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Although both decisions broaden the rules for patenting inventions based on the use of computers, the computer software industry is unlikely to rush to claim patent protection for its wares. Although industry spokesmen have long maintained that patent protection is essential to encourage innovation in programming, software companies have been doing very nicely without such protection. Software sales in the United States now amount to about $2 billion a year, and some analysts have forecast that they will reach $8 billion by 1985.

In the absence of patent protection, companies have relied primarily on trade secrecy to guard against unauthorized use of their products. Bruce Coleman, vice president of Informatics, a California-based software firm, says he expects that reliance to continue, because "trade secrecy is the most effective mechanism we have to protect software." In theory, some programs are already eligible for copyright protection, but Coleman notes that applications for both copyright and patents require disclosure of information. This, he argues, would foreclose the use of trade secrecy, and companies would be unwilling to file a claim unless they were reasonably certain it would be granted.

Given the confusion concerning the patentability of computer-related inventions, it would be difficult to predict the outcome of most patent claims based on computer software. Justice Stevens suggests that the only way to clear up the confusion would be "an unequivocal holding that no program-related invention is patentable . . . unless it makes a contribution to the art that is not dependent entirely on the use of a computer." But the Court last week averred the opposite.

Eventually, some suggest, Congress will have to step in to clear up the confusion by bringing the patent laws into the electronic age.

—COLIN NORMAN

The Fight Over Clean Air Begins

The outcome of a clash in Congress will affect autos, synfuels, utilities, and the steel industry, to list just a few

Congress has begun to consider major changes to the national Clean Air Act, launching what promises to be the most significant environmental struggle of the year. On the table are amendments that will affect virtually every industrial decision in the nation involving production, expansion, and relocation.

Business and environmental groups each have long agendas for the discussion, to be taken up initially by the full Senate Committee on Environment and Public Works, chaired by Robert Stafford (R–Vt.), and the House subcommittee on health and the environment, chaired by Henry Waxman (D–Calif.). Stafford says he expects the act's reauthorization to require at least 5 months, although as long as 2 years might be necessary "if interest groups seek to change the fundamental character of the law."

Stafford believes the law requires "only refinement and fine tuning," a view apparently shared by other congressmen who will figure prominently in the debate. Representative John Dingell (D–Mich.) and Senator John Chafee (R–R.I.), for example, both say they favor changes that will reduce the act's complexity, while preserving its overall goals. But the clash of regional interests, heightened by increasing concern about industrial performance and energy production, could result in some extreme proposals. Waxman has already warned of "some proposals which in the name of 'fine tuning' would actually gut the Clean Air Act. These must be resisted."

While no business group has openly avowed such a goal, there is no doubt that most would like to see many of the provisions in the act loosened and some of them eliminated entirely. Groups such as the Business Roundtable (of the top 100 corporations), the Chemical Manufacturers Association, the National Coal Association, the Edison Electric Institute, the Motor Vehicle Manufacturers Association, and dozens of other trade groups have been mobilizing for some time.

These groups claim that the act stifles industrial growth, constrains productivity, and bars the development of new energy sources by banning either new construction in polluted areas or expansion in areas that already have clean air. A group of construction unions and oil and chemical firms has hired John Quarles, a former deputy administrator at the Environmental Protection Agency (EPA), to coordinate their lobbying effort. Quarles' agenda for reform includes the elimination of strict rules against air quality deterioration in areas considerably cleaner than the national goal, more flexible deadlines for attainment of the air quality goals, and the loosening of rules against new construction in areas where the goals have not been met.

On the other side of the issue, environmentalists have been organizing with equal vigor. Five national groups have combined to defend the act under the rubric of the Clean Air Coalition. One of the groups, the Natural Resources Defense Council (NRDC), has recently hired David Hawkins, who was EPA administrator for clean air during the Carter Administration, to do some of its lobbying. Hawkins' agenda includes the preservation of most of the existing clean air requirements, the streamlining of EPA review for new construction permits, and the enactment of stricter controls on hazardous pollutants and chemical precursors of acid rain.

Congressional sources say that debate will ultimately center on the recommendations of the Reagan Administration, which are expected in late spring. The Administration has already drawn fire from environmentalists by proposing to limit a requirement that firms in highly polluted areas install expensive pollution control equipment. The change, announced on 9 March, is intended primarily to benefit the automotive and petroleum industries. Because the change involves only a reinterpretation of existing EPA rules, it is not subject to congressional approval.

Until more of the Administration's proposals are known, the major topic of discussion will be the recent report of the National Commission on Air Quality, which was established by Congress when it last revised the act in 1977. The commission, composed of four congress-

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men and nine others representing a broad spectrum of views, calls its recommendations a compromise between the environmental and industrial extremes.

The commission's thick report, released on 2 March, states that the act has been responsible for a significant reduction in the overall level of air pollution, noting in particular reduced concentrations of carbon monoxide, sulfur dioxide, and suspended particulates—pollutants that can cause or aggravate a variety of respiratory diseases. The act sets air quality goals for these and four other pollutants (ozone, hydrocarbons, lead, and oxides of nitrogen) and requires the states to develop and implement a plan for meeting the goals by 1982, or in the case of ozone and carbon monoxide, by 1987. Under the current law if a state fails to meet the deadlines, all new construction in the area of noncompliance can be barred, and certain federal funds withheld.

The commission says that while most regions appear to be on track in meeting the deadline, eight cities will miss the 1987 mark. Ozone in Los Angeles, for example, is "intractable and no reasonable level of effort is likely to result in attainment," the commission report says. To avoid unjustly penalizing these areas as well as any others that cannot comply in time, the commission recommends eliminating the deadlines and potential sanctions, which, in any event, had little effect in prodding the states to work harder. The commission suggests only that new companies in these areas should be obligated to install pollution control devices roughly comparable to the best available anywhere, a standard to be revised at 3-year intervals. Eventually, as the technology improves, the aggregate pollution within the areas will reach the national goal.

Three of the commission members disagreed with this conclusion. One of them is Richard Ayres, an attorney with NRDC, who says that "without deadlines, the determination of what controls are reasonably available would slip inevitably toward justifying status quo controls, legitimizing a failure to do more, and achieving no progress toward healthful air. . . . Without a [deadline], there will be nothing concrete to limit the weight given the industries' concerns in determining what is reasonable." Industry claims, on the other hand, that elimination of the deadlines and penalties is the only way to avoid stifling economic growth in regions that simply require more time to improve the air quality.

Another disputed commission recommendation is that Congress should eliminate some of the regulations covering air quality in regions that already meet the national goals. The act now says that, in the vicinity of national parks and wilderness areas where the air is relatively pristine, pollution can increase by only a small percent. In other areas where the air is not pristine but still relatively clean, pollution levels can increase as much as 35 percent (as long as the total pollution is still less than the overall goal). New industries in these areas must install pollution controls roughly comparable to the best available anywhere. In addition, the firms must prove, by monitoring the air for at least a year at a cost of as much as $1 million, that their

Clean Air at OMB . . .

Under a general program of regulatory reform announced in February, the Office of Management and Budget (OMB) is to have general oversight of environmental regulation in the Reagan Administration. That places OMB director David Stockman in a good position to influence any proposals to amend the Clean Air Act. Stockman, a former member of Congress, served on the National Commission on Air Quality from 1978 to 1980.

Stockman's views of the act, and of the commission, are generally scathing. In a speech to the National Association of Manufacturers in April 1980 he said: "As many of you know, the National Commission [on Air Quality] consists largely of a choir of the faithful committed to issuing melodious harmonies to the tenets of orthodoxy regarding the Clean Air Act, and I'm somewhat of a self-avowed heretic in that regard so its difficult for me to talk about it. . . .

"As I got into it and began to note anomalies . . . I came to the conclusion that the Clean Air Act, like the Ptolemaic model of the solar system that began to develop more and more elaborations and exceptions and complications as the basic model proved to be wrong . . . has become increasingly unplugged from reality and that we are probably at a point today where the whole thing has gone off the deep end in terms of sheer bureaucratic fiction and in terms of what I would call institutionalized obscurantism. . . .

"In my view almost every one of those ambient standards are far too stringent relative to what both economic and public policy and the medical evidence would suggest. Clearly we know that in the case of ozone. There simply isn't any credible evidence to put the standard at 12 parts per billion. It could be substantially higher than that, but if it were, we would find, lo and behold, that 95 percent of the country is already in compliance and that you wouldn't need this witch hunt against hydrocarbon emission from paint shops and lawn mowers and so forth. . . .

"I don't know how closely any of you follow the national papers, but if you read the *Star*, the *Post*, and *The New York Times* you find that somebody's orchestrating a pretty careful strategy, because every other day there's a new article about the acid rain problem. And it's written by reporters who know not a damned thing, and you'll excuse my language, about pollution, the techniques of pollution, the chemistry of pollution. And they're writing such preposterous and absurd things that what it's doing is creating an intellectual climate, an attitudinal climate, that will probably cause EPA or the Congress to lurch forward into an acid rain program that's based on nothing more substantial than the tail pipe standards were in 1970.

"I kept reading these stories that there are 170 lakes dead in New York that will no longer carry any fish or aquatic life. And it occurred to me to ask the question . . . well how much are the fish worth in these 170 lakes that account for 4 percent of the lake area of New York? And does it make sense to spend billions of dollars controlling emissions from sources in Ohio and elsewhere if you're talking about a very marginal volume of dollar value, either in recreational terms or in commercial terms?"

Stockman went on to endorse relaxation of the air quality standard for sulfur dioxides. The moderator for the manufacturer's group commented afterward that it was "encouraging to know that somebody who thinks like that is still in Washington and has something to say."—R.J.S.

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plants' will comply with the overall limit.

Many critics, including some in the environmental movement, say these requirements are awkward or unworkable in practice. A recent report by the National Research Council says the states have been applying the preconstruction monitoring rules too rigidly, and that the 35 percent limit should be regarded only as a benchmark, not an absolute ceiling. But a majority of the air quality commission recommended dropping the limit, and sharply reducing the amount of land that might be included under the most stringent controls. Pollution levels even without these limits will not worsen over the next 10 years and possibly beyond, the commission claims. Ayres disagrees, arguing that the requirement for up-to-date pollution control equipment is by itself inadequate "to keep clean air clean." Except for parks and wilderness areas, he says, clean air regions in 90 percent of the country "could be dirtied to levels no better than many of our major cities."

Additional controversy may be generated by the report's recommendation that Congress set a timetable for the regulation of particularly hazardous pollutants, a recommendation that industry opposes and environmentalists favor. To date, EPA has set emission standards for only three such pollutants, though it has listed about 40 more as potentially hazardous. The commission concluded that EPA has been reluctant to set such standards largely because the costs of compliance are so high. Although EPA has ignored some previous congressional deadlines, the commission believes it may be worth trying again.

In two victories for environmentalists, the commission recommended that air quality goals continue to be set without regard to the economic costs of compliance, and that Congress order a significant reduction in emissions of sulfur dioxide by 1990. The Business Roundtable and other industrial groups had suggested that costs and benefits be compared in a determination of the air quality targets, and also that additional study be made of the impact of acid rain before additional regulation of sulfur dioxide is required.

Much of the debate will center on the wisdom of transferring additional authority to the states under the Clean Air Act. Business groups will argue that state and local agencies are better equipped to judge local enthusiasm for varying degrees of air pollution control. Environmentalists will argue that the states have done a poor job of enforcing the law since 1977, have rarely required the most stringent or up-to-date pollution controls, and have virtually ignored the impact of pollution on agriculture, wildlife, and building deterioration.

Senator Stafford tentatively plans to take his committee on the road for hearings in Maine on acid rain, in Colorado or Wyoming on synthetic fuels, in Detroit on automobiles, in Pittsburgh on the steel industry, and in California for an investigation of requirements that new air pollution in dirty areas be more than offset by reductions in existing emission sources.—R. JEFFREY SMITH

Science Education Axed

The Reagan Administration wants to wipe out virtually all the science education activities of the National Science Foundation (NSF). If the President has his way, the budget of the NSF's education directorate will drop from a fiscal 1981 figure of $81 million to $10 million, which has already been committed to graduate fellowships. Gone would be support for more than 20 programs, including training for secondary school science teachers, upgrading of scientific equipment and curriculum development, science education research, and public understanding of science.

According to Yale physics professor D. Allan Bromley, the cutback is particularly unfortunate for secondary schools. Precollege training in science in the United States already falls far behind that in most developed countries—measured by the number of courses offered as well as by the quality of teachers, the best of whom are dropping out at a rapid rate in order to take more lucrative jobs in industry.

Bill G. Aldridge, director of the National Science Teachers Association, recently warned that secondary school science and engineering has fallen into a "dark ages." "By 1990," he wrote, "secondary science education in the United States will be insignificant and lacking substance unless there is a substantial intervention now at state, local, and, particularly, national levels. There will be few qualified science teachers left and essentially none being trained."

There are also exceptionally grim noises coming from the engineering community. In testimony before the House science and technology subcommittee on NSF authorization, Daniel C. Drucker of the University of Illinois described the "severe and increasing shortage of engineering faculty, facilities and instructional equipment." He said that not only the quantity but the quality of engineering instructors is going down, as the most capable are being lured into industry.

According to Reagan's 18 February budget document, the aim for NSF is to "preserve the agency's focus on its support of research in the natural sciences and engineering"—a statement which ignores the fact that the agency's original mandate called for strengthening of science education as well as research.

The budget-slashing decisions were made at the Office of Management and Budget without benefit of advice from the National Science Board or NSF director John Slaughter, and there is little doubt that one magnet for the ax is the still-remembered 1975 controversy over MACOS (Man: A Course of Study), NSF's best-known piece of curriculum development. MACOS drew the wrath of Moral Majority types (as they would now be identified) for allegedly peddling moral relativism because it contained descriptions of Eskimo life that included such family practices as infanticide and wife-swapping.

Observers find it not only ironic but downright puzzling that the Reagan people are striking out at programs to fertilize budding scientific and engineering talent at the same time they are calling for revitalization of the country's industrial and military establishments. As many have pointed out, the Soviet Union, China, and Japan put tremendous emphasis on giving secondary school students a solid grounding in science and math because they know they cannot run a technological society without a good supply of technologically sophisticated manpower. The Reagan Administration has yet to make the connection.—CONSTANCE HOLDEN

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