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Business Review

Evaluating Money Market Conditions

... Monetary aggregates, not interest rates, should be watched for policy signs

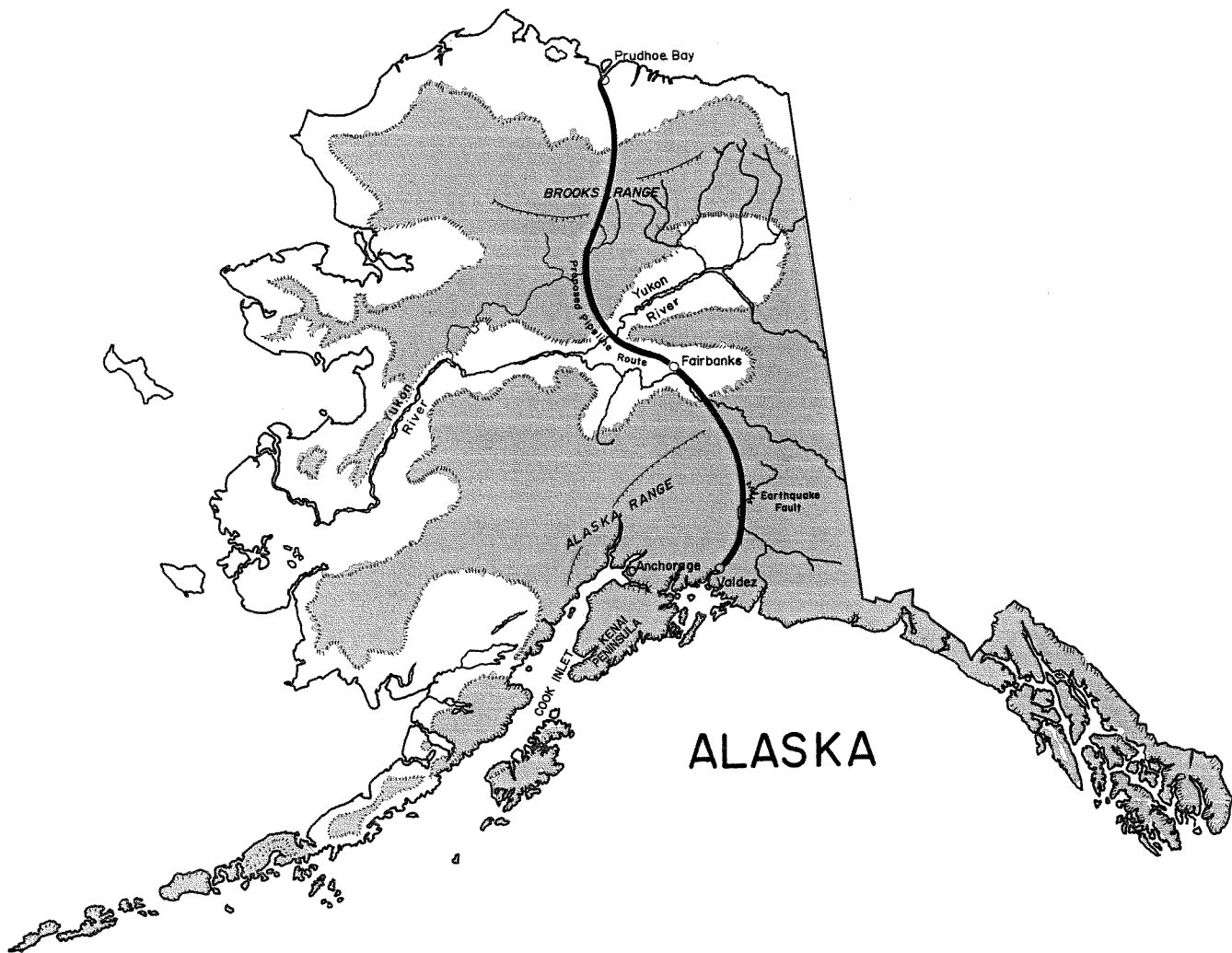
Oil From the Arctic

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Oil from the Arctic

Alaska, Land of Paradox, is the smallest state economically and the largest geographically. With personal income of less than \$2 billion annually, it has only two percent as much income as the largest state (California); with an area of over one-half million square miles, it is twice as large as the next-largest geographical unit (Texas). At the same time, it is both one of the poorest and one of the richest states. One-seventh of Alaska's total population (and half of the native population) are below the poverty line, and the state is plagued by the highest living costs in the nation. Yet it has tremendous unexploited wealth in its forests and fisheries, and especially in its petroleum resources. Most of this wealth is centered in the Prudhoe Bay field on the North Slope facing the Arctic Ocean.

To a nation which runs on oil and is increasingly worried about the cost and availability of oil imports, the discovery of a major new field within its borders comes as a godsend. Although petroleum accounts for almost one-half of the nation's energy requirements, the U.S. today cannot meet its requirements from its own resources. (Indeed, three-fifths of the world's total reserves are found in the politically unstable Persian Gulf area.)

Nonetheless, five years after the discovery of the Prudhoe Bay field, not a drop of oil has reached the markets in the lower 48 states, largely because of the environmental controversy over the construction of the pipeline designed to deliver the oil.

With the impending passage of Congressional legislation governing pipeline rights of way, construction finally may begin early next spring. Oil would begin flowing about three years after that, and in the process, would help transform this now problem-ridden state. The benefits from this oil bonanza are discussed below, as are also the economic and ecological costs of exploiting this resource. First, however, it is useful to review the background to the North Slope discovery, including the long and still-unsettled controversy over the best means of bringing oil to market.

Land of oil

Alaska's petroleum wealth first entered the news a half-century ago, when several firms began investigating oil seepages along the Arctic coast reported by Eskimos and early traders. President Harding in 1923 set aside 37,000 square miles of the North Slope as Naval Petroleum Reserve #4, and exploration continued in a desultory fashion in

that area for many years. Still, the industry's main interest centered for some time around the major Texas, Oklahoma and California oil discoveries.

The real beginning of the state's petroleum industry occurred in 1957 with the discovery of oil in the Kenai Peninsula near Anchorage. A decade later, five fields were producing crude oil and nine fields, natural gas. At the beginning of this decade, production in the Kenai area and in the nearby Cook Inlet amounted daily to 240,000 barrels of oil and 600 million cubic feet of natural gas—in each case, a relatively small percentage of the nation's total production.

Yet, with about \$275 million in total output annually, petroleum has become Alaska's leading industry, by a considerable margin. In addition to raw material production, processing has become increasingly important, especially with the construction of a petrochemical complex in the Kenai area. This includes two petroleum refineries producing jet, diesel and heating fuels, plus an ammonia-urea plant and a natural-gas liquefaction plant servicing the Japanese market.

Production in the Kenai area was approaching its maximum level when, fortuitously, a major find in the Prudhoe Bay area occurred in July 1968. Announcement of the find set off a rush reminiscent of the Klondike Gold Rush of 1898. Estimated reserves in the field came to 10 billion barrels of crude oil, as against Canada's 8 billion barrels and Texas' 15 billion barrels. Moreover, total recoverable reserves (with new technology) were estimated at 50 billion barrels of oil and 300 trillion cubic feet of gas.

Only 3 companies (Atlantic Richfield, Humble and British Petroleum) originally had a stake in this bonanza, on the basis of three state lease sales in the 1964-67 period. But the much-publicized September 1969 sale of leases drew many more bidders, as 450,000 acres were set aside for exploration. Based on earlier transactions, this offering was expected initially to elicit only about \$11 million in bids, but instead it gave the state a \$900-million windfall, enough to cover the entire cost of state government for almost half a decade.

Problems of geography

Nonetheless, none of this oil is likely to reach market until the latter part of this decade, despite all the discussion of shortages throughout the nation. Several factors have defeated efforts to exploit the Prudhoe oil field, beginning with geography. Almost all of Alaska's principal geographic features are arranged in an east-west orientation, and this affects the present structure of the transportation network and the future location of oil and gas carriers.

The North Slope is a flat flood plain with the water table practically at the ocean surface, and is marked by sediment-filled streams and numerous glacial lakes. The entire area usually is frozen solid from the two-foot level down to about 300 feet. South of that are the foothills and then the Brooks Range, stretching in an east-west direction across most of the state, with only two low-level passes, one of them across the border in Canada. Farther south is the Yukon Basin, consisting of a dry plateau around Fairbanks and, to the east, a vast area of semi-frozen peat bog and muskeg that is hundreds of feet deep in places.

Next comes the Alaskan earthquake belt—a sweeping arc that is the continuation of the Aleutian Islands—and south of that are the towering mountains of the Alaskan Range. Two difficult surface routes cross the mountains between Fairbanks and the port cities of South Central Alaska. One of these routes, between Fairbanks and Valdez, rises 2800 feet in one short 20-mile stretch. This contrasts sharply with the relatively flat Alaska highway route, which stretches southeast into Canada.

Problems of environment

Bringing oil to market through such terrain is a difficult but not insuperable technological task. What complicated the situation was a development which took place in the same year as the Alaska oil-lease sale—the passage of the National Environmental Policy Act of 1969. The act stipulates that when Federal agencies undertake actions with possible environmental consequences, they must file an environmental-impact report. In this statement, known as a 102(c) report, the agency involved must analyze and quantify the effects of proposed actions on the environment, and also consider alternatives where irreversible deleterious effects are found.

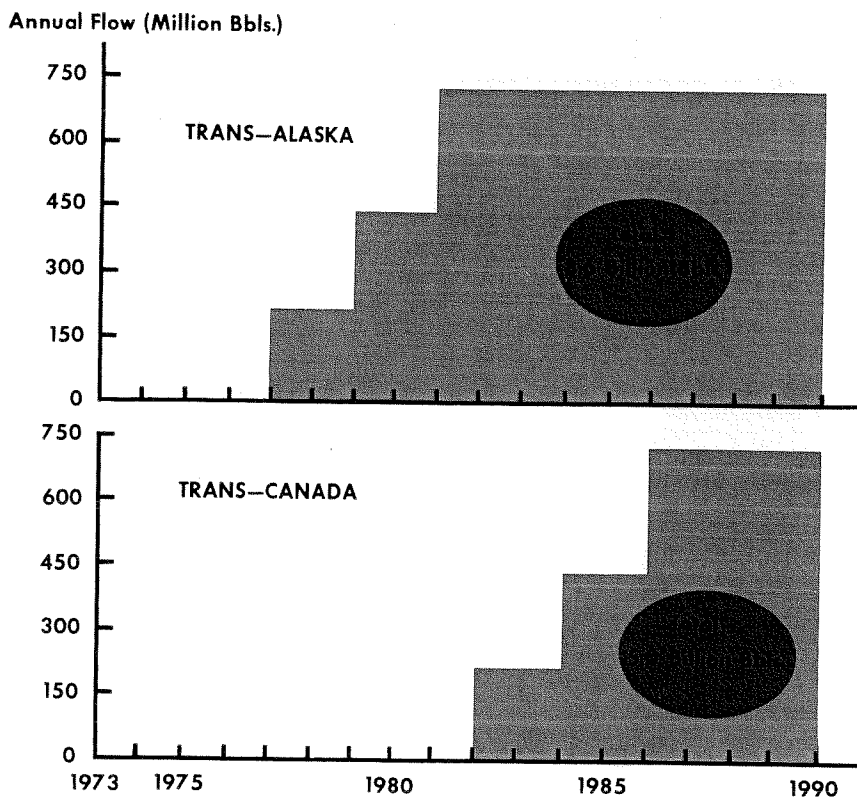
Transportation experts proposed a number of possible transportation modes—sea, air, rail, truck and pipeline—to bring the oil to market. The approved proposal, however, was a 789-mile trans-Alaska pipeline route developed by the Alyeska Pipeline Service Co., a consortium of seven oil companies. This route, as originally proposed, would be from Prudhoe Bay through Anaktuvuk Pass in the Brooks Range, across the Yukon River to Fairbanks, and then through the difficult terrain of the Alaskan Range, along the route of the Richardson Highway into Valdez. From Valdez, supertankers would carry crude oil to Puget Sound and California ports, and pipelines then would deliver the oil to the nation's major markets in the East.

Several legal actions were filed against the U.S. Department of Interior (USDI) to enjoin the granting of the pipeline permit to the oil companies. One major piece of litigation, concerning the settlement of native land claims, was eased by Congressional action in 1971. This act set aside 40 million acres of presumably mineral-rich land for Alaskan natives, and involved also the payment of \$962 million in cash, to be disbursed indirectly to 12 regional and 200 village corporations.

Most of the litigation, however, centered around the environmental issue. The Interior Department issued a preliminary impact statement early in 1971, and the pipeline companies followed up in July of that year with their own 29-volume environmental study. After issuance of a further detailed USDI study in early 1972, Secretary Morton granted a pipeline construction permit, but this was then appealed to the courts by several environmental groups. In early 1973, the Federal Court of Appeals in Washington ruled that the Secretary could not grant a permit unless Congress amended a 1920 law governing pipeline rights-of-way across public land. The Supreme Court refused to review this lower-court ruling, and the problem ended up in the hands of Congress. The appropriate legislation is now nearing passage, but further litigation could develop before construction actually begins.

Canadian alternative?

Much of the controversy has centered around the feasibility of an alternative pipeline route through Canada to Edmonton and then on to Chicago, servicing the oil-hungry Midwest. Those favoring this route included conservation organizations, commercial fishermen, academic specialists, Midwestern



Trans-Alaska pipeline, starting operations within several years' time, could ease oil shortage much more than trans-Canada line

Congressmen and state officials, and also some Canadian interests. Arrayed against them were the major oil producers and trade associations, Federal and Alaska state officials, and, presumably, most residents of Alaska.

Environmentalists argued that a hot-oil pipeline could create serious dangers in crossing the seismically active zone in the southern part of the route, not to mention the wide expanses of permafrost in other stretches. In addition, fisheries could suffer from unavoidable leaks and spills occurring at terminal facilities and in the narrow and fog-laden sea routes near Valdez. In rebuttal, Alaska-route supporters argued that the Canadian route, being several times longer, would have several times the environmental impact of the Alaska route. The Canadian route would not cross as much seismically active terrain or create dangers for marine transportation, but it would involve many more crossings of large rivers. Moreover, each side claimed that its pipeline was much safer for caribou (bears, moose, muskrats, otters, etc.) than the opposition's line.

In terms of market analysis, the Canadian route's supporters argued that the U.S. West Coast (District 5) would not be able to absorb all of the crude oil

shipped there by the Alaska route, necessitating the marketing of the surplus elsewhere. Exporting the oil would have been extremely profitable under then-existing oil-import regulations, but this is no longer true with the recent easing of such regulations. More importantly, given the developing shortages in all sections of the country, it is unlikely that there will be any surplus in the West Coast when the oil finally starts flowing three or four years from now.

Inconclusive choice

Cost-benefit analyses were developed by both sides in the controversy, but with rather inconclusive results. The Canadian route's supporters pointed to the fact that crude-oil prices are higher in the upper Midwest than in California, and that present transportation-cost calculations indicated that the value of North Slope oil would be greater if delivered to Chicago rather than to Los Angeles. This conclusion favoring the Canadian route, developed in several studies by economist Charles Cicchetti (Resources for the Future), was challenged by a Treasury study which Deputy Secretary William Simon presented to the Senate Interior Committee last May.

The Treasury study followed the same benefit-cost approach uti-

lized by Cicchetti, but came out with quite different results. "Benefits" were defined as the cost of alternative sources of supply less the resource cost of North Slope oil delivered to the same market; "resource costs" were defined as the total cost of goods and services required to bring either North Slope or foreign oil to U.S. markets.

In the Treasury projections, the delivered resource cost of Middle Eastern crude oil in 1980 would be roughly \$4.58 in Los Angeles and \$4.88 in Chicago. (Future market prices would be higher than these resource costs.) In contrast, the delivered resource cost of North Slope crude oil, by either pipeline route, would be roughly \$1.30 in Los Angeles and \$1.60 in Chicago. So the net benefit to the U.S. economy from either pipeline from the production of North Slope crude oil would be \$3.28 a barrel—the difference between the resource costs of foreign and Alaskan oil.

The difference in conclusion stemmed from the fact that Treasury analysts assumed that any North Slope oil would displace foreign oil in either market, whereas Cicchetti assumed that it would displace an even mixture of domestic and foreign crude in Los Angeles and a five-sixth one-

sixth mixture in Chicago—perhaps unrealistically in view of the shortage of domestic crude, as seen from the recent upsurge in imports and the U.S. industry's current peak capacity production. Basically, however, the Treasury concluded that *total* benefits (if not benefits per barrel) would be greater from the Alaskan route simply because of the earlier availability of oil from that source.

Alaskan choice

In evaluating the various environmental and economic arguments supporting the two alternative routes, the Senate Interior Committee refused to accept either set of arguments as conclusive. However, the Committee determined that "the trans-Alaska pipeline is now clearly preferable because it could be on-stream two to six years earlier than the comparable overland pipeline across Canada." Because of the much more advanced planning on the Alaska route, that pipeline could probably deliver a total of 8.6 billion barrels by 1990, as against 5.0 billion barrels via the Canadian route.

This argument apparently has been convincing to Congress, especially in the present crisis atmosphere, and thus has helped speed the necessary right-of-way

Four Stages of Growth

Alaska's economic history can be divided into a native period, a colonial period, a military period, and the present natural-resource development period. In the era of "Native Alaska," the influx of Russian fur-traders and American gold-seekers led to the decimation of the native Indian and Eskimo tribes; the native population dropped from perhaps 75,000 to roughly 25,000 in the century and a half which followed the Russian discovery.

In the "Colonial Alaska" period, the exploitation of the gold fields and the salmon fisheries brought considerable prosperity to Seattle but few permanent benefits to Alaska. (Alaska accounted for one-fourth of Seattle's total domestic shipping during the early years of this century.) During this period, population flowed in and out in response to the fortunes of the mines and fisheries.

"Military Alaska" began with World War II and coincided with the erosion of the props of the colonial economy. Population fluctuations again were extreme, but they responded to changing military requirements rather than to changes in the supply of colonial raw materials. Non-native population jumped from about 20,000 in 1920 to over 200,000 at the 1943 peak, declined by more than half by 1946, but then returned to the earlier peak level a decade later.

"Natural Resource Alaska" encompasses the present period of systematic resource development, in contrast to the haphazard exploitation of resources during the earlier periods of development. Forests and fisheries had provided a basis for development for some decades, but the beginning of the present period should be dated 1957, when oil production first began in the Cook Inlet-Kenai Peninsula area south of Anchorage.

legislation through the legislative process. Yet in view of the large unexploited resources available on the North Slope, and in view of the arguments favoring the Canadian route, an ultimate solution might involve the construction of both pipelines. Already planning is far advanced for construction of a natural-gas line from the North Slope through Canada to the Midwest, and a frequently mentioned alternative, the construction of a rail-pipeline corridor along this route, looks increasingly promising.

Railroad alternative

The rail-transportation mode has strong advocates, especially among those taking a long-range view of resource development. This view has been outlined by economist Richard Rice (Carnegie-Mellon Institute) in a recent article in *Technology Review*. Rice argues in favor of a high-capacity rail-pipeline route along the Yukon Corridor, or preferably along the Mackenzie Valley, in place of the trans-Alaska pipeline, partly in terms of short-term cost advantages but also in terms of its long-range value.

The cost estimates for the trans-Alaska pipeline, in his view, would total about \$9.2 billion—\$3.0 billion for the crude-oil pipeline, plus the costs of a nat-

ural-gas line, tanker fleet and port facilities. In contrast, the estimated cost of the rail-pipeline system would be about \$7.5 billion on the Yukon route and \$5.6 billion along the Mackenzie route. Moreover, this system would yield greater residual value after the Prudhoe field is finally exhausted.

Rice's proposal is apt to be overlooked in the present rush to get the oil flowing, yet over the long-run, a rail-pipeline system may become a necessity. The U.S. and Canadian Arctic contains, in addition to 10 billion barrels of proven reserves in the Prudhoe field, a great deal more that could ultimately become recoverable with improved technology—perhaps 10 billion barrels in Naval Petroleum Reserve #4, 20 billion barrels in the area around the Mackenzie Delta, and another 30 to 40 billion barrels to the east of the delta in Canada. Most of these areas are not accessible to the trans-Alaska pipeline route, but they can conveniently be served by the Mackenzie route proposed in Rice's study.

The railway would also have an essential role in developing other natural resources of interior Alaska, an area which could produce as much as two million tons of iron ore, one million tons of

coal, one-half million tons of other minerals, and, in addition, over two billion board feet of lumber every year. More than that, in view of the nation's increasing need for new energy sources, the Mackenzie route would be strategically located for exploiting two of the three largest known oil deposits in the world. Recoverable reserves in the Athabasca tar sands of Alberta are estimated at 370 billion barrels of oil, about the same amount as in the entire Persian Gulf area, and the shales of Colorado, Utah, and Wyoming might contain another 600 billion barrels. As technology develops to a point permitting exploitation of these resources, marketing development should not lag far behind.

Impact of pipeline

However valid these considerations may be in the distant future, the present emphasis is on bringing North Slope oil to market through the trans-Alaska pipeline. The oil will not start flowing immediately; after construction begins, it will take three years to bring the first shipment to market, and several more before production reaches its targeted flow of two million barrels a day. But as the project goes on stream, it will make an important

contribution to U.S. energy supplies, since the North Slope field by itself adds one-third to the nation's oil reserves.

The impact on Alaska will be far-reaching, and will mark a basic shift in the state's passage from a military-based economy to a resource-oriented economy. Even at the beginning of this decade, twice as many individuals were on military payrolls as on the payrolls of commodity-producing industries (farms, fisheries, forests, oil, construction and manufacturing), but the state's economic structure should be quite different in another decade or two. The process of growth will be very uneven and accompanied by sharp cyclical swings in employment and income, but it will lead eventually to a better-integrated and prosperous economy.

North Slope oil already has brought about one abortive boom, caused by the euphoric belief that the pipeline would be built immediately after conclusion of the \$900-million lease sale. The state for the last several years has lived with the let-down from that burst of activity, with the unemployment rate hovering around 10 or 11 percent throughout the past several years, as against 9 percent or less during most of the preceding decade. (However, total employ-

ment has grown somewhat faster over the past half-decade than in the preceding period.) But now that the pipeline is closer to reality, a major construction boom is likely to occur.

This period might last about three years, with pipeline-related employment peaking at around 24,000 jobs in the second year and falling off rapidly thereafter. However, the higher-paid jobs will probably be filled by specialized workers hired "Outside", and not from the Alaskan labor force, although the state government is making every effort to see that Alaskan residents get first consideration for construction jobs. It is even considering re-opening an information booth at the Seattle airport which was used during the slump several years ago to warn Outsiders away.

Impact of oil

Despite the bonanza in company profits and tax revenues expected from exploitation of North Slope resources, it may not produce much in the way of permanent employment of Alaskan workers or direct business for Alaskan firms. The fields in the Kenai-Cooke Inlet area have generated fewer than 3,000 permanent jobs, and with the exploitation of North Slope fields, perhaps no more than

5,000 permanent workers may be needed for drilling, production, pipeline and harbor work throughout the state.

Thus, petroleum's long-run contribution to the state's economic development will not depend primarily on the jobs or the directly-related business generated by the industry. Its contribution instead will be determined largely by the amount of revenue the state receives from oil and gas leases and taxes, and the way in which it spends this revenue.

It should be added that the petroleum industry differs considerably from other commodity-producing industries, such as the salmon and forestry industries, whose Alaskan operations have been primarily seasonal and concentrated in production. The oil firms have established an executive and administrative component inside Alaska, giving an Alaskan flavor to their main operating and planning functions, and they also have relied heavily on contracting for various supporting services within the state.

Even so, the oil boom in itself will not solve the state's major

problems of rural poverty and high (9.8 percent) unemployment. These problems, according to Arlon Tussing (University of Alaska) are not caused by lack of jobs in the ordinary sense, but by two peculiarities of the state's industrial structure: the existence of seasonal industries, such as salmon and construction, and the serious mismatch between the location, education and life styles of most natives (who make up one-fifth of the population) and the qualities required by modern economic development.

The oil boom nonetheless has stimulated the settlement of the native-claims question, by hastening the payment of \$962 million in cash and 40 million acres of land to poverty-afflicted groups. In addition, the \$900 million received from the 1969 lease sale has gone into the state's general fund to finance construction and maintenance of public facilities. But the state has also counted on severance taxes and royalty income from oil production, and these revenues have not yet materialized. This situation has led to charges that the state would "face bankruptcy" in several more years, and it has led to proposals in the governor's 1974 budget to develop new revenue sources and to reduce the rate of growth of state spending.

Benefits of proprietorship

Despite these recent difficulties, the prospects for the state government's finances—and for a further attack on the state's poverty—will brighten considerably when oil begins to flow. This evaluation is based on one crucial fact: unlike other oil-producing states, Alaska owns major subsurface rights, and so can participate in development revenues from all mineral exploitation within the state.

The oil firms and the state government have argued for some time over the future shape of the oil-taxation system. Basically, however, the state will collect a royalty on the wellhead price per barrel produced, and it will also impose a sliding-scale production tax, depending on the producing rate of each well. Since the Prudhoe Bay wells generally will produce at a high rate, the state's tax take could approximate 20 percent of the wellhead price per barrel.

In a University of Alaska study (*The Alaska Pipeline Report*) produced for the U.S. Department of the Interior, the wellhead price was estimated at \$2.42 to \$2.52 per barrel, which at full pipeline capacity of two million barrels a day would generate about one million dollars a day in state revenue. However, the study was based on 1971 prices, so that in view of the rapid price escalation resulting from the world-wide oil squeeze—involving a 9.7-percent jump in the wholesale price of crude within the past year alone—the state's revenues (and the Alaskan economy) should benefit substantially as time goes on.

The exploitation of North Slope oil will increasingly broaden Alaska's economic base. But to repeat, the long-term impact will come not from construction of the pipeline, but rather from the utilization of production revenues. (Most of the gains would occur, no matter what route were chosen to bring the oil to market.) The shape of Alaska's future will be determined largely by the state government, through its decisions on how and where to spend its oil revenues, while the Federal government's long-dominant role will become only secondary.

William Burke