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ALASKAN OIL

Environment vs. Economy

A Compilation of Selected Writings

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ALASKAN OIL: ENVIRONMENT vs. ECONOMICS

The discovery of vast new reserves of petroleum on the North Slope of Alaska has led to a serious conflict between those who would develop the resource and those who place primary emphasis on the protection of the environment. A specific issue is the construction of a pipeline to transport oil across the state.

The Congress has shown a vigorous interest in these matters and has sought a broad range of perspectives on them; this compilation is a response to that interest.

The following selection of materials is designed to show the complexity and the importance of the issue. Some of the articles are analytical; others show a preference for one side or the other of the development-protection issue.

Alaskan oil pipeline controversy tests environmental legislation

Hearings held in Washington last week on the Interior Department's draft environmental impact statement on the trans-Alaska oil pipeline make it increasingly apparent that the issue goes far beyond engineering. As former Interior Secretary Stewart Udall put it, "It's a test of the Administration's intentions on environmental issues and of the National Environmental Policy Act of 1969 (NEPA)."

Questioning the price of progress reasoning used to justify the project, Sen. John D. Dingell (D-Mich.), original author of the NEPA legislation, said the "statement does not comply with the terms" of the act. "We can no longer accept the environmental hazards involved in doing things in the cheapest possible manner," he said. Russell E. Train, chairman of the Council on Environmental Quality (CEQ), which must give its approval before issuance of a construction permit, said that "before we go ahead, I think we must be satisfied that this is the best alternative."

Alyeska Pipeline Service Co., a combine of seven oil companies that plans to build the 800-mile line from the North Slope to Valdez, has yet to present specific design plans for the entire haul road and pipeline.

Alyeska spokesmen say they intend to submit such data for segments of the route as construction proceeds. Alaska Sen. Mike Gravel (D) testified that, despite the dispute over the adequacy of pipeline design at this time, "for reasons of expediency" the construction should begin no later than September of this year "to ascertain proof of the design's integrity."

Alaskans are by no means in agreement on this point. State senators divided evenly recently on a resolution asking for added environmental and economic data on moving Alaska oil through a Canadian pipeline to Midwest markets, a route that Canadian Energy Minister J.J. Greene says would save 30 cents a bbl at Chicago over the Alaskan route.

Frederick A. Lang, an expert witness on pipeline safety and design for the state of Pennsylvania and the U.S. Department of Transportation (DOT), said that the safety standards and regulations with which the pipeline must comply as stipulated by the Interior Department are "woefully inadequate." He said these standards allow "over-stressing of the steel to a very dangerous stress level of 72% of yield." Hundreds of miles of the 48-in.-dia steel pipe are already stockpiled in Alaska.

Interior Secretary Rogers C.B. Morton, testifying before the Senate appropriations subcommittee last Friday, said that approval of the pipeline is "a long way off." He said the state acted too hastily in selling the North Slope oil leases because it was not in a position to guarantee federal approval of the ensuing pipeline proposal.

Hearings on the draft statement are being held in Anchorage this week.

Views polarized by pipeline

PROS

- National security demands a domestic oil and transportation route.
- Energy needs are growing.
- Engineering feasibility will be proved as pipeline is constructed.
- The trans-Canada route is too expensive, has same environmental problems.
- The probability of spills is minimal and risks are acceptable.
- Shipping oil from Valdez to the lower 48 states is not a hazard.
- Alaska will be bankrupt by 1976 without royalty oil flowing.
- Pipeline will bring Eskimos prosperity.
- It will occupy less than 20 sq miles.

CONS

- National security should not be issue in environmental consideration.
- We should appraise consumption.
- Alyeska is proceeding too hastily, and more research is needed.
- Mackenzie Valley oil and gas corridor avoids active seismic areas.
- Inevitable spills will ruin land, drinking water and fish spawning beds.
- Report fails to recognize threat to Canadian and U.S. shores along tanker route.
- The threat to lucrative Alaskan fishing industry is not justified.
- Natives want to preserve their culture.
- Pipeline will deface wilderness.

Source: Engineering News-Record, February 25, 1971. Reproduced with permission, by the Library of Congress, Congressional Research Service, March 9, 1971.

Alaska's Dilemma

THE North Slope of Alaska has gone through all the stages traditionally associated with an oil boom in any new area. First there were the quiet years as a few companies probed unsuccessfully beneath the frozen tundra of this most northern part of the United States. Then came the discovery of the Prudhoe Bay oilfield in February 1968, the biggest ever to be found in North America. Shares rocketed on the stock exchanges, other companies came into the area jockeying for leases, culminating in the record-breaking \$900 million lease sale in September last year, and Alaskan oil has remained in the world headlines ever since.

It was a pattern of events similar to that following other big oil discoveries - in the Middle East, for instance, or in East Texas. Like the Middle East Alaska had the glamour of being a remote and previously little-known area, in which oilmen had to brave the rigours of a harsh environment. And at a time when the traditional oil-producing regions of the United States were showing a decline and the nation was having to rely increasingly on foreign imports, the North Slope play was one of the most eventful in the oil history of North America and marked the opening of a new era in US petroleum.

Why then is Alaskan oil suddenly in the centre of such controversy, involving conservation and pollution and such seemingly unrelated issues as native land claims? The necessary capital has been poured in to develop the Prudhoe Bay field and, as expected, further oil-strikes have been made, all promising to transform Alaska from one of the poorest to one of the wealthiest states in the Union. So why has the

Source: Petroleum Press Service, July 1970, pp. 241-242. Reprinted with permission by the Library of Congress, Congressional Research Service, March 9, 1971.

building of a vital pipeline across the state become bogged down in court injunctions and delays which have even begun to threaten a slow-down in the tempo of drilling activities on the North Slope itself?

Last Wilderness

The basic reasons lie in the nature of the land and of the people who inhabit it. Alaska is one of the last great areas of untouched wilderness, not only in the United States but in the world. Over 375 million acres, one-fifth the size of continental US, with a population of only some 275,000. The population density is one person to more than two square miles, compared with more than 36 people per square mile in even the relatively thinly populated state of Texas. Herds of caribou and moose roam the mountain ranges, grizzly bears inhabit the entire arctic slope, and wolves are so common that bounty hunting is still allowed in many areas. Alaska is rich in wildlife, although it is by no means "teeming with game", as vast open areas are required to support such animals. But the most important factor is that many of the native inhabitants - the Eskimos, Indians and Aleuts who make up something like one-fifth of the total population - still depend largely on hunting and fishing for their livelihood.

As the past history of industrial development in other American states has shown, little thought was previously given to conservation or the needs of the native people. The concept of "taming the wilderness" was prevalent; the slaughter of the Indians and extinction of the buffalo seemed unavoidable in the march of progress; and the "cat-skinners" - the bulldozer driver - was the modern David against the Goliath of nature, tearing up forest and bush land to make way for civilization. Today, when much of this civilization has become polluted cities and a scarred landscape, there is a sudden concern for the environment, to the extent that it has become a major political issue in the United States. In most cases it is too late to do much about conservation, and there can only be an attempt to lessen the extent of pollution. The devastation and plunder of old frontiers are but regretful memories.

But in Alaska, this is not history but here and now. Alaska is America's last frontier, in much the same position as Texas 50 years ago or California at the turn of the century. It is not only Alaskans who are

concerned about their environment and what happens to it but also many Americans from the other states. They are now well aware of the sins of the past, since they are having to live with the results, and they are determined that the same should not happen to this last frontier. This is why there is such popular support for the Sierra Club and other conservation organizations which are fighting what they regard as the encroachment on the Alaskan wilderness by the oil industry. Alaska has in fact become a major battlefield in the whole environmental issue, in which ecological considerations have to be balanced against economic development.

In view of the present climate of opinion, the oil industry would have found itself facing the same kind of controversy about environment in whatever part of the United States it had found new sources of oil and sought to develop them. Much of the present concern, in fact, stems from the pollution caused by leakages during offshore drilling in California's Santa Barbara Channel last year. It is ironic that in going to Alaska in the first major attempt ever to utilize oil reserves in the arctic regions of the western world, the oil industry should find itself encountering the most fragile of all ecological systems at a time when their efforts would be subjected to such critical scrutiny by conservationists.

Fragile Ecology

The cause of most of the ecological problems facing the oil industry in Arctic Alaska is permafrost, the frozen silt and sediment which underlies 85 per cent of Alaska - including the entire region of the North Slope - down to a depth of 1 600 feet. The stability of this permafrost is maintained by a shallow blanket of soil and vegetation which insulates it from melting during the short Arctic summer. Any removal of this blanket of tundra exposes the permafrost table underneath to the heat of the sun and it begins to thaw. Such thawing becomes a self-feeding process with each-year's freeze-thaw cycle and leads to erosion which is almost impossible to reverse. Ruts made in the tundra by heavy tracked vehicles operating in summer can in a few years cause chasms many feet deep, with ultimate results which are impossible to determine since so little is known about Arctic ecology.

This effect was simply not realized when the oil industry first began operations on the North Slope, and considerable damage was caused in the early days by moving vehicles over the tundra in summer. When the problem was understood, exploration and drilling activities were confined to the winter months and work closed down during the summer. Now the problem has been largely overcome by the use of gravel for the foundations of drilling rigs and buildings and for roads and airstrips, so that operations

can continue all the year round. The gravel is extracted from river beds in the vicinity, but so great is the quantity required that this in turn is causing some anxiety as the rivers are important fishery resources and there is a danger that they may become silted or blocked by such interference.

Pipeline Problems

However, the main problem of permafrost as it affects the oil companies is the thawing process caused by the flow of hot oil. This first becomes evident at a completed oil-well, when hot oil is brought to the surface through the entire depth of the permafrost: this could cause a considerable amount of thawing over a period of continuous production, to a radius of 50 feet or more around the wellbase. Various experiments are being conducted to overcome this, including the cementing in of an outer casing string over the permafrost interval to absorb any stresses and movement that may take place as a result of subsidence. It remains to be seen how effective such solutions will be. But for the time being, before actual production starts, the major problem is centred on the projected hot-oil pipeline across Alaska, 800 miles from Prudhoe Bay to the ice-free port of Valdez from where the crude oil could be shipped to the West Coast market.

It is over the question of the Trans-Alaska Pipeline that the industry has come up against its biggest obstacle and main opposition. To begin with, there are the sheer engineering problems involved in what is undoubtedly the most complex pipeline system ever devised; problems which are more serious than was first thought. The ideal from an industry point of view would be to bury the pipeline for the whole of its route. But this is out of the question in those areas where the underlying permafrost has a high ice content. Although the oil leaving the wellhead at up to 82°C would cool off between pumping stations, its high temperature would be maintained as a result of friction and energy input from the pumps. In fact, this is a design necessity in order to keep up the flow of oil. The heat would melt such permafrost areas, leading to subsidence and erosion which would eventually cause the sagging pipeline to break.

It is the possibility of erosion and leakages from a broken line that most worries the conservationists. It is also of course a prime concern of TAPS itself (the Trans-Alaska Pipeline System, representing Humble Oil, BP, Atlantic Richfield, and a number of other companies active on the North Slope). A route has been chosen which avoids most of the wet permafrost areas: where the permafrost is more dry,

consisting typically of coarse-grained and well-drained sediments and gravels, there should be no thawing problem. In those areas where the ice content of the permafrost is high, such as on the North Slope up to the Brooks Range, the line would be built above ground on pilings.

The present argument, and the reason why conservation groups have taken out a court injunction against the building of the line and why the Interior Department has delayed for so long in giving the necessary approval for its construction, is over the effect of a hot-oil pipeline in the so-called dry permafrost areas. Scientists with the US Geological Survey and others feel that not enough is known to be certain that erosion would not occur. It is up to TAPS to prove their case, and in the view of the Interior Department they have not yet done so. Meanwhile, experiments and tests are being made on every aspect of the pipeline. Hundreds of cores have been taken of the permafrost along the proposed route to assess the ice content in different areas; a 600-foot section of experimental pipe has been buried in a permafrost site and will be heated in order to provide data on the effect of heat on the permafrost itself and on the vegetation; and various varieties of grass are being tested with a view to the restoration and revegetation of areas of disturbed tundra.

Drawbacks Above Ground

One solution would be to build the pipeline above ground in all those areas considered doubtful – and some government scientists put this at up to 90 per cent of the entire route. (TAPS on the other hand consider that only 10 per cent need be built above ground – which shows the extent of the present difference of opinion.) But this would cause further problems. To begin with, TAPS would be most reluctant to build so much of the line above ground. It would not only cost a great deal more – and the estimates have already gone up from \$900 million to \$1.3 billion – but the pipeline would be vulnerable to accidental damage by hunters shooting game in the area and even to sabotage.

The conservation groups would also be unhappy with an above-ground pipeline. Any leaks that might occur would be far more damaging than if the line was buried. And it is thought that such an obstacle might have an effect on caribou migration, depending on how high or low the line was built. It is at this point that the Eskimos and Indians become concerned, for the line would pass through several of their traditional hunting areas. Five Indian villages

north of Fairbanks have been successful in winning a court injunction of their own against the building of the line, on the grounds that it would be detrimental to the wildlife on which they depend for a living; and this is yet another cause of delay.

But of far greater importance than this is the whole question of the native land claims. When Alaska was purchased from Russia in 1867 - for \$7 200 00, which amounted to some 2 cents an acre - the status of the native population was never fully defined. Since tribes were living in some areas which were never occupied or even visited by the Russians during their hundred-year rule, there is some force in the argument that Russia did not have the legal right to dispose of the entire region of Alaska. The Treaty of Cession provided that the natives would not be disturbed in their use and occupancy of lands then occupied by them. In subsequent legislation, Congress reserved for itself the right to determine the extent of the native title, if any, but this has never in fact been accomplished.

Native Claims

The first native claims were filed over 30 years ago, but the majority were made during 1966 and 1967. The North Slope Eskimos, for instance, filed their native land protest in May 1966, covering some 58 million acres of land north of the Brooks Range which includes all the present area of drilling and exploration activity. There are at present 40 claims filed, covering approximately 290 million acres. It was because of these that the previous Administration in October 1966 imposed an administrative "land freeze" on the disposition of federal lands in

Books Received

Selected Documents of the International Petroleum Industry 1966
Published by the Organisation of Petroleum Exporting Countries, June 1970, and available from the Information Department, OPEC Secretariat, Dr Karl Lueger-Ring 10, 1010 Vienna, Austria. 264 pages. Price \$10 (post paid).

Contains the most important oil laws and regulations issued during 1966, and new oil agreements (or amendments) concluded by OPEC member countries in that year. Major items are Venezuela's income tax law, CREPS concession agreement in Algeria, the NIOC-ERAP agreement in Iran, and the preferential factors stipulated in Libya's new concessions. Volumes covering 1967 and 1968 have already been published. In future two series will be published - the existing series continued progressively by years, with 1969 next on the list, and a new series by country giving material issued up to and including 1965.

L'Industrie du Pétrole au Liban

By Afif Zeinaty. Published by Société d'Édition d'Enseignement Supérieur, 5 Place de la Sorbonne, Paris V. (Series: *Développement Économique, XIV.*) xxii, 305 pages; 46 tables. Subtitle reads: *Le cas particulier des pays passeurs de pétrole au Moyen-Orient.*

A comprehensive study of the oil industry in the Lebanon, including legislation and the history of exploration; pipeline transport, the Iraq Petroleum and Tapline companies and transit dues; refining and distribution in the Lebanon with an analysis of prices and of each section of the market.

Short Sea and Coastal Tramp Shipping in Europe

By Stein Ovrebø. Published by the Institute for Shipping Research, Bergen, Norway. 48 pages; tables; diagrams. Price Cr 10.

L'Industrie du Gaz

By Philippe Brachey. Published by Presses Universitaires de France, 108 Boulevard Saint-Germain, Paris. (Series: *Que Sais-je? No 239.*) Second edition (revised) 126 pages; 2 maps.

Publications noted are *not* available from *Petroleum Press Service*, and should be obtained from the publishers or through a bookseller.

Alaska. This will remain in force until the question of native land claims has been settled. And since 92 per cent of Alaska is still federal land it restricts further oil and gas leasing and, of more immediate importance, holds up the granting of the necessary rights of way for the Trans-Alaska pipeline.

The freeze did not apply to issued leases, nor to lands already selected by the state. On achieving statehood in 1958 - and a major factor in making this economically possible was the Territory's oil and gas potential - Alaska had the right to select approximately 102 million acres of land. To date, the state has selected only some 26 million acres and received patent or tentative approval on 14 million acres, which include incidentally the land along the North Slope coast which made the present oil operations and the lease sale of last year possible. Further selection by the state is also held up because of the land freeze.

There is a Bill at present before Congress which it is hoped will settle the native land claims problem. It provides for a settlement of \$500 million in cash, to be paid over a 20-year period, and 10 million acres of land around the native villages. The Alaskan Federation of Natives had been pressing for 40 million acres. But a more controversial issue is the perpetual 2 per cent overriding royalty which the natives had requested on all oil, gas and other minerals produced in the state of Alaska. The Federal Administration is against this, and a possible compromise may be for the natives to retain a 2 per cent royalty for a period of ten years or until an additional \$500 million is accrued, whichever comes first.

Federal Lands

The basic difference between state and federal land as regards leasing is that the state for the most part favours the system of competitive bidding in which

selected lots are put up for lease sale at various times and go to whichever companies make the highest bids, whereas federal land has always been open to simultaneous filing. This means that any company or individual can obtain mineral rights over unleased land for the annual payment of only 50 cents an acre. If more than one application is filed at any one time, then the selection is made by "drawing out of a hat". This lottery system ensures that the independent oil company or individual has a chance to profit from any possible oil discoveries. In the case of an individual, if the prospect looks good or oil is found in the vicinity, he will probably sell his leases to an oil company at a handsome profit and also obtain an overriding royalty on any oil produced. A number of speculators in Alaska benefited in this way at the time of the Prudhoe Bay discovery. However, when an area is known to contain oil or gas, then new leases on federal land would be put up for competitive bidding.

What worries the small independent companies and has caused further controversy is that, in all the various Bills put forward to deal with the native land claims, a section has been included which provides for all federal lands in the State of Alaska to be leased by competitive bidding only. They feel that, far from being competitive, this would eliminate competition and allow only those few companies with superior financial resources to participate.

State Lands

There are also mixed feelings within the state itself over which is the best system to adopt for the leasing of state lands. Whichever system is applied, the state retains 100 per cent of its income from mineral production on state lands, whether from bonuses, royalties, or severance taxes, and 90 per cent of such income from federal lands. Competitive bidding may result in a more immediate cash return, as against the higher royalties that could be charged under simultaneous filing. But the \$900 million which resulted from last September's lease sale can be deceptive. Such a sum would not have been expended

in the absence of the Prudhoe Bay discovery; and, in fact, 76 per cent of the lands in the sale brought no bids at all when offered two years earlier.

Alaska is at a crossroads in its history. There are those Alaskans who want to see the state developed industrially and to benefit as quickly as possible from oil and gas production. But there are others who want it kept as the last great wilderness of the United States - and many of them came to Alaska in the first place to get away from cities and an industrial society. There are Eskimos and Indians who want to pick up oil tools and join the technological age, but there are others who would prefer to follow their old ways of life undisturbed. The entry of the oil industry into Alaska in such a big way has served as a catalyst affecting all these underlying issues and it is hardly surprising that events have not gone as smoothly as the companies would have wished. They have found themselves involved in a whole range of ecological and environmental controversies, to an extent that is unique in petroleum development. But then, Alaska is a unique part of the world and it would seem to be worth the time and patience necessary to achieve a proper balance between conflicting requirements.

Economic Impact of Alaskan Oil

THE North Slope of Alaska is probably the most difficult region from an operational point of view in which the oil industry has ever sought for and found oil. Temperatures in winter can fall to minus 65°F, with 80 mph winds and blizzards that can bring drilling to a halt on even the specially protected Arctic rigs. During the two-month summer, with its 24 hours of daylight, the concrete-hard frozen tundra becomes a soggy marsh, creating the kind of problems mentioned in last month's article.

With the North Slope's remoteness allied to this, it is also the most expensive exploration ever undertaken. A single wildcat well can cost up to \$4.5 million. Included in this is the \$700 000 or more to fly a rig and all the necessary equipment and supplies from Fairbanks, the building of gravel roads at something like \$20 000 per mile, the \$2 million or so required to build and maintain a camp site with its air-strip and storage facilities, and operating expenses which can exceed \$1 million for a typical 10 000-foot North Slope well. Average drilling costs have been estimated at \$142 a foot, compared with the \$13 a foot average in the rest of the United States. Operating costs are \$18 000 a day in Alaska – and even higher for a wildcat – compared with \$3 000 a day for a conventional West Texas land rig and \$10 000 a day for an offshore rig in the Gulf of Mexico. Geological field parties average \$30–40 000 a month, and seismic crews up to \$300 000 a month.

Together with the various bonuses and lease payments that have been made, the industry has invested some \$2.5 billion on North Slope operations to date, and another \$1.3 billion at least will be required to build the trans-Alaska pipeline to Valdez in the south.

As against these costs, however, there is the size of the Prudhoe Bay field, conservatively estimated to contain up to 20 billion barrels of recoverable reserves. Initially, it is planned that the pipeline will

move 500 000 b/d, to be increased to 2.2 million b/d towards the end of the 1970s. At these production levels, North Slope oil could represent 7 per cent of total US output by 1975 and 17 per cent by 1980, when consumption is expected to rise to 20 million b/d. And if the reserves are even higher – some estimates put them as high as 40 billion barrels – these production rates might be doubled.

The North Slope operators – the major companies being Atlantic Richfield, Humble Oil and BP – are at present drilling development wells on the 430 000-acre field's three oil pools, on the basis of 640-acre spacing for the main Prudhoe Bay sand pool and the Lisburne lime pool and 160-acre spacing for the shallower Kuparuk River pool discovered by Standard Oil of California. Present plans call for the drilling of some 400 wells, and the companies are working towards a system of field unitization in order to develop the field most economically. Costs will also be reduced by drilling between four and eight deviated wells from one large drilling pad.

High Production Rates

The wells are being scheduled to produce from 15 000 to 20 000 b/d. This compares with the average production from all US wells of a mere 15.2 b/d – and only 3.6 b/d from the marginal stripper wells which account for two-thirds of the nation's 575 000 wells – which will be a major factor in making North Slope oil competitive in the rest of the United States. There is also the fact that Alaska has no prorationing system, which in some states holds

This second of two articles on oil in Alaska considers the high cost of exploration and drilling on the North Slope, offset however by the size of the Prudhoe Bay oilfield.

Source: Petroleum Press Service, August 1970, pp. 281–283. Reproduced with permission by the Library of Congress, Congressional Research Service, March 9, 1971.

back the production of rich wells. Unlike Texas, for instance, where prorationing was the result of thousands of individuals, small and big companies and workers having a stake in a decentralized and labour-intensive industry, in Alaska the state is the landlord and the producers are a few large companies; though these compete with each other at the exploration stage, they can also work together to develop a field in the most economical way once it is discovered.

Price Estimates

Various estimates have been made as to the likely cost and price of North Slope Oil. In a recent paper on the Impact of Oil Import Reforms Upon Alaska's Economy, Professor Arlon Tussing of the Federal Field Committee for Development Planning in Alaska suggests that the wellhead price might be \$2 a barrel, compared with \$3 in Cook Inlet. (This price assumes that trans-Alaska pipeline costs would be 60 cents a barrel.) Federal onshore and State of Alaska royalties are both 12½ per cent, and state production taxes 4 per cent, making a total of 16½ per cent; the sum of royalties and taxes on a \$2 price would therefore be 33 cents a barrel at the present rate.

Professor Tussing estimates that the wellhead cost of North Slope oil, including discovery, development and production charges but exclusive of lease acquisition costs and royalties and taxes, would be between 24 to 54 cents a barrel, compared with 80 cents to \$1.25 in the Cook Inlet. He concludes that any reduction in US crude oil prices, even of the magnitude which had been contemplated by the Cabinet Task Force on Oil Imports, would not substantially reduce exploration and production of oil and gas from Alaska's two proved petroleum basins. There might be some reduction of exploration activity in unproved regions, but overall the effect of any price reductions would be less pronounced in Alaska than in any other major oil state. Any domestic price for crude oil at or above the free world market price would be sufficient to induce continued production, development and exploration in both of Alaska's known petroleum basins.

Alaskan Economy

The Prudhoe Bay discovery has had a tremendous impact on the economy of Alaska. The lease sale of September last year produced \$900 million which was more than four times the total state budget. The three previous competitive lease sales of state lands on the North Slope between 1964 and 1967 had produced only some \$6 million, and even up to a few weeks before the September sale, the official estimates of what the state might receive were still cautiously being put at a mere \$11 million. Oil production from the Cook Inlet and Swanson River fields in the south had of course been earning revenue for the state, totalling some \$34.3 million in 1968. But the interest alone from the September sale bonuses comes to more than twice that sum, and by the time the flow of North Slope oil reaches the 2 million b/d planned for 1975 - providing the trans-Alaska pipeline is built - the state will be receiving an additional \$200 million a year in royalties and severance taxes.

For a state that has traditionally had to rely on federal assistance, to the extent that its economy was dependent for years on federal agencies for six out of every ten dollars spent, this cash inflow can put Alaska on its feet economically for the first time since it became a state in 1959. From being one of the poorest states in the Union, Alaska can become one of the richest per capita. But this is of course dependent on North Slope oil being transported and marketed, and at the present time this necessitates a pipeline across Alaska to the south. It may be that tankers can eventually operate a route through the Northwest Passage, following the experimental trials being made with the *Manhattan*, but this would only complement a pipeline and not replace it. Just as there are those who oppose the projected TAPS line from a conservation and environmental point of view, many Alaskans are bitterly opposed to the conservationists who they see as holding back the economic development of the State.

Early History

The Prudhoe Bay discovery was the result of a long history of intermittent but largely unsuccessful exploration in Alaska. Oil seeps had been noted by

the Russians as long ago as 1853 - 14 years before they sold Alaska to the United States for \$7.2 million (two cents an acre) - on the west side of Cook Inlet, and a number of shallow wells were drilled there from 1898 to 1904. These were unsuccessful, but in 1902 a well drilled at Katalla in south-east Alaska found oil, and from then until 1933 some 154 000 barrels were produced from 18 wells in a 60-acre site. The field was abandoned in 1933 when the small refinery built to process the oil burned down and it was not economic to rebuild the plant.

In northern Alaska, geological surveys were started in 1901 by the US Geological Survey as part of the systematic exploration of what was then a Territory, and it was between 1904 and 1914 that the oil potential of the North Slope area was first noted. As a result, in 1923, an area of 37 000 square miles in the north-west corner of Alaska around Point Barrow was designated as Naval Petroleum Reserve No. 4. Intensive exploration was carried out by the Navy and the USGS between 1944 and 1953, in which 45 core holes and 37 wildcat wells were drilled at a cost of \$60 million. Several small oil and gas deposits were found, the most important being the Umiat oilfield on the Colville River near the eastern boundary of the Reserve, estimated to contain 100 million barrels of reserves. These discoveries were all non-commercial, but the information they provided was a major factor in attracting the oil industry to the North Slope.

But the main effort of the industry in the post-war years was concentrated in the south, leading in 1957 to the discovery of the Swanson River field on the Kenai Peninsula by Atlantic Richfield. This was Alaska's first commercial oilfield, and was followed in 1959 by further oil and gas discoveries in the Cook Inlet. Total reserves in this area are estimated to be at least 1.5 billion barrels, but production rates have been disappointing, coming to a little over 200 000 b/d.

In 1958, one year before Alaska's statehood, the US opened up for leasing an area of the North Slope between the Naval Petroleum Reserve to the west and the Wildlife Refuge which had been established at the north-east corner of the Territory, bordering Canada. Several companies took out holdings, but the first to carry out any major exploration was BP. The first well was drilled in 1963, jointly by BP and Sinclair. Over the next four years, the BP/Sinclair group, Union Oil and Atlantic Richfield drilled a further nine wells in the area. The results were disappointing. Small quantities of oil were found on the Colville structure, but evidence pointed to the likelihood that the oil had migrated elsewhere. Another structure was

located at Prudhoe Bay, but because of the cost of drilling on the North Slope - an estimated \$125 million was spent on exploration up to the time of the Prudhoe Bay discovery - first Sinclair and then BP and Union Oil felt it was time to cut their losses and leave. By late 1967, the only active rig on the North Slope was that drilling Atlantic Richfield's Prudhoe Bay State No. 1.

Discovery

This was the well that located the Prudhoe field in 1968, later confirmed by the Sag River No. 1 well seven miles to the south-west which was drilled by Atlantic Richfield and Humble. BP decided to return to the North Slope in the summer of 1968 and begin drilling operations on its own, resulting in a further discovery on the Prudhoe structure at Put River No. 1. In fact, by the time the Prudhoe field had been delineated, it was found that BP's leases contained some 60 per cent of the total reserves - leases which had been obtained in 1967 for \$44 000 a block, compared with the prices of up to \$72 million a block paid in the 1969 lease sale. By that time, of course, other companies had moved into the area, and 23 rigs had drilled 37 wells while 24 seismic crews had mapped thousands of square miles of the North Slope.

While the oil industry effort since then has naturally been concentrated on the North Slope, and BP has made a further discovery near its original Colville River locations which may be a separate field from Prudhoe Bay, exploration will not end there. There are 15 known sedimentary basins in Alaska, and commercial production has been established in only two - the North Slope and Cook Inlet. Eight of the remaining basins have never been drilled, and only a few wildcat wells have been drilled in the others. It is possible that at some time in the future, as reserves in other producing states dwindle Alaska may take over from Texas as the major oil producing area in the US.

February 26, 1971

CONGRESSIONAL RECORD — SENATE

THE ALASKA PIPELINE: AN INTERVIEW

ALASKA OIL—PIPELINE FIRM PLEDGES TO PROTECT ENVIRONMENT
(By Stanton H. Patty)

Alyeska Pipeline Service Co. will pledge itself to maximum protection of the environment and to hiring as many Alaska natives as possible when new Interior Department public hearing on the proposed trans-Alaska oil pipeline begins Tuesday in Washington, D.C.

"We will welcome the opportunity to tell what we have found to be reassuring about this project," Edward L. Patton, Alyeska president, told *The Seattle Times* in an exclusive interview.

Patton answered more than 100 questions posed by *The Times* on topics ranging from environmental concern to financing.

Among other things, he said:

The aboriginal land claims of Alaska's 55,000-plus natives, now pending in Congress, must be settled before construction can begin.

Even if the land-claims issue is settled this year, federal court injunctions are lifted and the necessary federal permits are issued, it is doubtful that construction of the pipeline itself can begin this year.

However, if all the above hurdles are cleared by July, Alyeska likely will start construction of the pipeline service road—north from the Yukon River to Prudhoe Bay—in October.

Following this schedule, with pipeline construction beginning in 1972, it should be possible for the first Arctic oil to be flowing through the pipeline by fall of 1974. If the needed permits and other factors had fallen into place this month, the pipeline could have been in operation by the spring of 1974.

Alyeska will conduct schools in Alaska to train and qualify as many Alaskans as possible for pipeline-welding and other jobs. Special efforts are planned for Alaska natives.

Alyeska already has spent about \$6 million on environmental-research and investigations—in addition to other millions spent by the owner oil company. The Alyeska expenditures have included such studies as tundra-reseeded experiments, testing of effects of warm-oil pipelines buried in permafrost and studies of caribou migrations. Not included in the \$6 million are extensive soil investigations carried out along the 800-mile pipeline route.

Between 5,000 and 8,000 persons will be employed during the construction period. The exact number will depend on how condensed a construction schedule Alyeska decides to set.

Total right-of-way for the pipeline will amount to only 8.2 square miles—versus Alaska's over-all area of 586,412 square miles. When the road, airstrips, pumping stations and the tanker terminal at Valdez are added, the entire project will occupy a total of just 55 square miles.

Operational safety of the pipeline will be assisted by an elaborate microwave communications system, automatic monitors, emergency shut-off valves and other features.

Patton emphasized that the pipeline will be elevated in permafrost zones that truly are problem areas.

"We have no intention of burying the pipe in unstable soils or in soils that could become unstable when thawed," Patton declared.

Patton also conceded that further long delays could kill the project for the trans-Alaska route from Prudhoe Bay to Valdez.

"Obviously," he said, "there is a point at which (increasing) costs could cause us to drop this way of doing and go on to another scheme."

This could happen, for example, if the temporary injunction granted to conservation groups is made permanent and Alyeska faces a lengthy legal battle all the way through the United States Supreme Court.

What would be the alternatives to the Prudhoe Bay-Valdez route?

There have been no firm decisions on alternatives. But Patton indicated that likely options could include: A trans-Canada oil pipeline from Prudhoe Bay to the American Midwest, or a short pipeline from Prudhoe Bay to a port at Herschel Island, in Arctic Canada's Yukon Territory, for tanker shipments to the East Coast by way of the Northwest Passage.

"The cost is getting higher and higher every day we wait," Patton said.

PIPELINE WILL COST IN EXCESS OF \$1 BILLION

To hear some of the critics of the proposed Alyeska pipeline, one might get the impression that Ed Patton is something of an ogre who presides over a sinister apparatus for the big, bad oil companies.

Not so.

Patton, 54, is a soft-spoken Virginian with almost 33 years of experience in the petroleum industry. He has a sincere concern for the environment—and believes the trans-Alaska pipeline can be built and operated safely.

Twice for Humble Oil & Refining Co. in Normay and in California, he was responsible for building clean refineries. The most recent, at Benicia, Calif., won an award from the San Francisco Water Quality Control Board, for outstanding conservation activities.

Now Patton is "on loan" from Humble to serve as president of Alyeska Pipeline Service Co., the combine of seven oil companies assigned the job of designing, constructing, operating and maintaining the 800-mile oil pipeline in Alaska.

Patton intends to see that it is done right. So does the Interior Department, which has written a long list of environmental stipulations.

Source: Congressional Record-Senate, February 26, 1971, pp. S2101-S2104.
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CONGRESSIONAL RECORD — SENATE

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"I have my own personal standards of environmental protection that I would have insisted on, even if the Department of Interior hadn't imposed any," Patton said.

Understandably, Patton is irritated by irresponsible attacks from some zealots who are trying to block construction of the pipeline. But he is sure of his facts and prepared to weather the rest of the storm.

The reason I was given this job is that I have demonstrated my concern for the environment," he said.

In a wide-ranging interview with The Seattle Times at Alyeska's Bellevue headquarters, Patton put dozens of the facts on the line. Here are some of the answers:

Q. Who owns Alyeska?

A. The largest shares are owned by ARCO Pipe Line Co., BP Pipeline Corp. and Humble Pipe Line Co. Owners with lesser interests are American Hess Corp., Mobile Pipe Line Co., Phillips Petroleum Co., and Union Oil Co. of California.

Q. What happened to the 2 per cent share sold by Home Oil Co., one of the original owners?

A. Some of the other owners bought Home's interest.

Q. Are other North Slope oil producers eligible to join Alyeska?

A. An outside company could try to acquire shares, but the present owners have the right of first refusal if shares are to be released. The pipeline will be a common carrier, so it would be possible for outsiders to ship their oil through it, but probably at a higher cost than will be paid by the Alyeska member companies.

Q. How much will the pipeline cost?

A. More than \$1 billion, but the owners will not disclose how much more until all contracts have been awarded. This is to guard against possible automatic escalation of bids.

Q. What will be the pipeline's initial capacity?

A. 600,000 barrels a day, after an extensive testing period. This may be followed by an "intermediate" capacity of 1.2 million barrels daily, but this stage has not been approved yet by the owners.

Q. What will be the ultimate capacity?

A. 2 million barrels a day, with capacity expanding as required and as funds become available through the owner companies.

Q. How many pumping stations are planned?

A. Five in the beginning; 12 at full capacity.

Q. How much oil would there be in each mile of the line at any one time?

A. About 11,000 barrels, based on 42 gallons to the barrel.

Q. How fast will the oil move through the pipeline?

A. Probably at less than 2 miles an hour with initial capacity; at just over 7 miles an hour at full capacity.

Q. What will be the per-barrel cost of transporting the oil to market through the pipeline?

A. This has not been determined. Alyeska eventually will provide a detailed cost estimate to the owners so they can design a tariff structure.

Q. How will the oil be gathered from wells at Prudhoe Bay and fed into the pipeline?

A. There will be two crude-oil receiving tanks—each capable of holding 210,000 barrels—at Prudhoe. Producers will run metered lateral lines into these tanks and the oil will be pumped from there into the Alyeska pipeline.

Q. What is the estimated life of the Prudhoe oil field?

A. Patton said it is none of his business, but he has heard about 30 years. Some say it will be longer.

Q. What is the total right-of-way requested for the pipeline?

A. Fifty-four feet, to permit ample room for construction and maintenance. The 1920 Mineral Leasing Act provides 54 feet for pipeline right-of-way. Even at that, the entire pipeline will occupy a total of only 8.2 square miles along its 800-mile route from Prudhoe Bay to Valdez.

Q. How much pipe is on hand now in Alaska and what is its origin?

A. About 700 miles of the 48-inch-diameter steel pipe has been delivered to Alaska. The balance will be there by July. Three manufacturers in Japan are supplying the pipe.

Q. How will the pipe be protected?

A. It will have a special coating to protect it from chemical corrosion. In addition, there will be an integral cathodeprotection system built into the line to prevent electrolytic corrosion.

Q. Have contracts for the coating work been awarded?

A. Yes. Work will begin in the spring at three plants—in Valdez, Fairbanks, and Prudhoe Bay. The job is to be completed during the summer.

Q. What is the exact mileage of the pipeline?

A. Probably about 790 miles, depending on the outcome of additional soils investigations due to resume next month.

Q. What are the recoverable oil reserves of the North Slope?

A. Patton does not know for sure. The Alyeska owners are saying at least 10 billion barrels. Speculation ranges up to 50 billion barrels.

Q. If other major oil fields are developed on the North Slope, will other Alyeska-size pipelines be required?

A. Logic says, according to Patton, that future developments would make maximum use of the investment already in place before spending new money.

Q. Who owns the land the pipeline will cross?

A. Except for a small portion owned by private parties, the route will traverse land either selected by the State of Alaska, or federal land now in the public domain. Most is subject to the aboriginal land claim of Alaska's natives.

Q. How long will it take to build the pipeline?

A. About three years for the initial stages. There will be at least a dozen major contractors and "hundreds" of subcontractors.

Q. How many persons will be employed?

A. Between 5,000 and 8,000 during the actual construction period; about 200 to 300 during the operating period.

Q. Can construction of the pipeline begin yet this year?

A. Probably not. However, work on the pipeline service road from the Yukon River to Prudhoe Bay might begin in about October, if the necessary federal permits are issued in time and the native land claims have been settled by Congress.

Q. Why does Alyeska feel an early start on the road is so important?

A. There must be a road before any pipeline construction can begin north of the Yukon River. The plan is to work from the Yukon River north and from Prudhoe Bay south with pipeline installations, behind the road construction. Meanwhile, on the southern part of the pipeline (south of the Yukon River) it may be possible to begin a number of "spreads" simultaneously. This will depend on the number of competent contractors Alyeska screens and signs. It may be that some contractors will be able to handle more than one segment.

Q. What is the earliest oil can be flowing through the line if permits are granted by summer of 1971?

A. Probably the fall of 1974.

Q. At what seasons of the year can Alyeska plan on pipeline construction?

A. It appears that work is not possible in

the Brooks Range area between about December 1 and March 1. Alyeska will take a good look at the possibility of year-around construction in other areas. In some areas it actually is desirable to work when the ground is frozen so as not to damage the tundra.

THIS IS ROUTE OF PIPELINE FROM PRUDHOE TO VALDEZ

The proposed Alyeska crude-oil pipeline will extend from Prudhoe Bay, on Alaska's Arctic North Slope to a supertanker terminal in the ice-free port of Valdez.

This is the route the line will traverse: From Prudhoe Bay, the pipeline will follow the Sagavanirktok River and Atigun Valleys, then cross the Brooks Range by way of 4,800-foot-high Dietrich Pass.

On the southern slope of the Brooks Range the pipeline will follow the Dietrich and Koyukuk Valleys and cross the hills and muskeg of the Yukon-Tanana uplands to the Yukon River. The Yukon River crossing will be in the hills west of the Yukon Flats.

South of the Yukon River the line will pass through more rolling hills, going about 10 miles east of Fairbanks, then south to the Alaska Range. The line will reach an elevation of 3,500 feet as it crosses through Isabel Pass before descending into the Copper River Basin.

After it crosses the Copper River Basin it will enter the Chugach Mountains, reaching an elevation of 2,500 feet as it goes through Thompson Pass. From Thompson it descends through Keystone Canyon to the Valdez terminal.

The total distance is about 800 miles. From Valdez, the oil will be shipped by tankers to refineries or other pipeline terminals in the "lower 48" states.

THE PIPELINE—COSTS MOUNT AS DELAY CONTINUES

The long delay in building the Alyeska crude-oil pipeline has been expensive—for everyone.

When the project first was announced in February, 1969, the cost of the 800-mile line was estimated at \$900 million. Now it may be past the \$1.5 billion mark.

In addition, the oil companies have been hurt by interest payments on money they tied up for the pipeline project. Not to mention the \$900 million or so in bonus bids they paid the State of Alaska in September 1969, for their North Slope acreage. Stockholders expect quick results.

The state has suffered, too. Not only does the state have to wait longer than anticipated to begin collecting severance taxes and royalties from North Slope oil, but the delay has resulted in increased costs for Alyeska Pipeline Service Co., which seem certain to boost eventual wellhead prices for the oil. The higher the wellhead price—which takes into account the cost of getting oil to market—the lower the state's take.

"What it all means is that we have had two years of escalating costs already," Edward L. Patton, Alyeska's president, said.

The Alyeska pipeline already rates as the most expensive construction project in the history of private industry.

Alyeska is owned by seven of the oil companies with holdings on the North Slope, or their pipeline subsidiaries. It is charged with designing, building, operating and maintaining the giant pipeline.

Here are other answers by Patton to questions posed by The Times:

Q. Was Alyeska perhaps taking too much for granted when it placed orders in Japan for the 800 miles of four-foot-diameter pipe before federal permits were granted?

A. No, the oil companies were acting in good faith. They were proceeding under the Mineral Leasing Act of 1920—the "pipeline law." This act provided a logical basis for

approaching the pipeline project. It has been done this way many times in the past.

Q. How much of the system has been designed?

A. In areas of the route where the Interior Department has not expressed concern, most of the engineering is completed. Design of the Valdez terminal also has been completed. Design of the pumping stations is very far along.

Q. What about the problem of installing a pipeline carrying warm oil through permafrost zones?

A. There are several kinds of permafrost. Pipe can be laid underground in "dry" permafrost areas of rock or gravel which have low-moisture content. Such areas remain stable in a frozen or unfrozen state and do not melt when thawed. Where high-moisture content permafrost is found, insulated pipe will be set above ground on a gravel berm or supported on structural bents. Thus, extensive thawing and melting of ice-rich permafrost will be avoided.

Q. How much of the pipeline will be elevated?

A. Interior is suggesting that about 400 miles, or about half of the pipeline, will have to be elevated. Based on its soil investigations, Alyeska estimates about 200 miles. We think the final figure will be somewhere in between. Alyeska will continue its soils investigations and provide the data to the Geological Survey, which will have the final word. Alyeska estimates it has about three more months of soils tests to conduct.

Q. Are Alyeska and the Geological Survey in conflict over details of the pipeline installation?

A. No. Alyeska has to give Geological Survey evidence to move (permafrost) areas from the questionable into the assured category for burying pipe. Alyeska will not bury any pipe in soils that would be unstable when thawed. Alyeska and Geological Survey always have been in agreement on that.

Q. How long have Alyeska and Geological Survey been working together on the project?

A. There have been continuous contacts since the spring of 1969. Alyeska has great respect for personnel of Geological Survey—including Arthur H. Lachenbruch, the scientist whose 1970 report on thermal effects of heated pipelines in permafrost Alyeska feels has been grossly misinterpreted by pipeline foes.

Q. At what temperature will the oil be transported through the pipeline?

A. The oil will emerge from the ground at 170 to 180 degrees, then cool to 100 to 145 degrees by the time Alyeska receives it. A final decision still is pending, but Alyeska probably will carry the oil at a temperature as low as 100 degrees to preserve natural fractions for various products and reduce thermal effects on the environment. The oil could be cooled at pumping stations along the route.

Q. How quickly could the pipeline be shut down in an emergency?

A. About 10 minutes. Valve closing is what takes the time.

Q. If a break should occur, how would the spilled oil be controlled?

A. Alyeska is working now on emergency plans. Bernis could be used to corral pools of oil. Stockpiles of sand and gravel would be placed at strategic sites. Vacuum trucks would suck up liquid oil. If the oil were jelled by the cold, it would be scooped up and reliquified to re-enter the pipeline. Affected soil would be cleaned and restored.

Q. How will the pipeline be controlled?

A. The entire line can be controlled remotely from the main control station at the Valdez terminal—in addition to controls at each pumping station. The situation at each pumping station will be monitored continuously. Thus, emergency shutdowns could be accomplished either from Valdez or the near-

est pumping station. Pumping stations will be manned around the clock. There will be a microwave communications system, plus backup facilities to protect against failure. Shutoff valves, power-operated and remotely controlled, can be closed to compartmentalize the pipeline, if required.

Q. Can excessive pipeline pressures be avoided automatically?

A. Yes, there will be system controls, relief valves and relief tanks—plus backup relief valves—at all stations.

Q. What other safety precautions are planned?

A. The entire line will be visually inspected daily from the air, weather permitting.

Q. What about earthquake danger?

A. The system is being designed to remain safely operational under the most severe earthquake expected along the route. In addition, the entire system will be monitored seismically by instructions on the basis of G-forces and fractions of G-forces. Readings will be transmitted to the control station at Valdez. At the outset, the pipeline probably will be shut down at the first rumble of an earthquake. It will not be restarted until there has been a complete inspection. In time, we expect to build up a reference base of G-forces through which the pipeline can operate safely.

Q. Will everything be automated?

A. Yes and no. The entire pipeline will be monitored 24 hours a day by the Valdez control center. Two computers there will receive a continuous flow of information from points all along the line. The computers will evaluate the information and react accordingly. There also will be automatic equipment at each pump station. However, the automatic monitors will be backed up by human monitors keeping a 24-hour watch on the line.

THE PIPELINE—WHEN OIL WELLS RUN DRY, PIPE WILL VANISH

(By Stanton H. Patty)

What will be done with the Alyeska pipeline when the North Slope oil wells run dry?

Virtually all traces of the 800-mile line will vanish when that happens, Edward L. Patton, president of Alyeska Pipeline Service Co., said.

Interior Department stipulations require Alyeska to remove all surface evidence of the pipeline and plug the openings where the pipeline travels underground.

But Alyeska is not going to wait for that time before beginning restoration work. The company plans to reseed the entire route soon after construction with fast-growing perennials and grasses until the slower-growing natural vegetation can take hold again. Reseeding experiments already being conducted on the North Slope are encouraging.

Reseeding is more than aesthetic. Alyeska wants to protect the right-of-way from erosion.

Other answers from Patton:

Q. How will rivers be crossed by the pipeline?

A. Alyeska still is studying each case. It may be best to bury the line in river beds in cases; bridging may be best at other sites. When buried, the pipe will be coated with concrete four inches thick to prevent scouring.

Q. Where will gravel be obtained for construction?

A. Mostly from river beds. However, Alyeska will make some of its own gravel by crushing rock in areas of solid rock. Care will be taken to avoid removals in rivers when fish are spawning and incubating.

Q. How will wildlife be affected by the pipeline?

A. Industry scientists have been studying wildlife along the route for the past two years. Both the route and construction schedule take their findings into account to minimize effects on wildlife. For example, nesting

grounds and calving areas will be avoided in critical seasons.

Q. Will above-ground sections of the pipeline become a barrier to normal caribou migrations?

A. No, studies have shown that caribou normally range 25 to 40 miles a day. If well-worn caribou paths should appear after the pipeline is built, these areas will be provided with ramps or underpasses. Besides, Anaktuvuk Pass, in the Brooks Range, is the main caribou route and we are not using that pass.

Q. In addition to protecting caribou, why did Alyeska choose 4,800-foot-high Dietrich Pass over the lower, 2,200-foot Anaktuvuk Pass in the Brooks Range?

A. Because soils in Anaktuvuk Pass are too high in moisture content. This is another example of Alyeska trying to avoid unstable soils. The decision will result in the expense of an additional pumping station.

Q. How about hunting by pipeline crews?

A. No firearms will be permitted in the camps. Alyeska plans to be only a minor and temporary inconvenience to wildlife of the area.

Q. Will construction crews leave a trail of debris?

A. No. Alyeska will police contractors, and contracts will stipulate that every scrap of garbage and trash must be removed or they won't be paid. And Alyeska does not intend to be the cause of any air or water-pollution input.

Q. What kind of a road is Alyeska planning in connection with the pipeline?

A. Before, pipeline construction can begin north of Yukon River, a road must be built to accommodate construction equipment. This will be a gravel road, 28 feet wide, and about 350 miles long. In the south, most of the pipeline will follow the existing Richardson Highway to Valdez.

Q. Has part of the northern road been built already?

A. Yes, the 57-mile section from Livengood, which is 81 miles north of Fairbanks, to the Yukon River. Existing roads lead from Livengood into Fairbanks.

Q. How many lanes will the pipeline service road have?

A. Three. It must have room for two-way traffic, and a lane for equipment that is stopped and in place for pipeline work.

Q. Will the pipeline road be useable the year around?

A. Yes, within reason. Q. How will the pipeline road differ from the infamous Hicel Highway, the temporary "ice road" that turns into a bog when winter ends?

A. There is no similarity. Alyeska is planning a permanent road, built according to 34 pages of Interior Department stipulations. To prevent the permafrost under the road from thawing, the road must be built so that it itself acts as an insulator. Tests have indicated that a gravel road bed up to five feet deep will provide the needed insulation.

Q. How many camps and airstrips will there be along the pipeline road?

A. Present plans call for nine camps and three airstrips. Fuel will be flown in for the construction equipment until we get the road going.

Q. What will happen to the road after the pipeline is completed?

A. It will be turned over to the state to be integrated into the state-highway system. In the meantime, Alyeska will maintain the road and control the traffic that is permitted to use it.

Q. What plans are there for spanning the Yukon River in connection with the road?

A. Alyeska will not build a bridge, thus preventing the road's use by casual traffic while under our control. We will use a construction-type ferry and winter ice bridge, in season, to get across the Yukon.

Q. Are standby costs being paid to some

contractors who moved road-construction equipment to the northern section of the proposed pipeline road before work was stalled?

A. Yes, but that information (cost details) is confidential. Alyeska chooses not to disclose to one contractor what another is receiving because each standby agreement was negotiated separately. Some contractors drove better bargains than others.

Q. What is the value of idle equipment on the road route now?

A. Perhaps \$30 to \$40 million, but this is a guess.

Q. Regarding the oil pipeline itself, has Alyeska learned much of value from various experiments and tests that have been conducted?

A. Yes. The information is proving very useful. It has shown that some of the things we feared haven't happened.

Q. There was a cold-pipeline test at Barrow. What did Alyeska learn from that?

A. For one thing, we found out that the effects of frost-heaving and ice-jacking are negligible, when compared with the strength of the pipe. We also learned how to protect the tundra from damage by installing a thin layer of packed snow. We also found it was possible to roll up tundra and replace it, like sod, and found that we can protect tundra with a layer of foam plastic topped with gravel.

Q. What is the nature of the hot-pipeline test now under way at the University of Alaska?

A. We are pumping air heated to 145 degrees through 1,000 feet of pipe buried in permafrost there to study the effects on the ground and to see whether heat will stimulate plant growth. This test probably will continue for several years, but we have received useful data already. There has been no significant ground warming so far. However, it is too early to tell conclusively what might happen after several years.

Q. Is Alyeska receiving information from a hot-pipeline test being conducted by another combine at Inuvik, in Northwest Territories, Canada?

A. We do have an information-exchange agreement with them.

Q. You discussed permafrost problems earlier, but could you go over it again in connection with the Alyeska pipeline?

A. It is obvious that if a warm line is buried in permafrost of high ice content, the heat of the pipe will thaw the permafrost and melt the ice, thus causing a loss of support for the pipeline. That is why, after hundreds of test borings, geologists have selected a route that will take the pipeline through rocky, stable, dry permafrost for most of its journey. In these areas, the pipeline will not create an unstable condition. Where the line crosses ice-rich permafrost it will be elevated to avoid thawing the permafrost.

THE PIPELINE—FIRM PLANS TO TRAIN, HIRE ALASKA NATIVES

Ed Patton wants to make it clear that Alyeska Pipeline Service Co. is "not just fanning the breeze" when it promises to train and hire as many Alaska natives as possible for pipeline jobs.

"We mean it—we are putting it in writing," the president of the pipeline company, told The Seattle Times in an exclusive interview at the firm's Bellevue headquarters.

"We are going to make a special effort where the natives are concerned."

Alaska's natives include Eskimos, Indians and Aleuts. They make up about 20 per cent of the state's population.

Patton gave these answers when asked for specifics:

Q. What "special effort" does Alyeska have in mind for the natives?

A. For one thing, Alyeska will be running welding schools in Alaska for Alaskans. I hope we qualify a lot of native welders for work in building the pipeline.

Q. When will these schools begin?

A. Probably a couple of months before the first pipe spread goes into the field. It takes three to five weeks to train a pipe welder.

Q. What other training programs are planned?

A. We will probably run a qualification school to check out (construction) equipment operators, too.

Q. There are fears that much of the labor for construction of the pipeline will be imported from the "lower 48." Is this so?

A. We would like to hire 100 per cent Alaskans, if they are available and they can be qualified. That would be great.

Q. How many employees will you have after the construction period, that is, during the operating period?

A. Not over 300—to man the pumping stations, the terminal at Valdez, for maintenance, standby, and so on. In my opinion, we will be totally dependent on Alaskans—many natives—to operate the pipeline once it's done.

Q. Please comment on allegations that the pipeline project will disrupt the native cultures.

A. Alaskan native culture has been touched already by the modern world—not always for the good and not always for the bad. Our hope is that education, training and job opportunity provided by Alyeska—coupled with benefits from anticipated land-claims settlements, oil royalties and severance taxes—should improve present conditions for many of them.

Q. What position has Alyeska taken on the native land claims?

A. We take no position on the terms of the settlement. However, aboriginal claims of Alaskan natives, now pending before Congress, must be settled before (pipeline) construction can begin.

Q. Turning to the tanker terminal at Valdez, the southern end of the proposed pipeline, how many docks will there be there for supertankers?

A. In the initial stage, there will be two for vessels of from 16,000 to 250,000 dead-weight tons and one for vessels of from 16,000 to 120,000 deadweight tons. Later, there will be at least one more, perhaps two more, additional docks, or a total of five eventually.

Q. How will oil be received from the pipeline at the terminal?

A. In the initial stage (for throughput of 600,000 barrels a day), there will be up to 15 crude-oil-storage tanks at Valdez, each with a capacity of 510,000 barrels. Later (the ultimate capacity of the pipeline will be 2 million barrels a day), of course, there will be additional storage tanks.

Q. What about treatment of tanker ballast at Valdez?

A. Alyeska will have a very sophisticated ballast water-treatment system. We will not load a tanker at Valdez unless the master of the vessel certifies in writing that he has not dumped any ballast at sea on the way to Alaska.

Q. What safety precautions does Alyeska plan at the Valdez terminal?

A. For one thing, no cargo hoses will be used for loading oil into tankers. A hose can break. We will use steel arms instead.

Q. What if an oil spill should occur in the Valdez harbor?

A. We will have automatic cutoff valves—and there will be a floating boom to drop quickly around a tanker if this should happen. We also will have suction skimmers to pick up the oil that might be spilled.

Q. What measures will Alyeska take to prevent tanker accidents in Prince William Sound?

A. There will be the latest navigation aids

and a modern communications system throughout the area. In addition, there will be in-and-out lanes established for tankers. There will be one-way traffic in Valdez Arm itself. When a tanker is going out, for instance, an incoming tanker would have to wait, and vice versa.

Q. Is Alyeska aware of the great value of marine resources in Prince William Sound?

A. Yes. We are awarding a contract for a long-term survey of marine life in Valdez harbor by marine experts so Alyeska will have basic information before any work is done there.

Q. Has the Valdez terminal been started?

A. No, and it won't be until we have a clear go-ahead on the pipeline.

Q. Why was Valdez chosen over other ports as the terminal site?

A. Valdez is the northernmost ice-free port in Southern Alaska—it's a good, sheltered, deep-water harbor. It is also the shortest route for the pipeline.

Q. Speaking of tankers, Humble Oil & Refining Co. has suspended its studies in the Northwest Passage after two seasons of work with the icebreaking tanker Manhattan. Does it appear to you that the Northwest Passage is dead now as a tanker route for moving North Slope oil to market?

A. Yes, for the short term—but the idea of icebreaking tankers is not dead, and I would expect that some day we will be made of them. The Arctic Islands of Canada, where they think they have oil, is where I believe they will have their day.

Q. What is the outlook for utilization of North Slope natural gas that will be produced with the crude oil?

A. It's going to be reinjected (into the wells) until there is a way to get it to market. It won't be flared or vented. A little will be used to fuel our northernmost pumping stations.

Q. What is the outlook for a natural-gas pipeline?

A. I think there is certain to be one through Canada from Alaska some day. Study groups are looking at this possibility now.

Q. Why not have the gas pipeline in Alaska instead?

A. It is not economical to tanker gas. And the most direct route to market is through Canada.

Q. The recent environmental-impact report on the Alyeska pipeline by the Interior Department said the pipeline is essential to the security of the United States. Why do we need North Slope oil?

A. The United States requires about 15 million barrels of oil a day. It now produces some 10 million barrels a day and this domestic production, excluding the North Slope—is expected to peak and then decline during this decade. We import crude oil from overseas sources, primarily the troubled Middle East. We have the choice of increasing our dependency on other nations—or developing our own domestic reserves. An assured source of energy will help maintain this nation's security.

Q. Alyeska recently began a series of nation-wide advertisements to sell the pipeline project to the public. Some of your critics have described the advertisements as misleading. What is your comment?

A. We didn't put anything in the ads that isn't the truth.

THE LONG PIPE

By Ron Moxness

THE YEARS WHEN the mountains, valleys, rivers, and creeks of Alaska yielded fortunes in gold have faded; now the production of sand and gravel is valued more than the annual production of the yellow metal for which men once struggled and died. But Alaskans have memories and today they impatiently await another economic boom—this one a river of oil which would flow through an 800-mile-long pipeline, stretching like some huge steel serpent from Prudhoe Bay in the north to Valdez on the Pacific, the northernmost ice-free port in the western hemisphere.

The technical problems involved in the oil pipeline project are as immense as the ranges of forbidding mountains that awed the goldseekers on the trail of '98. Alaska's first problem, well known to those who have looked north recently, is how to lay a steel pipeline 48 inches in diameter whose stream of hot oil — 176 degrees F. — will not melt its route through the Alaskan terrain, 85 percent of which is permafrost, or permanently frozen ground.

The second problem is the demand made by the conservationists, many of whose viewpoints are shared by the technical experts of the U.S. government, that the pipeline pose no threat to the ecology of what has been described as America's last great, untouched wilderness area. The description is particularly apt as it applies to the Brooks Mountain Range, whose towering peaks, some over 9,000 feet high, look north to the Beaufort Sea and the still imprisoned oil of Prudhoe Bay.

Today, despite the eagerness of oil companies who have already invested \$900,000,000 in North Slope oil and gas leases and of Alaska's resource-minded boosters who are anxious to get on with the project at a time of heavy unemployment, all of the factors—technical, environmental, social, and legal — are

being carefully weighed by a Federal Task Force on Alaska Oil Development established early in 1969 by the Nixon Administration.

The task force is a government-wide body including all of the Department of the Interior's major bureaus — from the United States Geological Survey, the principal technical and engineering study unit, to the Bureau of Indian Affairs, whose responsibility it is to safeguard the rights and livelihood of Alaska's natives — an Eskimo-Aleut population of more than 28,000 and an additional 14,000 Indians. These are part of Alaska's total population of only 282,000 persons who live on 586,400 square miles of territory.

The federal task force was established by Secretary of the Interior Walter J. Hickel on April 18, 1969. The original membership of eight Interior department bureau and office heads was expanded at the request of President Nixon to include the secretaries of Commerce, Defense, Health, Education and Welfare, Transportation, and Housing and Urban Affairs. The State of Alaska and a conservation/industry ad hoc committee are also represented. The Office of Science and Technology, the National Science Foundation, and the Bureau of the Budget participate as liaison members.

Dr. William D. McElroy, Director of the National Science Foundation, announced May 22 that a new coordinated research project into the potential ecological effects of the pipeline will get underway this summer.

The survey will be directed and coordinated by

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12 Source: Environment, Vol. 12, No. 7, September 1970. pp.12-18, 21-23, & 36. Reproduced with permission by the Library of Congress, Congressional Research Service, March 9, 1971.

Dr. Jerome Brown of the U.S. Army Cold Regions Research and Engineering Laboratory and by Dr. George C. West, Professor of Zoophysiology, Institute of Arctic Biology, University of Alaska. The \$300,000 project involves seven participating institutions and has two major objectives. First, the scientists want to find out how environmental disturbances by man affect the life systems of both plants and animals. Secondly, project directors plan to bring together the existing, scattered information on Arctic ecology. They also want to determine how the results of Arctic research can best be used to predict the consequences of resource development in the region. The U.S. Coast Guard is also planning a number of summer research programs dealing with the problem of oil pollution in ice, and the University of Alaska, in cooperation with industry, is studying oil pipe behavior under permafrost conditions. Studies on grass and tree plantings adaptable to the land through which the pipeline will run are also being conducted.

All of this study anticipates the exploitation of some of the largest reserves of oil ever discovered. According to Dr. Charles C. Bates, Science Advisor to the Commandant of the U.S. Coast Guard, "In the Colville Basin of Alaska's North Slope, [running] some 50 miles parallel to the coast, the Prudhoe Bay structure has been estimated to contain five to ten billion barrels of oil. When one realizes that Saudi Arabia and Kuwait each took until last year to produce their ten billionth barrel and that Iran achieved this magic figure only this year, it is easy to see that the North Slope may become the land of big oil in the 1970s to the 1990s. . . ."

Task Force Questions TAPS

It is little wonder then that a consortium of oil companies — of which the major names are Atlantic Richfield, Humble Oil, and British Petroleum — is pressing hard to move ahead with their Trans-Alaska Pipeline System (TAPS) as early as possible to carry this oil to market. Much of the pipe has already been stockpiled at Valdez, where construction was to begin this summer.

As of this writing, however, no federal authorization to go ahead with the pipeline project is forthcoming, and it is doubtful, at the present pace of negotiations, that a permit will be issued for some

months in the future. In the words of John Horton, Executive Secretary of the federal task force, the consortium of nine companies making up the TAPS group has not yet presented a plan "which demonstrates that its fundamental criteria are adequate to assure integrity of the line when buried."

The current impasse in discussions between TAPS and the federal body involves both technological and environmental differences of opinion. In the view of TAPS, the pipeline would be buried for almost the entirety of its route from north to south. It would be served by a \$120,000,000 highway in the northern region of Alaska. The highway, to be paid for by the TAPS group, would serve as a secondary highway for the state. Both pipeline and highway are currently blocked by suits initiated by leading conservation and wildlife organizations and by debate over financing of the road in its construction stage. TAPS is not interested in the road unless it receives a go-ahead for the pipeline project, now projected to cost about \$1,500,000,000.

The task force, on the basis of its own studies of the hazards of building in the permafrost and of questions relating to wildlife and the needs of the indigenous population, asked 79 questions for which the TAPS organization has not yet provided satisfactory answers. The questions, Mr. Horton asserted, "were about the toughest ever laid down before an industry group." The task force, in weighing the TAPS response, raised "serious questions" as to the consortium's "state of technological readiness" to proceed with the project. The task force so advised President Nixon.

The two groups are chiefly at loggerheads over placement of the line. TAPS wants to use engineering practices utilized elsewhere in the world as part of the oil industry's far-flung operations and simply bury the steel line for all but about 80 miles of its route, which would cross 23 rivers and 152 streams, and many mountains, mountain basins, and river flats.

The task force believes that at least half of the line should be built above ground on steel, timber, or concrete legs to permit free migration of caribou herds which are vital to the livelihood of native Alaskans. An elevated pipeline like that used by Soviet engineers in the U.S.S.R. would also keep the hot pipeline from any contact with the delicately balanced tundra and permafrost. The oil in the pipe-

line is heated to keep it fluid enough to pump easily by special heating units installed in the pumping stations along the route of the pipeline.

Federal technicians are also uneasy about the assurance of TAPS that its pipeline plans allow for a sag or differential of only three *inches* in a 50-foot section of pipe. The minimum estimate of the task force is that the potential differential to allow for soil settlement — not to mention the possibility of larger stresses — should be three *feet* in a 50-foot pipe section.

The Menlo Park working group of the U.S. Geological Survey in California, in its interim comments on engineering proposals provided by the TAPS organization earlier this year, found a number of apparent inconsistencies in the TAPS presentation and commented, "it is difficult to determine which statements represent TAPS' policies and intentions and which do not." The working group agreed that the TAPS information, set down in a number of reports, represented a forward step "in our mutual consideration of the many problems involved in the proposed pipeline project." But as of late July, Dr. Henry Coulter — one of the Geological Survey's principal technical advisors to the federal task force — points out, no reply to their interim comments had yet been received. Task force spokesmen indicated that a reply is not expected before October.

One of the major areas of concern is the problem of earthquakes. The pipeline will pass through several regions of earthquake faults (see map on page 17). Coulter indicated the task force's intention to require strict criteria for the pipeline design. "If you plan for a seven rather than a five range of [earthquake] intensity you are probably better off," he observed. "If you plan for five and are confronted with the possibility of seven it would be highly expensive to change designs."

Coulter said TAPS, in its preliminary reports, had proposed cutoff safety provisions for the pipe in fault areas to limit the amount of oil which would be lost in case of a break.

TAPS has not yet disclosed the number of cutoffs it plans to build into the line to cope with earthquakes or breaks or stoppages caused by other factors such

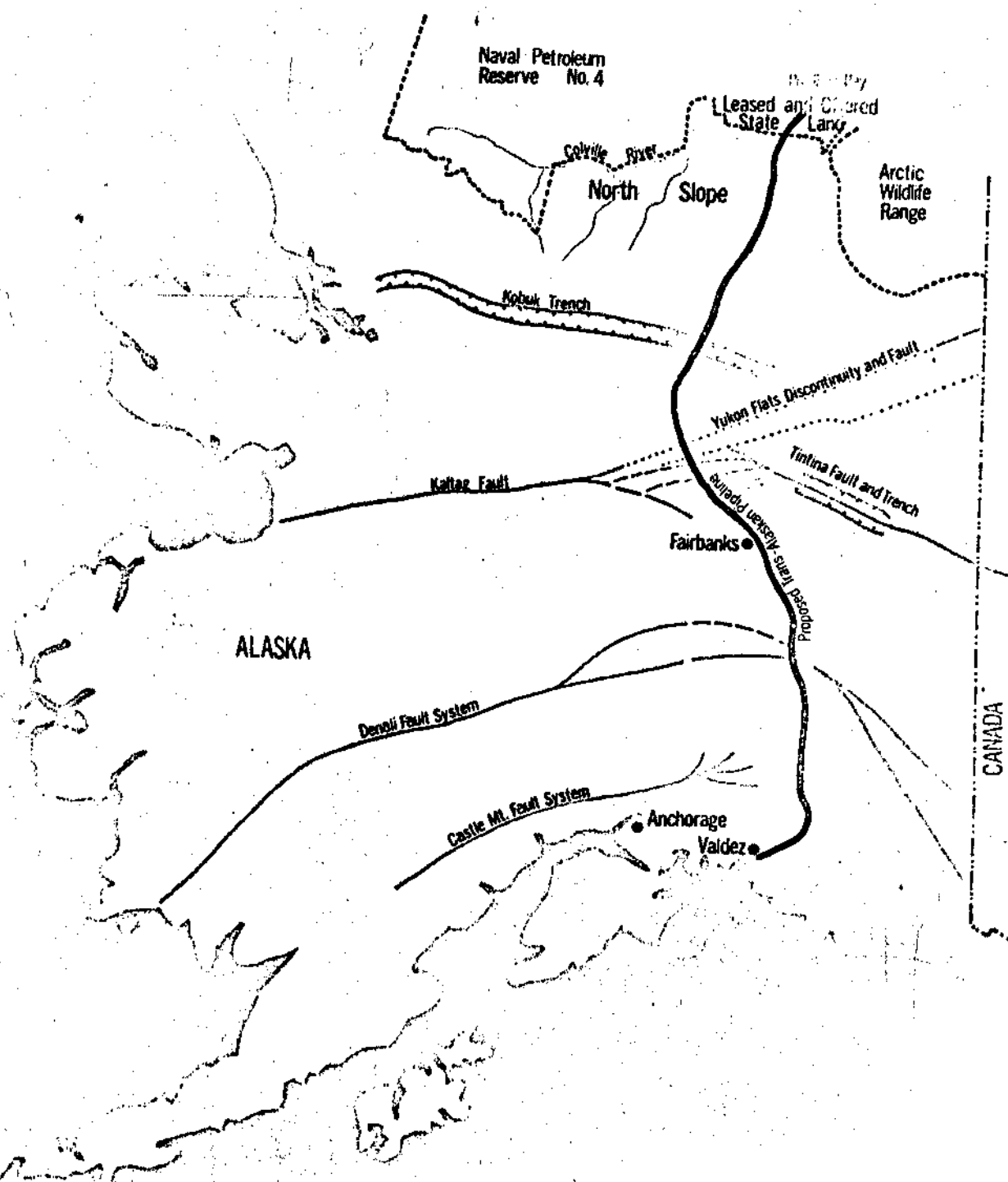
as ground displacement in thawing or sinking permafrost. But Coulter points out that a large cutoff valve designed to really halt the flow of oil would be 32 feet high, and men would have to be stationed at various points along the route to cope with emergencies. The backup pressure, in the event of a sealed off break, would be tremendous. This is one of the points in dispute, because the TAPS people have not yet determined specific details of design. As Coulter says, "our intent is to *prevent* spills, not to provide systems for cleanup."

Coulter views bedrock construction in rocky areas as more or less conventional, but the rest of the line is where the need for "imaginative" design concepts lie. He feels that some lengthy areas of the line may need only a few cutoffs and that other stretches, in potentially dangerous fault areas, may need much more frequent installations, perhaps at half-mile intervals.

Oil spills, in the event of an earthquake, would obviously be very destructive, since one mile of pipe will contain 500,000 gallons of hot oil. But a spill caused by a break in one section of line conceivably could be strictly local in effect. The Alaskan terrain is hilly and an oil spill would run downhill and come to a stop in a reasonably short distance. "In effect, the damage could be limited to a finite distance, limited by topography," Coulter said.

Should a river basin be involved, much more extensive damage could result. In Canada recently, oil from a spill in a pipeline at Fort McMurray traveled 150 miles downstream in the Athabasca River. Great Canadian Oil Sands Ltd., at whose plant the break occurred, said the break and the loss of pressure were reflected on monitors at its Fort McMurray plant and immediate steps were taken to stop the flow.

The spill caused a shutdown of the commercial fishing season on Lake Athabasca just at a time when fish prices were rising because of mercury pollution in other areas of Canada, the Canadian Press news agency reported. The spill did not, apparently, cause much damage to wildlife breeding grounds because of the fast current flow of the Athabasca.



The Permafrost Problem

Permafrost is defined exclusively on the basis of temperature, as its name suggests. It is rock or soil material, with or without interior moisture or organic matter, that has remained below 32 degrees F. continuously for two or more years.

Permafrost may be ice-free where no water is present, the Geological Survey notes. The permafrost table consists of the upper surface of the permafrost layer and the active layer, the zone that freezes in the winter and thaws in the summer.

The Geological Survey's "Permafrost and Related Engineering Problems of Alaska" makes it clear that American engineers who first tried to build structures — from houses to bridges and pipelines — in Alaska encountered the same problems as the Russians. The stresses and strains induced by the freezing, thawing, and heaving of permafrost soils subjected to unexpected temperature changes turned railroads into roller coasters and bridges into jigsaw puzzles.

"The permafrost region of Alaska, which includes 85 percent of the state, is characterized by a variety of permafrost-related geomorphic features including patterned ground, pingos, thaw lakes, heaved drainage, thaw or thermokarst pits, and muck deposits," states the report.

"Known permafrost thickness ranges from about 1,300 feet near Barrow in northern Alaska to less than a foot at the southern margin of the permafrost region.

"The extensive permafrost region of Alaska poses special engineering problems on the design, construction and maintenance of all kinds of structures," the report notes. "Lack of knowledge about

permafrost has resulted in tremendous maintenance costs and even in relocation or abandonment of highways, railroads, and other structures. Because of the unique geologic-environmental conditions that exist in permafrost areas, special engineering procedures should be used, not only to minimize disruption of the natural environment, but also to provide the most economical and sound methods for developing the natural resources of the permafrost region of Alaska."

The report warns that in the Alaskan experience with construction of airfields, highways, and railroads, "improper procedures can far exceed the expense of the initial investment. In some cases structures are damaged to the extent that they become unusable after just a few months or years. The financial losses caused by such problems as impassable roads, unusable airstrips or damaged machinery in buildings which have settled [unevenly] can be extremely high."

Dr. Arthur H. Lachenbruch of the U.S. Geological Survey's Menlo Park research staff, in a report entitled "Some Estimates of the Thermal Effects of a Heated Pipeline in Permafrost," notes that the proposed Prudhoe Bay-Valdez pipeline would maintain oil temperatures in the neighborhood of 158 to 176 degrees F. when full production is achieved.

"Such an installation would thaw the surrounding permafrost," Lachenbruch asserts. "Where the ice content of permafrost is not high, and other conditions are favorable, thawing by the buried pipe might cause no special problems. Under adverse conditions, however, this thawing could have significant effects on the environment and possibly upon the

security of the pipeline. It is important that any potential problem be identified prior to its occurrence so that it can be accommodated by proper pipeline design."

Lachenbruch notes that the actual degree of permafrost conditions along the pipeline remains to be determined by actual measurements. Such measurements, he said, are essential to predictions of the interaction between pipeline and environment. He estimates that a pipeline 48 inches in diameter buried six feet deep in permafrost and heated to 176 degrees F. would thaw a cylindrical region around the pipeline 20 to 30 feet in diameter in a few years in typical permafrost soil.

"At the end of the second decade of operation, typical thawing depths would be 40 to 50 feet near the southern limits of permafrost and 35 to 40 feet in northern Alaska where permafrost is colder. . . . The principal effect of insulating the pipe would be to increase oil temperatures rather than to decrease thawing," he reports.

Lachenbruch asserts that if permafrost sediments have excess ice and a very low permeability when thawed, melting below the pipe could generate free water faster than it could filter to the surface. As a result, the thawed material around the pipeline

could persist as a semiliquid slurry or slush. Where permeabilities are very low and excess ice contents are moderate, thawing rates would be sufficient to maintain this state for decades.

Lachenbruch explains that under certain conditions the semiliquid slurry "would tend to flow like a viscous river and seek a level. As an extreme example, if these slurries occurred over distances of several miles on almost imperceptible slopes, the uphill end of the pipe could, in a few years, be lying at the bottom of a slumping trench tens of feet deep, while at the downhill end, millions of cubic feet of mud could be extruded over the surface."

Where the pipe settled to the bottom of the trench, Lachenbruch notes, "it would accelerate thawing and flow, and the process could be self-perpetuating. The pipeline could be jeopardized by loss of support in the trench and by displacements in the mud flow, and the disruption of the landscape could be substantial."

Lachenbruch warns, too, that uneven settlement of a pipe can result from a variety of processes, the most conspicuous of which is probably the thawing of ice wedges. These massive vertical veins of ice, he notes, form polygonal networks, commonly invisible from the surface and difficult to delineate with borings. Ice wedges, he says, "are widely distributed in Northern Alaska. A statistical calculation suggests that in typical ice-wedge terrain, conditions which might exceed the design stress of the pipeline could occur on the average of once every mile. Most of these conditions could be anticipated by observations made during trenching."

Ice wedges are only one of a number of strange geological phenomena found in permafrost. Surface features include pingos (small ice-filled conical hills); stone nets (netlike concentrations of coarse rock); thaw lakes and pits, and "beaded" drainage patterns. Disturbing frozen ground, even by making small changes such as removing vegetation or putting up a building, will commonly upset the freeze-thaw balance. When certain kinds of permafrost soil thaw, what was once solid land becomes a veritable quagmire incapable of supporting any structure whatsoever.

As a result of these and other findings, to conservationists the prospect of a buried pipeline conjures pictures of an impassable "canal" of unstable land, and of slides which could bring about ruptured sections of pipe and produce ruinous oil spills which

would cover vast areas of the Alaskan landscape. They reject arguments that the oil flow could be "easily turned off" in the event of a break, noting that one mile of the pipe carries three times the amount of oil that damaged the Santa Barbara coastline.

The Soviet Experience

The task force has gone to an unusual source — the U.S. petroleum industry's own survey of Soviet oil and gas pipeline construction procedures—for further evidence that burial of an oil pipeline could be a very risky business indeed, to be avoided generally in the permafrost unless new and imaginative engineering designs are developed.

In commenting on the Soviet experience, D. C. Alverson, a geologist for the U.S. Geological Survey, observed:

"The Soviets have engaged in research on the feasibility of laying pipelines in permafrost areas since shortly after World War II. Earliest studies were based on problems encountered in building roads, airfields and various kinds of structures on a permafrost foundation, as well as laying water, gas

distribution, heat and electric lines in cities such as Norilsk and other settlements. Experience at Ukhta in the Komi (district), in the north part of European U.S.S.R. just outside the permafrost boundary, convinced the Soviets that it was most desirable to avoid disturbing the thermal regimen of the permafrost, and where possible to construct pipelines above ground. It is less desirable, but possible, to lay pipe directly on the ground surface, with the least possible disturbance of the soil layer. Least desirable is excavation of a trench and burial; this should be confined to the active layer [of the permafrost]. Examples of the results of failure to properly accommodate to the thermal regimen of permafrost in various kinds of construction abound in the Soviet literature."

Alverson notes that the Soviet experience in laying pipelines in permafrost areas has been limited to one oil line, from Krasnoyarsk to Irkutsk, where permafrost is usually less than 49 feet thick, and gas lines from Tazovskoye to Norilsk in the northern part of the West Siberian lowland; from Taas-Tumus to Yakutsk and Pokrovsk, in Yakutia, where the permafrost is commonly more than 650 feet thick.

One article referred to by Alverson notes that installation of gas pipelines involved "exceptionally complex and responsible engineering installations." The underground and semi-buried installation technique may be used on a limited number of sections, where soils when thawing do not lose their weight-carrying capacity. "In the permafrost," the Soviet article states, "it is necessary to use widely the above-the-ground (on supports) installation, and in isolated sections, on-the-ground and under cover with a thermally insulated layer under the pipeline."

In a March 1969 report, I. E. Dukhin, a Soviet engineer, notes that "the construction of transmission lines in the northern part of Western Siberia in regions of permafrost is a very complex engineering task.

"In spite of the complex installation of various supports and the difficult conditions of the construction itself, the possibility of excluding the heat effects of the pipeline on frozen ground and, therefore, the conservation of the best conditions guaranteeing its stability, makes it possible to consider above-the-ground laying as the most expedient laying method over almost the whole permafrost area. . . ."

Dukhin, in an observation echoed by ecologists pointing to similar dangers in Alaska, notes that "the main factor determining the stability of the temperature condition of grounds and their load-bearing capacity, is a sufficiently thick [eight to ten inches] moss blanket which stabilizes the inflow of heat into the ground.

"With the passage of a vehicle," he reports, "the moss blanket collapses or will be destroyed and the surface becomes uncovered; more heat flows into the ground and, therefore, the depth and intensity of the seasonal melting increases. The ground below the tracks of the vehicle melts more rapidly. As a result of the melting of the ice in ice-impregnated grounds, a significant sag arises in the area of the pipeline route which becomes a natural drain on the whole environmental surface. . . . The presence of a small amount of water in the route gives rise to the so-called hot-bed effect, which even more intensifies the melting.

"The depths of melting below the track can amount up to several [yards] during the season, and the sag in the track area (depending on the character of the ice) to [one foot to one yard]. The presence of vein ice may lead to [ground] collapse," he notes. "The extension of the disintegration to the adjacent territory and the bringing of the selected route into unfitness is extremely dangerous. The

clearly expressed thixotrophy [property of becoming fluid when shaken, stirred, or otherwise disturbed] of soils which lost their load-bearing capacity under the effect of even insignificant dynamic loads, will be the source of numerous transportation delays. . . . the laying of a gas pipeline in a zone of developing thermokarst formations is dangerous insofar as a guarantee of its stability is not realizable."

Dukhin, again speaking of a "cold" gasline, for which potential environmental damage is relatively minor notes that:

"A disturbance of the heat conditions of permafrost can be avoided through laying the pipeline above the ground. A gas pipeline laid above the maximum level of the snow cover has practically no heat effect on the frozen grounds of the base and guarantees maximum stability of the construction. The working of frozen ground, installing thermal insulation and other operations are not necessary for above the ground laying. However, increased heat losses during the winter period, the risk of precipitation out of the condensate, the negative effect of low temperatures on the longevity and the reliability of the insulation, and so forth, have to be considered."

Coulter points out that temperatures in Siberia and Alaska differ only by a few degrees. Geographical conditions in both regions — from mountains to river basins — offer comparable terrain, tundra and muskeg (wet, spongy ground) conditions. Both are permafrost areas. He notes that soil sagging caused by thermokarst phenomena, according to the Soviet engineer M. O. Pereltsvaig, "apparently originates dangerous stresses in an underground large diameter gas pipeline, too, as it starts floating in the soil pulp and turns up at the top of the active layer. There, soil bulging and crack formation by frost are most intensive."

Coulter notes that the thawing process, so often commented on by the Soviet engineers, takes place even though the pipe is about the same temperature as the ground. The TAPS pipeline, with its oil flow at 176 degrees F., would be far more hazardous to the environment.

Other Routes

The Prudhoe Bay-Valdez route, despite all its problems, still has many sponsors. Washington State Senator Henry M. Jackson, Head of the Senate Interior Committee, as much as promised the route could be used when in April he advised a group of Alaskans "not to be in too much of a hurry" to get the line built. He said he had enough faith in American technological prowess to assure him that there would eventually be a pipeline that posed no threat of environmental disaster. Dr. William T. Pecora, Director of the U.S. Geological Survey, also believes the line will be built — although he believes about half the line should be built above ground. The TAPS consortium continues to press for the line to be buried throughout its length.

Some Canadian observers who would like to see the Alaskan oil move down through Canada to the United States doubt if the TAPS project will be built. They see too many problems for the route — the permafrost, the opposition of conservationists, and the cost of construction. They believe that the recent voyages of the S.S. *Manhattan*, exploring the possibility of moving oil by tanker through the Northwest Passage, reinforce chances for the use of Canadian harbors to ship the oil to the east coast.

A Canadian oil consortium, represented by the Bechtel Corporation, believes that the North Slope oil could be brought to the Mackenzie River Delta by a relatively short pipeline from Prudhoe Bay. From the mouth of the Mackenzie it would move, they reason, through an all-Canadian, 1,600-mile-long pipeline down the valley of the Mackenzie to Edmonton,

Alberta, and from there to U.S. markets. Most of this route, too, is over permafrost.

The task force in Washington, however, leans hard in the direction of the all-Alaskan pipeline, despite the problems. They note that a Prudhoe Bay-Mackenzie River connecting line would parallel the northern boundary of the huge Alaskan wildlife range, which conservationists want to see protected in perpetuity. Secondly, the oil needs of the U.S. west coast would be more efficiently met by direct oil supply via the TAPS system and tankers from Valdez. Finally, the daily estimated production of two million barrels of oil can only be handled efficiently and economically by a pipeline. To transport the oil exclusively by sea would require dozens of supertankers (which have yet to prove they can safely and economically navigate the Northwest Passage), special equipment, and special diplomatic arrangements between Canada and the United States for the servicing of a tanker service.

In terms of ease of developing the vast oil reserves of the North Slope, the TAPS project has the edge. Which may be enough. An enthusiast once suggested during Alaska's application for statehood that Alaska be maintained forever as an undeveloped wilderness area.

"We looked at him," recalled an Alaskan who had been weaned on the search for gold, "as if he were some kind of nut." □

THE TRANS-ALASKA THE

Editor's Note. With the publication of the environmental impact statement the Trans-Alaska Pipeline controversy will move into a new phase.

In line with the Club's vital interest in the pipeline, members of the staff have prepared this special report on the project's potential impact on the Alaskan environment. As this report is based on material prepared in October of last year, it can be assumed that some of the objections raised here will be answered or countered in the impact statement. However, unless hitherto undisclosed material is released or major technological breakthroughs have been made in the past three months, the arguments put forth in this report remain valid and the sections of the impact statement dealing with these areas of concern may obfuscate the issue and should be examined with the greatest of care.

In 1969, following the discovery of oil in the preceding year on Alaska's north shore, the Alyeska Pipeline Service Company first sought the approval of the Department of Interior for a Trans-Alaska Pipeline. The 800-mile pipeline would run from Prudhoe Bay on the Arctic Ocean, across the Brooks and Alaska Ranges, to the ice-free port of Valdez.

Three years later, despite thousands of hours of study and millions of words in reports and the press, many of the basic questions on the impact of the pipeline on the environment have not been answered.

In early 1970, following the Alyeska request for a permit to build a supply road to facilitate construction of the pipeline, the Department of Interior issued what it claimed was an environmental impact statement for the road. This study bore little resemblance to a proper E.I.S. and led to a civil suit against the Department by the Wilderness Society, the Environmental Defense Fund and the Friends of the Earth. In April the court ordered the Department to treat the road and the pipeline as a single project and an injunction was issued to block work on the road until an adequate impact statement was filed.

Accordingly a preliminary environmental impact statement for the entire project was issued by the Department in February, 1971. Though of greater scope than the earlier effort, the study failed to resolve many of the basic questions about the effect of the pipeline.

In compliance with a request of the Department, Alyeska filed, in July and August of last year, a twenty-nine volume *Project Description. A Technical Review of the Project Description* was prepared by a sixty-man task force for the Department. This review, which was

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Source: Sierra Club Bulletin, January 1972, pp. 4-9. Reproduced with permission by the Library of Congress, Congressional Research Service.

put on "open file" on October 20, did not come to general public notice until December 15 when the Sierra Club brought it to the attention of the press.

The *Technical Review* reveals both the magnitude of the potential harm and the extent of our ignorance of the possible damage that the pipeline may cause. The problems arising from the construction, maintenance and monitoring of the pipeline still require intensive study before a proper evaluation of the effect of the system on the environment can be made.

As a result of deficiencies disclosed in the *Technical Review*, doubt has increased, rather than decreased, about Alyeska's present ability to construct and maintain an oil pipeline system across Alaska in a manner that would not cause major and irreparable damage to the Alaskan landscape.

The purpose of this report is to point out the deficiencies and to underscore the need for further, more comprehensive studies. All quotations, in italics, are from the

PIPELINE UNANSWERED QUESTIONS

Technical Review of the Alyeska Pipeline Service Company's Project Description of the Proposed Trans-Alaska Pipeline by the Ad Hoc Review Group of the Technical Advisory Board and the Menlo Park Working Group.

Earthquakes

Earthquakes which may occur along several major faults constitute a potential hazard. Only one fault zone, the Denali, has been studied in detail. However, its northern branch was not studied.

Identify the locations of the fault zones (other than the Denali fault zone) for which specific designs are necessary and provide seismic and fault displacement design provisions, including those for burial in bedrock, for crossing them. (p. 9)

The report calls for a revision of pipeline and pump safety standards.

In view of the recent strong motion records from Parkfield, Koyna, San Fernando and Lima the magnitude-acceleration relationships specified for the contingency earthquakes are too low . . . Revised values that accommodate the range of ground motion intensities recorded for these events, normalized to be consistent with the design magnitudes for each seismic zone, must be specified. (p. 12)

This reevaluation may require the revision of the con-

struction standards for the entire system. Further the . . . *potential effects of earthquakes on the shear strength and liquefaction potential of the soil have not been considered . . . This may be a vital consideration in the stability of the thaw plug. (p. 19)*

Pipeline Leaks and Spills

The minimum detectable leak of 750 barrels per day is too large and is . . . *inconsistent with the environmental concerns outlined in the Department of Interior Sitpulations.*

In view of the potential undetected leak volume, more sensitive and frequent monitoring techniques should be developed. (p. 39)

Location of leaks or breaks after they have been isolated between remotely controlled block valves depends upon visual observation . . . An unacceptable volume of oil could be lost between detection and remedial action . . . Research aimed at developing better leak detection methods should be initiated immediately. (p. 47)

This large leak potential necessitates more intensive pipeline monitoring which is difficult in the Alaskan climate. The more monitoring that takes place, the greater the disruption to wildlife.

A 99% availability of UHF/VHF radio for control of remote block valves from nearest pump station is stated, but its reliability, failsafe features, effects of atmospheric disturbances, and redundancy are not discussed. Provide an analysis to assure reliability of the system. (p. 35)

The question of the number of block valves necessary in the system is still unresolved. The maximum drainage potential of 50,000 barrels, i.e., the capacity of pipe between valves, is still huge. Extensive studies of river basin drainages will be necessary to show what would happen to oil spilled in such a massive leak.

Methods of recovering spilled oil have not yet been tested nor has the ability of Alaskan soils and plants to recover from the effects of spilled oil been adequately assessed. We believe that Alyeska has been overly optimistic about both of these problem areas.

Pipeline Siting and Permafrost

It is still uncertain what portions of the proposed pipeline would be placed underground and which would be above ground. This "indeterminacy" has made rational analysis of the environmental impact of the line difficult,

particularly with regard to its thermal effects. Heating of the surrounding soil by the pipeline might cause extensive erosion and influence the complex drainages over a wide area.

The effect of the pipeline on permafrost and of permafrost on the pipeline has been inadequately studied.

The thermal design of the pipeline system has not been specified. It depends upon the geographic distribution of buried and elevated modes which is also largely unspecified. (p. 32)

Disregard of potential sliding at freeze-thaw interfaces and in horizontal layers of atypically weak soil is not justified . . . (p. 19)

The feasibility of successful operation of the line in certain locations, where unusual and extreme natural processes are known to operate, has not been demonstrated. An example of this situation is burial of the pipeline in areas along river floodplains where icing conditions exist. (p. 3)

The feasibility of burial under Alyeska Pipeline Service Company's construction mode Categories 4 and 5 is dependent upon the development of new, unproven technological systems. Until the feasibility of such systems is demonstrated, burial under construction mode Categories 4 and 5 must be considered to be precluded by the Department of Interior Stipulations. (p. 3)

We believe that the effects of the pipeline can only be determined by extensive field testing of substantial lengths of pipeline containing hot oil.

River Crossings and Runoff

A major question remains about the ability of Alyeska to build adequate river crossings.

The Project Description has too many options in the alignment construction modes and stream crossings for us to complete an adequate Environmental Impact Statement at this time. (covering letter)

. . . The project description does not indicate that any pertinent river crossing data have been collected, except for the Klutina and Yukon Rivers. No evidence is presented that adequate field investigations have been completed either for river crossings or for areas where the pipeline is aligned in the flood plain or the active channel. (p. 17)

An acceptable method for the design of ditches and drains in erodible material is not presented. The sketches presented are not definitive and do not present enough information to enable determination of the adequacy of the design. In permafrost areas the design must accommodate the effects of ponded and flowing water in ditches and drains. (p. 41)

Information on the erosion force of the Alaskan rivers and scour resulting from the formation of ice flows is inadequate.

Many of the river channels are unstable. Although Al-

yeska claims that the crossing localities chosen are stable ones, it does not have evidence to prove this.

The section states, "Literature research of old maps and photography has confirmed the stability of stream channels in their present location." On the contrary, comparison of old and recent photographs indicates that movement of stream channels is quite common and that in some cases the active portion of the stream has moved a few hundred feet. (p. 42)

The instability of river banks, especially in heavily iced areas, may be much greater than anticipated, and lead to pipe slippage when the combination of forces becomes too great.

As plans now stand,

Large sections are indicated for burial beneath the flood plains or channels of rivers, especially on the north and south slopes of the Brooks Range. The advisability of this design requires additional study, as the applicant acknowledges. (p. 6)

There is insufficient allowance for the runoff that occurs in the area after heavy rains.

Methods to control erosion from surface drainage proposed by Alyeska Pipeline Service Company are not in compliance with the Department of Interior Stipulation regarding erosion. For example, at the Valdez terminal a 24-hour rainfall of 5.1 inches was used for design purposes while Weather Bureau records show a maximum 24-hour rainfall of 7.3 inches at Valdez and 9.2 inches at Thompson Pass. Effects of higher intensity rainfall associated with short duration storms and high snowmelt rates also are not considered. (p. 34)

Glacial Flooding

The project description states that: (1) all glacier-dammed lakes affecting the pipeline were located, (2) the process of lake formation and dumping was understood sufficiently to predict the future behavior of glacier-dammed lakes, and (3) surveillance of potentially hazardous new glacier-dammed lakes was considered.

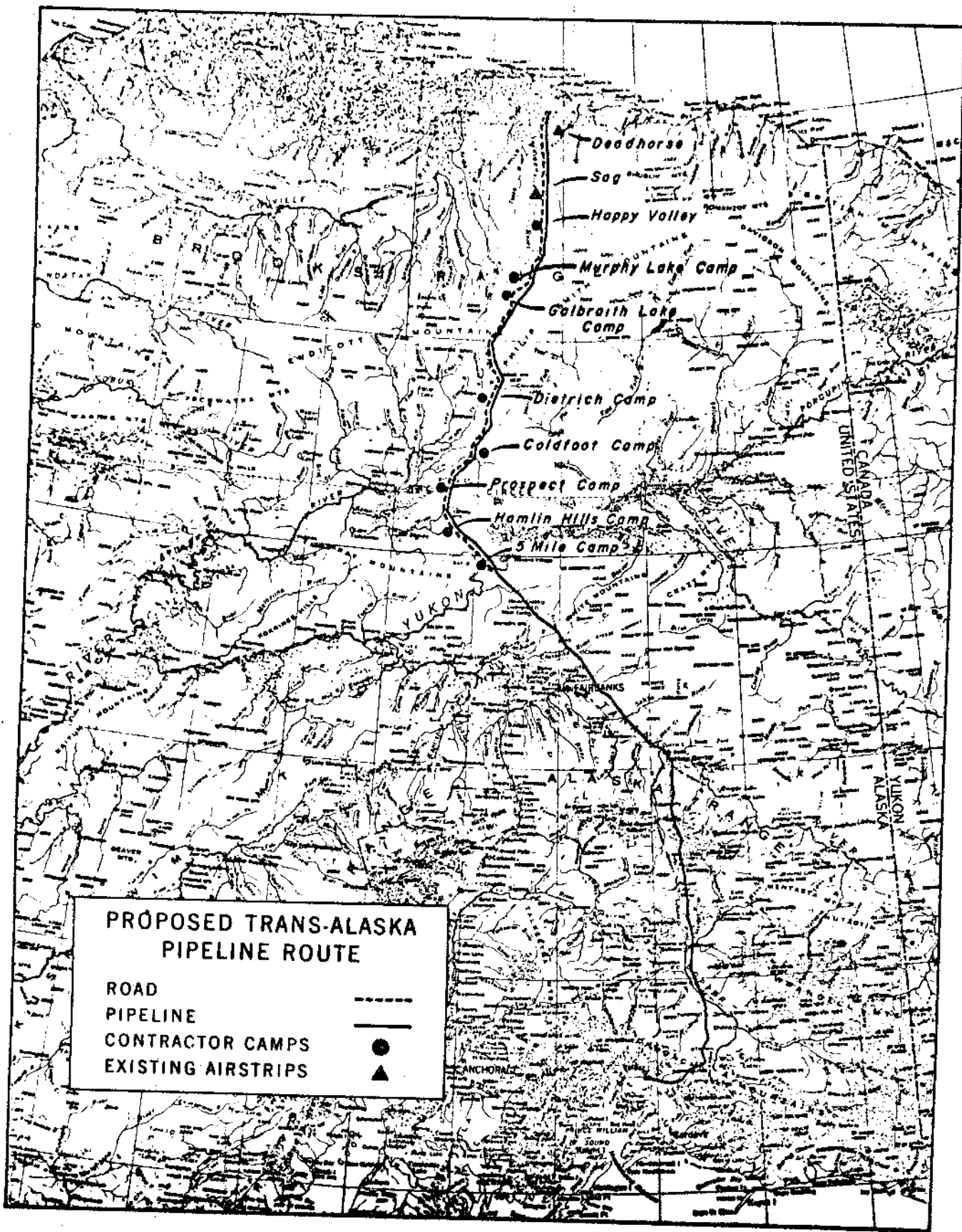
These statements are not adequately supported by the data presented. Supply justification of the factors used in computing floods from this cause. (p. 7)

An adequate evaluation of the potential flood danger from these lakes cannot be made on the information available. Further,

. . . serious outburst floods can occur from glaciers even though no significant lakes are found adjacent to the glacier. Repeated outbursts from Castner Glacier have occurred and the source is unknown; this is a particularly dangerous location because it is also in the Denali fault zone. (p. 23)

Pipeline Mechanics

Stress and strain criteria for all the combined forces at any point in the pipe, whether buried or elevated, have not been adequately presented and justified. At full



**PROPOSED TRANS-ALASKA
PIPELINE ROUTE**

ROAD - - - - -
PIPELINE —————
CONTRACTOR CAMPS ●
EXISTING AIRSTRIPS ▲

throughout the combine forces appear to introduce severe plastic strains in the pipe, perhaps to the point of rupture. Limits and their derivation must be presented as requested in the specific comments.

Examples of such stresses are that of the heat from the oil, the bending stresses of both live and dead loads, the stresses from soil subsidence, lateral movement, seismic stresses, and frost heave. Additionally, the "creep" properties of stressed pipeline have not been evaluated fully.

- Corrosion Protection

The project description implies that an effective cathodic protection system can be designed for a hot pipeline in frozen ground. Test data must be provided to demonstrate that a hot pipeline in frozen ground can be protected against corrosion. The proposed test of 30 miles of cold pipeline in frozen ground would not be indicative of operating conditions. No line pipe should be buried until this problem is resolved.

As brine will corrode the pipeline, the oil was slated to be brine-free. However, it may be necessary to increase the fluidity of the oil to facilitate passage through the pipeline during cold weather and the addition of seawater is being contemplated. More testing will be required to resolve these conflicting problems.

Avalanches

The danger from avalanches has not yet been properly evaluated.

The aboveground parts of the pipe are claimed to be free of dangers from avalanches. This cannot be verified because (1) not all above-ground parts are identified on the route map, (2) no report is presented to show that avalanches have been studied, and (3) the only avalanche hazards discussed are based on meager data.

A preliminary field survey lists a large number of areas as having "high" avalanche potential. More studies are required.

Monitoring

Events such as floods, fault displacements, earthquakes, avalanches and landslides, catastrophic sea-waves and glacial surges may pose significant hazards to the pipe. A monitoring strategy that will provide advance warning, and enable preventive action, or control of potentially adverse effects, should be formulated and continuously up-dated as shown necessary by operational experience. Environmental effects such as thermal pollution, erosion, and siltation must also be continuously monitored.

Wildlife

There is a general lack of information about the effect of the pipeline on wildlife. For example, the effect of noise from construction, monitoring, and from the pump stations has been insufficiently evaluated. Alyeska has proposed minimum noise levels, but the effects of noise on wildlife have yet to be studied.

An adequate evaluation of potential harm to wildlife populations must include studies of the effect of a large influx of construction and pipeline personnel, heavy equipment, recreational motor vehicles, pollution and other byproducts of human population.

Toxicity

Provide information on the toxicity of Prudhoe Bay crude oil on indigenous vegetation, specifying the toxic fractions and their persistence in solution and emulsified states.

Provide information on the toxicity of Prudhoe Bay crude oil on indigenous fish species, specifying the toxic fractions and their persistence in solution and emulsified states. (p. 8)

Very little is known about the effect of oil on arctic and subarctic plants and animals. Recent studies on the marine environment suggest that some compounds in oil may constitute a long term hazard because of their slow rate of degradation, their bio-accumulation, and their possible carcinogenicity. Additional studies are necessary on terrestrial and freshwater ecosystems, particularly with regard to their vulnerability to the intrusion of foreign substances. Such studies would have to be conducted over a period of time.

Air Pollution

The effect of sulphur dioxide generated by the pump stations has not been sufficiently studied. Preliminary work indicates that it is extremely poisonous to arctic lichens upon which much wildlife depends. The effect of other pump station-generated pollutants is unknown.

Gravel Requirements

Estimates of the amount of gravel required to construct the pipeline continue to grow, particularly with the need to elevate much of the line. The impact of such massive gravel removals could be significant. The source of the over 67 million cubic yards of gravel required is unclear.

Marine Transport

Marine transport of the oil, though a most important problem, was beyond the scope of the Department of Interior's *Technical Review*. It is not acceptable to say that every effort will be made to minimize the likelihood of marine oil spills. In spite of fines, careful procedures, and modern equipment, spills still take place as demonstrated by the recent ship collision in San Francisco Bay.

The rugged, island-studded coast of Alaska, British Columbia, and Washington is a dangerous place to conduct a substantial tanker traffic, as was recently noted in a report of a Special Committee of the Canadian House of Commons. "... The waters in this region are more confined and hazardous than those where the *Torrey Canyon* or the *Arrow* met disaster... For this reason the threat of damage to the environment and also to the tourist and fishing industries is grave...

"... The area most likely to be the scene of an oil spill is an important feeding area for many of the commercial and sport fish of the West Coast..."

"Consequently, your Committee concludes that the proposed tanker route is detrimental to the Canadian national interest, and unanimously recommends that it be vigorously opposed by the Canadian government." (From *Proceedings of the Special Committee on Environmental Pollution*.)

Policy Alternatives

Before any permit for the proposed Trans-Alaska Pipeline is issued, the Sierra Club believes that the Department of the Interior must thoroughly analyze at least two alternatives:

- (1) a pipeline through Canada and
- (2) a five-year moratorium on North Slope oil development.

Analysis of alternatives is required by the National Environmental Policy Act, which requires consideration of the alternatives in sufficient depth to compare their environmental and other costs and benefits with the primary proposal in a rigorous fashion. In this case, the two alternatives mentioned above promise to be far superior to the proposed Trans-Alaska Pipeline.

The Canadian route eliminates some environmental hazards. It avoids the earthquake belt of southern Alaska and the Valdez to Puget Sound tanker traffic. It would use a route, the MacKenzie Valley, which will probably be used as a general transportation corridor for other purposes, including any gas pipeline from the North Slope and oil pipelines from Canadian-Arctic petroleum deposits. Studies have conclusively shown that it is economically more advantageous to the United States if the oil comes through Canada.

A five-year moratorium makes more sense than either pipeline route. The technical problems of North Slope oil development are severe. Our nation's last great wilderness is at stake, and it can never be replaced. There is no national security need for the oil during the next five years.

In summary, the most logical and sensible action would be to use this five-year moratorium to review alternative energy sources, re-examine our oil export-import laws, improve our technology, and only then make a decision.

DEPARTMENT of the INTERIOR

news release

For Release on Delivery 9:00 A.M. February 16, 1971

REMARKS BY SECRETARY OF THE INTERIOR ROGERS C. B. MORTON

AT TRANS ALASKA PIPELINE HEARINGS

WASHINGTON, D.C. FEBRUARY 16, 1971

The public hearings being conducted here today and tomorrow, and those in Alaska next week, address the application by a group of oil companies for a pipeline right-of-way across federal lands from the North Slope of Alaska to Valdez on the southern coast. The hearings are called to elicit from state and local agencies, and from the public, further information to enable the Department to more thoroughly assess the environmental impact of the project as required by the National Environmental Policy Act of 1969.

Let me make several important points at the outset. The environmental statement which was released for public review on January 13, is a preliminary report prepared by staff representatives of the Department of the Interior. It is an interim document and it has not been endorsed by the Department. In no sense was it prepared as the final position of Interior. The statement is thought to be unique for this very reason: that, though not required by law or regulation, it was made public in preliminary form, before federal and state review, to allow ample time for inspection before these hearings. It is unique in the sense that we are asking the public to join in our examination process well before the final document is approved by the Department. The decision on the application has not been made, nor will it be made until the final environmental statement and other necessary documentation have been thoroughly reviewed, and until indepth policy discussions under my personal direction have taken place.

The January 13th draft environmental statement is properly viewed as the culmination of over 18 months of investigation by various bureaus, offices, and task forces in the Department of the Interior. This investigation has seen several landmarks familiar to most of you who have followed the evolution of the project. These include:

....The establishment of the Federal Task Force by President Nixon in May of 1969 which brought together other Federal Departments and offices to consider the application

....The completion of the environmental stipulations later that year which set forth exacting requirements for the protection of the environment and the rights of Alaskan Natives

....The formulation of the enforcement team under the authorized officer to whom is given

1. The absolute prerogative to inspect all phases of the project, and to suspend or terminate such activities when the provisions of the permit are not met.
2. The prerogative to require modification of alignment and installation to protect both the integrity of the pipeline and the environment along the route.
3. The prerogative to require rehabilitation of any property, resource, or land harmed during any part of pipeline activity.
4. The prerogative to require that the permittee file and maintain an acceptable performance bond, or pledge of securities, in the amount of \$5 million to insure the financing of any necessary rehabilitation.
5. The power under the authority of the Secretary of the Interior to revise or amend the stipulations as necessary to adjust to unforeseen conditions.

The investigation by the Federal Government has also included the establishment of the Technical Advisory Board within the Department of the Interior in early 1970 which has given rigorous examination to technical and geological aspects of the proposed system, and from which was prepared the set of technical stipulations. Foremost among the achievements of this group has been the determination of conditions under which a pipeline can be safely buried and of the stringent conditions for construction in seismic areas.

The most recent landmark in our investigation has been the close intra-agency cooperation which has led to the publication of the preliminary environmental statement, and the scheduling of the hearings this week and next prior to our preparation of the final document. During the present period in which the document is undergoing review by other Federal agencies and by public, the staff drafting committee in Interior is continuing its own examination and revision. I have given my personal direction that every effort be expended to present in the final document an objective, carefully weighed and balanced discussion of the environmental impact of the proposed project. In particular, I have directed the drafting group to elaborate upon their treatment of the environmental impact of tanker transport from the Gulf of Alaska to the Puget Sound area; to more carefully delineate the long term impact of construction upon the culture of Alaskan Natives; and to expand upon their examination of alternatives to the proposed action.

Let me emphasize, however, that change, editing, verification and reorganization are an integral part of the review process. No review could be valid without the opportunity for change, and indeed the absence of this opportunity would substantially negate the value of these public hearings.

In assessing the broader problem of petroleum development in the North, let me say that I share equally the concerns of those who speak for energy and the concerns of those who speak for the environment. This is the heart of the controversy. Neither the Department of the Interior, nor, of course, the Nation can afford the posture, or the luxury, of polarization. The mandate upon this Department demands that we stand with equal commitment to resource development and environmental protection. The meticulous examination given the project during the last two years and the development of the environmental stipulations are strong testimony to this commitment.

My own philosophy parallels the Department's long time charge. I am prepared to impose the most stringent safeguards for the protection of the environment; I am prepared to examine with the most objective detachment all transportation systems for the delivery of Alaska oil; yet I know of no transportation system that can be accommodated without some environmental impact; and, committed as we are in an era of ecological imperative, I cannot endorse the philosophy that we must impose a moratorium on resource development forever in the Arctic. Indeed, I am unable to perceive how permanently blocking all modes of transportation can do anything but complicate the problem.

I can assure you that meeting the basic energy requirements of the nation for the foreseeable future is fraught with problems of great magnitude. If we are to continue with a free and viable economy, the industries which supply the nation's energy must remain healthy and competent to meet the ever increasing demands placed upon them. Lack of recognition of this principle can only endanger the energy base of the nation as a whole.

There seems to be the common feeling today that the transportation of oil is done only for the sake of those who are in the business and is not connected with the demands of a society whose welfare depends most substantially upon its energy base. Nonetheless the overall decisions must be based on the long term needs of the nation as a whole, and not simply upon the interests of any industrial group.

So let us recognize, all of us, the social necessities and values as well as the social costs of energy development. Let us, in government and in the news media, set high standards for ourselves in the proper reflection of this problem. In a project of the magnitude of the Trans Alaska Pipeline, as well as any transportation system for Arctic oil, it is imperative that judgment, discretion, and understanding be exercised at every turn.

When President Nixon established the Federal Task Force in 1969 he charged it with finding the way that oil resources of Northern Alaska could be "explored and developed, without destruction and minimum disturbance." I reaffirm that responsibility today. We must redouble our efforts toward insuring the maximum compatibility between development and environmental protection. Only in recognizing the magnitude of the challenge, and in the careful awareness of the sensitive balance of our northern ecosystems, can we insure a new and permanent environmental ethic for the Arctic.

With this in mind, I welcome all of you here today. It is a particular privilege to have Governor Egan and members of his far travelled cabinet, members of the Alaska delegation, and other Alaskans with us. We look forward to your thoughts and recommendations, and to the consideration and evaluation that we will give them in reaching our final decision.

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Pipeline from North Slope may go through Canada

There's a growing feeling among oil interests in both the U.S. and Canada that the trans-Alaska oil pipeline never will be built. And last week Alaska Gov. William Egan (D) even threw cold water on his state's enthusiasm for the job and revenue-producing project.

At a recent meeting in Ottawa and in private discussions in Washington, D.C., last week, industry sources indicated that oil from Alaska's North Slope probably will move to markets through a line built mainly within Canada, even if the U.S. Department of Interior gives its long-awaited approval for the 800-mile route to the ice-free port of Valdez.

The main argument bolstering the switch: Canada has tremendous gas reserves and unmeasured petroleum on its side of the Arctic border. Canada will almost certainly build its own gas pipeline through the Mackenzie River Valley from the Arctic Sea and probably an oil line as well. Thus, it would make sense to gather U.S. and Canadian oil from the nearby sources and pipe them along the same route to a distribution point near existing mid-continent pipeline systems.

As oil companies and Interior officials have wrestled with the environmental consequences of the pipeline from Prudhoe Bay on the North Slope, Alaska officials generally have been boosting the project as an economic boon. Now, however, Egan says that a computer analysis shows that with an estimated cost of \$3.5 billion, the cost of operation and amortization would leave no royalty income for the state. Litigation over the pipeline could last more than two years, he said, and economics may dictate leaving the oil in the ground.

In addition to ecologists' arguments that the Alaskan wilderness cannot withstand the dire consequences of the pipeline, the Coast Guard recently released a report saying that shipping the oil south from Valdez would pose a ma-

ior environmental hazard because of the threat of spillages.

Canada is about a year away from a decision on its pipeline routes. When that decision is made, some industry and government observers believe that if national security reservations can be satisfied, the pipe and equipment stockpiled between Fairbanks and Prudhoe Bay may be moved east into Canada to be used on a binationally built and operated delivery system.

Last week a binational group of producers and pipeline companies proposing a 2,500-mile gas line from Prudhoe Bay through Canada to the North Dakota border pegged the cost of that project alone at \$5 billion.

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 CHICAGO TRIBUNE
 DATE
 SECTION PAGE

North Slope oil untapped because of pipeline snags

IT HAS BEEN almost five years since oil was discovered at Prudhoe Bay on Alaska's North Slope, and it's still a guessing game as to when the first of the oil will reach market.

A week ago the United States Court of Appeals restored an injunction which blocks the issuance of permits to build the pipeline, and Alyeska Pipeline Service Co., a consortium of seven oil companies which proposes to build the 800 mile line, is still studying alternative courses of action.

The action could take the form of an appeal to the Supreme Court, or proposals to Congress to amend the Mineral Leasing Act of 1920.

SECRETARY OF the Interior Rogers Morton, a party to the suit, late last week suggested the administration will push for an amendment to the Mineral Leasing Act, but said the administration won't decide on its course of action for a week or so.

The appeals court restored an injunction because Congress had not authorized a wide enough corridor for the pipeline. The mineral act provides for a 25-foot right of way on each side of the pipeline, plus the width of the pipe, four feet in this case, for a total of 54 feet for the trans-Alaska line. About 500 feet would be needed on each side for the Alaska line, pipeline supporters have said.

In saying it looks as if legis-

lative steps are needed, Morton said he still believes alternatives to the Alaska route suggested by environmentalists are less satisfactory than the proposed pipeline, which would bring oil by pipe to Valdez in southern Alaska for transloading to tankers. Opponents of the Alaska line have urged an oil pipeline across Canada.

CANADA ALSO HAS urged a Canadian oil line, protesting the environmental dangers of oil spills from tanker runs along Canada's west coast.

Atho there have been suggestions that the appeals court ruling will delay the pipeline construction for at least a year while it is fought out in the courts, an Alyeska spokesman said, "We can't predict any dates until we decide what action we are going to take."

The company hopes that decision will be made soon, she said.

Meanwhile, the 10 billion barrels of oil lying underground in the Prudhoe Bay field remain in the ground.

SINCE OIL WAS discovered at Prudhoe in 1968, the estimated cost of the pipeline has

grown from about a billion dollars to \$3 billion. Before work was stopped by the court action, and then voluntarily delayed by Alyeska, a 54-mile service road was built north of Fairbanks. And pipe is stockpiled at three Alaskan locations—Prudhoe Bay, Fairbanks, and Valdez.

After construction begins, it will take three years before the first Prudhoe oil gets to market, so the late 1970s is the earliest date it would be available. Initially, oil companies were talking of moving Prudhoe oil to market by 1972.

The Alyeska consortium is made up of Atlantic Richfield, Exxon, Standard of Ohio, Mobil, Amerada-Hess, Phillips, and Union of California oil companies.

Markets closed

Securities exchanges and major commodities markets will be closed today in observance of Washington's Birthday. Most banks also will be closed.

Alyeska chief bolsters defense of line

With backing from ARCO, president of trans-Alaska pipeline refutes point by point the arguments of opposition during Proxmire hearings. TAPS said fastest, cheapest means of moving crude to optimum market.

BACKERS of a trans-Alaska crude pipeline emerged from the latest round of congressional hearings the clear victors in the political and publicity battle.

The project and the Interior Department's decision to approve it took their lumps from hostile witnesses for 3 days of hearings before the Joint Economic Committee.

But on June 22, the 1 day accorded to supporters, the campaign to discredit the project by Sen. William Proxmire (D-Wis.), committee chairman, lost much of its steam. Proxmire himself conceded that Interior Sec. Rogers C. B. Morton's statement answered many of the questions in his mind (OGJ, June 26, p. 42).

Also, the vigorous defense of the trans-Alaska route over Proxmire's preference, a trans-Canada line, by Sen. Clifford P. Hansen (R-Wyo.) and Sen. Ted Stevens (R-Alaska) took the wind out of the Wisconsin senator's sails.

Hansen took Proxmire to task for the qualifications of the witnesses selected to criticize the Alyeska Pipeline Service Co. project June 7-9. Stevens also returned Proxmire's assaults against trans-Alaska in kind, leading to a shouting match in which the chairman suffered a rare loss of composure.

Except for a previous challenge from Sen. Mike Gravel (D-Alaska), the hearings had been largely a forum for a succession of anti-Alyeska statements. The project was attacked on environmental and economic grounds by Dr. Charles J. Cicchetti, economist for the Ford Foundation-financed Resources for the Future; S. David Free-

man, former director of the energy policy staff in the White House and now director of the Ford Foundation energy-policy project; David Anderson, member of Parliament from British Columbia; and others.

Courts hold answers. Morton met the criticisms point by point in his testimony, and allegations were further disputed in written statements from Alyeska and Atlantic Richfield Co., one of seven Alyeska owners.

If Proxmire intended his hearings to be a springboard for congressional action to override the decision in favor of Alyeska, he must have been disappointed.

Whether the pipeline is actually built will be determined by the outcome of court appeals, perhaps by the first of the year. A ruling on petitions of environmental groups to block the project is due in U.S. District Court by Sept. 1.

The Supreme Court should give the final answer—expected to be favorable to the pipeline—by late this year or early in 1973.

Assumptions challenged. E. L. Patton, president of Alyeska, and Thornton F. Bradshaw, president of ARCO, disputed several assumptions made by opponents of the Prudhoe Bay-Valdez pipeline.

They questioned the critics' premises as to ownership of a trans-Canada line, the delay compared to a trans-Alaska line, Canadian clearances required, West Coast market demand, the likelihood of a second crude line across Alaska, market demand in the Midwest, and environmental risks of both routes.

Ownership. Patton said conclusions that a trans-Canada route would be superior economically are based in part on the assumption such a line would be owned by U.S. interests and would transport only Alaskan North Slope oil to market.

This assumption is necessary, he said, to support the conclusion that the resource cost of delay in North Slope production involves only the delay in authorizing a trans-Canada route.

This ignores announced policies of the Canadian Government, the Alyeska executive charged. Canada has made it clear that Canadian interests would have to own part of a trans-Canada line, probably at least 51%, Patton said. Also, he added, Canadian oil would have a right to share the pipeline capacity on a priority basis.

Delay involved. Patton ridiculed suggestions that a switch to a route across Canada would delay delivery of North Slope oil only 1 to 2 years.

This estimate is based on the assumption that construction of a Canadian route could begin early in 1975 and that a trans-Alaska route could not begin until 1973 or 1974.

But it's completion dates that are important, not the beginning of construction. Common sense dictates that a pipeline across Canada, four times as long as TAPS and traversing more than twice as much permafrost and muskeg, will take considerably longer to construct, Patton said.

He cited 5 years as the most optimistic estimate for construction of a Prudhoe Bay-Chicago line by pipeline experts, compared with 2½ years for trans-Alaska. Assuming a Canadian line could be started in 1975—which

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Patton noted similar ironies in their positions in expressing concern over possible oil pollution from tanker traffic between Alaska and the West Coast.

They pointed out that refineries on Canada's West Coast at Vancouver are shipping oil every day by tanker; Canada has licensed exploration for offshore oil on 2.7 million acres off British Columbia and large areas off the East Coast; refining and tanker facilities off eastern Canada are rapidly expanding; and 500,000 b/d of imported oil is landed at Portland, Me., for movement to Montreal through a pipeline largely in U.S. territory.

Bradshaw rejected Puget Sound pollution warnings by Anderson, the Canadian MP, by comparing traffic there with the East Coast.

"Americans are accepting the risk of oil tanker operations on the coast of Maine to provide Venezuelan and Mideast crude oil for the pipeline which runs from Portland to Montreal," he said. "In 1970 this risk involved delivery of approximately 150 million bbl of oil to Canada through Portland in 886 tankers, as against 80 tankers per year forecast for delivery of Alaskan oil to Puget Sound."

He added that the 80 tankers for the Puget Sound refineries aren't dependent on construction of the Alaska pipeline.

The issue is whether tankers continue to carry foreign oil or will in the future carry Alaskan oil in more closely regulated U.S. ships.

"Canada is quite willing to accept risks of oil operations when its own interests benefit," the ARCO president pointed out.

Union support. The International Brotherhood of Teamsters, in a letter to Proxmire, threw its support behind the administration decision favoring construction of the Prudhoe Bay-Valdez crude line.

The letter supporting the project, which has been held up since April 1970 pending court review of environmental issues, was signed by Frank E. Fitzsimmons, Teamster president.

The powerful union, taking note of Proxmire's hearings on the pipeline,

supported the project as a shot in the arm for the construction and ship-building industries. Several tankers will be built to haul oil from the Gulf of Alaska port of Valdez to refineries on the West Coast.

Patton doubts—he is convinced it wouldn't be completed before 1980.

He pointed out it has taken 3½ years to obtain secretarial approval of a much shorter and less costly line under one government's jurisdiction. He therefore projected a 4 to 5-year planning period for the more expensive, bigger venture requiring clearance of two governments.

West Coast market. Several critics said the West Coast market could not absorb the entire throughput of Alyeska, and so the surplus probably would be exported.

Scheduled oil shipments through Alyeska are 600,000 b/d during 1976-78, 1.2 million b/d during 1978-83, and 2 million b/d after that.

However, proved reserves at Prudhoe Bay of 9.6 billion bbl are not expected to be produced at more than 1.6 million b/d, Patton noted, the maximum capacity of the equipment being installed in the field.

Therefore, he added, projected throughput of 2 million b/d even after 7 years of operation depends on further discoveries totaling 5 billion bbl or more of recoverable reserves being made on the North Slope during the interim period.

The supply-demand gap on the West Coast, on the other hand, will exceed 1.2 million b/d by 1976, Patton contended. This minimum figure is based on "unrealistically low demand and high production."

The lowest deficit forecast by anyone, Patton said, is 1,348,000 b/d in 1975, and 1,580,000 b/d in 1980. The median deficit in 1980, he added, is well over 2 million b/d.

"To make the case for an oversupply on the West Coast," he charged, "the trans-Canada proponents estimate demand on the low side, production on the high side, and fill in the deficit with undiscovered or unavailable supplies principally from Ecuador, Peru, Offshore California, and the Gulf of Alaska.

"This method of projecting the supply-demand situation on the West

Coast is interesting and unique. . . . Neither industry nor Government should make significant decisions affecting the supply of national energy needs on such speculation."

Second Alaska line. Patton also attacked assumptions made by Richard Nehring, former economist for the Department of Interior who quit over the Alyeska permit decision and testified for Proxmire.

One of his arguments in favor of a trans-Canada route assumed a second oil line will be built from the North Slope of Alaska to ship additional crude oil to the Lower 48 States. Nehring assumed the second line would begin construction in 1978, and that it would be owned by the same corporation that builds the first line.

He then concluded that it would be better to build a trans-Canada line first, since the second oil line would go the same route.

"Such speculation," declared Patton, "borders on fantasy and reveals the absence of even a casual inquiry into the facts."

Patton isn't all that confident that "this phantom second oil line" will be required that soon.

To date, he pointed out, 75 development wells, excluding dry holes, have been drilled at Prudhoe Bay. The rest of the drilling required to develop the field fully will be within the perimeter of the field, which has been well defined.

Development drilling to date rules out any significant field extension and has substantiated the previously estimated 9.6 billion bbl of recoverable oil, Patton said.

The estimated primary recovery of Prudhoe Bay is 40%, representing the best engineering thinking even though fluid injection may be required to reach even that recovery level. Hence, in Patton's view, the secondary-recovery harvest, which is greatest in reservoirs with only 15-20% primary recovery, won't be so bountiful at Prudhoe Bay.

Patton acknowledged statements by ARCO officials "hoping" to recover ultimately 65-70% of the oil in place. He described this as a remote possibility.

Even if that does occur, he said, it is more likely to result in longer

field life, not faster recovery and higher producing rates.

Also, he continued, no proven commercial oil fields other than Prudhoe Bay have been found on the North Slope.

Exploration drilling has either eliminated or revised downward the potential of a number of once exciting prospects.

"However," he conceded, "future discoveries are contemplated, and the ultimate capacity of the TAPS line cannot be utilized unless they are made."

Effect on exploration. Trans-Canada's opponents have denounced a trans-Alaska route as discouraging exploration in Canada, especially in the Mackenzie Valley which the line would traverse.

Patton pointed out that exploration has come to a standstill on the North Slope because of uncertainties of when and how any oil will be shipped to market.

There will be no resumption of drilling, he said, until it is known for certain that a pipeline system will be built which has capacity to handle additional discoveries.

"A trans-Canada line which would be shared with Canadian oil would do little to encourage resumption of exploratory activity in Alaska," he declared.

Midwest demand. Proxmire and most of his witnesses argued that North Slope oil is really needed in the Midwest, not on the West Coast, but Patton disputed this.

In the northern-tier states encompassing the Great Lakes refining centers, he said, there is only 1.8 million b/d of refining capacity which would have access to Alaskan crude. These refineries, according to the pipeline executive, have been designed for relatively high-quality Gulf Coast, Mid-Continent, and Canadian crudes, and could not run 100% Alaskan crude.

They would require investment of \$50 million to modify a typical 100,000-b/d refinery (or up to \$1 billion for the region) to handle 75% Prudhoe Bay crude.

West Coast refineries, on the other hand, were said to be designed for relatively poor-quality California crude and therefore can easily handle Alaskan crude without additional investment.

Environmental issues. Patton and ARCO's Bradshaw challenged the widespread assumption by Proxmire witnesses that the trans-Canada route is environmentally superior.

Along the TAPS segment with a high earthquake hazard, Patton said that under criteria of the Interior Department, seismic risk has been designed out of the pipeline. "It is significant," he said, "that no modern electrically welded steel pipeline in oil service has yet been ruptured by a seismic event."

Bradshaw accused Canadians and other backers of a trans-Canada route on environmental grounds of using a double standard.

The Escalating War for Alaskan Oil

by Arthur M. Louis

Oil exploration traditionally has been a game full of risks and uncertainties. And on the North Slope of Alaska, two dozen oil companies are bedeviled by plenty of risks and uncertainties, but not the traditional ones. The companies long ago resolved the major questions about the location of the oil, the amount of it, how to get it out, and where to send it. But they continue to be stymied by a potent new force—the environmental movement. Environmentalists already have managed to postpone production on the Slope for almost four years, and there still is a chance that the lode—conservatively estimated at 12 billion barrels, or more than one-fourth of the nation's proved petroleum reserves—will never be tapped.

The oil companies found some cause for optimism last May, when Secretary of the Interior Rogers C. B. Morton approved construction of the proposed 789-mile pipeline between the Slope and the port of Valdez, on Alaska's southern shore. The companies say they plan to ship the oil from Valdez to markets along the West Coast, and they maintain that a trans-Alaskan pipeline is the only feasible means of getting the oil off the Slope. "We're now committed to the pipeline and nothing else," says Thomas D. Barrow, senior vice president of Standard Oil (N.J.). "It is not a situation with a first choice and a list of alternatives." The Interior Department's scientists acknowledged that the line would disrupt Alaska's fragile ecology, that possible leaks could harm the state's wildlife, and that the tanker traffic would pose a serious danger of oil spills at sea. Still, Morton declared that the "national interest" requires the U.S. to minimize its dependence on foreign oil, and that this requirement overrides the environmental hazards.

Source: Fortune Magazine, July, 1972. Reproduced by the Library of Congress, Congressional Research Service, December 4, 1973. With Permission

Unfortunately for the oil companies, Morton's decision is not the end of the matter. Three environmental organizations are challenging the decision in the federal courts. The odds appear to favor the oil companies, but the issue probably will go all the way to the Supreme Court, and a final decision is not expected before the end of this year. Even if the environmentalists lose, the oil won't begin to flow until late 1975 or early 1976, since it will take about three years to build the pipeline.

Meanwhile, the delays on the North Slope are already having some large side effects on the U.S. oil industry. Robert O. Anderson, chairman of Atlantic Richfield Co., insists that "the Alaskan situation has really prejudiced our dealings with the oil-producing nations of the Middle East. We have no more cards left in our hand." That may be an extreme view, but now that domestic production has begun to flatten out, the other oil-producing nations certainly are exerting increased leverage on their customers around the world. (The customers' bargaining position was weakened still further last month, when some holdings of the Western oil companies in Iraq were nationalized.) If U.S. consumption of petroleum continues to grow at the present rate, and if the North Slope remains undeveloped, imports will rise from the present 3,800,000 barrels a day to 10,900,000 by 1980.

While production on the Slope would scarcely eliminate the nation's dependence on imports, it would go a long way toward bridging the gap. At full production the petroleum is expected to flow at more than two million barrels a day. Moreover, during the anticipated twenty-year life of the field, North Slope oil could prevent \$2 billion a year from being added to the U.S. balance-of-payments deficit.

The oil also could work some wonders for the companies involved. With petroleum selling on the West Coast for upwards of \$3.20 a barrel, the proved reserves on the Slope should generate gross revenues of at least \$38 billion over the twenty-year production period, even without price rises. After allowing for taxes and royalties, and the costs of drilling, piping, and shipping, the companies would stand to make a profit of between \$1 and \$1.25 a barrel, or \$12 billion to \$15 billion.

Even if they never invested another cent, it would be a severe financial blow to the companies if they were forced to abandon the Slope. They paid more than \$900 million for leases, primarily at an auction sponsored by the state of Alaska in September, 1969. (The state retains full ownership of the leased land, while the companies have only the mineral rights.) About \$550 million has been spent on preliminary drilling and other exploration activities. In addition, seven companies—Standard Oil (N.J.), Atlantic Richfield, Standard Oil (Ohio), Mobil, Phillips, Union, and

Amerada Hess—are participating in a consortium, called Alyeska Pipeline Service Co., which intends to build the trans-Alaskan line. Alyeska has spent \$350 million toward the ultimate \$3-billion cost, including \$120 million for the pipe itself, which currently is stacked in 69,000 pieces at three locations in Alaska. Conceivably, some of the pipe could be sold if the project fell through. But if the environmentalists win in the courts, almost all of the \$1.8 billion already invested on the Slope could be lost.

The merger that backfired

The oil companies now admit that they badly underestimated the strength of their opponents. Not long after oil was discovered, Atlantic Richfield and British Petroleum, both North Slope pioneers, made aggressive moves to expand their marketing operations. Atlantic Richfield drilled the first successful well at Prudhoe Bay in January, 1968, and along with its partner, Standard Oil (N.J.), it holds leases on 4.8 billion barrels. B.P. has an interest in about 5 billion barrels. To get the maximum financial return from these enormous reserves, both Atlantic Richfield and B.P. entered into ambitious merger agreements, based on the notion that the oil would begin to flow in 1972. Now those agreements are rising up to haunt them.

Atlantic Richfield, which historically has been a net buyer of crude, merged with Sinclair Oil, also a net buyer, in March, 1969. At the time, Atlantic assumed that it soon would be getting plenty of oil from its Alaskan holdings, and that it would have no problem supplying Sinclair's thousands of service stations—not to mention its own—at a relatively low cost. With the North Slope continuing to lie fallow, however, the merged company has been forced instead to buy still more oil from its competitors; it now relies on outside sources for 37 percent of its needs. Its problem today would be even larger if it had not sold off 10,000 East Coast service stations to British Petroleum in 1969 for \$400 million.

As one might expect, Atlantic Richfield's financial condition has begun to deteriorate. Net income slipped last year despite a 14 percent rise in revenues, and the company's supply of cash and equivalents, never large, slumped to \$137,300,000, or just 2.9 percent of assets. Things became even worse in the first quarter of this year, as net income fell 39 percent below 1971's first quarter. Atlantic Richfield stock, which boomed to \$135.75 a share in the euphoric days after the Prudhoe Bay discovery, recently was selling for less than half that price. To meet the financial crisis, the company has trimmed 3,000 of its 30,000 employees from the payroll, and it plans to reduce the total by another 2,700 before the end of next year. The company also will sell 9,000 of its 22,000 remaining service stations,

a move that will help balance its needs with current production. Of all the participants in the North Slope venture, Atlantic Richfield clearly is being hit hardest by the long wait for the Alaskan crude. "The steps we're taking are steps needed to put us in a competitive position, with or without North Slope oil," says Louis M. Ream Jr., an executive vice president.

British Petroleum, for its part, had planned to use its North Slope reserves to establish itself as a major force for the first time in the American market. Soon after the discovery at Prudhoe Bay, B.P., which previously had no retail outlets in the U.S., bought those 10,000 service stations from Atlantic Richfield. B.P. then signed an agreement designed to give it a majority interest in Standard Oil Co. (Ohio), which has a strong marketing organization in the Midwest and middle Atlantic states.

With production delayed on the Slope, however, the terms of the agreement could turn out to be less favorable for the British company. Under the agreement, B.P. handed over to Sohio all of its holdings on the North Slope, although it retained the rights to about 75 percent of the profits. B.P. also gave Sohio its two U.S. refineries, located at Port Arthur, Texas, and Marcus Hook, Pennsylvania, all of its U.S. service stations, and some other U.S. properties. In return, B.P. immediately received 25 percent of Sohio's stock, with the chance to increase its equity, depending on the speed and volume of production on the Slope. B.P. will end up owning 54 percent of Sohio if the reserves it gave the company are producing at least 600,000 barrels of oil per day by the end of 1977.

Hollow footsteps, empty roads

Those reserves probably are capable of producing substantially more than 600,000 barrels a day, but there is a strong chance that the deadline will not be met. And the agreement does not contain any escape clauses to cover delays caused by circumstances beyond B.P.'s control. In short, if the trans-Alaskan pipeline isn't built, B.P. could lose its big opportunity to establish a competitive marketing organization in the U.S., an opportunity that may never come again. Moreover, it would be saddled with a large, unprofitable investment in a lackluster company; the Sohio stock, which cost B.P. more than \$400 million in assets, had a recent value of less than \$350 million.

A visitor to the proposed route of the trans-Alaskan pipeline sees only the scantest traces of activity these days. Skeleton work forces are maintained at the eight pipeline construction camps scattered through the wilderness. Isolated from the outside world, the men have little to do but eat, read magazines, play table tennis, and drift about the dormitories. Flying between the 4,000-foot peaks of the Brooks Range and over the Slope itself, one sees only an occasional derrick on the horizon. Drilling is being conducted—in desultory fashion—at just one well, on the B.P.-Sohio properties. In the large, modern compounds,

which were built to accommodate hundreds of workers. footsteps produce hollow echoes, and not a single vehicle is to be found on the sixty miles of new man-made roads that wind through the region.

One of the prime victims of the delay is the state of Alaska. After the strike at Prudhoe Bay, the state underwent a massive invasion; everyone from oilfield rough-necks to top executives to tourists headed for Alaska, putting a strain on the airlines, hotels, and restaurants. But today, with activity on the North Slope at a virtual standstill, visitors from the "lower 48" are almost as rare as Eskimos in Palm Beach.

Alaska digs into capital

Alaska expected to make perhaps \$300 million a year from royalties and taxes once oil production reached its peak. Unfortunately, the state cannot afford to wait much longer for those extra revenues. In 1970 the legislature, assuming that the payments would begin to trickle in by 1973, passed a series of public-works and social-welfare programs that more than doubled the budget. The state currently is spending about \$300 million a year while receiving less than \$200 million in taxes and investment income, and it is meeting the surplus by digging into capital—in particular, the \$900-million windfall it received from the auction of leases in 1969. If oil production does not begin by 1977, it appears, the state will face the choice of halving its budget or going bankrupt. Governor William A. Egan understandably finds such a choice intolerable. "With the vast needs that are still unmet in Alaska in all fields, it would be virtually impossible to roll the clock back," he declares.

Businessmen throughout Alaska are today a crestfallen lot. In 1969 and 1970, entrepreneurs began gearing for the boom. Drilling suppliers, building contractors, food processors, clothing suppliers, and souvenir dealers, to cite just a few, sank large sums of money into equipment and inventories. Now many of them are saddled with big debts, and with goods and services they can't sell.

One dramatic case in point is Alaska Airlines, the largest of several intrastate carriers. During 1969 the company did a land-office business in both passengers and cargo. Its revenues leaped 43.5 percent to an all-time high of \$39 million, and for the first time in nine years the company turned a profit. Anticipating more of the same, Alaska Airlines almost doubled its fleet and expanded its schedule. But now the airline's revenues are in a nose dive, and it has resumed its money-losing ways, registering large deficits in 1970, 1971, and the first quarter of this year.

When the oil companies began making their investments on the North Slope, they had every reason to suppose that they would have a free hand in tapping the newly discovered field. Substantial new additions to the domestic reserves had traditionally been welcomed with enthusiasm.

And the North Slope was the largest single discovery ever made on U.S. territory, twice as bounteous as the celebrated East Texas field discovered in 1930.

Moreover, the Alaskan discovery occurred at a propitious time—just as production in the rest of the U.S. was about to reach its peak. Onshore production in Texas, Louisiana, and California, by far the three top oil-producing states, already has begun to slide. If the demand for petroleum continues to rise at the recent rate of 4 percent a year, Americans will find themselves relying on foreign sources for most of their supply during the 1980's. Of the 5.5 billion barrels consumed in the U.S. last year, only 4.1 billion barrels, or less than three-fourths, were produced domestically. By 1980 the demand is expected to surge to 7.9 billion barrels, while domestic production, excluding the North Slope, will decline to just under 4 billion barrels.

The great refinery ban

Even aside from the North Slope controversy, the U.S. oil industry is now facing another problem that has worldwide dimensions. Among their more dramatic achievements, the environmentalists have brought the construction of refineries in the U.S. almost to a halt. Delaware, which has one refinery, recently passed a law prohibiting construction of any more, and the officials of most other states have imposed a de facto ban on new refineries. There are some 300 refineries in the U.S., but at least 100 more will be needed to meet the increased demand by 1980. Only two are under construction—in Illinois and Louisiana—and only one, to be built in Baltimore, is on the drawing boards. On the West Coast, where the environmental movement has its roots and its strongest adherents, it could be political suicide for a city administration to allow the construction of refineries. Yet that area will need two or three new refineries per year over the next decade to cope with the expanded demand for petroleum products.

One solution would be to build the refineries abroad, and ship the refined products to the U.S. Exporting the nation's environmental problems would have a stiff price, however, even if foreigners were willing to accept plants that Americans find unbearable. If foreign refineries were used to serve the U.S., the cost of petroleum products would almost certainly increase substantially. Building new refineries abroad also would mean exporting thousands of jobs, and it would contribute to the deterioration of the nation's balance-of-payments position. And yet if the new refineries are not built *somewhere*, the U.S. will be forced to drastically curtail its energy needs.

Mr. Brower's kooky thought

As they continue to press their case in the courts, the environmentalists are stressing two basic points. They contend, first of all, that Secretary Morton acted capriciously in ruling for the pipeline. They say Morton's decision flew in the face of evidence presented in the Interior Department's own "environmental-impact statement" on the pipeline, which was issued last March as required by the National Environmental Policy Act. They also contend that the impact statement did not give adequate consideration to other possible means of getting the oil off the North Slope; the act specifies that impact statements must weigh the merits of "alternatives to the proposed action." The environmentalists say they still have high hopes for victory. "It's my kooky thought that some day we're going to get a grant from the oil companies for saving them from a horrible mistake," says David Brower, president of Friends of the Earth and doyen of the environmental movement.

At the moment, there aren't many oilmen around who would give David Brower the time of day, but some will at least concede that the delay in building the trans-Alaskan pipeline has produced one advantage. The safeguards imposed on Alyeska Pipeline Service Co. will make the line—assuming it is built—a much sounder project than it would have been otherwise. It is more than just the caribou, salmon, sheep, and waterfowl of the Alaskan wilderness that will be protected. Environmental considerations aside, the companies themselves have a strong financial interest in preventing breaks, leaks, and spills. And there is reason to believe that the pipeline, as originally conceived, would have had more than its share of these mishaps.

Of course, the Alyeska consortium will have to pay for the improvements. In the early planning stages it was estimated that the pipeline would cost \$1.5 billion. Edward L. Patton, president of Alyeska, now estimates that environmental safeguards will add \$450 million to the cost. In addition, an extra \$1 billion will be accounted for by inflation, and by engineering problems not foreseen at the time of the preliminary studies. The over-all cost of some \$3 billion would make this not only the most expensive pipeline ever built, but also the most expensive construction project in history.

The pig in the pipeline

In the most radical change from the original plan, almost half of the proposed pipeline will lie aboveground. At the start, it had been assumed that all but 5 percent of the line would be buried. But the planners failed to reckon fully with the difficulties presented by permafrost, that mixture of soil, gravel, and ice that lies only inches below much of the Alaskan tundra. The oil from the Slope will be hot, coursing through the pipeline at temperatures of up to

150° Fahrenheit. In areas where the permafrost has a high water content, a buried pipeline, or one resting directly on the tundra, would turn the surrounding area to marshland, and the line, deprived of support, might break from the strain. Under the present plan, 178 miles of the pipeline will be supported above the ground on cement stilts, 177 miles will lie on thick gravel pads, 79 miles will be buried with a jacket of insulation, and 364 miles will be buried without any special precautions.

Alyeska admits that it cannot absolutely guarantee against leaks, but it says it has taken extraordinary measures to prevent and detect them. It plans to send a torpedo-shaped electronic sensing device, called a "pig," through the line at frequent intervals. The pig will record the configuration of the entire pipeline on tape, permitting technicians to spot any significant changes; the device purportedly can sense leaks of five gallons an hour or more. In the case of major leaks or strains, an electronic communication system will trigger an automatic shutdown of the line. Valves will be activated by remote control to isolate any portion of the line where there is a problem. Alyeska says that even the most severe rupture would not cause leakage greater than 64,000 barrels. While that is a lot of oil, it is less than 1 percent of the line's capacity.

Part of the original pipeline route has been altered to avoid areas where there is a strong possibility of avalanches, flooding, or earthquakes. Earthquake zones could not be avoided entirely, however, and the line will cross five seismic zones, including the one that was devastated by the great earthquake of 1964. Alyeska claims that the pipe, which is forty-eight inches in diameter and half an inch thick, is strong and resilient enough to have withstood the 1964 quake.

The pipeline company will take measures to secure the 800-acre port and terminal at Valdez against natural disasters. Valdez is a new town, built a few miles from the site of the original town of that name, which was wiped out by the quake and a tidal wave. The proposed facility will be placed on a promontory, with its lowest point 200 feet above sea level, and the foundations of the buildings will be built into bedrock.

With all that tanker traffic moving into Valdez—forty-one tankers averaging 160,000 deadweight tons each would be operating between the town and the West Coast if the North Slope were operating at full capacity—Alyeska is planning a navigational system that it describes as "second to none in the world." Tankers moving in and out of the port will be required to carry two radar systems, one continuously in use, the other as a backup. As the vessels approach Valdez, they will have to maintain constant radio communication with the terminal, and with other tankers in the vicinity. Only one-way traffic will be allowed in the three-mile-wide channel leading past the port, and in bad weather navigation will be helped by a fog signal audible at a distance of two miles. There also

will be a light visible at a distance of twelve miles. Alyeska is making a virtue of the fact that cargo shipped between U.S. ports must, under the law, be carried in U.S.-flag vessels. Environmentalists are constantly raising the specter of maritime disasters, such as the destruction of the *Torrey Canyon* off the coast of Cornwall in 1967; Alyeska has responded that U.S. ships are subject to more stringent inspection and safety regulations than foreign-flag vessels.

A Canadian corridor

Despite all the precautions, the environmentalists contend that the risks are too great to justify a trans-Alaskan pipeline. Instead they suggest a frequently mentioned trans-Canadian alternative, with a line proceeding east from the North Slope, across the Yukon Territory to the Mackenzie River delta, then south to Alberta and on into the midwestern U.S. The Canadian route would be about four times longer than the Alyeska route, but part of the line could be integrated with the network of pipelines already extending between Alberta and the U.S. Such a project would cost between \$5 billion and \$6 billion, and could not be completed before 1977. But there is no doubt that, time and money notwithstanding, the proposal has some important advantages. Most important of all, it would parallel a pipeline planned to carry more than 26 billion cubic feet of natural gas off the North Slope. (Several U.S. companies, including Atlantic Richfield, Standard of Ohio, and Jersey Standard, have joined a consortium to build the gas pipeline, and the project may be started within a year.)

In the minds of some industry executives, the need for production of the immense natural-gas reserves on the Slope is even more pressing than the need for oil. Proved natural-gas reserves in the U.S. are down to about a twelve-year supply, the lowest ever. Moreover, many experts believe that no major new discoveries of gas will be made south of the Canadian border. To fill the demands of U.S. customers, natural gas is now being imported in liquefied form from Algeria at a cost three times greater than for the domestic product, and a number of companies have announced plans to import liquefied gas from the Middle East. But however impressive the economic argument, here again the oil companies face a dilemma, since the North Slope gas cannot be moved to U.S. markets until production of the oil begins. Thornton F. Bradshaw, president of Atlantic Richfield, sums up the frustration of industry executives when he remarks, "We need it now. When I say we, I mean the country. I think it's not a question of whether the Atlantic Richfield company needs it."

Since the Canadian Government has approved in principle a transportation corridor that would include not only the gas line but also a highway and space for an oil line, the environmentalists say that it would be unnecessarily harmful and wasteful to use a separate route across Alaska. Even if North Slope oil is not piped through Canada, that nation, anxious to begin production of its own Arctic oil reserves, probably will need an oil line by 1980.

The advocates of a trans-Canadian route have marshaled several other potent arguments. A recent study by Dr. Charles J. Cicchetti, an economist with Resources for the Future, a nonprofit research organization based in Washington, concludes that the oil companies might actually find a trans-Canadian route more profitable than the Alaskan route. For one thing, the companies could get a higher price for their oil in the Midwest. The average price per barrel there is \$3.65, or 45 cents more than on the West Coast. The trans-Canadian line would also eliminate the need for a big investment in port facilities and tankers.

The Yokohama gambit

There are a number of reasons why the oil companies reject the proposed trans-Canadian pipeline. One is that they might want to sell some of the North Slope oil to Japan, a plan that would be ruled out if the oil were piped to the Midwest. On the surface, it might seem impractical to sell the oil in Japan; the price per barrel there is lower than on the West Coast, and the shipping distance between Valdez and, say, Yokohama is nearly twice that between Valdez and Los Angeles. But John M. Houchin, deputy chairman of Phillips Petroleum, has proposed an "export-for-import" program that would make sales to Japan eminently practical—and profitable.

The proposal, made two years ago to a congressional committee, was that companies exporting oil from the North Slope be allowed to increase their imports on the East Coast. The market price of oil on the East Coast is \$3.90 a barrel, the highest in the country, and the imports would be shipped in foreign tankers, which can be chartered at little more than half the rates for U.S. vessels. Moreover, the oil shipped to Japan could also be carried in foreign tankers.

The oil companies now prefer to stress the virtues of U.S. self-sufficiency and play down the possibility of an import-export deal. A spokesman for Phillips Petroleum explains that Houchin's proposal was "made at a time when it appeared the West Coast would not be able to absorb the entire production of oil from the North Slope." Current projections indicate that North Slope production could just about make up the difference between production and demand on the West Coast during the late Seventies and early Eighties.

Another reason the oil companies reject a trans-Canadian pipeline is because of concern about a political clash between the U.S. and Canada. Canadians are increasingly sensitive about American companies dominating their economy, and the provincial and federal governments would be likely to restrict the American role in a trans-Canadian line. Donald S. Macdonald, the Canadian Minister of Energy, Mines and Resources, acknowledges that the money needed to finance a trans-Canadian pipeline would have to come largely from American investors, but he insists that the line should be built by Canadian companies and regulated by the Canadian National Energy Board.

Some U.S. oil executives fear that the Canadian Government might cut off the flow from Alaska as soon as the fields in the Canadian Arctic are ready for production. Rawleigh Warner Jr., chairman of Mobil Oil, remarks, "It is a real possibility that the Canadian Government might very properly say to us: 'When we have as much oil as we want, you can put yours in.'" This viewpoint received some support from Secretary Morton, who in his statement last May stressed the need for "a secure pipeline located under the total jurisdiction and for the exclusive use of the United States."

But Macdonald, who had appealed to Morton for American cooperation, scoffs at such arguments, saying that the two governments can agree in advance on a throughput schedule. Macdonald points out that some oil lines serving Canada run through U.S. territory; he says that even if the worst came to pass, his country would stand to lose more, since "the Americans could shut down all of Eastern Canada."

How far will consumers go?

As the tug of war on the North Slope demonstrates, rising public concern over the environment is having powerful—and costly—repercussions for the oil industry. It has created a frustrating business environment for executives who, not so long ago, could concentrate exclusively on problems of engineering, transportation, and marketing. Moreover, the attacks at home come at a time when some formidable adversaries have achieved powerful political positions among formerly compliant regimes in the Middle East and North Africa. (See "How the Arabs Changed the Oil Business," *FORTUNE*, August, 1971.) In negotiations last year with the members of the Organization of Petroleum Exporting Countries, the Western oil companies were coerced into granting \$15 billion in additional taxes over a five-year period. Negotiations with O.P.E.C. will begin again in three years, before any of the North Slope oil can possibly be brought to market, and it is clear that the oil companies will have to make large new concessions at that time.

The confrontation between the oil companies and the environmentalists certainly will have one important economic result—the cost of all forms of energy, from electric power to gasoline, will increase. No one is sure just how far American consumers are prepared to go to protect their environment. Will they risk an energy shortage that could lead to drastic curtailments in the power supply? Will they lower their standard of living, sacrificing many of the cars, air conditioners, automatic dishwashers, and other goods that account for the continuing surge in the nation's energy demand? In the great debate over Alaskan oil, Americans are beginning—whether they know it or not—to confront these critical issues. **END**

Alyeska clears major legal roadblock

Pipeline firm and Interior score sweeping victory in federal judge's decision to dissolve injunction against trans-Alaska crude-oil line.

Pipeline now starts appeals route; final ruling may come by year's end.

THE INJUNCTION which has blocked construction of the trans-Alaska pipeline since April 1970 was dissolved Aug. 15 by U.S. Dist. Judge George L. Hart, Jr.

Actual start of construction, however, will await the outcome of the appeals process, with the answer coming from the Supreme Court perhaps around the first of the year.

Judge Hart ruled that Interior Sec. Rogers C. B. Morton had complied with the National Environmental Policy Act in approving the \$3-billion project to pipe Prudhoe Bay oil to the tanker port of Valdez in southern Alaska.

Morton announced on May 11 he would issue the required permits for the 789-mile, 48-in. line as soon as the injunction was removed.

The environmental groups whose suit has already delayed the pipeline 28 months immediately served notice of appeal in the U.S. Court of Appeals for the District of Columbia.

The Government and Alyeska Pipeline Service Co., the seven-company combine backing the project, promised meanwhile that construction wouldn't be kicked off without giving 30 days' notice to the environmentalists. That would give them time to obtain a stay of any permit pending outcome of the appeal. Alyeska promised not to start laying pipe in any event before the appeals court rules.

The Government said the permits are still in the drafting stage, and will take some time to complete. But lawyers for the Interior Department insisted on the right to issue permits, now that the injunction has been removed, when they are ready.

If the Supreme Court gives the green light, Alyeska should be delivering oil from Prudhoe Bay's 9.8 billion-bbl reserve in 1976, in volumes rising eventually to 2 million b/d. Oil will be shipped by tanker from Valdez to refineries on the West Coast of the U.S. The State of Alaska said it may ask the Supreme Court to take up the case directly, bypassing the Court of Appeals.

Judge's ruling. Judge Hart handed down his decision at the close of 2 days of arguments in Washington.

His ruling represented a sweeping victory for Interior and the pipeline firm.

It was a summary defeat for the plaintiffs—the Wilderness Society, Environmental Defense Fund, Friends of the Earth, Canadian Wildlife Federation, Canadian Member of Parliament David Anderson, and the Cordova, Alaska, fishermen who object to the terminal at nearby Valdez.

The U.S. environmental groups obtained the injunction on grounds Interior violated the law by failing to prepare an environmental-impact statement of the project under NEPA.

The pipeline company applied for the permit in July 1969, before NEPA went into effect the first of the year, but the Interior Secretary's decision came after the law was on the books in April 1970.

The environmentalists argued last week that Interior's nine-volume impact statement, running into thousands of words, still fell short of NEPA requirements. They contended that the statement lacked data on the precise impact of the pipeline and related tanker shipments on Alaskan wildlife and fisheries resources, particularly

in Prince William Sound at Valdez. They further alleged that Interior failed adequately to consider alternatives to the trans-Alaska route.

The Canadian plaintiffs said the statement was defective because the secretary considered an oil-delivery system only, ignoring disposition of the gas produced with the oil. They said that no pipeline permit should be allowed until Interior first examined in greater detail the alternative of a common corridor route across Canada for an oil line and a gas line.

This may very well be the main issue before the appellate court. Attorneys consider that a reversal, if it occurs, may well be on this point.

The environmental groups also maintained that the secretary could not lawfully grant the requested 54-ft right-of-way, a use permit for a 46-ft construction strip along the route, and a construction and haul road from the Yukon River to Prudhoe Bay — now covered by a federal grant to the State of Alaska.

The fishermen also protested issuance of a permit for the 802-acre terminal site at Valdez as an improper disposition of National Forest Lands.

But Judge Hart ruled against them on all points. The issue, he said, was not whether the secretary of Interior had made the right decision on the pipeline. It was whether he followed proper procedures under NEPA, obtaining necessary environmental information before reaching a decision, and whether right-of-way and use permits were in keeping with the Mineral Leasing Act and other public lands laws.

The judge held that the Government acted legally, and that Interior's en-

Source: The Oil and Gas Journal, August 21, 1972. Reproduced by the Library of Congress, Congressional Research Service, December 4, 1973. With Permission.

vironmental statement "meets all the requirements of NEPA."

Decision explained. Judge Hart disposed of the landmark environmental case in a summary opinion, citing the time already consumed and the need to get on with the appeal.

He said the press of time, the importance of the case, the tremendous costs involved, and the lack of a factual dispute made it wise to proceed without an extensive legal opinion.

In the first day of the arguments, Judge Hart indicated he was toying with the idea of sending the case back to Interior for further environmental studies. He even asked the plaintiffs to prepare an estimate of the time required to study a common corridor for two lines through Canada. They said it would take 4 months.

The environmentalists agreed with the judge's suggestion that regardless of the time taken, the statement could never be made "perfect" in their eyes. The question, the judge said, and the environmentalists agreed, was whether the statement "reasonably" meets the requirements of the law.

In his decision, Judge Hart found that Interior's Mar. 20 statement "reasonably sets forth:"

- Environmental impact of project.
- The adverse environmental effects.
- The alternatives to the project.
- Relationship between local short-term use of resources and the enhancement of long-term productivity.
- Irreversible and irretrievable dedication of resources.
- Conflicting views.

Also, the judge added, it complies with the Council of Environmental Quality guidelines and provisions of NEPA.

Moreover, he concluded, the secretary did not act arbitrarily, unreasonably, or capriciously in reaching his decision, but had substantial evidence in the record to support it.

Decision hailed. Edward L. Patton, Alyeska president, welcomed the decision of Judge Hart, but stressed that it doesn't mean construction work will

begin right away.

More time will be required for litigation that lies ahead, Patton said.

"Work will not begin until the legal issues identified by Judge Hart are resolved by the Court of Appeals," he commented in a statement. "We are confident that we will be allowed to build the pipeline, and know it will be constructed under the most stringent safeguards ever imposed on any such project."

U.S. opens two-pronged Alyeska attack

The Government will push a Supreme Court appeal as well as congressional legislation to overcome obstacles to building trans-Alaska crude line.

Morton expects favorable high-court ruling, rules out Canada line again.

THE Government will press an appeal to the Supreme Court and new legislation at the same time to remove obstacles to construction of the trans-Alaska crude line.

Interior Sec. Rogers C. B. Morton announced the decision of the Nixon administration last week, giving the project high priority in national energy policy. He expressed confidence the high court will overturn last month's appeals-court decision, permitting construction to proceed.

"With each passing month," Morton stressed, "it becomes ever more obvious that is in our national interest to get delivery of Alaskan oil to the Lower 48 states at the earliest practicable date. We will have to import every barrel of oil we don't get from Alaska."

He called Alaskan oil necessary to relieve the energy pinch, to avoid further deterioration in our trade balance, and to avoid increasing dependence on foreign oil.

"We have studied this matter for almost 4 years," he declared. "It is time to get on with the job." He asked the solicitor general to petition the Supreme Court to decide both the environmental and right-of-way issues as a matter of urgency this term. The court recesses in June.

In announcing the strategy, he again rejected an alternate route through Canada as inferior for several reasons.

Legislative battle. Before Morton spoke, it became apparent that attempts to win legislative relief for the stalled pipeline will turn into a congressional fight over whether to build it through Canada—if at all.

So far there are two bills and another on the way.

Broad-base approach. Rep. Lloyd Meeds (D-Wash.) introduced a bill to amend the Mineral Leasing Act of 1920 to authorize the secretary of Interior to determine the width of a pipeline right-of-way.

He would replace the present specific limits—25 ft on either side of the pipe—with a general standard. Under his approach, the secretary could decide the amount of land "reasonably necessary for access to and operation, construction, and maintenance" of the pipeline and related facilities.

Passage of such legislation would solve one of the problems barring construction of the proposed \$3-billion, 789-mile, 48-in. line to deliver North Slope Alaska oil to a tanker terminal on the Gulf of Alaska.

The U.S. Court of Appeals ruled Feb. 9 that land-use permits proposed to be granted by the Interior secretary actually amounted to right-of-way wider than the law allows. The pipeline is stymied unless this bar is removed by appeal to the Supreme Court or amendment of the statute.

Even then, the Alyeska Pipeline Service Co. project must obtain resolution of environmental issues on which that these issues weren't ripe for decision.

Alaskan approach. Alaska's two senators—Republican Ted Stevens and Democrat Mike Gravel—will try to remove both barriers in legislation they introduced. Their bill would authorize construction of the pipeline, direct the secretary to issue required permits, declare the environmental statement to be in accord with legal requirements, and remove any federal administrative decision on the pipeline from judicial review.

Stevens acknowledged the measure "goes to the extreme," and seasoned Capitol Hill observers give such sweeping legislation virtually no chance of enactment.

However, Stevens added, "the critical shortage of petroleum today, coupled with the uncertainty of foreign supplies, and the fact that other power sources, such as nuclear power and oil shale are possibilities only in the distant future, make congressional approval of the pipeline an immediate necessity."

He said court resolution otherwise would take at least a year, even after rise by \$200-\$300 million/year for each year of delay, he estimated. Sen. Henry M. Jackson (D-Wash.), whose Interior committee will consider the legislation, opposed the sweeping approach of the Alaska senators.

He agreed that right-of-way restrictions must be removed, but that requirements of the National Environmental Policy Act must be satisfied. Jackson set a target date of the spring of 1974 for resolving the questions that stand in the way of building the 2-million-b/d pipeline.

Jackson said hearings on pipeline legislation would get under way this week.

Canadian approach. Rep. Les Aspin (D-Wis.) and Sen. Walter F. Mondale (D-Minn.), advocates of a Canadian route, introduced identical bills waiving right-of-way restrictions only for an oil line from the North Slope through Canada. It will be a rallying point for congressmen who favor marketing the oil in the Midwest rather than on the West Coast.

Trans-Canada route. The Interior reaffirmed earlier convictions as to

Source: The Oil and Gas Journal, March 5, 1973. Reproduced by the Library of Congress, Congressional Research Service, December 4, 1973. With Permission.

the superiority of the all-Alaska pipeline route, adding the U.S. cannot afford to try to force the oil-company backers to build it through Canada.

"For a number of reasons," he explained, "a pipeline across Canada would involve great delay in delivery of oil to our markets. Even if the Canadian Government could and would grant the permits necessary for construction and even after the line is in operation, recent statements by Canadian leaders indicate that its full capacity will not be available to U.S.-owned oil."

This aspect of the Canadian route, he contends, is of great concern from a balance-of-trade point of view.

"My concern on this account is increased by the fact that the Canadian Government has recently found it necessary to place controls on their export of crude oil to us," he added.

Urgency emphasized. Morton predicted the Supreme Court will rule in favor of the Government on both the right-of-way and environmental questions.

However, he added, congressional relief will be pursued at the same time because of the consequences of an unfavorable judicial decision.

"Because an unfavorable decision on the question of my statutory authority would do such great damage to our entire economy," he said. "I am also recommending that the Congress promptly enact legislation that will remove any doubt about my authority to issue permits necessary for construction not only of pipelines but also of (utility) transmission lines and other facilities that must cross federal lands."

If the appeals-court decision is al-

lowed to stand, he warned, it will probably be impossible to build any new oil or gas pipeline across federal land anywhere in the U.S.

The opinion even casts a cloud over the very common practice of using public lands for the purpose of bringing in materials and equipment during construction, the Interior secretary said.

The statutory limitation—25 ft on either side of the carrier, or 54 ft total in the case of the Alaska pipeline—makes construction impossible for the huge 48-in. line and for smaller ones as well.

"Because we simply must have such facilities to support our expanding economy," Morton declared, "I will ask Congress to include an appropriate right-of-way provision in the administration's proposed National Resource Land Management Act of 1973."

Alyeska faces rough going in Congress

Nixon administration pushes for quick authority to approve right-of-way in a simple measure. But Senate committee postpones vote on key amendment to its bill, and House group is split on several versions.

PRESIDENT Nixon has made development of Alaskan North Slope reserves a priority item in national energy policy, but the pipeline needed to get the oil to market still faces a rocky legislative road.

The Senate is certain to pass a version significantly different from the House, and the actual shape of the final right-of-way measure is unpredictable.

The Senate continued its markup of draft legislation in the interior committee last week, while the administration and Alyeska Pipeline Service Co. urged the House committee to adopt a relatively simple bill. They prefer to give the secretary of Interior discretionary authority to grant rights-of-way across federal land in widths that are reasonably necessary for construction.

Postponing a vote on a key amendment, the Senate committee recessed Apr. 16 until Apr. 26-27, at which time it hopes to complete action on a right-of-way bill.

It was the specific limitation—25 ft on either side of the pipe—in existing law that tripped up Alyeska in the U.S. Court of Appeals for the District of Columbia. The Supreme Court agreed that temporary land-use permits which the secretary intended to issue in addition to the permanent right-of-way violates the law.

Presidential push. President Nixon and Interior Sec. Rogers C. B. Morton remain committed to the proposed Alyeska line from Prudhoe Bay to Valdez, on the Gulf of Alaska, and delivery of the oil by tanker to the West Coast.

Nixon told Morton that the trans-Alaska line, opening up 10 billion bbl of oil reserves and 26 trillion cu ft of natural gas, is "vital to the national interest."

Morton wrote every member of Congress supporting legislation which would enable the secretary to approve the necessary right-of-way for the project. This would clear the way for completion of the environmental review in the appeals court, then the Supreme Court.

Morton disputed arguments that a trans-Canada route would be both environmentally and economically superior to the trans-Alaska line, and that a trans-Canada line could be built more quickly.

He made these major points to the congressmen:

- Any Canadian route would be four times as long as the land portion of the trans-Alaska delivery system and would cause more environmental damage on land. Special steps have been taken to assure the safety of the tanker leg of the Alyeska delivery system.

- In any case, if West Coast markets don't receive their oil from Alaska in U.S. tankers, complying with strict American-flag requirements, an equivalent amount of oil would have to be imported in foreign-flag tankers built and operated under lower standards.

- There is no specific Canadian route yet, and U.S. officials cannot proceed with comprehensive environmental studies on Canadian soil, as proponents of that alternative suggest. "I cannot order the more than 3,000 core samples in Canada of the type that were made of the Alaska route,"

he commented. "I cannot even order a simple survey."

- From the viewpoint of the national interest, as distinguished from the interest of any single region, the trans-Alaska route is economically preferable, in spite of arguments of Midwestern congressmen who want the oil delivered in their states.

- Canadian Government requirements are not in the interests of the U.S. These say that: (1) a majority of the equity interest of the line would have to be Canadian, (2) the management would have to be Canadian, (3) at least 50% of the capacity of the line would have to be reserved for transportation of Canadian oil to Canadian markets, and (4) at all times preference would be given to Canadian-owned and controlled groups during construction of the project and in supplying materials. These requirements, Morton said, are unacceptable from the point of view of U.S. national interests when the U.S. has the alternative of a line through Alaska built by American labor and delivering its full capacity of American-owned oil to U.S. markets.

- In spite of the delay caused by the recent court decisions, a trans-Alaska line can still be built much more quickly than a trans-Canadian line. Before an application for a Canadian route could be approved, a number of time-consuming steps would be necessary that have already been accomplished for the Alaskan route.

- Some of the advantages to the Midwest that are claimed for a trans-Canada pipeline would not occur. For example, an oil pipeline through Canada would not affect fuel prices in

Source: The Oil and Gas Journal, April 23, 1973. Reproduced by the Library of Congress, Congressional Research Service, December 4, 1973. With Permission.

that area, because price is set by the much greater volume of oil coming north from the Gulf of Mexico.

• Nor is it true, as some claim, that the West Coast does not need nor cannot use all of the oil delivered by a trans-Alaska pipeline. By 1980 and for later years, West Coast demand will exceed local production and Canadian imports available in that area by at least the capacity of the trans-Alaska line of 2 million b/d.

House hearings. But these appeals have not yet persuaded the Congress as a whole—certainly not the members of the House interior subcommittee on public lands.

The subcommittee is considering almost a dozen pieces of legislation, ranging from outright 100% authorization of the Alaska line to outright rejection, and most points in between.

Most members of the subcommittee seem to have their pet concept or approach.

Rep. Morris K. Udall (D-Ariz.) wants the newly authorized Office of Technology Assessment to make a crash 1-year study of all alternatives then report back to Congress. Hopefully, this would settle outstanding controversies and point the way clearly to the right legislative route. Within 60 days of receiving the report, Congress would be obliged to vote the Alaska line up or down.

But Rep. Sam Steiger (R-Ariz.)

doesn't see what another study would do besides delay construction of the pipeline further.

Rep. Lloyd Meeds (D-Wash.) feels that alternatives have been studied to death and that the Congress has enough information to decide. Meeds would eliminate further court review and permit the secretary to issue the pipeline permit on his own authority.

Two Midwestern Republicans, John B. Anderson of Illinois and Philip E. Ruppe of Michigan, are pushing a Canadian line hard. Their measure would exempt an Alaska pipeline from right-of-way width restrictions, but only if its direction is eastward along the North Slope and down the Mackenzie Valley through Canada to the U.S.

Anderson says that without North Slope oil, the U.S. Midwest will need 3.05 million b/d of imports from the Middle East by 1980, 51% of the region's projected total demand. If the Canadian line were built, the dependence would be 28%. He also criticizes Interior's cost estimates of the alternatives, arguing that they are biased against the Canadian route.

Secretary Morton Advises Congress Trans-Alaskan Pipeline Route Serves Best Interests of U. S. and Canadian Route Is Not Desirable Alternative

April 4, 1973

DEAR CONGRESSMAN:

The President has recently received a number of letters concerning the proposed Trans-Alaska pipeline. He has asked me to share with you our view of some of the issues raised.

Now that the Supreme Court has declined to review the Court of Appeals decision in the Alaska Pipeline case, Congress must enact new right-of-way legislation before I can authorize construction of any major pipeline across the public lands. Prompt adoption of such legislation is required by our overall national interest. It is also in our national interest that the Alaska pipeline be built as soon as possible and that the Congress not force a delay of this project while further consideration is given to a pipeline through Canada.

The United States is faced with a serious imbalance between domestic energy supply and demand. Almost every region of our country and every sector of our economy is affected. Last year we imported 1.7 billion barrels of foreign oil at a cost in first-round balance of payments outflows of approximately \$6 billion. The President will, in the near future, address a special message to the Congress on the entire question of national energy policy.

Despite all the efforts we can and must make to increase our domestic resource base, by 1980 we will probably have to import about 4 billion barrels of oil with first-round balance of payments outflows of about \$16.0 billion, in the absence of oil from the North Slope of Alaska. The Alaska pipeline will not avoid the necessity to purchase foreign oil, but it will reduce the amount we have to buy.

In the past few months, we have witnessed difficulties occasioned by too large an unfavorable balance of payments and too large an

accumulation of dollars abroad. Because we must purchase abroad every barrel of oil that we do not get from the North Slope, for the next 10-20 years at least, I am fully convinced that it is in our national interest to get as much Alaska oil as possible delivered to the U.S. market as soon as possible. I am equally convinced that prompt construction of a Trans-Alaskan pipeline is the best available way to accomplish both of these objectives.

Several of the letters we have received advocate that we abandon the Trans-Alaska route in favor of a pipeline through Canada or at least delay the Alaska pipeline until we can conduct further environmental studies of a Canadian route and initiate intensive negotiations with the Canadian government. In support of this position, it is argued that a Trans-Canadian pipeline would be both environmentally and economically superior to a Trans-Alaska route, and that in view of the recent decision in the pipeline case, it is now quite likely that a pipeline could be built more quickly through Canada than through Alaska.

Let me explain why I disagree with these points.

First, a Canadian route would not be superior from an environmental point of view. No Canadian route has been specified. But the environmental impact statement prepared in connection with the Alaska route considered various possible Canadian routes, and from the information available it is possible to make a judgment about the relative environmental merits of the various Canadian routes and the proposed Alaska route. The Alaska and Canada routes are equal in terms of their effect on land based wildlife and on surface and ground water. However, it is clear that any pipeline through Canada would in-

volve more unavoidable environmental damage than the Alaska route. Because the Canadian route is about 4 times as long, it would affect more wilderness, disrupt more wildlife habitat, cross almost twice as much permafrost, and necessitate use of three or four times as much gravel that has to be dug from the earth; and it would obviously use about four times as much land.

The potential environmental damage of these alternatives is more difficult to assess. The two routes are approximately equivalent with respect to risks from slope failure and permafrost. A Canadian route would not cross as much seismically active terrain or require a marine leg. It would, however, involve many more crossings of large rivers, which, experience proves, are a major source of pipeline damage and, thus, environmental damage. River crossings present difficult construction problems; and the main hazard during operation comes from floods which scour out the river bed and bank, and if large enough, may expose the pipe to buffeting from boulders and swift currents and, thence, rupture. It is generally the rule that the wider the river, the greater the risks.

The environmental risks involved in the Alaska route are not insurmountable. They can be guarded against. The environmental and technical stipulations that I attach to the Alaska pipeline permit will assure that this pipeline is designed to withstand the largest earthquake that has ever been experienced in Alaska; it will be designed and constructed more carefully than many buildings in known earthquake zones, such as Los Angeles and San Francisco. Moreover, we are insisting that operation of the maritime leg be safer than any other maritime oil

transport system now in operation. If our West Coast markets don't receive their oil from Alaska in U.S. tankers that comply with the requirements we are imposing, their oil will probably be imported in foreign flag tankers that are built and operated to much lower standards.

It is important to recognize that while we can go far to study and control the environmental risks that are involved in an American-owned transportation system on American soil, we have no jurisdiction to take comparable actions on Canadian soil. I cannot, as requested in some of the letters, "immediately begin comprehensive environmental studies of a Canadian pipeline route" because such an action would encroach on foreign sovereignty. I cannot order the more than 3,000 core samples in Canada of the type that were made of the Alaska route. I cannot even order a simple survey.

Our environmental impact study was based on the best information available about Canada. I believe it would be contrary to our national interests to delay this matter further by seeking additional detailed information about a route that has not been requested or designated by any of the companies or governments involved.

Second, it is clear that from the viewpoint of our national interest, as distinguished from the interest of any single region, the Trans-Alaskan route is economically preferable. The United States Government has had a number of discussions with responsible Canadian officials about a possible pipeline through Canada. Some of these discussions were through the State Department, and one year ago I personally met with Mr. Donald MacDonald, the Canadian Minister of Mines, Energy and Resources. Responsible Canadian officials, at these

Source: Interior Department Press Release, April 4, 1973

meetings and in subsequent policy statements, have made it clear that there are certain conditions that the government of Canada would impose on any pipeline through Canada. These are: (1) a majority of the equity interest in the line would have to be Canadian (in this connection, ownership by a Canadian subsidiary of an American company would not qualify as Canadian ownership); (2) the management would have to be Canadian; (3) a major portion (at least 50%) of the capacity of the line would have to be reserved for the transportation of Canadian-owned oil, with the primary objective being to carry Canadian oil to Canadian—not United States—markets; and (4) at all times preference would be given to Canadian-owned and controlled groups during the construction of the project and in supplying materials. Since our meetings with the Canadians, these four requirements have been reiterated by them many times in public statements, and we have never had any indication that their insistence on them has lessened. In fact, recent pronouncements from Canada suggest these four elements are more important than ever to the Canadian Government. The question, then, is not simply whether Canada is willing to have a pipeline built through its territory (although no Canadian official has ever said it is willing), but also whether the four requirements Canada would impose are acceptable in light of the United States national interest.

These four requirements are probably reasonable from the point of view of Canada's national interests. They are unacceptable from the point of view of our national interests when we have the alternative of a pipeline through Alaska that will be built by American labor and will deliver its full capacity of American-owned oil to our markets. The Alaska route would be economically superior from our point of view even if we could be assured of getting for our market all the Canadian oil a Trans-

Canada pipeline would carry, because of the balance of payments costs we would incur by importing additional foreign-owned oil. There is a prospect of even worse consequences from a Canadian pipeline. Recent estimates by the Canadian Energy Board show that Canada's demand for oil from her western provinces will soon equal or exceed production; and, unless major new sources are discovered, the eventual result will be the cessation of Canadian exports of oil to the United States. The seriousness of this developing situation was demonstrated just last month, when Canada imposed controls on the export of crude oil.

Third, even though the recent Court of Appeals decision has caused delay and the Supreme Court has refused to review the case, it is clear that a Trans-Alaska pipeline can be built much more quickly than a Trans-Canadian line. The companies who own the North Slope oil have not indicated a desire to build through Canada. Before an application for a Canadian route could be approved, a number of time-consuming steps would be necessary that have already been accomplished for the Alaskan route: detailed environmental and engineering investigations, including thousands of core holes, would be required prior to design; a complex, specific project description would have to be developed; following that, another U.S. environmental impact statement would have to be prepared for the portion (at least 200 miles) of the line in Alaska and its extensions in the "lower 48" states; permits from the provincial and National Energy Boards of Canada would have to be requested, reviewed, and approved; and Canadian native claims would probably have to be resolved, a process that took years in the United States. Moreover, specific arrangements between the U.S. and Canadian governments would be necessary to protect U.S. national interests and provide an operating regime for this in-

ternational pipeline. Finally, the task of arranging the financing of a Trans-Canada line would be extremely difficult. The capital required to meet the condition of majority Canadian equity ownership would strain Canadian financial sources and finalization of new financial arrangements could take years to complete. Whether all these steps are even possible, however, must be viewed in the context of the political and environmental controversy in Canada about the wisdom and feasibility of a Canada pipeline and the recently repeated position of the Canadian Government that it has "no commitment to a northern pipeline at this stage."

In contrast, the only two remaining steps required to commence construction of the Trans-Alaskan route are for the Congress to grant me authority to issue permits necessary for a pipeline of this size and for the Courts to determine that the environmental impact statement complied with the requirements of the National Environmental Policy Act. Both steps are also required for a pipeline in Canada, because the recent Court of Appeals decision applies to the U.S. portion of any line through Canada.

I sincerely hope that a great deal of oil is discovered in Northern Canada and that these finds together with increased reserves of Alaskan oil soon justify a second pipeline, or other delivery systems, to bring oil, natural gas or both through Canada to our Midwest. It is in our interest to increase our secure sources of foreign oil as well as to increase our domestic resource base. However, for all the reasons listed above, I do not believe it is in our interest to delay the Trans-Alaska pipeline any longer than required by the Court of Appeals decision and I do not believe it is now in our interest to request negotiations with the Canadian government for a pipeline route through their country.

By stressing so strongly my belief that a Trans-Alaska pipeline is in our

national interest, I do not mean to imply that we are insensitive to the energy requirements of the Midwest. The Administration has taken, and will continue to take, such steps as are necessary to assure that these requirements are met; just last week, for example, oil import restrictions were lifted to bring additional oil to the Midwest.

Moreover, some of the advantages to the Midwest that are claimed for a Trans-Canada pipeline will not, in fact, occur. For example, an oil pipeline through Canada will not affect fuel prices in that area, because price is set by the much greater volume of oil coming north from the Gulf of Mexico and North Slope oil would provide only a portion of the total Midwest demand. Nor is it true, as some claim, that the West Coast does not need nor cannot use all of the oil delivered by a Trans-Alaska pipeline. In 1972, demand in that area was 2.3 million barrels per day (MMbpd), of which 1.5 million barrels was obtained from domestic sources and 0.8 million barrels was imported (0.3 MMbpd from Canada, 0.1 MMbpd from other Western Hemisphere sources and 0.4 MMbpd from relatively insecure Eastern Hemisphere sources). The best available projections show that by 1980, and for subsequent years, the West Coast demand will exceed domestic production and Canadian exports available in that area by at least the capacity of the Trans-Alaska pipeline.

As much as I would like to assure the Midwest even a marginal increase in the security of its total energy supply, it is more important now to assure that the total economic and energy security interests of all the people of the U.S. are served by getting as much American-owned oil as possible to the U.S. market as soon as possible.

I hope the views expressed in this letter will be helpful to you in your consideration of this issue.

Yours sincerely,
Rogers C. B. Morton
Secretary of the Interior

FACT SHEET

TRANS-ALASKA v. TRANS-CANADA PIPELINE CHRONOLOGY

- Feb. 1968—Major oil discovery announced.
- Apr. 1969—Interior establishes task force.
- May 1969—President Nixon expands task force to include all concerned Federal agencies.
- June 1969—Pipeline application received.
- Aug.-Dec. 1969—Public hearings in Alaska and Washington.
- Oct. 1969—Preliminary environmental stipulations approved.
- Jan. 1970—National Environmental Policy Act takes effect.
- Apr. 1970—Preliminary injunction against issuance of permits.
- Jan. 1971—Draft environmental impact statement issued.
- Feb.-Mar. 1971—Public hearings in Alaska and Washington.
- Feb. 1972—Revised technical and environmental stipulations issued.
- Mar. 1972—Final environmental impact statement issued.
- May 1972—Secretary Morton announces intention to issue permit.
- Aug. 1972—District Court dissolves preliminary injunction.
- Feb. 1973—Appeals Court reverses; enjoins construction.
- Apr. 1973—Supreme Court declines to review the Court of Appeals decision.

POINTS FAVORING DECISION TO GRANT PERMIT FOR ALASKA PIPELINE:

- Construction of the pipeline in Alaska will produce about 26,000 U.S. construction jobs in Alaska (peak), 73,000 man-years of U.S. tanker construction, 770 man-years of U.S. maritime crews and maintenance, which would be lost if the line went through Canada because the Canadian Government has said it will at all times insist on a preference for Canadian labor and materials.
- Construction of the line in Alaska will produce much more royalty income, and sooner, for the State of Alaska and for the Alaska natives than a Canada pipeline.
- The U.S. needs as much North Slope oil in the U.S. market as soon as possible to meet our energy needs consistent with our economic and security interests. In 1972 the U.S. demand for petroleum was 16.6 mil. barrels per day, of which District V accounted for 2.3 mil. barrels per day. Of this total, 4.7 mil. barrels per day was imported in the total U.S. and .8 mil. barrels per day imported into District V. The projected supply-demand situation, as reflected in the Department's economic and security analysis prepared in conjunction with the environmental impact statement is as follows:

	Total U.S.		Dist. V (West Coast)	
	1980	1985	1980	1985
Demand (thousands of barrels per day)	23,290	27,480	3,315	4,052
Supply				
Domestic Production (without North Slope)	11,350	10,320	1,278	1,100
North Slope	1,600	2,000	1,500	2,000
Imports	10,440	15,160	537	952
Imports as percent of demand				
With North Slope	45%	55%	16%	23%
Without North Slope	51%	62%	61%	73%

- Obviously, all Alaska oil can be consumed on West Coast, taking place of foreign oil that would have to be imported. There is no indication of any export of Alaska oil.
- The Alaska route will deliver oil to the U.S. market sooner than a line through Canada because construction of a Trans-Alaska route can start as soon as legal issues are resolved. Construction of Canadian route cannot begin until these issues are resolved (because over 200 miles will be in Alaska) and until the following additional steps are completed: detailed field study, detailed project description, new corporate arrangements, a U.S. environmental impact statement covering the 200 miles of the line in Alaska, and Canadian approval, which may be delayed by native claims and environmental issues. Moreover, no one has applied to build a Canada line. Canadian conditions will make new financial arrangements difficult and time-consuming.
- An Alaska pipeline will deliver more U.S.-owned oil to the U.S. because the Canadian government has said it will insist on majority equity ownership, management of the pipeline, and reservation of up to 50% of pipeline capacity for Canadian oil, which may go to Canadian markets. This last point is of particular concern in view of recent Canadian export controls and Energy Board findings that Canada may have no surplus to export in the near future. Moreover, even if we could get Canadian oil, there will be an adverse impact on our balance of payments from purchasing it rather than Alaskan oil.

POINTS MADE IN FAVOR OF A TRANS-CANADA PIPELINE:

- A Trans-Canada route would (i) avoid areas of high seismic hazard, (ii) avoid a marine leg, (iii) interfere less with caribou migrations, and (iv) might be combined with a gas line in a single corridor.
- A Trans-Canada route would deliver oil to the Midwest, where, some assert, it is needed more than on the West Coast.
- The time advantage of the Trans-Alaska route may be reduced because commencement of construction has been stalled by the Court of Appeals decision and the Supreme Court's refusal to review the case. (Some assert the Court of Appeals opinion removes this time advantage, but, for the reasons listed above, this point is not valid.)

COMPARISON OF ENVIRONMENTAL IMPACTS—CANADIAN v. ALASKAN ROUTES

- Unavoidable Impacts**
 - Canadian route would require approximately 4 times as much land and gravel as Alaskan route.
 - Canadian route would cross more major rivers and create more drainage diversion than Alaskan route.
- Potential Impacts**
 - Alaskan and Canadian routes are about equal in terms of permafrost risk.
 - Alaskan route crosses more seismically active terrain than Canadian route.
 - Alaskan route requires a marine leg.
 - Canadian route involves greater risk of pipeline break at river crossings, which are high-hazard areas.
- Stipulations**
 - Environmental and technical stipulations in U.S. permit will guard against risks on the Trans-Alaska route; but the U.S. cannot control and supervise construction in Canada.

THE WRONG ROUTE

BY CHARLES J. CICHETTI

ATTEMPTS TO BALANCE the economic benefits of the Alaskan oil field in Prudhoe Bay against the environmental costs of getting the oil to market are handicapped by heavy emphasis on the Trans-Alaska Pipeline (TAP) as opposed to overland pipeline routes through Canada. This stems largely from the fact that the TAP is preferred by the oil companies developing the Alaskan fields. A major reason for this preference, as will be explained, is that the TAP until recently appeared to offer the oil companies considerably greater profit potential than the Canadian routes. Recent changes in government oil import regulations have nullified the profit advantage, however. Yet so entrenched has the TAP route proposal become, and so urgent has Alaskan oil development been viewed by the companies, that the developers continue to press for the Alaskan route even though the Canadian pipeline would, in fact, yield more profits for them, produce more tax benefits for Alaska and the federal government, deliver oil where it is most needed in the U.S., and probably do less damage to the environment.

To explore the situation, I propose here to sketch an environmental comparison between the two different transport systems and then to concentrate on an economic comparison between them.¹ My intention is to assess the economic benefits of these particular alternative routes in order that environmentalists can more easily balance them against environmental costs which have been detailed elsewhere. It is important, I believe, for environmentalists to have this definitive knowledge about the pipeline systems, since these are presently the most likely methods to be used for oil shipment even though other means of transportation have been mentioned (and will be discussed later).

It is also important to state my conclusion at the outset so that environmentalists and others will realize that a pipeline route chosen under existing circumstances would not necessarily be the one that would yield the greatest advantage to society, even though society has a just claim to maximum benefit if it is to accept the consequent environmental costs. The reason for this state of affairs is that the oil companies found it to their economic advantage to push hard for the TAP system, even though the public would gain considerably and the environment would suffer less from the Trans-Canadian system.

To summarize briefly what follows, a Trans-Canadian Pipeline (TCP)

Source: Environment Magazine, June, 1973. Reproduced by the Library of Congress, Congressional Research Service, December 4, 1973. With Permission.

would be subject to fewer environmental stresses, would avoid ocean pollution associated with port and terminal facilities which are a part of the TAP system, and would be a more logical trunk pipeline for combined oil and gas developments in Alaska and Canada. In addition, the Canadian pipeline would deliver oil to U.S. markets east of the Rocky Mountains, which are in short supply, rather than to the West Coast where oversupply caused by input from the TAP eventually will produce a misallocation of natural resources. Furthermore, utilization of the Trans-Canadian as opposed to the Trans-Alaskan line would mean a present value of up to \$1 billion more in oil tax revenue for the state of Alaska, probable lower costs to oil consumers east of the Rockies, and a present value of up to \$5 billion more in net profit to the oil companies before corporate income taxes. The higher corporate income taxes would, in turn, add more to the U.S. federal treasury.

If Alaska, Canada, the U.S., the oil consuming public, the oil companies, and the environment all stand to gain from the Trans-Canadian line, why have the oil companies steadfastly focused their plans on the Trans-Alaskan route? A number of reasons were given publicly, particularly the desirability of a line completely on U.S. soil to circumvent possible political difficulties with Canada. But there were far more compelling reasons for companies to favor the TAP: Despite the apparent economic disadvantages, the companies planned the distribution of TAP oil in a way that would ingeniously take advantage of complex U.S. laws regarding the import, export, and ocean transport of oil. The laws were designed in large part to give domestic oil producers and U.S. merchant shippers advantages in the U.S. oil market. Companies with trading interests in the Alaskan oil, however, planned to seek U.S. Presidential support for an elaborate scheme (to be explained later) that was proposed in 1970² which would have enabled them to play off Alaskan oil exports against imports to Japan, thereby reaping a profit even larger than would be obtained by using the seemingly advantageous TAP.

Another plan that will be discussed in more detail later would take TAP oil not needed on the West Coast, transport it by ocean tanker or a combination tanker-pipeline system to the Virgin Islands in the Caribbean for refining, then ship it to the U.S. East Coast for sale. This arrangement, if the state of Alaska retained tax provisions that were in effect when TAP was first proposed, would enable the companies to use less-expensive foreign tankers, make certain oil sale or exchange arrangements that

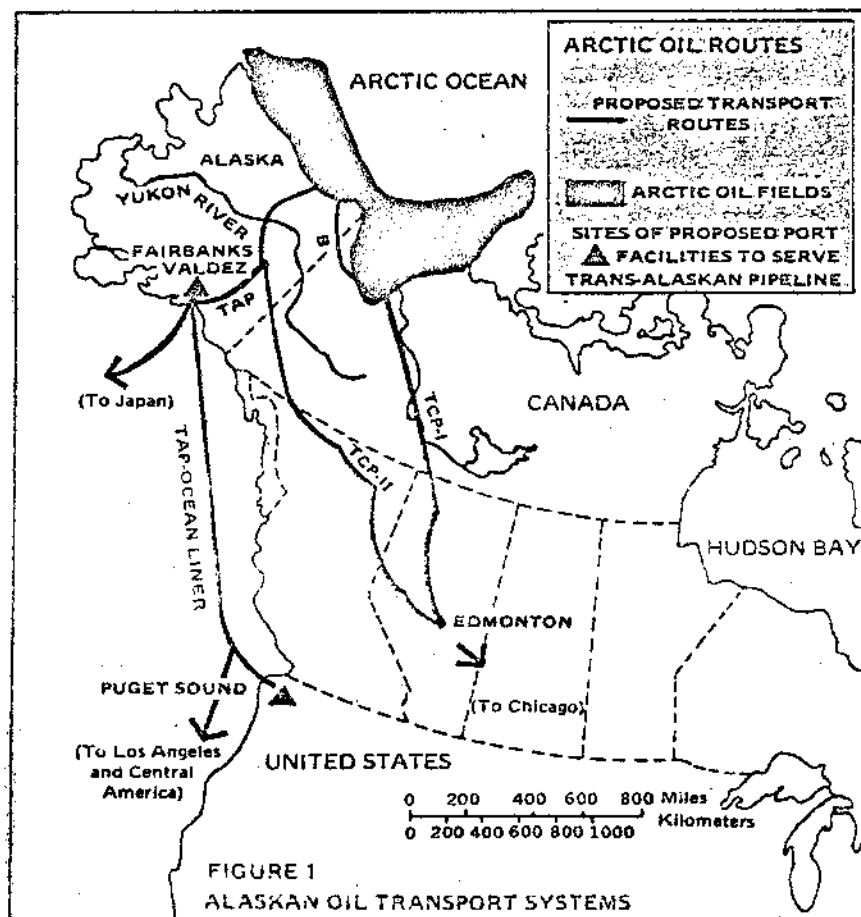
actually would reduce taxes owed to the state of Alaska, and import Alaskan oil to the East Coast without regard for the Mandatory Oil Import Quota Program. (The quota program, which controlled the quantity of oil imports to the U.S. at the time plans were being made by oil companies, has recently been changed by the President, and now even from a strict profit standpoint an all-land Canadian system is superior.) The TAP-Virgin Islands system would vastly increase marine pollution since new terminals would be needed on both sides of Central America (in the case of the tanker-pipeline option) and probably in the Virgin Islands. The foreign tankers, normally excluded by law from routes between U.S. ports but which could be used here because of the special political status of the Virgin Islands, generally have less-advanced pollution control systems than U.S. ships and so inevitably would produce greater oil contamination in the Pacific and in the Caribbean. The TAP route under the now defunct Mandatory Oil Import Quota Program thus offered unexpected economic potential for the oil companies — at the expense of the environment, the oil consumer, the U.S. merchant marine industry, and the Alaskan and U.S. treasuries (and hence of the general tax-

payer). Now, even though the profit potential has been eliminated with the demise of the import quota program, the oil companies seem reluctant to give up their initial plans for the TAP, perhaps because they are reluctant to experience further delays and for other reasons to be discussed later.

Pipeline Routes

A brief description of the Trans-Alaskan and Trans-Canadian systems provides a comparison between their market potentials and environmental problems. The route (TAP), which is currently proposed by the consortium of oil companies,³ would move the oil in a north-south direction across Alaska, crossing two major mountain ranges and, in its southern half, the most earthquake-prone region in North America (Figure 1). The pipeline would terminate in the port city of Valdez, Alaska, where storage and terminal facilities would be constructed to service the oil for ocean shipment to final markets.

The Trans-Canadian Pipeline actually is a misnomer, since segments of the line would cross part of Alaska before proceeding to the southeast across Canada. Several alternative TCP routes have been proposed, as seen in Figure 1. One alter-



Oil companies are reluctant to give up their plans for the Trans-Alaska Pipeline, despite the elimination of its profit advantage.

native would be a pipeline from the North Slope to the Canadian city of Edmonton, following the natural corridor of the Mackenzie River. Actually, there are two routes which have been proposed for the Mackenzie Valley, labeled TCP-IA and -IB in Figure 1. Another alternative would follow the TAP route to the Alaskan city of Fairbanks, then the man-made corridor of the Alaska Highway, and, in some portions, previous pipeline routes, to the Canadian city of Edmonton. This route is labeled TCP-II in Figure 1. The all-land TCP pipeline alternatives would link up with existing lines from Edmonton to the U.S. Midwest and perhaps even the Pacific Northwest.

Either the TAP or the TCP obviously would cross long stretches of land, and ruptures or settling of the pipelines along any of the routes would lead to serious environmental problems (see "The Long Pipe," *Environment*, September 1970). The pipeline itself might interfere with migrations of caribou. A route which would minimize damage could be chosen, but some environmental damage is inevitable. Other alternatives such as air or rail transport have been suggested, but much debate over their economic and environmental characteristics seems to indicate that a pipeline will inevitably be the system used. The experiment to test ocean transport through the Northwest Passage, from the Atlantic to the Pacific, utilizing the specially outfitted tanker *Manhattan*, produced difficult technical and legal problems that also make the overland route more attractive. Another alternative, of course, is to cap the oil fields of the Alaskan North Slope as a reserve for some future need. This would prevent all immediate environmental hazards, but in terms of any benefit-cost analysis, it would mean that those environmental impacts would be assigned a value in excess of the economic and resource allocation benefits to be obtained by immediate use of the oil. While such a comparison should have preceded the current debate, it did not. Accordingly, the following discussion will concentrate on the current controversy over the best route.

Among the pipeline alternatives, the most significant differences in

potential environmental difficulties. The TCP routes cross a far less rugged terrain as well as avoid the zone of most intense earthquake activity along the southern leg of the TAP from Fairbanks to Valdez. Fragile soil conditions imposed by permafrost (a permanently frozen layer of soil or subsoil) are most extensive along the TAP route but do exist on the Trans-Canadian courses as well, particularly along TCP-IA, the line that follows the Arctic Ocean coastline, then the Mackenzie River channel. TCP-II, the southernmost Trans-Canadian route, passes through less permafrost than the other TCP routes. Since TCP-II follows the Alaska Highway from Fairbanks, physical effects of the pipeline on permafrost probably would be minimal from that city to Edmonton.

Perhaps the most notable difference between the TAP and the TCP environmental impacts would be in marine pollution. Key to the TAP system is the ocean link between the city of Valdez on Prince William Sound and terminal facilities at Puget Sound or at Los Angeles. Oil transfer and tanker operations along this route would produce chronic, low-level oil contamination as well as probable major discharges resulting from tanker accidents. The hazards of navigation near Valdez and Puget Sound include many islands, frequent fog, violent winds, and high waves. These problems would have to be negotiated by large tankers that have had an unfortunate safety record in the past ten years (see "Horizon to Horizon," *Environment*, March 1971). Shipment of oil to Japan and to the Caribbean, according to plans discussed earlier, for marketing oil not needed on the West Coast would greatly increase the areas affected by the marine pollution. If tankers associated with greater pollution were utilized and more oil terminal operations were involved, the level of marine pollution would increase.

Although the Trans-Canadian routes present much less of a direct threat, there are nonetheless potential problems. TCP-IA passes close to the coast of the Arctic Ocean as well as across many rivers flowing into that ocean. An oil leak from the pipeline thus could be carried into the sea. Furthermore, if TCP oil were piped from Edmonton to Seattle in Puget Sound, then shipped by ocean to Los Angeles or San Francisco, ocean pollution would result as it would in that portion of the TAP system. Although the TCP Seattle-California arrangement has been suggested by TAP proponents, the Edmonton-Chicago pipeline to the Midwest would produce far greater profit, and so it is much more likely to be selected by the oil companies if the companies are forced to accept an all-land system.

The Gas Problem

In addition to these overt environmental considerations, there is a related point that has regrettably had little attention. The natural gas that will be released from the oil wells in Prudhoe Bay most probably will be piped to market, since Alaskan law now forbids flaring (burning) it. This means that developers must plan for still another pipeline across the North. The most likely route for the gas line would be across Canada to the Midwest for the following reasons: (1) it is a cheaper system, since it avoids the expensive liquification that would be necessary if tanker transport were used; (2) many of the same companies have found vast gas fields in Canada and need a transport system; and (3) the gas market in the Midwest is far larger than on the West Coast.

The natural gas pipeline will not prevent the imminent environmental hazards inherent in pipes carrying hot crude oil, but there will be considerable environmental disruption in securing overland rights-of-way for the gas line. Since this disruption appears to be an inevitable, overlooked, environmentally significant cost of the North Slope development, it can be argued that the cost could best be minimized by combining oil and gas pipelines in one Trans-Canadian corridor to Edmonton. This would do away with the need for one pipeline route to Valdez for oil (the TAP plan) and another route through Canada for natural gas. The combined corridor through Canada would also better serve transport of oil and gas from the Canadian Northwest Territories. The various

TABLE 1
PROJECTED PIPELINE SCHEDULES
(barrels per day)

Year	Alyeska*	Accelerated*
1975	350,000	2,000,000
1976	900,000	2,000,000
1977	1,200,000	2,000,000
1978	1,400,000	2,000,000
1979-2000	2,000,000	2,000,000

These flow rates would produce approximately 16.7 billion and 18.3 billion barrels for the Alyeska and Accelerated schedules, respectively, over the estimated 25-year lifetime of the North Slope field.

*"Alyeska" schedule refers to that originally suggested by Alyeska, the pipeline service company formed to develop North Slope oil holdings. Alternatively, a faster, or accelerated schedule is sometimes assumed.

Source: Tussing, A. R., G. W. Rogers, V. Fischer, R. Norgaard, and G. Erickson, *Alaska Pipeline Report*, prepared for the USDI by the Institute of Social, Economic and Government Research, University of Alaska, 1971, p. 72, Table IV-1.

TABLE 2
REPRESENTATIVE PREDICTED COSTS OF TRANS-ALASKAN PIPELINE*

	Capital Costs (in \$ billions, 1971)			
	1.75	2.00	2.25	2.50
At Alyeska flow rate (dollars per barrel)**				
Discount rates†				
8%	0.819	0.868	0.916	0.965
10%	0.913	0.975	1.037	1.099
12%	1.024	1.102	1.179	1.257
At Accelerated flow rate				
Discount rates				
8%	0.736	0.803	0.844	0.844
10%	0.832	0.882	0.932	0.982
12%	0.909	0.971	1.032	1.093

*Total cost per barrel to Los Angeles from the North Slope, via the American flagships and the Trans-Alaskan pipeline.

**Flow rates in barrels per day, as explained in Table 1, taking into account operating costs.

†Costs vary according to discount rate selected, as explained in text.

pipeline developments thus might be combined into a northwestern petroleum transport corridor.

A number of these considerations are weighed in a comparative analysis of the alternative routes in the environmental impact statement on the TAP prepared by the U.S. Department of the Interior. The department concluded: "No single generalized route appears to be superior in all [environmental] respects to any other."⁴

However, the department concluded that, first, the TAP was superior to the Trans-Alaskan-Canadian routes only from the standpoint of its impact on the abiotic, or nonliving, environment. This difference occurred because the TAP right-of-way would occupy less land than the TCP route. Department of the Interior analysts pointed out that this advantage was lost if a natural gas pipeline were to be considered as part of the Arctic development plan, since the gas pipeline would require a right-of-way in addition to that for the TAP, resulting in a vast increase in land exposed to environmental problems related to development of North Slope oil. Second, the department concluded that from the standpoint of the impact on the overall biotic environment, TCP-IA was superior. Third, the department concluded that from the standpoint of the unavoidable impact upon "socioeconomic systems, . . . recreation, aesthetic, wilderness, communities, and native culture and substance," the TCP-IA route was superior. Fourth, the department concluded that routes TCP-IB and TCP-II would probably have the least impact on the marine environment. From the standpoint of risk, or threatened environmental impact, the Department of the Interior concluded that both of the TCP routes were superior to

the TAP from the viewpoint of both the terrestrial and marine environments. Since the TAP is environmentally inferior, its economic advantages will be examined next to determine the social tradeoffs that are necessary to select the optimal route.

Economic Analysis

The first step in assessing the economic benefit of the Trans-Alaskan, ocean route is to determine the construction and operating costs. Capital investments represent opportunities foregone in several time periods. For example, one could invest the money in a bank at a guaranteed rate of interest rather than risk it to build the TAP. One may decide, however, that the TAP risk is worthwhile in view of profits to be made at some time in the future once the pipeline is operating. To help make the decision, one generally reduces, or discounts, the anticipated profits by some set rate to facilitate a comparison with the amount of money that could be made by banking or otherwise investing the money at a fixed rate of interest.

Presently, there is some agreement among economists and government officials that this discount rate is 10 percent.⁵ However, since benefits and cost comparison are generally very sensitive to the value of the discount rate which is selected, rates of 8 and 12 percent will be used here to test the sensitivity of conclusions to this important parameter.

The present cost of a pipeline depends on the rate of utilization of the system, determined by the use of capacity as measured in barrels of oil piped per day. This analysis also depends on several interdependent factors: (1) the project's life expectancy; (2) the total

amount of oil transported by the project; and (3) the amount of oil that is produced in any given year. In the present analysis two production schedules are examined, as shown in Table 1.

There have been many estimates of the construction costs for the TAP system. At the present time there is still no single estimate that is agreed upon by industry and government sources. Therefore, the strategy here is to use various capital costs ranging from \$1.75 billion to \$2.5 billion in 1971 U.S. dollars in a simulation model.⁶

The total transportation costs of the proposed TAP (which equal average capital costs plus operating costs) and of the tanker operations to Los Angeles are shown in Table 2 for each flow rate, discount rate, and capital cost. These estimates are based upon tanker costs of 35 cents per barrel and the pipeline and terminal operating costs of 13 cents per barrel.

Mackenzie Valley Pipelines

An interested person who attempts to keep track of the various public estimates of the cost of a Trans-Canadian pipeline will probably have a difficult time of it. Estimates of construction costs ranging from \$1 billion to \$7 billion may be found by reviewing the public statements and writings of various oil companies and public officials in both Canada and the U.S.⁷

It should be noted that all TCP routes avoid the necessary expenditures for terminal and marine facilities that are included in the TAP estimates above. Using the same costs per mile as TAP, the capital costs of crude oil pipeline from the North Slope to Edmonton down the Mackenzie Valley range between \$2 billion and \$2.75 billion in 1971 U.S. dollars.⁸ Beyond that it is often presumed that it may take two years longer to put a Canadian route into operation than it would the TAP. This can be accounted for by further discounting against the proposed flow rate.

The second component of costs, after capital costs, is the operating cost per barrel of crude oil. This has been estimated by the three major North Slope companies for the North Slope-Edmonton-Chicago system operating at 2 million barrels per day to be approximately \$0.30 per barrel.⁹ This operating cost may be broken down into costs of \$0.174, \$0.126, and \$0.065 per barrel for the North Slope to Edmonton, Edmonton to Chicago, and Edmonton to Puget Sound, respectively.

The capital cost estimates per barrel for the Edmonton to Chicago leg depend upon the assumption that is made about the costs of looping (using existing excess pipeline capacity) on the in-

Alaska Dept. of Economic Development



terprovincial pipeline (between Edmonton and Chicago) and may be as small as \$100,000.¹⁰ On the other hand, frequently cited figures for a Canadian pipeline to Chicago are \$3 to \$3.5 billion, thus implying estimates nearly \$1 billion greater for this route than for the TAP route. In order to bracket the above estimates,⁹ the range of capital costs, from \$600 million to \$1 billion are analyzed here for the Edmonton to Chicago leg (Table 3). Finally, one can add the total per barrel operating and capital cost estimates for the North Slope to Edmonton and Edmonton to Chicago segments and determine the total North Slope to Chicago transportation cost estimates per barrel, shown in Table 3.

It is useful to compare the per barrel transportation cost estimates shown in Table 3 for the Mackenzie Valley crude oil pipeline TCP-I, with the per barrel cost estimates for the TAP - tanker system to the Los Angeles market. Table 2 indicates that the accelerated flow-rate schedule without delay for TCP-I has lower costs per barrel than the TAP estimates using the Alyeska schedules for comparable capital costs. This comparison, of course, assumes that the accelerated flow rate will be achieved immediately once TCP-I is operating, whereas the slower Alyeska flow rate will pertain initially in the tanker system. This assumption is based on the larger market needs of the Midwest and East Coast (approximately 10 million barrels of oil per day in 1970) as opposed to those of the West Coast (approximately 2 million barrels of oil per day in 1970). In other words, greater demand for oil east of the Rockies would most likely absorb the accelerated 2 million barrels per day flow rate from the start, whereas lesser need on the West Coast probably would mean a

delay of some time while normal supply sources were phased out. Furthermore, if North Slope oil production rates prove too low to support the accelerated schedule, the possibility of supplementing the flow with Canadian Arctic or Mackenzie Valley oil (at some additional cost) is greater with the TCP than the TAP alternative. This illustrates the advantages of flexibility to be gained by the suggested northwestern oil-gas transport corridor through Canada.

Even when one compares the slower

Alyeska flow-rate schedules for both the TAP and the TCP, costs are similar, starting at about 80 cents a barrel and ranging up to \$1.26 per barrel for TAP, \$1.46 per barrel for TCP-I. A seemingly small difference of 20 cents per barrel in costs actually is large, of course, when millions of barrels are involved. Pinning down this comparison exactly is difficult, mainly because of the uncertainty of the cost for the Edmonton-Chicago leg of TCP-I. Overall, the cost comparisons between the TAP and TCP-I are

**TABLE 3
COST OF TRANS-CANADIAN PIPELINE***

Production Schedule**	First Leg: Range, Representative Capital Costs To Edmonton In \$ Billions, 1971		Second Leg: Range Of Estimated Capital Costs, Edmonton To Chicago, In \$ Billions, 1971	
	2.00	2.75	0.6	1.0
	Cost In \$ per Barrel, Including Capital Costs, Above, And Pipeline Operating Expenses†			
Alyeska flow rate				
8%	0.804	0.882	0.950	1.027
10%	0.943	1.042	1.129	1.228
12%	1.108	1.232	1.341	1.465
Accelerated flow rate (no delay)				
8%	0.720	0.785	0.841	0.906
10%	0.822	0.903	0.973	1.053
12%	0.938	1.036	1.222	1.226
Accelerated flow rate with two-year delay				
8%	0.790	0.867	0.932	1.007
10%	0.932	1.029	1.114	1.211
12%	1.100	1.223	1.331	1.454

*Total cost per barrel from the North Slope via a Mackenzie Valley crude oil pipeline, then to Chicago via TCP-I.

**Production schedules utilize different flow rates in barrels per day, as explained in Table 1.

†Costs vary according to discount rates selected, as explained in text.

Nearly 70 miles of steel pipe (center foreground) in Fairbanks, Alaska, awaiting construction of the Trans-Alaska Pipeline.

inconclusive at best. Since the capital and operating costs are so close, the profit to be expected from the oil and cost of alternative sources of supply, according to the different market conditions of the West Coast as opposed to the Midwest and East, are the predominant factors in comparing the economic advantages of the respective transport systems.

Oil Profits

One method of calculating the economic efficiency benefits of producing and transporting oil on the North Slope of Alaska is to determine the costs of alternative means of supplying oil to the same market. Such alternatives range from importing foreign oil to increased production of domestic oil. After mathematical computations, the ratio of the costs of the best alternative to the costs of the proposed development project (TAP or TCP) can be obtained to determine the benefit-cost ratio of the development project. The mathematics are detailed in my full report on the subject published by Resources for the Future¹ and are beyond the scope of this presentation. Also considered in the full report are a number of alternative factors related to the U.S. domestic oil demands, domestic and foreign oil supplies, and various optional pipeline transportation arrangements. For example, one might wonder what would happen if an excess of North Slope oil delivered to Puget Sound were shipped via the existing Trans-Mountain pipeline to Edmonton, then to Chicago, rather than being shipped to Japan or to the Caribbean as suggested before. The answer to this, and to the other alternative plans to meet various supply-demand situations

by the TAP, is that the margin of the TCP over the TAP profits remains as large, or in some cases even increases.

So far we have compared only the TAP and TCP-I, or Mackenzie Valley, routes. This was done partially for convenience, partially because the TCP-I option is one of the least expensive Canadian routes, and because it passes through the areas of Canada where new oil discoveries are most likely, making the route the probable best choice for an oil-gas transport corridor for northwestern North America. On the other hand, TCP-II, the southernmost route that follows the Alaskan Highway on the way to Edmonton, probably would have the least environmental impact, as mentioned earlier. TCP-II would be more expensive than TCP-I to build and operate, however, because of the greater distance. Allowing for an estimated \$400 million increase in capital cost of TCP-II over TCP-I,¹¹ plus additional operating costs for the longer distance, the TCP-II route still has the edge over the TAP in terms of tax revenues to Alaska and net profits for comparable flow-rate schedules. This is shown in Table 4, which summarizes the various dollar values of the TCP-I, TCP-II, and TAP routes, allowing for average estimated capital and operating costs and for different flow-rate schedules. A discount rate of 10 percent is used. The flow-rate schedules are the slow Alyeska schedule (see Table 1 for explanation), the accelerated flow rate, and the accelerated flow rate with a two-year delay. (As mentioned above, the Trans-Canadian lines may take two years longer to build than the Trans-Alaskan line.)

Table 4 is arranged to reflect potential increases in TCP costs caused by inaccurate cost data or by new taxes or other costs imposed by Canada for the privilege of building the pipeline across that country. Case I gives the benefit

A Canadian pipeline would deliver oil to the U.S. markets which are in greatest need.

comparison without such increase in costs, Case II includes cost increases of 20 percent. In all cases, the dollar-benefit of the Trans-Canadian lines exceeds that of the TAP. This is true even if the TCP-II route with a two-year delay and 20 percent increase in costs is compared with the TAP accelerated schedule.

The Profit Motive

As explained at the outset, several complex plans were uncovered that would have enabled the oil companies to profit from the TAP despite the apparent economic advantages of the Trans-Canadian systems. The key to the plans is the oversupply of oil that will be produced on the West Coast by TAP oil. The oversupply may be 500,000 to 1 million barrels a day and may last until 1990 or so.¹² By comparison, oil demands east of the Rockies would exceed even accelerated schedule delivery through the TCP system. But to consider profit potential rather than domestic needs, for the moment, oil experts have proposed an import-for-export plan¹³ under the Mandatory Oil Import Quota Program, a federal requirement that, until the President changed the system on April 18, 1973, dictated permissible quantity of oil imports according to a complex formula. The plan would have made it very profitable to sell this excess Alaskan oil to Japan, which needs large amounts of petroleum. The oil would be shipped in foreign tankers from Valdez

TABLE 4
DOLLAR BENEFITS OF PIPELINES

	Mackenzie Valley (TCP-I)		Alaska Highway (TCP-II)		Trans-Alaska (TAP)	
	Accelerated*	Accelerated After 2-Year Delay	Accelerated	Accelerated After 2-Year Delay	Accelerated	Alyeska*
Case I — No increase in costs						
Average capital cost (\$ billions, 1971)	3.2	3.2	3.6	3.6	2.25	2.25
Present value of net social benefits (\$ billions, 1971)**	12.6	9.9	12.1	9.5	8.3	6.3
Case II — Operating and capital cost of Trans-Canadian alternatives increase by 20%						
Average capital costs (\$ billions, 1971)	3.9	3.9	4.3	4.3	2.25	2.25
Present value of net social benefits (\$ billions, 1971)	11.6	9.0	11.1	8.5	8.3	6.3

*See Table 1 for explanation.

**Net social benefits are based upon the cost of supplying each market with oil from alternative domestic and foreign sources if Alaskan oil is not brought to the relevant West Coast or east of the Rockies market.

TABLE 5
NET REVENUE FROM IMPORT-EXPORT PLAN (in dollars per barrel)

	Los Angeles	Japan
Export Portion		
Posted Prices	3.17	2.00
Minus:		
Approximate production costs for North Slope oil	-0.25	-0.25
Approximate pipeline costs	-0.60	-0.60
Approximate tanker costs	-0.35	-0.20
Before tax net revenue	1.97	0.95
Import Portion		
Excess of domestic price over foreign costs on the East Coast of the U.S.		+1.75
Taxes		
Savings in taxes to the state of Alaska from a price difference of \$1.17 per barrel (\$3.17-2.00=\$1.17)		+0.23
Per barrel equivalent net revenue	1.97	2.93
Gain in revenue from import-export plan		+0.96

to Japan, producing a lower transportation cost since shipment is less expensive in foreign as opposed to U.S.-registered tankers. The exporting company would then be allowed to import an equal amount of foreign oil, say from Venezuela, to the U.S. East Coast — again, in less expensive foreign-flag tankers. Under the Mandatory Oil Import Quota Program, the amount of foreign oil that could be shipped to the U.S. East Coast normally is determined by a set percentage of domestic production. This requirement, in effect, guaranteed a high price for the East Coast market to domestic companies producing oil in the U.S. The import-for-export plan, on the other hand, if approved, would have allowed oil companies to import a foreign barrel of oil on the East Coast for every barrel of oil exported from Alaska to Japan.

Proponents contended that the plan was needed to compensate exporting companies for lower profits obtained from sale of Alaskan oil in Japan, as compared with the West Coast. At the same time, they asserted national security and balance of payments problems would be avoided since exports and imports would be equal. There is no doubt that the oil companies would have been well compensated under the export-import plan. Although the price obtained for oil in Japan would have been lower, taxes to Alaska would have been correspondingly less since they are in part based on income from oil sales. Then the companies would have been able to import foreign crude oil — again, in less expensive foreign tankers — for sale on the East Coast at the highest prices obtainable anywhere in the

country. Under the proposed import-

export plan are summarized in Table 5. We start with prices that are \$1.17 per barrel higher in Los Angeles than in Japan. We then subtract production and pipeline costs that are the same in both cases since the same TAP line is used. Then, although tanker costs are lower to Japan, net revenue is nearly \$1 more for sale in Los Angeles. However, we must then add to the Japan export column a profit of \$1.75 for the barrel of imported crude oil that would be allowed on the East Coast. Furthermore, we must add 23 cents to that column for the saving in taxes resulting from the difference in posted prices in Los Angeles and Japan. In sum, the oil companies would gain nearly \$1 per barrel under the import-export plan. Between 100,000 and 300,000 barrels of Alaskan oil per day might be shipped to Japan by 1980, which at 96 cents per barrel would mean a profit considerably in excess of what could be obtained from sale of oil on the West Coast.

After the Japanese exports, oil companies might still have up to 700,000 barrels per day in excess of West Coast needs. A second plan was proposed that would yield exceptional profits by selling the additional excess on the U.S. East Coast by a round-about way. For that matter, the profits from the second plan would be proportionately greater if as much Alaskan oil as possible were sold on the East Coast, where the demand is much greater than in Japan and where prices for oil are highest. Under one version of the plan, Alaskan oil would be shipped from Valdez in foreign tankers to Central America, piped across the isthmus, and loaded on other foreign tankers for shipment to the Virgin Islands. The Virgin Islands have been selected, because, first, they are exempt

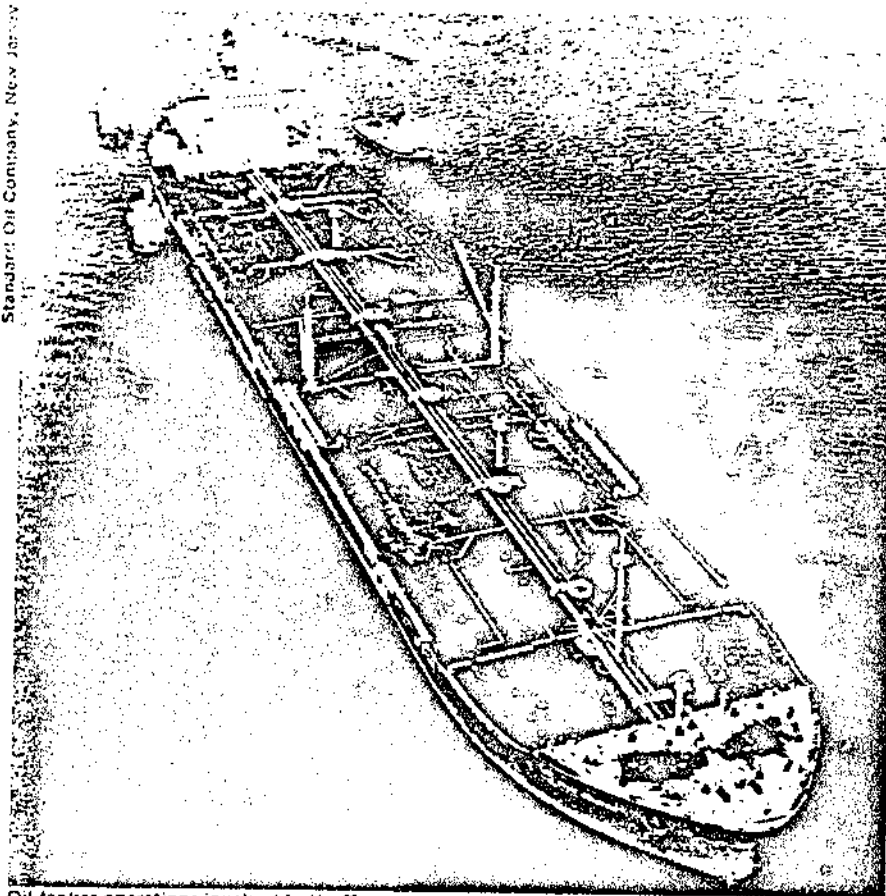
from restrictions of the Jones Act, which otherwise requires U.S. ships rather than less-expensive foreign ships to be used to carry cargo between domestic ports. Second, crude oil can be refined in the Virgin Islands and then shipped to the East Coast, completing the long circuit from Valdez while greatly increasing the amount of routine marine pollution and intensifying the risk of major oil tanker accidents. One company already is reported to have expanded its Virgin Islands refinery to process 450,000 barrels of oil per day in anticipation of large amounts of North Slope oil to be marketed in the U.S.²

To make the plan pay, oil companies would receive the world price for oil, \$2.01 per barrel, in the Virgin Islands before refining; in actuality, the companies might do this by selling or swapping oil through subsidiaries. (The world price is that agreed upon by members of the Organization of Petroleum Exporting Countries to prevent price wars among member countries. Prices paid by those receiving the oil, may be higher, as in the U.S.)

The low world price would yield the state of Alaska only 10 cents per barrel in taxes, some 35 cents per barrel less than if the oil companies sold the Alaskan oil in California at prices much higher than the world price. (The state of Alaska has passed a law, which is being challenged by the oil companies, to protect themselves from such obvious tax dodges.) The refined oil then could be shipped to New York City to be sold at the highest prices in the world, producing net profits to the oil companies, before corporate taxes, that would be about 50 cents per barrel greater than would be obtained from North Slope oil shipped by the most favorable Trans-Canadian route (specifically, TCP-1 — allowing for a 10 percent discount) to Edmonton and then by direct pipeline to the Midwest. In other words, this round-about delivery of Alaskan oil to the East Coast via pipeline and tanker offered a most profitable arrangement for the oil companies under the Mandatory Oil Import Quota Program but would produce by far the greatest environmental damage, would yield less in tax benefits to state and federal governments, and would require the largest consumption of fuel energy in transporting the oil by pipeline and tanker.

In addition to these two ingenious, complex plans that were to manipulate tax, oil quota, and shipping regulations to the oil companies' advantage, two other considerations may play a part in prompting the company officials to press for rapid construction of the TAP rather than accept the delay associated with the TCP routes. As to the first, the average rate of return for domestic oil

Standard Oil Company, New Jersey



Oil tanker operations involved in the Trans-Alaskan Pipeline system would produce chronic low-level marine pollution as well as possible major accidents.

and gas production in the U.S. is greater than other industries because of enormous tax benefits afforded that industry. Additionally, in 1968 the ten largest domestic oil companies paid average corporate income taxes which were less than 10 percent. Accordingly, while a delay of a year may cost society or the state of Alaska only about ten cents per dollar foregone per year, the oil companies on the North Slope may find their opportunity costs to be several times greater than this amount. A delay of three or more years to build a superior Canadian alternative might double the costs to the oil companies. Thus, their decision in favor of the route they judged initially to be the fastest possible development made private - if not social sense.

As to the second consideration, British Petroleum, Limited (one of three major members of the TAP consortium) has merged with the Standard Oil Company of Ohio. In order to complete this merger as agreed, British Petroleum must produce 600,000 barrels of oil per day by the end of 1977. The company has doubtless selected and pursued the fastest alternative in order to develop the speediest alternative and hence the sur-

est bet to achieve the 1977 production goal, regardless of U.S. and Canadian national interests.

For its part, as facts began to emerge, Alaska moved to protect itself against loss of revenue from either the Japanese or Virgin Islands marketing schemes by passing a law similar to that used in Middle-Eastern countries. There, a posted price for oil is used to calculate taxes regardless of where the oil is marketed. Such a law in Alaska would mean that oil companies could not use transportation costs and low market prices elsewhere to reduce their tax obligations. To date, the main concern in the state has been the most rapid development possible in order to gain immediate tax revenue and to provide employment to ease a chronically high unemployment rate.

To summarize, the TAP system is inferior to the Trans-Canadian route in a number of respects. First, the overland route through Canada is environmentally superior, though by no means environmentally harmless - it avoids the most serious earthquake and avalanche problems in southern Alaska and will not contribute directly to ocean pollution since tankers will not be used. Fur-

thermore, TCP-I or TCP-II would utilize existing rights-of-way over part of the distance rather than all new construction as would TAP. The interprovincial pipeline, which now carries oil from Edmonton to eastern Canada and the Midwest, could be incorporated into the TCP to carry North Slope oil to Chicago. The pipeline could be extended from Chicago to the East Coast without loss of profits, because the higher East Coast prices would offset added construction and transportation costs. Finally, the Department of the Interior conceded that a joint oil and gas transportation system through Canada would be environmentally superior to an arrangement requiring an oil pipeline through Alaska and a gas line through Canada, as probably would be the case if the TAP were built.¹⁴

A Trans-Canadian system would supply the U.S. markets most in need of oil at costs that would be of greatest bene-

Pipeline construction will expose thousands of acres of tundra to the effects of erosion and sliding. Agronomists are now trying to develop reseeding techniques to stabilize disturbed areas.



Atlantic-Richfield Company

fit to the public and, seemingly, to the oil companies. It was only when the companies' profit motive alone was considered under the now defunct Mandatory Oil Import Quota Program that the TAP had the edge - and then only if arbitrary, though legal, manipulations were made to take advantage of U.S. laws that are at least ostensibly designed to benefit more than just the oil companies. The only remaining justification for the TAP is the cash flow problem of two American and one British oil companies; it hardly seems wise to let this one factor dominate a major decision of this type.

To close, I would like to quote from the final two paragraphs of my basic report written for Resources for the Future:¹

"It is not surprising that the possibility of a Trans-Canadian pipeline for Alaskan oil has never been thoroughly explored with the Canadian government - although there is every sign that Canadian officials are receptive to such a proposal. After all, this alternative has been resisted by both the oil men and [the Department of the Interior] and has suffered in comparisons with TAP because too little has been known about its economic and environmental merits.

"No one analyst can produce all the answers needed to resolve the controversy over Alaskan oil, particularly when so many variables and unquantifiable factors are involved. . . . But it is my hope that the merits of TCP alternatives will receive further consideration before a final - perhaps irreversible - decision ends the controversy over TAP. The consequences of a TAP-tanker system for transporting Alaskan oil could haunt an entire continent for many years to come. Even [the Department of the Interior] acknowledged this in its environmental impact statement: 'Because of the scale and nature of the project, the impact would occur on abiotic, biotic, and socioeconomic components of the human environment far beyond the relatively small part . . . of Alaska that would be occupied by the pipeline and oilfield.'"

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NOTES

1. This article is based in large part on two technical reports by the author: "Alaskan Oil: Alternative Routes and Markets," published by Resources for the Future, Inc., distributed by The Johns Hopkins University Press, Baltimore, 142 pp., 1972; and "The Trans-Alaska Pipeline: A Benefit Cost Analysis of Alternatives," presented at the annual meeting of the American Association for the Advancement of Science, Washington, D.C., December 1972.

2. Corrigan, R., "Resources Report/ Japan May Get Some Alaskan Oil; Foreign Flag Shipping of Exports is Likely," The National Journal, July 31, 1971.

3. The consortium is named the Alyeska Pipeline Service Company and is owned by Amerada Hess Corporation, ARCO Pipeline Company, British Petroleum Pipe Line Corporation, Humble Pipe Line Company, Mobil Pipe Line Company, Phillips Petroleum Company, and Union Oil Company of California. The acknowledged major ownership is in the control of three parent companies which have found the most North Slope oil: Atlantic-Richfield Company, British Petroleum Company Limited (Its U.S.-owned subsidiary is BP Oil Corporation, which was merged with the Standard Oil Company (Ohio) on January 1, 1970), and the Standard Oil Company of New Jersey (Humble).

4. "Final Environmental Impact Statement Proposed Trans-Alaska Pipeline," U.S. Dept. of the Interior, National Technical Information Service, p. 320 and following, 1972.

5. Eckstein, O., and A. Harberger, "Economic Analysis of Public Investment Decisions: Interest Rate Policy and Discount Analysis," Joint Economic Committee, USGPO, Washington, 1968. Seagraves, J. A., "More on the Social Rate of Discount," Quarterly Journal of Economics, vol. LXXXIV, no. 3, Aug. 1970. "Proposed Principles and Schedules for Planning Water and Related Land Resources," Federal Register, Water Resources Council, 36(245):24144-94, Part II, Dec. 21, 1971. "Discount Rates to be Used in Evaluating Time Distributed Costs and Benefits," Circular A-94, Office of Management and Budget.

6. The most recent estimate utilized by the Department of the Interior placed the 1973 construction costs at \$2.8 billion. Converting this back to 1971 for comparability using a 10 percent discount rate implies a 1971 capital cost estimate of \$2.3 billion, which is

within the range utilized in this analysis. See Nehring, R., "Future Developments of Arctic Oil and Gas: Analysis of the Implications of the Possibilities and Alternatives," U.S. Dept. of the Interior, Office of Economic Analysis, May 10, 1972.

7. For a more detailed discussion of the reasons for this confusion, see Cichetti, C. J., Alaskan Oil: An Economic and Environmental Analysis of Alternative Routes and Markets, Johns Hopkins Press, Baltimore, 1972.

8. In a recent Department of the Interior Analysis, Nehring uses a total system cost of \$5.3 billion in 1974 dollars. Converting this to 1971 dollars at a 10 percent discount rate makes his total cost estimate to Chicago \$4 billion, and splitting this at 66 percent for the North Slope to Edmonton segment results in his comparable estimate being equal to \$2.63 billion in 1971 dollars.

9. "Transcontinental Pipeline Project, Transportation of Alaskan Crude Oil, Atlantic, BP, Humble, Dec. 31, 1968. Prudhoe Bay to Chicago Pipeline," Atlantic-Richfield Company memorandum re Trans-Canada Alternative Route submission to U.S. Dept. of the Interior, Appendix B, Sept. 10, 1971.

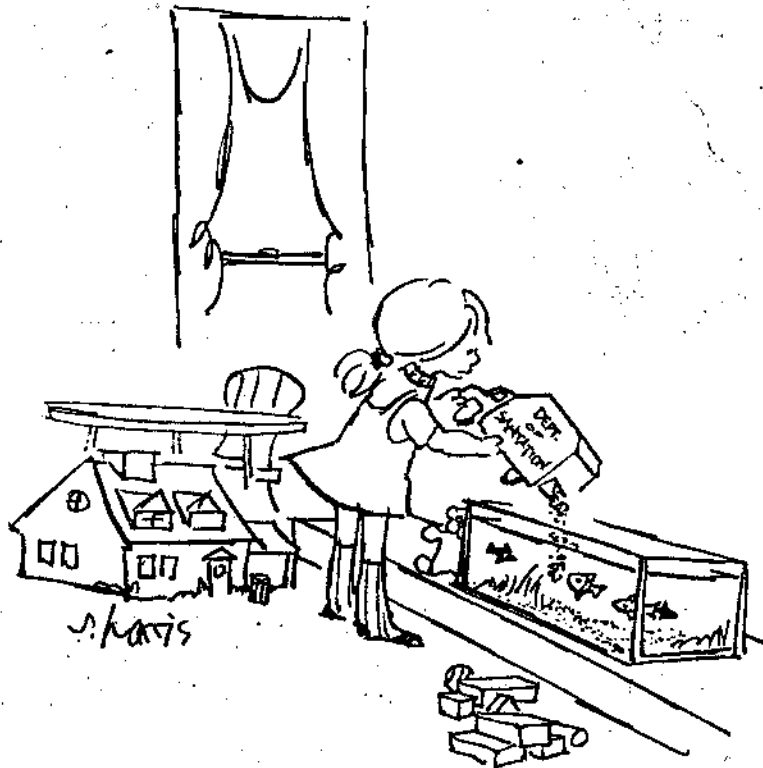
10. "Interprovincial Adds a Quarter Million Horsepower," Oil and Gas Journal, Oct. 18, 1971.

11. Parker, Walter B., A Comparison of Prudhoe Oil Costs via Valdez or via a Mid-Canada Pipeline, Federal Field Committee for Development Planning in Alaska, Anchorage, March 1971.

12. Cichetti, C. J., "Alaskan Oil: Alternative Routes and Markets," loc. cit.; "The Trans Alaska Pipeline," loc. cit. Corrigan, loc. cit.

13. Proposed by Rollin Eckis, executive with Atlantic-Richfield Company and a former president of Richfield Oil. He discussed the Japanese market in his paper, "Alaska Oil in Domestic and World Markets," Change in Alaska (George W. Rodgers, ed.), University of Alaska Press, College, Alaska, 1970.

14. "Final Environmental Impact Statement . . ." op. cit., vol. 1, Introduction and Summary.



JAMES J. KILPATRICK

Let's Start Building the Alaskan Pipeline

A group of Midwestern legislators, pressing for regional advantage at the expense of national needs, has managed once more to delay construction of the trans-Alaskan pipeline. The project is bogged down in committee, and faces a bruising fight when it reaches the floor.

The story is one long chronicle of frustration. If construction of this pipeline had been started three years ago, when its prospective builders were ready to go, the nation might now be benefiting from one to two million barrels of oil per day. We would be significantly less dependent upon supplies from the Middle East. Our balance of payments would not be quite so dangerously out of kilter. At least two billion dollars could have been saved in construction costs.

All this is what might

have been. Much of the exasperating delay has resulted from the opposition of the eco-freaks, those conservationist zealots whose frenzy carries them, like the Jesus freaks, beyond faith to fanaticism, beyond dedication to obsession. Their spokesmen have conjured up damage to the migratory habits of the caribou; they have expounded pathetically upon the harm that a four-foot pipeline would do to hundreds of thousands of square miles of tundra; they have raised vague fears of earthquakes, melting ice, oil spills, and harm to polar bears, fish, and to 320 species of Arctic birds.

I do not mean to challenge the sincerity of these conservationists. It is their judgment and their sense of priorities that compel a blunt rejoinder: The United States urgently needs

Alaska's North Slope oil. We have to have it. Further delays cannot be condoned.

Yet further delays are in prospect. On Feb. 9, the U.S. Court of Appeals for the District of Columbia enjoined construction of the pipeline on a single point: The Mineral Leasing Act of 1920 limits rights-of-way on federal lands to 25 feet on either side of a pipeline. The proposed line from the North Slope to Valdez would have required 70 to 75 feet on either side at certain points.

On Feb. 21, less than two weeks after the court ruling, Alaska's senators, Mike Gravel and Ted Stevens, introduced a bill to overcome the objection. They proposed to cut all the red tape in a single blow, by declaring that the bulky environmental impact statement, long ago

supplied by the Department of the Interior, filled all requirements of law. Similar legislation was offered in the House.

We are now into June, and nothing has happened. Instead, the old alternative of a trans-Canadian route has been revived.

William E. Simon, deputy secretary of the Treasury, demolished these arguments in a recent statement. Building a Canadian line, he said, "would delay receipt of vitally needed Alaska crude oil by from three to five years." The Canadian line would be much longer; it would have to cross 12 major rivers; it would cost twice as much.

Every national interest, it seems to me, demands that we get on with this job — and get on with it now.

Source: *The Evening Star and Daily News*, June 6, 1973. Reproduced by the Library of Congress, Congressional Research Service, December 4, 1973. With Permission.

Thirsting for the Alaska Pipeline

By Rogers C. B. Morton

WASHINGTON—The United States was once a leading oil exporter. This year we will import about 5 million barrels a day, at a dollar outflow of more than \$6 billion. By 1980 we will be importing about 11.6 million barrels a day, if we are still without North Slope Alaska oil, at a dollar outflow of about \$16 billion a year. We can't avoid increasing oil imports for the next ten to fifteen years; but we can reduce our imports by increasing our domestic supply of oil.

The largest oil discovery ever made on this continent was made five years ago on the North Slope of Alaska. Its proven reserves are conservatively estimated at about 10 billion barrels. Yet the oil remains in the ground for lack of a way to bring it to market in the "lower 48" states.

In 1969 a group of oil companies sought a permit to build a pipeline to carry North Slope oil 789 miles southward to an ice-free port on Alaska's south coast where it would be loaded aboard tankers and carried to West Coast U.S. ports. An exhaustive technical, economic, and environmental study resulted in a six-volume environmental impact statement and a three-volume economic and national security study that convinced me it is in our national interest that this pipeline be built as soon as possible and that the pipeline can be built and operated compatibly with the Alaskan environment.

But lawsuits challenging my authority to issue the necessary permits and attacking the adequacy of the environmental studies have blocked pipeline construction. The latest court rulings have made it clear that no new major pipeline can be built anywhere in the United States, including Alaska, until Congress removes the narrow width limitations placed in the Mineral Leasing Act in 1920.

Congress now is considering necessary changes. There have been some proposals that any new legislation prohibit construction of the trans-Alaska pipeline until a study can be conducted of a trans-Canada oil line to the Midwest.

I have carefully considered the possibility of a trans-Canada oil pipeline and I am firmly convinced that it is not in our interest to pursue this alternative further at this time.

First, neither route is clearly superior environmentally. The trans-

Alaska route crosses zones of earthquake probability, and its marine tanker leg involves some risk of oil spills at sea. But these risks are avoidable and I will impose stipulations on the permit that will control them. The U.S. tankers that will carry Alaskan oil to our West Coast will be environmentally safer than the foreign-flag vessels that will bring foreign oil to our ports if Alaskan oil is not available.

Second, a trans-Alaska tanker delivery route means more jobs for Americans, as organized labor has recognized. Building the Alaska line would create 26,000 construction jobs, at peak, for American workers, 73,000 man-years of tanker construction, and 770 man-years of work for U.S. maritime crews and maintenance. These jobs would be lost if the pipeline goes through Canada, because the Canadian Government has said it will give preference to Canadians.

Third, consider our balance of payments problem. Canada is a friendly nation, but big dollar outflows to Canada or any other country inevitably affect the strength of our economy and, thus, our efforts to control inflation.

Fourth, the time factor has crucial implications. The more we depend on foreign oil, the more our diplomats and strategists must take this dependency into their calculations to meet our national commitments. Alaskan oil will be no cure-all, but it can supply 10 to 12 per cent of our needs by 1985.

By Morris K. Udall

WASHINGTON—In a democracy the way a decision is made is frequently as important as the decision itself. The beleaguered trans-Alaska pipeline is a case in point.

Four years ago some of the smartest heads in the oil industry and the Nixon Administration adopted a strategy to win approval of the controversial hot oil pipeline by avoiding public debate in the Congress. Despite our increasingly forboding energy picture and the obvious national impact of the Alaska decision, it was to be treated like a gas line from Tucson to El Paso. A friendly Interior Secretary would issue boilerplate right-of-way permits, and if the "deep breathers" didn't like it they could go to court.

They did and the result has been deadlock and, for the oil industry, a hair-raising court decision returning the whole question to Congress in the sheepskin of the Mineral Leasing Act of 1920. That law permits rights-of-way on Federal land to 54 feet, far less width than is needed to build the Alaska line.

Now industry and the Administration, having apparently learned little from this four-year saga, are again seeking backdoor approval of the pipeline by camouflaging it in a needed amendment to the 1920 law that would widen all utility corridors to correspond with modern technology. Even if this tactic worked in Congress, a doubtful proposition, the pipeline could be bogged down in the courts for years on the environmental issue.

Opponents of this strategy fall currently into two groups. First are the conservationists, dead set against the Alaska route, but concerned that a wholly negative stance could set the conservationist movement up as the scapegoat for the petroleum shortages that are coming. Second is a growing group of Senators and Congressmen from the oil-thirsty Midwest who want an unbiased study of the Canadian alternative—a pipeline that takes a different route through Alaska into Canada's Mackenzie Valley and finally northern United States. The feasibility of such a project and the willingness of Canada have yet to be proved.

Recently, I introduced a third approach which will be loved by no one, but offers substantial concessions to all sides.

Its three basics are these:

- A one-year crash study by the Office of Technology Assessment, Congress' new research arm, to determine once and for all which parts of the country will experience the greatest demand for the oil and how best to get it there. Tied to that would be Congressionally mandated negotiations by the Interior Department with Canada to explore our neighbor's posture on rights-of-way.

- An up or down vote by Congress within sixty days of receipt of the reports by O.T.A. and Interior.

- Language in the bill making this a final decision not subject to judicial review.

To industry it says: "Here's the decision you've been wanting; fourteen months from the passage of this bill you can start building. The study could go against you, but if you really believe the position of your industry and the Administration to be correct, you have nothing to fear. You will be building the Alaska pipeline long before the courts would have decided the environmental issue."

To the conservationists and the Midwest: "Here's the independent Canadian study you have wanted all along. You would have to abandon your courtroom strategy based on the National Environmental Policy Act, but in its place would get something better: A study that not only takes environmental factors into consideration, but for the first time puts them on an equal footing with economic cost and national security."

Finally, to the public: "Since 1968, when the oil find was made in Alaska, neither you nor the Congress, your agent, have played any role in the important national decisions relating to the recovery of this important resource. Those decisions to date have been made by political appointees serving the President and a handful of men in judicial robes; they have been influenced by industry committed to its plan and by established conservation groups determined to oppose it. My bill allows you to have an impact on a judgment which may well determine in the years immediately ahead the availability of gas for your automobile and oil to heat your home, as well as the risks to your beaches and waterways."

One hears much talk in Congress these days about the arrogance of the executive branch. One way to put the President on notice would be to adopt the kind of Congressional remedy I have proposed. I think the American people would welcome it and perhaps think a little more of the democratic system, which is taking such a beating these days.

Morris K. Udall is a Democratic Congressman from Arizona.

Source: The New York Times, May 26, 1973. Reproduced by the Library of Congress, Congressional Research Service, December 4, 1973. With Permission.

ALASKA PIPELINE VOTED BY SENATE; NIXON GETS BILL

By EDWARD COWAN

Special to The New York Times

WASHINGTON, Nov. 13—In an atmosphere of crisis, the Senate approved the Alaska pipeline bill today and sent it to President Nixon. The vote was 80 to 5, and there was only perfunctory debate.

Mr. Nixon was expected to sign the bill, despite some provisions disliked by the Administration, and thereby restart the stalled multibillion-dollar project to lay a 48-inch pipeline across 789 miles of mountains, tundra and rivers between Alaska's North Slope oil fields and the warm-water port of Valdez.

Officials of the consortium of oil companies that will build the line, the Alyeska Pipeline Service Company, said that if there were no new, long delays in the courts, oil might start flowing by the end of 1977. Tanker ships would take it from Valdez to West Coast refineries.

Resistant to Rationing

Developments related to the acute energy shortage that faces the country this winter were the following:

¶ Treasury Secretary George P. Shultz expressed resistance to gasoline rationing, saying it "should be absolutely the last resort."

¶ Oil industry executives meeting in Houston urged that strong measures be taken to alleviate the energy crisis. [Details on Page 63.]

¶ The Senate and House Commerce Committees approved legislation to put the country on daylight saving time this winter.

Both committees have heard testimony that moving the clocks ahead one hour would save energy, especially the use of electricity in the evening. Congressional enactment of the bill was regarded as highly likely.

Mr. Shultz's remarks appeared to put him at odds with other senior Administration officials, who have said that gasoline rationing could come this winter. However, authoritative sources said that Mr. Shultz P. Shultz expressed resistance to gasoline rationing, saying it "should be absolutely the last resort."

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save energy, especially the use of electricity in the evening. Congressional enactment of the bill was regarded as highly likely.

Mr. Shultz's remarks appeared to put him at odds with other senior Administration officials, who have said that gasoline rationing could come this winter. However, authoritative sources said that Mr. Shultz was not absolutely opposed to rationing but was hopeful that it could be avoided.

The vote on the pipeline bill reflected the political impact of the intensification of the energy shortage because of the Arab states' embargoes. The Senate's first vote on the bill on July 17 was 77-20.

Of those 20 Senators who voted no in July, 12 voted yes today including Abraham A. Ribicoff of Connecticut and Clifford P. Case of New Jersey. Mr. Case was the only Republican among the 12.

The House approved the bill yesterday by a vote of 361-14. As the aide to a member of the New York City delegation explained it, "with the fuel crisis, being for the pipeline is a low-visibility issue. We do need the oil and we didn't hear anything from the environmentalists."

Environmentalist organizations have opposed the pipeline project ever since the announcement in June 1968 of a

Source: New York Times, November 14, 1973. Reproduced by the Library of Congress, Congressional Research Service, December 4, 1973. With Permission.

major find, conservatively estimated at 10 billion barrels, in the vicinity of Prudhoe Bay, on the North Slope.

The occasion for a second vote was the presentation to the Senate of a compromise version drafted by a Senate-House conference committee. Senator Henry M. Jackson, Democrat of Washington, the floor manager and principal sponsor of the pipeline bill and other energy measures, warned President Nixon that if he vetoed the bill there was no way of knowing when Congress might re-enact it.

"The nation obviously needs the oil," Senator Jackson said. The line would carry two million barrels a day of low-sulfur crude when it reaches its maximum flow rate.

No O.M.B. Veto

It was widely believed on Capitol Hill that Mr. Nixon would sign the bill in light of his repeated urging to Congress to pass it quickly. The President has described it as one of several measures to move the country closer to energy self-sufficiency.

The Administration was opposed to a provision that would strip the Office of Management and Budget of its veto power over proposals by regulatory agencies to require corporations to submit financial and economic data.

Nor did the Administration want as part of a pipeline bill provisions that would strengthen the power of the Federal Trade Commission to represent itself in court, rather than wait for action by the Justice Department.

Blocked in Courts

The pipeline bill would basically do two things: revise the pipeline provisions of the Minerals Leasing Act of 1920 to take account of modern technology and much larger pipe diameters and, second, specifically authorize the Alaska route.

The project, estimated by its sponsors to cost between \$3.5-billion and \$4.5-billion, has been blocked in the courts because the 48-inch line and attendant facilities, such as pumping stations, could not be built within the restrictions of the 1920 act.

The act said that the right-of-way could not exceed 25 feet on either side of the line, and it provided for no exceptions.

The new bill provides for a 50-foot-right-of-way plus the width of the pipeline, and authorizes the Secretary of the Interior to approve exceptions.

Title II of the bill, the Trans-Alaska Pipeline Authorization Act, declares it is the will of Congress that "the Trans-Alaska oil pipeline be constructed promptly without further administrative or judicial delay or impediment."

Title II seeks to thwart any further delay as a result of any challenge in the courts. It says that the project shall go forward "without further action under the National Environmental Policy Act of 1969," an oblique way of declaring that the Interior Department's environmental impact statement for the project meets the act's requirements.

The bill also requires that challenges to its constitutionality, which are expected, must be brought within 60 days of enactment, be tried ahead of all pending matters by the Federal District Court that gets the case, and that any appeal must go directly to the Supreme Court.

The bill would make the owners of the pipeline strictly liable, without regard to fault, for damages up to \$50-million caused by oil spills.

Alaska removes state barriers to Alyeska line

THE Alaska Legislature last week completed work on a package of six oil-tax and pipeline bills which generally follow the lines of a compromise agreement reached between the oil industry and Gov. William A. Egan.

The bills, which Governor Egan was expected to sign, eliminated a number of provisions in 1972 legislation which threatened to delay construction of the trans-Alaska pipeline.

With passage of the bills, along with congressional approval of the pipeline, the danger of a construction holdup in Alaska appears over.

The three chief changes contained in the legislative package would abolish the excessive right-of-way rentals on the Prudhoe-to-Valdez pipeline, change the severance tax on oil to eliminate the floor of \$2.65 on crude, and do away entirely with Alaska's option to purchase, or negotiate to purchase, a 20% ownership in the pipeline.

The legislation does impose new ad-valorem taxes and higher severance taxes—but not so high as to be unacceptable to the industry.

The special session in Juneau, which lasted from Oct. 17 to Nov. 12, started out ominously because of lack of understanding by many of the lawmakers of the Egan measures. But as the session progressed and public hearings were held on the issues, the opposition, particularly from Republican members, dissipated. Membership in the two houses is divided almost equally between Democrats and Republicans, but Republicans have organized both houses.

The six bills approved by the special session dealt with:

1. Ad-valorem taxes. The bill places a new statewide property tax of 20 mills on all real and tangible personal property for producing and transporting oil and gas. The tax, es-

timated by the state to bring in \$140 million annually, is a revenue substitute for the right-of-way rentals.

2. Right-of-way leasing. The bill eliminates the right-of-way rentals, based on profits, and the state's option to buy into the line. It also grants the pipeline owners the right of eminent domain for purposes of acquiring right-of-way from private land owners.

3. Wellhead taxes. The new severance tax, while containing higher rates than the 1972 legislation, eliminates the minimum royalty and tax based on \$2.65 on the wellhead value.

The new tax fixes the rate for all Alaska at 3% of the wellhead price for any amount up to 300 b/d per well. This increases gradually to 8% for wells producing 1,000 b/d but sets a minimum rate of 27¢/bbl on wells of 1,000 b/d or more. The amount of the increase over the old law is uncertain because the tax is dependent, under a complicated formula, on the wellhead price of crude and the amount of crude produced. Governor Egan's office said state revenue from Cook Inlet production would rise some \$6 million or more per year.

4. Pipeline commission. The bill cuts down the extent of the state's jurisdiction over pipeline tariffs and other pipeline operations, leaving this field to the federal Interstate Commerce Commission.

5. Common purchasing. The crude-purchasing companies must buy from all sellers in a field, or adjacent fields, on an equitable basis.

6. State lands. The state is granted authority to sell land for the pipeline for a minimum of \$10 million, or for the appraised value, whichever is greater. The state may lease the land

instead of selling. The bill applies to the Valdez terminal site and other property used for the pipeline. Under the old statute the land would have been sold at auction.

One bill submitted in the package was killed by the legislature. It would have placed a conservation tax of 1/8¢/bbl on oil production. It would have raised about \$700,000 yearly to finance a state conservation program.

Passage of the legislation will serve to cancel out several lawsuits filed by the industry in the Superior Court of Alaska in Anchorage. The lawsuits, challenging constitutionality of the 1972 legislation, had been set tentatively for trial this fall but were delayed pending outcome of the legislative action.

The legislation which triggered the dispute was passed in June 1972. And U.S. oil-company sources contended that the laws were a greater threat to construction of the line than the environmental suits in the courts in the Lower 48.

In September last year, 10 major firms challenged validity of both the right-of-way leasing act and the amendment to its severance-tax law. Separate suits challenging only the right-of-way act were filed by Mobil and Atlantic Richfield.

Source: The Oil and Gas Journal, November 19, 1973, p. 35. Reproduced with permission by the Library of Congress, Congressional Research Service, December 4, 1973.

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~~GOVT PUB MAY 27 1975~~

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~~GOVT PUB MAY 28 1979~~

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