

government in Puerto Rico this weekend, we would like you to have the following thoughts on our present economic situation and our objectives for the future.

Coordination of economic policy among the major industrial countries is of the utmost importance in sustaining a healthy recovery of the world economy, and we commend you for initiating the upcoming consultations. However, we are disturbed by the tone of some statements by Administration officials regarding the problems to be discussed at this meeting. We are also disturbed by some parts of the communique issued on June 22 at the conclusion of the OECD ministerial meeting.

These statements leave the impression that the world economy is on the brink of an excessively rapid expansion which would bring with it serious inflationary consequences and that policy must be directed toward slowing the progress of recovery. The OECD communique suggests 5 percent "or somewhat more" as an appropriate target for the average annual growth of real output in the OECD area from 1976 through 1980, explicitly recognizing that this implies a continuation of high levels of unemployment throughout this period.

We recognize that this target is not necessarily intended to apply to the performance of individual countries within the OECD. Nonetheless, the impression may have arisen that this is regarded by Administration officials as an appropriate growth target for the United States.

Hence, we would like to call your attention to projections by the Congressional Budget Office indicating that a 5 percent growth path in the United States from 1976 through 1980 would imply an unemployment rate of about 6.8 percent in 1980. Certainly there is no political consensus in this country that such a performance would be satisfactory. Indeed, we believe the overwhelming majority of people in this country would agree with us that such a prospect is highly unsatisfactory. We remind you that your own budget, submitted to the Congress last January, assumed for planning purposes an average real GNP growth rate of 6.2 percent through 1980.

In contrast to most other countries, economic policy-making in the United States is the joint responsibility of the Congress and the Executive Branch. To date there has been no agreement between these separate branches of our government as to appropriate growth targets through 1980. It would be most unfortunate if leaders of other countries were to obtain the impression that a consensus exists in this country to the effect that high unemployment through 1980 is a necessary price for controlling inflation. Any such contention is highly controversial, and we trust you will do your best to make this clear to those with whom you will be meeting next week.

We do not question the importance of further reducing inflation. Nor do we question that this urgent problem must be attacked in coordination with other major countries. We do dispute the apparent conviction that prolonged acceptance of high levels of unemployment is the only available method of dealing with inflation. In fact, we question whether it is even likely to be an effective method. We respectfully suggest that one of the most useful topics that could be discussed at your upcoming meeting would be alternative approaches to dealing with inflation—approaches which do not involve loss of jobs and output. We have in mind such things as incomes policies, policies to overcome frictions and inefficiencies in labor markets, and policies designed to insure steady and adequate supplies of food stuffs, raw materials, and finished goods. Surely such policies offer better hope for the future than does a passive acceptance of continued high unemployment.

Again, we commend you for the efforts you

are undertaking to achieve meaningful international discussion of these crucial economic issues. You have our hopes and best wishes for a highly successful meeting.

Sincerely,

HUBERT H. HUMPHREY, Chairman;
RICHARD BOLLING, Vice Chairman;
JOHN SPARKMAN; HENRY S. REUSS;
WILLIAM PROXMIER; WILLIAM S. MOORHEAD;
ABRAHAM RIBICOFF; LEE H. HAMILTON;
EDWARD M. KENNEDY;
GILLIS W. LONG; LLOYD M. BENTSEN,
JR.; and OTIS G. PIKE.

TOXIC SUBSTANCES CONTROL ACT

Mr. TUNNEY. Mr. President, I ask unanimous consent to have printed in the Record an outstanding series of articles done by the Los Angeles Times on occupational health hazards. The articles are the result of an intensive 3-month examination by the Los Angeles Times Washington staff of the Nation's occupational health crisis.

I commend the Los Angeles Times for devoting such a significant amount of space to such an important but little discussed subject.

As the author of the Toxic Substances Control Act which passed the Senate in March of this year, I am pleased to see the attention given to the daily dangers faced by workers on the job. These articles all too clearly illustrate the need for rapid passage of the Toxic Substances Control Act by the House so we can begin to protect workers and the public from a major health hazard—toxic substances.

There being no objection, the articles were ordered to be printed in the Record, as follows:

[From the Los Angeles Times, June 27, 1976]
OCCUPATIONAL HEALTH HAZARDS—A NATIONAL CRISIS

(By Richard T. Cooper and Paul E. Steiger)

WASHINGTON.—In bygone days, coal miners took caged canaries underground with them because the tiny birds were far more sensitive than men to the deadly, invisible "white damp," carbon monoxide gas. By collapsing—and sometimes dying—the canaries warned of a danger that would otherwise have crept up undetected.

Today, in factories and mills, and even in beauty parlors, dentists' offices and auto repair shops, hundreds of thousands of American workers have themselves become canaries—for their fellow-workers and for society as a whole. By falling sick and often dying, they are signaling the fact that a major crisis has struck the nation as stealthily as poison gas in a coal mine.

The source of the danger is a little understood but rapidly growing array of occupational health hazards, many of them toxic chemicals routinely used by industry, that kill an estimated 100,000 workers every year, cause at least 300,000 new cases of job-related disease annually and pose an increasing threat to the entire spectrum of U.S. society and the environment.

As documented in a three-month investigation by a team of Times reporters, the occupational health crisis and its implications for the larger society are only dimly perceived by the public, yet specialists regard them as perhaps the most serious medical challenge facing the United States in the remainder of this century. And the battle to deal with the problem is in jeopardy because of bureaucratic red tape, public apathy, political sniping and claims that reform would be too costly.

At the Occupational Safety and Health Ad-

ministration and the National Institute of Occupational Safety and Health, the two federal agencies most directly responsible for dealing with the problem, officials are struggling with inadequate budgets, scattered and ill-equipped staffs and lack of expertise. Labor leaders have lobbied for a larger commitment, and there has been significant response among some business executives. But overall the problem is growing faster than are the efforts to contain it.

Occupational health hazards have existed from earliest times, of course. One of the cruel ironies of the present situation is that toxic substances identified more than 100 years ago still inflict widespread disability and death. What has caused the problem to mushroom in the last three decades, however, is the technological explosion of new chemicals, new industrial processes and new products.

This flowering of technology, responsible for much that is good and desirable in modern life, unfortunately has sent a deluge of carcinogens, systemic poisons, lung-destroying dusts, brain-damaging metals and other hazardous substances cascading down upon the nation's workers in unprecedented volume and variety.

Clearly, one reason for the apparent public indifference to job-related health problems is that many of the worst ones, lung cancer and heart disease, for example, normally take 15 to 20 years to develop and often have not been associated with the work place. More immediate problems tend to be perceived as isolated incidents—50 or so workers afflicted by Kepone pesticide poisoning in Hopewell, Va., a dozen or so poisoned by lead at a Visalia auto battery plant.

The problem is pervasive, not scattered, however. And, if workers, like the miners' canaries, are the first to exhibit its symptoms because they are exposed to the hazards first and most intensively, the toxic substances originating in the nation's mills and factories are showing insidious capacity to seep out into the community at large.

Says Joseph K. Wagoner, director of field studies and clinical investigations for the institute, "The tendency to separate health hazards found in the work place from general environmental problems is a deadly division. This is a continuum, not isolated events." And, Wagoner says of the government's effort to cope, "The problem is so vast that we have been reacting in a crisis environment for the past two or three years."

For a glimpse of the problem's scope, consider the following:

As many as 90% of all cancer cases are believed to be environmentally induced, according to an analysis by the National Cancer Institute. Of these, scientists estimate, at least 10% resulted in about 30,000 deaths a year, stemming chiefly from occupational carcinogens. In fully half of all cancer deaths, occupational factors are believed to have contributed to the disease.

Heart disease is the greatest single killer of Americans. It is conservatively estimated that 5% of such deaths, or 37,000 a year, result from occupational causes.

In a general health study of 908 persons performed by the University of Washington, 31% of all the diseases and other "medical conditions" found were judged to be occupational in origin. In an additional 10% of the problems, job-related factors appeared to have played some role.

Significantly, however, only 2% or 3% of all the medical conditions had been reported by employers, a fact suggesting that available data vastly understate the extent of job-related health problems.

Evidence from a number of fields indicates that white-collar, professional and service workers are often in as much danger as employees in steel mills, chemical plants and other forms of heavy industry.

Dentists' chronic exposure to X rays, mer-

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ary and anesthetics contributes to their abnormally high rates of leukemia, Hodgkin's disease and suicide. Female operating room personnel, with similar exposures, have unusually large numbers of miscarriages and abortions, with congenital birth defects. Beauticians are extraordinarily susceptible to cardiac problems, lung cancer and respiratory diseases generally.

Chemicals and other substances and equipment used in the work place are not the only dangers. The unique stresses, life-styles and patterns associated with particular occupations also can be factors. For instance, statistics reveal that office administrators are more likely to suffer coronary heart disease than many other types of white-collar workers, such as scientists and engineers. As with other hazards, the causes and cures for these occupational health problems are imperfectly understood.

—An estimated 500,000 living workers have been significantly exposed to asbestos. Of these, 100,000 are expected to die from lung cancer, 35,000 more from a rare cancer of the lining of the lungs and stomach called mesothelioma, and another 35,000 will die from asbestosis, also an affliction of the lungs.

Recently, evidence has been found in a study for the Environmental Protection Agency that employees in office buildings constructed before the 1973 ban on use of asbestos as a structural fire retardant are being exposed to the mineral. Apparently the asbestos is coating on steel girders in such buildings has begun to flake away, and microscopic fibers are being carried to unsuspecting workers through the ventilation systems. It is not yet known how serious this threat may be.

Health hazards are particularly acute in some industries and job classifications. Rubber workers are 1.7 times as likely to die of stomach cancer as members of the general population, 1.6 times as likely to succumb to respiratory malignancies, according to a joint study by the rubber workers' union and industry. Workers in steel mill coke ovens are 7.5 times as likely to die of kidney cancer as workers assigned elsewhere in the same mills and 10 times as likely to die of lung cancer.

In three Ohio towns where the carcinogen vinyl chloride was manufactured, the Ohio Department of Health has reported abnormally high incidences of birth defects, particularly affecting the central nervous system, among newborn babies, and an unexpectedly high level of tumors of the central nervous system in adult men.

Studies of two Montana towns, Butte and Anaconda, where copper is mined and smelted, found unusually high rates of lung cancer in both men and women.

Experts agree that no accurate measurements of the overall problem exist. The U.S. Public Health Service uses indirect statistical techniques to form its estimates of the annual toll of job-related deaths and diseases. Owing to insufficient knowledge of the biochemistry involved, inadequate monitoring of workers, and the often years-long delay between exposure to a carcinogen and the onset of the disease, these numbers may be just the tip of the iceberg.

The catalogue of hazardous substances, with their sometimes equally dangerous permutations, combinations and interactions, seems endless: benzenes, phenols, cadmium, nickel, gold, lead, asbestos, vinyl chloride, coke oven gases, creosote, textile dyes, X-rays, silica, carbon tetrachloride, tar, beryllium, bischloromethyl ether, chloromethyl methyl ether, polychlorinated biphenols, pesticides, paraffin, beta naphthylamine. . . .

The government has thus far established links between about 12,000 substances and particularly serious health problems—a huge number but probably just a small fraction of the hazards still undetected among the scores of natural elements and the 500,000 chemical compounds now in use by American

industry, which synthesizes about 3,000 new chemicals each year. With virtually no outside control and scant knowledge of what the full consequences may ultimately be, this cornucopia of materials is mixed, modified, boiled, baked, burned, sprayed and vaporized in a rush of technical ingenuity that never stands still.

On an April morning this year, at an hour when the sun was bright but the air retained a sharp edge, half a dozen employees of a small plastics plant near Slatersville, R.I., crowded into an aging Pontiac and drove to the seacoast town of Groton, Conn. A team of occupational health specialists from New York was to examine almost 1,000 workers there, and the Rhode Islanders were to be tested as well.

Somehow, they arrived several hours before the special clinic, set up in the gymnasium of Groton's trim new civic center, was to open. As they waited, the six grumbled about the delay, joked sardonically about the general malevolence of things and discussed their jobs. It seemed clear there had been ample reason to invite them.

Service Color, Inc., where they worked, is a small plant that takes raw plastics compounds, cooks them up with pigments, flame retardants, and fillers, then converts the resulting material to pigmented pellets that are sold to fabricators of colored plastic products. Turning out about 1 million pounds a month, Service Color's 18 employees handled compounds of lead oxide, lead chromate, mercury-cadmium, lead-cadmium, and toxic, organic dyes.

Medical problems had cropped up, and several had been hospitalized. There was apprehension mixed with the bravado and dark humor in the six who had come to Groton. "Everything . . . we handle kills you," one of them laughed. "It says so right on the cartons."

As they were unloaded and mixed, the powdery chemicals would fill the air, settling over everything and sometimes turning their skin bright colors, the men said. A photograph taken about that time by a safety administration inspector showed a worker who had just crawled out of an enormous vat he had cleaned with an air hose. An Occupational Safety and Health Administration inspector pointed out that a face mask issued by the company was so oversized that its bottom hung several inches below the worker's chin, nullifying its effectiveness even if it had not been the wrong type. The man's hair showed white, but his face and arms were a violent orange.

"Ventilation?" one of the workers at Groton said. "One place we got ventilation—four windows. And if you breath real hard, you can blow the dust out."

During their examinations, the workers were checked for lead poisoning by a machine called a hematofluorometer, which subjects a tiny sample of blood to a powerful quartz light and instantly flashes a lead exposure value on a display screen. Readings up to 50 are considered acceptable, but at 60 and 70 there is concern. The Service Color workers registered such values as 101, 107 and 370, according to technicians.

Depending on extent of exposure, lead poisoning can produce brain damage, respiratory failure, anemia, tremors, paralysis, kidney problems, loss of teeth, depression, feelings of hostility and chronic unhappiness. The dangers and conditions in the plant led workers and their union the United Rubber Workers, to protest. A team of safety administration inspectors swooped down.

Today, according to plant manager John Busco, some new duct work, dust collectors, and other ventilating equipment are being installed at Service Color. Also, workers are being instructed to wash themselves before eating or smoking and to take other precautions of that sort. "Not much is involved," Busco said.

What has the safety administration done? Busco has heard nothing, he says. Some citations are said to be wandering somewhere in the clogged arteries of this administration bureaucracy, but two months after the inspection nothing has been done.

"The joke is," one Service Color employee had said in Groton, "They give you a good pension but you don't live to collect it."

There is a quandary workers often face, and Morton Corn, the industrial hygienist who now heads the occupational safety agency, sees it clearly: where health is concerned, what seems a gross hazard may be harmless, and what looks lovely may be lethal.

He recalls a clean, air-conditioned factory in the South; "people thought it was like working in a hotel," yet a chemical undetectable by human senses poisoned 73 of the 300 employees. At the same time, in certain kinds of dehydrating plants, Corn says, "I've walked through dust that I left footprints in, but it won't harm anyone."

"When the worker takes a job he thinks, 'Gee, somebody must have thought about this thing. It must be safe. I'm being asked to work here.' He's seen a lot of dust in his life. How is he to know whether this is the dust that will kill him?"

When people are sick, most turn without question to their family doctors, yet the typical family physician knows little about a worker—as employees of Life Science Products Co. in Hopewell, Va., discovered last year.

After only a few weeks of working in the plant, set up two years ago in a converted gas station, many began to suffer dizzy spells, poor vision, tremors. One man later recalled that when he stopped off for a beer after work, friends had to help him hold the glass. Inevitably, workers went to their doctors.

Could it be something at the plant, some asked? Probably not, the physicians said. More likely it was overwork or nervousness. Or perhaps too many of those beers on the way home. So, worrying about mortgage payments and child support payments and just getting by, they returned to work.

One man who could not stop trembling eventually went to see a young specialist in cardiology and internal medicine, a recent emigre from Taiwan named Yi-nan Chou. Chou asked what it was they made in that converted gas station. "Kepone," the man said. Kepone. Chou looked it up in a handbook of poisons.

A chlorinated hydrocarbon related to DDT, combining hexachlorocyclopentadiene and sulfur trioxide, potent in controlling ants, roaches and banana pests, Chou took samples of the man's blood and urine and sent them to the federal Center for Disease Control in Atlanta for analysis. Some days later Virginia health authorities arrived in Hopewell and began unraveling a major industrial scandal.

The result: Life Science Co. was shut down, 13 workers were hospitalized and about 40 others were found to have high levels of the pesticide in their blood. Federal indictments were returned against the company, its owners and Allied Chemical Co., which had been involved in the creation of Life Science, but no way found to cleanse workers' blood of the Kepone, which has been linked to blood cancer in laboratory animals.

"The guys who have no voices," Sheldon Samuels of the AFL-CIO calls them, and there is a special horror to their anonymous plight. In isolated shops and businesses too small for company doctors and union hygienists, seldom visited even by safety administration inspectors, they are sometimes victims only of ignorance, but sometimes they are also undone by the tricks of their assorted trades.

Commercial fishermen mending their tar-soaked nets sometimes hold the darning needle momentarily in their mouths to free

both hands; they contract lip cancer in extraordinary numbers. Auto mechanics often clean off brake drums with a deft blast from an air hose, thereby sending asbestos fibers winging toward their own lungs. House painters and shoe repairmen work with benzene solvents, unaware of the bladder and bone marrow malignancies those chemicals inflict on their trades.

"Who is telling them?" Samuels asks. "Who is doing something for them?"

Even safely behind his desk in his office, there is something gingerly about the way Robert L. Harris sits in a chair, an apprehensive stiffness as if the last egg of a rare and dying bird has been entrusted to his lap.

Harris' unease is understandable. An industrial hygienist at the University of North Carolina in Chapel Hill, he is the director of an unusual occupational health research program sponsored jointly by the United Rubber Workers and the seven giants of the U.S. rubber industry. Established during negotiations on the industry's 1970 master labor contract, Harris' group and a similar unit at Harvard together receive more than \$1 million a year in corporate funds to probe the industry's operations and study the health of its workers.

The North Carolina group is a promising model of what could be done in other basic industries. Like similar units in government and other private institutions, it is working to protect workers now and also to overcome the critical shortage of basic research data. The problem is that almost all these units are extremely fragile, lacking permanent foundations.

In Harris' case, the unit is precariously balanced between two sponsors whose interests often conflict.

The researchers cannot function without cooperation from the companies; yet their findings often support the union's contention that more needs to be done to protect workers. The situation is especially touchy now: health hazards have become an issue in the rubber industry's long and bitter strike.

Thus far, Harris and his associates say, there has been no lack of cooperation, no restricting of their plans, no attempts to alter or suppress research findings. Still, an administrator is understandably nervous.

As a long-range goal with enormous potential, the unit is trying to devise a comprehensive, computer-based system for continual recording and analysis of the materials and processes used in each rubber plant, as well as the work and health histories of all employees. Since chemicals, processes, and employee work assignments change constantly, a system such as this would vastly simplify the needle-in-a-haystack task of pinpointing occupational health problems and their specific causes.

The system might even detect incipient problems, raising warning flags long before workers begin to sicken and die.

Such a capability and its fruits are years away. Meanwhile, the team has proved its worth in more immediate ways: It has done pioneering work in identifying job classifications where death and serious disease are high. And in one case, it quietly headed off what might years later have become a well-publicized disaster.

A major rubber company had begun using a manufacturing process previously abandoned by another company because of pulmonary damage to workers involved; the company believed it had eliminated the problem. Tests by the North Carolina group showed "reversible" pulmonary changes in workers after initial exposure to the new process, with the likelihood that the damage would prove permanent with continued exposure. The process was abandoned for the second time.

What is to be done?

Experts argue over details, but there is widespread agreement that progress must involve these elements:

More money for scientific and technical research to pinpoint problems and devise solutions.

Development of government health and safety regulations that place the burden of protecting workers squarely, and equally, on all employers.

Designing an enforcement strategy that increases voluntary compliance and gives the safety agency's limited inspection force a deterrent impact comparable to that of the Internal Revenue Service.

The budding alliance between labor and environmentalists should be nurtured to assure integrated government policies; unions must maintain, or in some cases increase, their insistence that workers' health is not to be traded off for additional pennies an hour, corporations that are trying to improve should be encouraged while those that now profit by avoiding health-related expenditures must be brought to heel.

"If you can't afford to provide a safe, healthy working place, then you shouldn't be in business. You don't have that right," a veteran safety administration health specialist declared recently. "A businessman rents a worker's time, not his safety and health."

It is important to remember, however, that requiring companies to meet unnecessarily stringent health standards will raise costs and prices, possibly eliminating some jobs, also, forcing employers to buy needlessly elaborate control systems for one hazard will mean less money available to deal with other dangerous substances.

Can government, labor, and management ever have enough solid information to make all the necessary decisions with perfect wisdom? No. Decisions cannot be avoided—ignoring them amounts to a decision to let disease and premature death continue—but they will have to be made with imperfect knowledge, experts agree.

The safety administration, for example, established worker exposure limits for 14 major carcinogens even though it does not know precisely where the dangerous exposure level begins; to get that information would have required the rounding up of 3 million laboratory animals for testing—an impossibly costly and protracted experiment that might have been useless anyway because of the difficulties in assembling "megamouse" populations that are genetically comparable enough to yield valid results.

The struggle against occupational disease, those involved agree, will be controversial, messy and long.

It was afternoon now, and the sun had warmed the air. Irving J. Selikoff, founder of the pioneering occupational health research center at New York's Mt. Sinai Hospital, watched outside the entrance to Groton's town hall as scores of shipyard workers filed in to be tested by his mobile team of physicians and technicians for asbestos cancer and other damage.

Selikoff knew in advance that some of these men, exposed for years to lead and asbestos dust in the holds of submarines they were working on, would exhibit the telltale signs of disease—abnormal blood, diminished lung capacity traced out by a stylus as they huffed and puffed into an automated spirometer, grainy patches like wisps of cloud on the chest X rays developed in a trailer behind the building.

"We can help these people," he said quietly. "If they have asbestos, we can't change that, but if we know they have it we can do things to allow them to live a normally full life span. If they have lung cancers and we find them early enough, some can be saved. Of course, if they have mesothelioma . . . There is no treatment for mesothelioma now."

A large, cheerful man with white hair, Selikoff turned to watch the men again. "Look at them," he said. "They are the solid citizens of our country. Electricians, carpenters—trained, capable people of the sort who built our country. We have to help them, and others like them."

HOW ONE BIG FIRM FOUGHT HEALTH PERILS (By Richard T. Cooper and Paul E. Steiger)

MIDLAND, MICH.—For the 35,000 citizens of this flat, faceless, miles-from-anywhere town lost in a sea of scrub trees and plowed fields, life begins and ends with one master, a giant corporation with an alchemist's passion for turning base materials to gold. Earth, air, water, the daily bread on the table, all lie under the corporate hand.

Winter and summer, clouds of steam rise from five square miles of pipes, tanks and kettles in which Dow Chemical Co. produces chlorine, caustic soda, carbonic acid, bug and weed killers, industrial solvents—a witch's brew of toxic substances that makes the radioactive fuel in most nuclear plants seem tame as lemonade.

Almost every paycheck comes directly or indirectly from Dow. Even the lawns have corporate roots: when herbicidal vapors got loose a few years ago and killed much of the grass in Midland, Dow paid for reseeding.

Voiceless and vulnerable as other company towns, Midland enjoys a critical difference: while many companies seemed oblivious to the dangers inherent in their operations, Dow pioneered in occupational health research and reform here and elsewhere long before labor unions, government leaders or the public seemed to care much about such things.

As a result, federal officials and even some competitors agree, Dow today points the way that all corporations must follow if workers and the larger society are to live safely with the golden goose of technology.

In its efforts to protect its workers and its environmental neighbors against both instant health hazards and the carcinogenic time bombs that explode with increasing regularity across the nation, Dow has developed a large assortment of weapons:

Proposed new products and manufacturing processes must undergo progressively more rigorous testing in Dow's sophisticated toxicological labs; workers are offered regular medical examinations; individual exposures to chemicals are monitored and recorded; detailed files are kept to enable researchers to correlate health data and workers' exposure histories, and Dow trains harts-to-get industrial hygienists in its plants.

At the same time, Dow researchers conduct epidemiological and mortality studies of workers to monitor the effectiveness of health programs and to search for unsuspected problems. Manufacturing operations are modified to meet health standards. And Dow, a major supplier of industrial chemicals, has even begun intervening actively in the way customers use its product. What all this has meant, simply enough, lives saved and crippling illnesses avoided.

In the early 1950s, for example, Dow scientists spotted potential health hazards in a compound called chloromethyl methyl ether, an important ingredient in the dawning age of plastics; they insisted that production facilities be designed to limit workers' exposure to one part per million.

Some other producers, first unaware and then apparently indifferent to the danger, let exposures to chloromethyl methyl ether and related chemicals soar. Dozens of workers in those plants now are known to have died from exposure-related lung cancer.

Similarly, Dow toxicologists vetoed plans to produce an unusually effective anti-barnacle coating for ships because arsenic-based compound, highly poisonous, could contaminate harbors. And Dow

recently withheld caustic soda from a New England customer until huge shields and other safety equipment had been installed to protect the customer's workers.

To be sure, other companies have made important occupational health efforts. And one, including Dow, suggests that the company has always done everything necessary or desirable as soon as possible. Workers at Dow plants have died and been injured in fires, accidents and explosions. Recently a group of workers was exposed to the carcinogen vinyl chloride when 2,000 gallons of the substance were accidentally spilled. Further, some of Dow's operating executives are more resistant than others to recommendations for steps that would increase employee protection.

Also, Dow has been among the most outspoken opponents of the proposed Toxic Substances Act, which would require premarket testing of chemicals. The company denounces the bill as costly, wasteful and unnecessary interference with business.

Nonetheless, there is widespread agreement—even among some who still cannot forgive Dow for its role in napalm production during the Vietnam war—that the company has done more than others to promote its workers' occupational health and done it sooner than other major industrial corporations, and thus has avoided many of the problems afflicting U.S. workers generally.

Equally important to the growing debate over the economic feasibility of occupational health reform, Dow's record indicates that large firms, at least, should be able to make substantial improvements without reducing profits or lessening their competitive position, as long as top management insists that concern be built into operations from the ground up.

Consider vinyl chloride, perhaps the best known of recent occupational health nightmares. For many producers, it is a costly and palling monument to heedlessness. For Dow, it illustrates the economic and social benefits of what the company has tried to do.

Discovered in Germany in the 1930s and developed by U.S. firms in the 1950s, vinyl chloride today is the world's second most common plastic compound, produced in the United States alone at the rate of 5 billion pounds a year. The ubiquitous substance is found in phonograph records, meat-wrapping film, auto interiors, water pipe, floor tile, electrical insulation and hundreds of other products.

Vinyl chloride, a gas until it is converted to a solid through a process known as polymerization, has also been used as an aerosol propellant for cosmetics, paints and pesticides.

In producing this bonanza, thousands of workers were exposed to vinyl chloride gas, often in concentrations of hundreds or thousands of parts per million and often for periods of several years. Some employees were regularly sent down into processing kettles for maintenance work and occasionally inhaled so much vinyl chloride that they experienced euphoric highs or were anesthetized.

Scattered hints and warnings of medical trouble cropped up, including evidence that vinyl chloride caused workers' bones to dissolve inside their fingers, but most producers pushed ahead with little regard for all that might be happening to their employees. Until 1974.

In January of that year, B. F. Goodrich made the jolting announcement that vinyl chloride had been linked to a rare and fatal form of cancer, angiosarcoma of the liver, among exposed workers. Almost overnight a classic battle developed among manufacturers, labor unions, health professionals and the federal government.

Unions demanded total protection for workers. Producers argued that such reforms

would be ruinously expensive, force plant closings and cost thousands of jobs. Occupational health specialists saw vinyl chloride as the tip of an iceberg. Finally, the Occupational Safety and Health Administration imposed a one part-per-million exposure limit for workers.

That standard, if strictly enforced, will probably protect future workers, but as Dr. Irving J. Selikoff, a prominent environmental health specialist at New York's Mt. Sinai Medical School, said a few months after the Goodrich announcement: "For vinyl chloride, in a large sense, we are already too late."

Thus far, 49 workers around the world are known to have died from angiosarcoma. Given the average 20-year time lag between first exposure and death in this type of cancer, the toll among workers already exposed is expected to keep rising for years to come, no matter what is done now.

As had others, Dow steadily increased its involvement with vinyl chloride in the 1940s and 1950s, becoming a manufacturer of polymers and also a leading supplier of vinyl chloride gas to other processors.

But in keeping with general company policy of minimizing employee exposure to all chemicals, Dow's operations seem to have been tighter than most. More important, Dow's toxicological lab began a series of inhalation studies with rats, rabbits and guinea pigs in the late 1950s.

By today's standards, the tests were relatively unsophisticated, but they were soon to make a critical difference.

Groups of animals were exposed to various concentrations of vinyl chloride gas seven hours a day, five days a week for periods of six months—a rough approximation of a worker's potential exposure. Then the animals were killed, along with unexposed control animals, so that pathologists could make tissue comparisons.

What researchers found was evidence of liver cell changes in the vinyl chloride-exposed tissue that were so subtle they would have gone unnoticed except in direct comparison with cells from unexposed animals.

Dow toxicologist Theodore R. Torkelson, who was in charge of the studies, said there were "reversible fatty changes, evidence of stress, about the lowest level of injury you can have."

What Torkelson and his colleagues did not know then was that they were at the threshold of discovering the angiosarcoma link to vinyl chloride almost 15 years before the B. F. Goodrich announcement.

If Dow scientists had kept some of the exposed animals alive a little longer—now standard practice in such studies—instead of sacrificing them immediately after exposure stopped, Torkelson is convinced the tumors would have been found.

"I've kicked myself many times that I did not take 20 of those rats and let them sit for six months," Torkelson said recently.

Be that as it may, Dow published its results in 1960, including data indicating liver cell damage was detectable at 100 parts per million exposure levels but not at 50 ppm. The company urged the entire plastics industry to adopt a 50-ppm exposure limit voluntarily.

Other scientists dismissed the cell changes Dow had found as insignificant. Other companies rejected the proposal for cutting exposures, some even criticizing Dow as alarmist. Dow, however, set in motion an internal program that cut exposures below 50 ppm for most of its own workers within a few months, then worked on the handful of difficult and more costly situations over a period of years.

The result: Dow's cleanup cost it less than \$3 million, company officials say, spread comfortably over an extended period. And when the Occupational Safety and Health Admin-

istration imposed its 1-ppm limit last year Dow met it without the expensive upheaval that its competitors had to endure. Most important, thus far no cases of angiosarcoma have been reported among Dow's vinyl chloride workers.

Just why Dow in particular developed the system that so far has kept it out of the worst of the occupational health minefields is not fully clear. Part of the answer may be that Dow began as a family firm concentrated in Midland so that top executives had a strong sense of personal identification with Dow's activities and were not isolated from lower-level subordinates or production workers.

Regardless of precisely why it developed, one thing seems clear about Dow's system: Instead of being spawned in crisis and imposed on reluctant production managers by remote corporate officials, it has been woven gradually into the fabric of the company's operations over many years—and the evolutionary process has contributed substantially to the system's present effectiveness.

By including the occupational and environmental health experts in decisions on design, marketing and production at early stages, Dow officials say they minimize friction, avoid errors, reduce the need for costly retrofitting of equipment and raise efficiency—all concrete business benefits that increase the enthusiasm of operating executives for cooperating with the occupational health specialists.

Most company officials trace the beginnings of this system, and of Dow's exceptional concern for workers' health, to a set of puzzling accidents in the early 1930s.

Within a period of a few weeks, two men were found dead at the Midland plant. The first death was initially attributed to heart failure, but, when the second worker died, officials began looking for another explanation.

They found one. The second worker—and, it is now believed, the first man as well—had cleaned his skin in a company locker room with a colorless liquid he mistook for alcohol. The liquid was phenol, a chemical used in making hospital antiseptics, explosives, plastics and some dyes.

"If you spill enough phenol on you to make a patch about like so," said top Dow scientist V. K. Rowe, describing a 12-inch circle on his thigh, "you can wash it right off, and all you'll have is a little skin burn. Or you can leave it on there for 20 minutes and you'll be dead."

Dow officials had known all along that phenol was dangerous, but they had not known how dangerous. Nor had they trained workers to recognize the compound and deal with it effectively if they had contact with it.

The phenol incident struck a worrisome chord in the mind of Willard Dow, then the company's president.

His scientists were conjuring up new compounds every day. How many more might turn out to be sudden killers? Dow, son of the company's founder, did not much like the idea of finding out only after his workers had died or been disabled. He put a young, freshly hired biochemist to work testing for potential hazards.

From that impromptu beginning the company has developed a program that aspires to protect not only Dow workers and Dow customers but also the customers' workers and the customers' customers from the risks inherent in the more than 8,000 separate chemical combinations the company sells or uses. What started with one man at one lab bench now involves hundreds of people and as much as \$20 million a year.

With all its attention to toxic substances and the health of its workers, Dow Chemical Co. has scarcely suffered financially. Over the last 20 years its annual sales have increased

more than tenfold, to \$4.9 billion, while profits have increased by nearly 16 times, to \$616 million.

WOMAN'S WORK: BIOLOGY VS. CIVIL RIGHTS (By Marlene Cimons)

WASHINGTON.—Thirty-seven women in an Idaho lead smelter recently were told they could no longer work in lead operations because of the potential adverse effects of lead on their future offspring. The women, all of childbearing age, were transferred by the company to other, safer jobs—at less pay.

A mother of four, employed in a lead storage battery plant, was told she would have to prove she was no longer fertile to continue working. She had herself sterilized to keep her job.

A woman at a California fiberboard plant, two months pregnant, stopped working after her physician warned her that association with formaldehyde might harm the fetus. She applied for a transfer or for disability benefits. The company resisted. All she received was unemployment pay, \$85 a week less than her working salary.

A female research technician in a thyroid laboratory of a health care facility learned she was two months pregnant. Her work exposed her to limits of radiation considered safe by the then-Atomic Energy Commission and the Occupational Safety and Health Administration. But her employer could not guarantee the exposure would not harm her unborn child. The employer told her to take maternity leave—without pay—or quit. She chose to resign, in order to collect unemployment benefits, and on returning was treated as a "new hire."

These stories, taken from the handbook, "Working for Your Life: A Woman's Guide to Job Health Hazards" by Andrea Hricko, health coordinator of the Labor Occupational Health Program at UC Berkeley, illustrate a particular dilemma faced by women as they gain equity in the job market: how can they be protected without suffering economic loss?

This problem, along with the occupational health and safety questions faced by all workers, became the focus of a three-day conference here recently on "Women in the Workplace," sponsored by the Society for Occupational and Environmental Health.

Labor unions, health specialists and others have long argued that no worker, male or female, should be forced to choose between health and safety on one hand, good wages or a job on the other. Such choices amount to economic blackmail, union leaders say, charging that the Occupational Health and Safety Administration should make a safe workplace a matter of legal right—not something to be bartered for with lower pay or other sacrifices by the employee.

Where women are concerned, however, a troubling new aspect of this issue has emerged: some chemicals and other workplace hazards appear to pose dangers unique to women or their unborn children. Federal regulations are designed to dictate what an employer must do to protect workers generally, but so far there is little provision for the special risks faced by women. Thus, business firms may be free to establish their own rules, sometimes forcing women to choose between greater safety and better pay. This, many women's leaders believe, is a form of sex discrimination.

The Occupational Safety and Health Act mandates that employers provide safe and healthful workplaces for employees, while the Equal Employment Opportunity Act and Title VII of the Civil Rights Act prohibit discrimination against women in the workplace. Sometimes, the two legislative areas appear to clash. How can they be reconciled? No one yet has a definitive answer.

"These anti-sex discrimination laws require that women are to be treated the same as men," said Portia Hamlar, an attorney with the Chrysler Corp. in Detroit. "These

conflicting requirements exist notwithstanding the primary biological difference between men and women, that difference known as the female's reproductive capacity. But also not to be ignored are the possible hazards presented by industry to the genetic systems of both men and women. How can industry effectively deal with this dilemma, while simultaneously complying with the mandates of both OSHA and the EEOC?"

Andrea Hricko thinks the answer is quite simple, although industry might not readily comply.

"Until occupational health standards are stringent enough to protect the developing fetus, the woman worker—at the very least—should be informed by her employer about the potential effects of hazardous chemicals on the fetus," she said. "And she should be given the opportunity to transfer to another job during the pregnancy without loss of pay, seniority or other benefits. If the worker must temporarily leave work, she should be able to return to her former job after childbirth with seniority and all her other benefits."

Anne Trebilcock, assistant general counsel with the United Auto Workers, agrees. "We have come to a sad state in this country when a woman must choose between her child-bearing capacity and her job," she said.

How does one company respond?

"If there is valid and conclusive scientific evidence that a hazard to pregnant women existed and that the employee barred from a job in the hazardous area was, in fact, pregnant or had child-bearing capacity, the alleged discrimination would appear to be defensible," said Portia Hamlar, the Chrysler Corp. lawyer. "If such was established, two ancillary issues would surface. First, was the employee temporarily transferred to a non-hazardous job location rather than temporarily suspended? Secondly, if a transfer was affected, did it involve loss of pay or seniority?"

As for transfer versus suspension, she said, many court decisions have supported a pregnant employee's right to continue to work as long as her physician considers it safe. "Therefore, a transfer to a non-hazardous job seems to be the more proper alternative," she said. "Of course . . . (this) depends upon whether . . . the employer has vacancies in any jobs in non-hazardous areas. It is conceivable that in certain types of businesses, jobs nonhazardous to pregnant women or women of childbearing capacity simply do not exist."

As to seniority and equal pay?

"While retention of seniority is subject to union bargaining, equal pay pursuant to a temporary transfer presents a totally different problem," she said. "Such an adjustment would raise the issue of wage discrimination against permanent employees in the location to which the temporary transfer was made, as well as nullify the employer's pre-established job-wage classifications. Such a result does not appear to be reasonable or legal."

She compared it to employment of the handicapped. "Although the employer is expected to make job modifications in order to employ the handicapped, those modifications do not include pay for a job the employee is unable to perform due to a physical limitation," she said. "For the same reason, a pregnant employee should not receive pay which is higher than that allocated to the assigned job."

Just what are some of these hazards that women face, either by virtue of their child-bearing capacity, or simply by their large concentrations in certain job classifications? Also, do some of these toxic substances pose a threat to male workers as well? In some cases, the answer appears to be yes.

The toxicity of lead has been known for approximately 2,000 years; a Roman senator warned against it in the first century A.D.

It is capable of damaging the central nervous system, the kidneys and blood-forming elements, with a high probability of permanence. If exposure is great, it can result in coma, convulsions and death. A common manifestation of lead poisoning in workers is severe abdominal pain, a condition known as "lead colic."

"Persons who are exposed to lead on the job are in double jeopardy since the lead exposure while working must be added to the lead entering their bodies from general environmental exposure, which in certain instances may already be excessive," said Dr. Kenneth Bridbord, a medical officer with the National Institute for Occupational Safety and Health.

"In this regard, women workers of childbearing age must be considered to be of triple risk," he said.

EFFECTS OF LEAD

Peter F. Infante, an epidemiologist with NIOSH and Joseph K. Wagoner, NIOSH's chief of the bureau of industry-wide studies, in a paper on the effects of lead on reproduction presented to conference participants, wrote:

"Observations among human populations indicate that lead is associated with sterility, spontaneous abortions, stillbirths, birth defects, increased infant mortality, increased prematurity and an increase in chromosomal anomalies."

The two also cited studies linking lead exposure to reproductive problems in men, the most recent being a 1975 report examining 150 male workers exposed to lead in a storage battery facility. The study showed a significant decrease in fertility, including a toxic effect on gonads and changes in sperm production, sperm strength and the likelihood of transmitting potential birth defects.

In addition, they wrote, animal tests have shown respiratory and kidney cancers following exposure to lead. "Cancer mortality experience in Shoshone County, Idaho, where primary lead and zinc smelters are located is also of interest," they wrote. "During the period 1968-72, the respiratory cancer mortality rate for Shoshone County was the highest recorded in the state."

The dangers of mercury can affect an estimated 125,000 employees, the majority of them women, who work as chairside dental assistants. Mercury, a heavy silver metal used to fill teeth, is liquid at room temperature, but quickly vaporizes into the air—where it can easily be inhaled.

Signs of chronic mercury vapor poisoning include inflammation of the gums and mouth, excessive salivation, metallic taste, emotional instability and tremor. It can produce kidney damage and acute respiratory problems.

A study sponsored by the California Department of Health's occupational health section and the department of health science at California State University, Northridge, examined 19 dental offices employing 303 dental workers, 177 of them women. It found mercury contamination in every office.

Operating room personnel who are continually exposed to anesthetic gases face a potentially increased risk of cancer, miscarriages and birth defects. A study undertaken by the American Society of Anesthesiologists and NIOSH examined 50,000 operating room professionals, with 24,000 unexposed medical and nursing professionals serving as controls. The figures were presented by Dr. Thomas H. Corbett, associate professor of anesthesiology at the University of Michigan Medical Center.

HIGHEST RISK CASES

The study found 1.3 to 2 times the incidence of spontaneous abortion in exposed women, compared with unexposed female personnel. Women physician-anesthetists were at the highest risk, followed by nurse anesthetists. The incidence of congenital abnormalities among live-born offspring of ex-

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