by arms control advocates are valid. What to do about it is another matter. Even within the arms control community there are some analysts who argue that it is too late to do anything and others who believe that not too many countries will decide to build bombs anyway, regardless of their opportunities. But the debate is far from over and the political action is just beginning. Nonetheless, there seems to be considerable merit in the view advanced by many arms control analysts and articulated by Victor Gilinsky, a physicist and former analyst for the Rand Corporation who is now a member of the Nuclear Regulatory Commission, that "delay of plutonium separation is the only effective safeguard available at the moment." That is, if the spread of nuclear fuel technologies cannot be stopped or at least slowed significantly, then the path to nuclear power does appear to lead to proliferation.

—ALLEN L. HAMMOND

National Environmental Policy Act: Critics Say Promise Unfulfilled

Since the National Environmental Policy Act (NEPA) was passed 6½ years ago, it has become one of the best known of all federal laws. Thousands of "environmental impact statements," prepared pursuant to NEPA's now famous section 102, have been issued by federal agencies. And hundreds of lawsuits—a year ago the total stood at 654—have been brought, alleging violations of the act by the federal agencies responsible for building, financing, or permitting various kinds of projects, ranging from oil pipelines to dams and highways. Moreover, federal judges have ordered scores of such projects held up or stopped, although in all but a very few cases the injunctions have been lifted after the agencies involved have come back with acceptable "102 statements," which sometimes have run to thousands of pages.

In light of all the activity generated by NEPA, which attracted little notice or controversy during the period of legislative gestation that preceded its enactment, a careful evaluation of this surprising statute and its implementation obviously is in order. Over the past year, several such general evaluations have in fact been undertaken, chiefly by the Council on Environmental Quality (CEQ), by a House subcommittee on conservation and environment, and by a conference sponsored by the American Bar Association's Center for Administrative Justice and the Environmental Law Institute. The judgments have been quite mixed.

Nearly everyone agrees that NEPA has led to significant procedural reforms within the federal bureaucracy by forcing agencies to look at the environmental impact of their proposed actions and defend those actions in light of all reasonable alternatives. Furthermore, inasmuch as 102 statements are public documents and are subject to formal hearings, a vast amount of information is made public which otherwise would remain hidden in agency files.

Indeed, the Freedom of Information Act itself has not done as much as NEPA to make information publicly available in the important fields of environment protection and energy resource development. Also, if it were not for the 102 statements and their discussion of the alternatives to actions being proposed, there might be no systematic analysis of alternative "futures" whatever going on in Washington.

Indigestible Statements

But, at the same time the good news about NEPA is acknowledged, the bad news about this statute—or, more particularly, about its implementation—is also recognized. In particular, the hallmark of NEPA is the bloated and partly indigestible impact statement, from which the serious reviewer must try to dig out the relevant information from a mass of irrelevant material. Also, the analysis of alternatives is often weak and seems pro forma, indicating a failure to make the preparation of 102 statements an integral part of agency decision-making.

It is true, too, that 102 statements often do not contain the scientific information that is needed if the consequences of alternative courses of action are to be foreseen—a problem explored in some depth in a report issued last year by the Institute of Ecology. But the absence of good baseline information and the difficulty of predicting the behavior of complex ecological systems makes this failing readily explainable at least.

On 14 June, the CEQ issued a report on the first 6 years' experience with NEPA, and its conclusion was that NEPA is "working well." For instance, the report cites the findings by an interdepartmental task force that within the Department of the Interior—the agency responsible for energy resource development in the West, in Alaska, and offshore—there is "overwhelming support by nearly all bureaus for NEPA" and that the benefits of NEPA are seen to far outweigh any delays or other impacts on Interior programs.

The CEQ went to special pains in releasing the report to dispel any idea that NEPA is causing unwarranted delays in construction projects, and thus aggravating problems of unemployment and energy development. Russell W. Peterson, chairman of the council, commented that, while there were substantial problems of delay in the early years of NEPA, such problems are now diminishing as agencies improve their environmental expertise and prepare 102 statements earlier in their planning and decision-making process.

The CEQ, created under NEPA as part of the Executive Office of the President, might be suspected of self-serving motives in putting out such a report in an election year. But, actually, the report dwells at length on the need for Interior and other agencies to improve their analysis of environmental impacts and policy and program alternatives. "Agency leaders need a clearer understanding of the potential of the [102 statement] process as a management tool," the report said.

Along with holding oversight hearings on NEPA last year, Representative Robert L. Leggett (D–Calif.), chairman of the House subcommittee on conservation and environment, commissioned the Congressional Research Service of the Library of Congress to conduct a NEPA workshop. By and large the workshop participants—they included two former members of CEQ, several environmental lawyers, and some representatives of the growing body of "NEPA scholars" at the universities—agreed that NEPA's full promise will not be realized until the Ford Administration

or some successor administration becomes deeply committed to the act's policy goals.

Those goals are broadly stated in the act as ringing exhortations which may never prove enforceable. But they may have enough content to be an effective guiding influence for policy-making in any national administration inclined to embrace them.

Lynton K. Caldwell, professor of public and environmental affairs at Indiana University, observed that judges have had to become the true enforcers of NEPA because of the lack of commitment on the part of those in power. In his view, this failure of commitment is attributable to an overriding economic orientation molded by the depression of the 1930's. He suggested that, perhaps only if controls on economic growth are instituted to curb consumption and resource depletion, will NEPA become truly effective.

The 3-day conference held in early June by the Environmental Law Institute (ELI) and the Center for Administrative Justice was attended by about 140 persons from federal and state government, environmental law groups, private consulting firms, and the like. Frederick R. Anderson, director of the ELI, said that the conference—like the Leggett hearings of last fall—had pointed up for him the bureaucracy's acceptance of NEPA. "The bureaucracy has swallowed the hook," he told *Science*.

But Anderson expressed concern that the Supreme Court, by its 28 June decision overturning a lower court ruling in Sierra Club v. Morton, may have set back efforts to have the agencies follow NEPA precepts in their broad-scale planning. In this important case, the U.S. Circuit Court of Appeals for the District of Columbia ruled last year that the Department of the Interior and other agencies must issue a "programmatic" impact statement covering coal development on federal lands for the entire Northern Great Plains region. Or, in

Kachemak Bay: Oil Spill Leads Alaska to Reverse Drilling OK

A small but dramatic oil spill from a drilling rig stuck in Kachemak Bay in lower Cook Inlet, Alaska, has led to the resolution of a bitter 3-year battle over plans to drill for oil beneath some of Alaska's richest marine habitat. As a result, the state has reversed its position on drilling in the bay and is now planning to buy back a lease it sold 3 years ago. Many Alaskans, however, see this as a classic case of doing the right thing for the wrong reason (*Science*, 18 July 1975, p. 204). The state's fishermen and environmentalists believe the lease should never have been sold in the first place.

The subject of the dispute was 5000 acres of sea bottom in Kachemak Bay that were leased in 1973 as part of a much larger sale by the state of offshore drilling rights in the lower Cook Inlet area. At the time of the sale, local fishermen and marine scientists warned that even a relatively small oil spill in the bay could be disastrous for the area's important fishing industry. And some scientists working for the Alaska Department of Fish and Game and the National Marine Fisheries Service argued against the sale on grounds that Kachemak Bay is an important nursery area for the nationally important Gulf of Alaska fishery.

The sale of the Kachemak Bay lease became a major issue in the 1974 gubernatorial campaign. The victor, Jay Hammond, who won by a slim margin, urged that the state buy back the leased land in the bay in order to protect its ecology.

Ironically, fishermen sued the state after Hammond's election, claiming that the sale of drilling rights was illegal. Among other things, they argued that there had been insufficient notice of the sale and inadequate time for them to be heard. Last summer a district court in Anchorage dismissed the suit on procedural grounds. The fishermen appealed to the Alaska Supreme Court, asking it to order the lower court to hear the case on its merits. By early May the court still had not ruled. But now the issue may be moot.

Shortly after the lease sale, the new leaseholders contracted for an exploratory oil rig to drill test wells. The rig, called the *George Ferris*, arrived in Kachemak Bay about the time the lawsuit was filed and has since sat idle.

On 4 May the *Ferris*'s owners announced that they were going to move the rig further up Cook Inlet to drill for another company while the Kachemak Bay suit was being resolved. But as the rig was being prepared to be towed out of the bay, its legs became mired in the 80-foot-deep mud of the sea floor. Two of the legs broke during attempts to free the rig, leaving it anchored in the mud and subject to flooding by the tides which were running 20 feet or more.

So there was the *George Ferris*, stuck in the mud, with more than 30,000 gallons of diesel fuel on board. Two oil containment booms were rigged while work crews tried to drain the fuel tanks into barges and boats, and the Coast Guard was notified of a potential spill.

The state's newspapers carried front-page stories detailing the rig's problems and quoting a host of authorities on the dangers facing the aquatic environment if the oil escaped. Most of the oil on board was successfully drained, but, as the waters rose higher in the spring flood tides, oil from machinery and tank walls was washed into the sea. Then a work boat accidentally pushed an oil containment boom aside, allowing oil to flow into the open water where it created a slick more than 2 miles long. Alaska's newspapers carried aerial photos of the rig trailing the oil slick across Kachemak Bay and quoted biologists who were worried about the hazards posed to seabirds, shrimp, crab larvae, and other aquatic life.

Faced with evidence of potential disaster, the sometimes lethargic Alaska state legislature acted swiftly during the last 2 weeks of its session to authorize the governor to buy back the Kachemak Bay acreage. The new law gives the state a year to negotiate with the leaseholders for a mutually agreeable buy-back price. If no agreement is reached, the law authorizes the state to condemn the leases.

Although the spill was minor, a little oil goes a long way on water, and it was a dramatic example of what could happen. The incident leaves a sour taste in the mouths of many scientists and officials who—although pleased that the legislature acted—had argued that the Kachemak Bay area was too valuable a habitat to put at risk. In the words of one state official who has been dealing with the issue from the start, "It was just dumb luck that the spill wasn't 30,000 gallons or 30,000 barrels."—MARK PANITCH

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other words, these agencies were told they could not get by simply with a series of impact statements covering bits and pieces of the overall development. By its reversal of the court of appeals, Anderson is afraid that the Supreme Court may have given further encouragement to the natural tendency of agencies to "gerrymander" problems to suit their bureaucratic or political convenience.

Such apprehension on the part of Anderson and other followers of the NEPA process appear well taken. What now seems to have been a classic failure to observe NEPA's letter and spirit can be seen in the Trans Alaska Pipeline (TAPS) project. The Department of the Interior spent $9 million producing a huge 102 statement on TAPS; but it now seems self-evident that the environmental and economic advantages of the trans-Canada alternative were never properly analyzed and presented.

Just as some independent economists were predicting more than 3 years ago, most of the oil from the North Slope will be needed not in California—where the TAPS pipeline-tanker system is supposed to begin delivering it in 1978—but in the Midwest. In fact, officials at the Department of the Interior and the Federal Energy Administration have indicated recently that, ultimately, Alaskan oil may have to be sent to Japan in exchange for other oil to be imported from abroad.

Such an exchange, requiring an amendment to the Trans Alaska Pipeline Act, would be a makeshift and hardly desirable solution to the problem in light of the need to reduce dependence on insecure foreign sources. Friends of NEPA believe that such gross miscarriages in economic and environmental planning could be avoided through better use of this statute and its only partially tapped potential.

—LUTHER J. CARTER

British Science Policy: Assuming a Lower Profile

London. The British government has quietly reorganized its machinery for providing science advice at the top and in the process has abolished the office of Science Adviser to the Government. The action came a few weeks after the resignation of Harold (now Sir Harold) Wilson from the office of Prime Minister and furnishes a pertinent postscript to the Wilson era.

Wilson, Prime Minister for eight of the past dozen years, was his country's dominant political figure during a time when the British set out to employ science and technology more systematically than ever before to achieve economic and social goals. The effort, by and large, proved disappointing, and when Wilson returned to office in 1974, the Labour government's enthusiasm for science and technology had perceptibly flagged.

Abolition of the science adviser's job, therefore, came as no great surprise. The post had not been formally filled since Sir Alan Cottrell left in 1974 for the headship of a Cambridge college. Robert Press, a career government scientist, had performed the duties of science adviser but had not been accorded the title. And in February, Wilson, in response to an inquiry about the post from the chairman of the House of Commons Select Committee on Science and Technology, said that circumstances within government which had prompted creation of the science adviser's job had altered. When Press in turn announced his retirement, it was assumed that changes would be made.

The government's actions have been questioned in Parliament and in the scientific community and the science press, but the reaction in no way compares in intensity with the protest in the United States when President Nixon, in 1973, relegated the White House science office and his science adviser to the National Science Foundation. The response has no doubt been tempered in Britain by a recognition that the government has essentially formalized what was already, de facto, done.

In an official explanation, transmitted to the science subcommittee of the Commons Select Committee on Science and Technology in a memorandum from the Lord Privy Seal—a nice anachronistic touch—the government points to changes in science advisory arrangements in recent years.

A major source of these changes was a controversial report on the organization of science, written in 1971 by Lord Rothschild, then head of the Central Policy Review Staff (CPRS) in the Cabinet Office, which provides staffing for the Cabinet. What stung the scientific community at the time was Rothschild's recommendation that part of the funds then spent by the five semiautonomous research councils for basic research be shifted to the authority of the appropriate departments to finance mission-oriented research (*Science*, 24 May 1974).

There was also some alarm about a Rothschild proposal that more research be commissioned under terms more closely approximating the customer-contractor relationship prevailing in successful industrial research. A major aim of the report was to make departments with R & D responsibilities more accountable in this realm and to strengthen departmental science advisory machinery. Overall, says the Lord Privy Seal's memo, "the principal objective was a decentralized form of organisation and management to improve the efficient planning of R & D within (functional) Departments, but with sufficient cooperation and coordination."

Wilson noted last February that most of the major departments have appointed chief scientists and that, therefore, what was needed was not centralized science advice but stronger central coordination. Wilson added that "creation of the Central Policy Review Staff as a multidisciplinary body of advice to the Cabinet also added a new dimension." The CPRS will apparently be counted on to oversee coordination; the reorganization plan includes appointment of a "chief scientist" to the CPRS.

The CPRS was set up as a think tank in the Cabinet Office by Edward Heath after the Conservatives won office in 1970. Heath apparently disliked formal committees and intricate staff structures, preferring to rely on task forces, which would be asked to work on specific problems and then dissolve themselves, and on CPRS for policy analysis somewhat independent of the civil servants who