to be imprudent and unwise, primarily because of the pressure it would place on our supply of coal.

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I regret that my article inadvertently failed to make clear that the hypothetical moratorium in question would apply only to the construction of *additional* nuclear power plants.—A.L.H.

Oil Spills: Risks and Relevance

Philip H. Abelson's editorial "Oil spills" (14 Jan., p. 137) quite properly calls attention to problems raised by the use of such terms as "disaster" and "ecological catastrophe" to describe the sinking of the tanker *Argo Merchant* off Nantucket Island. His editorial also demonstrates the inadequacy of our procedures for disseminating findings such as those in the National Academy of Sciences' report *Petroleum in the Maritime Environment* (*1*).

However, the editorial is seriously misleading in its bland conclusion that "Incidents of this kind should be avoided and the perpetrators should be forced to pay for any demonstrable damage." First, our government has long since decided that there cannot be adequate compensation for many insults to the environment, and the regulation of potentially harmful behavior has been given a higher priority than compensating mechanisms. Second, even if there is no damage from this oil spill, even if there has never been serious damage from previous oil spills, the *Argo Merchant* incident raises in a dramatic way some major issues of science-related public policy that are of increasing interest to *Science*'s readers. For an editorial in *Science* to focus on distortions in the press and on the difficulty of establishing "demonstrable damage" strikes me as an unfortunate lost opportunity.

All uses of high technology involve risk, and the oil spill from the *Argo Merchant* raises the question of how much of a risk we are willing to take to obtain petroleum. Rather than risking the consequences of badly maintained and badly navigated oil tankers in coastal waters, we could substantially reduce these risks by properly enforcing existing regulations.

Why aren't these regulations enforced? What are the necessary risks of transporting oil? Who is to determine what are the relevant scientific "facts," and who is to judge the relevance of these facts for the national welfare? There are no easy answers to these questions—nor to most questions of technology management. But they can never be answered unless they are asked.

It seems to be true that this oil spillage did not lead to an ecological disaster, but it nevertheless did reveal the near-disastrous inability of our institutions to make and enforce public policy on scientific-technological issues. This is the true relevance of the sinking of the *Argo Merchant*.

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References

1. Ocean Affairs Board, *Petroleum in the Maritime Environment* (National Academy of Sciences, Washington, D.C., 1975).

In his editorial on oil spills, Abelson concludes that ecological catastrophe from oil spills is only talk and has no basis in fact. This seems to be true only when one bases these conclusions on the kind of data arising from studies following emergencies from accidental spills. Loss of seabirds, seals, and fishes are the subjects mostly reported, while the largest biomasses of the oceans, the nannoplankters, have been ignored.

During World War II, German submarines sank many oil tankers along the coastal waters off North Carolina. The ensuing oil spills, which I studied, resulted in much environmental degradation. Some of the most productive areas of eelgrass and clams have not yet recovered. The principal perturbation was not injury from toxins of the oil itself, but from apparently unsuspected high concentrations of some lipid-soluble metals derived from the tolerant concentrations in the ocean. Toxic levels of these metals were concentrated in the oil in the euphotic zone and were released as the hydrocarbons were degraded. In choppy waters the oil is not confined to a thin film of petroleum, but forms an emulsion to considerable depths. My comparisons of the nannoplankton upcurrent to downcurrent from oil rigs off Galveston, Texas, in 1975, and off Louisiana in the summer of 1976, indicate acute toxic effects to the nannoplankton in downstream sectors as well as lower species diversity and, therefore, lower water quality. However, increases in populations of fishes tend to occur around the rigs, which are associated with food organisms that foul these rigs.

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