munity was a special bonus. The few Survey employees who already have moved there appear pleased. Reston people gripe about the special fees and other costs associated with maintaining play areas, parking lots, and other common property, but these burdens seem tolerable.

In short, the decision to put the Survey headquarters in Reston was felicitous. It is not at all certain, however, that Congress will appropriate the money to begin construction next year, or even that the President will include a request for such funds in his budget. The budgetary exigencies of the Vietnam war leave little room for optimism. Yet to postpone this Survey project would delay not only construction of a much-needed government facility but also the government's taking a possibly critical role in an experiment for meeting urgent problems of urban culture.

—LUTHER J. CARTER

Thermal Pollution: Senator Muskie Tells AEC to Cool It

The growing number of nuclear power plants scheduled for construction in the United States is forcing greater attention to the pollution associated with the production of this power. This concern is not only dictated by the necessity for arranging safe disposal of radioactive wastes but also by the great quantities of heat which such plants transfer into the water used for cooling.

During the past few years, Congress has passed significant water-pollution and air-pollution legislation. [The Air Quality Act of 1967 (*Science*, 20 October) passed the House of Representatives by a 362–0 vote on 2 November, thus removing the last real obstacle to presidential signing of the bill.]

Last week, the key member of Congress on pollution matters, Edmund S. Muskie (D–Maine), chairman of the Senate Public Works Subcommittee on Air and Water Pollution, served notice that nuclear power plants might be next on the congressional pollution-control agenda. On 30 October, Muskie announced that his subcommittee would hold hearings in New England on water pollution from nuclear power plants after congressional adjournment. If Muskie finds pollution from nuclear plants a potential problem in New England, he will expand his hearings to encompass the rest of the nation as well.

Muskie's decision was prompted by concern over two planned nuclear power plants in New England. The first is the Vermont Yankee plant, which is to be located in southeastern Vermont just north of where the Connecticut River flows into Massachusetts. As initially proposed, Muskie noted, this Vermont plant would require 60 percent of the maximum flow of the Connecticut River for cooling and would discharge heat that would raise the temperature of the river 15 to 20 degrees. (An Interior Department water-pollution-control official has commented that such a massive discharge of heat would "kill" the river biologically; "the Connecticut River would become a cooling system for Vermont Yankee," he said.) A second proposed nuclear power plant which bothers Muskie is one to be built in his home state of Maine on Bailey Point, Wiscasset, which is northeast of Bath and north of Boothbay Harbor. On 5 October, the Atomic Energy Commission (AEC) announced that the Maine Yankee Atomic Power Company had applied for a permit to build a plant at the Maine site; Muskie wrote the AEC that he was worried about "potential thermal and radioactive pollution hazards . . . to Back River and Montsweag Bay." Although Muskie has so far confined himself to commenting on these New England plants, he is well aware that possible pollution from nuclear plants has aroused concern in several sections of the nation; for instance, there is controversy in Oregon and Washington about nuclear plants to be built along the Columbia River and also in New York about such projects on the Hudson River.

Since the AEC must grant licenses for privately owned nuclear power plants, Muskie contends that the commission has the responsibility for seeing that thermal pollution from such plants will be controlled under the provisions of the Water Pollution Control Act and of Executive Order 11288 which implements part of the act. In writing to the AEC, Muskie has cited Section 7 of the executive order which calls for agency review of facilities and operations supported by federal loans, grants, and contracts to determine adherence to water-pollution control and which states that such control needs shall be considered in the planning for each new installation. Muskie contends that AEC licenses are as much contracts as are the insurance agreements entered under the Price-Anderson Act. Among the standards of the executive order which Muskie cited were:

> If discharge of cooling water is expected to create problems by significantly increasing the temperature of the receiving waters, facilities shall be installed, or operating procedures shall be established, to maintain water temperatures within acceptable limits.
>
> No waste shall be discharged into waters if it contains any substances in concentrations which will result in substantial harm to domestic animals, fish, shellfish, or wildlife, if methods of treatment or disposal are available that will remove or render harmless such pollutants. If such methods are not available, but can reasonably be developed, they will be developed and used at the earliest possible date. A determination that such methods are not available or cannot reasonably be developed will not be made without the concurrence of the Secretary of the Interior.

Muskie made his views known to AEC Chairman Glenn T. Seaborg on 20 September in a letter questioning an AEC statement that the commission could not deal with thermal water pollution caused by the proposed Vermont plant. In that letter, Muskie said that "it is the opinion of the Senate Subcommittee on Air and Water Pollution that excessive heat is as much a pollutant as municipal wastes or industrial discharges." Muskie asked Seaborg for a prompt reply.

On 23 October, Muskie received his reply, but it was signed by Harold L. Price, the AEC Director of Regulation, not by Seaborg. (It is fairly common to have lower-ranking agency officials answer letters from congressmen, but it

A POINT OF VIEW

Representative Emilio Q. Daddario (D–Conn.), chairman, House Subcommittee on Science, Research, and Development, address to the National Academy of Sciences, 23 October.

. . . The legislator who is active in science policy walks a kind of tightrope which is kept in tension by the press and his colleagues who may be either uninterested or uninformed. If he is sympathetic to science and exhibits an understanding of the very real problems which may exist today in carrying on research and teaching, he may be called a "patsy" for the scientific community. If he appears too incisive in his questioning of a witness or casts a vote . . . against a technical authorization, he may be relegated to the ranks of neanderthal reactionaries. With scientists the same abrupt categorizations often occur. The person who gives up weekends to the Academy or other advisory committees, who develops a liaison with industry, or speaks out in his own right on public issues is suddenly somehow impure. His peers may detect the odor of the political arena and the hedonistic sounds of the secular world. On the other hand, if the scientist closes the door to his ivory tower (assuming there is still such a thing) and prefers to concentrate on his experiments, he may be regarded as rejecting reality and shirking his duty in the "new priesthood."

is not usually considered a practice which will best assuage the doubts of a troubled legislator.) In his reply, Price said that the agency believed that "AEC's licensing and regulatory authority is limited essentially to radiological health and safety and the common defense and security. . . ." Although the AEC complied with the Federal Water Pollution Control Act with respect to discharge of water from its own installations, Price stated, the commission did not feel that it had gained additional regulatory authority from the Federal Water Pollution Control Act or Executive Order 11288 over those plants licensed by the commission.

The AEC response did not satisfy Muskie. Soon after receiving Price's letter, he wrote again directly to Seaborg, citing the provisions of Executive Order 11288 and bluntly stating that "the Federal Water Pollution Control Act and Executive Order 11288 do not exempt the Atomic Energy Commission." Muskie posed new questions to the AEC and concluded by asking, "What plans, if any, does the Atomic Energy Commission have to clear up any pollution problems (including thermal and radioactive waste)?" in connection with the proposed Maine and Vermont atomic power plants. A few days later, Muskie announced that he would hold hearings on the subject "in response to the increasing public concern regarding the Atomic Energy Commission's policy of granting licenses for nuclear power reactors without giving due consideration to the effect of waste heat on state water quality standards." As of this writing, the AEC has made no further response to Muskie's volleys.

The battle which is raging over the Vermont plant is indicative of what will happen elsewhere in the nation. The struggle is influenced by at least two concurrent developments: (i) the rapid progress of decisions to build nuclear power plants and (ii) the establishment and federal approval of state water-quality standards. Massachusetts, for instance, received federal approval of water-quality standards which would allow no increase of temperature on the Connecticut River. Massachusetts authorities, as well as officials in New Hampshire and Vermont, have objected to the great heat increase associated with the proposed plant. Jacob I. Bregman, the Deputy Assistant Secretary of Interior for Water Pollution Control, said that the Commonwealth of Massachusetts could take legal action against a plant like Vermont Yankee for violating the approved standards and that, indeed, the federal government would "take them to court" if they violated these standards. Bregman said that many states were proposing water standards which did not allow temperature increase in interstate streams, a standard which his department was "very enthusiastic about."

Bregman added that "no one foresaw the magnitude of the thermal pollution problem." He argued that a substantial technological breakthrough was needed to help avert the environmental changes which would be caused by the release of great quantities of heat from nuclear power plants. Bregman hopes that the heat from these facilities can be used in a positive manner by industries which could be built adjacent to the nuclear sites.

Ironically, the nuclear power plants, increasingly criticized as polluters of the nation's waters, owe part of their popularity to their reputation as a "clean" method of power production. As AEC Chairman Seaborg said in a New York City speech on 2 November, "another advantage of nuclear power plants is that there has been a growing awareness of their advantage as clean sources of power. . . . In fact, some utilities have chosen nuclear power . . . even in borderline economic situations because of the contribution to the reduction of air pollution."

So far, the subject of pollution caused by nuclear power plants has received relatively little attention in Congress. The question is occasionally raised in the Joint Committee on Atomic Energy; for instance, last year Chet Holifield (D–Calif.) told the AEC witness that the committee had received complaints that the release of heat at Hanford was affecting fish life in the Columbia River. The Joint Committee, however, is committed to the rapid development of nuclear power production, and the question of pollution from these plants is likely to receive a more comprehensive public examination from the Senate Subcommittee on Air and Water Pollution.

Muskie's subcommittee has already examined one aspect of radioactive pollution. In May 1966, the subcommittee held a hearing on radioactive water pollution in the Colorado River Basin from piles of uranium-mill tailings. Although Muskie has initially expressed his concern about thermal pollution from nuclear power plants, there is no reason why his hearings could not be expanded to include radioactive waste disposal as well. The entire subject of pollution from nuclear power plants could well be a logical third problem around which to orient the subcommittee's work after the partial completion of its examination of water and air pollution.

—BRYCE NELSON