission have all banned aerosol sprays using vinyl chloride as a propellant. But the measure that cuts deepest was taken by the Occupational Safety and Health Administration. OSHA has moved to reduce the permissible level of worker exposure to vinyl chloride in the plants where it is made or converted into plastic.

Preparing for the Iceberg

In the course of these developments, it has become clear that our regulators have a hard time thinking sensibly about problems like vinyl chloride. The businessmen being regulated and the workers affected seem to find it no easier. The fact is that our society seems to have no agreed-upon standards for dealing with situations in which medical and economic considerations collide head-on. Since collisions of this sort will plainly be numerous in the years ahead—the vinyl chloride case is widely identified as the tip of an enormous regulatory iceberg—it seems useful to get clear on the issues involved.

If vinyl chloride were an unimportant substance, or if it were known to be dangerous only in very high concen-

trations, or if it were easy to keep human beings out of contact with it, there would be no particular problem. In that case the health danger could be completely eliminated at little or no cost, and the question of what to do would answer itself.

Unfortunately, the vinyl chloride issue isn't so simple. It seems to be very difficult and costly—and it may be impossible—to guarantee that no vinyl chloride worker will be exposed to the gas. Though no one knows for sure, it is possible that even very small exposures may cause sickness or death. Yet it is also true that the plastics made from vinyl chloride are extremely important to the American economy. The market value of the gas being produced this year, and of the resin made from it, is perhaps \$1.5 billion; the gas and resin industries together employ about 6,000 workers. But what most people think of as the "plastics industry"—the transformation of resins into products—is a far larger operation. The total number of jobs involved in polyvinyl chloride (PVC) alone is about 320,000; the sales volume runs to many billions. And there are no entirely satisfactory substitutes for PVC at hand. Banning it would be certain to cause grave economic dislocations.

Thus the regulators at OSHA are caught between the proverbial rock and a hard place. It is clear that their task should be to find the right "trade-offs"—to devise regulations in which the benefit of increased health for

The most hazardous job in polyvinyl chloride plants used to be the cleaning of the vats in which vinyl chloride polymerizes into PVC—that whitish resin at the worker's feet. Of the sixteen known U.S. cases of vinyl-chloride-related liver cancer, fourteen occurred in vat cleaners. The job is presumably a lot less hazardous since the introduction of the respirators, protective clothing, and air evacuation (provided by the dangling hose) that are shown here. The stainless-steel-lined vat shown is in B.F. Goodrich's Pedricktown, New Jersey, plant, perhaps the most modern in the U.S. The vat is entered and cleaned manually only once a month. Until recently vats in most older plants were entered once or twice a day.

Research associate: Sydney Ladensohn Stern

from the University of Pennsylvania's Wharton School of Finance.

Sabet himself had a \$9 education. When he was a boy, tuition cost \$1 a year, and his father, a textile retailer, could afford only nine years. The family's house was tiny. "I was very embarrassed to see almost no furniture and no door between our one room and the kitchen. So I got some wood and built them."

At fifteen, Sabet landed a job in a bicycle shop, where he saved \$70 to invest in his own taxi. Later he organized the country's first furniture factory and bought into a Dodge distributorship. He kept plowing his profits into new enterprises until the eve of World War I, when he sold everything and went to the U.S.—to export goods to Iran.

The furniture is improving

During the Shah's first visit to the U.S. in 1949, Sabet met the king. "His Majesty asked me to return home and do whatever I could to build up industry," he recalls. Sabet started three TV stations that never made a profit, and he sold them to the government. He still makes sets—which are profitable.

White haired and patrician looking at seventy, Sabet compensates for those lean early years by a bit of conspicuous consumption. "With His Majesty's encouragement, I made many industries and got a lot of money," he says. "Now we can do something beautiful with it." On the outskirts of Tehran, he is building a new home—a magnificent replica of the Petit Trianon, where Marie Antoinette once relaxed in splendor. The mansion is nearly complete, after a decade of work and an investment of about \$15 million. Sabet's French architect has added such modern touches as a swimming pool and underground garage.

At a London auction in 1971, Sabet paid a record \$440,000 for an antique desk once owned by a czarina, and he keeps it in his apartment in Paris. "That has given me more pleasure than anything," he declares. "It's like a soldier who becomes a general, like a clerk who becomes president. I started out building a kitchen door for my poor family, and now I can afford the most expensive furniture in the world."

hard as he pushes himself, he cannot be everywhere at once, and even his direct orders are frequently ignored once he turns his back. During a visit last year to the town of Shiraz, for example, he told administrators to stop a cement factory from polluting the air. Returning this year, he found nothing had been done. Finally, a burst of royal outrage galvanized officials into action.

In charting goals for the future, the Shah often seems unable to grasp the impossibility of attaining them in such a short time. Up to a point, proclamations can help inspire people. But the promises have also brought expectations that outstrip results, and the disparity could ultimately lead to social unrest. While some of the oil money has trickled down to workers, it has also helped raise inflation to an annual rate of around 20 to 25 percent. Cities have been beset by periodic food shortages and strikes. A loyal Iranian who has held lofty positions in government and business says privately of the Shah's majestic plans: "They are childish, totally unrealistic. Look at our miserable villages and even the streets of this capital. There's enough practical work for us to do without such nonsense."

Delivering the milk

The Shah now promises quick delivery of social benefits for all: free elementary education, free milk to students, and a broad national health-care program. And very soon, he pledges, workers will also have housing loans on easy terms.

Prime Minister Amir Abas Hoveyda puffs on his Dunhill pipe with a cocky confidence that lately infects the regime and says: "In Western countries, you talk too much about things, take them from committee to committee. Here, we just go to the Shah and then act." Merely extending elementary schooling to all youngsters will require an additional 29,000 teachers and many more classrooms. Hoveyda says that college students can temporarily fill the teacher gap, and within two years the government television network will broadcast lectures to all schools via Iran's own satellite. The fact that many villages

have no electricity for running TV sets doesn't bother him. "We'll use batteries."

Delivering one glass of milk a day to every student in 65,000 villages is beyond the capacity of the entire dairy industry, even with large imports of powdered milk. But the Prime Minister grandly claims that somehow the headmasters will provide milk for everyone beginning this month. "We will only send the money. It's their responsibility. Imagine what a boom in business this will bring."

Blonde nurses will be tolerated

Those at the working level discount such optimism. As one official in the Ministry of Economics and Finance puts it, "Of course, we can't deliver all these things immediately. We must first develop institutions." Implementing a meaningful national medical-care plan overnight is hardly possible in a country with only 10,000 doctors. As short-term solutions, Iran is hiring physicians from Pakistan and making plans to purchase fully staffed hospitals from the U.S. and Europe. Says Hoveyda, "We don't mind if the nurses are blonde."

The problem of meeting these ambitious social goals is compounded by the fact that both industry and the armed forces are competing with the social-welfare bureaucrats for the small pool of skilled manpower. "I just don't know where we are going to get the trained personnel," says an executive of the government oil company, which plans at least a dozen new petrochemical plants and refineries.

At Isfahan, a U.S. Army officer training Iranians to use complex electronic controls for artillery notes that most students have only a sixth-grade education. In Oman, a British officer serving there reports, the greatest military hazard comes from inexperienced Iranian troops firing at each other. Iran increasingly depends on U.S. companies to provide training along with weaponry. Bell Helicopter employs 1,000 Americans to teach Iran's Army how to fly, maintain, and manage logistics for the hundreds of choppers on order. Northrop Corp. supplies technical support for overhauling jet fighters.

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workers is balanced against the increased cost to the plastics industry and society as a whole. Unfortunately, this task has remained largely unacknowledged.

OSHA probably will end up compromising on the degree of exposure to the gas it will allow; its decision is apt to be announced this month. But the agency has been under terrific pressure to view the issue before it in absolutist terms, as if its only legitimate concern were the preservation of absolute security for the vinyl plastics industry, or the achievement of perfect safety for vinyl chloride workers.

For a while, it seemed a foregone conclusion that OSHA itself would opt for perfect safety. On May 10, it formally proposed that the new standard for vinyl chloride be set at "no detectable level," i.e., that no plant would be allowed to operate so long as any of the gas could be found in the air or in contact with workers. The industry replied, in effect, that any such standard would be technically impossible and economically disastrous, and that if OSHA went through with it, the polyvinyl chloride industry would be put out of business.

OSHA's final decision will affect more than this single industry and its customers. The vinyl chloride issue may be viewed as the first major test case for a new movement in government regulation. The leaders of the movement are three of the newest federal regulatory agencies, all created since 1970: EPA, CPSC, and OSHA. One general theme behind all of these agencies is that business can no longer promiscuously pass on to society all the indirect costs of running a modern economy. As Sheldon W. Samuels, health director of the Industrial Union Department of the A.F.L.-C.I.O., put it, "The free ride on social costs is at an end. In the plastics industry you're seeing a manifestation of social costs."

With jurisdiction over virtually every product and substance, these agencies, together with the FDA, are beginning to use their sweeping powers to reduce the public's risk of chronic disease, especially from industrial products. Some of the agencies are subjecting new substances to rigorous pretesting before they are allowed onto the market. And with the vinyl chloride case, they have tackled the first of a long list of basic substances on which our industrial economy is already built.

It could put you to sleep

During the first decades of its commercial existence, vinyl chloride seemed a most unlikely candidate for the role of heavy in a historic regulatory drama. Put into full-scale U.S. production in 1939, polyvinyl chloride was hailed as a "miracle" material: cheap, stable, fire-resistant, and able to assume an extraordinary range of soft and hard forms. Its major applications now include coated fabrics (like those used in automobile seat covers), wire insulation, floor tiling, pipe and conduit, phonograph records, and medical supplies, e.g., blood-storage bags.

In the beginning the vinyl chloride gas seemed to be

virtually harmless. The only apparent dangers were of explosion (at concentrations beginning around 36,000 parts per million) and narcosis. In fact, during the 1940's the gas was tried out as a medical anesthetic, but doctors abandoned it when it was found to cause heart arrhythmia. With low prices providing little incentive for conservation, producers paid no particular attention to workplace exposure levels so long as they were safely below the point of fire and explosion.

And yet exposure levels in plants producing the gas itself were probably not very high even in the early years. Vinyl chloride is synthesized from chlorine and petrochemical feedstocks (usually ethylene) in a continuous closed process. The plants, which resemble oil refineries (and in some cases are attached to them), are open to the air. Historically, the heavy exposures have occurred in the plants where vinyl chloride is polymerized into PVC, the whitish powdery resin from which actual plastics are made.

It could make you "high"

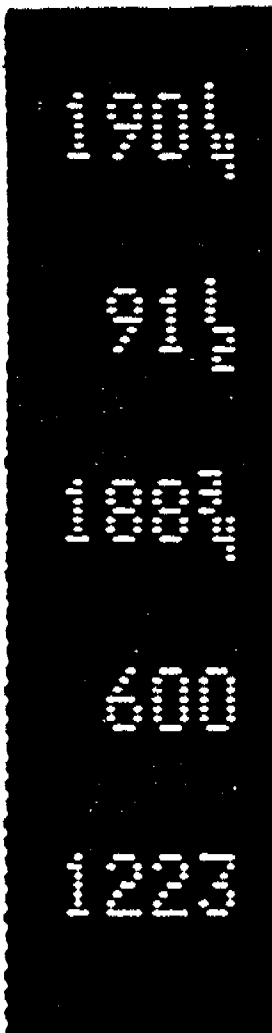
Polymerization is a batch process: vinyl chloride monomer (VCM) and other substances are put into a pressurized vat, heat is applied, and hours later, when polymerization is completed, the vat is emptied, opened, and cleaned for the next batch. The process is full of leaks. In most of the early plants the gas could be smelled almost constantly (VCM has a faintly sweet odor that seems to be detectable at concentrations above 2,000 parts per million), and workers occasionally got "high" from the fumes. It is widely agreed that in this early period, lasting into the 1950's, exposures of several thousand ppm were common.

During the 1950's, as the vinyl industry grew, a trickle of little-noted and often inconclusive medical reports began to raise doubts about the monomer's presumed harmlessness. In 1949 a Russian group found a hepatitis-like condition in more than one-fourth of seventy-three PVC workers examined, and over the next ten years European researchers encountered other symptoms: skin lesions, a circulatory disorder, gastritis, and dermatitis, to name a few. By the mid-1960's these had been confirmed and were described collectively as "vinyl chloride disease." Later in the 1960's, acroosteolysis, a disease involving a degeneration of the finger bones, was identified among workers who clean polymerization vats.

As these findings accumulated, producers began to reduce exposure levels. In 1961 the American Conference of Governmental Industrial Hygienists, a voluntary standards-setting organization, had put the maximum safe exposure at 500 ppm. During the 1960's industry began working to get much lower than that, and by the early 1970's exposure levels were generally in the 100-to-200-ppm range, with short-term "excursions" to levels many times higher.

In this general downward movement, Dow Chemical

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After his hedge fund got shot down, Mike Epstein rejoined the soldiers on the Street.

A Random Walk Among the Wounded

During the great bull market days, the performance crowd got the idea they couldn't lose. What happened hit their egos as hard as their pocketbooks.

by Stanley H. Brown

R&S 111758

The face of Burt Kleiner is sometimes sad, sometimes tranquil like a Buddha. As he sips iced coffee at the Beverly Hills Hotel, he talks vaguely about metaphysical "trips," "energy," "the planet," and "trialectics" (the successor, of course, to dialectics). He says he plans to set up a foundation that will have something to do with a mysterious coming "event" he won't disclose. His dress is, well, casual—robes, safari suits, American Indian jewelry, a woven shoulder bag. It's hard to believe that only a half dozen years ago, his name was one to be reckoned with in the financial community.

Kleiner was the archetype of the "deal man." Through his Beverly Hills brokerage firm, Kleiner, Bell & Co., he tried to take over such prominent corporations as Studebaker, Pan American World Airways, Armour & Co., and Metro-Goldwyn-Mayer. He made paper profits

in the millions in a single day. Forced out of the business in 1970, he liquidated his firm, turned his back on the stock tickers and the deals, and set out on a curious new journey as what he calls a "guru groupie."

Devaluing human assets

Kleiner's departure was precipitated by SEC charges that he had manipulated shares of such clinkers as Omega Equities, Commonwealth United, and Minnie Pearl's Chicken System. To that degree, the radical change in his life is a special case. But a lot of other famous protagonists in the great bull market of the Sixties have also undergone transformations in their incomes and expectations. The great bear market of the Seventies has left many of them damaged, diminished, jobless.

A random walk down Wall Street reveals that, even among those who have

Books & Ideas *continued*

policy action, like a stone dropped into a pool, sets off ripples of reaction. Since the economy responds with varying time lags, a second stone is often dropped while the ripples from the first are still roiling the economic waters. When this "stabilization" exercise is repeated often enough, the result is greater instability.

There are also technical objections to using a full-employment budget to justify federal deficits, as the Nixon Administration did in 1972. Such a budget no longer measures the true impact of government spending and lending on the economy. Federal activities totaling tens of billions of dollars annually—among them the farm credit agencies, the Export-Import Bank, and the Federal National Mortgage Association—have been spun off into independent corporations.

A better yardstick

Another defect is even more serious. "Full employment," a concept intended to measure economic slack, is still defined solely in terms of joblessness. Last year, unemployment averaged 4.9 percent, and the federal budget showed a surplus on the full-employment basis, suggesting that there was still room for fiscal stimulus. Yet shortages of all

kinds, notably in basic materials, plagued the nation. Full employment ought to be measured in terms of our total capacity to produce, including labor, plant, and capital. If such a yardstick had been in use a few years ago, we might have had more timely warning of today's raging inflation.

Despite such problems, Jim Tobin clearly believes that the new economics is still the road to millennium, provided that we adopt a number of fiscal and monetary reforms. Two have been put into effect since the book was written. By setting the international value of the dollar free to float, the Nixon Administration gave the Federal Reserve freedom to pursue a more flexible monetary policy. And Congress at last has created budget committees to set overall guidelines for spending.

But Tobin also demands changes that have little chance of adoption. For instance, he would give the President power to adjust appropriations to fit budget targets. And he wants Congress to separate tax reform from bills to raise or cut taxes, so that temporary surcharges or credits can be enacted speedily to stabilize the economy.

If adopted, such proposals would only

lead the government back to fine tuning with "macro," or broad gauge, economic policies. That is like using a shotgun where a rifle would be more appropriate.

At comparatively small cost, we could open-end the duration of unemployment insurance, a step that would aid mature, trained workers. There should be, as Chairman Arthur Burns of the Fed has suggested, a much enlarged public employment program when the jobless rates go up. It would help mostly young people and those without the skills to compete in a modern economy. Putting 800,000 people on a government payroll at \$5,000 a year would cost about \$4 billion, but it might reduce unemployment by a fifth (i.e., from 6 to 5 percent). In Tobin's program, public-service employment is only an adjunct of much more ambitious—and expensive—macro-economic policies.

In today's changed economic environment, the new economics has become the old economics. The old solutions are not only inflationary, but of dubious help to the people who need it most. Broad-gauge policies for economic stability should be stable themselves. There is no need to change them to offset each wiggle on economists' charts. END

Vinyl Chloride *continued from page 153*

was far and away the leader. In 1961 it had conducted an animal experiment showing liver effects at levels as low as 100 ppm and had decided to get its own plants below 50 ppm. By the early 1970's, Dow had achieved average exposures in the neighborhood of 25 ppm in its copolymer plants (one of which produces resins for Saran Wrap).

In 1970, Dr. Pierluigi Viola, an Italian physician studying acroosteolysis for Solvay, a major European PVC producer, reported an unexpected discovery. After twelve months' exposure at 30,000 ppm, many of his experimental rats had developed cancers. Doubts about Viola's procedures led Montedison and other European producers to commission Dr. Cesare Maltoni to undertake a large-scale animal experiment to see if this carcinogenic effect could be replicated at lower exposure levels. By the end of 1973 Maltoni's well-executed study had shown that levels of VCM as low as 250 ppm induced a variety of cancers in rats, including angiosarcomas of the liver. In June, 1974, he reported angiosarcomas at 50 ppm.

American producers began to join the inquiry into vinyl chloride and cancer in 1973. Early that year the Manufacturing Chemists Association decided to commission two massive studies. One was an animal study somewhat like

Maltoni's (it has since confirmed his findings). The other was an epidemiological analysis of the morbidity and mortality history of American vinyl workers.

In December, Dr. John L. Creech, a Louisville, Kentucky, surgeon who is plant physician for B.F. Goodrich's massive PVC installation there, received a report that one of the workers had died of angiosarcoma of the liver. Remembering that another worker had died of the same cause two years earlier, he notified a superior. In mid-January, 1974, while a systematic mortality study of Goodrich workers was being organized, Creech received a report of a third angiosarcoma death. On January 22, B.F. Goodrich announced the three deaths and their cause. To date, a total of eight persons employed at the Louisville plant have been found to have contracted this disease.

They blew the whistle themselves

As of January, 1974, literally all the information linking vinyl chloride to cancer had been developed by the industry on its own initiative. As Ralph L. Harding Jr., president of the Society of the Plastics Industry, observed, "This is a unique situation. Industry financed the studies, and industry blew the whistle on itself."

But this was quickly forgotten in the furor that arose during the weeks following B.F. Goodrich's

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The New Economics Is Alive, If Not Well by Tilford C. Gaines

Government economic policies ever since World War II have been judged according to how far short the results fell of a millenarian goal: full employment combined with stable prices. For a time in the mid-Sixties, when a long boom brought the goal within view, the professional economists who had tinkered so successfully with taxes, spending, and monetary policy took on some of the luster of public heroes. Now that despair about inflation has replaced the old euphoria about growth, the "new economics" of the Sixties commands allegiance from only a dwindling band of partisans, including, understandably enough, James Tobin, Sterling professor of economics at Yale University and a member of the Council of Economic Advisers for the first year and a half of the Kennedy Administration.

An engine of inflation

In his slender but sprightly book, *The New Economics One Decade Older* (Princeton University Press, \$6.50), Tobin argues that the fall of the doctrine he helped bring to power "is only partial and temporary." His appraisal of what we should have learned from the economic experiments of the Sixties is perceptive and, in large part, objective. But the book is greatly flawed by omissions, notably the failure (like that of the new economics itself) to give sufficient weight to the dangers of inflation.

Tobin dismisses inflation with polemic brevity. "Our economy, like all others of the modern world, has an inflationary bias," he writes. "When it operates without socially intolerable rates of unemployment and excess capacity, prices will drift steadily upward . . . As consolation, I can only offer my opinion that inflation is greatly exaggerated as a social evil."

To be sure, Tobin wrote before price inflation in the U.S. reached its recent level of more than 12 percent annually, and perhaps could not conceive that such a rate was imminent. But this is precisely the point where his doctrine is most

vulnerable to attack. The fundamental question that must be raised about the new economics is whether, in practice, it became first an instrument of ever-increasing government intervention in the economy and later a formidable engine of guaranteed inflation.

The new economics, as Tobin notes, was not entirely novel. In essence, it is based on the Keynesian notion that deficit spending and tax cuts can reduce unemployment, promote economic growth, and, as business picks up, even swell federal revenues. To support these ideas, Kennedy's CEA turned to the concept of the "full-employment budget," which measures deficits or surpluses not in conventional terms but as they would be if the economy were running at full employment (arbitrarily defined as 4 percent unemployment). This concept led in turn to the massive income-tax cut of 1964.

The triumph of the new economics lasted through 1965. "Then," recounts Tobin, "things began to fall apart." Against the advice of his economic advisers, President Johnson dallied two

years before asking for a tax increase to pay for the Vietnam war, which swelled the federal deficit to dangerous proportions. It was mid-1968, about three years late, before Congress enacted a temporary income-tax surcharge. And then the Federal Reserve, more concerned about economic "overkill" than about inflation, moved toward an easier monetary policy, thus undercutting the economic restraining effect of higher taxes. The inflationary mess of the late Sixties followed.

Rationale for overspending

Tobin insists that "the validity of New Economics as science is not impaired but rather reinforced by the fact that bad things happened as predicted when the advice of its practitioners was rejected." But with the benefit of hindsight, it seems fair to conclude that the doctrine had congenital defects, making failure inevitable. In the first place, the new economics is politically naive. The full-employment budget gives the federal government an intellectual rationale for doing what it is disposed to do anyway: spend too much money.

The new economics also requires continuing government interference with the course of the economy, and such "fine tuning" has a perverse effect. Each

In the early days of the "new economics," James Tobin (left) testified before the Joint Congressional Economic Committee with Walter Heller and Kermit Gordon, fellow members of the Council of Economic Advisers. The date was March 6, 1961.



Tilford Gaines is senior vice president and economist of Manufacturers Hanover Trust Co.

announcement. Within days, regulators, public-health doctors, and union officials had begun to dominate public discussion of the vinyl problem. Within weeks, the Louisville *Times* initiated a series of stories alleging that industry had engineered a Watergate-style cover-up of the angiosarcoma discovery, which it abandoned only when it saw that the information was about to leak anyway. This charge was symbolic of the manner in which the initiative passed out of the hands of industry.

It was seized, rapidly, by a loose but not uncoordinated network of regulatory agencies, government research institutes, academic medical teams, labor unions, and other groups united by a common commitment to eradicate environmental causes of disease. This "regulatory-medical complex" is largely the creation of a decade's federal legislation in the medical and environmental fields. Its unofficial leader is Dr. Irving J. Selikoff, professor of community medicine at the Mount Sinai School of Medicine in New York City.

The one-man power elite

White haired, gracious, and preternaturally energetic, Selikoff is best known as the man who explored the hazards of asbestos and who fought for many years to get them reduced. But a glance at his credentials shows him to hold so many other distinctions and positions that he constitutes a virtual power elite all by himself: a recipient of the Albert Lasker Award of the American Public Health Association, he is also director of Mount Sinai's Environmental Sciences Laboratory, governor and past president of the New York Academy of Sciences, editor in chief of *Environmental Research*, president of the Society for Occupational and Environmental Health, and consultant to the A.F.L.-C.I.O. as well as to an almost endless list of medical organizations and government institutes. He seems personally as well as professionally close to nearly everyone who matters in government occupational medicine, and has excellent contacts in the press, which he uses skillfully. Though he insists that he is only a scientist, Selikoff is also a crusader and reformer, and the weapons he takes into battle, aside from his many personal talents, are research and publicity.

Within a month of B.F. Goodrich's announcement, half of Selikoff's staff was working on a series of medical and epidemiological studies of workers at three older PVC plants. Researchers from the Harvard School of Public Health began an analysis of morbidity and mortality in Goodrich's Louisville plant. The National Institute of Occupational Safety and Health, which does research and standards development for OSHA, began a major epidemiological study of workers at four older plants, and together with OSHA sent out numerous teams to conduct "walk-through" inspections of PVC production facilities across the nation. In May, Selikoff convened in New York City a large international working

group on vinyl chloride, held under the auspices of the New York Academy of Sciences. As Dr. Joseph K. Wagner of NIOSH described the position of the many researchers who entered the field, "'Seek and ye shall find' is where we're sitting right now."

What they found was a great deal of information that linked vinyl chloride ever more closely to a variety of diseases, and this information in turn generated newspaper copy. To an attentive reader, the cumulative impression conveyed was of a hidden crisis slowly uncovered. With each passing week, the discovery of yet another angiosarcoma case or the release of a new report seemed to show the crisis to be graver and more widespread than it had been the week before. The tacit message was that industry had failed, and that government would have to step in and do something fast.

Federal regulators were quick to respond. By early February NIOSH and OSHA were actively at work on the problem of workplace exposure. (See the report on page 152.) By the beginning of April OSHA had issued an emergency temporary standard of 50 ppm and in May it proposed "no detectable level" as a permanent standard.

But during the summer, the plastics industry, which had maintained a low profile during the preceding months, reassumed the initiative under the leadership of S.P.I.'s Ralph Harding and Jerome H. Heckman. The burden of the industry position was that OSHA's proposal was not required on medical grounds and was technically and economically unfeasible. In its place S.P.I. advocated a phased reduction to 10 ppm as an average and 25 ppm as a ceiling by 1976. The industry case was set forth in considerable detail and with much documentation during the OSHA hearings that began on June 25.

Making policy in a desert

It was clear at the hearings that, in the end, the vinyl chloride decision was going to be made in an informational desert relieved by only the most occasional oasis of knowledge. It was established that vinyl chloride causes cancer and other diseases. It was also established that, over the course of two decades, industry had reduced exposure levels in its plants by a factor of something like 50 without experiencing notable hardship or burdensome expense. But beyond that almost everything was uncertain.

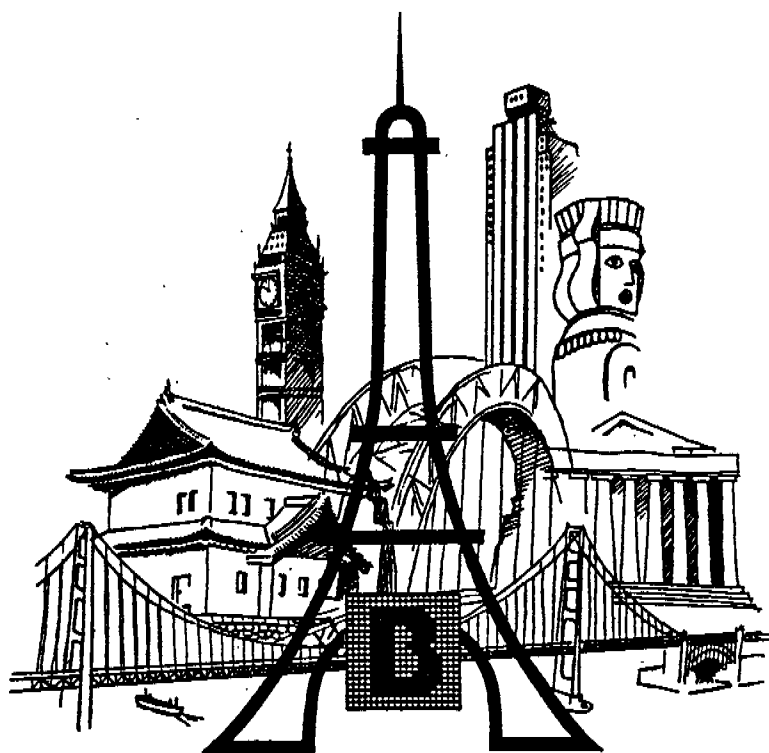
One large area of uncertainty concerns the shape of the so-called "dose response" curve for vinyl chloride between 0 and 50 ppm—the range within which, presumably, OSHA will set the permanent standard. To date, no animal experiments have been completed at exposure levels below 50 ppm, and since historic exposure levels in most existing plants have been above that level, it is extremely unlikely that epidemiological studies can reveal anything about human response below the level. The data for Dow Chemical's Midland, Michigan, copolymer plant,

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where exposures have been monitored for upwards of a decade, are difficult to interpret. Dow's own studies suggest no adverse health or mortality effects for workers at exposures below 200 ppm; however, Dr. Selikoff's group reports a significant incidence of abnormal symptoms even among Dow workers.

Where data are unsatisfactory, one must fall back on inference and theory—but these have proved even less satisfactory, and much more subject to dispute. At the theoretical level, there is disagreement over how cancer is caused. Advocates of the "no detectable level" argued for the so-called "one-hit" theory of cancer causation, which holds that there can be no such thing as a risk-free exposure to a carcinogen. The theory implies that *any* identifiable exposure to vinyl chloride is certain to cause angiosarcoma, at however low a rate.

But there is another theory of cancer causation, which emphasizes the role of the body's immune system in combating cancer. According to this theory, cancers appear when the immune system breaks down. If what a carcinogen does is to weaken the immune system, and if the weakening process requires a certain level of dose, then it is possible that there is a risk-free level of exposure.

At the present time, there is no definitive way to evaluate the truth of these competing models. Thus when OSHA chooses a standard, it will do so in almost total ignorance of the different rates of cancer and other diseases to be expected at different exposure levels.

The cost of approaching zero

The agency will be just as uncertain about the other major point in dispute—the level below which it is not economically feasible for industry to reduce exposure. "No detectable level" advocates point to the huge exposure decreases that industry has already achieved, to the fact that many producers got below 50 ppm soon enough after the emergency standards were issued on April 5, and that not a few were far below that. To many regulators, it seemed obvious that industry could get to a near-zero level if it really wanted to.

Industry representatives argued vehemently that a nondetectable level simply could not be attained. "Even a system that doesn't leak, leaks," thundered Todd C. Walker, president of Firestone Plastics, at the OSHA hearings. The companies also argued that efforts to approach zero would be extremely expensive. Firestone, for instance, detailed every capital expenditure that would be necessary if it tried to reach "nondetectable" exposure levels and concluded that the total cost would equal the entire value of its existing plant. Even then, Firestone insisted, it would not ultimately achieve a "nondetectable" exposure and would be forced to go out of the plastics business.

By the end of the summer, it appeared that even the OSHA staff felt the standard might be unjustified. An August, 1974, report by the agency's Division of Program

Evaluation and Research observed: "First, it is not clear that it is technically feasible to comply with the proposed standard without a shutdown of the entire vinyl chloride industry. Second, it is not clear from existing experimental and other historical data that a 'no detectable level' standard is justified. And third, it is quite clear that compliance with the proposed standard will require substantial capital investments and lead times."

They'd call it a sellout

If these findings should lead OSHA to compromise—to set an exposure standard of, say, 25 ppm—the agency should not expect to be praised for its moderation. It may even be assailed for violating its charter. The Occupational Safety and Health Act of 1970 states that OSHA, in regulating toxic materials, "shall set the standard which most adequately assures, to the extent feasible, on the basis of the best available evidence, that no employee will suffer material impairment of health or functional capacity even if such employee has regular exposure . . . for the period of his working life."

Members of the regulatory-medical complex would surely insist that a compromise was incompatible with these words—and would see it as an unprincipled sellout, sacrificing lives for dollars. Industry, meanwhile, is apt to view whatever level is allowed as an arbitrary intervention, reflecting political emotionalism rather than reason. And whatever the level, it is hard to believe that the new vinyl chloride standard will do much to end the confusion and uncertainty that currently prevail in many different industries subject to regulatory power.

The vinyl chloride hearings have made it clear that practically nobody in government, industry, or labor is willing to discuss these regulatory issues in trade-off terms. "We don't equate lives with dollars and cents—not at the Department of Labor," John Stender, Assistant Secretary of Labor in charge of OSHA, declares.

Even spokesmen for industry seem unwilling to challenge Stender's formulation head-on. "If we know we're exposing our workers to a known health hazard, we get out of the business," says Dr. Ben Holder of Dow. In the course of the long argument about vinyl chloride standards, businessmen have shied away from asserting that some level of mortality might actually be "worth it." Instead, they have tried to smuggle some practical considerations into the discussion by pointing to problems of "engineering and economic feasibility"—as if feasibility were an absolute.

One reason for the general reluctance to think in cost-benefit terms is to be found in the language of the Occupational Safety and Health Act itself. But another reason lies in the ethos of the regulatory-medical complex which has something more on its mind than the rate at which people get sick or die. It is committed as well to a larger conception of the good society.

In this society the idea of health is central. Ever more
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remote causes of disease would be eliminated. The role of medicine in this society would be different; it would no longer merely cure, but would actively redesign the environment and ways of living to prevent disease. Inevitably, it would be a society in which doctors, by virtue of their expertise, possessed considerable power. The role of markets would be sharply curtailed, inasmuch as they often lead people to make decisions contrary to their best medical interests. In this sense the regulatory-medical complex is a political movement. As such it perceives in issues such as the vinyl chloride standard a symbolic importance that transcends the particular merits involved.

They don't like business

And, of course, it is an antibusiness movement in its underlying commitment. American regulatory agencies seem to reflect the times in which they were founded; the new regulation was established in an era of intense conflict and hostility to business, and there is little prospect of the movement's suddenly acquiring another personality. For all its unattractive implications for regulatory equity and consistency, this fact is not entirely without its redeeming aspects. By pressing industry hard, these agencies will hasten economic modernization. It is clear that they have long since achieved immense success in raising health consciousness in industry and labor alike. As Dr.

Ralph Langner, an industrial hygienist at Dow Chemical, says, "Vinyl chloride is to industrial hygiene what Rachel Carson was to the environmentalists."

In any case, if Americans are now going to assume the responsibility of deciding what is a "socially acceptable risk," and thus of implicitly putting a price on human life, surely it is desirable that the critical decisions not be left entirely to business—or to any one group or center of authority. A process of indeterminate struggle between business and antibusiness forces, yielding decisions more political than rational, seems preferable to a system in which a single cooperative establishment coolly announces the exact going rate at the close of every business day.

Even so, it seems clear that the process of consciousness-raising could usefully flow in the other direction as well. The regulatory-medical complex would not be any the worse if it had a clearer sense of the novelty of the concept of health it is promulgating and of the uneasiness of its relationship to the existing economic system. And it could take more fully to heart the potential consequences of its regulatory interventions for ordinary living standards. As G.J. Williams, vice president of Dow Chemical, remarked recently, "You could probably not find a single thing in the world that's essential, but they all go towards making life pleasurable. You can do without almost anything, but not without everything." **END**

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cooperation. Ironically, there's a good chance that the U.S. will be leading the trend to unilateral action.

Interpretations of innocence

Because of the diversity of its interests in the sea, the U.S. had been expected to play a keystone role in locking together a compromise among all the divergent points of view represented at Caracas. In fact, however, the conference was one of the first manifestations of a remarkable reversion in the international posture of the U.S. From a preoccupation with the politics of peace, we have moved to a preoccupation with resources and revenues. The clash between this new U.S. stance and the ideological preoccupations of the less-developed nations brought the sea-law negotiations to a standstill at Caracas.

To be sure, American economic concerns originally began the erosion of

the freedom-of-the-seas principle. In 1945, President Truman unilaterally declared the U.S. to be sole owner of the mineral resources on its underwater continental shelf, where oil and gas had recently been discovered. This move was quickly followed by a rash of unilateral claims by other nations, not merely to offshore resources but also to territorial waters wider than the traditional three miles. In most cases, the new limits were set at twelve miles, but some countries, beginning with several in Latin America, claimed absolute sovereignty over areas extending as much as 200 miles to sea.

At that point, the U.S. woke up to what it had set in motion, in particular the implications for shipping and aviation. Traditional maritime law recognizes the right of "innocent passage" through any nation's territorial waters but has always been vague as to what the term meant. With the advent of new kinds of traffic, including airplanes, missile submarines, nuclear-powered ships,

and supertankers, various states have adopted their own interpretations of innocent passage—such as prohibiting aircraft overflights, requiring advance notification of warship passage, making submarines travel on the surface, and forbidding passage to tankers in order to avoid the danger of oil spills.

Planners in sore straits

When combined with the almost worldwide adoption of territorial limits greater than three miles, these constraints on innocent passage had serious implications for all maritime nations, but they especially worried the U.S. Navy and its Soviet counterpart. The heart of the problem was the "straits issue": with even twelve-mile limits, more than 100 important international straits fall entirely within national jurisdiction. Cold-war military planners were appalled by the prospects of emergency ship and aircraft deployments being held up by a straits nation or of ballistic missile submarines being obliged to

The View from NIOSH: Make It Safe

On January 22, 1974, Dr. Maurice Johnson, environmental health director for B. F. Goodrich, called on Marcus Key, director of the National Institute of Occupational Safety and Health. Johnson had a discovery to report. Three workers in Goodrich's Louisville polyvinyl chloride plant had died from angiosarcoma of the liver since 1971. Key summoned his top aides, who agreed that they had an emergency on their hands. Two days later a small army led by NIOSH Standards Development chief Vernon Rose, invaded the Louisville plant to conduct the first of many "walk-through" inspections.

Within a week, Rose's task force had a list of recommendations for reducing worker exposure to vinyl chloride:

- protective coveralls, shoes, and gloves for workers exposed to PVC.
- airtight suits and respirators for reactor cleaners.
- daily showers for exposed workers.
- a 50 parts per million suggested ceiling on vinyl chloride monomer exposure.

Normally, writing a criteria document—NIOSHese for a recommended standard—is an eighteen-month process involving exhaustive study. In this instance, however, Rose relied on guesswork and precedent. Assuming that vinyl chloride causes cancer through inhalation and skin contact, he modeled his standards on those used earlier by NIOSH for industrial carcinogens.

Aiming for a mid-March deadline, NIOSH organized a hectic series of meetings and studies. By the end of February, its toxicology group had been unable to determine the carcinogenicity of VCM below 50 ppm. The medical group had suggested a battery of liver tests for PVC workers,

but industry and labor had split over the exposure ceiling. Industry urged 50 ppm, which it knew it could achieve; labor advocated "no detectable level," refusing to treat workers as guinea pigs.

In this situation, Rose simply toughened and expanded on his earlier recommendations. Most important, he decided that the ceiling for vinyl chloride be set at "no detectable level"—the only exposure he knew to be safe. "It is doubtful," he conceded in a memo to Key, "that *any* plant can show workroom levels of non-detected." To meet it, respirators would have to be worn at all times. He wasn't sure this was practical, but he was certain it was safe.

On March 11, Dr. Key submitted NIOSH's recommendation to Assistant Labor Secretary John Stender. When OSHA proposed its permanent standard two months later, it incorporated most of the NIOSH text verbatim, including the "no detectable level" provision.

The View from Firestone: Make It Practical

To Todd C. Walker, the towering, outspoken president of Firestone Plastics, OSHA's proposed standard was as much a crisis as the Goodrich bombshell had been to NIOSH. He was determined to resist the standard with "the maximum information" at the OSHA hearings in Washington, D.C., this summer.

Walker assembled four task forces—legal, engineering, financial, and medical—to develop a Firestone-recommended standard on a crash basis. Four alternatives were to be studied: the interim 50-ppm standard, "non-detectable," and two intermediate levels chosen arbitrarily—40 ppm maximum with a time-weighted average (TWA) of 25 ppm, and a 15-ppm ceiling with a TWA of 10 ppm. For each level the questions were: is it safe and is it feasible?

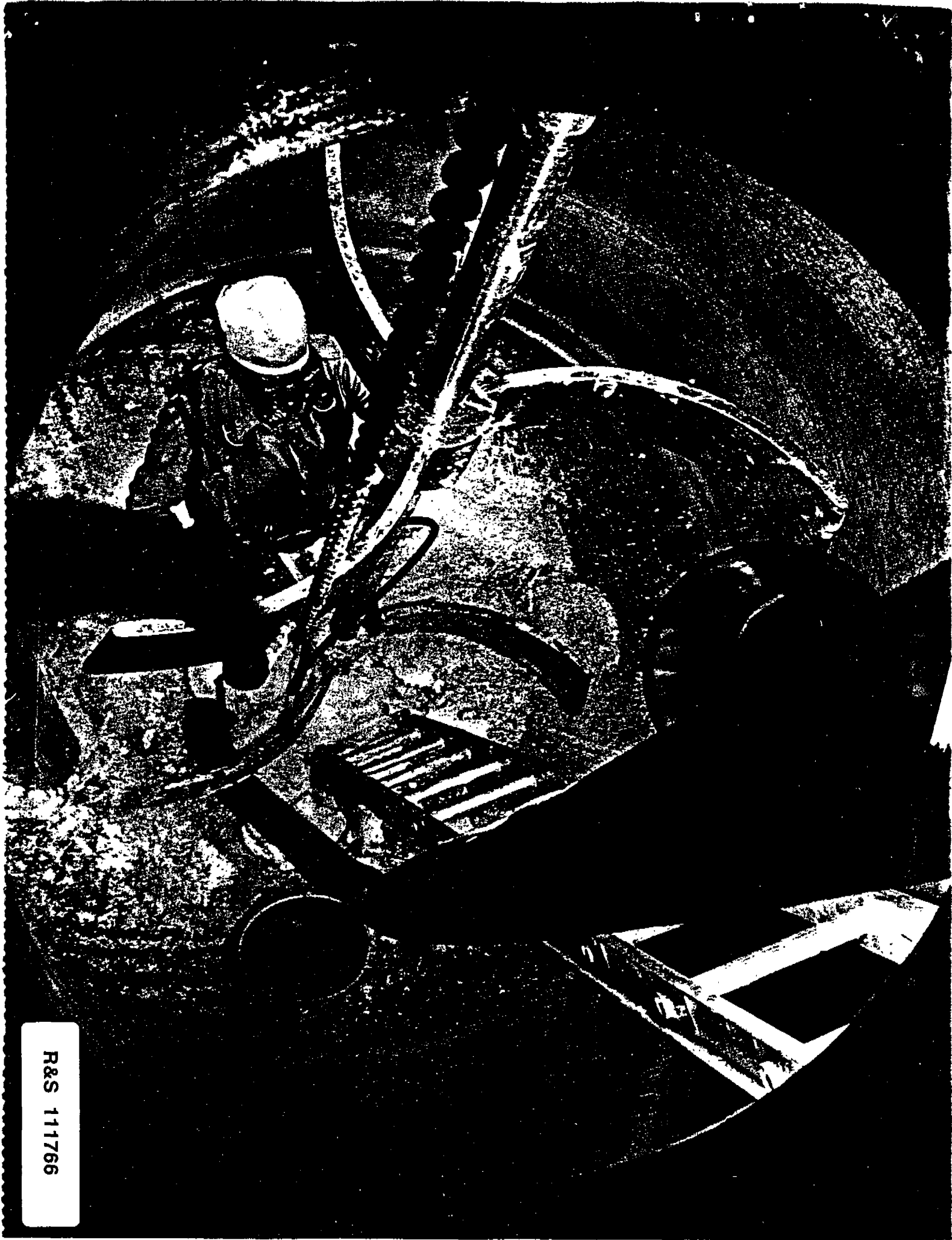
Weeks later, the medical group was unable to say positively that any of the levels was unsafe. An epidemiological study of Firestone's rubber and PVC workers showed no significant differences, suggesting that 50 ppm was not relatively unsafe.

The engineering group reported that the nondetectable level was unattainable. It also forwarded a critique of OSHA's proposed work practices. Protective clothing for all workers was unnecessary, it said, because PVC dust is not a carcinogen. VCM gas, which is, could be kept away from the skin only by air-tight suits, which would be "hot, cumbersome, expensive, and dangerous." OSHA's provision for air-supplied respirators for all exposed workers was also ill advised. These would be uncomfortable ("an instrument of torture"), fatiguing, probably hazardous, and would interfere with work. One portable type weighs twenty-eight pounds and would have to be changed three times an hour. Nonportable respirators could be

used, but workers would be attached to air hoses (themselves a workplace hazard) and confined to a radius of less than fifty feet.

The financial group reported that capital investment would have to double to attempt reaching a nondetectable level. The legal staff concluded that OSHA's proposed standard was unfeasible and therefore illegal.

When it came to deciding what level he *would* recommend, Walker had a problem. His medical evidence showed the three levels above nondetectable to be equally safe. His engineers said that the feasibility of the lowest of these (15-ppm ceiling with a 10-ppm TWA) was uncertain, and Walker ruled it out. Left with a choice between the two higher levels, he opted for the 40-ppm ceiling with a 25-ppm TWA to show that Firestone was willing to do more than the minimum. Thus, with a practicality reminiscent of NIOSH's decision to recommend a level it *knew* was safe, Firestone ended up recommending a level it *knew* it could achieve.



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F O R T U N E

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