JOBS AND THE ENVIRONMENT:
Three Papers

THE ECONOMICS of POLLUTION CONTROL

by

Robert M. Solow

LABOR'S STAKE in the ENVIRONMENT/ THE ENVIRONMENT'S STAKE IN LABOR

by

Barry Commoner

LABOR and the ECONOMIC IMPACT of ENVIRONMENTAL CONTROL REQUIREMENTS

by

Leonard Woodcock

Presented at a conference on

JOBS AND THE ENVIRONMENT -- WHOSE JOBS? WHOSE ENVIRONMENT?

Sponsored by

INSTITUTE OF INDUSTRIAL RELATIONS
UNIVERSITY OF CALIFORNIA, BERKELEY

November 28, 1972
San Francisco, California

Berkeley 1972.

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(Introduction: Lloyd Ulman, Director, Institute of Industrial Relations)

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INTRODUCTION

The papers which follow were read at a conference sponsored by the Institute of Industrial Relations at the University of California, Berkeley, on November 28, 1972. The conference was entitled "Jobs and the Environment -- Whose Jobs? Whose Environment?" It was held in part because of tensions created on various occasions when local business, unions, and minority groups complained that, in attempting to limit the construction of new factories and homes in their communities, or to enforce tighter pollution emission standards, local groups of environmentalists were threatening to limit economic opportunity and security as well. Thus, in concrete adversarial situations, people in local communities become acutely aware that, however much they might agree on the desirability of preserving and improving their natural environment, attempts to achieve this common goal raise two difficult and even divisive questions: (1) How much will it cost? and (2) who will pay? To many, the issue could be posed simply as: The environment versus jobs.

But this is not the view expressed in these papers. Commoner, the environmentalist, stresses that much environmental pollution originates in the workplace where its adverse effects on the health of the worker may be particularly severe. In this respect the worker has much to gain from effective environmental control. Analyzing the problem from a quantitative viewpoint, Solow, the economist, denies that an effective national antipollution effort need result in overall job loss. And he suggests that, if the cost of environmental amelioration, which has been

estimated at about 2-1/2 per cent of GNP, is "paid" for by taxation and effluent charges -- which are more efficient devices than either subsidies or direct controls -- the revenues could be used to compensate needy workers who are displaced from their jobs. Woodcock, the labor leader, also favors legislative enactment of an extensive battery of compensatory devices, recognizing that "collective bargaining has a limited reach" in these matters -- and rejecting attempts to pressure union representatives into opposing environmental progress.

Commoner rejects passing the costs of environmental control along to the consumer, essentially on the grounds that some of the polluting commodities (e.g., automobiles) enter so importantly into the budgets and earnings potential of the poorer consumer that the consequent rise in the prices of such commodities would of themselves effectively reduce incomes at the lower end of the distribution. This problem, we may note, is exacerbated in the case of unemployed and underemployed members of racial minorities for whom little is available as compensation from abatement of occupational hazards to health since they so frequently can't obtain "good" high-wage, high-pollution jobs to begin with. This problem of redistribution (who pays?) is further complicated when the question of preserving purely aesthetic aspects of the environment is raised (although this question is not explicitly considered in these papers). As a result, the "environmental politics" to which many speakers at the conference made reference, has tended to reunite high-wage local union groups and representatives of depressed minorities -- two old but recently estranged sets of bedfellows -- and to array them against more affluent and allegedly "elitist" reform groups.

The lesson to be learned from the foregoing is not that economically efficient methods of inducing environment-enhancing behavior won't work, but rather that compensatory devices, including those which taxation and effluent charges make feasible, must be adopted as at least a necessary condition of the enactment of effective environmental programs. That would have to be the basis of a more constructive politics of environmental reform, which must derive support from all economic and social groupings in the community.

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THE ECONOMICS OF POLLUTION CONTROL

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Not so long ago, it might have been possible to dismiss the environmental movement as a sentimental storm whipped up by a bunch of backpackers called the Sierra Club. Maybe it was the fight over the SST that marked the transition, but nobody dismisses environmental issues as unserious any more. A post-election survey by the New York TIMES pointed out that ballot proposals having to do with air and water pollution, solid waste disposal, and recreational land acquisitions did rather well in New York, Washington, and elsewhere. And the environmental movement had quite a few victories in campaigns for the House, the Senate, and for state Governor. The League of Conservation Voters endorsed 57 candidates in all, and 43 of them won.

I hope that success doesn't drive all the evangelical flavor out of the environmental movement, because sometimes you need it to convince people that you're for real. In the early Sturm und Drang phase of the movement, economists were not very popular, probably because they're professionally inclined to see every issue as the sum of a lot of little pluses and a lot of little minuses, and that's bad for enthusiasm. But I think that now we have reached the stage where it is possible to be analytical about environmental issues without losing the kind of emotional sympathy that wins primaries and overrules vetoes.

The first question I want to raise is kind of indirect: why have pollution and other environmental issues become prominent just now, and why are they inevitably public and political issues? We don't find it surprising that as a society we spend more on health care every year, and even a larger fraction of our aggregate income on health care, or that our expenditures on education

grow faster than our total expenditures. That's not surprising because we expect a family or a nation to spend a larger fraction of its income on health and education, and a smaller fraction on food and clothing and shelter, as the family or nation gets richer. The demand for a clean environment seems to have the same characteristic. People and countries at low standards of living also value clean air and pure water, just as poor families value health and education. But there is no doubt that the demand for a clean environment rises on the priority list as the standard of living rises.

The trouble is that the difficulty and expense of maintaining a clean environment also goes up as the standard of living rises. As we consume more goods we generate more waste. (In fact, we never consume anything, literally, we only change its form, so consuming more goods is generating more waste.) As population and population density go up, as industrial production per head increases, the capacity of the atmosphere and running water to carry away waste inconspicuously is eventually surpassed, and we notice that we are polluting our air, our rivers, and the oceans, just about the time that we have enough to eat and wear, and we'd like to be able to enjoy fresh air and clean water.

If excessive pollution were an inevitable accompaniment of a high standard of living, we would have a tough choice, and we'd be at each other's throats. But there are other possibilities. There are more polluting and less polluting methods of production for many commodities (as with the sulfide and kraft processes in paper production). There are less polluting and more polluting commodities (as unbleached paper generates less dissolved solids than the bright household paper we seem to want). Oil can be desulfurized or sulfur can be removed from stack gases. Hydrocarbon and carbon monoxide and nitrogen oxides can be removed from automobile and truck exhausts by expensive equipment, or some substitute for the internal combustion engine can be found, or commuting

by car could be replaced by mass transit in densely populated areas, in which case waste disposal would be concentrated in electricity generating stations, say, outside the crowded city where it is more easily monitored and controlled. There is certainly no one-to-one correlation between pollution and high living standards; there is wide latitude for choice.

Why, then, do we have pollution? We have pollution because the environment belongs to everybody; it is common property, and rightfully so. Because it is common property, we have no tradition of charging a price for its use, including use of its capacity to carry away wastes, except under special circumstances. Everybody is free to vent smoke from a chimney, exhaust from a car, cooling water from a power plant, or waste from a factory into the atmosphere or into a river, free in the sense that there is no cost to him attached to doing these things. Most of the pollution-reducing things you can do -- like changing production methods or materials -- are costly, or else they would already be done. Dumping wastes into the environment imposes the cost on society at large, not on the polluter and not on the consumer of the polluting product. If this valuable service is provided free, it is hardly any wonder that it is used and overused. We never noticed that we were giving away this valuable service free in the old days when there was not enough waste generated to cause any trouble; in a real sense, it wasn't a valuable service then, because there was enough to go round. Now we notice. There is a flaw in the price system. There are valuable resources which don't have a price because they are not privately owned and the public has not previously seen how valuable they are. Since they are provided free, they are freely used. And excessive use of the environment's capacity to absorb and carry away waste is exactly what we mean by pollution.

Next question: if that is why we have pollution, what is to be done about it? There is more than one possible strategy; but this analysis of the origin of pollution suggests a general warning about all of them. A piecemeal approach to

the problem of pollution runs a risk of merely transforming one kind of dirt into another. One way to reduce water pollution is to incinerate wastes, which turns them into air pollution. One way to reduce air pollution is to insist on wet scrubbing of stack gases, which turns them into water pollution. If you see the environment and its waste-disposal capacity as a scarce resource, and if you take the law of the conservation of matter literally, then it will be clear that we have not an air-pollution problem and a water-pollution problem and a solid-waste-disposal problem, but a general problem of managing the flow of materials.

Granted that, there are two main environmental strategies. One is direct regulation and control: setting minimum standards, monitoring possible violators, and punishing violations. That is generally the approach we have followed in legislation so far, though we clearly have a long way to go. The alternative strategy is to fix the flaw in the price system through the price system itself, by levying effluent taxes and user charges on polluters, related to the amount of damage that they do. Instead of saying Thou shalt not emit sulfur oxide, the Congress says We shall add up the sulfur in the fuel you burn, subtract the amount of sulfur you have demonstrably removed from your stacks and disposed of in some safe way, and charge you so much per pound for dumping the rest in our (and your) atmosphere.

Naturally, economists rather prefer this second strategy, and there are some important things to be said in its favor. The most important is that it tends to minimize the cost of achieving any given improvement in the quality of the environment. Suppose for example, it were public policy to reduce hydrocarbon emissions to one quarter of their current level. One way to achieve that goal would be to set standards for each hydrocarbon-emitting activity at about one-fourth of the current level, and enforce them. But some polluters would find it relatively cheap to reduce their hydrocarbon emissions and others would find it all but impossible,

or at least very expensive. No government agency is likely to know who is in one position and who in the other. But if a tax were levied per pound of hydrocarbons released into the air, then the individual polluters would sort themselves out in their own self-interest. Those who could cheaply reduce their pollution would find it more profitable to do that than to pay the tax; the others would find it cheaper to pay the tax. Any given improvement would in fact be allocated among the polluters so that the cost of achieving it is the smallest possible. The only thing the control agency has to do is to set the tax just high enough to achieve the reduction it is looking for, and that it can do by trial and error rather simply.

There are other advantages to this device. It economizes on centralized information. It blissfully eliminates those hassles about whether this or that industry can or can not meet this or that standard by this or that year. In those discussions, the government agency is always at a natural disadvantage, because it can not know as much about coming technology as the people it is trying to regulate. In the case of an effluent charge, the technological prospects still matter, because that determines how hard or easy it will be to avoid the tax (and a corresponding price-increase) by changing methods of production, raw materials, and waste-treatment methods. But since it is not a matter of sheer ability to meet legally enforcible standards, the cards are not stacked against the regulatory agency and it can afford to be more hard-boiled.

Still another advantage of the effluent-charge approach is that it generates some revenue that can be used for environmental purposes -- for building water-purification plants, say, or for financing research into the technology of abatement or atmospheric diffusion, or the ecology of the lobster, or it could be used to improve public recreation facilities. In fact, it could be used for any socially desirable purpose, and I shall mention one possibility later on.

These are considerable advantages, and they suggest to me that a system of effluent charges would indeed by preferable to a collection of individual standards and regulations. For that reason, I think the proposals made in the last Congress for a tax on sulfur emissions represent a real step forward in environmental legislation, though I much prefer Representative Aspin's bill to the weaker one put forward by the Administration. Nevertheless, I don't want to overdraw the difference between the taxation strategy and the regulation strategy. There may well be situations in which the greater certainty and control of direct regulation make it the preferred policy. In any case, given enough information, a persistent regulatory agency could presumably get to where it wanted to go, in terms of the production of various commodities and the emission of various pollutants, by either route. In that case, the main difference between taxation and regulation is more subtle and long-run, and I won't pursue it here.

The strategy of effluent charges works by imposing on the consumers of pollution-intensive goods and services the full cost of those commodities, including environmental costs. Goods and services whose production places a big burden on the environment are made more expensive to the ultimate consumer, not as a punitive measure but because they <u>are</u> more expensive. It would be a mistake to think of this rise in relative price of pollution-intensive commodities as an artificial distortion of true market relationships. The whole point is that it is the present arrangement of relative prices that is artificial because a scarce resource is being used as if it were not scarce and therefore not valuable. The consumer is not entitled to something for nothing just because the something is common property. I emphasize this point because sometimes the environmentalist movement sounds as if it regards pollution as a mere wickedness of corporations. It is not that; it occurs because corporations respond to prices that do not reflect all the true costs of production.

issues about the distribution of this burden, and I want to come back to them. But it is worth saying at the outset that there seems to be no reason to expect an active pollution-abatement policy to have any strong systematic long-run effects on the distribution of income between income from work and income from property, for instance.

It is important to be clear about what it means to "pay" for improving the natural environment. From the point of view of society as a whole, it means that we divert labor and plant and equipment that might have been used to produce ordinary commodities like shoes or houses or medical services and use them instead to purify air or water or process sewage or compact solid waste. Or else we produce fewer conventional consumer goods for ourselves than we otherwise might, because we induce or force ourselves to adopt more costly, but less polluting, materials and techniques of production. In either case, we work as many manhours, wear out our plant and equipment just as much, and have fewer conventional goods and services to show for it. When I say that the consumer pays, I mean that this reduction in the total output of goods and services is shared among individuals in proportion as they buy the pollution-intensive goods whose prices rise compared with others.

The magnitudes are not tremendous, though they are far from trivial. I will quote some estimates made by Resources for the Future in a recent study of the costs of meeting the Environmental Protection Agency's recommended water and air emission standards, which appear to be achievable without requiring any major new technical discoveries. These estimates do not include some important elements of any broad-scale environmental policy, such as separation of storm and sanitary sewers or the repair of damage done by strip-mining. But they do include the major conventional items of air and water pollution and solid waste disposal. In 1970 these items cost about one percent of GNP, just under $10 billion. By 1980, if

the standards are to be met, annual expenditure would have to be about $35 billion in 1970 prices, or about $2\frac{1}{2}$ percent of GNP. By the year 2000 the annual costs of active pollution abatement might run to $55 billion with rapid population increase or only to about $40 billion with slower population increase, but in either case the total would amount to just under 2 percent of GNP. Remember that this is only part of a concerted program to protect the environment, but it does represent the cost of a perceptible improvement over current conditions. The program costs a lot of dollars, even 1960 dollars, but amounts to only a small fraction of GNP. To put it into perspective, the annual increase in real GNP in the United States is about 4 percent; so we could pass from spending one percent of GNP on the environment to spending even 3 percent by devoting one half of one year's growth of GNP to environmental clean-up, and then letting environmental costs grow only as fast as the economy from then on.

It should not be overlooked that these costs buy something. They bring a corresponding benefit in the form of cleaner air, purer water, better health, and more pleasant outdoor recreation facilities. I mentioned earlier that the social costs of environmental improvement might take the form of a reduced total production of conventional goods and services, a lower GNP in fact. But that is just the hole in the doughnut. The benefits from such a program don't happen to get counted in the national income statistics, because they represent the preservation and improvement of an asset we don't customarily count as "ecomomic". That's not necessarily a black mark against the GNP number, which doesn't pretend to measure what it doesn't try to measure. It is, however, a reminder that the benefits are no less real because the Department of Commerce doesn't price them into the national accounts.

Since there are benefits "bought" by environmental expenditures, they too have a distribution. We should ask not only who pays for improving the physical

environment, but also who gains. The answer is obviously very complicated, and hardly knowable with any exactness. Those who use the rivers, lakes and estuaries for recreation will clearly gain. You and I both benefit because we like to mess around in boats, and we both get more fun out of clear water and will have to do less painting and scraping. You, on the other hand, will rightly pay a larger share of the cost of cleaning up the shoreline than I, because I spend my time in a sailboat and you will have to pay higher prices for your twin 100-horse stinkpots and the gasoline to drive them. City people will also benefit, even if they never leave the city. City people, and especially center-city people and wrong-side-of-the-tracks people are the big sufferers from air pollution; and the larger the city you live in, the worse the air you breathe, generally speaking. Professor A. Myrick Freeman has estimated that white residents of Washington, D.C. are exposed to slightly over half as much air pollution as black residents in the form of suspended particulates, and to two-thirds as much in the form of sulfation. The air of Scarsdale contained only a fifth as much carbon monoxide and lead, half as much sulfate, and less than a tenth as much of the carcinogen Benzo(a)pyrene as did the air of Herald Square, in the early 1960s.

People who live in towns with expensive water-purification problems caused by upstream dumping of wastes would also gain from any program that forced or induced the polluters to eliminate or reduce the damage they cause to others.

The distribution of the benefits from pollution abatement is surely beyond calculation, if only because the subjective and aesthetic element is so great. But in particular instances, it won't be so hard to see which way the wind is blowing. The environment is by no means an exclusively middle-class cause, although I began by remarking that it is one of those commodities that people want proportionally more of as their incomes rise.

The fact that it is hard to measure the benefits from environmental policies in the aggregate and even harder to figure out how they are shared is not a difficulty special to environmental policy. After all, we share the cost of the military establishment in proportion as we pay federal taxes of all kinds; nobody has ever made a convincing estimate of the total benefits we buy through the military budget, let alone their distribution; and I know that I, personally, don't regard the last decade's worth as a great bargain. We pay for municipal snow removal in proportion as we own taxable real estate, and similarly for fire protection and the local police force, but not so for the services of the state police. That seems like a reasonable rule of thumb, though it is hardly the result of any exact analysis. When it comes to environmental policy, there is every reason to think hard about the distribution of costs and benefits, and about the equity as well as the cost-effectiveness of alternative policy devices. But it would be a mistake to be paralyzed wherever it turns out to be impossible to achieve precision. It will almost always be possible to find a better policy than inaction, because we do know the direction of the bias in the price system that I mentioned earlier.

Let me give one example. One of the lines of least resistance in federal environmental policy is the enactment of subsidies for the installation of anti-pollution equipment. It is pretty obvious why this is such an easy thing to do: everybody is against a tax (and a prohibition or restriction is also a tax), but there is at least one person in favor of any given subsidy. There are convincing arguments against the equipment-subsidy approach both on cost-effectiveness grounds and on distributional equity grounds. In the first place, it is foolish to prejudge every pollution-problem in favor of processing or purifying wastes as the natural solution. In some cases, that may very well be the best way to go; but in many other cases analysis will indicate that it would be better (i.e. cheaper when all costs are considered) to reduce the amount of waste material generated by going to less obnoxious

raw materials, or to an alternative production process, or even to relocate the polluter to a place where the natural waste disposal capacity of the environment will be adequate to handle the problem. To look automatically for a hardware solution may be inefficient.

Moreover, in the absence of effluent charges or stream or air standards, an equipment subsidy will generally have to be almost total to induce a polluter to use it. If we allow free use of the environment as a dump, then if we offer to pay half the cost of pollution-control equipment, we are requiring the polluter to pay the other half. Under the circumstances, that may not strike him as a bargain. So the subsidy rate is likely to have to be substantial. Then the equity question arises very sharply. Why should the general taxpayer pay for the disposal of wastes generated in the production of a commodity consumed only by a fraction of the population, and an easily-identifiable fraction at that? Our tax system is not so progressive that I am inclined to rely on it automatically on general ability-to-pay grounds. If there has to be a general presumption, it seems more equitable to me that the polluter should pay; but there are exceptions even to that. In any case, equipment subsidies are a poor substitute for intelligent policy.

One sometimes hears alarmist statements to the effect that a serious attack on pollution might mean prolonged recession and unemployment; if that were so, then the environmentalist and the worker would be at odds. But it isn't so; there is nothing inherently recessionary about an active policy of pollution abatement. The contrary belief is just a fallacy. The magnitudes alone tell you that 2 percent of GNP is not enough to cause uncontrollable variations in output and employment. But in any case, it is incorrect to reason from the displacement of individual jobs and individual producers to aggregate output and employment.

If and when we begin to take the environment seriously, there will certainly be effects on the location of industry, or at least of individual plants. There may well be shifts in the relative importance of major products -- between automobiles on the one hand and buses and mass transit equipment on the other. We are probably in for higher energy costs anyway, and to the extent that we impose environmental costs on the strip-mining of coal, just for example, energy costs will be higher still. That may well affect market choices between air-conditioning houses and improved insulation -- it should affect the balance, because that's what it's for -- but it is illogical to reason from examples like that, or even from the disappearance of individual jobs and marginal plants, to a general loss of work or business. In fact, as more attention is paid to environmental costs, any given production of conventionally marketable goods and services will require more labor and capital, not less.

Besides, pollution abatement is itself big business. A few minutes ago I mentioned an estimate that by 1980 the "cost" of pollution abatement and solid waste disposal might be as much as $2\frac{1}{2}$ percent of GNP. That is just another way of describing $35 billion worth of expenditures. To clean up a river or beach requires sewage treatment plants, heat transfer units, storm drains, pumps, monitoring instruments, and so on. A typical waste water treatment plant is about 30% labor, 26% machinery and equipment, and a quarter metal and non-metallic mineral products.

The demand for a clean environment is a demand that needs to be organized or aggregated to be effective. There is no easy way for me to buy myself relief from carbon monoxide, except perhaps by moving to the country. There is no point in my laying out money to equip my car with equipment to diminish the carbon monoxide it puts out. I will not notice the difference. That is exactly the flaw in the price system that accounts for the problem in the first place. Nor can I buy less sulfur dioxide from my friendly local utility. I can buy air conditioning, but

that is both expensive and -- compared with alternatives -- probably wasteful. Public action can organize or aggregate the latent demand for a cleaner environment in two ways. Most simply, the government can itself create a market for pollution-control equipment by direct purchase of its own, as with municipal sewage treatment facilities, breakwaters or other beach works, or the creation of recreation facilities. The other, and more important thing the government can do is to aggregate the private demand for environmental improvement by user charges or regulatory controls. In either case the latent demand is activated and converted to a diversion of private expenditure for the improvement of environmental conditions.

I want to emphasize that this last point I have been making is important but inessential to my argument. The enforcement of environmental controls is a diversion of expenditure, not a reduction of aggregate expenditure. Making pollution-intensive goods more costly is exactly the same thing as making non-polluting goods cheaper. There is no threat of generalized unemployment or recession implicit in the demand for a better environment.

There will, however, be redistribution of income, though no true reduction in aggregate income. And there will be displacement of jobs and specialized unemployment, though no generalized disappearance of jobs. Everyone knows of dramatic examples in his own part of the world. In Massachusetts, there have been examples of marginal leather companies, for instance, just eking out an existence in a more or less isolated town, and poisoning the local river as it had been doing for a hundred years or more. The enforcement of stream quality standards will save the fish, but will surely close the plant and throw a few hundred people out of work with no prayer of employment for a hundred miles around. It is nobody's fault: to say that such a plant is barely viable when it can pollute freely is to say that it can break even only by throwing part of

the cost of production onto the public. But that is no help to the workers who see their jobs sacrificed to the fish and the fishermen, or for that matter to the next town downstream.

There is a real conflict of interest here, and I think we should neither ignore it nor magnify it. Such things happen all the time: imports provide cheaper goods for domestic consumers (and permit foreign markets for our exports), but they do displace domestic jobs and profits. Technological change, even if it is hardly all good, is certainly the foundation of our standard of living, but it has its individual victims as well. For that matter, changes in fashion and shifts in population cause major economic displacement, but we would not propose to forbid them for that reason.

It seems to me that environmental legislation ought to include provision for assistance to workers tipped over the line from employment to unemployment and perhaps to individual plants tipped over the line from viability to failure, by the impact of pollution control. The reason for this is more than simple humanity, though that too. Economic analysis tells us, as I have emphasized, that a polluting factory and the people whose livings depend on it are not to be regarded as enemies of the earth. They are reacting, like most of us, to signals from the price system. It is everyone's fault, not theirs, that the price system has been allowed for a century to give false signals. If we now decide to correct that error, it is wrong that the costs of change should fall so heavily on a few people. One survey of 12,000 plants in 14 industries suggested that pollution regulations might close about 300 of them in the next few years, and displace about $1\frac{1}{2}$ percent of employment in the industries in question. No doubt some of those plants were already marginal and would have closed anyway, but no doubt also the pollution regulations will hasten their death -- after all, that's all homicide does.

Earlier I mentioned that one of the advantages of the effluent-charge strategy of pollution-control is that it would generate a stream of revenue which could be used for any useful social purpose. It seems to me that a good use of such funds might be to compensate the neediest among those who are displaced by the impact of environmental legislation. I realize that such adjustment-assistance programs keyed to trade liberalization have often proved to be mere window-dressing. That is why I think it would be valuable if environmental legislation generated its own revenue for such purposes, rather than depending on the general budget. It is a direct way to dramatize the fact that the losses of displaced workers are among the costs of a better environment for all. That might be one of the gains if the environmental movement and the labor movement could join forces.

LABOR'S STAKE IN THE ENVIRONMENT/ THE ENVIRONMENT'S STAKE IN LABOR

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Keynote Address before the Conference
on "Jobs and The Environment"
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This conference is about the relationship between two great social issues: the concern of workers for their jobs; the concern of all of us for our environment. The two issues converge from very different origins.

The issue of jobs is as old as our economic system; it is championed by a movement, labor, which claims to speak only for itself and which--in recent years--has had few allies and non-partisan supporters; yet labor's goals have become a powerful element in the continuing struggle for social justice.

The issue of environmental quality is a new arrival on the social scene; its protagonists often claim to speak for universal constituencies--all Americans, all human beings, and even all living things; it has attracted such a large and varied range of proponents as to be regarded by some as a state of mind rather than

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an issue; and, according to some of these proponents the environmental crisis is so urgent as to override the traditional issues of social justice--such as jobs.

How can we find the interface between these two, seemingly divergent, segments of current public policy?

At first glance there appears to be a strong--but negative--relationship between the proponents of labor and of the environment. The examples are well known: Environmentalists won an important victory when the SST was abandoned, but the unions--which had joined Mr. Nixon and the aircraft industry's management in a strenuous effort to persuade Congress to approve the project--were among the defeated. When conservationists blocked the construction of a huge chemical plant at Hilton Head, South Carolina--an area much publicized for its natural beauty --their success was a defeat for the unemployed (a less publicized feature of the area) who had looked forward to the plant as a source of jobs. In Oregon, some unions and businessmen have banded together into an organization to oppose the "environmental McCarthyism" of conservationists, who have blocked construction projects and other job-generating, but ecologically harmful, activities. Management has cited environmental effects in justification of decisions to close down plants--over the understandable opposition of local labor.

These manifestations of an apparent built-in antagonism between labor's goals and concern for the environment are misleading. Actually, as I hope to show by an analysis of the relationship between the two, labor has much to gain from the effort to survive the environmental crisis, which can, in turn, succeed only insofar as labor achieves its long-standing goal of improving conditions in the work place, and its share of the wealth generated by the nation's enormous productive capacity. To a considerable extent, the environmental crisis represents an extension into the community of problems which were once confined to the work place, and an extension to the population as a whole of the resultant burden, which was once borne almost exclusively (and still most heavily) by the worker.

Let me begin to develop this thesis with an example that sharply illustrates the divergent ways in which a single technical problem turns up first in the realm of labor and then in the realm of environmental concern: the effects of a class of widely used synthetic organic substances--polychlorinated biphenyls or PCBs.

To the environmentalist the PCB story is a typical tale of

ecological misfortune. It begins in 1966 when a Swedish ecologist identified PCBs in a number of Baltic fish, in the body of an eagle, and in eagle feathers from museum specimens going back to 1880. PCBs were found only in the feathers of eagles captured after 1944, thus making the date at which these substances first entered the environment in significant amounts.

PCBs are, indeed, new, man-made synthetic chemicals, widely used as electrical insulators (in transformers and condensers), in heat-exchange and hydraulic systems, in plastics, tires, and in certain textiles, printers' inks and carbon papers. They were first produced commercially in 1929, but came into large-scale use only during and after World War II. The Swedish studies, and others which quickly followed, showed that PCBs are readily carried from their point of origin, through a chain of ecological events, to objects as remote from chemical factories, electrical equipment or plastics, as eagles and deep sea fish, and that, being stable, they persist in the ecosystem and accumulate at the end-points of ecological food chains--such as eagles, and people.

Ecologists are concerned about PCBs because they closely resemble DDT in chemical structure, and are therefore likely to have the same kind of untoward biological effects in wildlife, and

people; interference with sex hormone activities (leading in birds to eggs which fail to develop); effects on liver enzymes, which change bodily response to certain drugs; and, on the basis of experiments with laboratory animals, a potential for inducing cancer. This concern intensified when it was discovered that PCBs, along with DDT, are present in essentially all living things everywhere in the world--from arctic seals to antarctic birds; from deep sea fish to human beings.

On this evidence the Food and Drug Administration established acceptable limits for PCBs in foods; in 1969 Coho salmon in Lake Michigan exceeded 5 ppm of PCBs and were banned as food. In 1971 large amounts of animal feed were contaminated by PCBs leaking from a heat exchanger in a North Carolina plant; the contamination spread to chickens, eggs and catfish, which were then embargoed. A general FDA survey of all types of food initiated in 1969, found that 3,505 out of 17,000 samples tested were contaminated with PCBs. Some packaged foods had particularly high levels of PCBs, stemming from the PCB content of the packaging, which had been manufactured from waste paper containing a certain type of "carbonless" carbon paper--coated with microscopic plastic spheres containing PCBs. One researcher in a pesticide residue laboratory reports

that when he was unable to obtain a sample of Aroclor (trade name for PCBs of the Monsanto Company, the only U.S. producer, accounting for about one-half the world's output) for comparision with suspected PCB residues from Coho salmon, he extracted the needed PCB from the laboratory's residue report forms, which were backed with "carbonless" carbon paper. Meanwhile in October 1968, over 1,000 Japanese people became seriously ill from eating rice oil contaminated with PCBs (again, originating in leaks from a heating system).

One feature of current environmental concern is that it is usually attended by considerable public exposure, which is often followed by remedial action. PCB is no exception. Following the first public notice of the problem (in June 1970, in an article in Environment and in several newspaper stories) the Monsanto Company announced on September 1, 1970, that it had withdrawn PCBs from sale for uses which might lead to food contamination or other uncontrollable losses to the environment. U.S. sales dropped from a high of 75 million pounds in 1970 to about 35 million pounds in 1971. The company is expected to have restricted the use of PCBs wholly to "confined" systems beginning in 1972. Clearly an environmental victory has been won.

Now let us look at the same problem from the worker's point of view. The industrial history of PCBs is well known. They were first manufactured in 1929 and, through their remarkable range of applications, soon found a rapidly expanding market, which grew particularly fast after World War II.

In April 1930, "O. D.", a 26-year-old man in Georgia joined the work force at the first U.S PCB manufacturing plant. Three years later he developed a severe skin disease, chloracne, which covered his body with pustules. By October 1933, 23 of the 24 men in the plant suffered from chloracne. The reporting physician's paper states:

> ".....in the early manufacture of chlorinated di-phenyl (an earlier name for PCB), the men working were exposed for long periods to these chlorinated products. As the demand for the finished product increased, quantitative manufacture was speeded up rapidly, and open stills and heating units were of necessity used until better equipment could be designed and made".*

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*Jack W. Jones and Herbert S. Alden, Arch. Dermatol and Syphilol., 33, 1022 (1936)

In 1936 a public health surgeon reported that chloracne was a common occurrence among workers producing PCBs and that,

> "In addition to these skin lesions, symptoms of systemic poisoning have occurred among workers inhaling these fumes.....digestive disturbances, burning of the eyes, impotence and hematuria.....Cases of death from yellow atrophy of the liver have been reported among workers exposed to the fumes of the chloro napthalenes (substances chemically similar to PCBs, and which, as early as 1920, were also known to cause chloracne)".*

It was also reported that the PCBs are so stable that, carried home on workers clothes, they frequently caused chloracne among the workers' wives and children.

During World War II, outbreaks of chloracne occurred among workers handling electrical equipment (especially cables) containing PCBs and the related chlorinated napthalenes. After investigating one such outbreak in 1943, the director of the Division of Industrial Hygiene of the New York State Department of Labor concluded, that:

> "Chlorinated napthalenes and di-phenyls are in general highly toxic compounds and must be used with effort to see that such exposures are controlled, insofar as humanly possible. In this effort, we do not believe it

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*L. Schwartz, Am. J. Public Health, June 1936, p. 586

> safe to rely on limiting atmospheric concentrations [for example by ventilation] but rather to depend on a maximum of maintenance and engineering control..... General hygenic measures should be followed, but in no case should these be allowed to supersede engineering control of the primary source of the exposure, the operations in the plant [i.e. plant design and operational procedures should preclude escape of PCB vapors or fluid] .....Pre-employment and periodic physical examination should be made of all exposed workers.....Pregnant women should not be employed where there is a possible exposure to the synthetic chlorinated waxes".*

Thus, by the end of World War II, it was known, from the workers' experience that PCBs were so toxic that industrial techniques ought to be controlled in order to avoid exposure. It was also known that PCBs seriously affect the functions of the liver--an organ which is the seat of enzymatic processes that play pervasive roles in a great many living things. It was known, as well, that PCBs are so stable, and so toxic in minute amounts, that they can spread, in hazardous amounts, from the factory to the worker's homes by transport on their clothes. Here, then, was a warning of a serious environmental hazard--which, for 20 years or more, was ignored.

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*L. Greenburg, Ind. Med., Aug. 1943, p. 520

Following World War II, the production and use of PCBs expanded rapidly. Despite the 1943 admonition ".....to see that such exposures are controlled insofar as humanly possible", PCBs were sold for use in fabrics, carbon papers, inks, and plastics--materials which come in contact with large numbers of people in a wide variety of ways. Even the use of PCBs in sealed electrical components cannot be regarded as "controlled" in the sense of avoiding human exposure. Such components, for example the condensers used in common fluorescent lighting fixtures, are eventually discarded as junk. They are then often incinerated--at temperatures which are usually high enough to destroy the container and vaporize the PCBs but which are not high enough to destroy the latter. Result: exposure of refuse burners--and to a lesser extent, the rest of us--to PCB vapors. A recent study showed that 81% of refuse workers had PCBs in their blood plasma, while this was true of only 11% of a control group.* Thus, even apart from accidents which released PCBs from "closed systems", PCBs are released into the environment and come into intimate contact with people.

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*D. I. Hammer et al, Environ. Health Perspectives. April 1972, p. 83

These contrasts between our approach to PCBs in the work place and in the general environment are illuminating. Although the hazard from PCB was first discovered in the work place, in 1933, the problem was given relatively little scientific attention (beyond clinical description of chloracne and its association with PCBs) until 30 years later, when it was first recognized as an environmental hazard. As a result, we seem to be better informed about the detailed biological effects of PCBs on quail and minnows than we are about their effects on human beings.

Understandably, an industrial hygienist might reflect with some bitterness on the fact that while there is (to my knowledge) no monograph or comprehensive collection of papers on the effects of PCBs on workers, in April 1972 an entire issue of the journal, Environmental Health Perspectives was devoted to various aspects of PCB ecology. A worker once exposed to PCBs might be, understandably, angered to discover from articles published in this special issue that:

"The discovery of polychlorinated bi-phenyl (PCBs) in fish from the Baltic Sea in 1966 attracted widespread attention among scientists"*, while the discovery, 30 years earlier, that PCBs cause

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*See footnote, p. 11

chloracne did not. He might well wonder about the relative importance, to scientists, of workers and of other forms of life, on reading that:

> "In the early days of its use, little work was done on the toxicology of the PCBs, and this was only in relation to the risks of occupational exposure..... many more studies were made as soon as it appeared that the extremely stable PCBs became a threat to the environment and its wildlife, and accidents occurred of acute poisoning in man and animals".**

The worker might ponder, as well, over the research priorities reflected in another statement from these articles:

> "The exact chemical composition of these mixtures (i.e., PCBs) has not been determined. There probably was no incentive to determine the real nature of all the components as far as the industrial value of the products was concerned, but now that it has been found that there are untoward biological effects from these products and that their residues are widely distributed, there is need for more knowledge than is now available".***

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*Anonymous (editorial), Environ. Health Perspectives, April 1972, p. 1

**J. G. Vos, Environ. Health Perspectives, April 1972, p. 105

***J. W. Cook, Environ. Health Perspectives, April 1972, p. 3

The impact of environmental concern about PCBs on both scientific interest (as indicated by the number of scientific papers published on the biological effects of PCBs) and on the production of PCBs is shown in Figure 1. Relatively few papers were published until after 1966, when the widespread distribution of PCBs in the environment was first discovered. Since then, the number of papers published annually has risen sharply. The general public first learned about the problem in 1970--and in that same year PCB production in the U.S. began its sharp decline.

There is much irony--and tragedy--in the PCB story, for it shows that had the scientific community given enough attention to its earlier effects on workers, the present ecological hazard could have been avoided and the long-term effects of industrial exposures would now be much better understood. Had industry heeded the 1943 warning to prevent contact between PCBs and people, we might have avoided a situation in which, according to a recent estimate, 1,500 - 2,000 tons of PCBs per year are "lost" to the air; 4,000 - 5,000 tons per year to fresh and coastal waters and 18,000 tons per year to dumps and land fills.

Particularly ironic is the fact that early attention to the effects of PCBs on workers could have provided advance warning

that their chemical cousins--DDT and other insecticides based on chlorinated hydrocarbons--which were first manufactured some 10 years after the first commercial production of PCBs are also too toxic to be openly disseminated in the environment. In effect, proper attention to the fate of worker "O. D.", stricken with PCB-induced chloracne in Georgia in 1933, and the workers who followed him, might have warned us in time to avoid the great DDT debacle.

This kind of intimate relationship between the problems of the work place and of the ecosystem is typical of modern industrial production. This is evident from a detailed study of the relationship between productive factors and the amounts of pollutants emitted into the environment.* This study evaluates the relative effects of the three chief factors which govern the output of environmental pollutants: the growth in the size of the population; changes in per capita production of goods; and changes in the amount of pollution emitted per unit of production. The computations show that the first two of these factors (changes in population size and per capita "affluence") have contributed much less to the recent increases in pollution levels than has the "technology" factor--i.e., changes in productive technique that increase the amount of pollution emitted

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*Barry Commoner, "The Environmental Cost of Economic Growth", Chemistry in Britain, 8 (1972)

per unit of goods produced or used. For example, the chief reason for the sharp increase in the annual use of nitrogen fertilizer in the U.S. since 1946--which in turn gives rise to a nitrate pollution problem in the surface waters into which the excess fertilizer drains--is not the concurrent approximately 50% increase in population, or the 11% rise in crops produced per capita, but, far more powerfully, the five-fold increase in the amount of nitrogen fertilizer used per unit crop produced. In the same way, the reason why PCBs turned up in breakfast foods in 1970 was not because the U.S. population had grown, or because more of us ate breakfast--but because a business-form company decided to switch from old-fashioned carbon paper to the "carbonless" PCB type.

The major cause of the environmental crisis in the U.S. is the post-war revolution in the technology of industrial and agricultural production. This is revealed by production statistics which describe the significant changes in United States consumption patterns achieved by the technological revolution--changes that coincide, in time and scope, with the post-war period of intensified pollution. There has been a striking replacement of natural materials (cotton, wool, silk, wood) by man-made synthetics; there has been a remarkable increase in the amounts and varieties of other man-made synthetic materials

(e.g., detergents, pesticides, herbicides); automobile engines have been redesigned to operate at increasingly higher compression ratios; electric power, generated in very large power plants, has increasingly replaced geographically-spread home heating directly by fuel; materials, such as aluminum and certain chemicals, the production of which is intensely power-consumptive, have replaced more power-sparing materials; railroad freight haulage is being displaced by truck freight, which uses six-times more fuel per ton-mile than the railroads; at the same time there have been striking changes in agricultural practice, especially the increasing tendency to feed livestock separate from pastures, reduced crop rotation, large increases in the use of inorganic fertilizers, and the massive introduction of synthetic insecticides and herbicides.

These changes represent the massive introduction, following World War II, of new productive technologies that are drastically unsuited for accommodation by natural environmental processes, and therefore, lead to environmental pollution. Manufacture of plastics in place of natural fibers requires the use of fuel-generated power (with its attendant pollution) in place of the power of sunlight, absorbed by plants, and transmitted by natural (and therefore non-polluting) environmental processes. Synthetic

man-made products, such as detergents, plastics and pesticides, which cannot participate in the self-regulated systems of biochemical processes that living things have evolved, are not assimilated by natural environmental cycles and accumulate, as pollutants. The increased manufacture of synthetic organic chemicals--such as PCBs--has resulted in increased production of chlorine, an important ingredient in many organic syntheses. In turn, the use of mercury in electrolytic production of chlorine has also increased. This is the source of much of the mercury pollution in United States inland waters. The development of the modern high-compression gasoline engine, operating at high temperature, causes oxygen and nitrogen in the air to combine into nitrogen oxides, substances otherwise rare in nature and not readily accommodated by natural environmental processes. Nitrogen oxides are the basic cause of smog. Per ton-mile carried, trucks pollute the air with combustion products 6 times more than the railroads; the necessary highways use materials that use about 4 times more power, in their production, than do the same length of railroad; a truck-bearing highway takes up a 400 foot right of way, while the railroad uses only 100 feet. Intensification of power generation in large electric plants results in the increased production of several pollutants, especially sulfur dioxide, nitrogen oxides and

(in the case of nuclear plants) radioisotopes. The new agricultural techniques have disrupted soil cycles, so that natural soil fertility is reduced and fertilizers--which contribute to water pollution--leach into surface waters. The new pesticides disrupt the balance between insect pests and their natural predators and parasites--often resulting in insecticide-induced outbreaks of insect pests, and the accumulation of insecticides in wildlife and man.

This is the chaos imposed on the natural ecological order by our recent technological accomplishments. This is not to say that technological progress is, in itself, counter-ecological. Rather it is the kind of new technology which is at fault--because it has been designed--inevitably, given the nature of our economic system--to embrace short-term gains rather than to conform with the imperatives of the ecosystem. To be explicit: sewage treatment technology which dumps effluent into surface waters is counter-ecological; technology, which returns sewage to the soil, closes the broken soil-food-man cycle and is ecologically sound.

These changes also have an important bearing on the relationship between labor and the environmental crisis. The same transformation of the technology of industrial and agricultural production which is the chief driving force behind the environmental crisis has also had a powerful effect on conditions in the work place. This relationship is revealed in the statistical evidence on the one aspect of working conditions which is thus far well reported--work injuries. In considering these statistics it must be remembered that they represent only a very small fraction of the total effect of working conditions on the worker's health, being restricted, by definition, only to those injuries which are most directly and crudely connected with the occupation. Such injuries are largely of mechanical origin--cuts, falls, bruises and the like--although in recent years the frequency of dermatitis and aftereffects of chemicals has increased. Despite these limitations, the recent trends in the frequency of work injuries (expressed as the number of injuries sustained per million man-hours of work) is quite illuminating.

Thus, Figure 2 shows that while the frequency of work injuries in construction, federal government activities, and trades has declined steadily in recent years, manufacturing industries show a quite different trend. Between 1958 and 1969, the average frequency of work injuries in manufacturing industries increased by 30%. As shown in Figure 3, striking differences are evident among different industries: while certain industries show relatively little increase in work injury frequency rate (lumber, production of chemicals, stone, clay and glass, textile mill products,

tobacco manufacturing), others show rather sharp increases (rubber and plastic products, ordnance, primary metals, petroleum refining, manufacture of electrical machinery). The time course of these trends varies; in some industries (e.g., rubber and plastic products) the injury rate has increased steadily since 1958, while in others (e.g., ordnance) the increase has occurred only since 1964.

Clearly there is much to be learned from such trends, especially as they relate to the role of technological innovation in different industries. To begin with it should be noted that industries necessarily differ in their inherent danger to the worker; given the same effort to protect the worker from injury, manufacture of lumber--which involves manipulation of heavy logs and powerful saws--is bound to be more dangerous than the manufacture of clothing. Similarly, certain industries seem to be inherently more capable of technological transformation than others. Thus manufacture of lumber or of paper is based on an essentially fixed basic technique which has been modified, in its fundamentals, rather little over many years. In contrast the types of electrical equipment, or of military weapons, and the methods of manufacturing them, have changed a great deal. Research and development expenditure (which appears to be the only readily available quantitative measure of technological input into an industry) appear to reflect such differences.

Figure 4 shows that, in general, those industries which have relatively high research and development expenditures have low frequencies of work injury, while industries which do relatively little research and development have a wide range of injury frequencies, but include those industries with the highest rates. Figure 4 may be interpreted to mean that the more inherently dangerous industries seem to require--for their successful economic operation--relatively little research and development but this is also true of certain of the less dangerous industries (such as manufacture of clothing).

Apart from the absolute frequencies of work injury in different industries, the changes in these rates in recent years are particularly important. As indicated earlier recent technological displacement in industry bears a close relationship to the rising intensity of industrial pollution--i.e. both processes represent relatively recent changes. It is of interest, then, to examine the recent changes in the frequencies of work injuries in different industries, as they relate to the rate at which new technology (as given by relative R+D expenditures) is introduced. This is shown in Figure 5, relative to the changes in work injury frequencies in the period 1958-1969.

Figure 5 suggests that, with one very significant exception (production of chemicals and allied products) manufacturing industries can be divided into classes, both of which exhibit a proportionality between the increase in work injury frequency rate (between 1958 and 1969) and the

relative research and development expenditure rate (in 1969). One group comprises the process industries, in which production involves the continuous flow of material (rubber and plastics, primary metals, petroleum refining, fabricated metals, paper, food); in the second group unit products are manufactured (lumber and furniture, transportation equipment, machinery, instruments and ordnance). *

It would appear from Figure 5 that the relationship between the worker and the productive process is considerably affected by whether he is operating a continuous process (such as petroleum refining) or manufacturing a unit product (such as a chair, an automobile, an electric motor or a missile). Accepting this distinction, it would also appear from Figure 5 that in a given industry the recent increases in work injury frequency are proportional to the relative expenditures for research and development in that industry, and hence to the probable rates of technological change. It would appear, too, that the impact of such technological change on work injury frequency is considerably greater in the process industries than it is in the unit product industries.

As already noted, the production of chemicals and allied products is a very striking exception to these relationships. It exhibits the lowest

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*In some cases, research and development data are only available for a process industry and a unit production industry combined; in these cases a weighted average of the separate injury rates has been computed. I wish to thank my colleague, Mr. Michael Corr, for his assistance in these computations and in the preparation of the above figures.

increase in work injury frequency of an industrial sector (with the exception of lumber production) and yet is relatively high in research and development expenditures. That the industry involves rapid technological change, is also evident from the rapid increase in the varieties of chemical products since the 1940's. It is possible, however, that although this industry does show a rapid technological change in the nature of its products, changes in productive techniques may be less rapid--i. e., the same basic productive apparatus may be used to manufacture different end-products by making relatively small changes in the conditions of operation. It is also possible that this exception reflects the fact that the design of modern chemical plants tends to minimize the types of mechanical injuries that predominate in the official lists of occupational injuries and that the more subtle and long-term effects of chemical exposures on health are not officially recognized.

In a sense, the general relationship implied by these data is not surprising, since it is also suggested by the well known fact that inexperienced workers have a higher frequency of work injuries than experiences ones. Rapid changes in productive technology in effect transform experienced workers into inexperienced ones, each time an unfamiliar process is introduced. While it is obvious that much more detailed study of this relationship is needed, the evidence available thus far suggests that the rapid introduction of new productive technologies in recent years has a significant bearing on injury frequency rate. This provides another link

between the interests of labor and of environmentalists, for this same recent trend toward technological displacement is the major cause of intensified industrial pollution. It would appear that recent changes in the technology of production have been introduced without sufficient regard for their effects on either conditions in the work place, or on the environment outside of it.

Much more precise links between problems of the environment and of the work place emerge when one considers the effects of specific pollutants, such as sulfur dioxide, nitrogen oxides and carcinogenic hydrocarbons. Except when they are so concentrated as to have immediate toxic effects on the worker, the influence of such substances on health are not regarded as reportable "work injuries" at present. Nevertheless, these pollutants--which, it will be recalled, are the cause of major concerns in the general environment--are responsible for serious health effects among workers exposed to them on the job.

A recent study of smelter workers by the National Institute of Occupational Health and Safety (NIOSH) shows that the incidence of lung cancer among smelter workers is 229% higher than that expected in a similar nearby population of non-smelter workers. The incidence of tuberculosis is 41% greater than expected, and the incidence of heart disease is 18% greater than expected. * All of these effects are readily

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* J.K. Wagoner et al., presentation before Amer. Ind. Hyg. Assn. San Francisco. May 16, 1962.

understandable from the known effects of sulfur dioxide on the lungs, where it attacks the cells that help to remove toxic substances from the air passages.

Another detailed NIOSH study of disease among steel workers reveals that workers heavily exposed to the fumes of coking plants (which contain the carcinogen, benzopyrene) exhibit a cancer incidence 104% greater than expected.* Other studies show that workers exposed to asbestos--now also recognized as an important pollutant of the general environment--experience a significantly elevated incidence of lung cancer. Similarly, uranium miners and mill workers experience an excessive rate of lung cancer, due to elevated radiation levels.

The point at issue here is this: If, in the environmental arena we find reason to be concerned about the exposure of the general population to pollutants such as sulfur dioxide, carcinogenic hydrocarbons, asbestos and radioactivity, and we recognize that to a considerable degree, these pollutants originate, from industrial operations, then there is--or ought to be--a community of interest between the industrial worker and the citizen generally. Clearly it will be the industrial worker who is exposed to the highest levels of the pollutants that troubles all of us in the environment and equally clearly the most direct way to prevent environmental dissemination is to clean up the plant.

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* J.W. Lloyd, Jour. of Occup. Med., 13, 53 (1971).

NIOSH scientists have recently reported a notorious example of how poor plant conditions generate hazards not only for the worker, but in the environment outside the plant. In a recent investigation of an asbestos insulation plant in Tyler, Texas, they found that because of grossly inadequate precautions, nearly all of the workers in the plant were exposed to concentrations of asbestos in the air considerably in excess of the standard.* A number of the workers showed evidence of asbestos-related disease. One cause of trouble was the practice of emptying the sacks in which asbestos was shipped to the plant by hand--with enough vigorous shaking to scatter a good deal of asbestos dust in the air. The NIOSH investigators also discovered that poor housekeeping extended this hazard from the plant to the neighborhood: Waste asbestos was dumped in an open heap outside the plant where it was scattered by the wind. Finally, as its ultimate contribution to environmental quality, the plant management sold the empty asbestos bags to the numerous rose nurseries in Tyler("The Rose Capital of the World") and tests showed that the hapless gardeners who received plants packed in these sacks almost certainly receive an unacceptable dose of asbestos with their rose bushes.

The route of a health hazard from an industrial plant to the more general environment is not necessarily as exotic as a rose bush. It can also be delivered by way of underpants, for example. A recent study from

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*NIOSH Survey, Pittsburgh-Corning Corp., Tyler, Texas, Project 71-45, Dec. 1971 (Report kindly supplied by NIOSH, Cincinnati)

Czechoslovakia reports that the carcinogenic hydrocarbon, 3, 4 benzopyrene, accumulates in the work clothes of coke workers, and that a good deal remains in the cloth after laundering. * They found that despite a regular washing routine, underpants worn by these workers gradually accumulated 3, 4 benzopyrene, which increased from an average concentration of 41 ppm in the cloth after 2 weeks, to 315 ppm after 12 months. Because benzopyrene is a powerful skin carcinogen the report emphasizes the need for complete replacement of work clothes at frequent intervals. Here, then, is a rather mundane way in which a serious industrial hazard can leave the plant and enter the home, where it can exert its effects on the housewife who does the laundering, or for that matter, who decides to use old work clothes for cleaning rags.

That toxic substances carried into the home from the work place may also accumulate in house dust (where it can readily come in contact with a crawling baby) is shown by another recent report. Investigators found that vacuum cleaner sweepings from the house of a worker occupationally exposed to PCBs contained 180 ppm of that material. ** Selikoff and co-workers have already shown that asbestos workers often carry significant concentrations of this material into their homes. These

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*V. Masek, et al., Jour. Occup. Med., 14, 548 (1972)

** H. A. Price and R. L. Welch, Envir. Health Perspectives, April 1972, p. 73.

few instances suggest how important it would be to make a systematic study of the transport of hazardous substances from the work place to the home, where not only the worker is at risk, but also his family.

These considerations raise serious questions about the relationship between the environmental standards that have been adopted for the work-place and those which are applied in the general environment. It is now widely accepted that in the latter--for example the EPA standards for pollutants in urban air--a judgment must be made of the relative value of the benefits derived from the pollution-producing activity and of the hazards to environmental quality that result from it. Thus, the environmental standard adopted for, let us say, sulfur dioxide, reflects a judgment (made by EPA, hopefully in response to general public desire) of the relative benefit to society of the electric power produced by the plants that emit sulfur dioxide and the relative social cost of the resultant disease and physical damage caused by this pollutant.

Against this background it is illuminating to compare such environmental standards with the standards adopted in industry for acceptable in-plant exposure to the same hazard. This is shown in Table 1. The contrast is striking: in every case the exposure allowable in the work place is some 10-100 times greater than that allowable in the general environment.

How should we interpret this disparity between acceptable environmental standards in the work place and in the outside air? It

might be argued, of course, that since the occupational standards are for an eight hour per day exposure and the common environmental standard (which govern the acceptable annual arithmetic mean level) is for continuous, 24 hour per day exposure, the latter should, logically, be lower. However this approach would only call for approximately a three-fold difference between the two standards rather than the actual ten to 100-fold differences. The reality of the discrepancies between the two types of standards is evident when the work place standards are compared with the environmental standards for intermittent exposure. Thus, while the work place standard for SO_2 permits daily eight-hour exposure to 5 ppm, the environmental standard is exceeded if the level rises above 0.5 ppm for three hours once a year. Similar discrepancies are evident for the other pollutants tabulated in Table 1.

It would appear, then, that in absolute terms the two sets of standards require that the worker accept an environmental insult which is not tolerated outside the work place.

The extra burden of pollutants imposed on the worker is usually justified by a biological argument--originally offered to support the difference between occupational and environmental standards for ionizing radiation. It is argued that since the general population, unlike the working population, includes significant numbers of children, pregnant women, the aged, and others who are especially vulnerable to the effects of a health hazard, they ought to be given the extra protection of the more strict

standard. However, the new evidence, cited earlier, that chemical pollutants may be carried home by the worker, where they can become a hazard to the more vulnerable members of his family argues against this view.

It should be noted, as well, that industrial standards of exposure to chemicals are usually based on estimates of their direct, immediate toxicity rather than on the possible long term effects, such as cancer, or birth defects. However, it is known that substances which have relatively low direct toxic-effects, may exert powerful long-term ones. Thus, certain phthalates which are relatively low indirect toxicity have drastic disruptive effects on embryonic development, because they act much more strongly on dividing cells (as in an embryo) than on non-dividing ones.* It was this disparity that led to the thalidomide tragedy. Again, because of the possibility of inadvertantly transporting an industrial hazard into the worker's home, it would appear that industrial standards should be strict enough not only to protect the worker against immediate toxicity, but also to protect the worker and the more vulnerable members of his family, against long term effects.

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*Thus when female rats are exposed to a concentration of a phthalate derivative which has no direct toxic effects on them, nevertheless 93% of the fetuses which they bear show skeletal abnormalities.

Given these considerations, it seems to me that despite their superficial conflict there are deep and powerful reasons for a community of interest between labor and environmentalists. From the evidence cited earlier it should be clear how much environmental concerns can benefit from close links with the problems of the work place simply because the workers occupational diseases often serve as a kind of early warning system of broader environmental problems to come. It is worth noting, too, that the solution of many environmental problems depends crucially on an intimate knowledge of the productive process which generates the problem. Such information, which is usually difficult to obtain from management, might be more readily obtained directly from the workers. I am reminded here of the fact that in certain chemical plants that have polluted surface waters with mercury the most relevant information might have come from the janitor who had been instructed to sweep waste mercury into a drain rather than recover it. Similarly, it was the chemical workers in a New Jersey plant who knew, recently, that the company had responded to an order to cease dumping an intensely colored pollutant into a nearby river by ordering the workers to add a bleach to the waste, so that it could be dumped unnoticed. And beyond these considerations is the simple fact that

the best way to make an industrial operation safe for both the work place and the environment is to design it in such a way that no pollutants are released.

The value to the worker of support from the environmental scientist is equally evident. From the PCB story it is clear, for example, that environmental concerns, by eliminating some of the more obviously thoughtless industrial use of PCBs (such as carbon paper) are, thereby, reducing the PCB hazard to workers in those industries. (A Japanese study shows that PCB adheres to the fingers of those handling "carbonless" carbon papers and that the contaminant does not readily wash off). Beyond such direct benefits is the indirect but, I believe, important impact of the growing appreciation of ecological principals on occupational health. Thus workers, aware of the ecological law that "everything has to go somewhere", are now asking management to account fully for the deliveries to the plant of hazardous substances, such as mercury. How much of what is delivered is not shipped out in the product, but is "lost"--to the work environment, to the outside environment, to the workers' bodies, or their homes?

Perhaps the most basic reason for the community of interest between the worker and the environmentalist is that both

the condition of the work place and the quality of the environment appear to be, in a fundamental sense, external to the market place economy. It is, after all, the hoped-for short-term gain that governs the design of most productive technologies, not their impact on the environment or the work place. Both environmental pollution and the hazards of the work place are economic "externalities". There is considerable reason to believe that in both the work place and the environment, efforts made to improve conditions are likely to become costs which are not reflected in increased production--and which therefore lower productivity.

As noted earlier, there is a tendency, in some quarters, to treat the environmental crisis as though it were an issue in which everybody wins--whether rich or poor, worker or entrepreneur. Do the data on the United States situation support this view? Is it in fact true that environmental improvement is a good so universal in its value that it can override vested interests that contend so bitterly over other issues--such as jobs? The answer, I am convinced, is no. There is usually no way to work out an even-handed distribution of the cost of environmental improvement; something has to give.

A small but cogent example is the Weyerhaeuser Company's pulp mill at Everett, Washington. Recently the company decided to

shut down the plant, following a survey which showed that adequate pollution controls would cost about $10,000,000. This would benefit both the company (since it appears to be financially advantageous) and the environment (since it would eliminate the plant's contribution to the pollution of Puget Sound). However several hundred workers would lose their jobs.

Suppose, instead, that the plant were improved at the $10,000,000 cost; now both the environment and the workers would benefit--but the company's financial position would be hurt. Such cases, which are rapidly arising as older plants are confronted by tightening pollution controls, demonstrate that environmental improvement is a zero-sum game. If the environment wins, someone loses.

This is a strong reminder that environmental degradation is not a free-floating phenomenon, but is firmly built into the operation of the economic system. It represents a debt to nature, a mortgage incurred by productive operations, which--now that it must be repaid--is going to cost someone something. A simple rule common to ecology and economics is at work here: "There is no such thing as a free lunch."

When we speak of environmental pollution as a "debt to nature" it is well to ask who benefits from the debt and who has to pay it. Consider, for example, how efforts to improve the environmental impact of the production of paper or electric power might affect jobs, wages and profits. It is now widely recognized that environmental degradation represents an unpaid cost of production. Now, in a country such as the United States, where production is governed by private enterprise, and produces private gain, the savings represented by unmet environmental costs benefit the producer, while the costs--in the form of a degraded environment and all its harmful effects--are directed elsewhere.

The most intense burden from industrial pollution is borne by the industrial worker--who is, after all, exposed to the pollutant before it escapes from the plant and is diluted as it spreads into the environment. Then, a less intense but more widespread burden of pollutants is borne by the population at large. Thus, uncontrolled environmental pollution

represents a savings for the producer and a cost directed against the worker and society at large. And let me suggest, as well, that the jobs which are lost when a plant is closed down on environmental grounds is also a cost borne by society.

In this connection we must also keep in mind that the new counter-ecological technologies which have displaced the older less-polluting ones are also more profitable than their competitors. Thus, the profit in making detergents is undeniably greater than that derived from the manufacture of soap; trucking is more profitable than railroads; and to quote Henry Ford II, "minicars make miniprofits." Here then, is another benefit--to the entrepreneur--from the social costs of environmental pollution.

Now, consider once more the example of the Everett pulp mill. Here, as we have seen, the cost of environmental degradation--or of the plant improvements needed to mitigate it--must be borne among the entrepreneur, the workers and the environment. If the cost is borne by either of the last two, it is in effect a burden on society; if it is borne by the entrepreneur it is met by a private individual or group. Inevitably, then, if the cost of environmental degradation is to be met it will involve a redistribution of the costs and benefits of production between the individual entrepreneur and society as a whole. This is, of course, a long-standing--and in a country such as the United States still unresolved--issue of social justice, as between the wages of the workers and the profits of

the entrepreneur, or indeed, as between the justice of permitting a private entrepreneur to gain, preferentially, from the use of resources--including the environment--which are, in fact, social property. Insofar as no effort is made specifically to meet the costs of environmental degradation--that is, so long as the producer is allowed to pollute the environment--then these conflicts are mitigated. Insofar as an effort is made to meet the costs--that is, if environmental degradation is avoided or controlled--then, these conflicts must be faced. There is, therefore, no escape from this basic issue of social justice--of determining how the wealth produced by society is distributed within that society.

When, as in the United States, an economic system operates in such a way as to concentrate a major part of its wealth in the hands of the relatively few, then any major effort to combat environmental degradation is very likely to widen the gap between the rich and the poor. Consider a simple example. In some United States cities, in the mistaken notion that automotive pollution is encompassed by visible exhaust emissions, "pollution control" laws have been passed which result in fines imposed on people who operate smoky cars. Naturally, it is not the owner of the new, well-maintained car who is fined, but the impoverished person who can barely afford to

operate a neglected, second-hand vehicle--which, in the absence of adequate mass transit is often the only way to get to work. Under these circumstances it is they--the poor--who pay most of that "debt to nature."

Or consider another example--the often proposed idea that the costs of environmental control or improvement can be met by "passing them along to the consumer." Suppose, as predicted, the cost of exhaust controls adds several hundred dollars to the price of a car. To the rich person who buys an expensive car, the added expense is easily borne; but to the poor person the added cost may make the difference between having a car or none. Similarly, if as anticipated, reduction in the use of agricultural chemicals increases the cost of producing food, again it will be the poor who would suffer most from the added burden.

Consider another example, the difference in access to air-conditioning among different economic classes. Recent United States census figures show that the poorest families (less than $3,000 income per year) operate 1/4 as much air-conditioning per household as the richest families (more than $15,000 income per year). Recall that air-conditioning inevitably adds heat to the environment (as does every use of energy, for whatever purpose). Thus we have a situation in which the wealthy residents of a city, while enjoying cool surroundings, add to the city's

temperature--making the environment that much worse for the poor people who cannot afford an air-conditioner. Again the poor are forced to pay an extra share of the environmental debt to nature.

The outcome of these considerations is this: where, as in the United States, there are sharp economic inequities--between entrepreneur and worker, and between the rich and the poor--any serious effort to combat environmental degradation is likely to intensify these inequities, to widen the gap between the rich and the poor. There appears to be no middle ground; if, as we must, we resolve to end the environmental crisis we will need to choose between two paths--one leading toward a more just distribution of the nations' resources and wealth, and the other further intensification of the present unequal and--in my view--unjust distribution of wealth.

These are some of the reasons why labor has a vital stake in the quality of the environment, and why environmental quality cannot be achieved without the help of labor. Workers know a great deal about pollution problems because they are, literally, so close to them; environmentalists are informed about the work place because it is the origin of so many environmental problems.

The need for a new alliance is clear. Neither worker nor environmentalist can reach their separate goals without joining in a common one; to reconstruct the nations' productive system so that it

conforms to the imperatives of the environment which supports it, meets the needs of the workers who operate it, and secures the future of the people who have built it.

* * *

Table I

POLLUTANT	ENVIRONMENTAL STANDARD (EPA)	OCCUPATIONAL STANDARD (OSHA)
SO_2	Annual Arithmetic Mean 0.03 ppm *Max. 24 hr. once/year 0.14 ppm *Max. 3 hr. once/year 0.5 ppm	5 ppm
CO	*Max. 8 hr. once/year 9 ppm *Max. 1 hr. once/year 35 ppm	50 ppm
NO_2	Annual Arithmetic Mean 0.5 ppm	5 ppm
Particulates	Annual Geometric Mean .075 mg/m^3 *Max. 24 hr. once/year .26 mg/m^3	respirable fraction: 5 mg/m^3 total dust: 15 mg/m^3
Lead	0.7 microgm. per m^3 (USSR)	10 microgm. per m^3 (USSR)

*Ambient air standards are given several values for short-term concentrations: i.e. "maximum n-hour concentration not to be exceeded more than once per year. . . " All in-plant exposures are presumably for an eight-hour day.

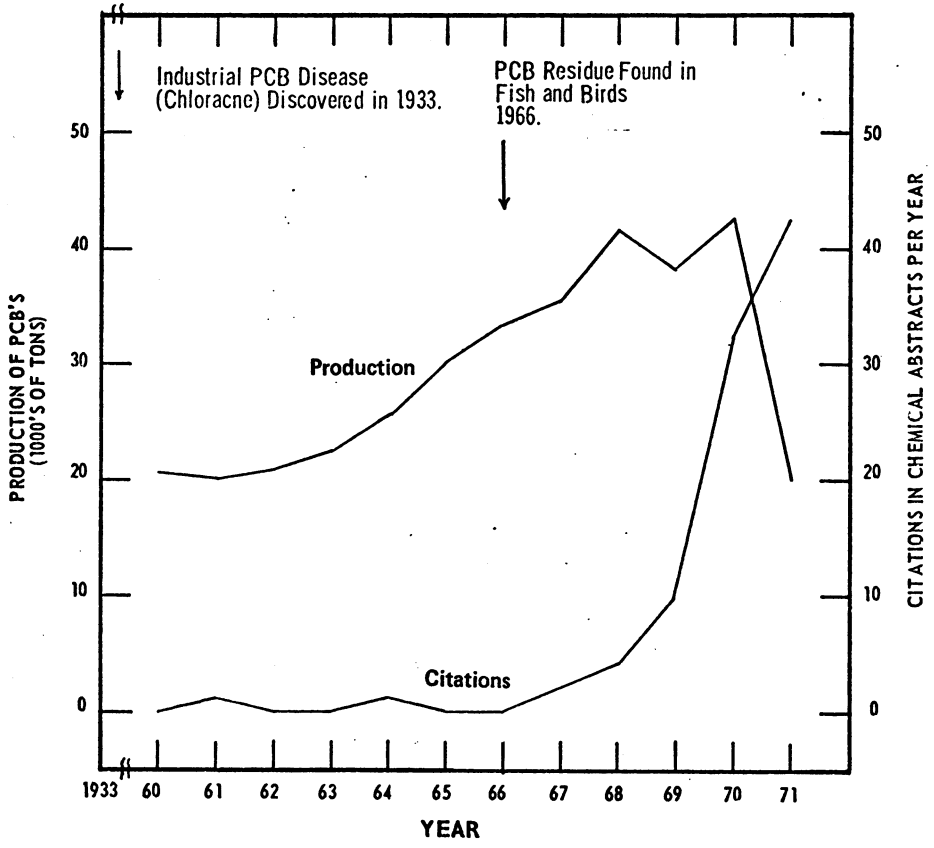

Industrial PCB Disease
(Chloracne) Discovered in 1933.
PCB Residue Found in
Fish and Birds
1966.
Production
Citations
PRODUCTION OF PCB'S
(1000'S OF TONS)
CITATIONS IN CHEMICAL ABSTRACTS PER YEAR
50
40
30
20
10
0
1933
60
61
62
63
64
65
66
67
68
69
70
71
YEAR

Figure 1

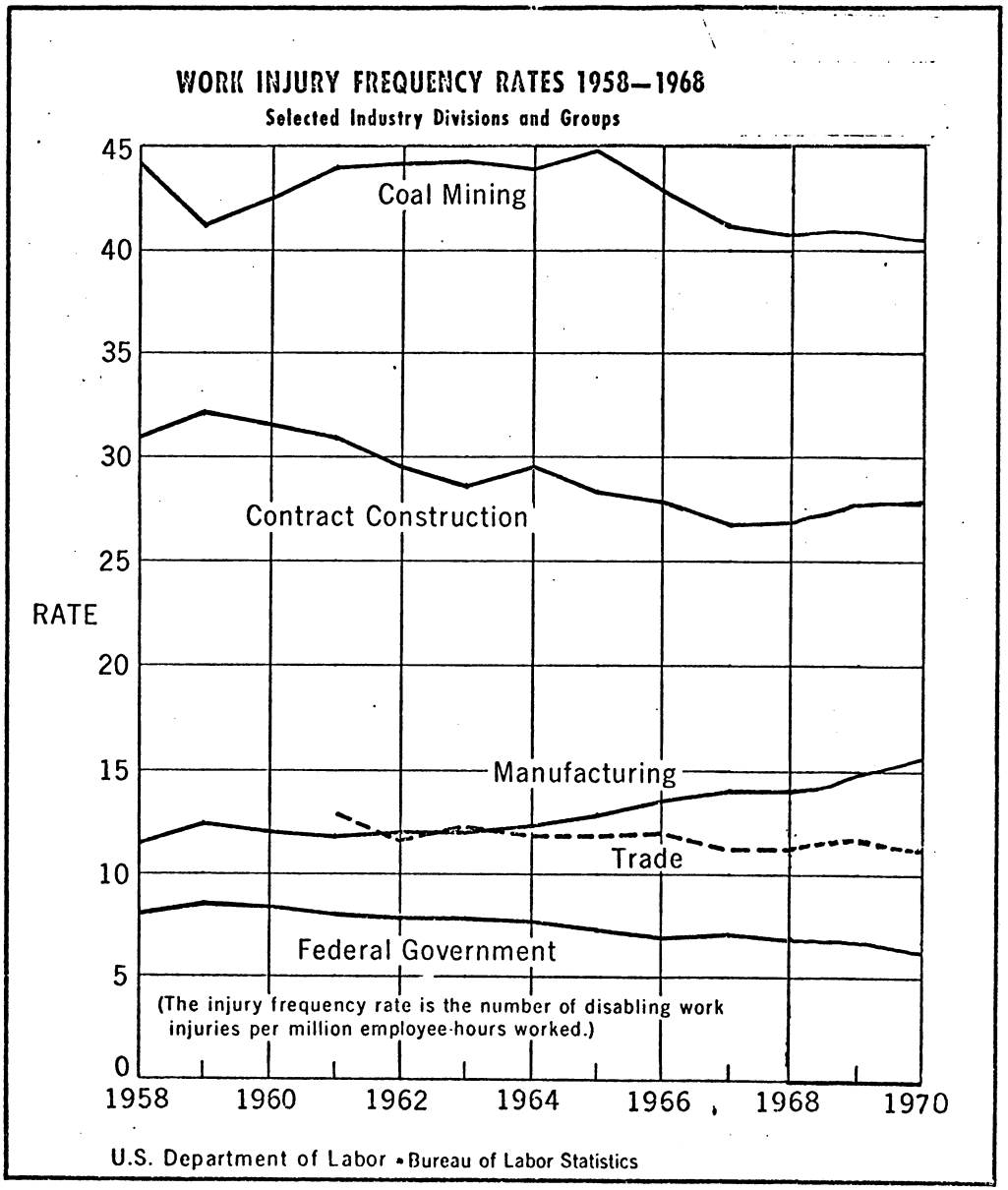
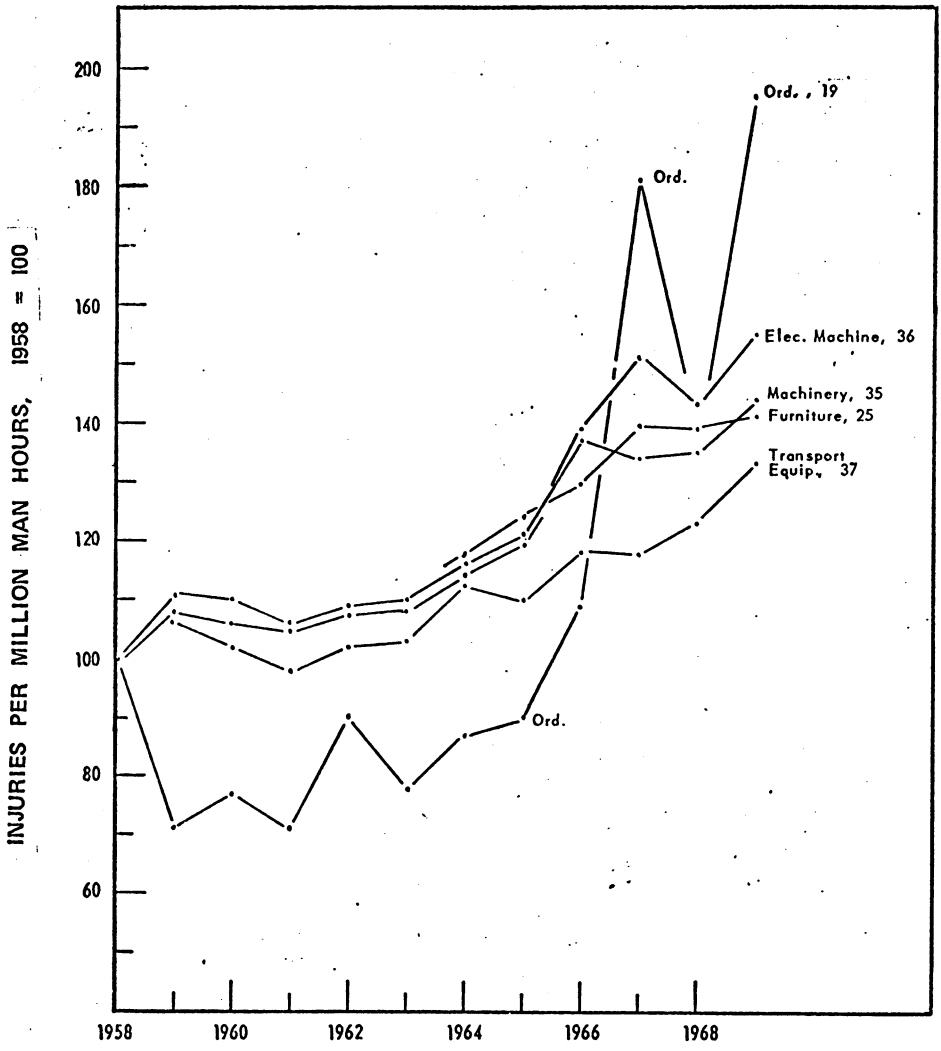
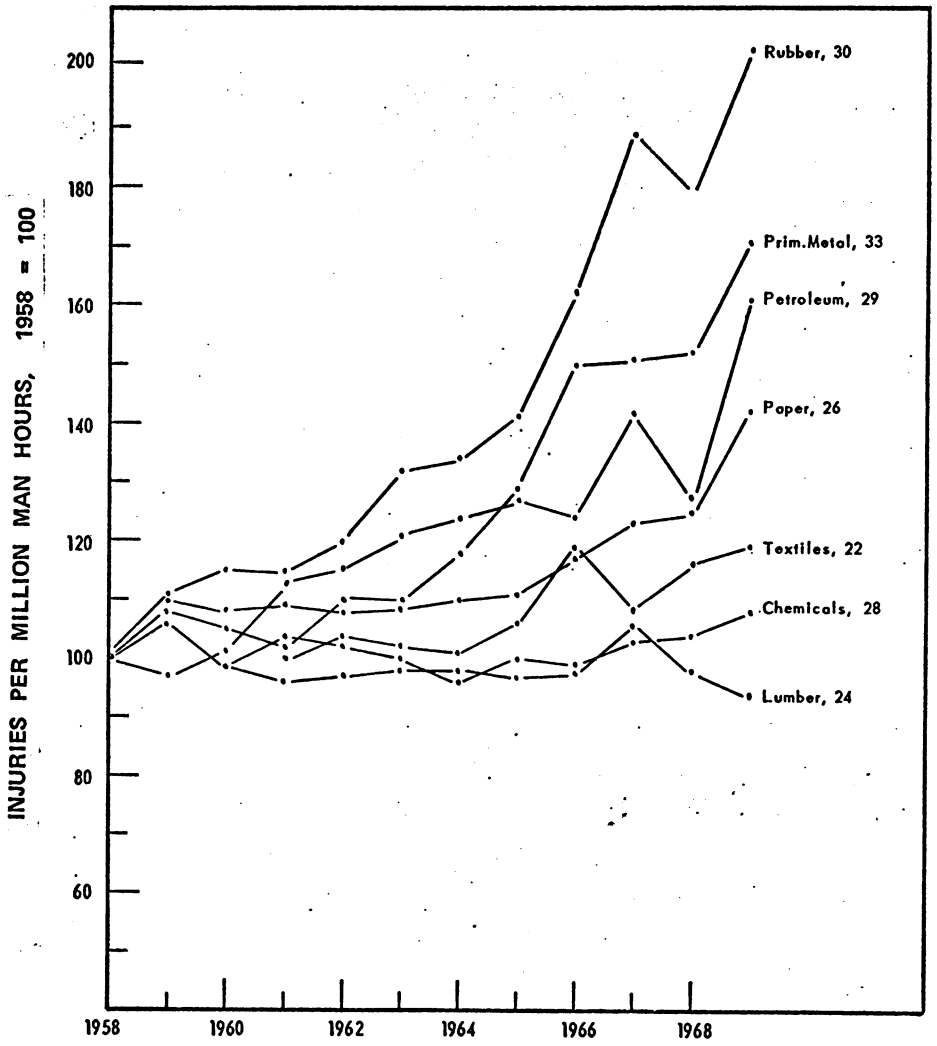

WORK INJURY FREQUENCY RATES 1958—1968
Selected Industry Divisions and Groups
45
40
35
30
25
20
15
10
5
0
RATE
Coal Mining
Contract Construction
Manufacturing
Trade
Federal Government
(The injury frequency rate is the number of disabling work injuries per million employee-hours worked.)
1958
1960
1962
1964
1966
1968
1970
U.S. Department of Labor • Bureau of Labor Statistics

Figure 2



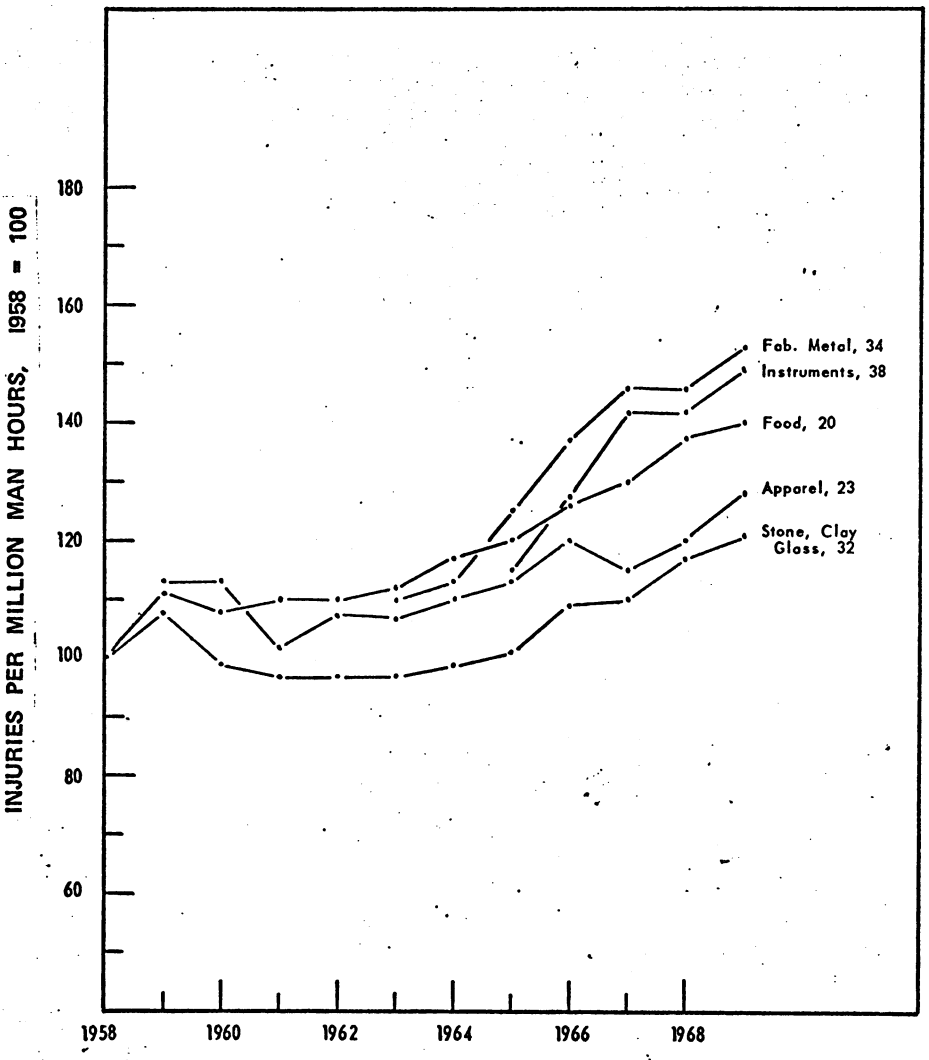
UNIT-PRODUCT INDUSTRIES; DAYS LOST DUE TO INJURIES PER MILLION HOURS WORKED. (1958=100)

Figure 3A



PROCESS INDUSTRIES; DAYS LOST DUE TO INJURIES PER MILLION HOURS WORKED. (1958 = 100)

Figure 3B



ASSORTED INDUSTRIES; DAYS LOST DUE TO INJURIES PER MILLION HOURS WORKED. (1958 = 100)

Figure 3C

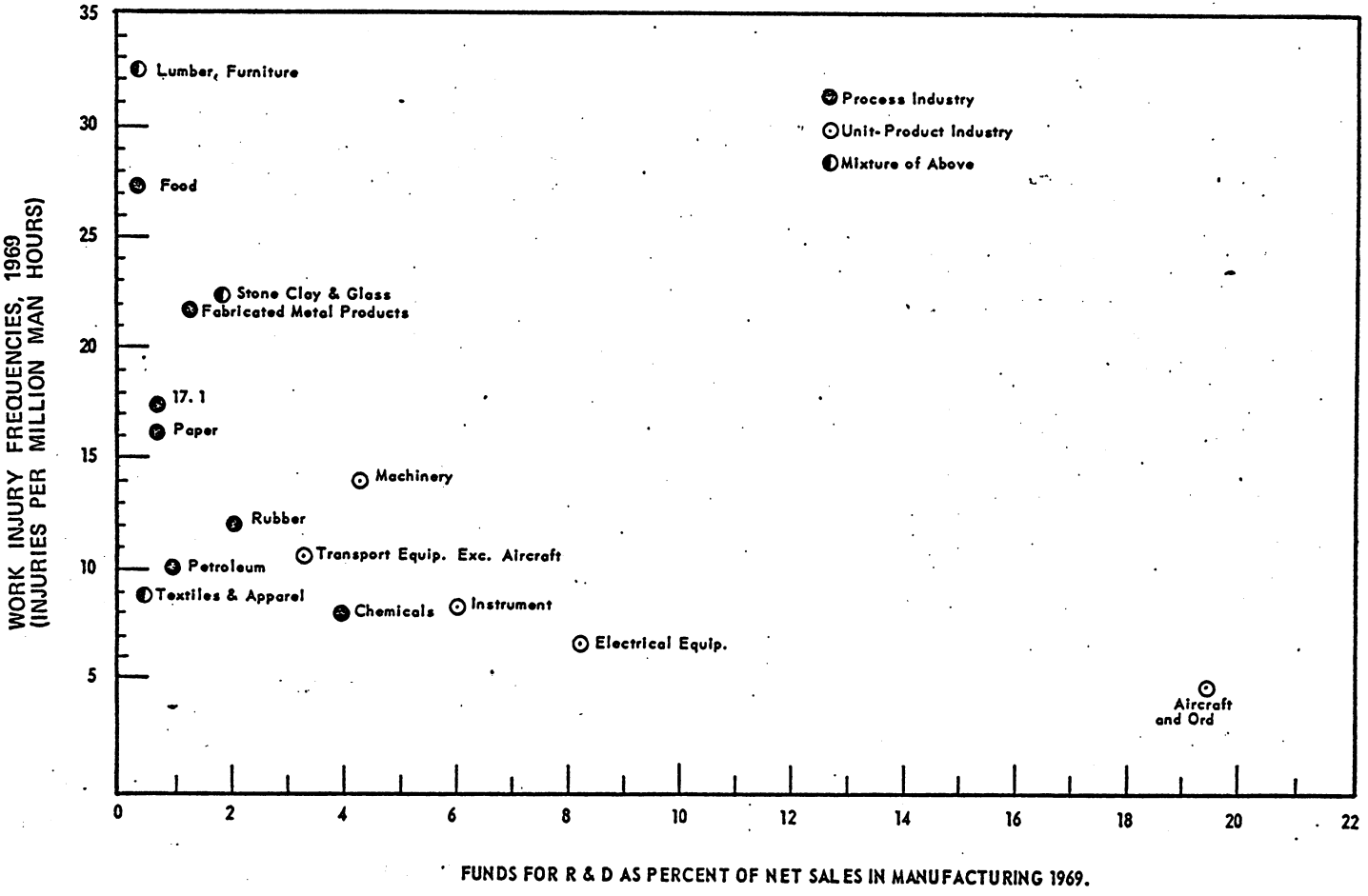

WORK INJURY FREQUENCIES, 1969
(INJURIES PER MILLION MAN HOURS)
35
30
25
20
15
10
5
0
2
4
6
8
10
12
14
16
18
20
22
Lumber, Furniture
Food
Stone Clay & Glass
Fabricated Metal Products
17.1
Paper
Machinery
Rubber
Transport Equip. Exc. Aircraft
Petroleum
Textiles & Apparel
Chemicals
Instrument
Electrical Equip.
Aircraft and Ord
Process Industry
Unit-Product Industry
Mixture of Above
FUNDS FOR R & D AS PERCENT OF NET SALES IN MANUFACTURING 1969.

Figure 4

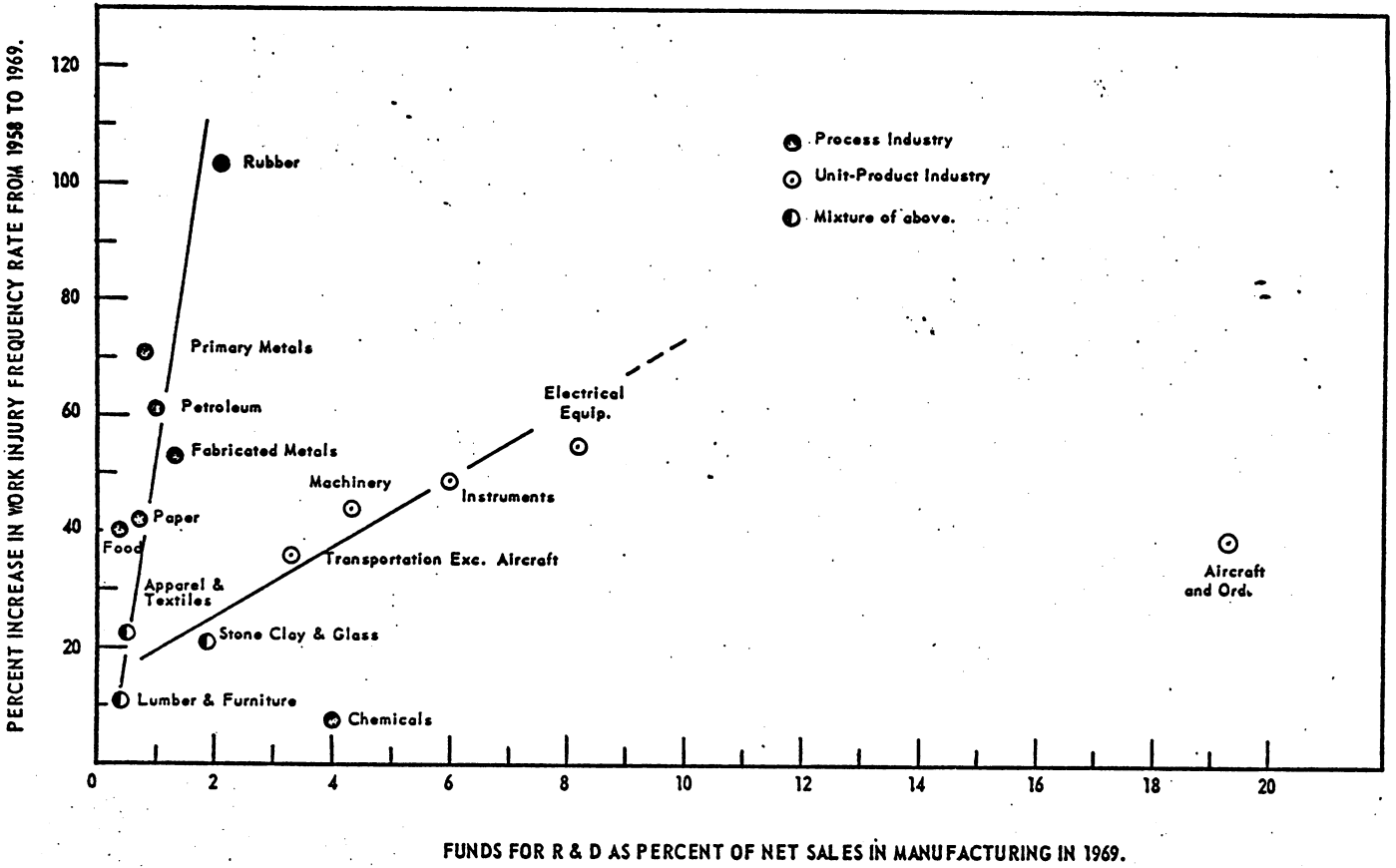

PERCENT INCREASE IN WORK INJURY FREQUENCY RATE FROM 1958 TO 1969.
120
100
80
60
40
20
0
2
4
6
8
10
12
14
16
18
20
Process Industry
Unit-Product Industry
Mixture of above.
Rubber
Primary Metals
Petroleum
Fabricated Metals
Paper
Food
Apparel & Textiles
Lumber & Furniture
Stone Clay & Glass
Chemicals
Machinery
Transportation Exc. Aircraft
Electrical Equip.
Instruments
Aircraft and Ord.
FUNDS FOR R & D AS PERCENT OF NET SALES IN MANUFACTURING IN 1969.

Figure 5

LABOR AND THE ECONOMIC IMPACT OF ENVIRONMENTAL CONTROL REQUIREMENTS*

by

Leonard Woodcock**

It is comforting, in a way, to be here on the San Andreas fault to discuss the insecurities of workers as they may affect environmental action. Here in San Francisco it is difficult to forget that we are on the fault line; and when people know what may hit them, at least they have a choice between daydreaming and various forms of constructive action.

In Washington, on the other hand, it appears that in the next term, as in the term now ending, Mr. Nixon, who ironically has acquired some reputation as a realist, will continue to lean heavily on a strategy of daydreaming, as opposed to what he contemptuously calls "throwing money at problems," meaning such massive problems as saving our urban areas, creating new cities that will not repeat the faults of the old, providing decent housing, quality education and comprehensive health care for all our citizens, and shoring up the battered, plundered and rapidly deteriorating environment we all depend on for survival.

Clearly, such massive and intractable problems do not vanish merely through the expenditure of public or private revenue to solve them; yet just as surely they do not disappear if ignored or treated with the placebos of sermons on the virtue of self-discipline and the work ethic, in the absence of adequate programs and the funds for their implementation.

Such daydreaming, particularly in the face of environmental dangers, cannot be recommended, for from the environmental standpoint we are all living along a fault line; or, as in the lines of Matthew Arnold:

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* Address presented to the Conference on Jobs and the Environment--Whose Jobs? Whose Environment? -- Sponsored by the Institute of Industrial Relations, University of California, Berkeley, San Francisco, California, November 28, 1972.

** President, International Union, United Automobile, Aerospace and Agricultural Implement Workers of America, UAW

"Wandering between two worlds, one dead,
The other powerless to be born."

Yet we have had no convincing evidence that the Administration views our environmental predicament as constituting a crisis that must be met through a drastic re-ordering of national -- indeed global -- practices and priorities.

Given that lack of understanding, we can look forward to the mixture as before: a virtuoso verbal performance by the President in behalf of a better environment, while in the legislative crunch the White House staff will twist arms in behalf of the weaker bill, with the presidential veto and impounding of appropriated funds the predictable defense-in-depth against vigorous environmental action in the Congress.

The recent record with regard to clean water legislation is illustrative of the ambivalence toward environmental degradation. In his 1972 State of the Union message, the President said: "The forces which threaten our environment will not wait while we procrastinate." In January of 1970 he declared:

> "The 1970's absolutely must be the years when America pays its debt to the past by reclaiming the purity of its air, its waters, and our living environment. It is literally now or never."

But when last month the Congress presented the Federal Water Pollution Control Act of 1972 to the President, he vetoed it on the grounds of cost, despite a 33-page letter to the Office of Management from William Ruckelshaus, the President's administrator of the Environmental Protection Agency, urging presidential approval. In his letter, Mr. Ruckelshaus reminded the President that almost all of the money represented a Federal commitment, endorsed by Mr. Nixon himself. In his 1970 State of the Union message, the President pledged to:

> "put modern municipal waste treatment plants in every place in America where they are needed to make our waters clean again, and to do it now."

And in his 1971 environmental message Mr. Nixon said:

> "We must also assure that adequate Federal funds are available to reimburse states that advanced the Federal share of project costs."

Mr. Ruckelshaus acknowledged the magnitude of the authorizations, but stated:

> "It seems reasonable to me to spend less than 1 percent of the Federal budget and two-tenths of 1 percent of the gross national product over the next several years to assure future generations the very survival of the gross national product."

Congress was of the same mind as Mr. Ruckelshaus and overrode the veto.

The clean water act itself carries the scars of what environmentalists called "an atmosphere complicated by consistent Nixon Administration opposition." During almost two years of Congressional consideration of the legislation, and despite Mr. Nixon's brave commitments, the White House had loyally supported industry in its opposition to key provisions such as limits on effluents set for classes of industry and the goal of zero industrial discharge of pollutants by 1985. And it is true that under the pressure of that opposition the bill came out of conference and went to the President with weakened provisions for compliance, Federal enforcement and citizen participation.

Nevertheless, under the circumstances, the 1972 Water Pollution Control Act remains a considerable accomplishment, largely because it breaks with the past Congressional practice of authorizing large amounts to control water pollution, thus encouraging communities to go ahead with their projects, and then have Congress fail to appropriate the funds to pay the Federal government's share. In the 1972 measure, Congress established the amount to be appropriated. Thus the President may delay but not ultimately prevent the spending of the money, and local officials, with that assurance, can now get new treatment plants under way.

In another respect, the clean water act has significance for workers and their unions, apart from the general employment aspects. The legislation requires the administrator to conduct a continuing investigation of potential employment losses or plant closures resulting from effluent limitations. Citizen suits are authorized against the Federal government, its agencies and the EPA administrator; and there is a prohibition against the firing of or discrimination against employes who file proceedings or testify under provisions of the act, including procedures for review by the Secretary of Labor.

Those provisions can protect workers from the employer tactic that has become known as environmental blackmail: the effort to create fear of job loss among workers and their communities if anti-pollution standards are imposed, as a means of evading, diluting or delaying the new controls.

Another measure, the Public Works and Economic Development Act of 1972, vetoed by President Nixon, also contained provisions designed to smoke out the environmental blackmailers. The Environmental Protection Agency on its own, or on the request of an affected employe would have investigated any real or alleged job losses due to enforcement of Federal environmental laws. If any facility was allegedly about to close due to environmental controls, a full disclosure of the facts and economic circumstances would be required. Unemployment occurring from Federal requirements would be certified by the Secretary of Labor, and workers so certified would be eligible for unemployment compensation payments equal to 60 percent of the former weekly wage until they had new employment or had retired. Assistance would be given to workers for retraining, to protect them against mortgage foreclosure or lease termination, and to defray some expenses involved in moving to a new job if employment could not be found near home.

In the case of actual plant closings or curtailed operations as a result of environmental regulations, the legislation would have provided low-interest loans

to business upon an explicit showing that the funds to keep the plant or operation going were not available.

These forms of protection against environmental blackmail, included in the clean water bill passed over presidential veto and in the accelerated public works bill that succumbed to presidential veto, had their origins in an industry-government-labor confrontation about two years ago, when a multinational corporation, Union Carbide, attempted to dodge its social responsibilities to its workers and the community by intimidating workers, community and government alike.

The classic maneuver was dramatized nationally in January 1971 as a result of exchanges between EPA Administrator Ruckelshaus and the Union Carbide Corporation, whose Marietta, Ohio, facility for years had assaulted workers and communities of the Ohio valley with a constant rain of sulfur oxides and particulates. For years the corporation had resisted both Federal and local pleas to reduce the volume of pollution. When Mr. Ruckelshaus in January 1971 finally ordered Union Carbide to comply with clean-up deadlines first made known in the spring of 1970, the company, instead of complying, responded with the declaration that it could meet the requirements only by laying off hundreds of workers.

Ralph Nader urged Senator Muskie to hold Senate hearings on the implications of Union Carbide's defiance of Federal requirements and its war of nerves against over 600 of its employes, and to consider legislation to protect workers from shutdowns and threats of shutdown due to environmental regulations.

Hearings were held by Senator Muskie's Subcommittee on Air and Water Pollution in May and June of 1971. Union Carbide in the meantime had softened its position, indicating that the air pollution standards could be met at the Marietta, Ohio, plant without more disruption than a possible temporary suspension of part of the operation. But when the UAW testified in June 1971,

the national air was still contaminated with the soc'al and economic fallout of the Nixon slump, including actual shutdowns and threats of shutdown in which environmental factors were prominent. A strip-mining bill, for example, had just been defeated in West Virginia with the help of the West Virginia Surface Mine Association, which claimed that 6,700 men would lose their jobs if the bill passed. One worker told Secretary of State John D. Rockefeller IV, a supporter of the bill, "You've never had to look for a job."

The UAW proposed that such economic intimidation be discouraged through legislation which would give workers, individually or as a class, the right to sue their employers in Federal and state courts for damage in situations where workers have lost wages, fringe benefits or seniority rights because of plant shutdowns or layoffs resulting from pollution of the environment by their employers. And where the employer is a corporation, officers and members of the board of directors would be liable as well as the corporate entity.

The protection we proposed for workers adversely affected by pollution-related plant shutdowns closely followed the Amtrak provisions for displaced railroad workers. Affected workers would be indemnified in full for lost wages, would receive payments needed to maintain fringe benefits, and be compensated for loss of seniority rights and all of the costs of retraining and relocation, including job prospecting and losses incurred in selling a house or cancellation of a lease. Compensation for lost wages and the maintenance of fringe benefits would continue for a period equal to the length of the worker's service with the employer. Public and private benefits paid to the affected worker because of his unemployment would be offset against the employer's liability. Compensation for lost wages and maintenance of fringe benefits would be determined not only by the worker's previous entitlement but also by the gains in wages and benefits he would have continued to receive if not for his separation, layoff or downgrading.

The courts would find in favor of workers in all cases of plant shutdowns, layoffs and downgrading resulting from compliance with a government order to

cease or suspend any operation or part of an operation because of environmental pollution.

If an employer shut down a plant or operation while in violation of government pollution requirements or under a government order to correct conditions causing pollution, there would be a rebuttable presumption that the shutdown was attributable to employer-caused pollution. The employer, however, could obtain dismissal of a suit brought by or for his workers if he could show that the shutdown was not related to environmental factors.

The Secretary of Labor would be empowered to bring suit when requested to do so by an affected individual or group of individuals, and would be required to sue when workers suffering as a result of employment loss stemming from compliance with pollution requirements requested his assistance. The Secretary's assistance would be available to all workers who appear to have a substantial cause for action; and when he became a party to any case he would be required immediately to borrow from the Treasury in order to make prompt payment to or, in the case of fringe benefits, in behalf of workers. The Treasury would be reimbursed out of employer payments after judgment is rendered.

This proposal for prompt restitution goes to the proposition that justice delayed is justice denied. The preventive purposes of the legislation would be frustrated if its provisions did not assure prompt judgment on the polluting employer. Some monies going to advance payments might not be recoverable when suits are lost. But the risk would be small, because it would be far less costly to employers to eliminate or abate pollution than to pay damages. Few suits, therefore, would be brought.

We also supported amendment of the Public Works and Economic Development Act which would provide assistance to any area suffering from severe economic loss as the result of the closing, curtailment or removal of Federal installations or private facilities which are major sources of employment.

The assistance would take the form of grants, loans and provision for the training and retraining of workers when funds for such purposes are not already available under other Federal programs. In making such areas economically viable, the whole community would be protected from the erosion of jobs, families and capital.

Such regional development programs, however, are at best remedial, not preventive. They attempt to pick up the pieces and to restore vitalities, in the wake of dislocations and migrations in an economy in which government fails to plan as effectively in the public interest as private corporations plan in their own selfish interest. And increasingly in recent years, government, when it does plan, plans in collusion with industry, frequently through backstair White House deals which turn on the special interests of business rather than on the general interest of the nation. Reporter Jack Anderson recently (Detroit Free Press, Nov. 15, 1972) published excerpts from a Justice Department memorandum detailing an "environmental blackmail" drama played out in the White House and involving the President himself. In 1971, according to Anderson, the Armco Steel Company was ordered by a Federal judge to stop dumping toxic wastes into the Houston ship canal. The president of the company, with the remarkably appropriate name of Verity, appealed to the White House, and, two days later, Peter M. Flanigan, who figured prominently in the ITT deal, was in touch with Assistant Attorney General Shiro Kashiwa, who, like one of the principals in the ITT case, was subsequently appointed to a seat on the Court of Claims. Kashiwa in turn directed a section chief, Martin Green, to work out settlement terms with the White House. When Green called the White House, he was told by two White House aides that Mr. Verity had told them that he would have to close down the plant in light of the judge's decision, and that, according to Green's memo, "...the President does not want plants closed down and more unemployment created. I said that we did not want to close the plant down either, and that we

had heard, in fact, that the plant would be able to operate without firing anybody. I... said that with Armco, as with our other defendants in Refuse Act cases, we had tried to negotiate a phased schedule of pollution abatement," but, the memo goes on, Armco had chosen not to negotiate because it thought it would win the case in court. After further consultation between Armco President Verity and Peter Flanigan, it was decided that a 60-day stay, during which Armco would "attempt to secure" - no doubt through the classic threats spreading the pollution of joblessness throughout the community - would attempt to secure from the appropriate local agency a permit to construct an incineration system and make necessary discharges into the air. The upshot was that the Justice Department negotiated a more favorable settlement for Armco.

How much more efficient and wholesome, from a democratic and environmental view, if an open hearing procedure had been in place before which Mr. Verity would be required to disclose the veritable and verifiable facts as to his company's ability to conform to environmental law without throwing people out of work.

This country is on the eve of another brutal and selfish assault on the environment of land and ocean, in a search for more sources of energy, in the absence of any democratic national planning within whose framework we as a nation could openly determine our priority needs, how we shall meet those needs with due consideration of effects on the natural and human environment.

Instead that vital search is being planned in the recesses of the White House and the President's coordinator of energy policy planning is none other than the same Peter M. Flanigan.

The National Journal (10/21/72) reported that the energy package being prepared would put the emphasis on stepping up domestic production of oil and natural gas as soon as possible and that:

> "To gain this higher output, Administration officials appear willing to accept higher consumer costs, additional environmental hazards and post-election political flak."

Mr. Flanigan, it appears, is proceeding as an investment executive, not as an environmentalist. Asked if he regarded the energy areas as a good investment, he reportedly replied:

> "Sure - you're doggone right. I would think that any area in which there is substantial demand would be a good investment."

An inter-agency study has estimated that the nation could cut down on the growth of energy demand by a significant amount, and that with respect to oil alone conservation measures could go a long way toward averting an energy crisis.

However, Mr. Nixon's energy coordinator, according to National Journal, showed little interest in the energy study and stated, "We're not going to ask everybody to heat their homes at 68 degrees."

One of the greatest obstacles to democratic planning that will make ecological sense is the large, socially indifferent and intransigent corporation. And if that obstacle is to be overcome, we must insist on what might be called the Amtrak principle: the widely accepted but rarely practiced principle that the burdens and sacrifices required by an action taken in the service of the interests of the whole society should be shared equitably by all who benefit from that action and not allowed to fall disproportionately on some, who are made victims of the action.

The corporate giants are rapacious in their demands on the government for tax advantages, which are termed "incentives" by the President - and they get them as a matter of course. Yet their pipeline to the U. S. Treasury has not sated them. A steel industry committee, for example, has recently asked

for preferential tax treatment for the cost of pollution-control facilities and a $3 billion kitty for low-interest loans to finance such investment. The committee wanted the government to allow 100 percent, first-year deductions for what it called "non-productive pollution control facilities."

Yet industry generally has lobbied fiercely against an effective national occupational health and safety law, long after the ineffectiveness of employer-dominated state laws was common knowledge. And despite the death-dealing and health-blasting impact of the new technologies, the Nixon Administration, by administrative fiat in defiance of the plain intent of Congress in enacting the Occupational Safety and Health Act, is beating a retreat from Federal standards, back to the discredited weaker standards and lax enforcement of state programs; a boon for employers, who will save money on health and safety, but a rising toll of death, disease and crippling injury for the workers the new national law was supposed to serve.

It is a regrettable fact that a number of other industrialized countries are ahead of the United States in public measures to assure that the social responsibilities of corporations with respect to workers and communities will be taken into account when decisions are made in such matters as plant location, and the termination or transfer of operations. In Britain, Germany, France, Scandinavia and elsewhere, public policy establishes codes of corporate behavior to insure that social and economic resources are used to the best advantage of the nation as a whole. Legislation requires companies to submit plans for government approval, with government permission granted or withheld depending upon the impact of a managerial decision on the public welfare and the economic conditions of the community and the nation.

In the United States, the direct opposite happens to a considerable degree. Workers and their communities in this country are all too frequently in the position of assuring the well-being of the corporation, which receives subsidies

in the form of tax favors, lenient laws with respect to unemployment and workmen's compensation, the right to pollute air and water, and a work force prepared by bitter experience to be philosophical about work pace and job hazards, all because the company might pick up and light out for a more permissive business climate, leaving both workers and communities stranded.

The present Administration, as no Californian should need to be told, terribly botched the transition from a war to a peace economy through failure to assure an orderly, planned conversion to peacetime production and employment. As a result, the engineered slump assumed calamitous proportions in defense-oriented areas. But throughout the country, as a consequence of that recession, technological change, corporate power plays and competitive pressures, working people and their communities have been going through the wringer of plant shutdowns, discontinuation of production lines, and unilateral management decisions to transfer operations with little or no regard for worker, family or community.

Trade unions, of course, can act through collective bargaining to protect legitimate interests of organized workers in such circumstances. The UAW will continue to require that managements negotiate fair standards clauses protecting economic and working conditions of members, and to provide economic benefits to assist workers adversely affected by plant shutdowns or the transfer of operations.

Collective bargaining, however, has a limited reach, with respect both to the range of problems it can resolve and the number of workers it can directly assist. National legislation, therefore, is also required to provide pension reinsurance, severance pay, moving allowance, allowance for loss on homes due to transfer, full income and fringe benefit maintenance and other forms of economic protection for the worker and his family against the hazards of job loss caused by private managerial decisions that entail public consequences.

If we cannot create a consensus with respect to such fairly plain and modest matters, how can we generate the political leverage to effect the drastic

institutional change that is needed now and will become increasingly more urgent as the environmental crunch, only now beginning to develop, really bears down upon us?

One big hope lies, of course, in the capability of those members of the scientific-educational estate who are not indentured to the corporate status quo of 1972 to help generate a new ecological awareness.

A still greater hope, it would seem, lies in a new political awareness, essential if we are to make the transition from a frontier "cowboy" psychology and economy to a sense of the world compatible with indefinite human survival on spaceship earth. That new political awareness would direct the attention of environmentalists to the need to give the quality and equity of life in human communities at least equal billing with the need to protect the quality and integrity of the natural environment. For if the transition from a polluted to an ecologically viable environment is attempted at the cost of democracy and brotherhood, our grandchildren will never make it. It is difficult to believe that a society that loses its sense of human solidarity, or never gains it, can make the radical adjustments in time to enable human life to survive on the planet.

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