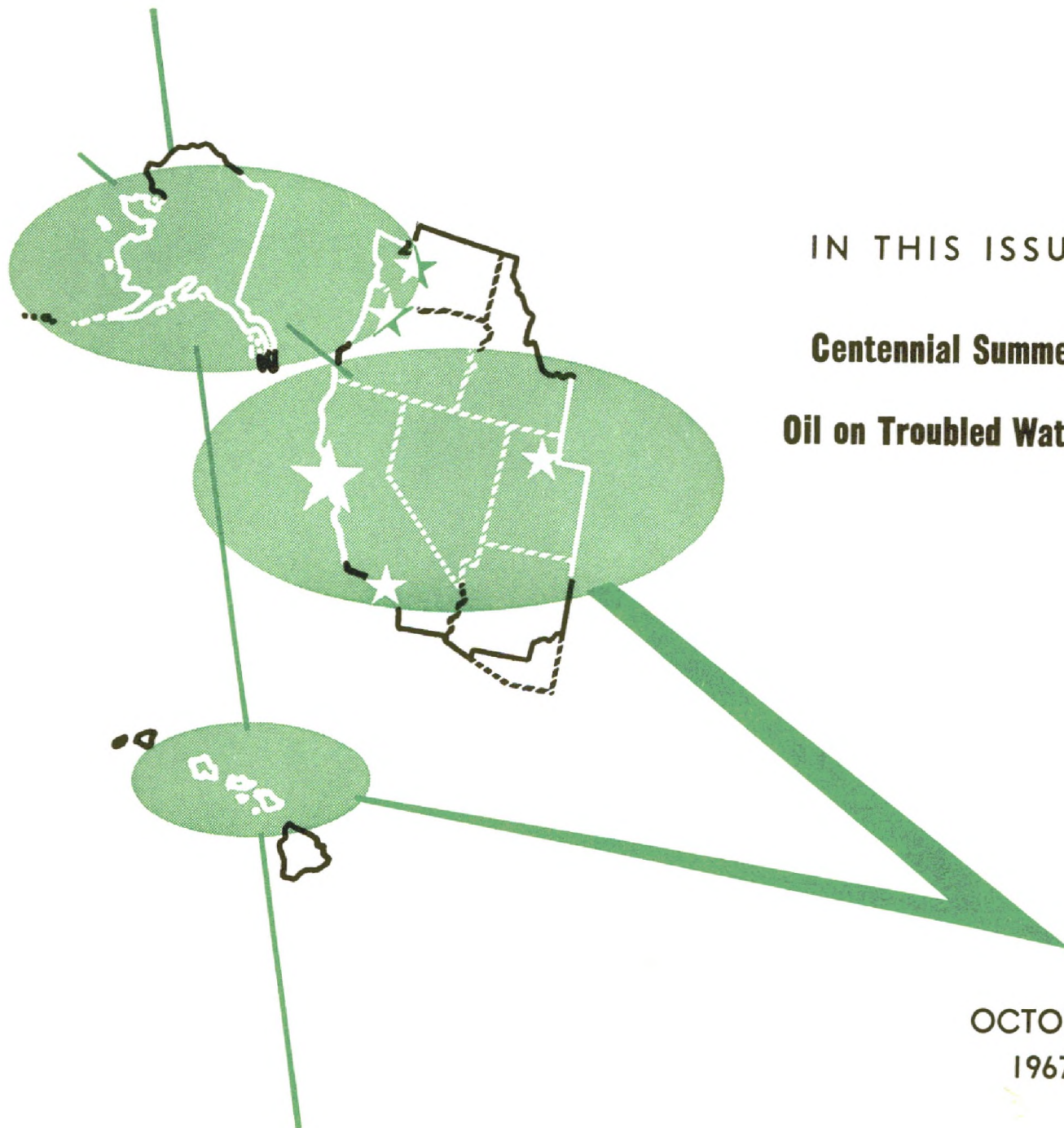


FEDERAL RESERVE BANK OF SAN FRANCISCO

MONTHLY REVIEW



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1967

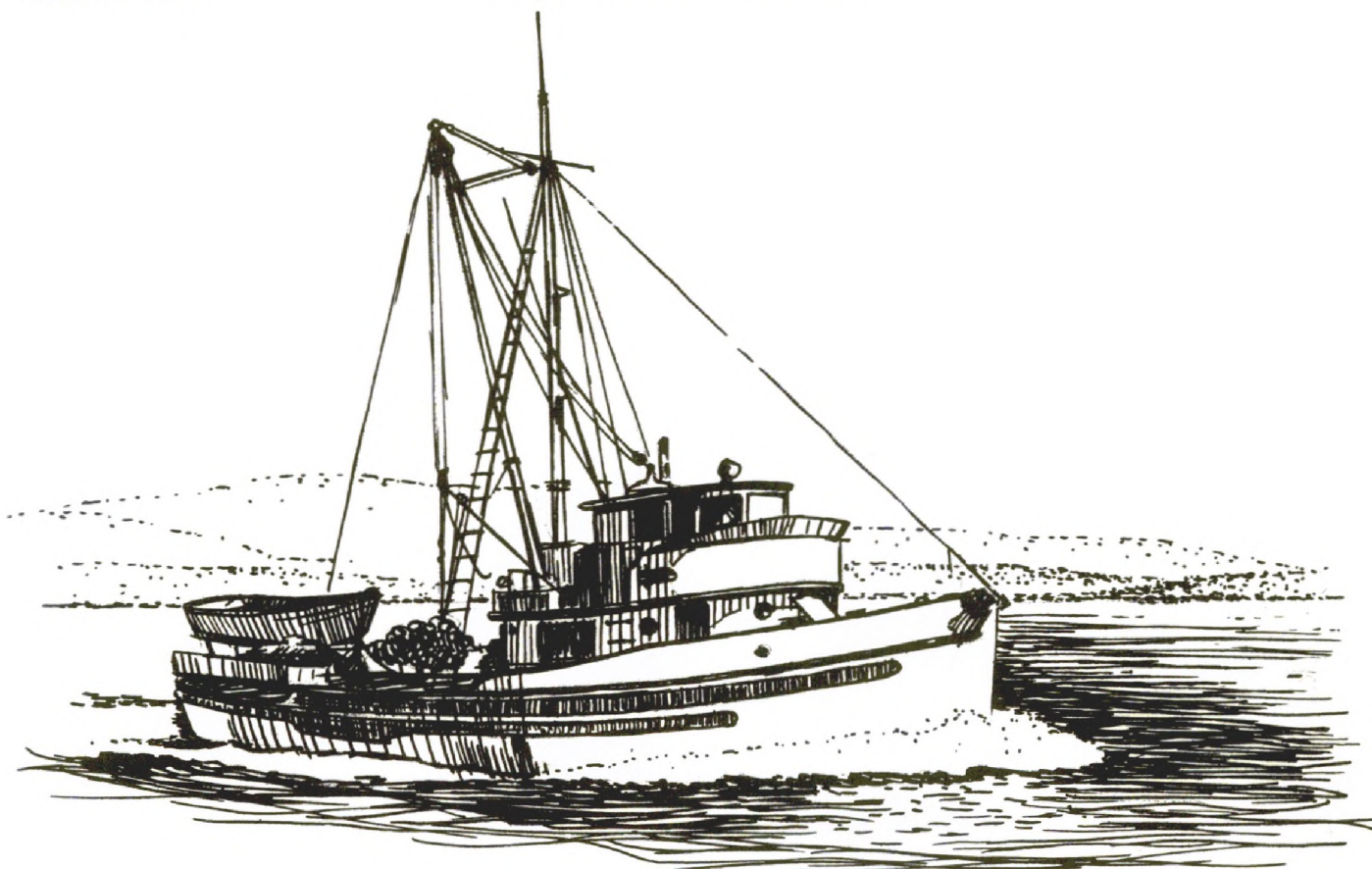
Centennial Summer

... With its gushing oil wells and its wealth of other resources, Alaska should no longer be thought of as an Arctic Appalachia.

Oil on Troubled Waters

... This summer's crisis, short-lived as it was, served to focus attention on petroleum's role in meeting the world's energy needs.

Editor: William Burke



Centennial Summer

ALASKA'S centennial celebration came to a premature close this August, when the Fairbanks flood forced the closing of the A-67 Exposition which had been organized to commemorate the 100th anniversary of the Alaskan Purchase. But the brief exposition — incidentally, it plans to reopen next spring — served once again to highlight the riches which Secretary Seward got for the taxpayers' \$7.2 million in President (Andrew) Johnson's Administration.

The exposition was mainly an exercise in nostalgia. Plane service from Seattle to the Fairbanks fair featured Gibson-girl stewardesses, turn-of-the-century decor, and in-flight readings from the poetry of Robert W. Service. At the fair itself, visitors toured a geodesic dome painted gold to represent Alaska's millions of gold nuggets, observed kayak rides and totem-pole carvers at a native village, and munched reindeer sausages while watching can-can girls perform aboard an old Yukon stern-wheeler.

Outsized problems—and promises

Yet, behind all of the hoopla and nostalgia was a serious effort to exhibit the problems and promises of the vast 49th State, with its wealth of resources and scarcity of people. Those tourists who went to A-67 rather than to Expo '67 would have found the largest state geographically (over 586,000 square miles), the state with the longest coast line (25,000 miles), the one with the greatest north-to-south and east-to-west extent — and the one with the smallest population (260,000) as well as the greatest amount of undeveloped resources.

Admittedly, Alaska's problems sometimes seem as outsized as the state itself. These include the adverse cost effects created by isolation from the states "Outside," the transportation problems created by the vast mountain systems blocking the interior, and the climatic problems created by the Arctic and subarctic weather. But, more than that, the state lacks sufficient population and revenue

base to supply capital funds for roads, airports, recreational facilities, and other public needs. Its extractive industries lack adequate transport facilities and adequate mapping and survey data, and its native populations — Indians, Eskimos and Aleuts — lack an adequate economic base to support their growing numbers, especially in the undeveloped West.

Despite these problems, the state definitely has moved forward. The momentum generated in the earthquake-reconstruction period of the last several years has been reinforced by the rapid development of the extractive industries, especially oil and timber, coupled with the modest but healthy reorganization of the fishing industry, while the summer tourist traffic faces a potential explosion. Meanwhile, population growth in the South-Central area around Anchorage and the Interior area around Fairbanks has now reached a point where self-generating growth is possible in such service fields as banking, insurance, and communications. (These areas — centered around Cook Inlet and the Alaska Railway zone — now contain two-thirds of the state's people, as against one-third prewar.)

Old history and new

Alaska, in other words, may now be on the threshold of a new period of development distinctly different from its earlier historical periods. Its recent military phase, which followed the colonial period of 1880-1940 and the even earlier native phase, may now be followed by a new period built upon the widespread and efficient exploitation of the state's many natural resources. These periods of development are analyzed in *The Future of Alaska* by the Alaskan economist Dr. George W. Rogers.

"Native Alaska" was a period in which the influx of Russian fur-traders and American gold-seekers led to the decimation of

the native tribes exposed, for the first time, to the ills of civilization. In the century and a half which followed the Russian discovery, the native population dropped from perhaps 75,000 to roughly 25,000 people.

"Colonial Alaska" was a period in which 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 colonial phase, the total value of outshipments was at least double that of shipments into the territory — and not surprisingly, the major imports were tinned foods, petroleum products, and liquor. Population trends responded to the fortunes of individual products; in 1900, the census-taker found 20,000 gold-seekers on the beach at Nome, but twenty years later he could locate only a few thousand more people (exclusive of natives) in the entire territory.

"Military Alaska" began with World War II and coincided with the erosion of the props of the colonial economy. In this period as in the colonial period, population fluctuations were extreme, but they responded to changing military requirements rather than to changes in the supply of colonial raw materials.

Military personnel, along with associated construction and supply workers, increased rapidly because of Alaska's strategic position during World War II and, after a postwar decline, they increased again in the 1950's in response to Korean-war and cold-war requirements. Total population jumped to 233,000 in 1943, dropped to 99,000 in 1946, and then rose to 212,000 in 1953 and to 228,000 in 1957. Yet, despite these fluctuations, the trend in employment and income was generally upward, and the expansion of consumer markets was strongly apparent throughout all of this period.

Underdeveloped affluence

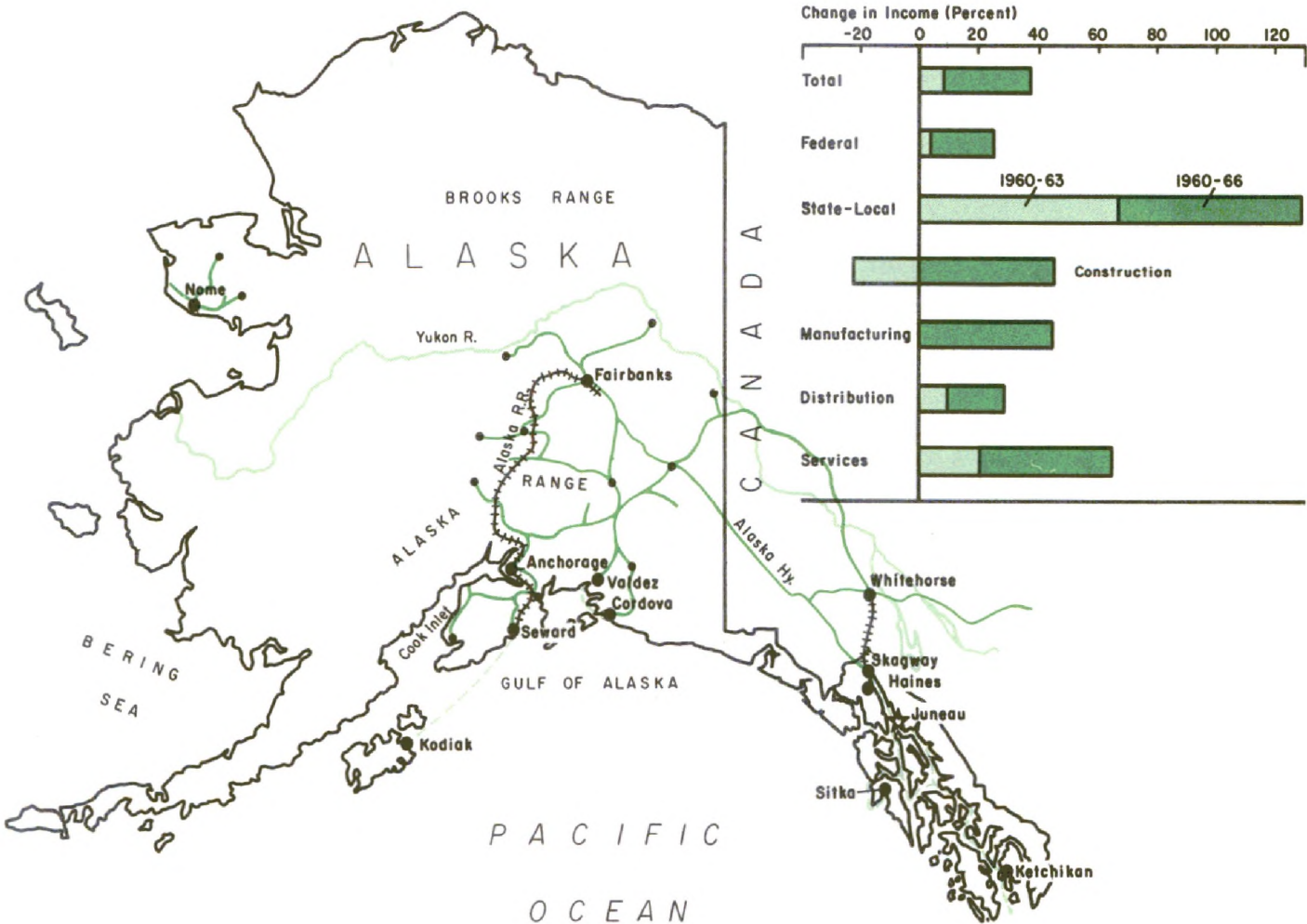
Supporting the continued upsurge in personal consumption is a substantial growth in income which has at least kept pace with the national uptrend. Alaskan personal income has increased more than 150 percent since the beginning of the Korean conflict in 1950 and, stimulated by the recent earthquake reconstruction, has increased at least 40 percent since the beginning of this decade. Personal income today is over \$900 million — a respectable consumer market even though it represents less than 1 percent of the total Western economy.

Income structure is still heavily weighted by government wages, especially Federal

government wages. Although declining as a share of the total, government wages and salaries still account for 56 percent of the total as against 12 percent in the nation as a whole. The military of course is a major factor in this disproportion, but also in this declining share. Total military wage payments are as high now as at the Korean-war peak, but total wage-and-salary income is now two-thirds above its 1953 level.

Wages in commodity-producing industries are only about 14 percent of Alaska's total wages, and wages in other private industries, although fast rising, are only 30 percent of the state's total. In each case, the share of the state's total is only half as large as it

Alaska's income rises at accelerated pace in recent years . . . future depends on expansion of new industries and transport network



is in the nation as a whole.

Today most analysts look to nonmilitary sources for the foundations of future growth. One possibility is the state's largest private industry, fisheries, which produced almost \$200 million in products last year. A more likely source of growth is the forest-products industry which, although producing only about one-third as much as the fisheries industry, is an object of much interest to large investors. An even more likely trend-setter is the oil-and-gas industry, which produced practically nothing at the beginning of this decade but is now producing more than \$40 million worth of products annually. There are other industries with varying growth prospects, such as minerals and agriculture, and, in particular, tourism — but right now the emphasis is on petroleum and forest product industries.

Arctic gusher

Alaska's oil-and-gas industry has now matured after going through cycles of minor success and major frustration during the 1902-57 period. The first commercial success, the Swanson River field on the Kenai peninsula south of Anchorage, came into production in 1957 and by now has blossomed into a major field. A refinery processing Alaskan crude is now producing heating oil for Alaskan homes and industries as well as jet fuel for transport planes, a nearby

natural-gas field is now heating the city of Anchorage, and the state's first petrochemical plant is under construction.

At present the state boasts five oil fields, four of them containing reserves of 100 million barrels or more, as well as at least three big natural-gas fields. Daily petroleum production has risen rapidly in the past year from about 40,000 barrels to a current level in excess of 80,000 barrels, primarily as a result of increased output from fields in the Cook Inlet area. Output is expected to rise to at least 200,000 barrels per day by 1970 but, judging by the recent surge in output, production may far surpass this level by then. Admittedly, present production is dwarfed by Texas' output of 2.8 million barrels per day, but many oilmen feel that Alaska has the potential to be among the top three producing states by 1980. In the Cook Inlet basin alone, petroleum reserves have been estimated at one billion barrels and gas reserves at 4 trillion cubic feet.

In the processing field, Alaska has finally come into its own. The first refinery was built in 1963, and the petro-chemical complex now building will be the world's largest source of urea and the West Coast's largest source of ammonia. In addition, another refinery and a gas-liquefaction project are past the drawing-board stage.

The petroleum industry has had to combat many difficulties in this new area. Costs are high, logistics are a problem, and the climate is sometimes forbidding — in fact, this may be one of the world's most hazardous areas for drilling, producing, and laying pipe. In the present center of operations, Cook Inlet ("Oil Alley"), the cost of a drilling platform for year-round operations may run around \$15 million, as compared with \$4½ million in California offshore operations and \$2 million in the shallow Gulf of Mexico.

Nonetheless, continued exploration is assured not only in this major field, but also in

Eldorado?

What Alaska has become, instead of an Eldorado of trappers and gold prospectors, is a very unusual phenomenon indeed: an as yet underdeveloped reservoir of primary products inhabited mainly by affluent citizens of the Western world, most of whom live in a cozy civilized existence — most of the time.

London *Economist* (1967)

Bristol Bay, the Gulf of Alaska, and the North Slope facing the Arctic Ocean, where the Navy has done some desultory drilling for many years. Exploration has been stimulated by a royalty incentive — a reduction in the discovery lease, from 12 to 5 percent, for a 10-year period. More important, the proved reserves in the area are very large, and, being under the American flag, are immune from the political uncertainties affecting other oil-producing areas throughout the world.

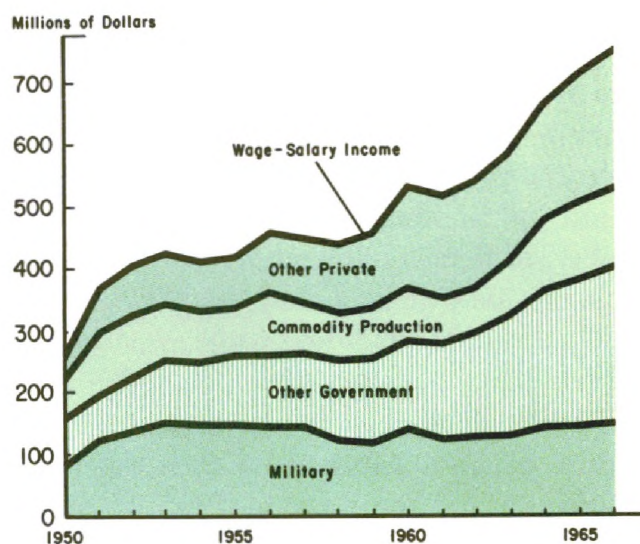
The industry has invested about \$600 million in Alaskan operations, and the total may rise to \$1 billion within the next several years. Even though the total return to date has been only \$190 million — all from the Swanson River field—the prospects for very profitable operations are strong indeed. Not incidentally, the industry is a major support of the state treasury: in the first half of this decade, petroleum accounted for roughly one-sixth of total state revenues.

. . . and other riches

Future prospects are also strong for the forest-products industry. The state contains 119 million acres of timberland, 28 million acres being in commercial forest land, including some 215 billion board-feet of marketable timber.

Over the past decade, the value of cut timber quadrupled to about \$65 million (over 400 million board-feet). This production was accomplished with only one-half of the allowable cut, that is, the cut permitted on a sustained-yield basis. Further expansion of the forest-products industry is now certain; the allowable cut, in fact, may increase to 600 million board-feet annually on the basis of a recent Forest Service sale of 8.8 billion board-feet in the Tongass National Forest. And in view of the recent Japanese investment in pulp mills and sawmills, the market for the timber products of the Alaskan panhandle appears very strong.

Military underpins Alaskan economy but other sectors grow faster



The fishery potential of Alaskan and North Pacific waters is still virtually untapped, except for the somewhat depleted salmon fisheries. Alaska and other West Coast States do not have modern fishing fleets comparable to those of Russia and Japan, and Alaska has only limited shore-based packaging and processing facilities. The problem is interwoven with the depressed state of the native villages, especially in Western Alaska. Harbor development for small craft in these areas would help the industry, since the supply of up-to-date harbor facilities lags behind even the somewhat limited demand for such facilities. But the industry is also faced with the salmon-depletion problem caused by the lack of earlier conservation measures — depletion which has reduced the salmon pack to only a fraction of what it was prior to World War II.

Agriculture, also small and underdeveloped, has considerably less potential for future expansion, even though Alaska produces less of its food supply than does any other state. Only about 8 percent of its food is produced within the state's borders, half of that being dairy products. In view of the necessity to import the vast majority of the

state's food, some 20-25 percent of the average family budget must be allocated for food purchases.

In general, the primary producing industries offer great potential — but tourism offers even more. In a special 1961 report on tourism, then-Governor Egan said: "Its potential is enormous. Alaska's future is tied to tourism as much as it is to petroleum, fish, timber, or minerals." And private and public planners alike suggest that tourism can provide as much stimulus to employment as all other sources put together.

Recent data suggest an acceleration of tourist activity. More than twice as many tourists visited the state in 1965 as during the 1964 earthquake year, and the number rose 20 percent more in 1966, to perhaps 130,000. About 60 percent of the users of recreational facilities came from outside the state. Provided that accommodations in state and federal parks can be developed rapidly enough, and provided that road and ferry networks can be expanded, the future income from this source should rise substantially.

Development model

As this industry summary suggests, Alaska has an enormous potential which, in many

cases, is still untapped. At the same time, the state must deal with a number of more general problems, many of which were faced squarely only when the earthquake disaster focussed attention on the state's needs for long-term development as well as for short-range reconstruction. These broader problems were covered in detail in last year's report, *Economic Development in Alaska*, prepared by the Federal Field Committee for Development Planning in Alaska. This joint Federal-State committee was created in the aftermath of the earthquake to conduct long-range economic and resource-development planning.

In the Committee's view, Alaska in many respects fits the classic development model. There is a chronic shortage of capital for development and expansion, the economy is narrowly based and dependent upon extractive industries, and it suffers from an import imbalance, selective inflation, and reduced scope for modern managerial and marketing methods. The Field Committee, in a nutshell, described Alaska as "an area as large as a subcontinent, with too few people to develop a revenue base that could support the rapid expansion of public facilities required for opening up the country and for

Greatest Asset

There is one other asset of the territory not yet enumerated . . . one of the chief assets of Alaska, if not the greatest. This is the scenery. There are glaciers, mountains, fiords elsewhere, but nowhere else on earth is there such abundance and magnificence of mountain, fiord and glacier scenery. For thousands of miles the coast is a continuous panorama. For one Yosemite of California, Alaska has hundreds. The mountains and glaciers of the Cascade Range are duplicated and a thousandfold exceeded in Alaska. The Alaska coast is to become the showplace of the entire earth, and pilgrims not only from the United States but from beyond the seas will throng in endless procession to see it. Its grandeur is more valuable than the gold and the fish, or the timber, for it will never be exhausted. This value measured by direct returns in money from tourists will be enormous; measured in health and pleasure it will be incalculable.

Henry Gannett

Harriman Alaska Expedition (1904)

the stimulation of resource and industrial development.”

Costs—too high

One of the state's thorniest problems is its price-cost structure. Admittedly, Alaska is a land of high costs. Petroleum firms, for example, claim that they must pay 30 percent more than they do even in high-cost California in order to compensate workers for difficult working conditions — and to compensate them for living costs inflated by the need to bring in most materials and practically all food from more than 1,000 miles away.

The Federal Field Committee argues, however, that the preoccupation with the transport disadvantages can be overdone, since Alaska's distance from suppliers and markets does not in itself satisfactorily explain the price structure. But whatever the factors involved, the problem must be overcome if Alaska is to be successful in attracting and retaining private capital — a development which will occur only when expected costs are reduced and expected yields on Alaskan investment thereby compare more favorably with available alternatives.

Infrastructure—not enough

One essential precondition to a well-rounded development program is the provision of such basic services as power, transportation, communications, and education and research. Provision of this “infrastructure” not only provides employment and income directly, but also stimulates a climate in which overall economic development can proceed.

Cheap power is generally lacking in Alaska today. Generating facilities are unintegrated and are below optimum size, maintenance costs are increased by climatic conditions, and distribution costs are increased by the small size and isolation of markets.

Admittedly, the mountains and rivers of Alaska provide tremendous hydro-power po-

tential. Much of this is in the Yukon River system, centered around the proposed Ramparts Dam. If this dam were in operation, it would provide 2½ times the installed capacity of Grand Coulee Dam, with 4.8 million kilowatts. The dam, however, would cost at least \$1.5 billion and would provide a severe loss to wildlife by flooding an area larger than Lake Erie. Projects of this type obviously would provide low-cost power, such as is required for aluminum, titanium, and uranium production. For other uses, however, low-cost power may be less important than such factors as nearness to markets, materials and workers.

Transportation is, of course, a long-standing need, especially in view of the distances involved; from Seattle, Juneau is 950 miles, Anchorage is 1,450 miles, and Fairbanks is 1,800 miles distant. Alaskan development to date has taken place in a series of footholds on the perimeter of a vast territory, with one emerging core. These communities are served internally by one short-line railroad, a ferry system, few roads, and a good basic air network, and externally by a single difficult road and an expanding network of shipping lines and airlines. (There are about as many airports and airstrips—550—as there are miles of railway track or of modern highways.)

Future planning looks to the creation of an expanded traffic flow, of a kind which would solve the back-haul problem which now adversely influences the rate structure. Also on the drawing board are the expansion of the air system, including the European and Asiatic routes, the development of the sea-train and sea-coach (“fishyback”) mode of steamship transportation, and the expansion of the ferry-system's links to the Canadian system. All in all, what is needed is an expanded movement of people and things by all forms of transportation into, out of, and around the state in a reliable fashion and at reasonable cost.

Money—more needed

Money, especially long-term money, is a basic development requirement today, as a means of building the economic structure that will produce future income growth. The state's goal is to secure a broadly based and efficient economy which will attract and retain predominantly private capital funds at reasonable rates of return.

Understandably, public capital plays a predominant role at the present stage. Yet, as the Field Committee points out, the solution of the capital investment problem will ultimately be found in providing adequate incentives for private capital, in enhancing prospective yields, and in encouraging re-investment through retained earnings. Given the proper investment climate, adequate financing should be available from both short-term commercial-bank funds and long-term private capital inflows.

Working capital requirements are being met today through a sharp expansion of commercial-bank lending. Over the past decade,

total loans have increased 350 percent — twice as fast as the Western and national average. Moreover, business loans during this period have increased more than 500 percent.

As for long-term investment capital, the extractive industries provide attractive prospects now and for some time to come. But not everybody can play in this league. In the Field Committee's view, the discovery and exploitation of Alaska's basic resources demand large commitments of finance capital and scientific-engineering talent to develop the most efficient techniques and the largest production volume.

Several factors already encourage such investment. High resource quality is available in many extractive fields amenable to the use of modern technology — thus producing high yields. Many of the production centers are located on tidewater, offering the potential of cheap bulk carriage. And the growing center around Anchorage and Fairbanks provides an expanding market for various types of consumer goods.

Building Bridges

Ironically, the same nation responsible for the "Military Alaska" that was an outcome of Alaska's strategic location in the Air Age is kindling an awareness of the strategic location of Alaskan resources in relation to the raw-material-hungry markets of industrial Europe and Asia. . . . Just as, in subsequent military planning, Alaska was to become a major bulwark of continental defense, so in our thinking on Alaska's natural resources development we must arrive at a more realistic focus. These resources are remote in space from domestic markets, and from this point of view Alaska economically is a marginal area of only remote future interest as a domestic source of supply. However, the elementary fact that the world is a globe, and that the shortest route to the Orient from the United States and Canada is via the Great Circle Route or through Alaska, has played an important part in the post-war plans of Japan in seeking to find replacements for its lost sources of natural resources. As a result Alaska may become one of the principal bridges between the rest of the states and the other side of the Pacific world.

George W. Rogers
The Future of Alaska (1962)

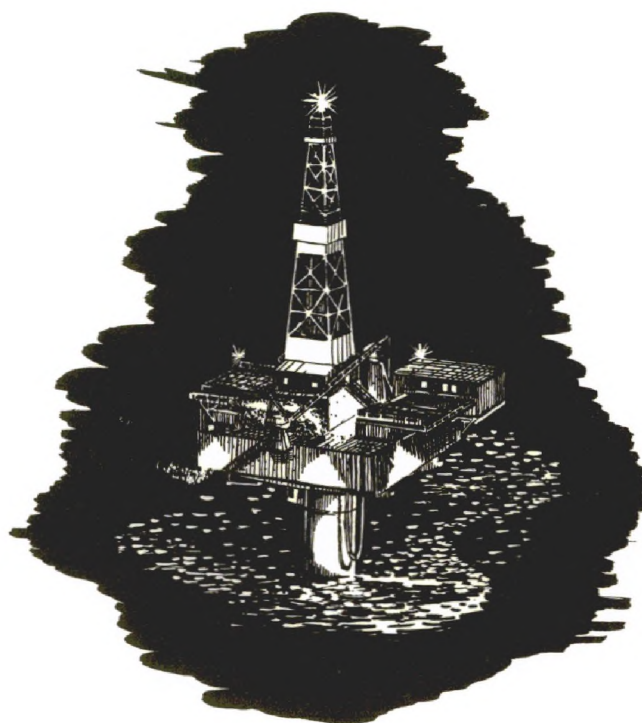
Money from Japan

Much of the long-term money may come from abroad, especially from Canadian and, in particular, Japanese sources. Given Alaska's present stage of resource development, and given the increasing world demand for primary products, this influx of foreign capital may become very substantial. In fact, Japan already is a major factor in the Alaskan scene. A decade ago, Japanese-Alaskan relations were confined almost entirely to salmon-fishing disputes. Now, however, Japan is a major customer and investor in Alaskan resources.

A Japanese-American company owns a Sitka pulp mill, operates a Wrangell sawmill, and markets much of the lumber from the Alaskan panhandle. The two largest Japanese fishery firms have a direct investment in Alaskan canneries and are involved in joint ventures with American fish-processing firms. And Japanese firms are involved in several major joint ventures utilizing Alaskan natural gas — a large petro-chemical complex, plus a gas-liquefaction project which is designed to supply the bulk of Tokyo's heating and lighting needs. In addition, Japanese interests have joined the search for additional oil and gas resources by securing acreage this July in a lease sale of Cook Inlet basin tracts.

Behind this "Arasuka Buumu" is Japan's rise over the past decade to the position of world's third-largest industrial power — a power which is a major importer of crude materials as well as a major exporter of finished manufactured goods. Alaska's underdeveloped resources are exactly those which Japan must have to supply its burgeoning industrial machine. Although lumber products now account for 92 percent of Alaska's exports to Japan, the state can supply six of Japan's eight major import requirements.

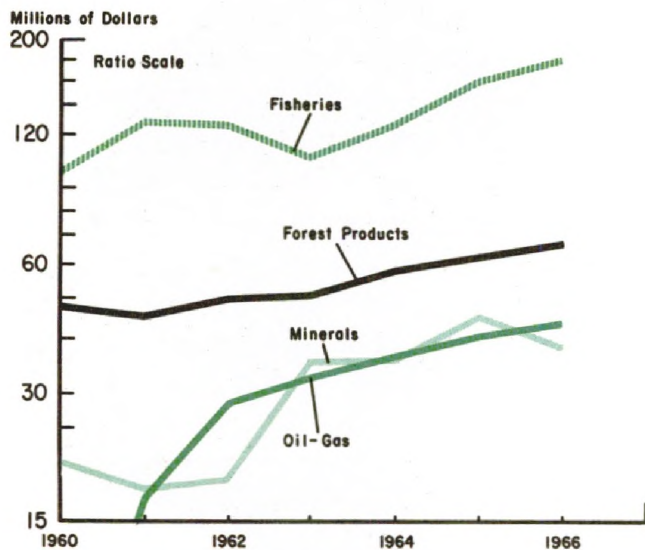
Alaska is operating in a competitive market, especially since the same primary products advertised by Alaska are also available



from the USSR. A commercial agreement signed last year listed 69 commodity groups which the USSR promised to supply to Japan — all of which duplicate Alaskan products. Yet Alaska's underdevelopment, which makes it attractive to investors, and its relative proximity to the Japanese market, mark it as a favored target in Japanese investment planning.

Japan lacks major oil and gas reserves of its own, and it obtains about three-fourths of its supplies from the politically uncertain Middle East. Alaska thus looks increasingly attractive as a reliable source of high-quality petroleum products. Moreover, in view of Japan's rapidly expanding needs for paper and food, increased Japanese investment in Alaskan forests and fisheries may be expected. Exploitation of other resources—for example, coal, iron ore, and copper—may proceed at a more leisurely pace, but whatever the product, Alaska's trade representatives in Tokyo will be certain to advertise the state's resources aggressively. (To demonstrate their ingenuity, they sent 1,000 reindeer carcasses to Tokyo recently in an effort to gain a foothold in the Japanese sausage market.)

**Oil-gas production surges upward,
but fisheries and forests also grow**



Money—only \$7.2 million

In this post-military resource-development phase of Alaska's history, development efforts will be based upon the provision of public and private capital to improve the state's price-cost structure and to provide profitable investment opportunities. The state undoubtedly will remain small in population and income for some time to come, but the rapid exploitation of its rich resources can

be expected to provide the foundation for future growth.

Regarding the size of this future Alaska, a study prepared for a Congressional transportation committee several years ago suggested that the state's population would still be less than 400,000 in 1980, assuming no change in government activity, resource base, or technology. Actually, it is conceivable that military activity could decline over time and that some resources (such as gold and coal) could be quite disappointing. At the same time, there is no reason to expect that technology will remain stable.

On the basis of accelerated research built around vigorous oil exploration and heavy Japanese investment in resources, and on the basis of the recent expansion of Federal-State research activity, Alaska should be able to look forward to technological changes which will create new demands and also make marginal resources more economic. Long before the second centennial summer arrives in 2067, the upward path of technology should prove — if further proof is needed — that Secretary Seward's \$7.2-million purchase of Alaska was one of the nation's most profitable investments.

William Burke

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Oil on Troubled Waters

ON June 5, the unstable peace in the Middle East was shattered, and within a matter of days the Western world found itself denied 8.5 million barrels of oil per day. Amid fears of rationing for European countries and fears of steeply higher prices for consumers everywhere, the U.S. government established an emergency committee to coordinate production efforts of oil companies and to insure a continued flow of oil to Vietnam.

As it turned out, the crisis was rather short-lived. The embargo imposed by the Arab oil-producing countries on shipments to this country and its major European allies was officially terminated on September 1 — unofficially, even earlier — and the crisis-induced upsurge in domestic production was cut back before the summer came to an end. This summer's developments served, however, to draw attention to the evolving pattern of U.S. and world energy demand, and to the dominant role played by petroleum in meeting that demand.

The world's energy

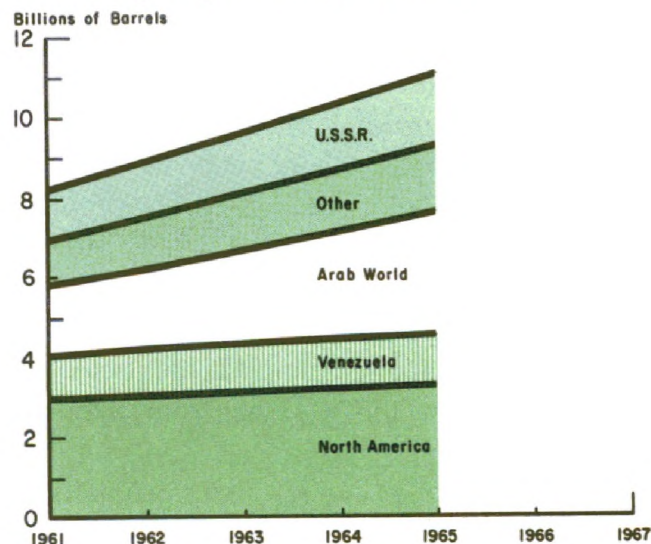
It would be impossible for modern industrial society to exist without major fuel resources. In fact, one major indicator of industrial growth has been the world's increasing demand for energy. In the period between 1920 and 1940 total energy demand grew at a 2-percent average annual rate, but in the 1940-60 period the growth rate increased to 4 percent a year. Moreover, total world energy requirements are expected to more than double between the mid '60's and 1980.

Aggregate figures do not tell the whole story, however, for the components of total energy demand have been growing at different rates. During the 1929-60 period, U.S.

petroleum demand increased from 139.0 to 460.3 million tons, and natural gas usage increased even more rapidly, from 49.7 to 432.1 million tons of oil equivalent. The rising demand for petroleum and natural gas has reflected sharp increases in available supplies, the ease with which such products can be transported relative to solid fuels, and the greater energy-producing efficiency of petroleum and natural gas.

Over the post-Korean period, energy consumption has expanded at different rates in different areas of the world. In Europe the most notable phenomenon is a one-fifth *increase* in the use of liquid fuels as compared with a one-fourth *decrease* in the use of solid fuels. The only area that still meets most of its energy needs with solid fuels is the Sino-Soviet area. This has been attributed to a number of factors — including the fact that the coal industry has a dominant influence in the Soviet bureaucracy. On the other hand, while the solid-fuels share has declined in North America and the liquid-fuels share has increased, the position of natural gas is notably different from the pattern elsewhere.

Petroleum production expands most rapidly in Arab world



Natural gas supplies a larger percentage of North American energy needs than it does in any other area of the world. U.S. consumption in particular nearly doubled between 1955 and 1965, with the most rapid growth taking place in commercial demand. Canadian consumption, although increasing at a faster pace in recent years, reached only 935 billion cubic feet in 1965—considerably smaller than the U.S. figure of 16,033 billion cubic feet.

Canadian natural gas, however, is playing an increasingly important role in the U.S. market. Between 1955 and 1965, the percentage of Canada's production going to the U.S. rose steadily from 6 to 31 percent. And the inflow has not yet reached its peak, as it is almost inevitable that this country will need higher natural-gas imports in the years ahead for industrial uses as well as for home heating and cooking.

Greatest single source

Petroleum nonetheless is the greatest single source of energy in the American economy. As the economy expands, demand expands (albeit at different rates) for each of the major petroleum categories: top-of-the-barrel, middle distillates, and residual. Top-of-the-barrel products include motor and aviation gasoline and kerosene products (jet fuel); middle distillates include gas oil and diesel fuels; and residual is composed mainly of fuel oil.

Jet fuel has exhibited the most rapidly growing product demand, in large part because of the introduction of commercial jets and the demands of the war in Vietnam. Domestic demand for jet fuel more than doubled between 1958 and 1964, and demand increased even more sharply in 1965 and 1966 because of the rising demands of Vietnam. In the West Coast area, production outpaced even the national rate over this period.

Demand for other petroleum products has

grown at a slower pace. For example, demand for aviation gasoline, used primarily for piston rather than jet engines, has been declining as airlines have replaced more and more piston aircraft with jets. Meanwhile, domestic demand for residual fuel oils has increased only modestly, reflecting the increasing popularity of natural gas.

In recent years the Vietnam war has made its presence felt in the demand for oil products. Roughly 40 million barrels of oil products are used annually in Vietnam. But this is only a small part of the total annual defense requirement of about 347 million barrels, which jumped by 29 million barrels in the 1967 fiscal year on top of a 26-million barrel increase in the preceding year.

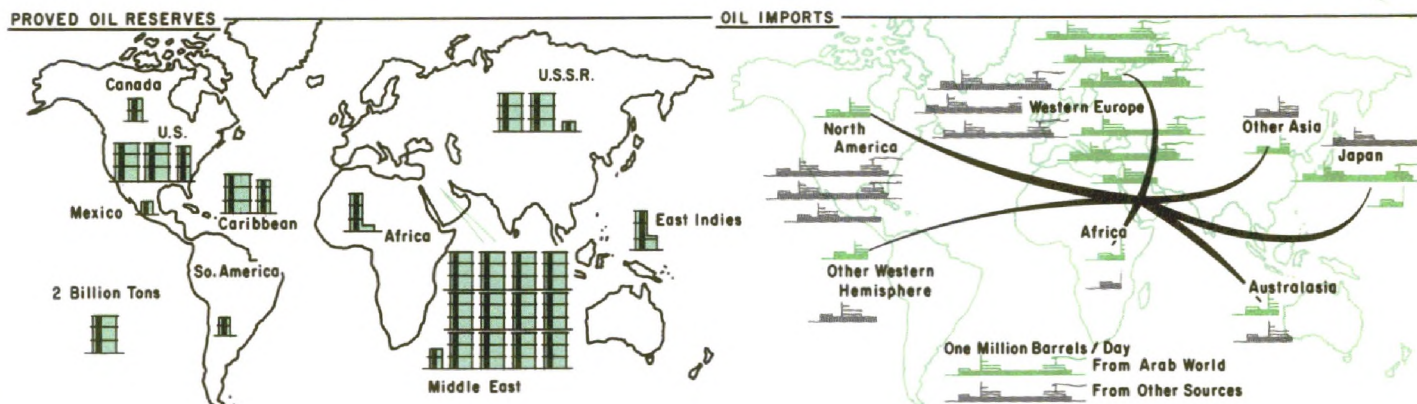
The influence of Vietnam is felt in a number of ways, and not only because of rising demand for jet fuel. For example, the average Army combat division in Vietnam burns up about three times as much fuel as its World War II and Korean War counterparts, at least partly because of the increasing use of helicopters in military operations. The balance-of-payments factor has stimulated the Administration to try to meet at least some of its needs from domestic producers; yet over half of the supply for Vietnam, prior to the Arab embargo, came from the Persian Gulf area, and most of the rest came from Venezuela.

Where the oil is

During the past fifteen years the world supply of crude oil has more than kept pace with increasing demand. But in Europe and (especially) in the U.S., natural gas has taken over many jobs formerly done by petroleum and thus has dampened the increase in demand for oil products.

In economic terminology, the oil industry is an industry of increasing returns in the short run but of decreasing returns in the long run. In the short run the industry is dominated by economies of scale, large initial

Middle East contains bulk of world's petroleum reserves . . . Europe and Japan heavily dependent on imports from that region



investments, and high proportions of fixed costs to total cost. Average costs of crude-oil production therefore decline rapidly as output expands — and as the costs of drilling are spread over more and more barrels of oil. But in the long run, since only a certain amount of crude oil is assumed to exist in the earth's crust, major new fields become harder to find and develop.

Industry sources place the cost of crude petroleum at \$0.33 a barrel in the Persian Gulf (due to the favorable geological location of the oil), \$0.90/bbl. in Venezuela, \$1.60/bbl. in the U.S.S.R. and \$2.40/bbl. in the U.S. The main flows of crude are from the Middle East and North Africa to Europe, Japan, and the U.S.; from the Caribbean to North America; and from Texas and Louisiana to the East Coast of the U.S.

Controlling production

Crude output in this country is dominated by Texas, Louisiana, and California. In Texas and Louisiana output is controlled by "prorating." In each case the regulatory commission calculates the state's estimated productive capacity. It also computes the maximum efficient rate (MER), or the fastest rate at which oil can be extracted from the ground with natural pressure. After deciding how much oil will be produced in any given

month, the state commission allocates the amount among the wells in the state. Each well usually receives the same "allowable," set as a percentage of the MER.

This form of production control is an attempt to adjust supply to demand in order to maintain price. There are serious consequences of such a program. It leads to an excess number of wells being drilled, since the allowable is on a per-well basis, and it also results in a higher cost per barrel of crude, since the larger fixed cost resulting from the excess number of wells is spread over the barrels extracted from a given pool. The system also discriminates against efficient wells, since it does not regulate the output of "stripper" wells — old wells producing only a small number of barrels per day — that rely on pumping rather than natural drive to bring oil to the surface.

Production of crude oil is not the only indicator of supply. The industry uses a concept known as "proved reserves"—reserves of oil known to exist and capable of being extracted economically with present technology. The nation's proved reserves, which average about 12 to 13 times annual production, largely depend on the amount of effort put into finding them. But proved reserves are not an exact indicator of total supply, as the concept has evolved in the industry. "Total supply"

is defined as total proved reserves, plus the currently unrecoverable contents of known reserves, plus the total estimated contents of undiscovered reservoirs, without regard to present or future technological feasibility of discovery and recovery.

The connection between supply and demand is represented by the available stocks of crude and products. Just prior to the Middle East crisis inventories had reached a three-year high in many cases. This overstocked condition naturally provided a useful cushion during the three-month-long embargo.

West—District 5

For Petroleum Administration purposes, the West (District 5) includes the states of Hawaii, Alaska, Washington, Oregon, Nevada, Arizona, and California. This district is physically separated from the rest of the country by the Rocky Mountains. Crude oil output in this area is dominated by California and to a lesser extent Alaska, and consumption — in both District 5 and the nation — is clearly dominated by California.

District 5 is a net importer of both crude oil and derived products, since District states do not themselves produce enough of the desired kinds of crude. New offshore drilling

and the use of steam recovery techniques have pushed California output up towards one million barrels a day. But California crudes yield comparatively large amounts of residual oils and, conversely, comparatively small amounts of top-of-the-barrel products (gasoline products and jet fuels).

Refiners have been able to change refinery yields over the past decade, so that only 8 percent of each barrel of California crude ends up as residual today, as against 14½ percent a decade ago. But achieving the desired refinery mix has required the construction of \$300 million in new facilities without any appreciable increase in refinery capacity.

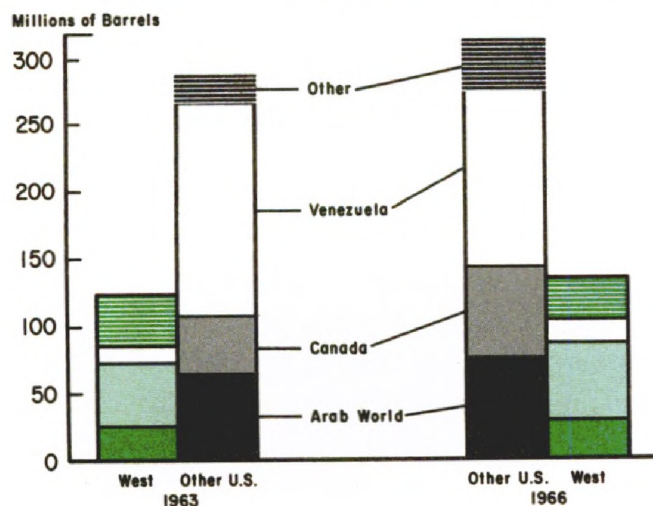
Most of California's recent increase in output has come from its off-shore fields, which are now producing over 20 million barrels annually. Moreover, one of the major new offshore fields, East Wilmington (off Long Beach), is estimated to contain reserves of 1.25 billion barrels. Other promising new fields are located off Santa Barbara and off Los Angeles. In many of these fields, producers are making extensive use of steam pressure to drive oil to the surface. The use of this technique, widely adopted only in the present decade, has led to steadily increasing output.

Vietnam has had its impact on this as on other regions. Even though this District is a net importer, it has been called upon to send some products, especially jet fuel, to the theater of war. District 5, however, would find it difficult to supply large amounts of refined products, other than residual oil, without curtailing consumer demands or increasing District imports considerably.

Towards the future

Over the period 1960-2000 oil and gas products will supply an estimated 75 percent of the nation's total energy demand. The estimated breakdown is 44 percent for oil and 31 percent for gas, as against 19 percent for coal and 6 percent for nuclear fuels and

Arab, Canadian, Venezuelan fields supply most U. S. petroleum imports



water power. Both world and U. S. demand for oil products are projected to grow at a 3-to-4 percent annual rate over this period.

Demand for the various types of oil products may expand at different rates, however. Domestic demand for gasoline and jet fuel may easily increase by half over the next decade alone. Residual fuel oil demand meanwhile should grow at a below-average pace, as it faces increasing competition from natural gas and atomically generated electricity.

Future supply is somewhat more difficult to estimate. The available statistics are not of much help since they apply only to proven reserves — discovered reserves which can be recovered by currently utilized methods at current costs and prices.

The number of new fields discovered depends on the amount of effort and money that companies are prepared to put into the costly techniques of exploration, especially drilling. The real costs of finding, developing, and producing crude oil have more than doubled in the last 20 years. Yet total crude oil awaiting future recovery in the U.S., according to geologists, is on the order of 500 billion barrels of oil. This should last the nation well beyond the year 2000, even at increasing rates of consumption.

Since crude oil is not consumed directly, refinery capacity is another necessary element of future supply. By the beginning of 1970 total U. S. capacity should be approximately 11.5 million b/s.d. (barrels per stream day, or output of a unit operating for a full 24-hour day with no allowance for downtime). By 1975 it should be about 13.2 million b/s.d. Almost all of this capacity will be needed to meet estimated future domestic demand. The problem will be complicated by the fact that refining capabilities may not match the pattern of demand for petroleum products.

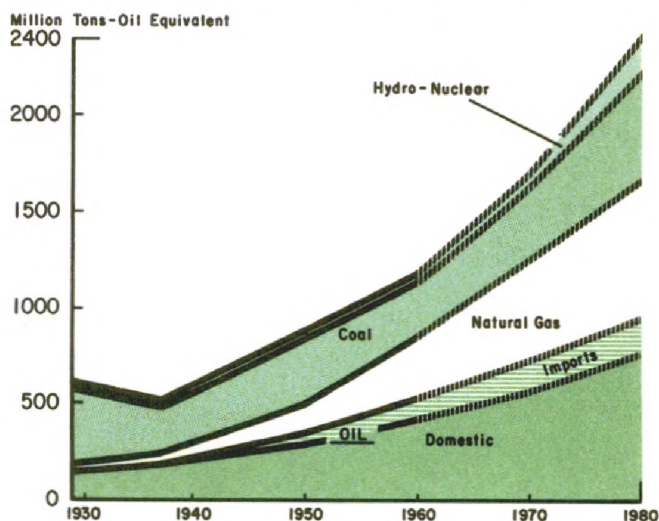
California's future lies in her offshore fields. The state's combined offshore and inland production should reach a peak of 1,200,000 b/d in 1970. And Alaska should be adding at least another 200,000 b/d to the West Coast total.

Additional future sources of oil are shale oil and tar sands. The shale oil deposits are located primarily in Colorado, Utah, and Wyoming. According to Geological Survey estimates, Colorado's shale-oil reserves alone total about 900 billion barrels of oil, including only those deposits that would yield at least 15 gallons of oil per ton of rock.

Japan is likely to prove the key to large-scale development of Alberta's Athabasca tar sands, which hold an estimated 600 billion barrels of crude oil. Unlike U. S. shale-oil deposits, these tar sands can be developed commercially right now in competition with conventional crude. Since Japan wishes to reduce its present overdependence on Middle East oil, Canada with its nearby and secure supply looks very promising. Of course, Japanese interest in Alaskan petroleum and natural gas is already well developed.

Nuclear power and fuel cells should eventually offer serious competition to petroleum. By 1980 the nation may well be

Oil, gas (and the atom?) should meet nation's future energy needs



using nuclear energy equal to 5 million barrels of oil per day. In 1966 one-half of the new power plants ordered by U. S. utilities involved the use of atomic power, and this year three-fourths of all new power plants may be atomic fueled. Italy, whose interest in atomic power has increased as a result of the Middle East crisis, plans to build a 600,000-kilowatt nuclear-powered generating plant which would be the largest in Europe.

Fuel cells are another potential competitor. The typical fuel cell breaks down methane gas into hydrogen, oxygen, and carbon; the hydrogen and oxygen then combine to form water and, in the process, an electrical current is given off. If this process were to be developed successfully for automobiles, it could influence oil's major market—gasoline. Alternative types of electric automobiles, if feasible, would have a similar impact.

Costs of the future

The oil industry is characterized by risk. Exploratory drilling, movements into new markets, and relationships with foreign governments are all elements of the overall risk involved. U. S. companies have undertaken operations in foreign lands, despite their higher risks, because of their high returns.

Recent studies have suggested that the return on oil investments in the U. S. is now greater than those in foreign areas. But in this connection it must be remembered that output in many domestic areas is subject to prorating which tends to keep supply in line with demand as a means of supporting the price level. A similar price effect is achieved by import quotas, which keep foreign oil from

flooding the domestic market. And the oil depletion allowance — 27½ percent of taxable income — is also a factor for increasing the return for domestic producers.

Yet because of the high returns available from Middle Eastern fields, U. S. companies can be expected to continue operating there unless they are excluded by the Arab countries. There may be very little decline in total investment in that still very profitable region, since if it is not carried out by U. S. or British firms, it will be done by others. But at the same time, the recent crisis should increase activity in other areas. Canada could be the nation most favorably affected, as both the U. S. and Japan will look to her as a secure source of supply.

In sum, the petroleum industry will continue to dominate the world's energy picture well into the future. Its growth may be limited, however, by the growth of competitive forms of energy supply. Natural gas may take over an increasing share of the total market, both in the U. S. and Europe. Moreover, the future of nuclear power also looks bright, depending on the availability of sufficient supplies of uranium.

The U. S. domestic petroleum industry no longer holds the dominant position that it once held in world markets. It has been surpassed by the Middle East as the world's largest single supplier, and under the present system of production control it no longer meets the total needs of the American market. Yet, behind its protective quota system, the U. S. oil industry can be expected to survive and even to prosper.

Donald Mathieson

Western Digest

Sharp Gain in Borrowing

Large Twelfth District banks posted a \$621-million gain in loans and investments in the first three weeks of September, in sharp contrast to a \$206-million decline in the comparable year-ago period. All of the increase occurred in loan portfolios; security portfolios declined as banks reduced their holdings of municipals and Federal agency securities. . . . Over one-third of the \$677-million loan increase was attributable to corporate tax-borrowing. The volume of such borrowing was only a little below the June tax date's record volume — and was eight times greater than the increase posted over last September's tax date.

Auto, Copper Strikes Continue

About 6,000 auto assembly-plant workers in Los Angeles and the San Francisco Bay Area went out on strike in early September. Nationwide, about 160,000 auto workers were on the picket line. . . . The prolonged copper strike sharply affected mining and manufacturing employment in Utah and Arizona. About 15,000 miners were on strike in the two states, in addition to several thousand more workers involved in shut-down manufacturing facilities.

Housing and Lumber Developments

Residential construction activity continued to show greater vigor in the West than elsewhere during August. For the month, housing starts were up 19 percent in the West, as against a 2-percent decline in the rest of the nation. . . . Lumber and plywood prices tumbled in late September, however, as buyers displayed increasing resistance to higher prices growing out of the shortage of logs. After a brisk runup in the first half of September, prices declined below the levels prevailing at the end of August.

Upturn in Steel Production

Western steel production rose about 6 percent above the preceding month's level during the first three weeks of September. Output also increased in other steel-producing areas of the nation during the same period. . . . The upturn in business occurred in response to an increased flow of orders from the appliance and construction industries, and even from the strike-affected automotive industry. However, production in some centers was curtailed in late September by a trucking strike.

