Pollution: PSAC Panel Takes a Panoramic View

It comes as no great surprise that an environmental pollution panel of the President's Science Advisory Committee, in a recently released report, says that things are bad now but likely to get much worse unless strenuous efforts at improvement are made.

The report, however, differs from most previous assessments of pollution in two principal ways. First, an attempt is made to deal with the whole range of pollutants rather than with one source of pollution—pesticides, for example—or a single category, such as air pollution. Second, the report treats pollution as a national rather than a regional or local problem.

The report could attract more public attention than PSAC panel reports ordinarily do because the panelists have suggested the imposition of taxes on polluters, thus entering an area of policy-making where scientists seldom tread.

Titled "Restoring the Quality of Our Environment," the new report is the product of work over a period of more than a year by a panel headed by John W. Tukey, professor of mathematics at Princeton and associate executive director for research in the communications division of Bell Telephone Laboratories.*

(The report is scheduled to be published by the Government Printing Office by early December and will be available from the superintendent of documents, price not set. The published version will include a series of appendices on various special problems and reports of 11 subpanels. The breadth of the main panel's survey is indicated by the subjects of these subpanel reports: soil contamination, health effects of chemical pollution, bench-mark monitoring, atmospheric carbon dioxide, solid wastes, combined sewers, effects of chlorinating wastes, agricultural wastes, aquatic blooms, effects on living organisms other than man, and improved pest-control practices.)

In both assignment and membership the panel was largely a carry-over from one of the Great Society task forces recruited in the period before President Johnson's inauguration to recommend administration action in problem areas.

The tone of the report is didactic rather than polemical. With its more than 100 recommendations the report seems to be purposely without priorities and intended less as a program of action than as a primer on pollution and a gambit to encourage public discussion.

Pollution and Prosperity

The panel takes the view that the increase in pollution problems in the United States is the inevitable result of growth in population, urbanization, and rise in the standard of living. The affluent society, in other words, is also what some wags have called the "effluent" society.

While the panel is primarily concerned with the scientific and technical aspects of pollution, it also stresses the relevance of the economic aspects. Specifically, the panel argues that disposal of polluting wastes should be the responsibility of those who produce the wastes, and that in the case of industry the expense of disposal should be reckoned as part of the cost of doing business.

The panel, in fact, begins its recommendations with a series of "principles," the first of which is that "the public should come to recognize individual rights to quality of living, as expressed by the absence of pollution, as it has come to recognize rights to education, to economic advance, and to public recreation. Like education and other human rights, improved quality of life from reduced pollution will be costly to individuals and governments."

The reciprocal of this is the next point in the report, which avers that "the responsibility of each polluter for all forms of damage caused by his pollution should be effectively recognized and generally accepted. There should be no right to pollute."

To arm these principles, the panel recommends later in the report "that careful study be given to tax-like systems in which all polluters would be subject to 'effluent charges' in proportion to their contribution to pollution."

A more specific example is given still later—the suggestion that "a tax be devised to provide an incentive for eliminating the long-term storage or holding of junk automobiles. An annual Federal or state license might be imposed on all automobiles except those currently licensed for road use; or a personal property tax might be placed upon junk cars. A tax approach has fewer difficulties than any of the subsidy approaches considered by the Panel."

A derelict automobile is easier to deal with, in terms of setting standards and penalties, than a lot of pollutants are. Clearly, it is hard to pinpoint adverse effects on the health of humans of small accumulations of toxic substances, for example. The panel recognizes this, and the range of difficulties is indicated in the following excerpt from the report.

"There are many areas in which ignorance constrains our ability to deal effectively with pollution problems. Examples lie in the deficiencies of our knowledge of the behavior of important carriers of pollution, such as atmospheric gases, surface and ground water, oceanic currents, and soil particles. Basic research on these topics is necessary in order to clarify our understanding of the movement of pollutants. Some pollutants are carried extensively in living things, moving from one plant or animal to another as food, moving from place to place with the plant or animal. Such movements of pollutants in and through living organisms are important, for example, when we consider means of protecting wildlife, fisheries, and shellfish from pollution. Basic ecological research is necessary if we are to cope effectively with these serious problems.

"We now know that the full effects of environmental changes produced by pollution cannot be foreseen before

* Other members of the panel are Martin Alexander, New York State College of Agriculture, Cornell; H. Stanley Bennett, University of Chicago; Nyle C. Brady, New York State College of Agriculture, Cornell; John C. Calhoun, Jr., Texas A & M, former Science Advisor to the Secretary of Interior; John G. Geyer, Johns Hopkins University; Aarie J. Haagen-Smit, California Institute of Technology; Norman Hackerman, University of Texas; James B. Hartgering, American Hospital Association; David Pimental, New York State College of Agriculture, Cornell; Roger Revelle, Center for Population Studies, Harvard; Louis H. Roddis, Pennsylvania Electric Company; William H. Stewart, Surgeon General (served as a member of the committee until June 1965); and James L. Whittenberger, Harvard School of Public Health. Staff head was John L. Buckley, Office of Science and Technology.

judgments must be made. The responsible judgment, therefore, must be the conservative one. Trends and indications, as soundly based as possible, must provide the guidelines; demonstration of disaster is not required. Abnormal changes in animal populations, however small, at whatever stage in the life history of the individual, or in whatever niche of the species complex, must be considered warnings of potential hazard."

The report, perhaps in order not to detract from its panoramic views, does not concentrate on any particular source of contamination. But the automobile is clearly identified as a villain of deepening dye.

The panelists note, "The special importance of the automobile as a source of pollution should be clearly recognized. The automobile is our most rapidly growing cause of many and diverse pollution problems."

The report recommends that "the principle of requiring registration before use . . . be extended to the addition to motor fuels of substances which are not eliminated by the combustion process. Widespread use of automobiles has made motor fuels the single most effective way to expose almost all our people to air pollution from combustion-resistant substances such as metals, and, as well, to escaped gasoline and combustion products. Lead has long been an additive . . .; phosphorus and boron have been added for a few years; nickel is now beginning to appear."

Take the Tiger out of the Tank

The report goes so far as to recommend that the federal government support efforts to find an alternative to the internal combustion engine. The panelists acknowledge that no substitute is readily at hand, but they feel that an early start on a serious search is essential. This is the way the panel puts it.

"We recommend that the Federal government exert every effort to stimulate industry to develop and demonstrate means of powering automobiles and trucks that will not produce noxious effluents. Less complete steps to reduce pollution from automobile exhausts will certainly play an important role. We must strive for more acceptable mass transportation. We must follow carefully the results of California's imposition of special regulations, and be prepared to extend those that prove effective to other smog-ridden localities. But we must also be prepared, as soon as reasonably may be, to take more drastic action if, as, and when necessary. The development of alternative means of mobile energy conversion, suitable for powering automotive transport of all kinds, is not a matter of one year or a few years. Yet if fuel cells, or rechargeable batteries, or other devices are to be developed in time to meet the increased threat, we need to begin now."

The call for action by federal agencies is a note sounded repeatedly throughout the report. Typical are the suggestions for dealing with pesticides, which in the last few years have been among the most publicized of pollutants.

The panel's approach to pesticide problems is a measured one. Starting with the data available on the effects of pesticides on human health, the panel notes that a small number of persons die each year from "accidental or occupational" misuse, and that probably 100 times as many suffer nonfatal poisonings of the same sort. The panel goes on to observe that, "despite the increasing use and variety of pesticides, there is no evident increase in mortality attributable to their use."

Increasing body levels of insecticide residue, however, do concern the panel, and the report recommends federal support for the development of better instruments and the conduct of more research to measure accumulation of these residues in living things, soil, and water, and to determine their effects on humans, animals, and plant life.

A number of suggestions for action are made to the Department of Agriculture, including one that USDA require, as part of the information given in the registration of pesticides, data on the "persistence and fate" of the chemical in all relevant segments of the environment. At present, registration procedures take into account persistence as related to food, but, says the panel, they "have not always done so for non-food uses, or, for uses that might result in food residues in years subsequent to the use of the material."

The panelists also want Agriculture to use its influence to encourage modification of present practices in the use of pesticides. The report calls particularly for replacement of "routine-treatment" schedules, which it terms wasteful, by "treat-when-necessary" schedules, and also for recognition that 100-percent control of most pests is not required for prevention of economic losses.

In general, the recommendations fall into a pattern familiar in reports by government-sponsored blue-ribbon panels on scientific-technical problems. The federal government is called on to encourage the development of new technology, support more research, and foster the training of more specialized manpower.

As regards research, the prescription

From the Environmental Pollution Panel Report

"Arrangements to deal with pollution have grown on a piece-meal basis, with organizations, programs, and legislation created when problems became evident or critical. With this background it is not surprising that current organization is a hodge-podge with responsibilities widely separated among government agencies, and some unassigned. Some pollutants are dealt with on the basis of the environmental medium in which they occur, for example, pollutants in air and water; others are dealt with on the basis of the kinds of effect they have, for example toxic materials in food; some are dealt with on the basis of their sources, for example artificially radioactive materials.

"With some pollutants there is no Federal authority to act at all, as is the case with pesticide residues on tobacco. With some pollution problems existing Federal authorities constrain the type of action that can be taken, as with water pollution problems that can be approached by the Corps of Engineers only through providing excess water storage for low flow augmentation (usually a costly and inefficient process). With some pollutants, such as radionuclides, extreme caution is exercised to assure that unwanted effects in the environment will be prevented; with other materials, such as pesticides, consideration of side effects has been scant in the past."

is for a mixture of basic and applied research across a broad spectrum. The finding of new ways to ameliorate salinity problems and the investigation of the oceanic and biological processes by which CO_2 is removed from or returned to the atmosphere are random examples of the kind of research the panel thinks should be done. In the better-mousetrap category is the need to replace glass bottles, metal cans, and their plastic counterparts with new types of containers which will have an adequate storage life but will "degrade" rapidly.

Federal support of institutes and centers devoted to research in fields relevant to pollution control is urged, and the underwriting of refresher courses and of national and international conferences is recommended. To increase the ranks of the antipollution forces, the panel suggests that the award of grants in environmental research be related to the intention of grantees to stress the training of students.

Attempting to predict how much impact the new report will have on pollution is not a very rewarding pursuit. As a product of a PSAC panel, however, the report underwent scrutiny at the White House and can be taken seriously as an administration document.

The President's statement accompanying release of the report carried a general endorsement and seemed to promise early advances on at least one front—an increase in the number of professionals and technicians trained to deal with pollution problems.

The panel, it should be noted, was probably doing some wishful recommending when it urged new initiatives on the part of federal agencies in the administration of existing laws. The bureaucracy characteristically is hesitant to make new departures in regulation or enforcement without new legislation and additional funds.

It is hard to say whether Congress and the public would now favor the general attack on pollution problems which the panel advocates. Public awareness of the implications of pollution is growing, as allusions in editorial cartoons and satirical songs testify. At another level, heightening concern, in both government and organized science, is manifest. For example, the AAAS Committee on Science in the Promotion of Human Welfare this fall published its report, *Air Conservation*, with a key section titled "Air Conservation and Public Policy." A committee of the National Academy of Sciences is now completing work on a report on broad aspects of the problems of pollution.

On the other hand, Americans, city dwellers in particular, have demonstrated a remarkable capacity to absorb punishment dealt by a deteriorating environment. This docility and the potentially high costs of controlling pollution could make us continue to take arms against only the intolerable.

In the past some victories have been won over pollution. In the 19th century, for instance, such water-borne diseases as typhoid, cholera, and dysentery were virtually conquered as public health problems through advances in medicine and the building of safe water systems and sewers. The epidemics had been deadly enough to make the public willing to pay the bill.

In recent years, effects of radioactive fallout on the environment led to the setting of radiation standards and marketing controls—for example, on milk deemed to be contaminated.

Scientists played an important role in informing the public—a good number providing persuasion as well as facts—and doubtless helped create the atmosphere in which the limited test ban treaty was achieved. The experience was one source of the activist concern many scientists have extended to other species of pollution of the environment.

Critics of the PSAC panel report are likely to regard enunciation of a freedom-from-pollution principle as naïve, the tax recommendations as presumptuous, and the call for government action as conducive to more federal interference. But the report represents both a recognition by scientists that pollution problems have dimensions beyond the purely scientific and an effort to proceed accordingly.—JOHN WALSH

Naval Academy: Lockstep Program Is Abandoned

Annapolis, Md. The ferment that has stirred much of American education since the first sputnik launching in 1957 is nowhere more evident than here at the U.S. Naval Academy. As recently as 1958 the midshipmen were moving through the curriculum quite literally in lockstep. All took the same courses, and at each bell they marched in sections for their next class assignment. Any who would have liked to drop by the library en route found themselves frustrated.

The plebe who entered the Academy after 2 years of study at a civilian college was on precisely the same footing as one straight from high school. The midshipman brilliant in science or mathematics was bound to a course of study designed to accommodate less capable classmates. The faculty suffered from similar constrictions. They could offer no electives, and they had relatively few opportunities to express their own scholarly interests by introducing new work into the curriculum. Moreover, the tendency in some departments (such as engineering) to cover many topics, but at a rather elementary level, made it difficult to attract faculty of high scholarly attainments.

In 1959 the Academy adopted two fundamental changes of policy. First, midshipmen were allowed to "validate" college-level work completed at another institution or in high school. Second, a program of electives was instituted which, within a few years, developed sufficiently to permit midshipmen to take enough electives in a given field to constitute a "minor" or even a "major." Now, at least 15 percent of a midshipman's course work is in electives, and the percentage can be higher if he has done part of his required work elsewhere and validated that work, or if, by virtue of strong academic per-