19. P. Hauser and E. Kitagawa, *Local Community Fact Book for Chicago, 1950* (Chicago Community Inventory, Chicago, 1953).
20. As noted, there are 75 community areas in Chicago. However, the central business district (community area 32—known as the Loop) is a unique area with regard to various social, economic, and other kinds of indicators. In our case, the measures of pathology are dramatically changed if the central business district is included. Perhaps the most marked case is the rate of admissions to mental hospitals. The city-wide rate is 297.6; the rate for the Loop is 3757.2, and the next highest rate is 851.1. While the elimination of the Loop does not transform the distribution of admissions to mental hospitals into a normal distribution, it does substantially reduce its deviation from this ideal: skewness is reduced from 7.56 to 2.88, and kurtosis is reduced from 62.32 to 15.14 [for a discussion of skewness and kurtosis, see J. Freund, *Modern Elementary Statistics* (Prentice-Hall, Englewood Cliffs, N.J., 1960), pp. 99–105]. Other measures, especially the standardized mortality ratio, are affected in similar, although somewhat less drastic, fashion. For this reason our analysis is based on 74 rather than 75 community areas in Chicago around 1960.
21. A regression analysis of income, education, and occupation was run on each of the pathologies. These five regression equations were then used as a basis for constructing the weighted sum of the three measures as a general index. The equation for the index of social class is as follows: index of social class $= 0.1 \times$ (median family income) $+ 10.0 \times$ (median years of school completed) $+$ (percentage of employed males in white-collar occupations) $- 550.0$. Median family income is by far the most important component of the social class index.
22. A regression analysis of percentage of Negroes, percentage of Puerto Ricans, and percentage of foreign-born was run on each of the pathologies. As with social class, these five regression equations were then used as a basis for constructing the weighted sum of the three measures as a general index. The equation for the index of ethnicity is as follows: index of enthnicity $= 25.0 \times$ (percentage of Negroes) $+ 10 \times$ (percentage of Puerto Ricans) $+ 0.1 \times$ (percentage of foreign-born). The percentage of Negroes is by far the most important component of the ethnicity index.
23. As Blalock notes, grouping by proximity may partially control for independent variables associated with "error" in the dependent variable. Thus to some extent, the size of the correlation between density and the pathologies, and between the social structure variables and the pathologies may be determined by the fact that the community areas, like all ecological variables, involved data grouped by proximity [H. Blalock, *Casual Inferences in Nonexperimental Research* (Univ. of North Carolina Press, Chapel Hill, 1964), pp. 102–114.
24. In a subsequent section of this article we will discuss the possibility that in human populations high rates of fertility might be a consequence of population density.
25. The same conclusion is reached if one uses regression coefficients. We would note that there are advantages and disadvantages to using either regression coefficients or partial correlations. Although multiple partial correlations are not strict estimates of the parameters of the causal model, we consider them to be sufficient for our purpose, and using them simplifies the analysis in the second part of the article.
26. H. Winsborough, in *Social Demography*, T. Ford and G. De Jong, Eds. (Prentice-Hall, Englewood Cliffs, N.J., 1970), pp. 84–90.
27. Holding the number of persons per room constant, it is probable that an increase in the number of rooms will increase the likelihood that a person will be able, at least occasionally, to be alone in a room.
28. The number of persons in each community area is reported directly in the *Local Community Fact Book*, as is the number of housing units. The number of rooms per community area and the number of residential structures per community area are, however, based on estimates from open-ended interval data. The fact book reports the number of housing units with 1, 2, 3, 4, 5, 6, 7, and 8 or more rooms in them. To get an estimate of the number of rooms per community area, we multiplied the number of housing units at each level by the appropriate number of rooms. The highest interval was multiplied by 8, even though it was an open-ended interval. The fact book reports the number of housing units in 1-unit structures, 2-unit structures, 3- and 4-unit structures, 5- to 9-unit structures, and 10- or more unit structures. Data from the 1940 fact book suggest that, for that year, slightly over half of the housing units located in the over 10 category were in the over 20 category. To estimate the number of residential structures in the area, we set the midinterval points for these data at 1, 2, 3, 5, 7, and 20. We divided the number of housing units in each category by these midinterval points and added the resulting figures to get the estimate of the number of residential structures for the community area. The four measures of density were then calculated by division: number of persons divided by the number of rooms, the number of rooms divided by the number of housing units, and so on.
29. The cogency of the multiple-partial correlation coefficient as an estimate of the relation is based upon the assumption that all indicators are related to the pathologies in the predicted direction. This assumption is, in general, supported by an examination of a table of the partial regression coefficients relating the four dimensions of density to each of the pathologies, although the general fertility rate increases with density. This table is available from the authors upon request.
30. O. Duncan, in *Sociological Methodology*, E. Borgatta and G. Bohrnstedt, Eds. (Jossey-Bass, San Francisco, 1970), pp. 38–47.
31. R. Sommer, *Personal Space: The Behavioral Basis of Design* (Prentice-Hall, Englewood Cliffs, N.J., 1969).
32. J. Plant, *Amer. J. Psychiat.* **9**, 849 (1930); in *Modern Introduction to the Family*, N. Bell and E. Vogel, Eds. (Free Press, New York, 1960), pp. 510–520.
33. A. Davis, in *Industry and Society*, W. F. Whyte, Ed. (McGraw-Hill, New York, 1946) pp. 84–106.
34. A. Pond, *Marriage Fam. Living* **19**, 154 (1957); D. Wilner, R. P. Walkley, M. Tayback, *Amer. J. Public Health* **46**, 736 (1956).
35. D. Wilner, R. P. Walkey, T. Pinkerton, M. Tayback, *The Housing Environment and Family Life: A Longitudinal Study of the Effects of Housing on Morbidity and Mental Health* (Johns Hopkins Univ. Press, Baltimore, 1962).
36. A. Watson, *Nature* **215**, 1274 (1967).
37. L. Mech, *The Wolf: The Ecology and Behavior of an Endangered Species* (Natural History Press, Garden City, N.J., 1970).
38. H Lewis, "Child rearing practices among low income families in the District of Columbia," mimeographed, presented at the National Conference on Social Welfare, Minneapolis (1961); S. Riemer, *Amer. Sociol. Rev.* **8**, 272 (1943); R. Mitchell, *ibid.* **36**, 18 (1971).
39. The relation between the percentage of persons living alone and admissions to mental hospitals remains fairly strong, even after class and ethnicity are used as controls ($r = .59$). The percentage of persons living alone also has a high negative correlation with rooms per housing unit $r = -.91$).
40. The research for this paper was supported in part by the Urban and Regional Developement Center, Vanderbilt University. We thank H. Costner, L. Rigsby, A. Gove, and O. D. Duncan for their comments on an earlier draft of this article.

NEWS AND COMMENT

National Environmental Policy Act: Signs of Backlash Are Evident

It is as much the duty of government to render prompt justice against itself, in favor of citizens, as it is to administer the same between individuals.—ABRAHAM LINCOLN

It's a rare occasion when Congress produces a piece of legislation that measures up to the lofty purpose of governmental self-control that Lincoln had in mind. Having done so, the chances are great that Congress will soon break out in a rash of second thoughts once the practical difficulties of enforcing self-control hit home.

This, at least, would seem to be the main lesson to be drawn from a bitter fight currently shaping up in Washington over the future of the 2-year-old National Environmental Policy Act (NEPA), a law that President Nixon symbolically chose to sign as his first official act of the new decade and one that his chief environmental adviser, Russell E. Train, has called "one of the most significant policy reforms in recent history."

History notwithstanding, the signs of a backlash against NEPA are becoming evident. A few high government officials like John A. Carver, Jr., a member of the Federal Power Commission (FPC), consider it a "paper monster . . . of great potential harm" and suggest that perhaps "Congress should take another look." And federal agencies, ranging from the Atomic Energy Commission (AEC) to the Department of Transportation, are pressing for new

legislation to grant them special dispensations from NEPA's burdensome requirement of preparing environmental impact statements for major government actions.

For the most part, these proposed dispensations have a narrow intent—not so much to emasculate NEPA as to circumvent some particularly troublesome court rulings under it. Such judicial short-circuits may help relieve the pressures from agencies and industries that are building against the law. However, a number of conservation leaders in Washington fear that the restiveness they sense now may intensify into a movement to repeal the law once the election is safely past.

NEPA has two fundamental and apparently irritating purposes: to open to public view a major new source of information about the way in which the government's activities affect the environment and, in so doing, to goad the whole federal establishment into adopting a more sympathetic attitude toward a fragile biosphere.

As federal legislation goes, NEPA is brief and not very complicated. In rather sweeping though scarcely controversial terms it sets forth a general policy that the government shall, among other things, "assure for all Americans safe, healthful, productive, and esthetically and culturally pleasing surroundings." NEPA's principal means for accomplishing this—and the sorest point of the current controversy—is the requirement that government agencies prepare environmental impact statements for every "major" action, which includes a description of the probable adverse effects and a discussion of alternatives.

Some of the discontent toward NEPA springs from the uncomfortable burden of paperwork and soul-searching it has imposed on federal bureaucrats. The most immediate source of anxiety, however, is the enthusiasm and rigor with which federal courts have been interpreting NEPA. This is the law that environmental groups invoked to stop the $3-billion trans-Alaska pipeline in 1970 and the $400-million Tennessee-Tombigbee Waterway last year. Court rulings under NEPA have delayed the operation of a half a dozen nuclear power plants and have tied the Atomic Energy Commission up in such a tangle of paperwork that, according to chairman James R. Schlesinger, the AEC has been unable to complete a single licensing action since last summer.

Less well known, though no less infuriating to the executive branch, was a court decision in January that forced the Interior Department to postpone its plans to sell oil and gas leases on tracts of Gulf Coast waters covering an area half the size of Rhode Island. The Treasury Department was counting on $400 million in revenues from this sale to offset the fiscal 1972 deficit, but now will have to wait at least until fiscal 1973. NEPA is also the law that let two obscure Cleveland lawyers throw a monkey wrench in the Nixon Administration's elaborate scheme to control water pollution by issuing discharge permits to industry. In each instance these nettlesome setbacks have resulted from federal court rulings in which one or more judges agreed that a federal agency—whether by reason of simple misunderstanding or out of pure intransigence—had failed to comply fully with NEPA procedures in assessing the impact of various projects.

A Swarm of Suits

Altogether, district and appeals courts have handed down more than 160 decisions under NEPA, with new rulings being tallied at the rate of about one a week. This frenetic rate of activity results partly from environmental groups' quick recognition of the law as a versatile tool for calling the government to account for its activities, partly from a strong inclination of the courts to uphold the private citizen's standing to sue the government under NEPA, and partly because the law is new and its language rather vague.

As one U.S. District judge has said, NEPA is "a relatively new statute, so broad, yet opaque, that it will take longer than usual to comprehend fully its import."

By and large, though, most of the 160 rulings have added to a fabric of precedent around the law without stopping government projects. Russell E. Train, the chairman of the President's Council on Environmental Quality (CEQ), which NEPA established, estimates that no more than 15 perecnt of the litigation so far has led to delays in federal projects. Moreover, Train points out, the role of the courts has generally been "the traditional one of ensuring that governmental process prescribed by statute is working correctly. . . ."

Thus most of the cases so far have revolved around such questions as who must comply with NEPA (the answer is just about every federal agency); whether NEPA applies to projects begun before the law was passed (yes, if major decisions are still to be made); and whether an agency can pass off someone else's description of a project's impact as its own (no).

In light of some of the repercussions, though, the seeming simplicity of these questions and answers is deceiving. A number of agency heads, among them the AEC's James Schlesinger, complain that NEPA contains no hint of guidance for handling the special problems that might have been expected to arise during the present "transition period" when the law is still new and many of the projects it affects were already under way when the law was passed Schlesinger also thinks that the courts have put too much emphasis on fine details of procedure in preparing impact statements while ignoring the urgency of the projects themselves.

Similarly, FPC chairman John Nassikas asserts that by stopping the Alaskan pipeline and the Gulf Coast offshore drilling projects the courts may exacerbate shortages of low-sulfur fossil fuels. He also contends that power shortages may occur this summer in the East and Midwest unless at least one of the blockaded nuclear power plants is allowed to run and unless as many as 45 other fossil-fueled and nuclear plants can obtain federal water discharge permits this spring.

Environmentalists, on the other hand, say that the overwhelming majority of delays in operating new power plants result not from their litigation but from construction and labor problems and that, in any case, administrative solutions can be found for troublesome court rulings and that no legislative relief is necessary. These views have some support within the Administration and among many, though not all, of NEPA's congressional backers.

Nevertheless, dark intimations of electric power shortages and the lingering sting of the citizens' suit that stopped the water pollution permit program have been enough to nurture a significant backlash against NEPA.

The roots of reaction against the law can be traced most directly to the controversial "Calvert Cliffs" ruling against the Atomic Energy Commission last summer (*Science*, 27 August). The suit, brought in part by the Sierra Club, accused the AEC of failing to consider fully the effects on the Chesapeake Bay of hot water discharged from a new nuclear power plant at Calvert

Cliffs, Maryland. The AEC countered that it was sufficient to take the word of a state agency or the Environmental Protection Agency (EPA) that effluents would be within federal limits. A three-judge appeals court—denouncing the AEC for making a "mockery" of NEPA— ruled that, in every licensing action, the AEC must determine for itself the impact of a plant's effluents, then weigh these environmental "costs" against the plant's presumed benefits. In so doing, the AEC would not foreclose the possibility that it might have to apply even stricter standards in special circumstances.

Against the wishes of the utility industry and some members of the Joint

Sperm Banks Multiply as Vasectomies Gain Popularity

How do you make a deposit at a sperm bank? At Idant Corporation, a rapidly growing young company that opened a branch in suburban Baltimore, Maryland, a few weeks ago, the procedure is simple.

The customer need only have observed at least 48 hours of prior continence—to ensure a high sperm count—to qualify as a depositor. He strolls into Idant's small laboratory, which is manned only by a secretary and a laboratory biologist, fills out a form, and plunks down the $80 fee required for the processing and freezing of three semen specimens. He then retreats to a tiny room furnished with a comfortable armchair, two pornographic magazines, and an ashtray. (He may also drop off his sample on the way to work, providing it is less than 2 hours old at the time of deposit.) The ejaculate is examined, diluted with a glycerol preservative, and stored in 12 or 15 little plastic vials resembling ball-point pen refills. The vials are stored in three metal cannisters and submerged in stainless steel barrels filled with liquid nitrogen, which bubbles away at its boiling point of −196°C.

The customer, usually a man about to undergo a vasectomy, pays an annual storage fee of $18 until such time as he should change his mind or his wife, whereupon his semen is delivered to his wife's physician, who performs the artificial insemination. The average number of semen injections required to make a woman pregnant is 14. The chances of pregnancy are about 50 percent—somewhat lower than the 70 percent pregnancy rate when fresh sperm are used.

Idant, which set up a New York bank last December, is one of two new corporations that have sprung up to capitalize on the current surge of vasectomies. Last year 750,000 of the operations were performed, and 1 million are expected in 1972. The other corporation, Genetic Laboratories, Inc., of Minnesota, began in 1970 and now has banks in five major cities. The main function of these banks is to provide "fertility insurance" for men who have reservations about being sterilized. The service is also appropriate for men who anticipate being involuntarily sterilized, either through cancer treatment or hazardous jobs (Idant has a sample from a crewman on a nuclear submarine). In addition, the banks will also purchase sperm, at around $20 a shot, from donors for the impregnation of women whose husbands are sterile. The market looks so promising that both companies are planning rapid expansion—Idant envisions banks in 20 major cities by next year and intends to extend its operations to England and Japan.

While all this sounds like a fine way simultaneously to make money and add to the sum of human happiness, the advent of the commercial frozen sperm bank raises a number of disturbing questions. For one thing, the American Public Health Association's population council issued a statement in February warning that sufficient data did not exist to indicate that frozen sperm would retain potency after 16 months. Idant's 29-year-old vice president, pathologist Jerome Silbert, insists to the contrary that successful inseminations have been made with sperm frozen up to 10 years and there is no reason to believe it could not stay viable for centuries.

Much more serious, though, is the fact that there are virtually no regulations in any state governing this type of operation. Anyone with a few thousand dollars, some vials, and some liquid nitrogen can go into business.

The ethics of this enterprise is also in doubt. Biologist Mark Lappé of the Institute of Society, Ethics and the Life Sciences in Hastings-on-Hudson, New York, is disturbed that commercial outfits are the first to introduce large-scale sperm banking. If it is worthwhile, he says, the government should be taking the lead. Silbert responds that "it has to be done commercially" because the government, as well as private foundations, are afraid to touch so controversial an undertaking.

Lappé also feels that the promise of possible fatherhood in the future "plays on the basic anxieties of the male," and since most vasectomized depositors will never make a withdrawal, a sperm bank can supply just another way to parlay anxiety into money. Silbert puts things in a more charitable light—that the opportunity to freeze one's sperm "removes some of the psychological burden of the irreversibility of vasectomy."

The most perplexing ethical questions pop up around the insemination of women with the sperm of anonymous donors—a practice for which cryogenic sperm preservation opens up broad new vistas. Donor insemination "is functionally serving as fostering eugenic aims," says Lappé. That is, the availability of the service could promote an unhealthy preoccupation with "good genes," alter the nation's gene pool, produce unwitting consanguineous marriages in the next generation, and encourage women to line up for the sperm of some latter-day Einstein. All this is rather unlikely, but Americans do seem to feel that a new technology, once available, must be exploited. One unusual arrangement has already been reported. A prominent Minnesotan has laid away some sperm to be used to carry on the family line in the event his only son proves sterile.

As is often the case, private enterprise has leaped into an ethical and legal vacuum, and the price may be left for future generations to pay.—CONSTANCE HOLDEN

Committee on Atomic Energy—which remains "promotion-minded," even if the AEC no longer is—the AEC decided not to appeal the Calvert Cliffs ruling. Instead, it set out to draw up rigorous new guidelines for writing its impact statements and then began composing these reports, some more than 300 pages long, for more than 100 nuclear reactors and fuel facilities. While all this may yet result in more stringent controls of thermal pollution, the immediate upshot was to mire the commission's severely understaffed regulatory branch in a deep bog of paperwork and to bring licensing activities to a virtual halt.

To make matters worse, the AEC then struck on the idea of issuing "interim" operating licenses to nuclear plants for low-power test runs before the new impact statements were finished, only to have this plan abruptly scotched by a suit brought by the Izaak Walton League and the Attorney General of Illinois against the issuance of such a license to Commonwealth Edison's new Quad Cities plants 1 and 2 near Chicago. The suit contended that thermal discharges from the two reactors might interfere with reproduction in two major species of fish in the Mississippi River. The reactors are still idle, although the FPC says they're "urgently" needed to fatten power reserves in the Midwest this summer.

Bills to Skirt NEPA

The AEC appealed the Quad Cities decision, but, under pressure from the joint committee and the FPC, it is also pushing legislation to circumvent this ruling as well as the Calvert Cliffs decision. Two bills before the joint committee—one from Representative Craig Hosmer (R–Calif.) and a more modest one from the AEC—would allow the AEC to issue its interim licenses after all. Both the agency and the committee apparently will continue to press these bills in Congress, even though plaintiffs in the Quad Cities case have since dropped their suit in exchange for a promise from the utility to build a $20 million closed-circuit water-cooling system for the contested plant.

A second effort to shield the AEC from NEPA emanates from Senator Howard H. Baker (R–Tenn.), who has tacked an amendment onto the Senate water pollution control bill (S. 2770) that would, in Baker's words, "throw out Calvert Cliffs." As a number of leading environmentalists read it, the amendment, which appears in similar form in the House version of the bill, would allow the AEC to revert to its former practice of ignoring a case-by-case balancing of pollution costs against benefits that the court found so essential. Baker insists that environmentalists are simply reading too much between the lines.

Still another end run around the courts concerns a NEPA suit brought last December against the Administration's water pollution permit program by two Cleveland lawyers, Jerome S. Kalur and Donald W. Large. Among his findings in the suit, U.S. District Judge Aubrey E. Robinson left the clear impression that at least some of the 25,000 permit applications now pending before the Army Corps of Engineers and the EPA (which share responsibility for the program) would have to be accompanied by impact statements, no matter how time-consuming the writing of them might be. The EPA now assumes that most of the 25,000 permits would require statements, and the mere thought of all that paperwork has paralyzed the program since December. (Most of these permits apply to major industrial outfalls.) In fact, there is a large body of opinion in Washington that the EPA has taken an overly gloomy view of its predicament.

Environmental groups, as well as congressmen like Representative Henry P. Reuss (D–Wis.), who in large part fathered the permit program, suggest that the court could be satisfied and the workload greatly reduced by writing one impact statement per major watershed, or one per major aggregation of discharge pipes, or one for the entire program. The White House, however, is spurning such administrative solutions as these and has opted instead for a quick legislative remedy —which probably will take the form of a bill to exempt the permit program from NEPA.

This decision runs counter to a view held widely within the Administration as well as by the environmental movement, that no agency should be exempt from NEPA and that having to justify the reasoning behind its pollution control programs (though not its individual enforcement actions) might be a very useful exercise for the EPA. Even the Interior Department seems to think so. Secretary Rogers C. B. Morton was to have testified to this effect in Senate hearings on NEPA last month, but the page of his testimony containing these views was removed at the last minute at the request of the CEQ and the White House Office of Management and Budget. The CEQ chairman, Russell Train, says that he supports circumvention of court rulings under NEPA as a means of dealing with "temporary, transitional problems."

To be sure, none of these proposed dispensations directly alters NEPA, and it would probably be rash at this point to take them as evidence of a coherent movement to cripple the law. But what worries environmentalists, as well as NEPA's two main authors, Senator Henry Jackson (D–Wash.) and Representative John Dingell (D–Mich.), is that a feeding frenzy may develop among federal agencies once a few loopholes have been opened in the law.

The Department of Transportation, for instance, is anxious to relieve itself of the burden of impact-statement writing for highway projects and would prefer to let state highway agencies do the work instead. And FPC chairman Nassikas has hinted that he may seek to protect his commission's licensing activities from NEPA. The aggregate effect of such exemptions, one staff aide for Representative Dingell insists, is to weaken the law. "You get enough of them on the books and you'll just wall NEPA off from reality."

Strategic Retreat

Despite this prospect, the environmental movement is in a poor position to protect what has turned out to be its most versatile tool of law. Financial problems and ideological splits have weakened the environmental lobby in recent months, and late last month the movement took a sound drubbing in a fruitless attempt to insert strengthening amendments in the House water pollution bill. Their confidence apparently shaken, Dingell and Jackson have opted for a strategic retreat. Jackson has prepared an amendment to NEPA that would allow the President to exempt individual projects from the law for a limited time, and Dingell has his own bill to allow interim licenses for nuclear plants. It would expire, however, in July 1973.

As a Dingell aide puts it, "A self-sealing loophole is preferable to having the wolves gnawing chunks out of the law." But the wolves may have the last word after all if the John Carver's have their way.—ROBERT GILLETTE