Letters

Water Pollution

I would like to second the policies advocated in Philip H. Abelson's editorial "Water pollution abatement: Goals and costs" (28 June, p. 1333). One item that needs to be further discussed is the impact on human health and survival of spending money to clean up pollution.

Abelson notes that industry will have to invest an additional $8 billion to meet 1977 requirements of "best practicable" water pollution control technology at existing plants. However, industry will have to spend an additional $9.5 billion to meet the 1977 standards for thermal discharges. The costs for thermal plant discharge elimination then exceed those from all other industrial wastes put together. When one compares the known incidence of disease and environmental destruction from the discharge of heavy metals, carcinogens, mutagens, pesticides, and so forth, to the known incidence of disease from thermal discharges (zero), one is somewhat appalled at the relative emphasis given to the thermal pollution abatement. A more realistic approach would be to evaluate each discharge in place and compare the benefits to be achieved by its elimination or reduction with the costs to achieve such benefits. From this a more realistic standard could be set (*1*).

Although the Environmental Protection Agency is supposed to be a total environmental agency, it appears that the waste effluent standards are set without regard to the effects on the atmosphere and lithosphere. In the case of thermal pollution elimination standards, these effects would include the environmental costs of treatment of the chemicals concentrated in the circulating cooling water (possibly an even more severe environmental insult than the hot water); the decrease in efficiency and consequent increase in air pollution resulting from the greater use of fossil fuels in central generating stations; and the fog, drift, icing, and acidic rains that occur in the immediate vicinity of plants because of the combination of sulfur dioxide from power plant stacks and the water vapor from the cooling towers. We need to change the law to require environmental impact statements for these effluent guidelines, and we need to have the Office of Technology Assessment determine the actual effect rather than the desired effect.

FRANK L. PARKER
Program in Social Engineering,
Vanderbilt University,
Nashville, Tennessee 37235

References

1. For a more detailed exposition of these views, see F. L. Parker, in *Energy Production and Thermal Effects*, B. J. Gallagher, Ed. (Limnetics, Inc., Milwaukee, Wis., 1974).

Abelson's editorial may come as a surprise to some environmentalists. Nevertheless, in this connection, I want to call attention to one of Czechoslovakia's regulations that borders on genius: "A plant's water intake is to be down stream of its discharge."

Z. F. DANEŠ
Department of Physics,
University of Puget Sound,
Tacoma, Washington 98416

Air Quality Control

In the context of her report "Clean air: Congress settles for a restrained coal conversion plan" (News and Comment, 21 June, p. 1269), Constance Holden states inaccurately and perhaps unfairly that "intermittent control strategies" proposed by certain industries are a potent threat to the Clean Air Act, while states moving ahead to secondary standards are, by contrast, supporting it. The intended effect of the act, indeed, of any air pollution control system, is the resultant ambient air quality. The suggested emission control strategies, including the use of tall stacks to penetrate inversions and of fuel-switching techniques which permit taking advantage of the dispersive properties of the atmosphere, are some means toward that end. If they can be shown to be most cost-effective in any given situation, they should be encouraged by control authorities and not summarily rejected.

An integral part of the dispersive strategy, of course, is the ability to maintain control of the ambient concentration of pollutants by use of adequate predictive mathematical models of the atmosphere (*1*). Fortunately, this technology has advanced rapidly in recent years and will now permit a total "systems approach" to air quality control (*2*) well beyond the restraints of fixed emission standards.

R. J. BIBBERO
Advanced Technology Staff,
Honeywell, Inc.,
Fort Washington, Pennsylvania 19034

References

1. R. J. Bibbero, *IEEE (Inst. Electr. Electron. Eng.) Spectrum* **8**, 47 (December 1971).
2. ——— and I. G. Young, *Systems Approach to Air Pollution Control* (Wiley-Interscience, New York, in press).

Quality of Chemical Compounds

In the past few years, several instances in which the deficient quality of commercially labelled chemical compounds, and in some cases of particular shipments, have been reported in the literature by unhappy users. As a result of these and many other unreported experiences, the International Union of Biochemistry and the International Union of Pure and Applied Chemistry have established a joint Ad Hoc Committee on Radioactive and Isotopic Specifications of Labelled Compounds, of which I serve as chairman, to assess the problems and take whatever action seems appropriate. The committee would like to be kept informed of problems that arise and would be happy to have constructive suggestions and comments from both users and suppliers of labelled compounds.

GERALD GOLDSTEIN
Oak Ridge National Laboratory,
Oak Ridge, Tennessee 37830

Science and Public Policy

In his editorial of 10 May (p. 617) Brewster Denny states that there is a surplus of available science advice for state and local governments, but since the mechanisms are weak, "state and local officials, their staffs, . . . civil service bureaucracies . . ., and citizens will simply have to be brought up to a level of understanding at which decisions involving technical issues can be made through the political process."

He is certainly right that there is plenty of technological expertise. What the states need, however, are scientists who know how to apply this expertise to specific problems.

Three states have developed mechanisms for the application of technology in the legislative process: California (a distinguished council), New York (Assembly Scientific Staff), and Illinois (part of the legislative council). Four other states are getting started; elsewhere such mechanisms are nonexistent. Mechanisms for advising the governor are established in Georgia, Hawaii, Pennsylvania, Utah, and several other states.

Important requirements for legislative success include interest and backing by the leadership, and intimate participation of the staff in the formulation of bills and in the committee analysis process.

No legislator has time enough to make rational decisions solely from his own knowledge on the several hundred technical bills that are introduced in one assembly session. Consequently a staff must be brought together with expertise in science and technology and expertise in lawmaking.

In January, Speaker Perry B. Duryea of the New York State Assembly jointly sponsored a unique workshop conference on energy legislation with AISLE (An InterSociety Liaison committee on Environment—with members from a consortium of 20 professional societies, including AAAS, in science, engineering, and public administration). About one-third of the invited participants from government, industry, and universities were scientists; one-third were engineers; and one-third were lawmakers.

A few dozen recommendations were made and a few dozen bills were introduced to the Assembly. Of the 25 bills that received serious consideration, at the end of the Assembly session (16 May) 3 bills were still on the floor, 12 had passed the Assembly but were designated for out-of-session study in the Senate, 5 more were on the governor's desk with 900 other bills, and 5 were law. None was voted down. This record should be interpreted in light of the fact that it normally takes 3 years to get a new bill through one house.

It must be emphasized that it is impossible in this aspect of government to specify exactly just what results from what, and in the present case many factors beside the conference contributed. The 22 bills are energy-related and were introduced by members who participated in the conference. All of the delegates, both scientists and legislators, agreed that they learned much from the experience, and all have been lavish in their comments about each others' expertise in their areas of specialization.

The prime conclusion to be drawn is that our complex societal problems require the joint collaboration of experts in many disciplines. Only by working together can they reach constructive conclusions.

SEVILLE CHAPMAN
Assembly Scientific Staff,
The Assembly, State of New York,
Albany 12224

Brewster Denny's editorial reminds us of the many problems facing science professionals engaged in public affairs. As scientists, we are convinced that we have something to contribute to the "very quality of local and state government itself . . ." which Denny concludes is an essential objective for scientists and engineers.

An important focus for scientists who are seeking to bring citizens "up to a level of understanding at which decisions involving technical issues can be made" is the state legislature. The state legislature represents a cross section of public opinion and, as such, offers the scientist more direct access to the public. Executive branches of government, both state and federal, have been guilty in recent years of using scientific and technical information poorly (*1*). For this and other reasons, the legislative branch of government has taken up the challenge to develop its own resources for making science policy. With such resources, the legislative branch is not intimidated by the expertise in the executive branch.

Scientists can have many roles in this struggle for political power. One of the obvious ones is to seek election in state and local government. Other roles include working *directly* with those who are in the political arena and demonstrating that sophistication in science and technology is politically valuable. These roles require that scientists develop an appreciation for the political environment and new communication skills. Any success that scientists enjoy in improving public policy will derive from their integration with the political process, not from their standing as a separate constituency. In general, it is the scientists who must take the first step toward establishing credibility if our contribution to public policy is to be effective.

In Illinois we are developing an armory of science-in-public-policy devices to test and implement these ideas. Sangamon State University, in the state capital, is in a good position to explore new roles for scientists in state government. One science faculty member has taken leave to work full time as a technical analyst to the Illinois House Energy Crisis Investigating Committee. New roles for scientists are being developed through the university's legislative internship program, more than a decade old, which is in its second year of vigorous recruitment of graduate students with science or engineering backgrounds. In 1974–75, such interns will work with both partisan and nonpartisan staffs. A staff scientist now works in the bicameral and bipartisan policy research unit of the legislature—The Illinois Legislative Council. New and unique relations between the legislature and academic scientists are being developed with the cooperation of the major institutions of higher education in Illinois.

JOHN W. AHLEN
J. C. KELLETT, JR.
Illinois Legislative Council,
M-9 State House, Springfield 62706
PETER KAKELA
Illinois House Energy Crisis
Investigating Committee,
M-9 State House, Springfield

References

1. F. von Hippel and J. Primack, *Science* **177**, 1166 (1972).

Genetic Counseling and the Law

Margery W. Shaw's editorial on genetic counseling (17 May, p. 751) offers a good case for a rule of law which protects us from individualized ethical codes. I do not believe it narrows our options when we support life, particularly unborn human life. Law narrows a lot of "options." It limits my taking another's property, another's life, another's right to clean air and water, and so forth.

Justice Marshall, who concurred in the Supreme Court decision in Roe *v.* Wade on elective abortion, wrote in his opinion on another life-and-death matter, capital punishment (Furman *v.* Georgia), that the Eighth Amendment to the U.S. Constitution is our