people credit for knowledge and experience gained outside of college.

Instead of advocating more diversity within institutions, the report calls for more differentiation among them. Those students who prefer the ivory tower, for example, should have the opportunity to choose football-teamless "research universities." At another extreme would be disembodied "television colleges." The report recommends other "new special-purpose institutions" which would have the distinctness of personality which once belonged to small religious, vocational, and land-grant colleges.

The report also has a chapter on the "experiment" in minority education. Newman says he chose the word "experiment" over the objections of his teammates because colleges, despite their efforts to embrace the untouchables of yore, are still structured as "sifters of talent" for the 18- to 22-year-old "elite." The report notes that data on how minority and disadvantaged students do in college and what happens to them afterwards is scanty at best. It recommends that a thorough study be made on blacks in higher education—blacks because data on this minority is the best available.

The task force avoids spelling out specific remedies because, says Newman, "it is more important to design conditions under which people can find their own answers." The report is surprisingly free of mind-numbing talk about "motivation" and "alienation." And, perhaps because students did much of the work, many of its observations hit simple truths at a penetrating angle. For instance: "Students seem now more than ever to be making major decisions about their lives without knowing that they are making them." And: " 'Going to college' has always carried with it a measure of 'you can't go home again'; but today's minorities have to live with the reverse—that you can't leave your racial or ethnic identity behind."

HEW has indicated that the report has already persuaded it to take a new look at one policy: that of giving financial support only to full-time students. Newman's team sees this discrimination as being a manifestation of the attitude that part-time students are hangers-on who should either go to school full time or quit.

Newman has consented to round up some more colleagues to pursue the next step: figuring out what the federal government can do to help shove higher education down all these new paths.

—CONSTANCE HOLDEN

Trans-Alaska Pipeline: Impact Study Receives Bad Reviews

The National Environmental Policy Act of 1969 requires federal agencies to assess the ecological impact of any work they propose and to file their assessments with the President's Council on Environmental Quality.

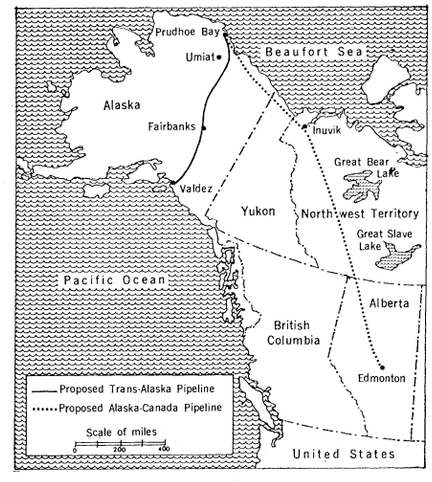
As might be expected, these reports are fast becoming the seeds of new conflict between government and conservationists over proposed dams, pipelines, and numerous other public works.

In little more than a year since the Act became law, some 400 "environmental impact statements" have poured into the Council's offices. And at least one basic lesson is emerging from this burgeoning library: The law's instructions for preparing an impact report apparently are not specific enough to ensure that an agency will fully, or even usefully, examine the environmental effects of the projects it plans.

By all accounts the reports submitted so far vary greatly in their literacy, thoroughness, and objectivity. Some may rank as scholarly, but sources close to the Council say a good many amount to little more than bald advocacy of a proposed project.

A case in point is the Interior Department's statement on the environmental impact of the trans-Alaska pipeline, sought by a consortium of seven oil companies to bring petroleum down from the vast new fields at Prudhoe Bay on the Alaskan coast of the Beaufort Sea, southward 789 miles to a terminal port at the little fishing town of Valdez on Prince William Sound. The project would include building a dozen pumping stations and a 373-mile access road along the pipeline route. Running almost due south, the line would traverse the desolate Brooks Range, reach across vast tracts of permafrost terrain, and span about 600 miles of the most seismically active land in Alaska. By 1980, the line would carry some 2 million barrels of crude oil a day down to tankers at Valdez (*Science*, 3 October 1969).

Conservationists have protested the project on numerous grounds, arguing chiefly that its construction could cause irreparable damage to fragile tundra vegetation; that it would inhibit movements of migratory animals such as caribou; that a leak in the line could



have catastrophic effects on any of the 350 major streams it would cross and on the land itself. Although a 53-mile segment of the access road leading north from Fairbanks has been completed, none of the pipeline has been laid.

The project is presently stalled by two injunctions granted by the U.S. District Court in the District of Columbia—one on a motion by three conservation organizations, and the other involving Alaskan native land claims along 20 miles of the pipeline route.

Last January, the Interior Department released a preliminary version of its assessment of how the pipeline would affect Alaska. By any reasonable measure, it was a sorely deficient job. It may have served the purpose of opening a

public forum on the trans-Alaskan route, but the ensuing torrent of conflicting commentary, reviews, and criticism has not abated yet.

The impact report concluded that environmental damage caused by the line could be held to an "acceptable minimum" and that the project should proceed. Dismissing out of hand any alternative routes or modes of transporting oil down from Alaska's North Slope, the Interior Department's statement contended that prompt construction of the pipeline would reduce the nation's need for imported oil, thereby helping to stem the flow of dollars abroad and to bolster the national security by lessening U.S. dependence on the "politically unstable" nations of the Middle East.

Interior hearings on the pipeline project held in Washington and Anchorage last month produced some 400 witnesses and several thousand pages of testimony favoring and opposing the line. Since January, the report has drawn a continuing barrage of criticism from predictably outraged conservationists, and even from the Alaska district of the Army Corps of Engineers, which supports the idea of a trans-Alaska pipeline but which had few kind words for Interior's evaluation of its effects. In an acerbic review dated 5 February, the Alaska district accused the Interior Department of understating the real and potential environmental dangers of the pipeline system, found Interior's dismissal of alternatives "unconvincing," and judged that the report generally "fails to fully comply with the letter and the spirit of the Environmental Policy Act."

"It contains limited detailed analyses," the Corp's Alaska district said, adding that "Without this information conclusions on environmental effects appear to be unsupported opinions which, in fact, in many instances they indeed are."

The Defense Department's over-all review, though more diplomatic, was no less critical. Dated 3 March, the 15-page review challenged Interior's assertion that enough was known of Alaskan geology and permafrost to assess the pipeline's effects; it contradicted Interior's claims that oil spills on land can be effectively removed and the land rehabilitated; it accused Interior of "understating" the project's impact on Valdez, which probably would become an industrial center; and it asked for more discussion of alternatives to the trans-Alaska pipeline.

Up to now, the pipeline report has been faulted chiefly for its short shrift of environmental hazards. But recently the report has drawn some new and very different fire, aimed this time at the economic arguments it advanced for the Alaskan line.

The new criticism comes from economists Charles J. Cicchetti and John V. Krutilla at Resources for the Future,

Fire Ant Control under Fire

The Environmental Defense Fund (EDF) took the United States Department of Agriculture (USDA) to court last week in an attempt to halt Agriculture's proposed program to control the imported fire ant by spraying the pesticide Mirex—a program once estimated to cost $200 million over 12 years.

Questioning the harmfulness of the ants and the safety of Mirex, EDF filed a complaint against USDA last August. USDA had then already begun application of Mirex, but stopped in mid-November and announced the program would be resumed on 15 March. But in court on 10 March, attorneys for the department maintained that spraying would not begin until 1 April.

The imported fire ant, *Solenopsis saevissima*, is found in nine southern states from Florida to Texas, EDF witnesses told Judge Oliver Gasch of the U.S. District Court for the District of Columbia. Its original home is South America and it was first recognized in the United States in Alabama in 1918. It is only one of a number of species of fire ants, and the United States has three that are native. The ant, which inhabits mainly pastureland, may spread as far west as California. It also stings, and there have been substantiated reports of two human deaths. Since the 1940's, its population has peaked to nuisance levels—hence the rationale for a program of control.

EDF maintains that the imported fire ant is not harmful enough as a pest to justify the massive control program; they say there are 100 times as many human deaths from bees and wasps each year as there are from these fire ants.

Moreover, Mirex, a chlorinated hydrocarbon, has been shown to be "moderately" carcinogenic in laboratory mice. It is a persistent chemical and will enter the food chain uncontrollably, passing to ever larger organisms, just as mercury is passed from small fish along the food chain where it accumulates in big fish, and may subsequently be consumed by animals and humans.

The USDA has been trying to eradicate, or at least control, the imported fire ant for more than a decade. A massive program in which heptachlor and dieldrin were used as the pesticides was attempted during the 1950's—but this undertaking is generally acknowledged to have been a failure. Under federal-state contracts, the pesticide Mirex has been used against these ants since 1962. At one point during this latest episode, USDA was contemplating a full eradication program in which Mirex would be used as an air spray for the next 12 years over an area of 126 million acres, at a cost estimated at $200 million. Most recently, however, USDA claims it only wishes to "control" the ants, although the proposed method is the same.

The Agriculture Department has made other shifts. Under the 1969 National Environmental Policy Act, it was required to file a final environmental impact statement before the Mirex program began. Last week in court, USDA attorneys maintained that its environmental impact statement was only a preliminary document, despite the fact that spraying was to have started within a week.

USDA told the court it would file a final environmental impact statement by 18 March, and, unless restrained by the court, commence spraying on 1 April. Judge Gasch continued the case until 26 March, when the government's testimony will be heard.—D.S.

Inc., (RFF) in Washington. A nonprofit think-tank funded mainly by the Ford Foundation, RFF supports a broad range of resource management studies, but does no lobbying.

Cicchetti and Krutilla have analyzed Interior's estimates of the extent to which North Slope oil might alleviate the nation's balance of payments problems and its dependence on Middle Eastern oil imports. Drawing on a variety of government documents and statements by Interior officials, they conclude that the authors of the pipeline report seriously overestimated the future U.S. demand for imported oil; that the Interior statement failed to account for means of increasing domestic supplies of oil from the "lower 48" states; and that it exaggerated the benefits of North Slope oil to the balance of payments by at least an order of magnitude.

What's more, the two economists calculate that piping the oil south to Valdez and then shipping it to West Coast markets—the presumed destination for North Slope oil—is economically the "least attractive" of several alternatives. They contend that it would be slightly more economical to import an amount of oil equal to 1 year of North Slope production—about 730 million barrels in 1980—and store it in underground salt domes in the lower 48 states. This scheme, they say, would offer insurance for national security while avoiding the ecological risks of piping and shipping North Slope oil out of Alaska. But if oil must flow from the North Slope, they go on to say, it could be moved more profitably through Canada's MacKenzie Valley and south to Alberta—a route the Canadian government has already proposed for a natural gas pipeline of its own.

A Key Assumption

In urging that the project proceed, the Interior Department report cited a "compelling need" for Alaskan oil based partly on a "key" assumption that U.S. petroleum demands would grow by 4 percent a year through 1985. The report forecast that by 1980 the nation would need 22 million barrels of oil a day, 23 percent of which would have to come from the Middle East—a situation the report said was "inconsistent with our national security interests." It claimed that North Slope oil could reduce this dependence to 14 percent.

Cicchetti and Krutilla, however, dipped into the records of hearings before the House Interior and Insular Affairs Committee about a year ago and came up with a very different set of projections. Figures supplied by fuel industry leaders and Interior officials suggested the nation's appetite for oil is growing at an annual rate of about 2.7 percent, not 4 percent. Interior's own experts, the two authors say, set the nation's oil demand in 1980 at about 18 million barrels a day, not 22 million, and further estimated that only 4 to 10 percent of it would have to come from the Middle East.

"Accordingly," Cicchetti and Krutilla conclude, "the size of the national security benefits estimated in the impact statement is due more to inappropriate data than to reality."

The Interior report also predicted that Alaskan oil production would reduce dollar drains to pay for foreign oil by $470 million to $680 million a year. Cicchetti and Krutilla estimate this balance of payment benefit would be closer to $36.5 million a year.

When Interior's impact report finally arrived at the subject of alternatives to the pipeline, its authors displayed an odd set of priorities, devoting far more space to discussion of nuclear-powered submarine tankers than to the Alaskan route's leading competitor, the proposed trans-Canada pipeline. This route would convey the oil 400 miles east to the MacKenzie Delta, then 1300 miles south to Edmonton, Alberta. From there the oil would be distributed through existing lines to the United States. In recent weeks several Canadian officials have made warm overtures encouraging U.S. consideration of an international Arctic pipeline system along this route. The impact report observed, however, that such a scheme would merely "shift the location of ecological problems rather than cure them."

Since Interior offered no quantitative assessment of a Canadian route, Cicchetti and Krutilla supply their own; they calculate that oil sold to midwestern and eastern U.S. markets via Canada would bring an additional profit of about 10 cents a barrel over oil shipped through Alaska and carried by tanker to West Coast markets.

Their arithmetic raises an interesting question of why oil companies are so diligently pressing for a trans-Alaska pipeline. One common supposition is that the industry plans to sell a considerable fraction of Alaskan oil to Japan. Valdez would make a convenient loading point for supertankers bound in that direction.

Litigation will probably stall the project for at least another year. And last week, William D. Ruckleshaus, chief of the New Environmental Protection Agency, asked Interior not to grant right-of-way permits for the Alaskan line until it has studied the trans-Canadian route in detail. Ruckleshaus said in a letter to Interior Secretary Rogers C. B. Morton that this route would avoid the "general adverse effects of tanker traffic" between Valdez and West Coast ports, a point raised recently by several members of the Canadian Parliament concerned about the likelihood of oil spills along the Pacific Coast. Adoption of the MacKenzie Valley route, however, is likely to raise objections by conservationists on the grounds that it would slice through Alaskan and Canadian arctic wildlife refuges. Although Secretary Morton has said the Canadian route would be seriously considered, along with other alternatives, such magnanimity may serve to place him at odds with President Nixon, who is said to favor the trans-Alaskan pipeline.

The Courts' Responsibility

Meanwhile there remains the problem of ensuring more satisfactory evaluation of the environmental impact of major public works. Observers of the Environmental Quality Council's workings feel that in the longer run it may be up to the courts to oblige agencies such as Interior to produce detailed and objective impact reports.

It is worth noting that one of two injunctions against the project was granted in part because Interior failed to file a proper environmental impact statement. There is good reason to believe the present report won't do the job either. The Alaska district of the Corps of Engineers has also observed that Interior's summary consideration of alternatives "may not be legally sufficient" to satisfy the Environmental Protection Act. Certainly the Corps should know: last month a Federal district judge issued a permanent injunction barring the Corps from finishing a dam on the Cossatot River in Arkansas. The court acted on the grounds that the Corps had prepared a poor evaluation of the dam's environmental impact.

—ROBERT GILLETTE

Erratum: In the report "Sex attractant in a brown alga: Chemical structure" by D. G. Müller *et al.* [**171**, 815 (1971)], allo-*cis*-1-(cycloheptadien-2′,5′-yl)-butene-1 in line 2 of the abstract and in line 4 of column 3, page 815 should read all-*cis*-1-(cycloheptadien-2′,5′-yl)-butene-1.