



ISER RESEARCH SUMMARY

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PETROLEUM IN ALASKA

The huge Prudhoe Bay oil field has dominated Alaska petroleum development for 20 years. It is so big that it justified the monumental trans-Alaska pipeline project; so big that it alone accounts for nearly 20 percent of U.S. oil production and more than 2 percent of world oil production.

But Prudhoe Bay is exceptional. Other Alaska petroleum development has been less dramatic but still significant. Below we summarize growth and change in the petroleum sector by reporting trends in prices, costs of business, production, exploration and development, and processing.

This summary is based on a report prepared by economist Matthew Berman and research associate Teresa Hull of ISER for the Alaska Department of Commerce and Economic Development and the Alaska Industrial Development and Export Authority. (See the box on the last page.)

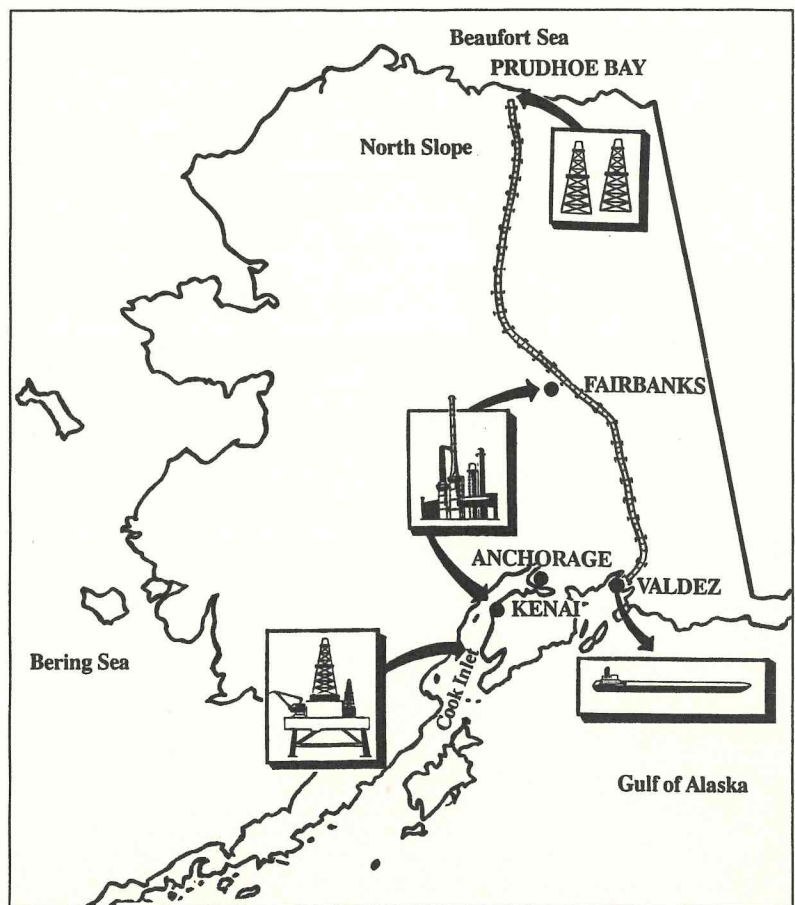
Sketch of Petroleum Sector

The petroleum sector accounted for more than a third of Alaska's gross product in 1987, and among Alaska's resource industries it is second only to fisheries in creating jobs. Petroleum production has also generated 85 percent of state revenues over the past decade.

Alaska produces petroleum on the North Slope and around Cook Inlet. (See map.) Facilities for transporting and processing petroleum include the trans-Alaska pipeline from Prudhoe Bay to Valdez; several smaller pipelines

on the North Slope, in the Interior near Fairbanks, and around Cook Inlet; refineries near Kenai, outside Fairbanks, and on the North Slope; and liquefied natural gas (LNG) and ammonia-urea plants near Kenai.

The vast majority of Alaska oil comes from the North Slope. The oil flows through the trans-Alaska pipeline, and most is loaded on tankers at Valdez for shipment south. The federal government prohibits foreign export of North Slope crude oil. Refineries near Kenai and Fairbanks use Cook Inlet and North Slope oil to produce jet

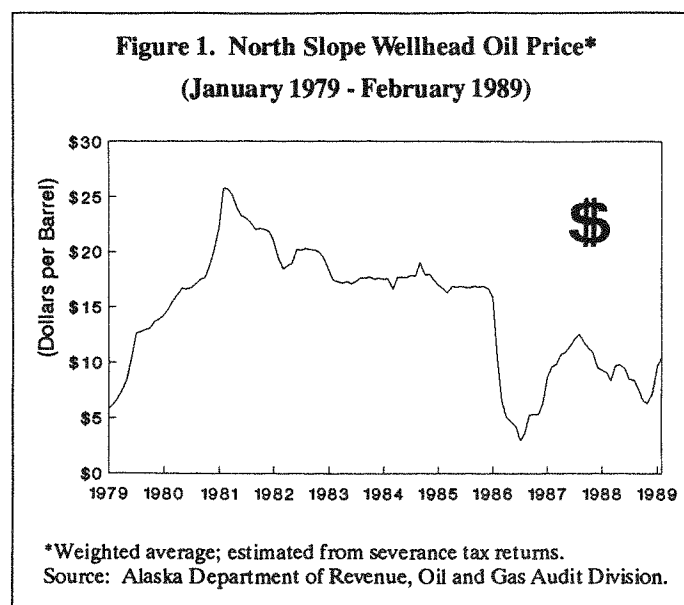


fuel, diesel, and gasoline, mostly for local markets. A little Cook Inlet oil and some refined products are exported to Japan.

Almost all gas produced on the North Slope is used in oil field operations; right now there's no market for the huge quantities of gas known to exist in the region. Most of the gas currently produced in Cook Inlet is sold to utilities in southcentral Alaska. Some is liquefied and shipped to Japan; some is processed into fertilizer.

Oil and Gas Prices

Figure 1 shows the wellhead price of North Slope crude from 1979 through early 1989. (The wellhead price is the price producers get, minus the cost of transporting the oil to market. For North Slope oil, that cost—the tariff—declined from \$6 a barrel early in the decade to about \$3 per barrel in the late 1980s, when a legal dispute over the tariff was settled.)



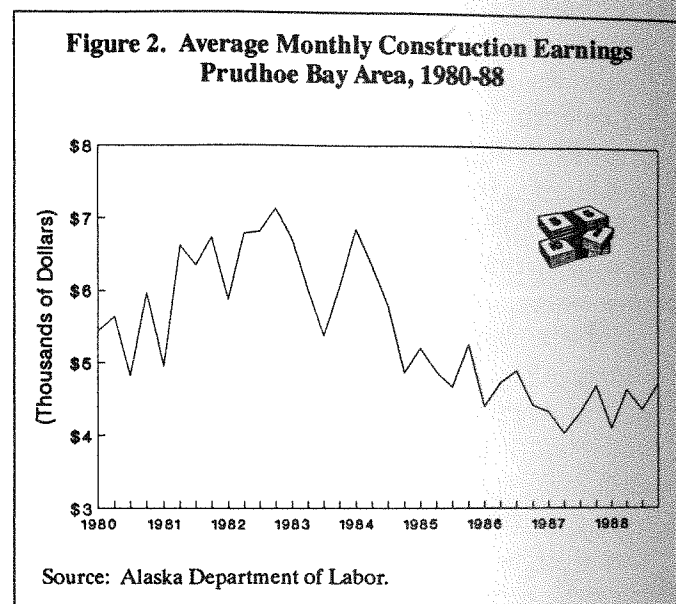
The wellhead value of North Slope oil was about \$5 per barrel in 1979. It skyrocketed to \$25 a barrel by 1981 and then crashed below \$5 per barrel in early 1986. Since 1986, prices have fluctuated, recovering somewhat from their 1986 lows.

Wellhead prices for Cook Inlet gas stayed at about 70 cents per thousand cubic feet (Mcf) from 1979 through 1986 because the producers

had long-term, fixed-price contracts with utility companies in southcentral Alaska. Since those contracts expired, Cook Inlet wellhead prices have gone up to around \$1.30 per Mcf.

Costs of Business

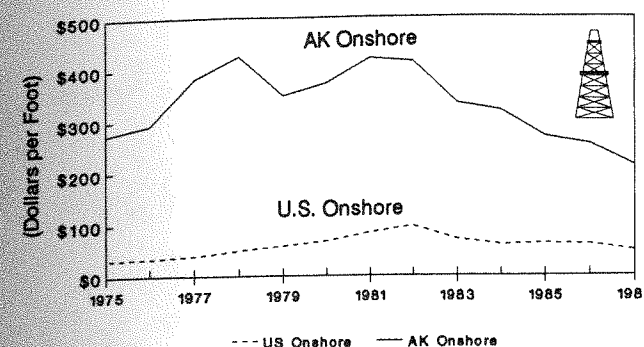
Wages are an important cost of business, and petroleum industry wages in Alaska rose from an annual average of \$20,000 in 1974 to around \$60,000 in the late 1980s. Average earnings of construction workers in the Prudhoe Bay area, by contrast, peaked at about \$7,000 per month in 1983 and then fell 40 percent before stabilizing in 1988. (Figure 2.)



Alaska drilling costs, another major cost of business, averaged more than \$400 a foot in the early 1980s, but dropped sharply—to just over \$200 a foot—by 1987. Alaska onshore drilling costs remain substantially above the U.S. average, which was about \$50 a foot in 1987. (Figure 3.)

Severance taxes—another cost of business—are the main state tax on the petroleum industry, but we can't calculate an average tax rate. Tax rates are based on a formula (the Economic Limit Factor, or ELF) that uses average production per well and total production to determine the tax rate for any given field. Oil and gas have different tax rates and different ELFs.

Figure 3. Estimated Average Drilling Costs United States and Alaska 1975 - 1987



Source: Joint Association Survey on Drilling Costs, American Petroleum Institute.

Production

Alaska oil production began in the Cook Inlet fields in 1959, peaked at 80 million barrels a day in 1970, and declined to 16 million barrels a day by 1988. (Figure 4.) Prudhoe Bay oil began flowing through the trans-Alaska pipeline in 1977, and production climbed steadily to 720 million barrels in 1988, with Prudhoe Bay oil being augmented by production from Kuparuk, Endicott, and other smaller fields developed in the 1980s. Production from the Prudhoe Bay field, which accounts for most of the current North Slope production, has begun to decline and will continue to drop over the next several decades.

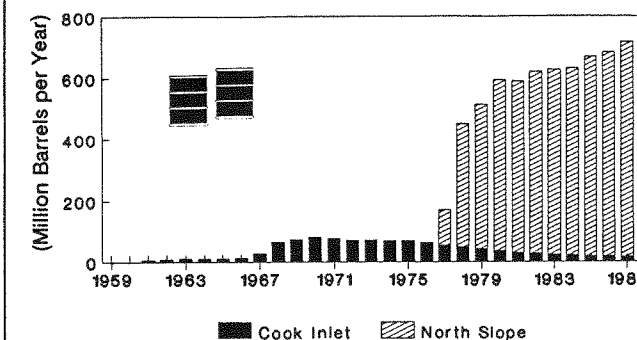
About 20 million cubic feet of Cook Inlet natural gas per month were sold in the late 1980s.

When Alaska production started in 1959, there were only a few hundred people with jobs in petroleum extraction. That number had climbed to around 8,000 by the 1980s, and it has been fairly constant in recent years, despite lower oil prices.

Exploration and Development

The oil companies have slashed Alaska exploration and development expenditures in the past few years, but lower oil prices are only part of the explanation.

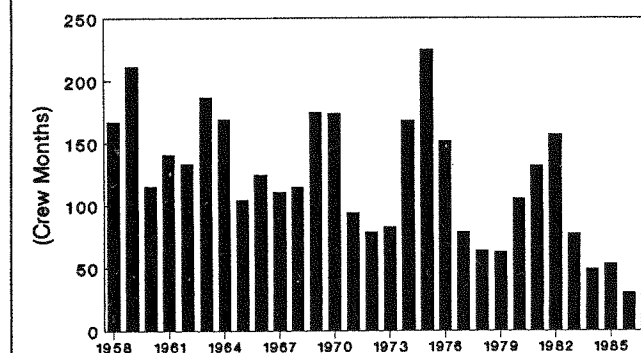
Figure 4. Annual Crude Oil Production Cook Inlet and North Slope Regions 1959 - 1988



Alaska Oil and Gas Conservation Commission, Statistical Reports and Bulletin.

In the 1960s there was substantial exploration in the Cook Inlet area, and exploration on the North Slope was growing steadily. In the 1970s and early 1980s oil companies did substantial exploration in advance of federal lease sales on the Outer Continental Shelf (OCS). By the late 1980s exploration was down in all areas—but even when oil prices were at their lowest there was still at least some exploration. (Figure 5.)

Figure 5. Alaska Petroleum Exploration (Geological and Geophysical) 1958 - 1987



Note: For 1981-86 includes only geophysical crew-months. We calculate crew-months by multiplying the number of crews at work by months they spend in the field. Source: American Association of Petroleum Geologists.

Most wells drilled throughout the 1970s and 1980s were development wells. A handful of OCS exploratory wells were drilled in that period, and in each year there were some onshore exploratory wells – although very few lately. Drilling was highest in the first half of the 1980s, when oil prices were at their peak and the oil companies were developing Kuparuk and other fields adjacent to Prudhoe Bay.

Finally, another sign of development activity is the number of people hired to build development facilities. Figure 6 shows that construction employment in the Prudhoe Bay area peaked at nearly 4,000 in 1983, when various big development projects were underway. After that construction employment plummeted so that by 1988 there were just a few hundred workers. Part

of that drop is certainly the result of lower oil prices, but in part it means that all the major fields the oil companies know about and feel are profitable to develop right now have been developed.

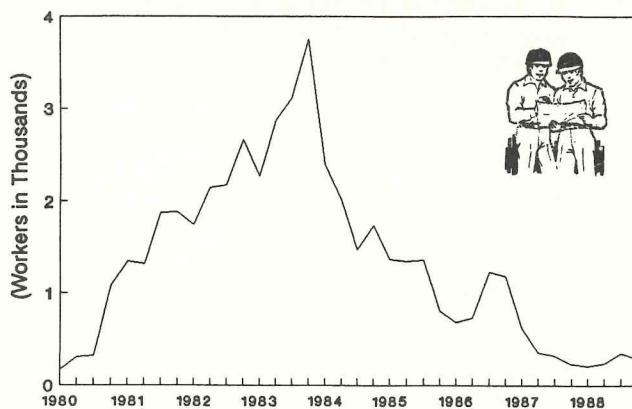
Processing

Earlier we described petroleum processing for Alaska markets. A portion of Cook Inlet oil and some refined oil products – heavy residual oil, for example – are exported. All the liquefied natural gas (LNG) and most of the fertilizer produced in Alaska are exported to Japan. The value of those exports has been between \$300 and \$400 million dollars a year in the late 1980s.

Summary

Alaska's petroleum industry has been resilient as it faced low and fluctuating oil prices in recent years. It has brought new North Slope fields on line and held industry employment fairly steady because construction wages and drilling costs have fallen. Some exploration and development has continued, but at a much lower level than in the early 1980s.

Figure 6. Average Monthly Construction Employment Prudhoe Bay Area, 1980 - 1988



Source: Alaska Department of Labor.

Editor's note: ISER is preparing a series of reports on Alaska economic sectors for the Alaska Department of Commerce and Economic Development and the Alaska Industrial Development and Export Authority. These reports will be available from the Department of Commerce and Economic Development.

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